

Installing Operating Systems (VMware, Windows) with M.2 SSD's on UCS B200 M5

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Introduction

This document describes the installation of Operating Systems (VMware, Windows) with M.2 SSD's on UCS B200 M5

The Cisco UCS B200 M5 blade server has a mini-storage module option that plugs into a motherboard socket to provide additional internal storage. The mini-storage module can be one of the following types:

- An SD card module that supports up to two SD cards. (Uses UCS-MSTOR-SD cartridge)
- An M.2 SSD module that supports up to two SATA M.2 SSDs. (Uses UCS-MSTOR-M2 cartridge)

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Prerequisites

Requirements

- Understanding of UCS, policies and profiles

Components Used

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

UCSM 3.2.2b or higher

UCS B200 M5 (Server firmware 3.2.2b or higher)

Capability Catalog 3.2.3i or higher

Background Information

The M.2 cartridge consists of the UCS-MSTOR-M2 carrier holding the UCS-M2-XXXGB SATA drives

You can use one or two M.2 SSDs in the carrier.

M.2 socket 1 is on the top side of the carrier; M.2 socket 2 is on the underside of the carrier (the same side as the carrier's connector to the server board socket)

This is depicted in the pictures (both slots have been populated with M.2 SSD drives)



Top side (slot 1)
(slot 2)

Underside

M.2 UCS-MSTOR-M2 inventory in UCSM

- < General
 - Inventory
 - Virtual Machines
 - Installed Firmware
 - CIMC Sessions
 - SEL Logs
 - VIF Paths
 - Health
-
- Motherboard
 - CIMC
 - CPUs
 - GPUs
 - Memory
 - Adapters
 - HBAs
 - NICs
 - iSCSI vNICs
 - Security
 - S

⊖ Mini Storage

mini-storage-M2-1

ID : 1

Model : UCS-MSTOR-M2

Type : M2

Vendor : Cisco Systems Inc

Revision : 0

Serial :

VID : V01

Part Number : 73-17926-05

Product Name : Cisco UCS Mini-Storage Carrier for M.2

Caption : Cisco UCS Mini-Storage Carrier for M.2 (holds up to 2)

Description : Dual M.2 Mini-Storage Carrier (holds up to 2 M.2 modules)

Controller ID : 1

Controller Type : PCH

Any addition or removal of the disks will be updated to UCSM inventory only after a re-acknowledgement of the server as there is no CIMC sensor for the PCH controller and the M.2 Sata drives.

The UCSM will warn you about any hardware changes to the mini storage and will also request that you re-acknowledge the server.

Properties

Affected object : **sys/chassis-1/blade-7/board/mini-storage-M2-1/inv-status**

Description : **Mini storage inventory mismatch**

ID : 13155391	Type : equipment
Cause : hardware-mismatch	Created at : 2018-09-26T17:13:58Z
Code : F1901	Number of Occurrences : 1
Original severity : Critical	
Previous severity : Critical	Highest severity : Critical

Properties

Affected object	: sys/chassis-1/blade-7		
Description	: Server 1/7 hardware inventory mismatch. Acknowledge the server to clear the fault		
ID	: 13155390	Type	: equipment
Cause	: hardware-inventory-mismatch	Created at	: 2018-09-26T17:13:58Z
Code	: F1913	Number of Occurrences	: 1
Original severity	: Critical		
Previous severity	: Critical	Highest severity	: Critical

After the server has been re-acknowledged the storage inventory should update (In this case, a M.2 ssd was added in slot 2).

Equipment / Chassis / Chassis 1 / Servers / Server 7

General | **Inventory** | Virtual Machines | Installed Firmware | CIMC Sessions | SEL Logs | VIF Paths | Health | Diagnostics | Faults | Events | FSM | Statistics | Temperatures | Power

Motherboard | CIMC | CPUs | GPUs | Memory | Adapters | HBAs | NICs | iSCSI vNICs | Security | **Storage**

Controller | LUNs | **Disks**

+ - Advanced Filter Export Print

Name	Size (MB)	Serial	Operability	Drive State	Presence	Technology	Bootable
Storage Controller PCH 1							
Disk 1	227927	17191708379C	Operable	Online	Equipped	SSD	Unknown
Disk 2	227927	173819147CCD	Operable	Online	Equipped	SSD	Unknown
Storage Controller SAS 1							

Configure

The onboard Lewisburg sSATA controller is used to manage both types of M.2 cartridges but does not manage any front panel drives.

The PCH controller operates in AHCI mode or SWRAID mode.

AHCI Mode: Disks are presented as JBOD disks.

SWRAID Mode: Disks can either be in RAID0 or RAID1 based on user configuration in policy.

Desired Raid	BIOS P-SATA Setting	Storage Profile Controller Definition Setting	Notes
RAID0, RAID1	SWRAID	RAID0 OR RAID 1	Only UEFI boot supported. OS requires megasr driver.
JBOD	Disabled	NORAID	Legacy or UEFI boot

VMware ESX/ESXi operating system is not supported with the embedded SATA MegaRAID controller in SW RAID mode, as VMWare does not have a software raid driver. You can use VMWare in AHCI mode.

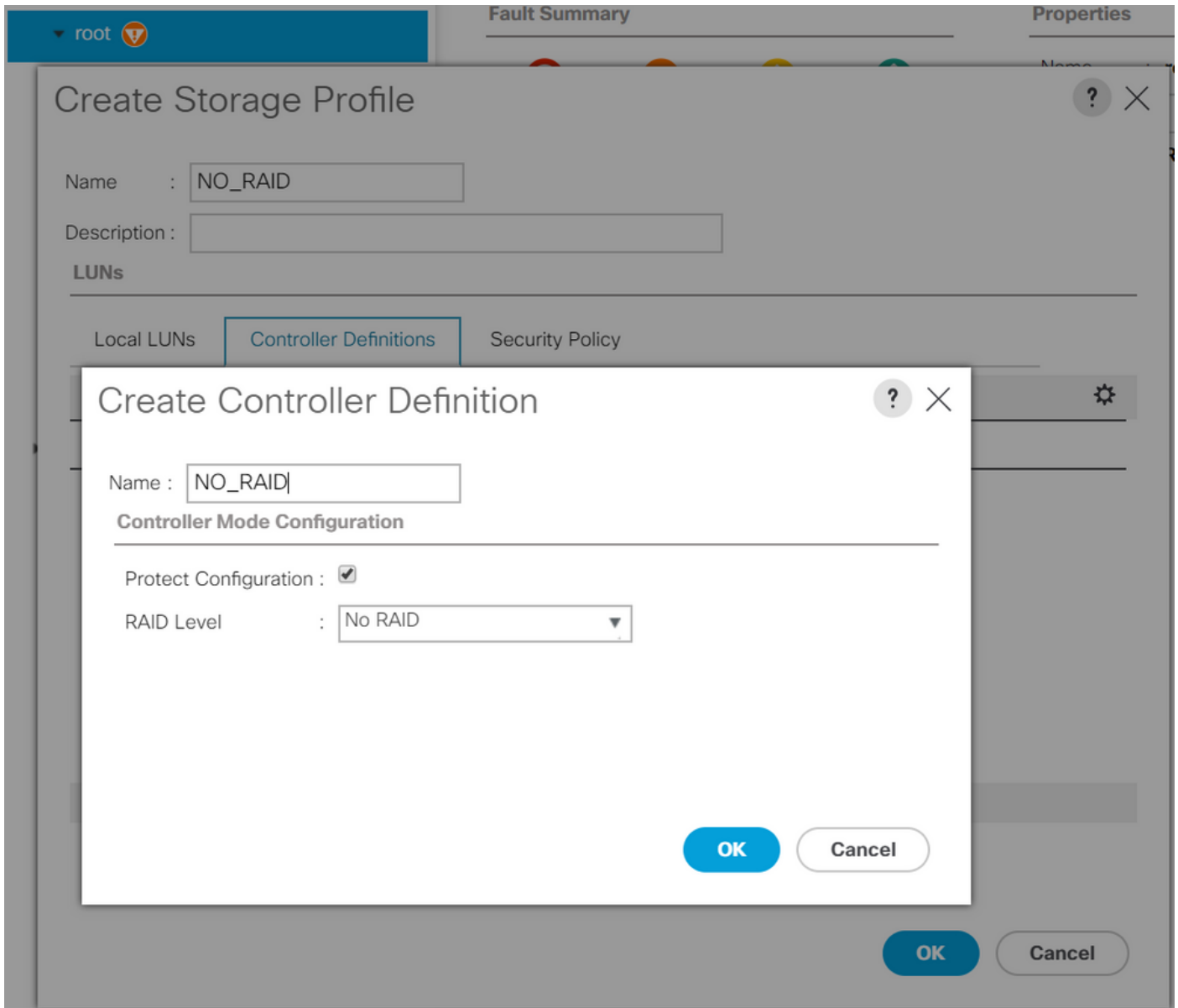
Microsoft Windows Server 2016 Hyper-V hypervisor is supported for use with the embedded MegaRAID controller in SW RAID mode, but all other hypervisors are not supported.

All Hypervisors are supported in AHCI mode.

AHCI Mode

This is an example of installing VMware ESXi with the PCH controller in AHCI Mode.

Create a Storage Profile with RAID Level set to No RAID.



Create a BIOS Policy with P-SATA mode set to AHCI

BIOS Policy



Main Advanced **Boot Options** Server Management Events

Advanced Filter Export Print



BIOS Setting	Value
Cool Down Time (sec)	Platform Default
Number of Retries	Platform Default
Boot option retry	Platform Default
SAS RAID module	Platform Default
SAS RAID	Platform Default
Onboard SCU Storage Support	Platform Default
P-SATA mode	AHCI
Power On Password	Platform Default
IPV6 PXE Support	Platform Default

Create a Boot Policy

Set the Boot Mode to UEFI

Select "Add CD/DVD"

Select "Add Embedded Local Disk"

Create Boot Policy



Name : AHCI_Boot

Description :

Reboot on Boot Order Change :

Enforce vNIC/vHBA/iSCSI Name :

Boot Mode : Legacy Uefi

Boot Security :

WARNINGS:

The type (primary/secondary) does not indicate a boot order presence.

The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.

If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.

If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Local Devices

Add Local Disk

- Add Local LUN
- Add Local JBOD
- Add SD Card
- Add Internal USB
- Add External USB
- Add Embedded Local LUN
- Add Embedded Local Disk

Add CD/DVD

- Add Local CD/DVD
- Add Remote CD/DVD

Boot Order

+ - Advanced Filter Export Print

Name	Or...	vNIC/...	Type	LUN ...	WWN	Slot N...	Boot ...	Boot ...	Descri...
CD/DVD	1								
Embedded Disk	2								
Embedded Disk Image			Primary			1			

Move Up Move Down Delete

Set Uefi Boot Parameters

Select the appropriate options from the "Add Embedded Local Disk" section

If "Any" is chosen, then the default order is Disk1, Disk2

Add Embedded Local Disk



Type : Primary Secondary Any

Disk Slot Number :

OK

Cancel

Specify the Uefi Boot Parameters

Set Uefi Boot Parameters

Uefi Boot Parameters

Boot Loader Name :

Boot Loader Path :

Boot Loader Description :

Assign the BIOS Policy you created earlier to the Service Profile

Servers / Service Profiles / root / Service Profile M.2_AHCI

General Storage Network iSCSI vNICs vMedia Policy Boot Order Virtual Machines FC Zones **Policies** Server Details CIMC Sessions FSM V

Actions

- Change Serial over LAN Policy
- Change Power Sync Policy

Policies

BIOS Policy

BIOS Policy:

BIOS Policy Instance : org-root/bios-prof-AHCI

Assign the Storage Profile you created earlier to the Service Profile

Servers / Service Profiles / root / Service Profile M.2_AHCI

- General
 - Storage**
 - Network
 - iSCSI vNICs
 - vMedia Policy
 - Boot Order
 - Virtual Machines
-
- Storage Profiles**
 - Local Disk Configuration Policy
 - vHBAs
 - vHBA Initiator Groups

Actions

Modify Storage Profile

Storage Profile Policy

Name : **AHCI_SP**
 Description :
 Storage Profile Instance : [org-root/profile-AHCI_SP](#)

- Local LUNs
- Controller Definitions**
- Security Policy
- Faults

Advanced Filter Export Print

Name

NO_RAID

UCSM view of embedded PCH controller in AHCI mode

General **Inventory** Virtual Machines Installed Firmware CIMC Sessions SEL Logs VIF Paths Health Diagnostics Faults Events FSM Statistics Temperatures

Motherboard CIMC CPUs GPUs Memory Adapters HBAs NICs iSCSI vNICs Security **Storage**

Controller **LUNs** Disks

+ - Advanced Filter Export Print

Name	ID	Type	Subtype
Storage Controller PCH 1	1	PCH	NA

General **FSM** Faults Events Statistics

Actions

Import Foreign Configuration	ID	: 1	Name	: Lewisburg SSATA Controller [AHCI mode]
Clear Foreign Configuration	Description	: Lewisburg SSATA Controller [AHCI mode]	PID	: N/A
Clear Boot Configuration	Model	: Lewisburg SSATA Controller [AHCI mode]	Serial	: LSIROMB-0
Cancel Storage Operations	Revision	: N/A	Vendor	: Intel Corp.
Unpin Cache	Subtype	: NA	PCI Slot	:
Unlock Disk	RAID Support	: RAID0, RAID1	Rebuild Rate	: N/A
Unlock For Remote	OOB Interface Supported	: No		
Modify Remote Key	PCI Address	: 00:17.5		
Disable Security	Number of Local Disks	: 2		
	Pinned Cache Status	: Unknown		

This is the view from F2 BIOS menu

Notice the pSATA is set to AHCI

LOM and PCIe Slots Configuration

Current Boot Mode	UEFI
SecureBoot Support	Disabled

SWRAID Configuration	
pSATA SATA OpROM	[AHCI]
M.2 SATA OpROM	[AHCI]

LOM and PCIe Slots Configuration

- ▶ PCIe Slots Inventory Details
- ▶ PCIe Link Speed Configuration
- ▶ PCI OpROM Configuration

Notice the UEFI policy is named VMware ESXi (specified in our boot policy earlier)

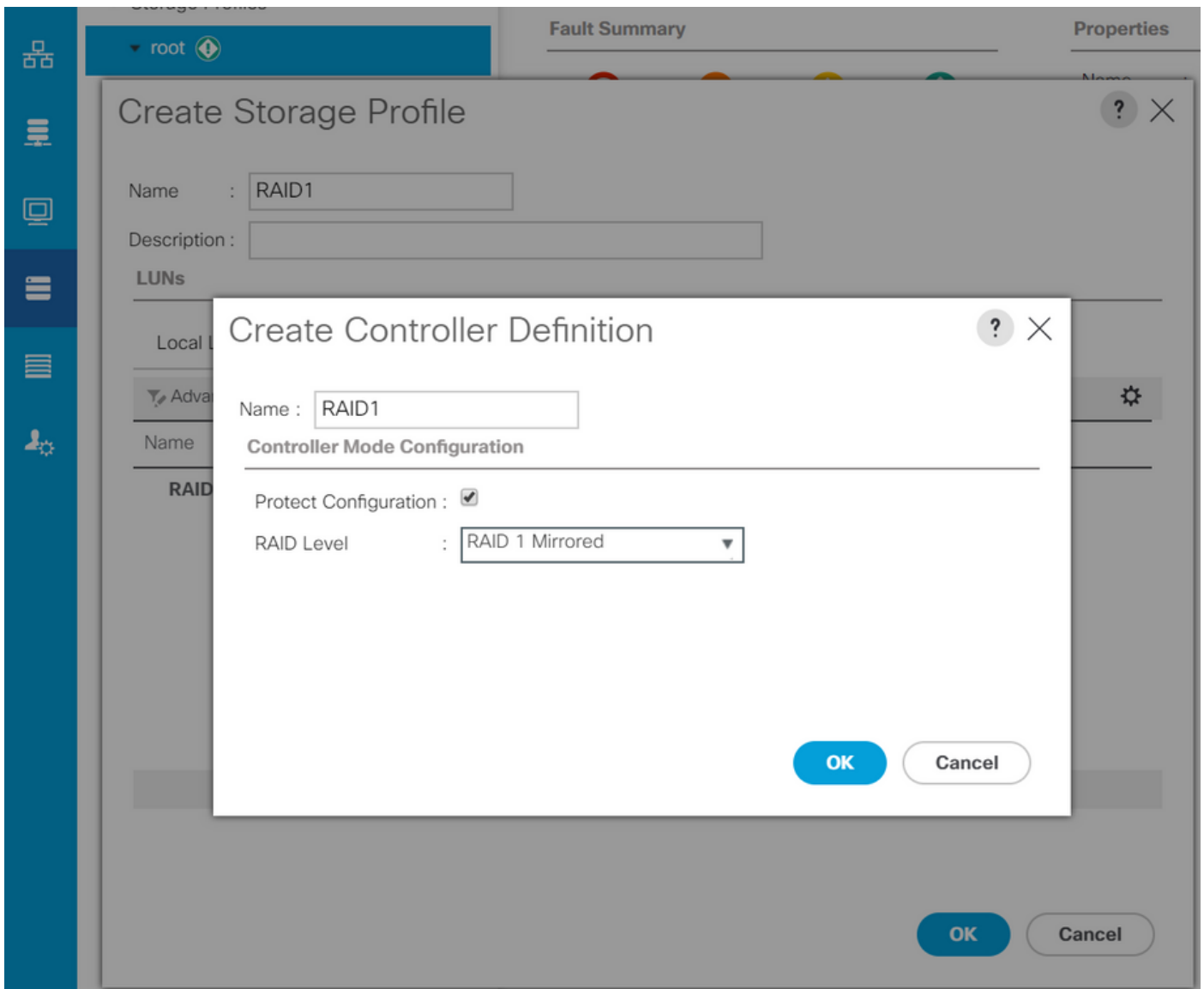
Main Advanced Server Mgmt Boot Options Save & Exit

Boot Configuration	
Setup Prompt Timeout	3
Bootup NumLock State	[On]
SecureBoot Support	Disabled
Boot Mode	[UEFI Mode]
CDN Control	[Disabled]
Boot Option Priorities	
Boot Option #1	[VMware ESXi]
Boot Option #2	[UEFI: Built-in EFI Shell]
Boot Option #3	[Disabled]

SWRAID Mode

This is an example of installing Microsoft Windows Server 2016 with the PCH controller in SWRAID Mode

Create a Storage Profile with RAID Level set to RAID1 for redundancy.



Create a BIOS Policy with P-SATA mode set to SWRAID

BIOS Policy

Main Advanced **Boot Options** Server Management Events

Advanced Filter Export Print

BIOS Setting	Value
Cool Down Time (sec)	Platform Default
Number of Retries	Platform Default
Boot option retry	Platform Default
SAS RAID module	Platform Default
SAS RAID	Platform Default
Onboard SCU Storage Support	Platform Default
P-SATA mode	LSI SW RAID
Power On Password	Platform Default
IPV6 PXE Support	Platform Default

+ Add - Delete i Info

OK Apply Cancel Help

Create a Boot Policy

Set the Boot Mode to UEFI

Select "Add CD/DVD"

Select "Add Embedded Local LUN"

Create Boot Policy



Name :

Description :

Reboot on Boot Order Change :

Enforce vNIC/vHBA/iSCSI Name :

Boot Mode : Legacy Uefi

Boot Security :

WARNINGS:

The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Local Devices

- Add Local Disk
 - Add Local LUN
 - Add Local JBOD
 - Add SD Card
 - Add Internal USB
 - Add External USB
 - Add Embedded Local LUN
 - Add Embedded Local Disk
- Add CD/DVD
 - Add Local CD/DVD
 - Add Remote CD/DVD

Boot Order

+ - Advanced Filter Export Print

Name	Order	vNIC/vH...	Type	LUN Na...	WWN	Slot Nu...	Boot Na...	Boot Path	Descript...
CD/...	1								
Emb...	2								

Move Up Move Down Delete

Set Uefi Boot Parameters

Specify the UEFI Boot Paramaters

Global Boot Policy

Name : **embeddedlun**
 Boot Policy Instance : org-ro
 Description :
 Reboot on Boot Order Change : **No**
 Enforce vNIC/vHBA/iSCSI Name : **Yes**
 Boot Mode : **Uefi**
 Boot Security : **No**

WARNINGS:
 The type (primary/secondary) does not indicate the effective order of boot devices within the policy.
 If **Enforce vNIC/vHBA/iSCSI Name** is selected, the vNICs/vHBAs are selected based on the policy.
 If it is not selected, the vNICs/vHBAs are selected based on the server configuration.

Boot Order

+ - Advanced Filter Export

Name	Order
CD/DVD	1
Embedded LUN	2

uefi-boot-param

Create iSCSI vNIC Set iSCSI Boot Parameters **Modify Uefi Boot Parameters**

Modify Uefi Boot Parameters ? X

Uefi Boot Parameters

Boot Loader Name :

Boot Loader Path :

Boot Loader Description :

OK Cancel

Assign the BIOS Policy you created earlier to the Service Profile

iSCSI vNICs vMedia Policy Boot Order Virtual Machines FC Zones **Policies** Server Details

Policies

⊖ BIOS Policy

BIOS Policy: [Create BIOS Policy](#)

Assign the Storage Profile you created earlier to the Service Profile

Properties for: Service Profile embeddedlun

< General **Storage** Network iSCSI vNICs vMedia Policy

Storage Profiles Local Disk Configuration Policy vHBAs vHBA Init

Actions

[Modify Storage Profile](#)

Storage Profile Policy

Name : |
Description :
Storage Profile Instance : |

Local LUNs **Controller Definitions** Security Policy Faults

Advanced Filter Export Print

Name

RAID1

UCSM view of embedded PCH controller in SWRAID mode

General Inventory Virtual Machines Installed Firmware CIMC Sessions SEL Logs VIF Paths Health Diagnostics Faults Events FSM Statistics Temperatures Power

Motherboard CIMC CPUs GPUs Memory Adapters HBAs NICs iSCSI vNICs Security Storage

Controller LUNs Disks

+ - Advanced Filter Export Print

Name	ID	Type	Subtype
Storage Controller PCH 1	1	PCH	NA
Storage Controller SAS 1	1	SAS	NA

General FSM Faults Events Statistics

Actions

Import Foreign Configuration	ID : 1	Name : Lewisburg SSATA Controller [SWRAID mode]
Clear Foreign Configuration	Description : Lewisburg SSATA Controller [SWRAID mode]	PID : N/A
Clear Boot Configuration	Model : Lewisburg SSATA Controller [SWRAID mode]	Serial : LSIROMB-0
Cancel Storage Operations	Revision : NA	Vendor : Intel Corp.
Unpin Cache	Subtype : NA	RAID Support : RAID0, RAID1
Unlock Disk	RAID Support : RAID0, RAID1	OOB Interface Supported : No
Unlock For Remote	OOB Interface Supported : No	PCI Address : 00:17.5
Modify Remote Key	PCI Address : 00:17.5	Number of Local Disks : 2
Disable Security	Number of Local Disks : 2	Rebuild Rate : N/A
	Pinned Cache Status : Unknown	

This is the view from F2 BIOS menu

Notice the pSATA is set to AHCI

LOM and PCIe Slots Configuration

```

Current Boot Mode                UEFI
SecureBoot Support                Disabled

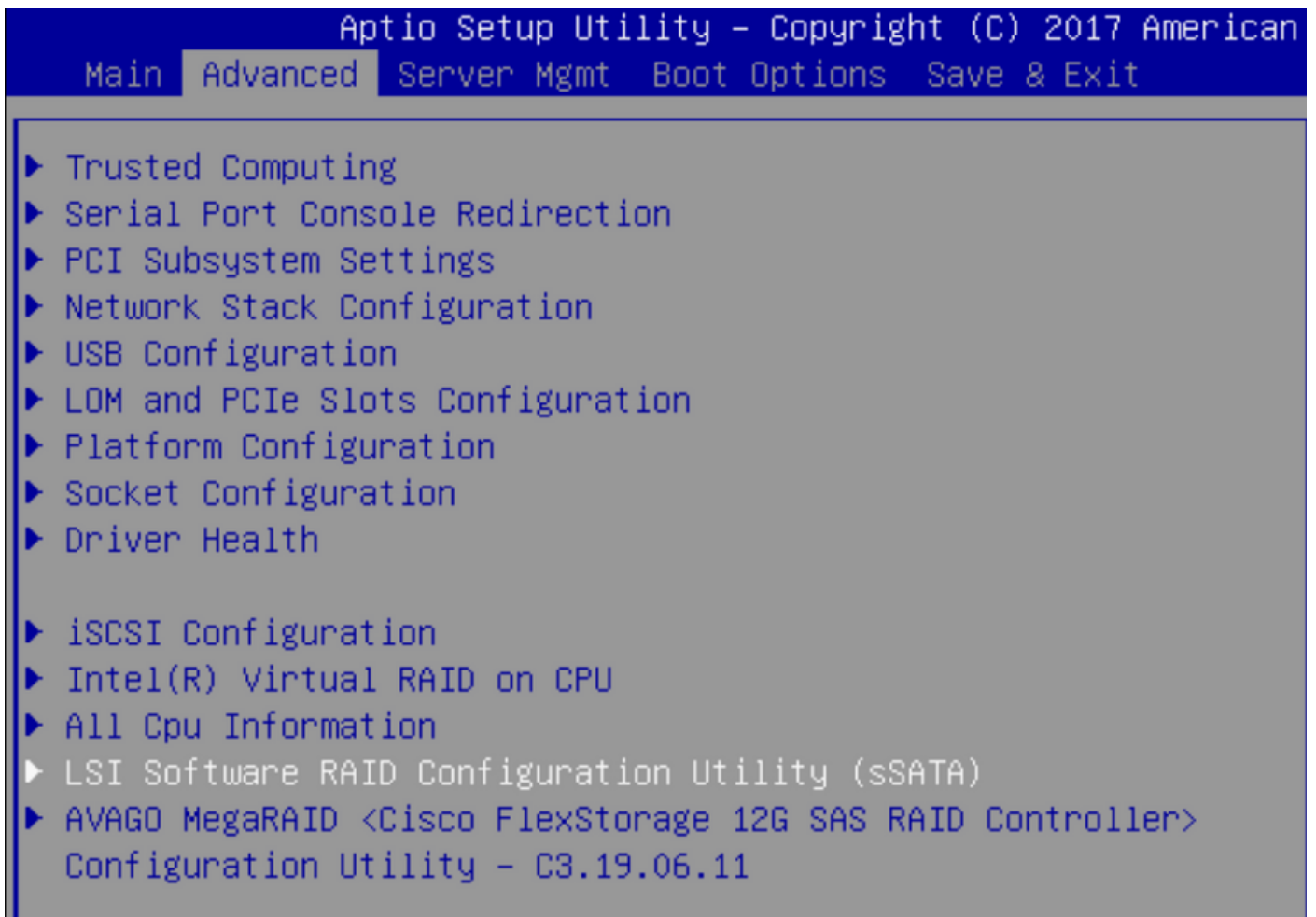
SWRAID Configuration
pSATA SATA OpROM                [LSI SW RAID]
M.2 SATA OpROM                  [LSI SW RAID]

LOM and PCIe Slots Configuration

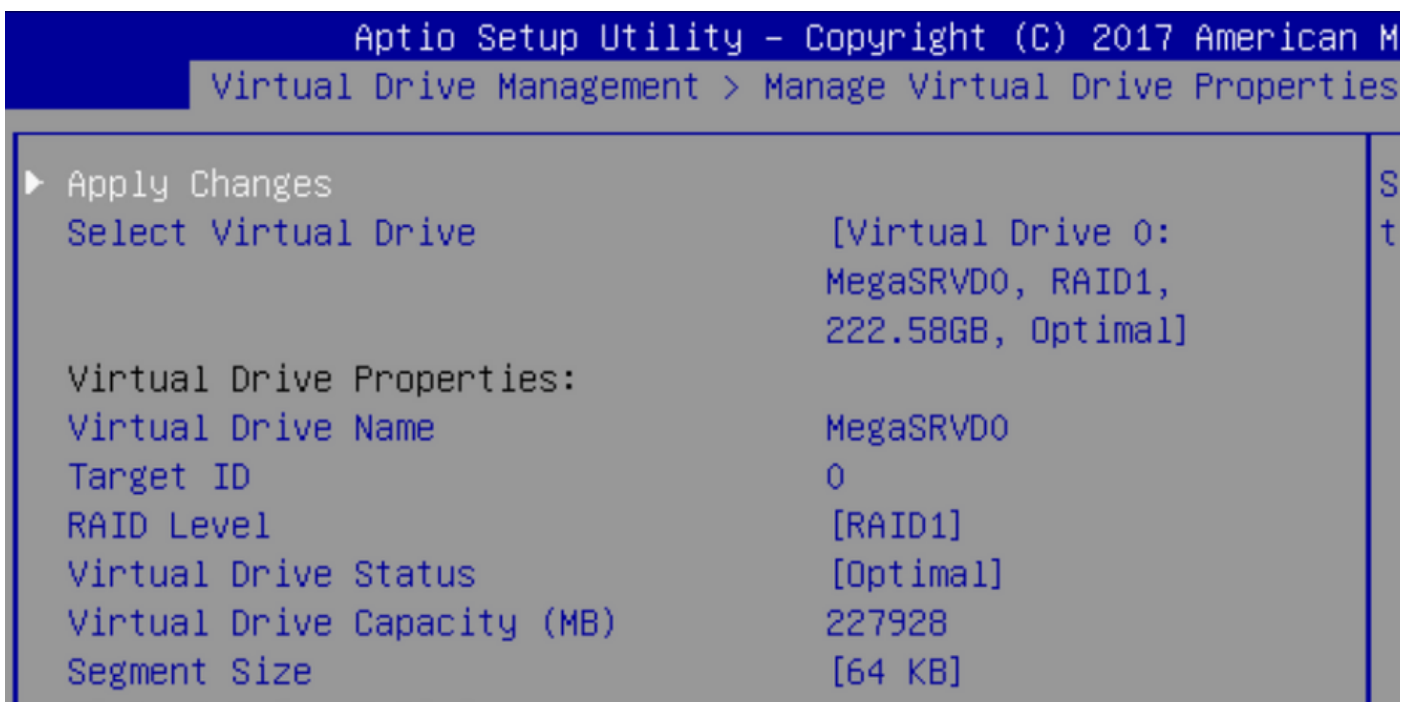
▶ PCIe Slots Inventory Details
▶ PCIe Link Speed Configuration
▶ PCI OpROM Configuration

```

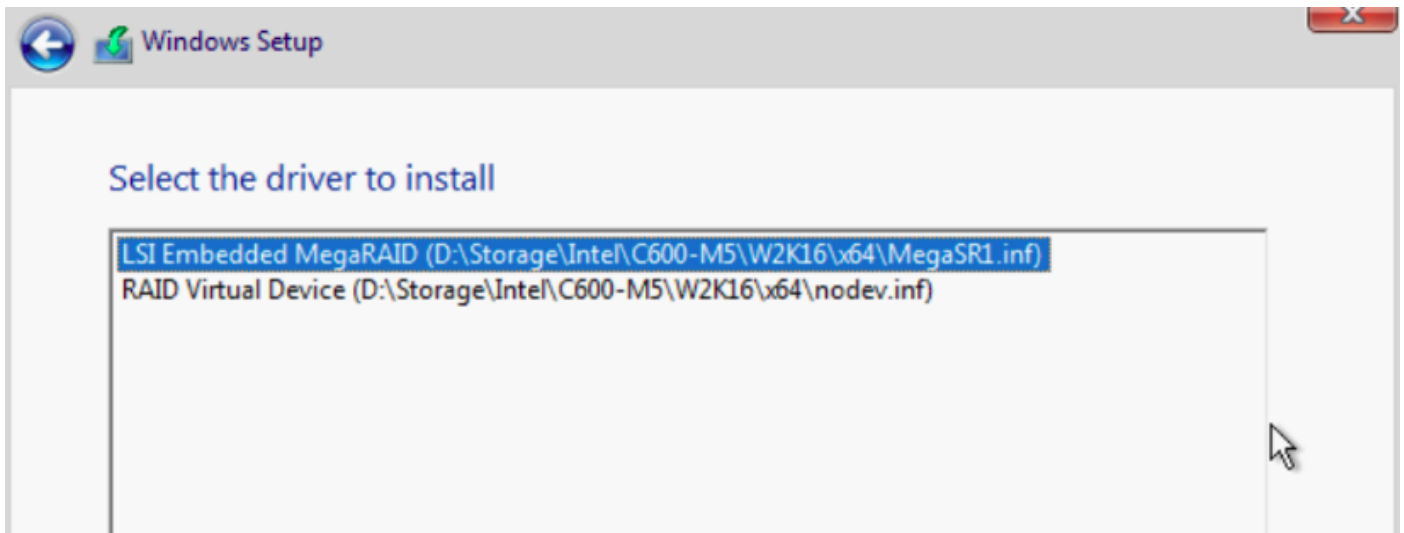
Notice the LSI Software RAID Configuration Utility (sSATA) show up



We can confirm that the Virtual Drive is set to RAID1 in BIOS

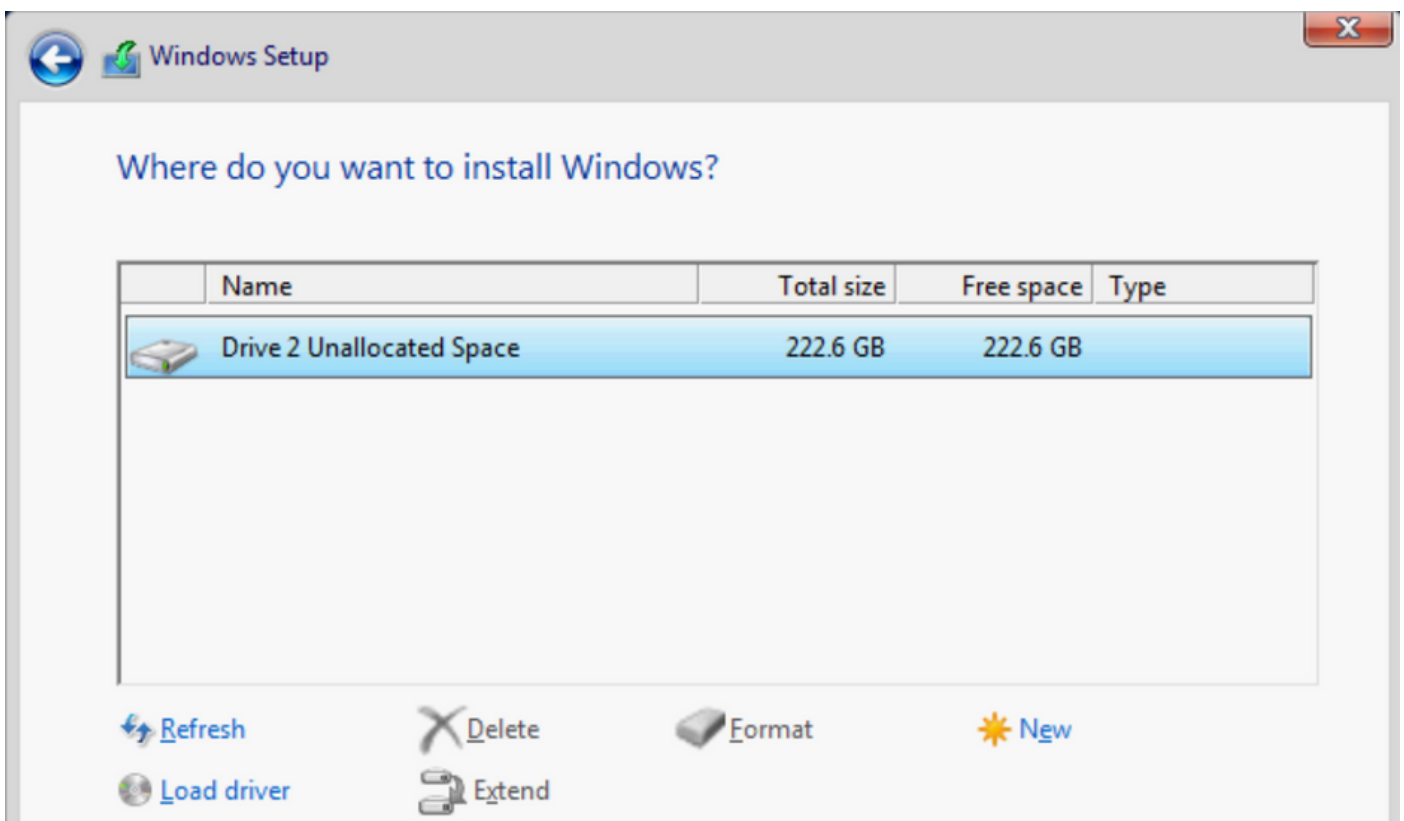


After you map the Windows Operating System, when you reach the section to install the driver, browse the contents of the drivers folders to the location of the embedded MegaRAID drivers: Storage/Intel/C600-M5/<OS>/

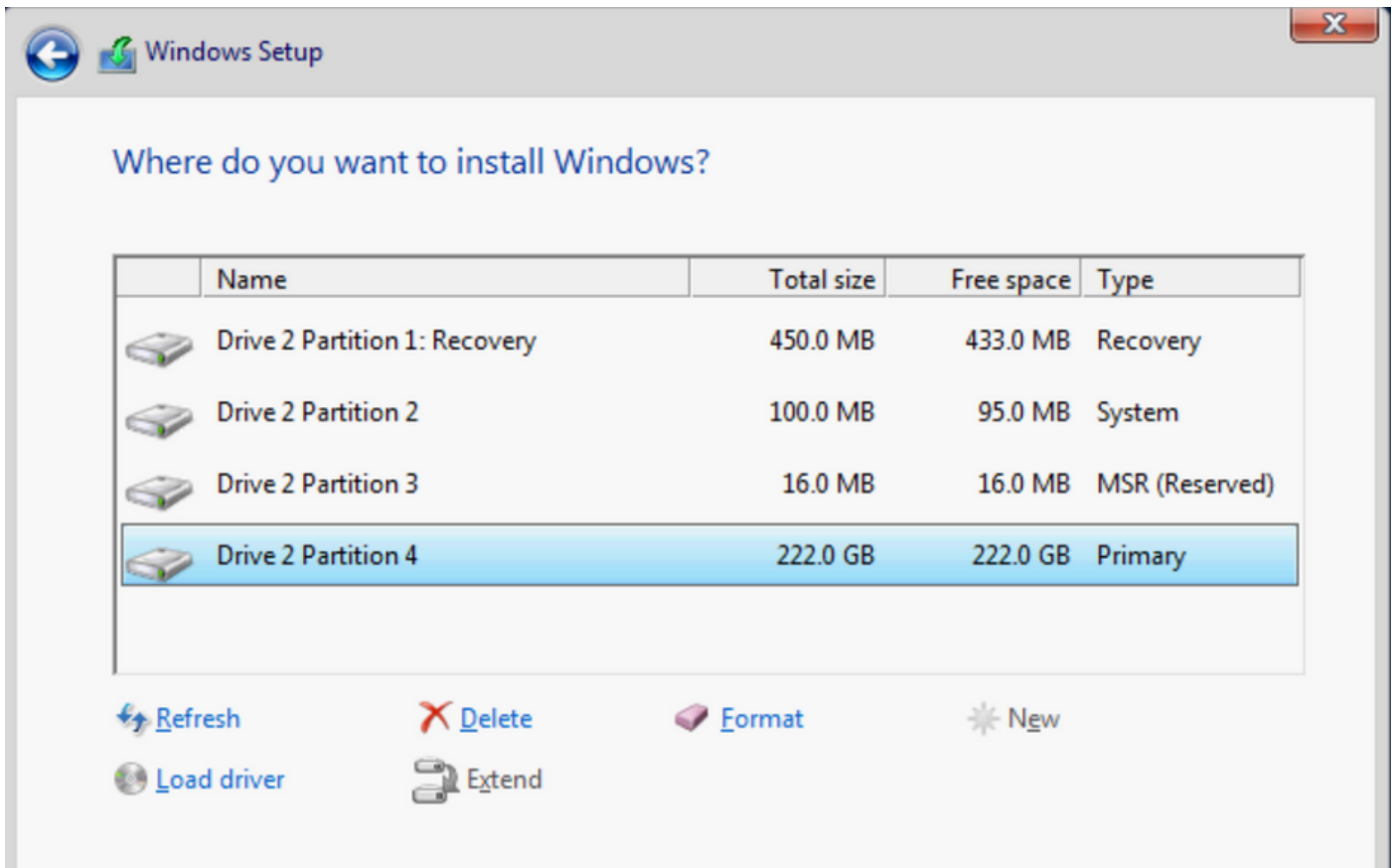


We should be able to detect the Virtual Drive we created

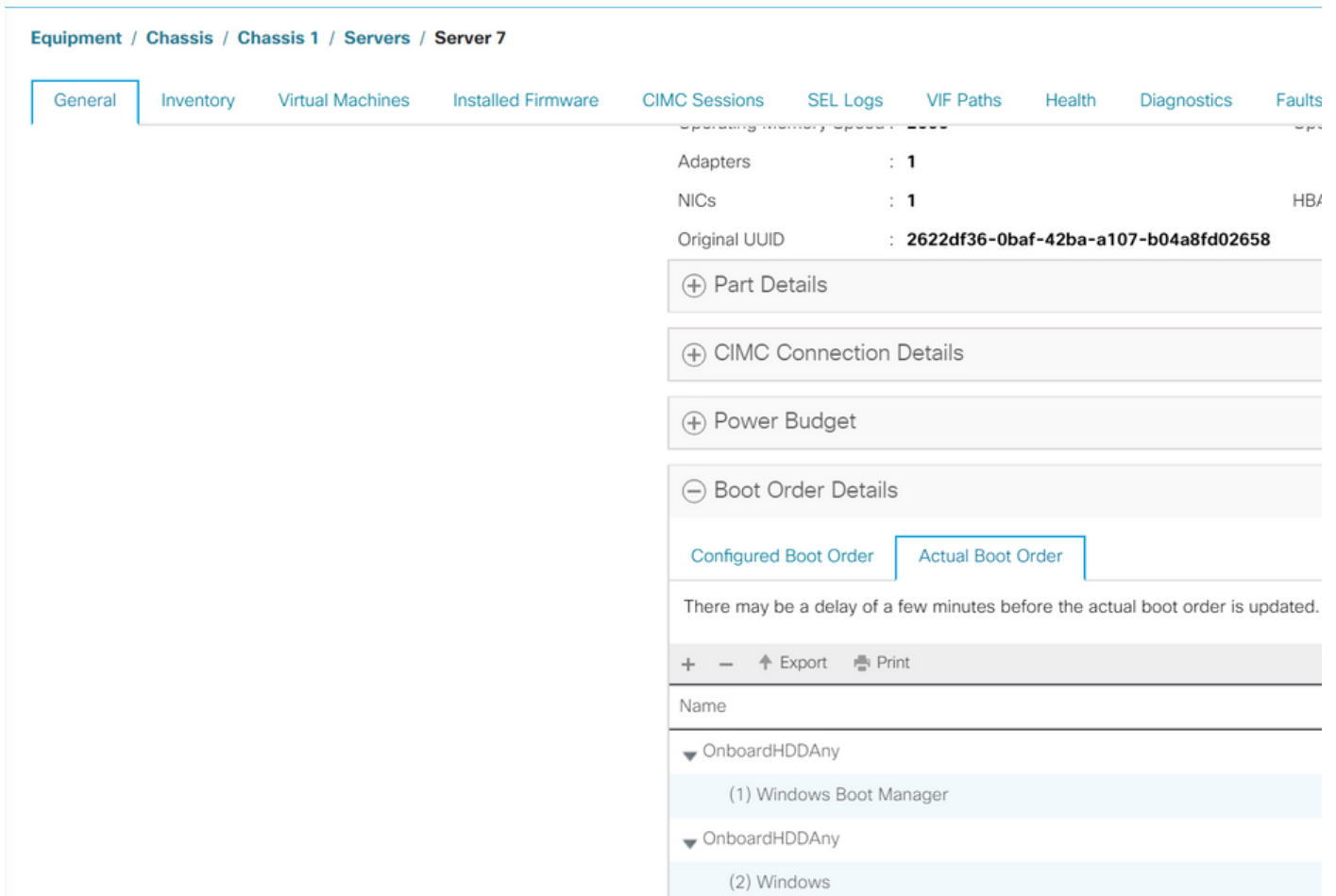
Click "New"



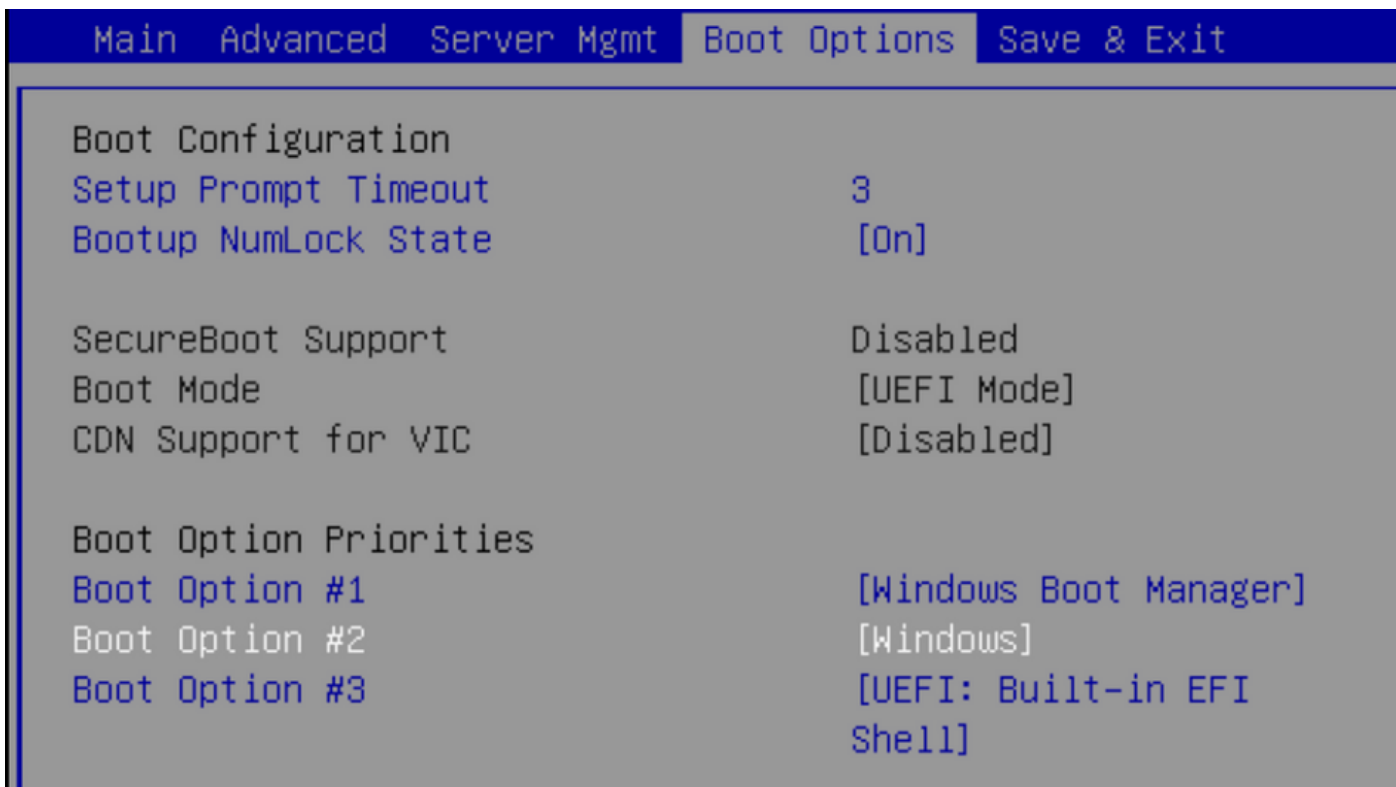
The disk should partition like so and allow you to install windows on the Primary partition.



Once the OS has installed, you can verify the mapping in the Actual Boot order



Notice the parameters in Actual Boot Order are identical to parameters in Boot Options in the BIOS



Clean up

If you want to install a different OS or want to shift the controller to AHCI mode, then you would need to scrub the disks.

In order to do so, apply a scrub policy to your Service Profile with Disk Scrub set to yes, then disassociate the Service Profile for scrub to take effect.

Actions	Properties
Delete	Name : diskscrub
Show Policy Usage	Description : <input type="text"/>
Use Global	Owner : Local
	Disk Scrub : <input type="radio"/> No <input checked="" type="radio"/> Yes
	BIOS Settings Scrub : <input checked="" type="radio"/> No <input type="radio"/> Yes
	FlexFlash Scrub : <input checked="" type="radio"/> No <input type="radio"/> Yes

After the Service Profile has been disassociated, the drive state should move to Unconfigured Good.

Navigation: < General **Inventory** Virtual Machines Installed Firmware CIMC Sessions SEL Logs VIF Paths Health Diagnostics Fa > >

Storage Sub-headers: Motherboard CIMC CPUs GPUs Memory Adapters HBAs NICs iSCSI vNICs Security **Storage**

Storage Sub-headers: **Controller** LUNs Disks

Actions: + - Advanced Filter Export Print ⚙

Name	Size (MB)	Serial	Operability	Drive State	Presence	Technology	Bootable
▼ Storage Co...							
Disk 1	228936	17191708379C	Operable	Unconfigured Good	Equipped	SSD	Unknown
Disk 2	228936	173819147CCD	Operable	Unconfigured Good	Equipped	SSD	Unknown

The M.2 SSD's can only be scrubbed in SWRAID mode and not in AHCI.

Verify

There is currently no verification procedure available for this configuration.

Troubleshoot

There is currently no specific troubleshooting information available for this configuration