Cisco IT Elastic Infrastructure

Cisco IT wanted to increase the company's business agility by automating the ordering and provisioning of IT infrastructure and making it available as a standardized, cost-effective service. This goal led to the development of the Cisco IT Elastic Infrastructure Services (CITEIS) offering.

Enterprises are increasingly adopting the model of IT as a service as a way to reduce costs, increase IT efficiency, and improve development agility. Several common models have been developed for these services, from providing a fully equipped data center (DCaaS) to complex application hosting (Software as a Service or SaaS).

The CITEIS offerings cover two models of service delivery in the middle of that spectrum:

- Infrastructure as a Service (IaaS), which provides centralized compute, storage, and networking resources for a limited time or for ongoing use.
- Platform as a Service (PaaS), which builds upon IaaS by delivering a complete environment for application hosting, development, testing, and deployment.

CITEIS addresses the following customer needs:

- Finding alternatives to the high costs and complexity of IT infrastructure.
- Taking advantage of the efficiencies, cost-savings, and flexibility offered by virtualized IT infrastructure elements and services.
- Transforming from an IT organization focused on separate and isolated functions to a services-led organization to address the commercialization of IT. Internal users expect the same agility and service delivery from IT services as they receive from providers of public cloud services.
- Shortening time-to-capabilities for delivering IT services from weeks to minutes.

Solution

CITEIS is designed to provide a consumer-type IT experience to internal Cisco® users while maintaining governance and control over the infrastructure by Cisco IT. The CITEIS program encompasses:

- Catalog of standard IT infrastructure services and resources
- Self-service portal interface for users to order a CITEIS offering
- Policy-based controls over how CITEIS services and resources are allocated
- Process orchestration to automate service ordering, provisioning, modification, and deletion

CITEIS users, who come from Cisco IT, product business units, and development organizations, can choose from these offerings:

- CITEIS Virtual Data Center (VDC) subscription service: Used primarily by product development groups to

meet ongoing needs for IT infrastructure. These users can create their own application spaces on a secure and supported VDC platform.

- CITEIS Express service: An infrastructure "sandbox" designed to meet the needs of short-term development projects. This service, which can be used for as little as one hour or as long as 90 days, is available to anyone with a Cisco user ID and is used primarily for testing and proof-of-concept projects.

Deployment

All CITEIS resources operate on the standard Cisco IT data center and network architectures. The CITEIS infrastructure is largely implemented by the Cisco IT operations teams, using traditional infrastructure deployment processes. (Figure 1)

All of the resources available to CITEIS users are contained within a single infrastructure, but the virtual resources allocated to individual users are separated by multitenant segmentation capabilities. These capabilities also protect the infrastructure from internal cross-contamination when one application or server experiences a problem.

For critical applications and development activities, dedicated pools of server resources and network bandwidth can be allocated within the CITEIS infrastructure.

Figure 1.   CITEIS Service Workflow
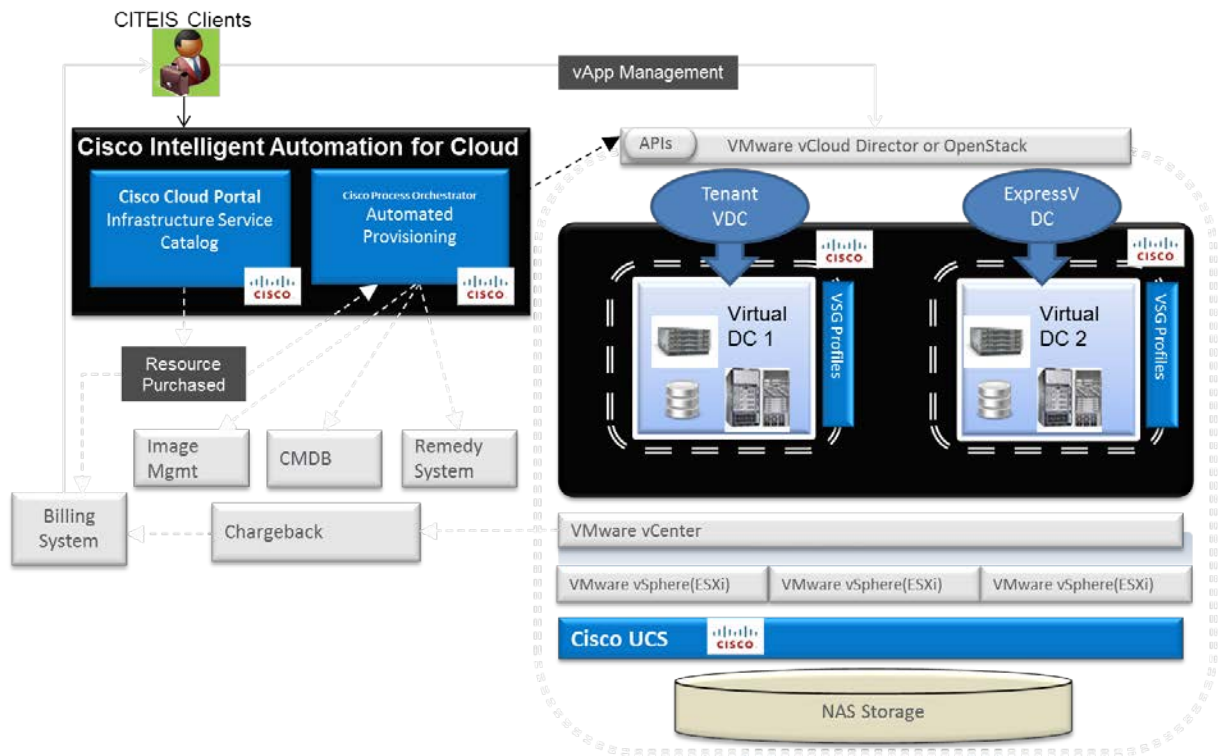
Cisco IT has realized the following benefits from offering CITEIS:

- 170,000 CITEIS requests provisioned in a little more than two years.
- Cisco employees can pursue more business opportunities more quickly, without lengthy delays for receiving IT resources.
- The time required for Cisco IT to order and provision a server resource has been reduced from 6-8 weeks to the service-level agreement (SLA) of 15 minutes, with actual delivery times as little as 6 minutes.
- Cisco IT reduced infrastructure total cost of ownership (TCO) by 61 percent in the two generations of CITEIS deployments because of standardized elements and services and better asset utilization. More savings are expected as more IT resources are virtualized and automated.
- CITEIS users can order the service through an easy web portal.
- Standard server provisioning is fully automated, which eliminates the delays and errors of manual provisioning.
- 90 percent of virtual machines provisioned by users are self-managed, which reduces the support burden on Cisco IT.
- Cisco IT experiences less over-provisioning of IT resources, because budget charges and the ability to order more resources if needed motivate users to make reasonable initial requests.
- CITEIS eliminates reasons for users to turn to external cloud services, with their associated costs and security risks.

Management

The CITEIS infrastructure elements are managed according to Cisco IT operations standards. In any development project, some infrastructure capacity and resources won't be fully utilized, even if they are reserved and paid for. To reduce this level of underutilization, the CITEIS team routinely oversubscribes the IT services and resources while continuing to monitor actual utilization to avoid affecting service performance.

Within a VDC (subscription model), the CITEIS and IT operations teams manage the infrastructure elements and services.

For the CITEIS Express model, the users allocate and manage their assigned resources based on their specific needs. The CITEIS team offers a basic level of support and a best-effort SLA.

Upgrades to the infrastructure elements and standard operating system (OS) images are maintained through standard Cisco IT processes. However, CITEIS users also have the option to self-manage their own OS images through a service platform.

For disaster recovery purposes, the CITEIS team has deployed Cisco Prime™ Services Orchestrator systems in two U.S. locations and one location in Europe. Additional systems can be added in other locations when needed to meet virtual infrastructure demands. At each location, the Orchestrator system is deployed as a passive/active pair for local redundancy, with the ability to redirect activity to another Orchestrator system in a different region as needed. The Cisco Prime Services Catalog system is installed only in one U.S. data center, in a highly resilient implementation.

The CITEIS service also relies on capabilities for resilience, high-availability, and load-balancing in VMware for

reducing server outages and for disaster recovery. And, the CITEIS offering benefits from the efforts of the Cisco IT data center and network groups to plan and manage disaster recovery resources and activities.

Service and Support

The CITEIS team performs initial triage on support cases to identify which can be handled by the team and which should be transferred to other Cisco IT support teams. Each support case is documented in and tracked by Cisco IT's standard case management tool.

CITEIS users have the option of signing up for IT support for managing their assigned infrastructure. As of early 2012, 90 percent of users had selected the self-managed option, which reduces the service management burden for Cisco IT.

Security

CITEIS relies on the security capabilities in the Cisco Nexus® 1000V switch, which is deployed with the Cisco Virtual Security Gateway virtual appliance. These capabilities allow the CITEIS team to manage separation of multiple tenants within the server infrastructure and to manage protection among virtual resources deployed in the demilitarized zone (DMZ) and on the Cisco internal network.

This multitenant design overcomes the scalability limitations of traditional separation within the physical network architecture by using techniques such as virtual LANs and access control lists. Inter-cloud security also helps the CITEIS team implement consistent security around the service.

Lessons Learned

Cisco IT has gained the following insights from its deployment of IT as a service through CITEIS:

- Prepare by virtualizing the server environment and implementing a wire-once server environment that eliminates the need to individually cable new servers.
- Use commercial, off-the-shelf components instead of developing software internally for tools such as the service catalog.
- Develop a complete operational model for the service early in the planning process. Map out every step for the service before activating it in production.
- Understand the expectations of your potential users for IaaS and PaaS.
- Start offering services for a limited set of resources. Make sure you can provision the simplest resource end-to-end before offering more complex resources.
- Make a simple user experience a high priority. Hide the complexities of the service offering by creating short, simple online forms for service ordering and provisioning.
- Calculate the TCO for the complete service environment to determine accurate costs for internal budget charges.

For More Information

Two case studies present Cisco's experience with implementing and delivering CITEIS:

- Private Cloud at Cisco: http://www.cisco.com/en/US/solutions/collateral/ns340/ns1176/data-center/cities_gen2_case_study.html
- Private Cloud Aids Software Upgrade: http://www.cisco.com/en/US/solutions/collateral/ns340/ns1176/data-center/Cisco_IT_Case_Study_Using_CITEIS_for_WebEx_Social_Upgrades_1.html

To read additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT www.cisco.com/go/ciscoit

Note

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