



Managing Storage Using RAID



Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

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RAID Options



Note

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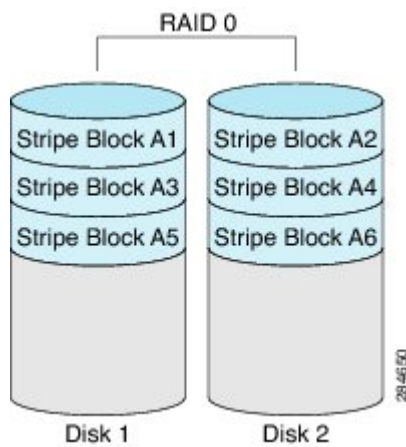
You can choose to store the E-Series Server data files on local Redundant Array of Inexpensive Disks (RAID). The following RAID levels are supported:

- The single-wide E-Series Server supports RAID 0 and RAID 1 levels.
- The double-wide E-Series Server supports RAID 0, RAID 1, and RAID 5 levels.
- The double-wide E-Series Server with the PCIe option supports RAID 0 and RAID 1 levels.

RAID 0

With RAID 0, the data is stored evenly in stripe blocks across one or more disk drives without redundancy (mirroring). The data in all of the disk drives is different.

Figure 1: RAID 0



Compared to RAID 1, RAID 0 provides additional storage because both disk drives are used to store data. The performance is improved because the read and write operation occurs in parallel within the two disk drives.

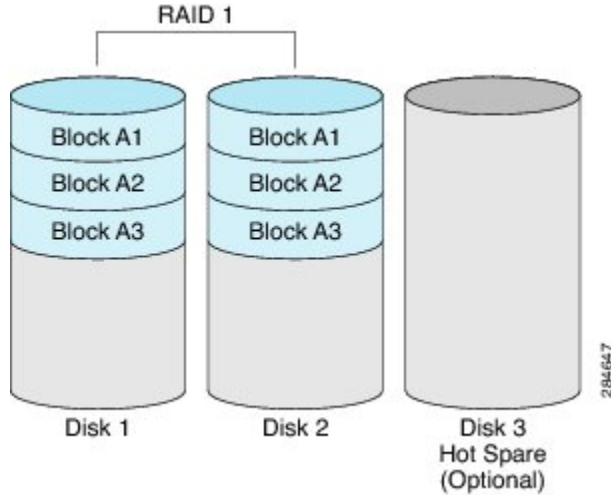
However, there is no fault tolerance, error checking, hot spare, or hot-swapping. If one disk drive fails, the data in the entire array is destroyed. Because there is no error checking or hot-swapping, the array is susceptible to unrecoverable errors.

RAID 1

RAID 1 creates a mirrored set of disk drives, where the data in both the disk drives is identical, providing redundancy and high availability. If one disk drive fails, the other disk drive takes over, preserving the data.

RAID 1 also allows you to use a hot spare disk drive. The hot spare drive is always active and is held in readiness as a hot standby drive during a failover.

Figure 2: RAID 1



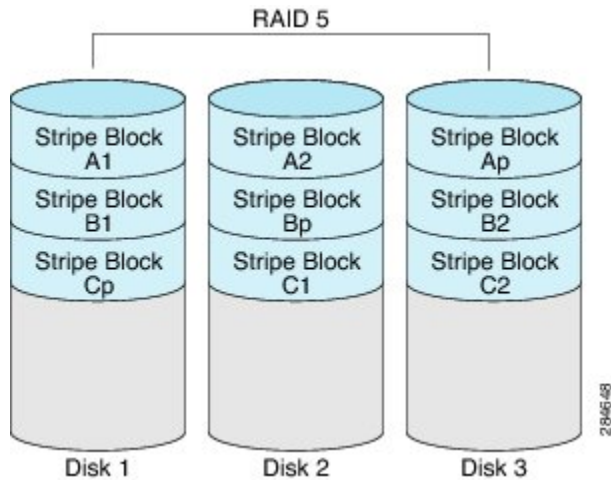
RAID 1 supports fault tolerance and hot-swapping. When one disk drive fails, you can remove the faulty disk drive and replace it with a new disk drive.

However, compared to RAID 0, there is less storage space because only half of the total potential disk space is available for storage and there is an impact on performance.

RAID 5

With RAID 5, the data is stored in stripe blocks with parity data staggered across all disk drives, providing redundancy at a low cost.

Figure 3: RAID 5



RAID 5 provides more data storage capacity than RAID 1 and better data protection than RAID 0. It also supports hot swapping; however, RAID 1 offers better performance.

Non-RAID

When the disk drives of a computer are not configured as RAID, the computer is in non-RAID mode. Non-RAID mode is also referred to as Just a Bunch of Disks or Just a Bunch of Drives (JBOD). Non-RAID mode does not support fault tolerance, error checking, hot-swapping, hot spare, or redundancy.

Summary of RAID Options

RAID Option	Description	Advantages	Disadvantages
RAID 0	Data stored evenly in stripe blocks without redundancy	<ul style="list-style-type: none"> • Better storage • Improved performance 	<ul style="list-style-type: none"> • No error checking • No fault tolerance • No hot-swapping • No redundancy • No hot spare
RAID 1	Mirrored set of disk drives and an optional hot spare disk drive	<ul style="list-style-type: none"> • High availability • Fault tolerance • Hot spare • Hot-swapping 	<ul style="list-style-type: none"> • Less storage • Performance impact
RAID 5	Data stored in stripe blocks with parity data staggered across all disk drives	<ul style="list-style-type: none"> • Better storage efficiency than RAID 1 • Better fault tolerance than RAID 0 • Low cost of redundancy • Hot-swapping 	<ul style="list-style-type: none"> • Slow performance
Non-RAID	Disk drives not configured for RAID Also referred to as JBOD	<ul style="list-style-type: none"> • Portable 	<ul style="list-style-type: none"> • No error checking • No fault tolerance • No hot-swapping • No redundancy • No hot spare

Configuring RAID



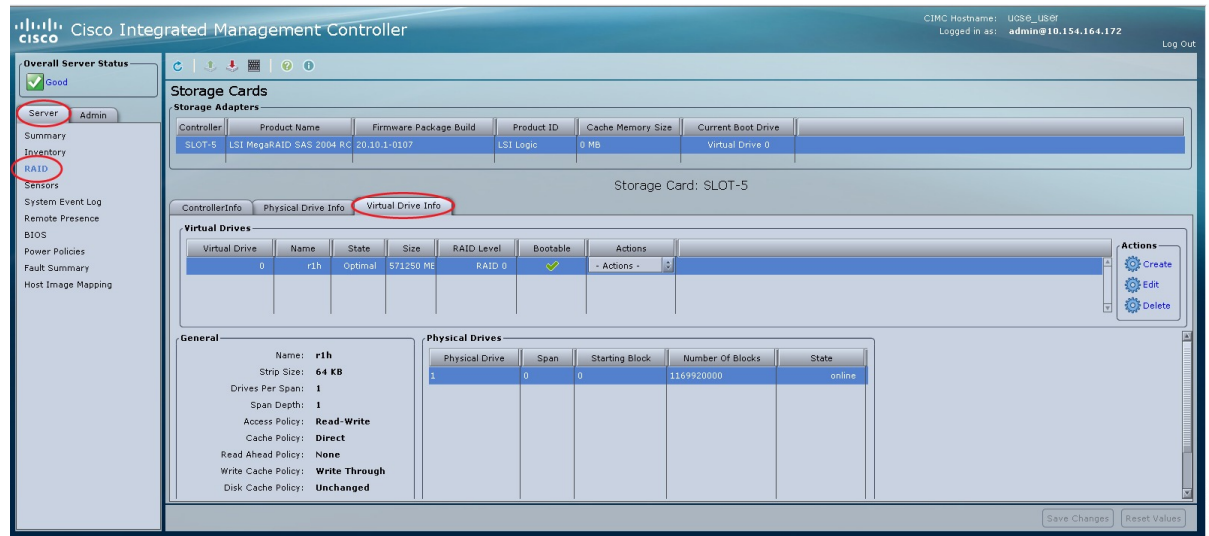
Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to configure the RAID level, strip size, host access privileges, drive caching, and initialization parameters on a virtual drive. You can also use this procedure to designate the drive as a hot spare drive and to make the drive bootable.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**. Do one of the following:
 - If the **Configure Virtual Drive** dialog box does not appear, proceed to the next step.
 - If the **Configure Virtual Drive** dialog box appears, and the virtual drives are not configured, complete the fields as shown in Step 5.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

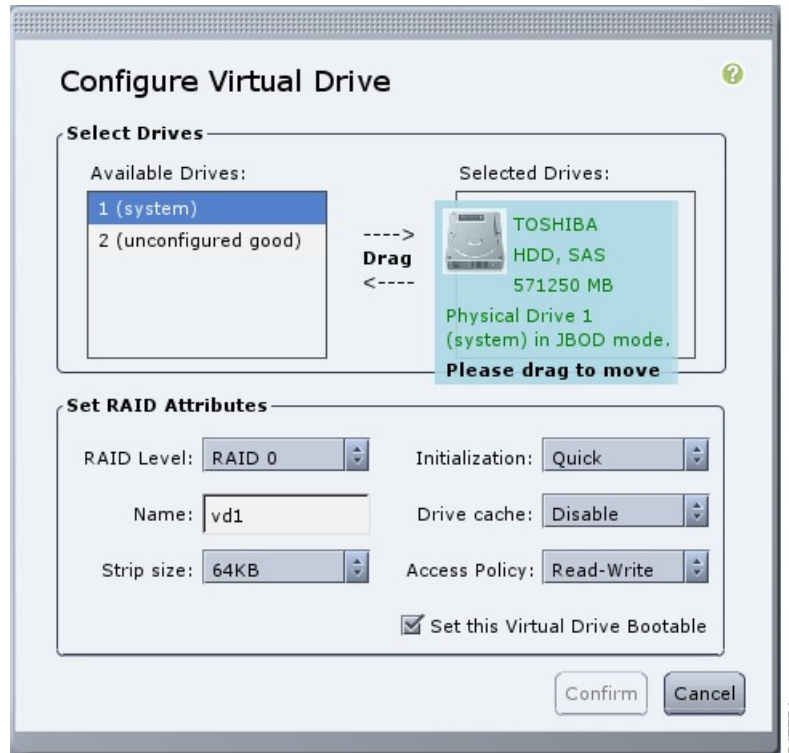
Figure 4: Virtual Drive Info Tab



- Step 4** In the **Actions** area of the **Virtual Drive Info** tab, click **Create**.

The **Configure Virtual Drive** dialog box appears.

Figure 5: Configure Virtual Drive Dialog Box



Step 5 Complete the following fields as appropriate:

Name	Description
Available Drives table	Displays the drives that are available for RAID configuration. Note To move a drive, click and drag a drive to the appropriate table.
Selected Drives table	Displays the drives that are selected for RAID configuration. Note To move a drive, click and drag a drive to the appropriate table.
RAID Level drop-down list	The RAID level options. This can be one of the following: <ul style="list-style-type: none"> • RAID 0—Block striping. • RAID 1—Mirroring. • RAID 5—Block striping with parity. Note The single-wide E-Series Server supports RAID 0 and RAID 1 levels. The double-wide E-Series Server supports RAID 0, RAID 1, and RAID 5 levels. The double-wide E-Series Server with the PCIe option supports RAID 0 and RAID 1 levels.

Name	Description
Name field	<p>The name of the virtual drive.</p> <p>Enter a maximum of 15 characters. The characters can have numbers and upper- or lower-case letters. Special characters are not supported.</p>
Strip Size drop-down list	<p>The strip size options. This can be one of the following:</p> <ul style="list-style-type: none"> • 64 KB • 32 KB • 16 KB • 8 KB
Initialization drop-down list	<p>How the controller initializes the drives. This can be one of the following:</p> <ul style="list-style-type: none"> • Quick—The controller initializes the drive quickly. This is the default and recommended option. • Full—The controller does a complete initialization of the new configuration. <ul style="list-style-type: none"> Note Depending on the size of the drives, full initialization can take several hours to complete. To view the progress, see the Initialize Progress and Initialize Time Elapsed fields in the General area. • None—The controller does not initialize the drives.
Drive Cache drop-down list	<p>How the controller handles drive caching. This can be one of the following:</p> <ul style="list-style-type: none"> • Disable—Caching is disabled on the drives. <ul style="list-style-type: none"> Note This is the default and recommended option. • Unchanged—The controller uses the caching policy specified on the drive. This is the default and recommended option. • Enable—Caching is enabled on the drives. This option minimizes the delay in accessing data. <ul style="list-style-type: none"> Caution Enabling Drive Cache, voids all warranty on the hard disk drives. This configuration option is not supported. Use this option at your own risk.

Name	Description
Access Policy drop-down list	Configures host access privileges. This can be one of the following: <ul style="list-style-type: none"> • Read-Write—The host has full access to the drive. • Read Only—The host can read only data from the drive. • Blocked—The host cannot access the drive.
Set this Virtual Drive Bootable check box	How the controller boots the drive. This can be one of the following: <ul style="list-style-type: none"> • Enable—The controller makes this drive bootable. • Disable—This drive is not bootable. <p>Note If you plan to install an operating system or hypervisor into the RAID array, we recommend that you check this check box.</p>
Use the Remaining Drive as Hot Spare check box	Designates the drive that is in the Available Drives table as a hot spare drive. <p>Note Applicable for RAID 1 only. This check box is greyed out for other RAID levels.</p> <p>Applicable for double-wide E-Series Servers.</p>

Step 6 Review the RAID configuration, and then click **Confirm** to accept the changes.

Modifying the RAID Configuration



Note

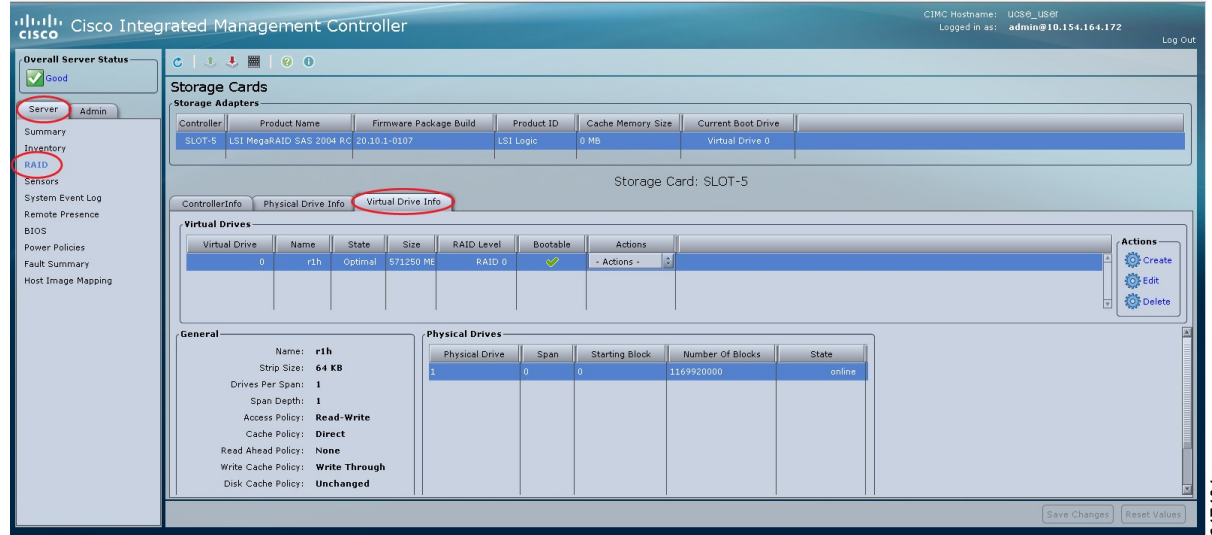
The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to enable or disable auto rebuild on the storage controller.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 6: Virtual Drive Info Tab



- Step 4** In the **Actions** area of the **Virtual Drive Info** tab, click **Edit**. The **Modify RAID Configuration** dialog box appears. Modify the following as appropriate:

Name	Description
<p>Enable or Disable Auto Rebuild button</p>	<p>Whether the rebuild process starts on the new drive automatically when a virtual drive becomes degraded. This can be one of the following:</p> <ul style="list-style-type: none"> • Enabled—If a drive becomes degraded and a new drive is plugged in, the rebuild process starts automatically on the new drive. Note The rebuild process overwrites all existing data; therefore, make sure that the drive that is plugged in does not contain important data. • Disabled—If a drive becomes degraded and a new drive is plugged in, the new drive is ignored. You must manually start the rebuild process on the new drive. <p>Important The Disable Auto Rebuild button indicates that auto rebuild is enabled.</p>

Deleting the RAID Configuration



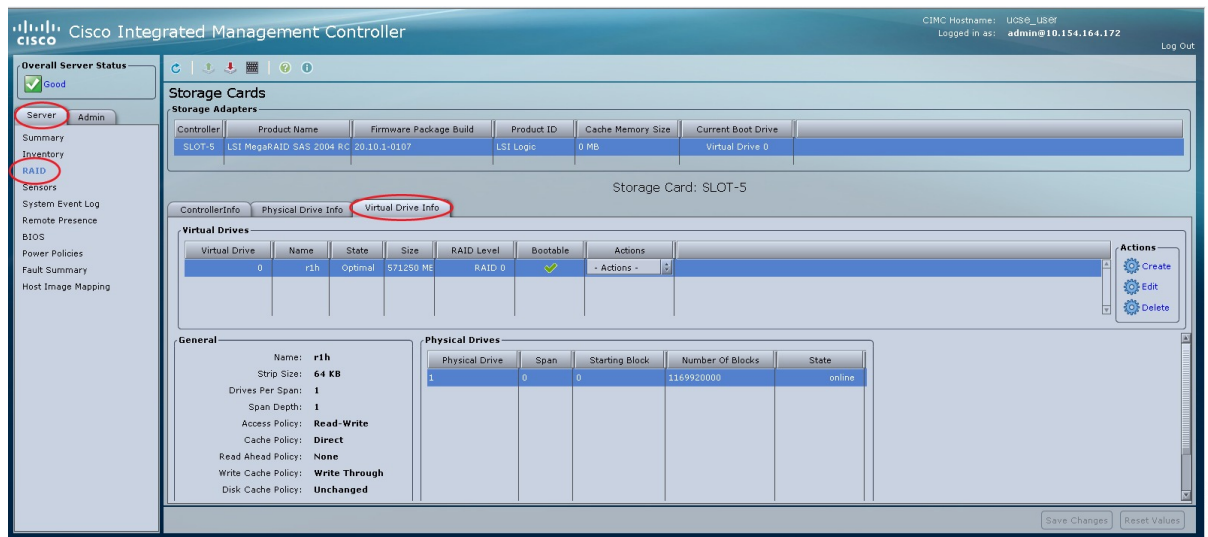
Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to clear all RAID or foreign configurations.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 7: Virtual Drive Info Tab



- Step 4** In the **Actions** area of the **Virtual Drive Info** tab, click **Delete**. The **Clear Configurations** dialog box appears. Do the following as appropriate:

Name	Description
Clear All RAID Config radio button	Deletes all RAID configuration. Caution When you click this radio button, all existing data in the drives is deleted.

Name	Description
Clear Foreign Config radio button	Deletes all foreign configuration. If you plug in a drive from another E-Series Server, you must clear its foreign configuration to make it usable. Note When you click this radio button, only the configuration in the new plugged-in drive is deleted, while the configurations in the existing drives stay untouched.
Proceed button	Continues with the delete operation.

Changing the Physical Drive State

**Note**

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to change the state of the physical drive. Options are hotspare, jbod, or unconfigured good.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Physical Drive Info** tab.

Figure 8: Physical Drive Info Tab

The screenshot displays the Cisco Integrated Management Controller (CIMC) interface. The top navigation pane shows 'Server' and 'RAID' tabs. The 'Storage Cards' section is active, showing 'Storage Adapters' and 'Physical Drive Info' for 'Storage Card: SLOT-5'. The 'Physical Drives' table is as follows:

Slot Number	State	Mode	Type	Coerced Size	Bootable	Actions
1	system	JBOD	HDD, SAS	571250 MB	✓	- Actions -
2	unconfigured good		HDD, SAS, SED	571250 MB		- Actions -

Below the table, the 'General' section lists: Enclosure Device ID: 64, Slot Number: 1, Power State: active, Device ID: 9, Sequence Number: 2, Media Error Count: 0, Other Error Count: 0, Predictive Failure Count: 0, Block Size: 512, Block Count: 1172123568, Raw Size: 572325 MB, Non Coerced Size: 571813 MB, Coerced Size: 571250 MB. The 'Inquiry Data' section lists: Vendor: TOSHIBA, Product ID: MBF2600RC, Drive Firmware: 5704, Drive Serial Number: EA10PB90. The 'Status' section lists: State: system, Fault: false, Online: true. The 'Security' section lists: FDE Capable: false, Security Enabled: false, Secured by Controller: false.

- Step 4** From the **Actions** column in the **Physical Drives** pane, choose one of the following from the **Change State To** list:
- **hotspare**—The drive is designated as a spare drive.
 - **jbod**—The drive is not configured as RAID.
 - **unconfigured good**—The drive is ready to be assigned to a drive group or hot spare pool.
- Step 5** Click **OK** to confirm.

Rebuilding the Physical Drive



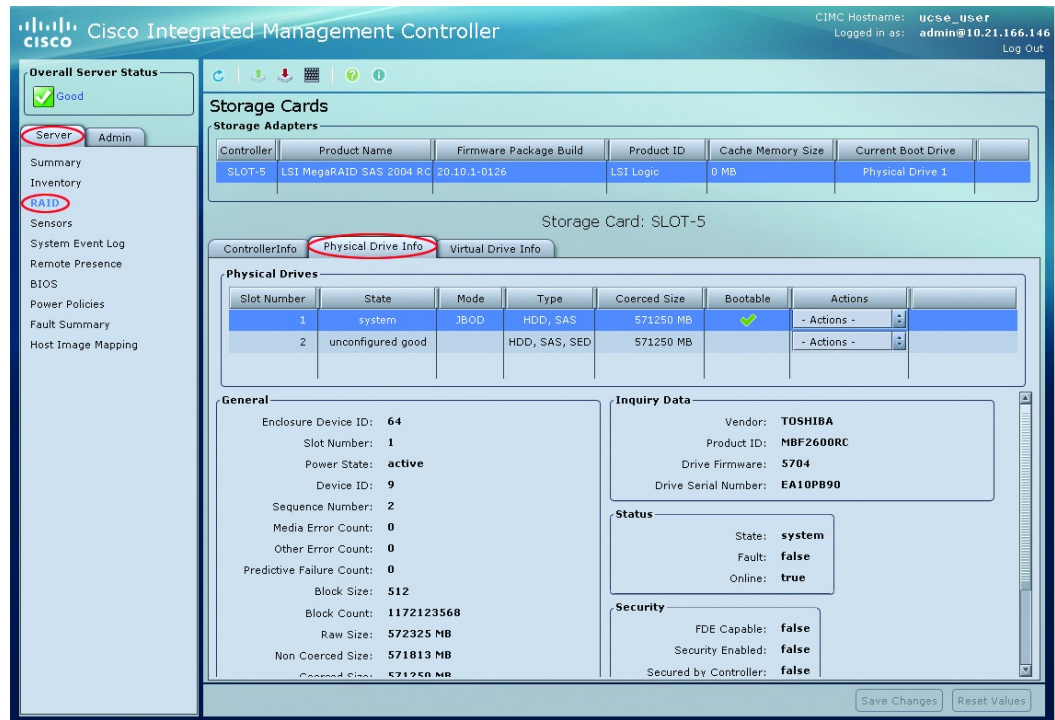
Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to manually start the rebuild process on the physical drive.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Physical Drive Info** tab.

Figure 9: Physical Drive Info Tab



Step 4 From the **Actions** column in the **Physical Drives** pane, choose **Rebuild** from the drop-down list, and then click **OK** to confirm.

The Rebuild process takes a few hours to complete.

Note The **Rebuild** option appears in the drop-down list when the state of the physical drive is Failed or Offline.

- Step 5** To view the progress of the Rebuild process, see the **Rebuilding Progress** and the **Rebuilding Time Elapsed** fields in the **General** area.
- Step 6** To stop the Rebuild process, click the **Abort** button, which is located next to the **Rebuilding Progress** field in the **General** area, and then click **OK** to confirm.

Erasing the Contents of a Physical Drive



Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to erase all of the contents of a physical drive and set it to zero.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Physical Drive Info** tab.

Figure 10: Physical Drive Info Tab

Cisco Integrated Management Controller

CIMC Hostname: ucse_user
Logged in as: admin@10.21.166.146
Log Out

Overall Server Status: ✔ Good

Navigation: **Server** (circled in red), Admin

Storage Cards

Storage Adapters

Controller	Product Name	Firmware Package Build	Product ID	Cache Memory Size	Current Boot Drive
SLOT-5	LSI MegaRAID SAS 2004 RC	20.10.1-0126	LSI Logic	0 MB	Physical Drive 1

Storage Card: SLOT-5

ControllerInfo **Physical Drive Info** (circled in red) Virtual Drive Info

Physical Drives

Slot Number	State	Mode	Type	Coerced Size	Bootable	Actions
1	system	JBOD	HDD, SAS	571250 MB	✔	- Actions -
2	unconfigured good		HDD, SAS, SED	571250 MB		- Actions -

General

Enclosure Device ID: 64
Slot Number: 1
Power State: active
Device ID: 9
Sequence Number: 2
Media Error Count: 0
Other Error Count: 0
Predictive Failure Count: 0
Block Size: 512
Block Count: 1172123568
Raw Size: 572325 MB
Non Coerced Size: 571813 MB
Coerced Size: 571250 MB

Inquiry Data

Vendor: TOSHIBA
Product ID: MBF2600RC
Drive Firmware: 5704
Drive Serial Number: EA10PB90

Status

State: system
Fault: false
Online: true

Security

FDE Capable: false
Security Enabled: false
Secured by Controller: false

Save Changes Reset Values

390013

- Step 4** From the **Actions** column in the **Physical Drives** pane, choose **Erase** from the drop-down list, and then click **OK** to confirm.
The Erase process takes a few hours to complete.
- Step 5** To view the progress of the Erase process, see the **Erasing Progress** and the **Erasing Time Elapsed** fields in the **General** area.
- Step 6** To stop the Erase process, click the **Abort** button, which is located next to the **Erasing Progress** field in the **General** area, and then click **OK** to confirm.
-

Enabling Auto Rebuild on the Storage Controller

**Note**

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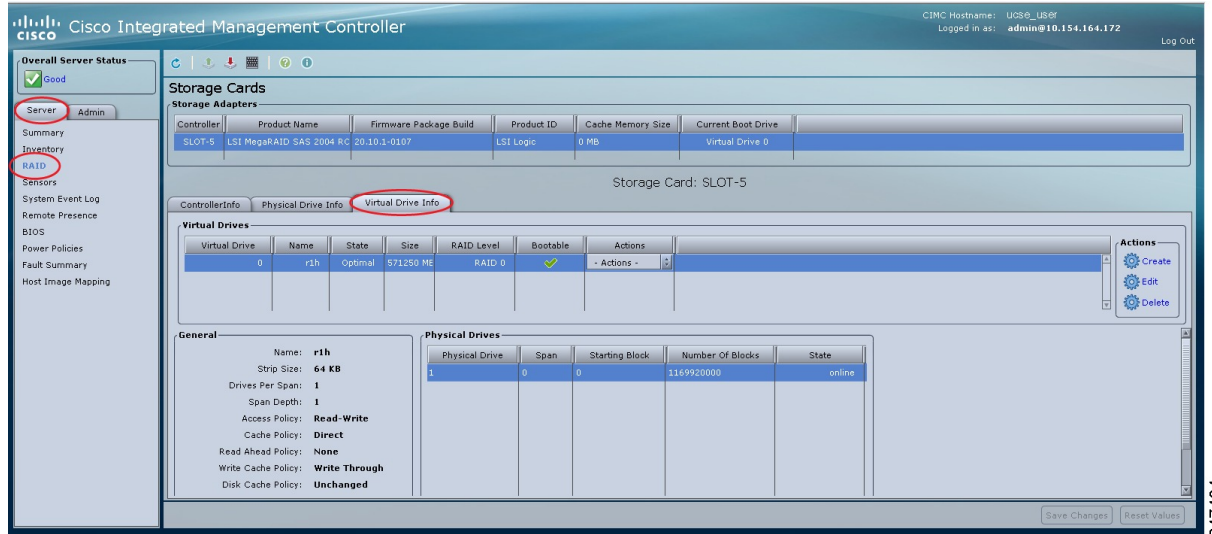
Use this procedure to rebuild a disk drive automatically. If one of the disk drives that is configured with RAID becomes degraded, and a new drive is plugged it, the rebuild process on the new drive starts automatically.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the **Storage Adapters** area, select the storage card.
If the server is powered on, the resources of the selected storage adapter appear in the tabbed menu in the **Storage Cards** area.

Step 4 In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 11: Virtual Drive Info Tab



Step 5 In the **Actions** area of the **Virtual Drive Info** tab, click **Edit**.
The **Modify RAID Configuration** dialog box appears.

Step 6 If the **Enable Auto Rebuild** button appears, click the button to make the **Disable Auto Rebuild** button appear.
The **Disable Auto Rebuild** button indicates that auto rebuild is enabled.

Caution The rebuild process overwrites all existing data; therefore, make sure that the drive that is plugged in does not contain important data.

Deleting the Virtual Drive



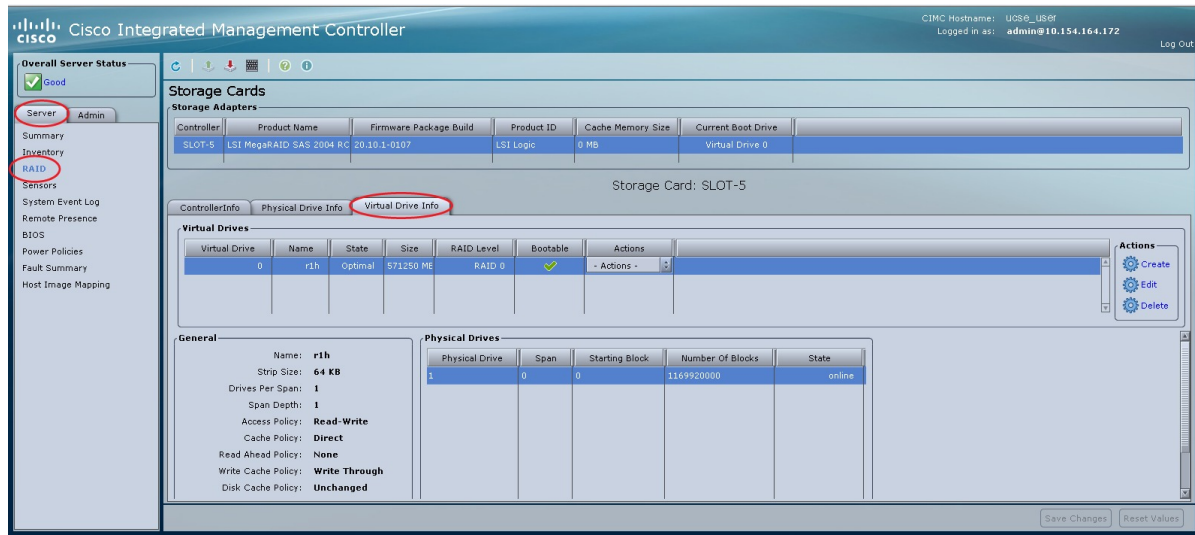
Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 12: Virtual Drive Info Tab



- Step 4** From the **Actions** column in the **Virtual Drives** area, choose the **Delete** option.
- Step 5** Click **OK** to confirm.

Performing a Consistency Check on Virtual Drives



Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to perform a consistency check on virtual drives. This can be one of the following:

- **For RAID 1**—Checks if the data in both drives is identical.
- **For RAID 5**—Checks if the data in all of the parity stripe blocks is correct.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 13: Virtual Drive Info Tab

The screenshot displays the Cisco Integrated Management Controller (CIMC) interface. On the left, the navigation pane shows 'Server' and 'RAID' selected. The main content area is titled 'Storage Cards' and shows 'Storage Adapters' for 'SLOT-5'. Below this, the 'Virtual Drive Info' tab is active, showing a table of 'Virtual Drives' with one entry: '0', 'r1h', 'Optimal', '571250 MB', 'RAID 0', and 'Bootable'. The 'Actions' column for this entry includes 'Consistency Check'. Below the table, the 'General' section displays RAID configuration parameters: Name: r1h, Strip Size: 64 KB, Drives Per Span: 1, Span Depth: 1, Access Policy: Read-Write, Cache Policy: Direct, Read Ahead Policy: None, Write Cache Policy: Write Through, and Disk Cache Policy: Unchanged. The 'Physical Drives' section shows a single drive with Span: 0, Starting Block: 0, Number Of Blocks: 1169920000, and State: online. The bottom right corner of the interface has 'Save Changes' and 'Reset Values' buttons.

- Step 4** From the **Actions** column in the **Virtual Drives** area, choose the **Consistency Check** option, and then click **OK** to confirm.
The Consistency Check process takes a few hours to complete.
- Step 5** To view the progress of the Consistency Check process, see the **Consistency Check Progress** and the **Consistency Check Time Elapsed** fields in the **General** area.
- Step 6** To stop the Consistency Check process, click the **Abort** button, which is located next to the **Consistency Check Progress** field in the **General** area, and then click **OK** to confirm.

Reconstructing the Virtual Drive Options



Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

To migrate (reconstruct) the virtual drive to a new RAID level, you might need to add or remove physical drives. When you add or remove physical drives, the size of the virtual drive is either retained or increased.

You can retain or increase the size of the virtual drive, but you cannot decrease its size. For example, if you have two physical drives with RAID 0, you cannot migrate to RAID 1 with the same number of drives. Because with RAID 1, a mirrored set of disk drives are created, which reduces the size of the virtual drive to half of what it was before, which is not supported.

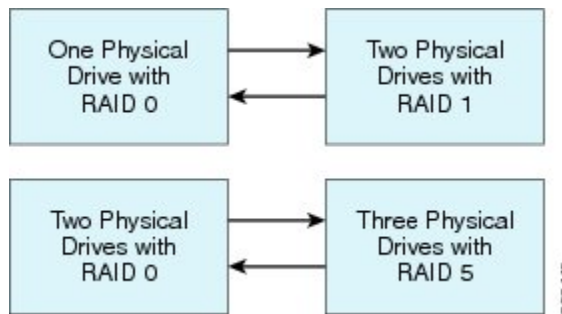


Note The virtual drive reconstruction process might take several hours to complete. You can continue to use the system during the reconstruction process.

Options for Retaining the Size of the Virtual Drive

See the following figure and the table that follows for options that retain the size of the virtual drive when you migrate the virtual drive to a new RAID level.

Figure 14: Retaining the Virtual Drive Size Options



The following table lists the options that retain the size of the virtual drive and provides information about how many physical drives you must add or remove to migrate the virtual drive to a specific RAID level.

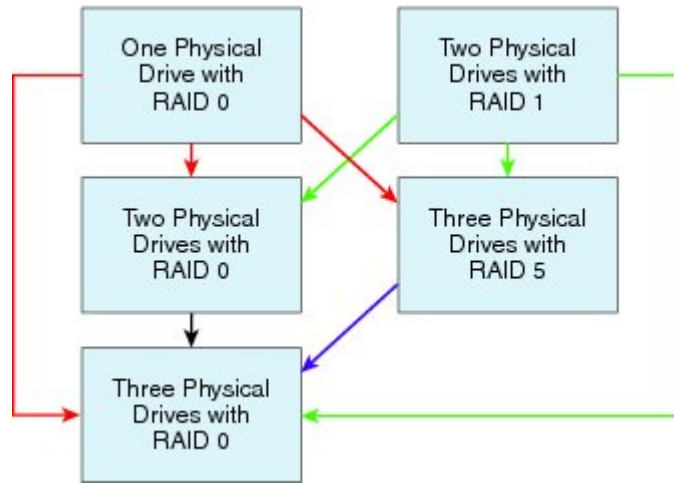
Table 1: Retaining the Virtual Drive Size

From:	Migrate to:	Add or Remove Disks
One physical drive with RAID 0	Two physical drives with RAID 1	Add one disk.
Two physical drives with RAID 1	One physical drive with RAID 0	Remove one disk.
Two physical drives with RAID 0	Three physical drives with RAID 5	Add one disk.
Three physical drives with RAID 5	Two physical drives with RAID 0	Remove one disk.

Options for Increasing the Size of the Virtual Drive

See the following figure and the table that follows for options that increase the size of the virtual drive when you migrate the virtual drive to a new RAID level.

Figure 15: Increasing the Virtual Drive Size Options



The following table lists the options that increase the size of the virtual drive and provides information about how many physical drives you must add or remove to migrate the virtual drive to a specific RAID level.

Table 2: Increasing the Virtual Drive Size

From:	Migrate to:	Add or Remove Disks
One physical drive with RAID 0 See the red arrows in the figure.	Two physical drives with RAID 0	Add one disk.
	Three physical drives with RAID 5	Add two disks.
	Three physical drives with RAID 0	Add two disks.
Two physical drives with RAID 1 See the green arrows in the figure.	Two physical drives with RAID 0	—
	Three physical drives with RAID 5	Add one disk.
	Three physical drives with RAID 0	Add one disk.
Two physical drives with RAID 0 See the black arrow in the figure.	Three physical drives with RAID 0	Add one disk.
Three physical drives with RAID 5 See the purple arrow in the figure.	Three physical drives with RAID 0	—

Reconstructing the Virtual Drive



Note

The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

Use this procedure to migrate (reconstruct) the virtual drive to a new RAID level.

Before You Begin

See [Reconstructing the Virtual Drive Options](#).

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 16: Virtual Drive Info Tab

The screenshot displays the Cisco Integrated Management Controller (CIMC) interface. In the left-hand navigation pane, the 'RAID' option is circled in red. The main content area shows the 'Storage Cards' section with a tabbed menu where 'Virtual Drive Info' is also circled in red. Below this, the 'Virtual Drives' table is visible:

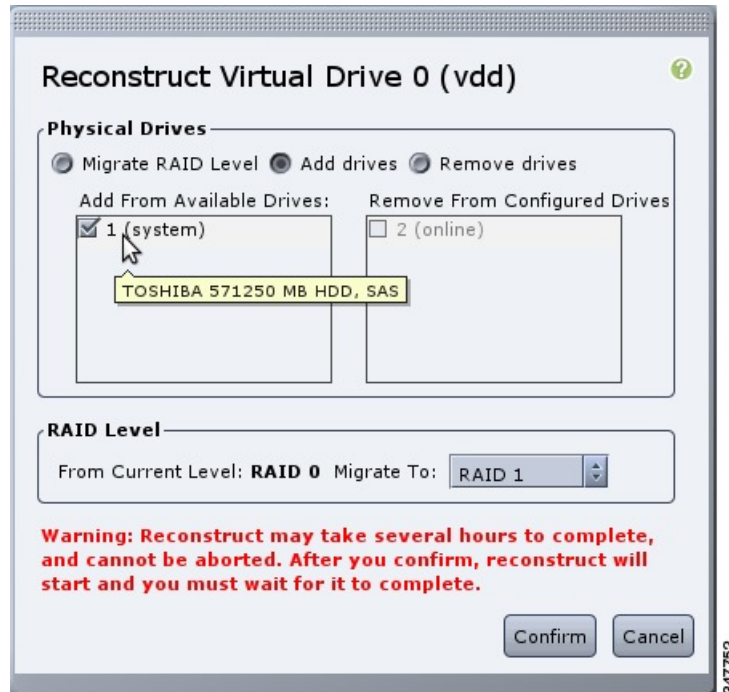
Virtual Drive	Name	State	Size	RAID Level	Bootable	Actions
0	r1h	Optimal	571250 MB	RAID 0	✓	- Actions -

Below the table, the 'General' section shows details for the virtual drive 'r1h', including Strip Size (64 KB), Drives Per Span (1), Span Depth (1), Access Policy (Read-Write), Cache Policy (Direct), Read Ahead Policy (None), Write Cache Policy (Write Through), and Disk Cache Policy (Unchanged). The 'Physical Drives' table shows one physical drive with an online state.

- Step 4** From the **Actions** column in the **Virtual Drives** area, choose the **Reconstruct** option.

The **Reconstruct Virtual Drive** dialog box appears.

Figure 17: Reconstruct Virtual Drive Dialog Box



Step 5 Complete the following as appropriate:

Name	Description
Migrate RAID Level radio button	Select this option to migrate the virtual drives to the specified new RAID level.
Add Drives radio button	Select this option, and then choose the drives to add from the Add from Available Drives table.
Remove Drives radio button	Select this option, and then choose the drives to remove from the Remove from Configured Drives table.
Add from Available Drives table	Lists the physical drives that you can add to migrate to the new RAID level. Note This table is active after you select the Add Drives radio button.
Remove from Configured Drives table	Lists the physical drives that you can remove to migrate to the new RAID level. Note This table is active after you select the Remove Drives radio button.

Name	Description
From Current Level: RAID x Migrate To: drop-down list	The new RAID level to which you want to migrate the drives. Starts the reconstruction process after you click Confirm . Note You can retain or increase the size of the virtual drive, but you cannot decrease its size. See Reconstructing the Virtual Drive Options .

The Reconstruct process takes a few hours to complete.

- Step 6** To view the progress of the Reconstruct process, see the **Reconstruct Progress** and the **Reconstruct Time Elapsed** fields in the **General** area.

Making the Virtual Drive or Physical Drive Bootable



Note The RAID feature is applicable to E-Series Servers and the SM E-Series NCE. The RAID feature is not applicable to the EHWIC E-Series NCE and the NIM E-Series NCE.

When you configure RAID, the **Configure Virtual Drive** dialog box has a check box that allows you to make the disk drive bootable. If you did not check the **Set this Virtual Drive Bootable** check box during the RAID configuration process, you can use this procedure to make the disk drive bootable.

Procedure

- Step 1** In the **Navigation** pane, click the **Server** tab.
- Step 2** On the **Server** tab, click **RAID**.
- Step 3** To make a virtual drive bootable, do the following:

- a) In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 18: Virtual Drive Info Tab

The screenshot displays the Cisco Integrated Management Controller (CIMC) interface. The left sidebar shows navigation options, with 'RAID' selected. The main content area is titled 'Storage Cards' and contains a table of storage adapters. Below this, the 'Virtual Drive Info' tab is active, showing a table of virtual drives. The 'Virtual Drives' table has one entry with a checkmark in the 'Bootable' column. Below the table are sections for 'General' configuration and 'Physical Drives'.

Controller	Product Name	Firmware Package Build	Product ID	Cache Memory Size	Current Boot Drive
SLOT-5	LSI MegaRAID SAS 2004 RC	20.10.1-0107	LSI Logic	0 MB	Virtual Drive 0

Virtual Drive	Name	State	Size	RAID Level	Bootable	Actions
0	r1h	Optimal	571250 MB	RAID 0	✓	- Actions -

General

- Name: **r1h**
- Strip Size: **64 KB**
- Drives Per Span: **1**
- Span Depth: **1**
- Access Policy: **Read-Write**
- Cache Policy: **Direct**
- Read Ahead Policy: **None**
- Write Cache Policy: **Write Through**
- Disk Cache Policy: **Unchanged**

Physical Drives

Physical Drive	Span	Starting Block	Number Of Blocks	State
1	0	0	1169920000	online

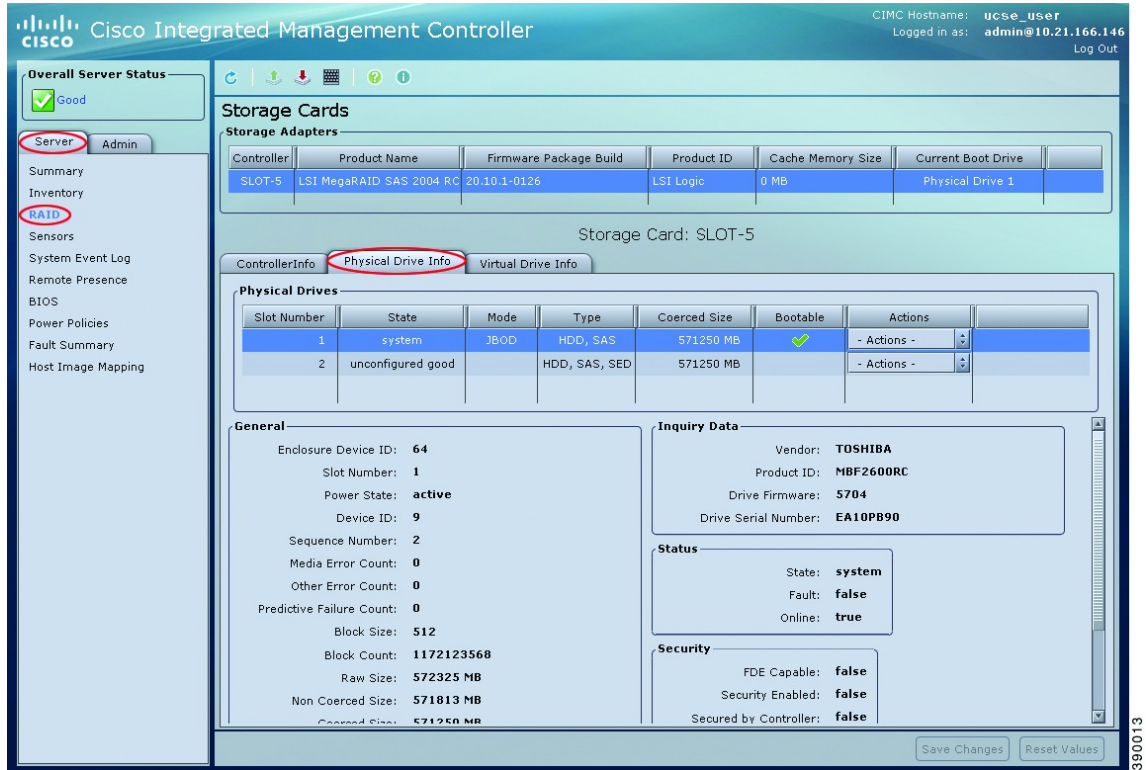
- b) From the **Actions** column of the appropriate virtual drive, choose **Set Bootable** from the drop-down list.
 c) Click **OK** to change the boot drive to this virtual drive.

Note After you set the drive to be bootable, the **Bootable** column displays a checkmark against the configured drive.

Step 4 To make a physical drive bootable, do the following:

- a) In the tabbed menu of the **Storage Card** area, click the **Physical Drive Info** tab.

Figure 19: Physical Drive Info Tab



- b) From the **Actions** column of the appropriate physical drive, choose **Set Bootable** from the drop-down list.
 - c) Click **OK** to change the boot drive to this physical drive.
- Note** The physical drive must be in non-RAID mode to be bootable. After you set the drive to be bootable, the **Bootable** column displays a checkmark against the configured drive.

Installing W2K12 to Support RAID Volumes Larger than 2TB

On a UCS-E160D-M2 series server, if you want to run Windows with more than 2 TB of hard drive space installed, follow the procedure explained in this section. There are two ways you can install W2K12: Using Legacy BIOS or using UEFI:

Installing W2K12 Using Legacy BIOS to Support RAID Volumes Larger than 2TB

This workaround shows how to install W2K12 using legacy BIOS to support RAID volumes larger than 2TB. The workaround involves the following major tasks:

- 1 Configure all the drives in 'Unconfigured Good' state.
- 2 Configure a Virtual Drive 0 (VD0) using the first hard disk and put it in RAID 0. W2K12 will be installed on VD0.
- 3 Configure a Virtual Drive 1 (VD1) using the remaining hard disks and put it in RAID 0. Use W2K12 to convert this volume to GPT so that it can access the entire storage.

The detailed procedure is explained below:

Procedure

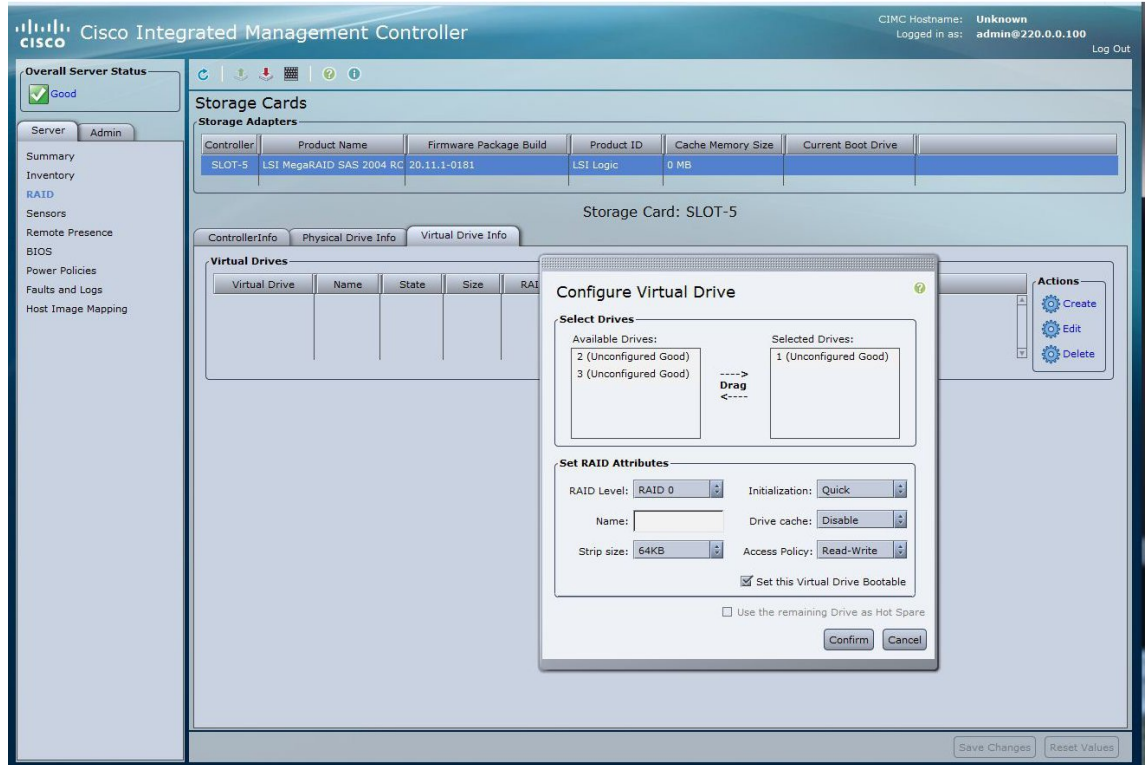
- Step 1** Configure all the drives in 'Unconfigured Good' state. Refer [Changing the Physical Drive State](#), on page 11
- Step 2** In the tabbed menu of the **Storage Cards** area, click the **Virtual Drive Info** tab.

Figure 20: Virtual Drive Info Tab

The screenshot shows the Cisco Integrated Management Controller (CIMC) GUI. The top navigation bar includes the Cisco logo, the text 'Cisco Integrated Management Controller', and user information: 'CIMC Hostname: Unknown', 'Logged in as: admin@220.0.0.100', and a 'Log Out' link. On the left, there is a sidebar menu with options like 'Overall Server Status' (Good), 'Server', 'Admin', 'Summary', 'Inventory', 'RAID', 'Sensors', 'Remote Presence', 'BIOS', 'Power Policies', 'Faults and Logs', and 'Host Image Mapping'. The main content area is titled 'Storage Cards' and shows a table for 'Storage Adapters' with one entry for 'SLOT-5' using 'LSI MegaRAID SAS 2004 RC' firmware. Below this, the 'Virtual Drive Info' tab is active for 'Storage Card: SLOT-5'. It features a 'Virtual Drives' table with columns for Name, State, Size, RAID Level, Bootable, and Actions. The 'General' section lists various RAID settings such as Strip Size (64 KB), Drives Per Span (1), Span Depth (1), Access Policy (Read-Write), Cache Policy (Direct), Read Ahead Policy (None), Write Cache Policy (Write Through), Disk Cache Policy (Disable), Allow Background Init (true), Auto Snapshot (false), and Auto Delete Oldest (true). The 'Physical Drives' table shows one drive with Physical Drive ID 0, Span 0, Starting Block 3515088996, and State 'online'. At the bottom right, there are 'Save Changes' and 'Reset Values' buttons.

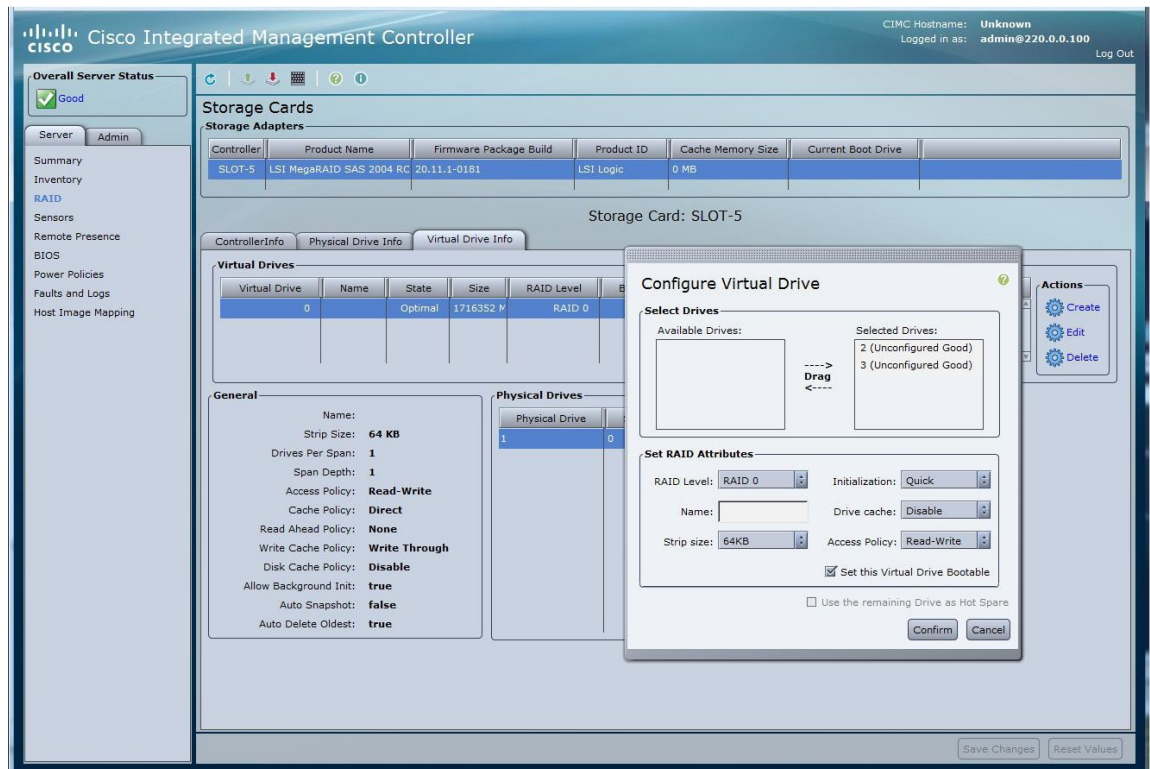
Step 3 In the Actions area of the Virtual Drive Info tab, click **Create**. The **Configure Virtual Drive** dialog box appears:

Figure 21: Configuring Virtual Drive 0



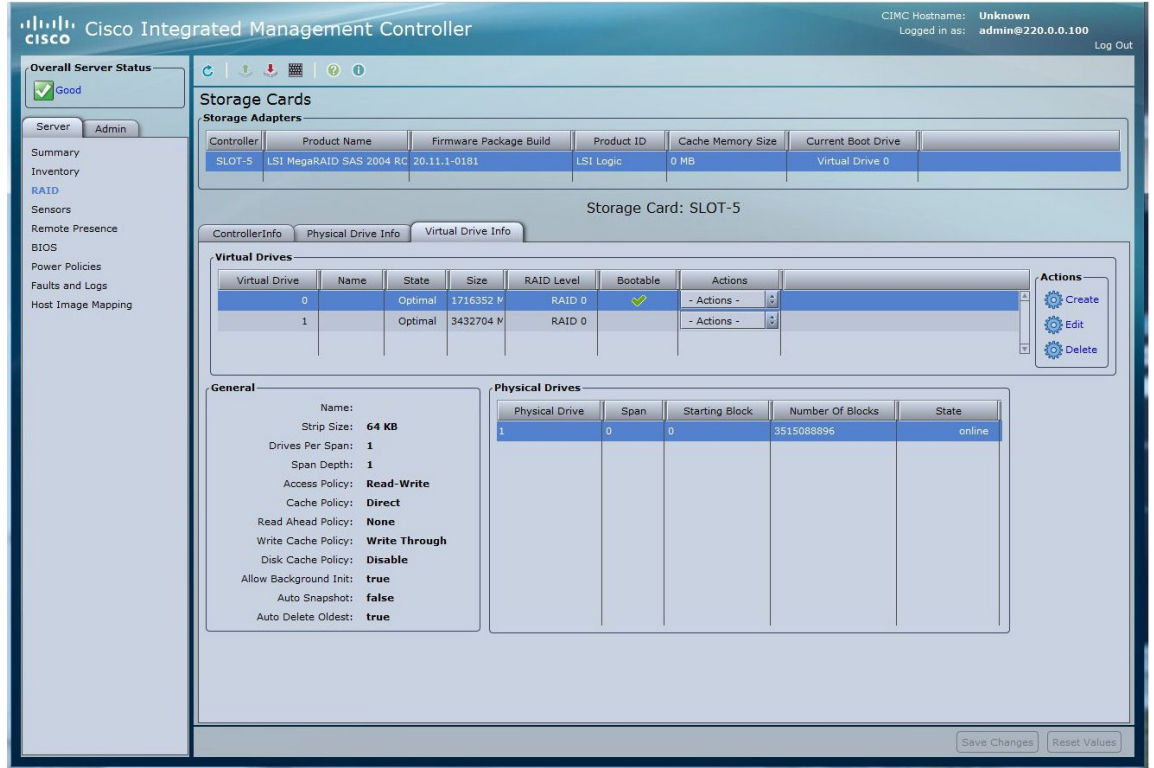
- Step 4** Select drive 1 from the Available Devices and drag to Selected Devices.
- Step 5** Click **Confirm**. You have now created Virtual Drive 0.
- Step 6** In the Actions area of the Virtual Drive Info tab, click **Create**. The **Configure Virtual Drive** dialog box appears.
- Step 7** Select the remaining drives from the Available Devices and drag to Selected Devices.

Figure 22: Configuring Virtual Drive 1



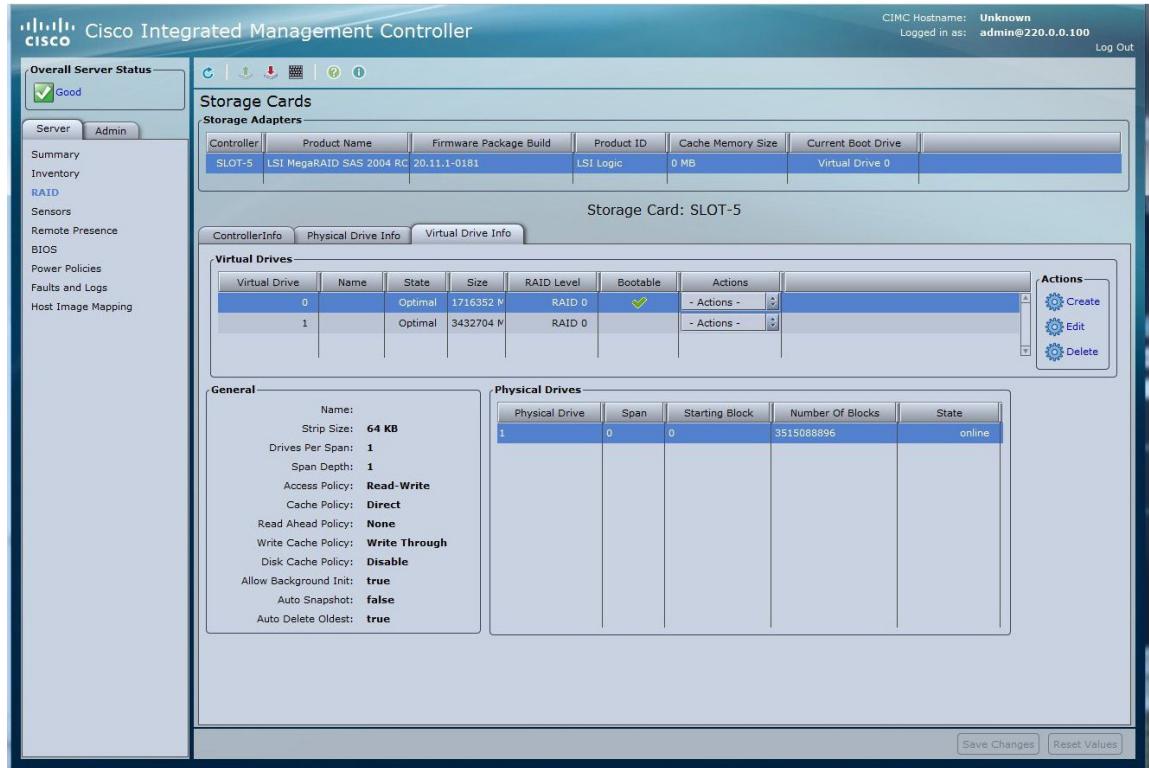
Step 8 Click **Confirm**. You have now created Virtual Drive 1. Verify the Virtual Drives.

Figure 23: Verifying Virtual Drives



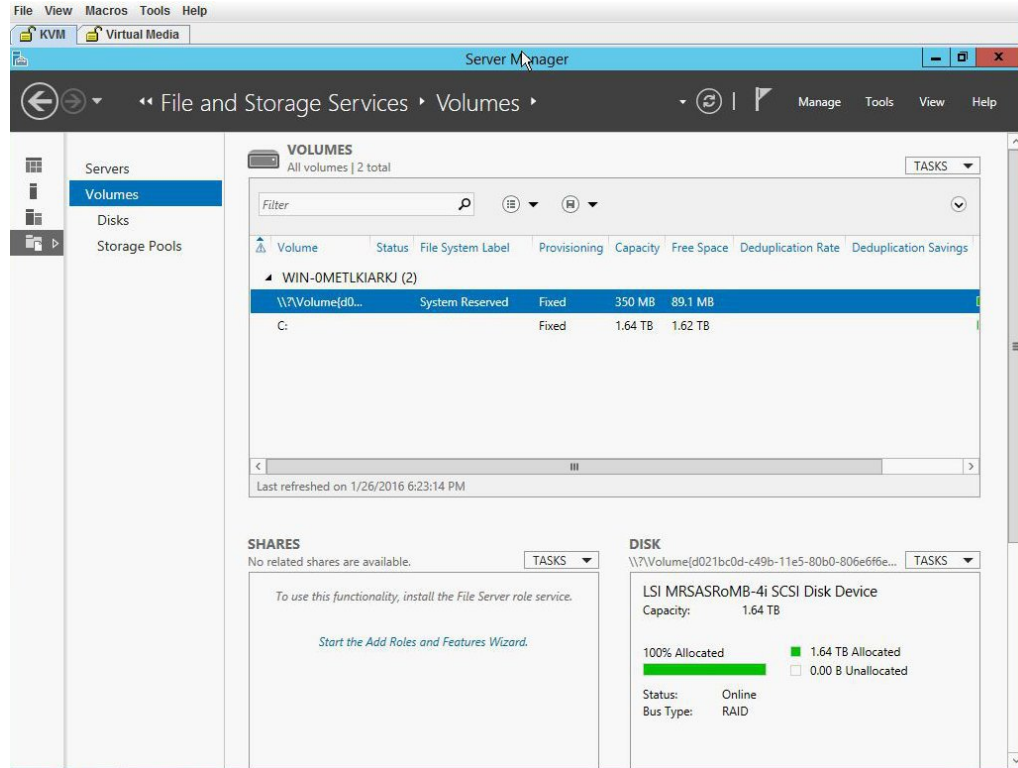
Step 9 Use Host Image Mapping or vKVM to install W2K12 on Virtual Drive 0.

Figure 24: Installing W2K12 on Virtual Drive 0



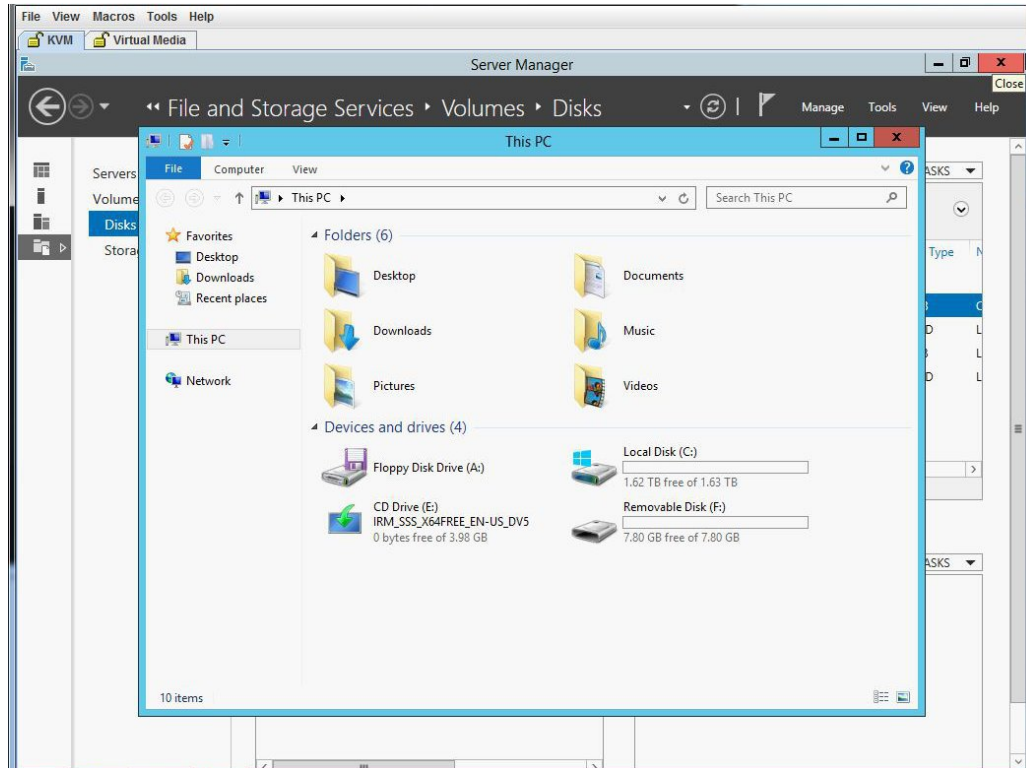
Step 10 After W2K12 installation, log in and check the status of volume.

Figure 25: Status of Volume



Step 11 Check the storage size of C drive.

Figure 26: Storage Size of C Drive



Step 12 Go to Disk and create a new volume using the Virtual Drive 1. Select Virtual Drive 1 and right click on it. Click **New Volume**. The New Volume wizard appears. This wizard helps you create a volume, assign it a drive letter, and then format it with a file system.

Figure 27: Creating a New Volume

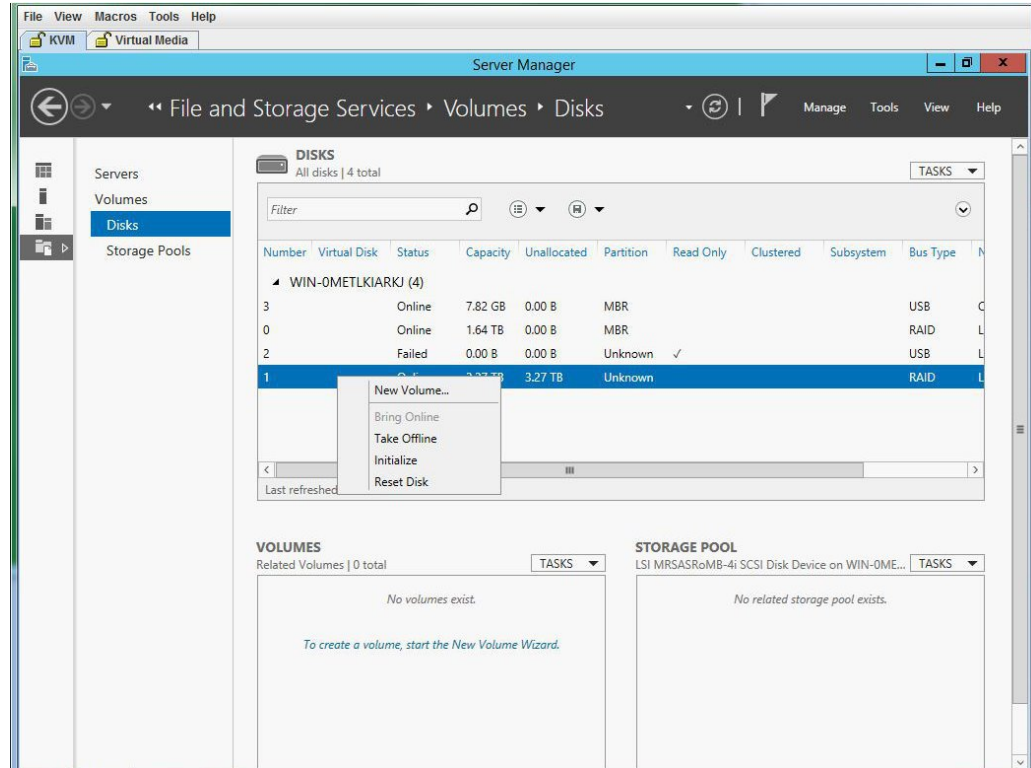
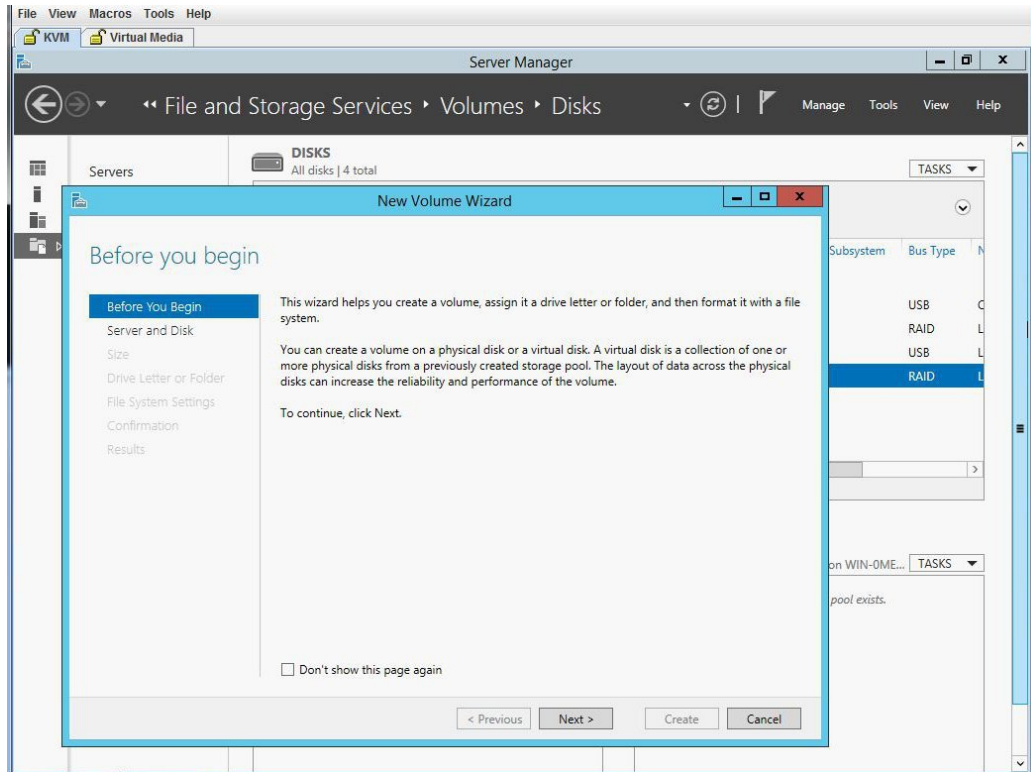
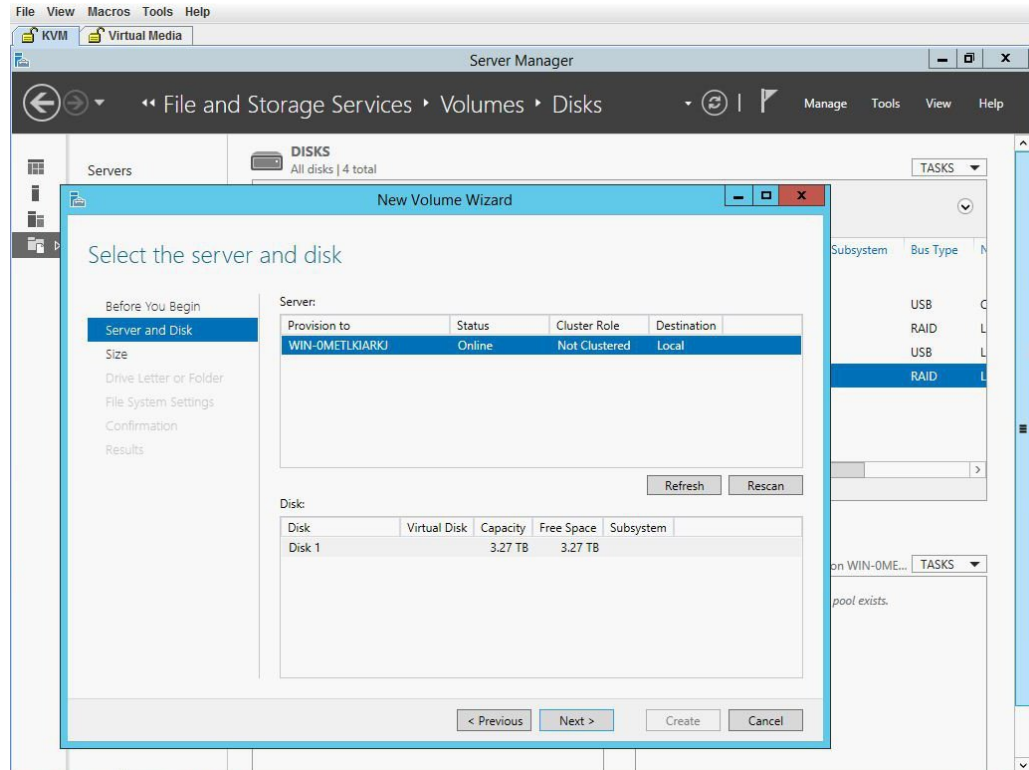


Figure 28: New Volume Wizard



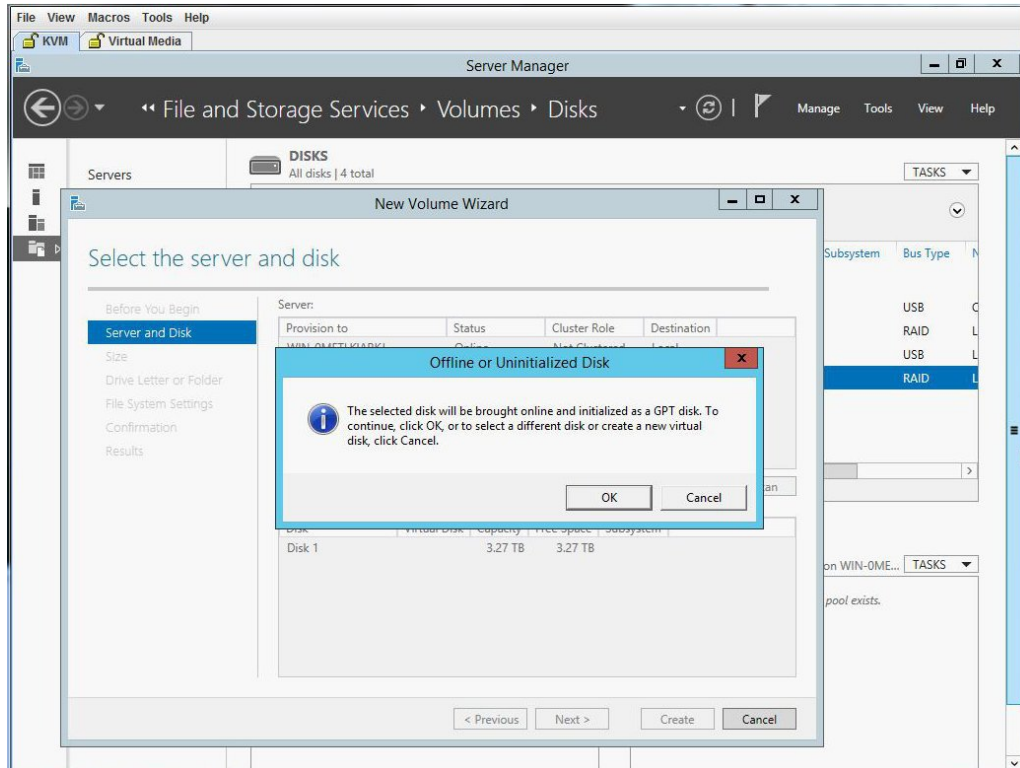
Step 13 Select the server and disk, and click **Next**. You will be prompted with a dialog box.

Figure 29: Server and Disk



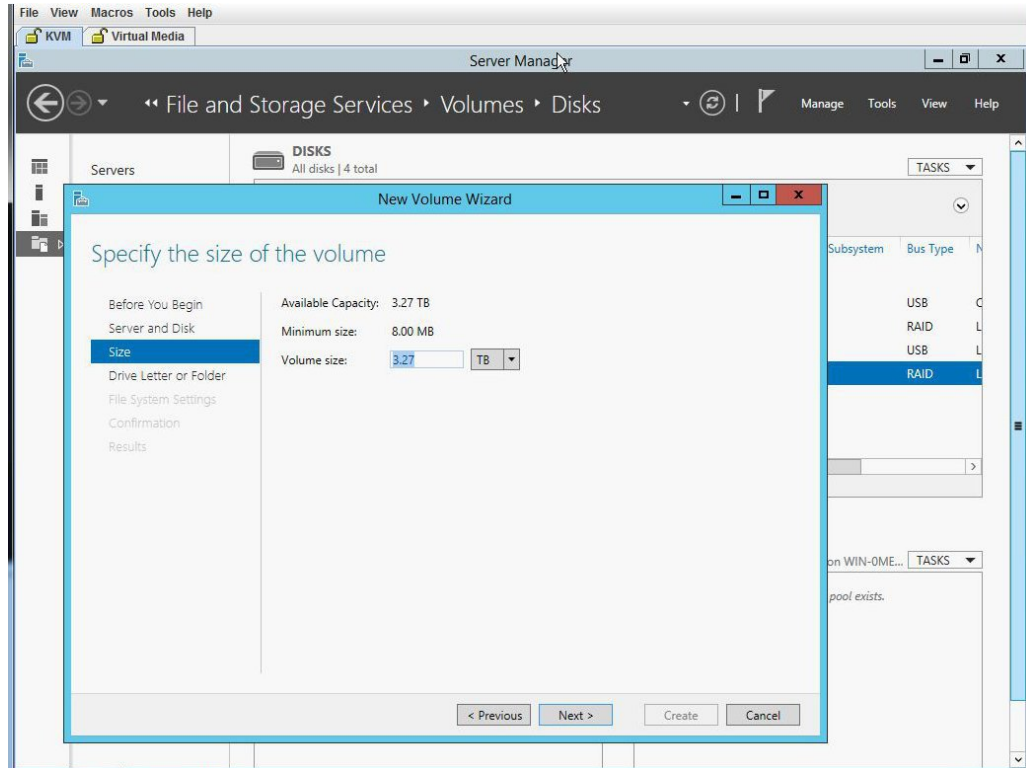
Step 14 Click OK.

Figure 30: Server and Disk



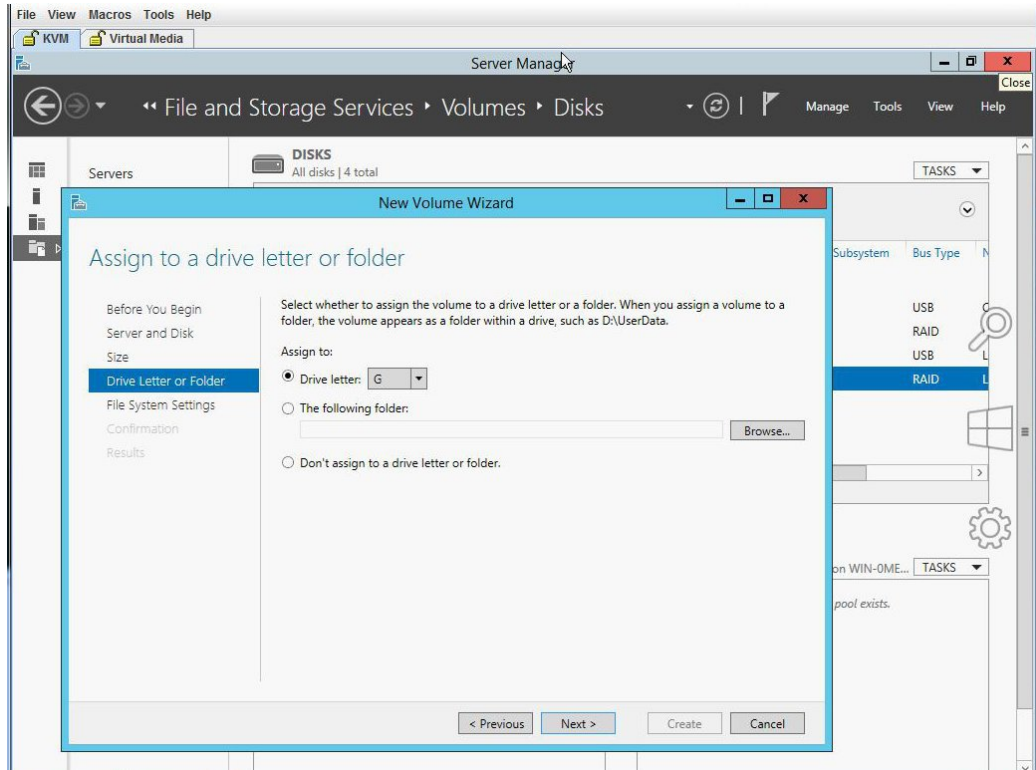
Step 15 Specify the size of the disk volume.

Figure 31: Size of the Disk Volume



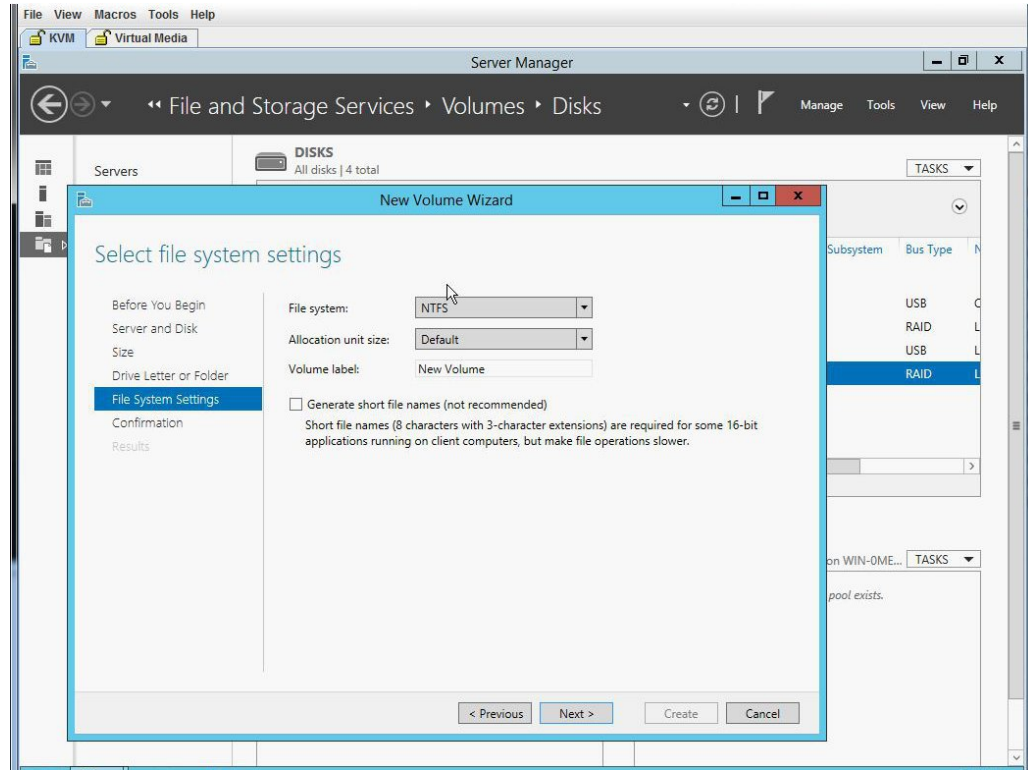
Step 16 Assign the volume to a drive letter.

Figure 32: Drive Letter or Folder



Step 17 Select the File System Settings.

Figure 33: File System Settings



Step 18 Confirm the selections and click **Create**. A completion message appears. Click **Close**.

Figure 34: Confirm Selections

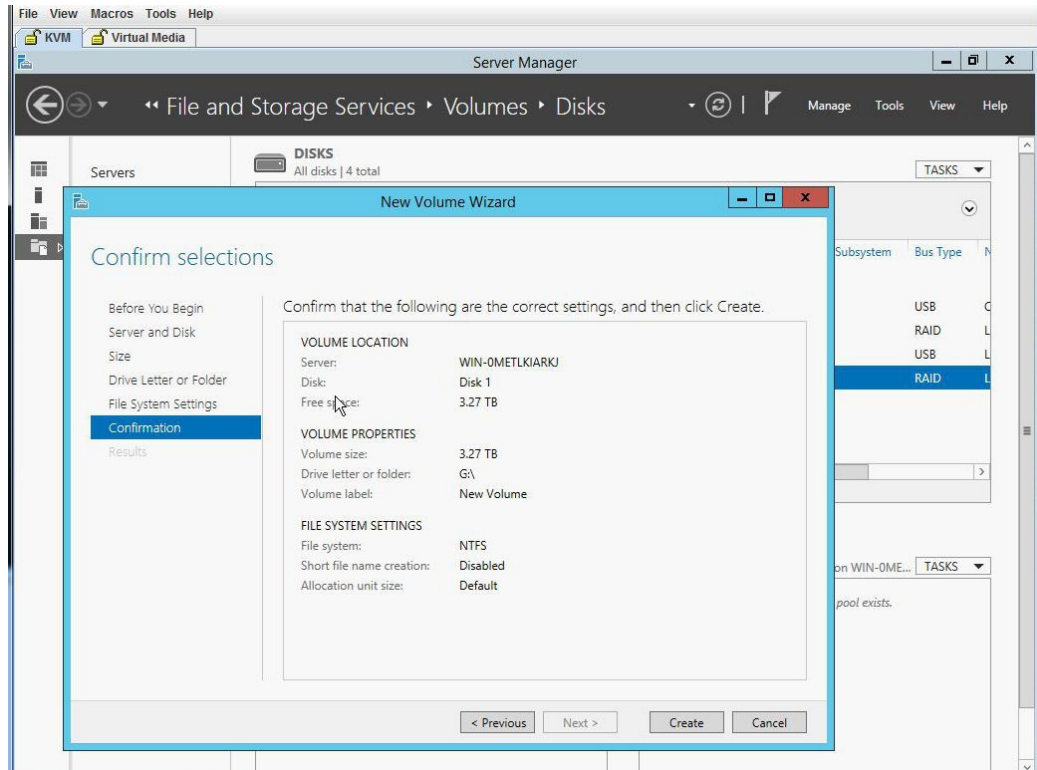
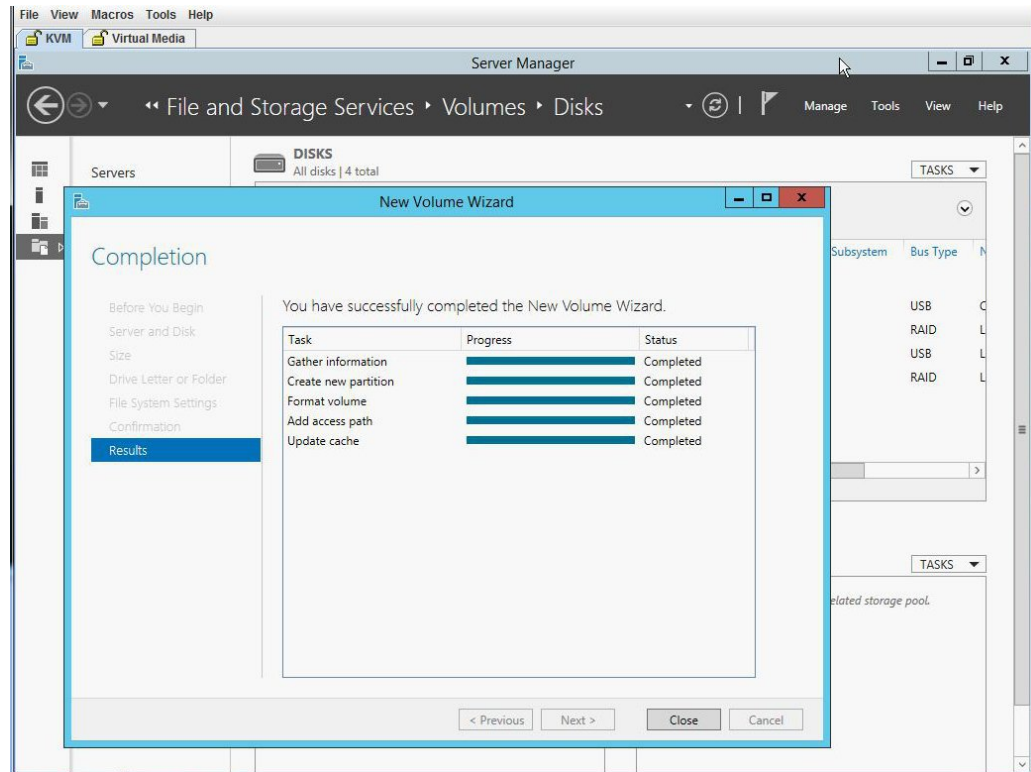
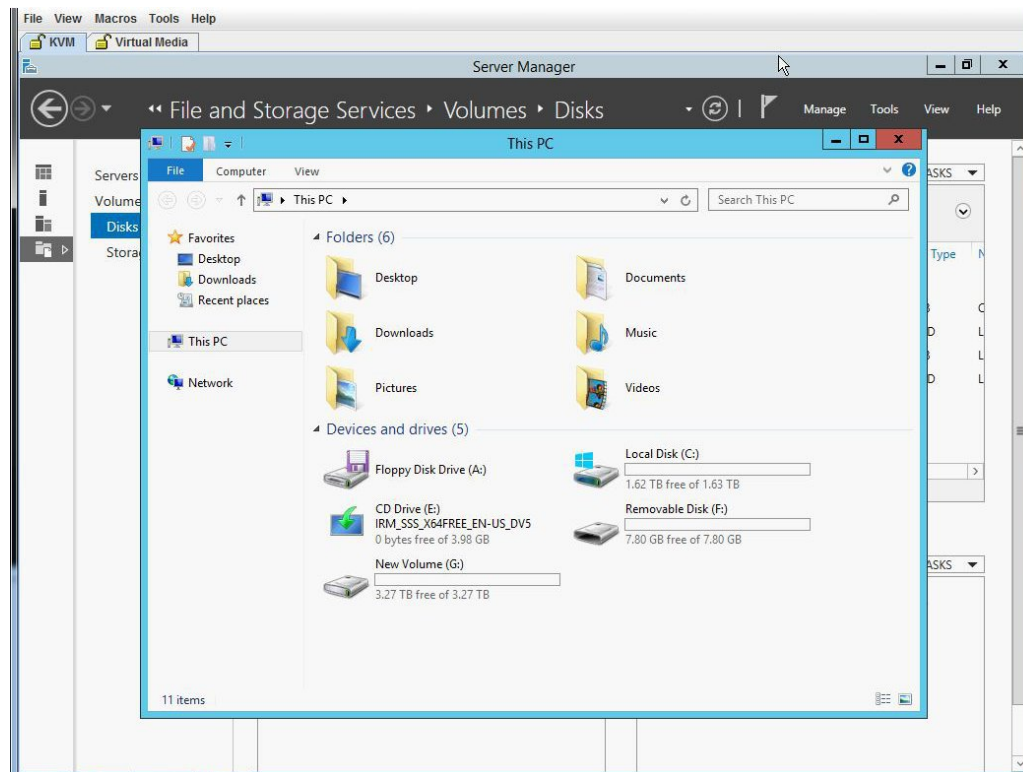


Figure 35: Completion



Step 19 Verify the new volume created and W2K12 recognizes the remaining storage.

Figure 36: Verifying the New Volume



Installing W2K12 using UEFI to Support RAID Volumes Larger than 2TB

This workaround shows how to install W2k12 using UEFI to support RAID volumes larger than 2TB. The workaround involves the following major tasks:

- 1 Configure all the drives in 'Unconfigured Good' state.
- 2 Configure a Virtual Drive 0 (VD0) using all the hard disks and put it in RAID 0. W2K12 will be installed on VD0 and the OS will recognize the entire storage capacity.
- 3 Enter BIOS setup and configure it to boot using UEFI.
- 4 Map W2K12 ISO using Host Image Mapping or Virtual Media using vKVM.
- 5 Boot UCS-E module into EFI shell.
- 6 From the EFI shell, navigate to the ISO and boot BOOTX64.EFI.
- 7 Install W2K12. During W2K12 installation, the server will reboot.
- 8 Enter BIOS setup and change the 'UCSM boot order rules' from 'Strict' to 'Loose'. This change disallows CIMC to override the BIOS boot order. The BIOS boot order will be used instead of the CIMC boot order.

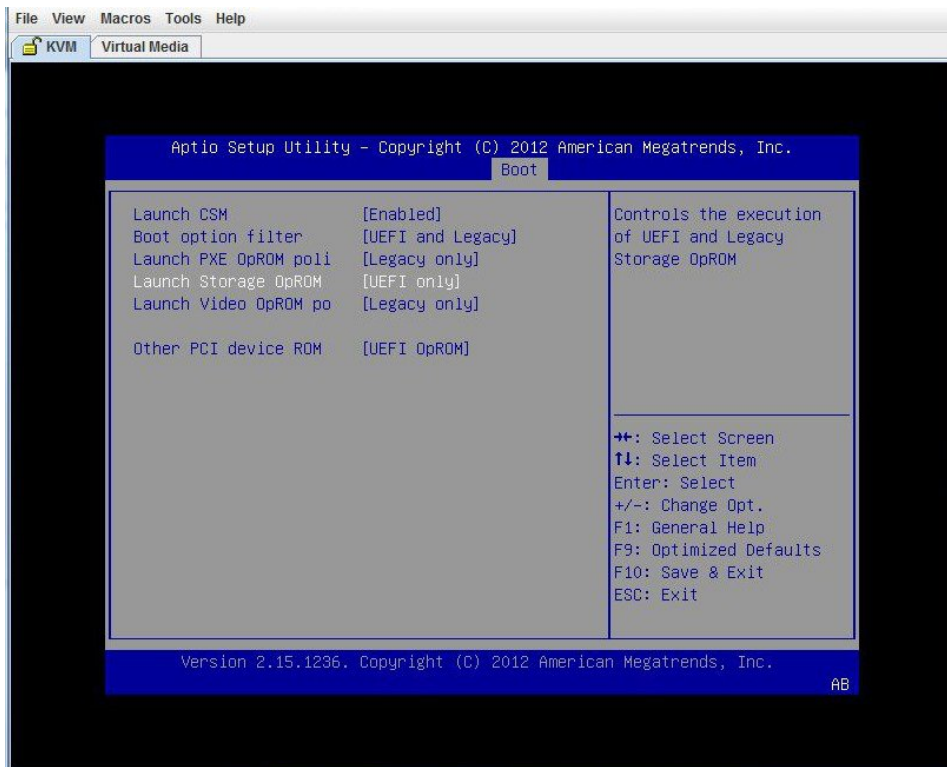
- 9 Move 'Windows Boot Manager' to top of the boot order. W2K12 should now automatically boot and recognize the entire storage.

The detailed procedure is explained below:

Procedure

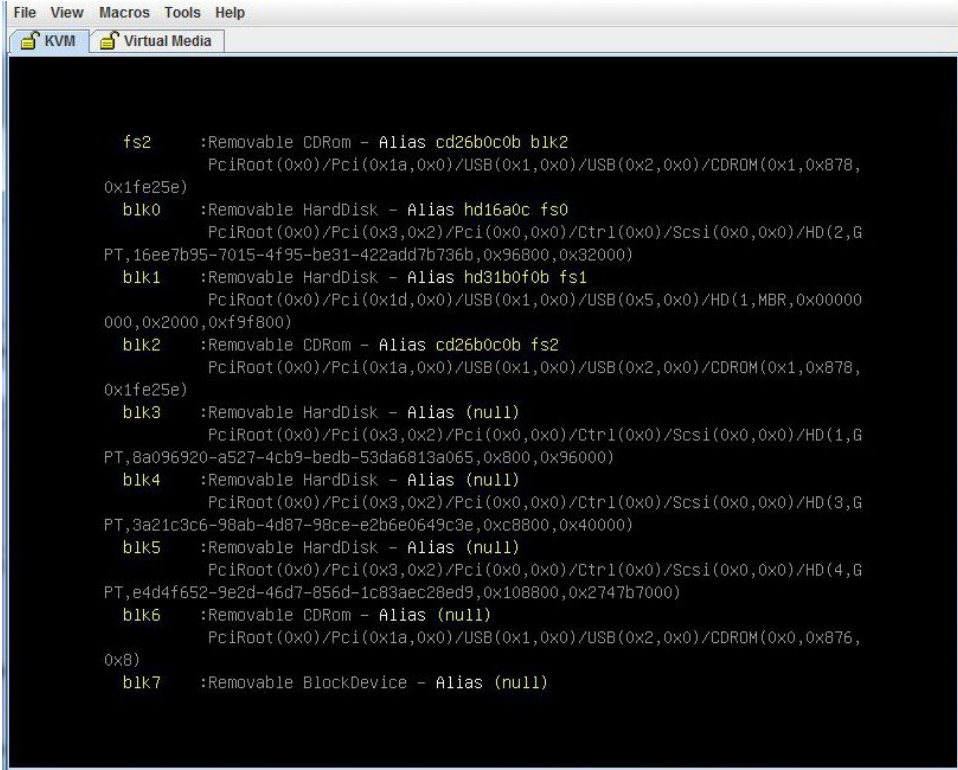
- Step 1** Configure all the drives in 'Unconfigured Good' state. Refer [Changing the Physical Drive State](#), on page 11
- Step 2** Configure a Virtual Drive 0 (VD0) using all the hard disks and put it in RAID 0. W2K12 will be installed on VD0 and the OS will recognize the entire storage capacity. Refer the procedure explained in [Installing W2K12 Using Legacy BIOS to Support RAID Volumes Larger than 2TB](#), on page 25
- Step 3** Enter BIOS setup and change storage to 'UEFI only'.
 - a) On a Cisco UCS-E180D-M2 server, go to **Boot > Launch Storage > OpROM** and, select 'UEFI only'.

Figure 37: Configuring BIOS Setup



- Step 4** Map ISO using virtual media or use the host image mapping. Configure 'CD/DVD' as the first bootable device using CIMC GUI.
- Step 5** Power cycle the server. Press F2 while booting up. Enter BIOS setup and select one time boot to **EFI shell**.
- Step 6** Boot from the EFI shell. Locate the file system number (fs#) that contains the 'Removable CDRom'.

Figure 38: Booting from EFI Shell

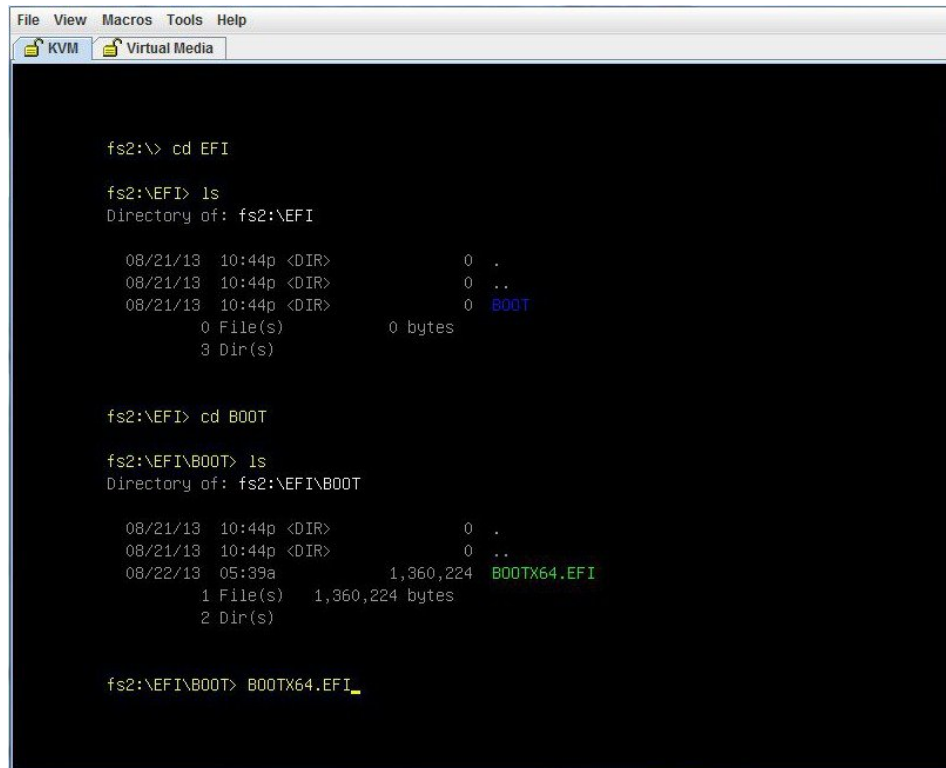


```

File View Macros Tools Help
KVM Virtual Media

fs2      :Removable CDRom - Alias cd26b0c0b b1k2
         PciRoot(0x0)/Pci(0x1a,0x0)/USB(0x1,0x0)/USB(0x2,0x0)/CDROM(0x1,0x878,
0x1fe25e)
b1k0     :Removable HardDisk - Alias hd16a0c fs0
         PciRoot(0x0)/Pci(0x3,0x2)/Pci(0x0,0x0)/Ctrl(0x0)/Scsi(0x0,0x0)/HD(2,G
PT,16ee7b95-7015-4f95-be31-422add7b736b,0x96800,0x32000)
b1k1     :Removable HardDisk - Alias hd31b0f0b fs1
         PciRoot(0x0)/Pci(0x1d,0x0)/USB(0x1,0x0)/USB(0x5,0x0)/HD(1,MBR,0x00000
000,0x2000,0xf9f800)
b1k2     :Removable CDRom - Alias cd26b0c0b fs2
         PciRoot(0x0)/Pci(0x1a,0x0)/USB(0x1,0x0)/USB(0x2,0x0)/CDROM(0x1,0x878,
0x1fe25e)
b1k3     :Removable HardDisk - Alias (null)
         PciRoot(0x0)/Pci(0x3,0x2)/Pci(0x0,0x0)/Ctrl(0x0)/Scsi(0x0,0x0)/HD(1,G
PT,8a096920-a527-4cb9-bedb-53da6813a065,0x800,0x96000)
b1k4     :Removable HardDisk - Alias (null)
         PciRoot(0x0)/Pci(0x3,0x2)/Pci(0x0,0x0)/Ctrl(0x0)/Scsi(0x0,0x0)/HD(3,G
PT,3a21c3c6-98ab-4d87-96ce-e2b6e0649c3e,0xc8800,0x40000)
b1k5     :Removable HardDisk - Alias (null)
         PciRoot(0x0)/Pci(0x3,0x2)/Pci(0x0,0x0)/Ctrl(0x0)/Scsi(0x0,0x0)/HD(4,G
PT,e4d4f652-9e2d-46d7-856d-1c83aec28ed9,0x108800,0x2747b7000)
b1k6     :Removable CDRom - Alias (null)
         PciRoot(0x0)/Pci(0x1a,0x0)/USB(0x1,0x0)/USB(0x2,0x0)/CDROM(0x0,0x876,
0x8)
b1k7     :Removable BlockDevice - Alias (null)

```

Figure 39: Booting from EFI Shell

The screenshot shows a terminal window titled "KVM Virtual Media" with a menu bar (File, View, Macros, Tools, Help). The terminal output is as follows:

```
fs2:\> cd EFI

fs2:\EFI> ls
Directory of: fs2:\EFI

08/21/13  10:44p <DIR>          0  .
08/21/13  10:44p <DIR>          0  ..
08/21/13  10:44p <DIR>          0  BOOT
0 File(s)  0 bytes
3 Dir(s)

fs2:\EFI> cd BOOT

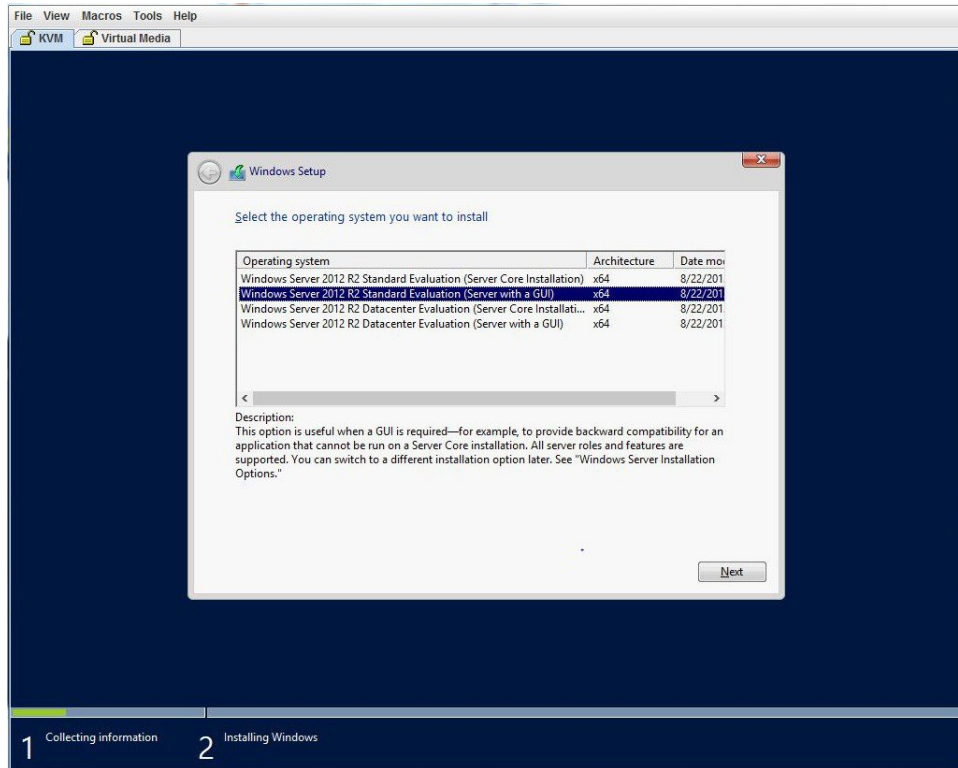
fs2:\EFI\BOOT> ls
Directory of: fs2:\EFI\BOOT

08/21/13  10:44p <DIR>          0  .
08/21/13  10:44p <DIR>          0  ..
08/22/13  05:39a                1,360,224  BOOTX64.EFI
1 File(s)  1,360,224 bytes
2 Dir(s)

fs2:\EFI\BOOT> BOOTX64.EFI_
```

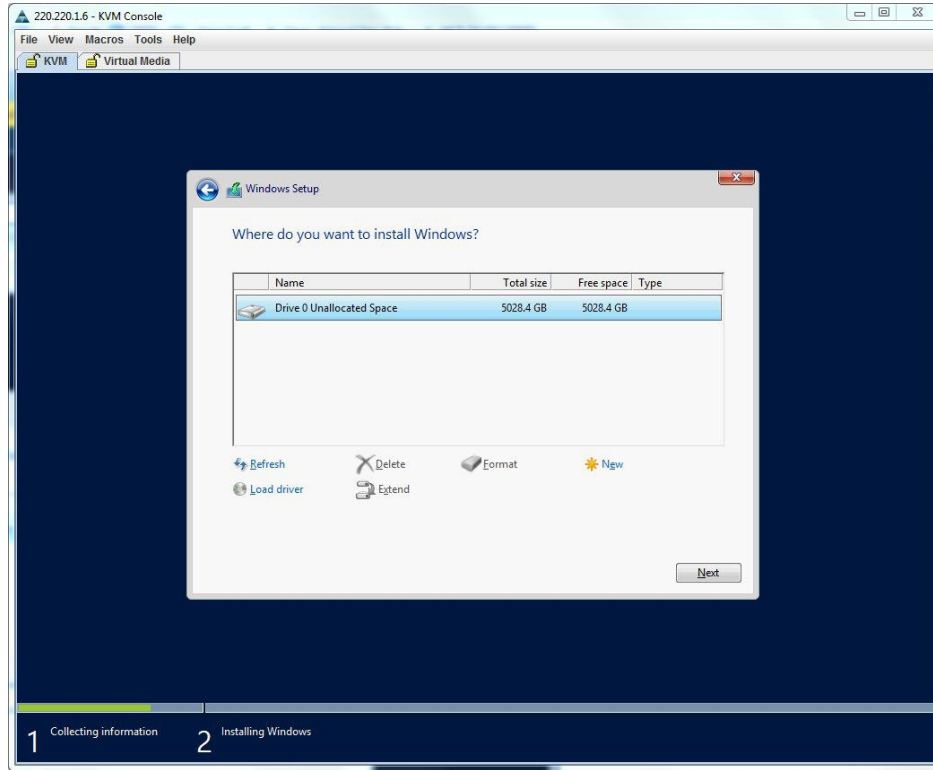
Step 7 Choose W2K12 Standard Evaluation Server with GUI. Click **Next**

Figure 40: Installing Windows Server



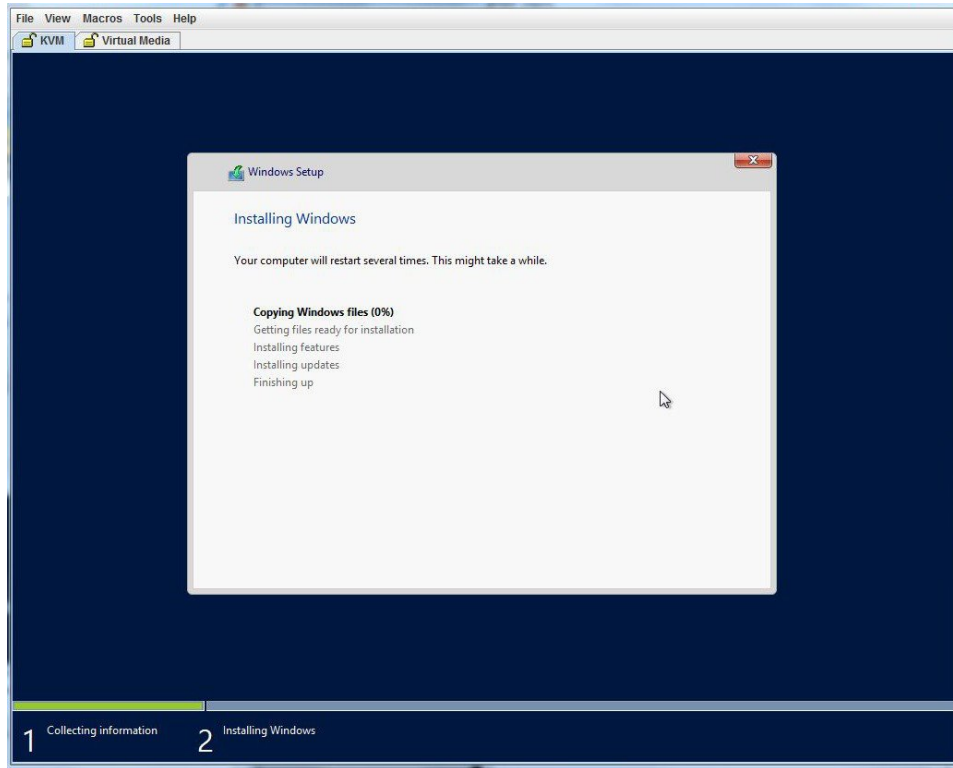
Step 8 Select the drive you want to install Windows. Click **Next**.

Figure 41: Installing Windows Server



Step 9 Wait till the installation completes.

Figure 42: Installing Windows Server



Step 10 After the installation, enter BIOS setup (press F2) or BIOS Boot Menu (press F6) and boot using Windows Boot Manager. You may find several Windows Boot Manager. Select the one that works.

Figure 43: Booting Using Windows Boot Manager from F2 Bios Setup

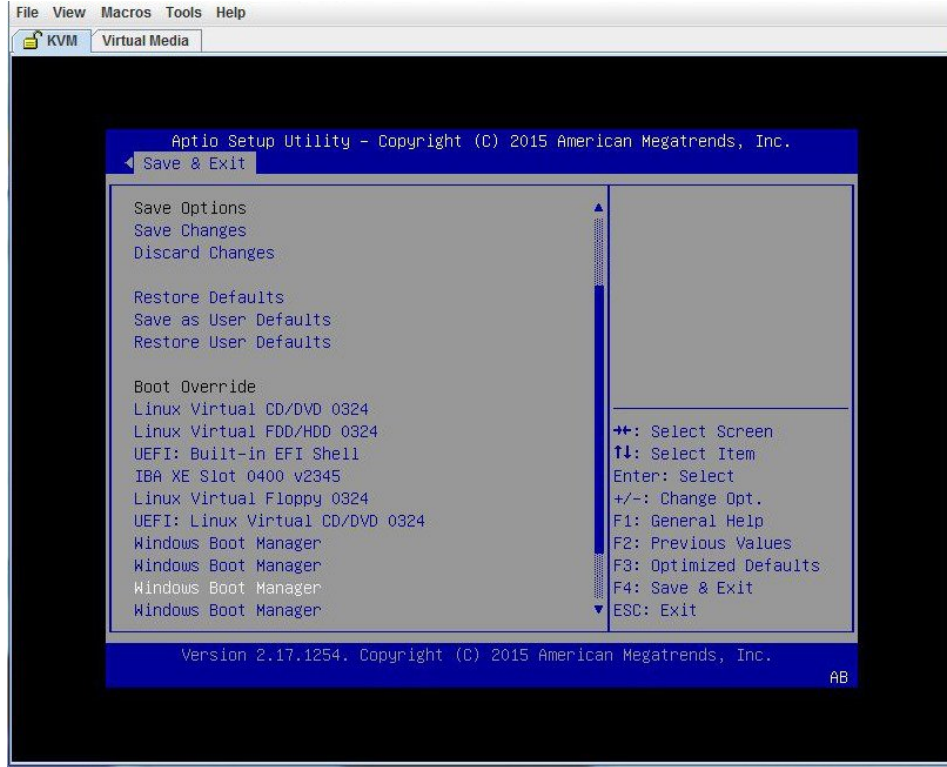
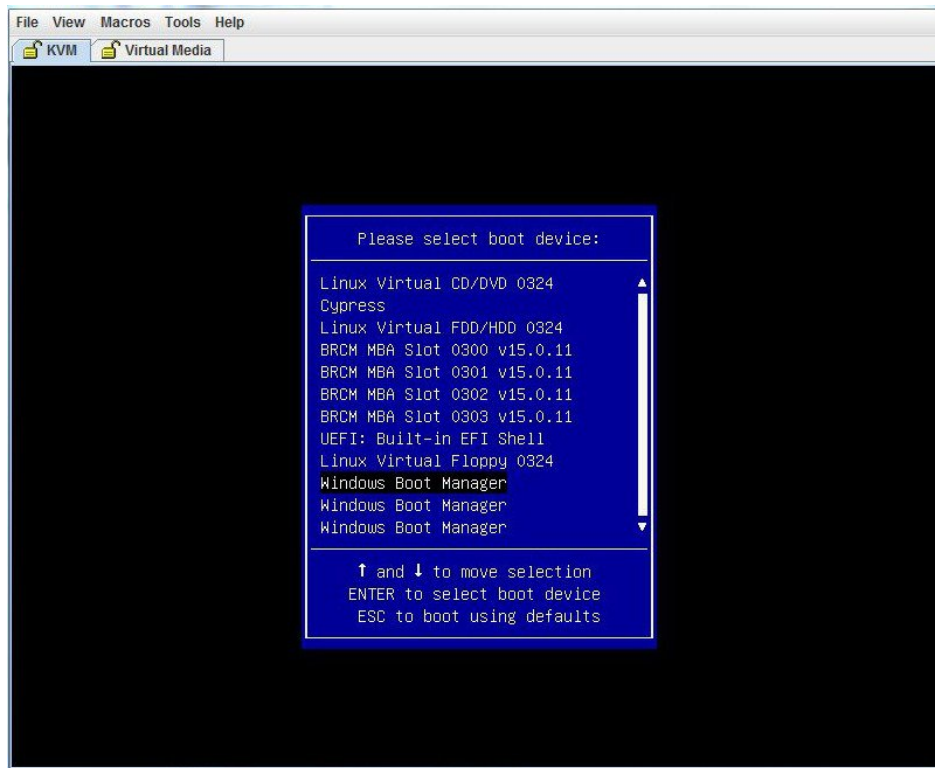
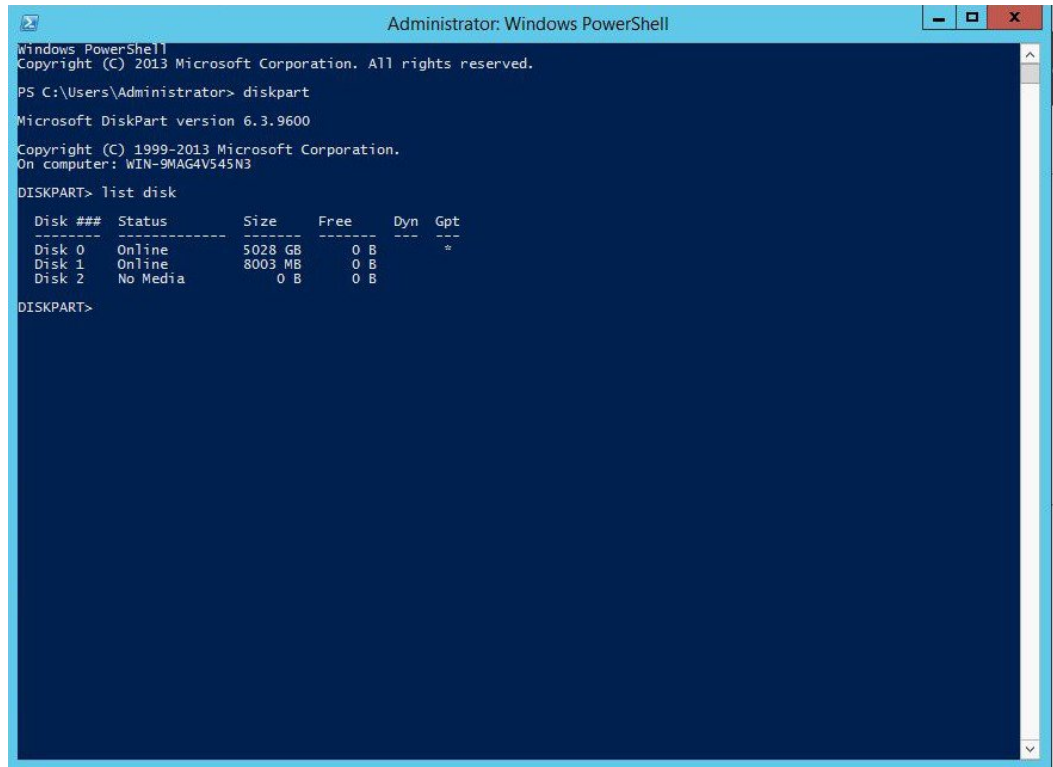


Figure 44: Booting Using Windows Boot Manager from F6 BIOS Boot Menu



Step 11 After W2K12 boots up, verify the GPT volume using the **diskpart** command.

Figure 45: Verifying the GPT Volume



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) 2013 Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> diskpart

Microsoft DiskPart version 6.3.9600

Copyright (C) 1999-2013 Microsoft Corporation.
On computer: WIN-9MAG4V545N3

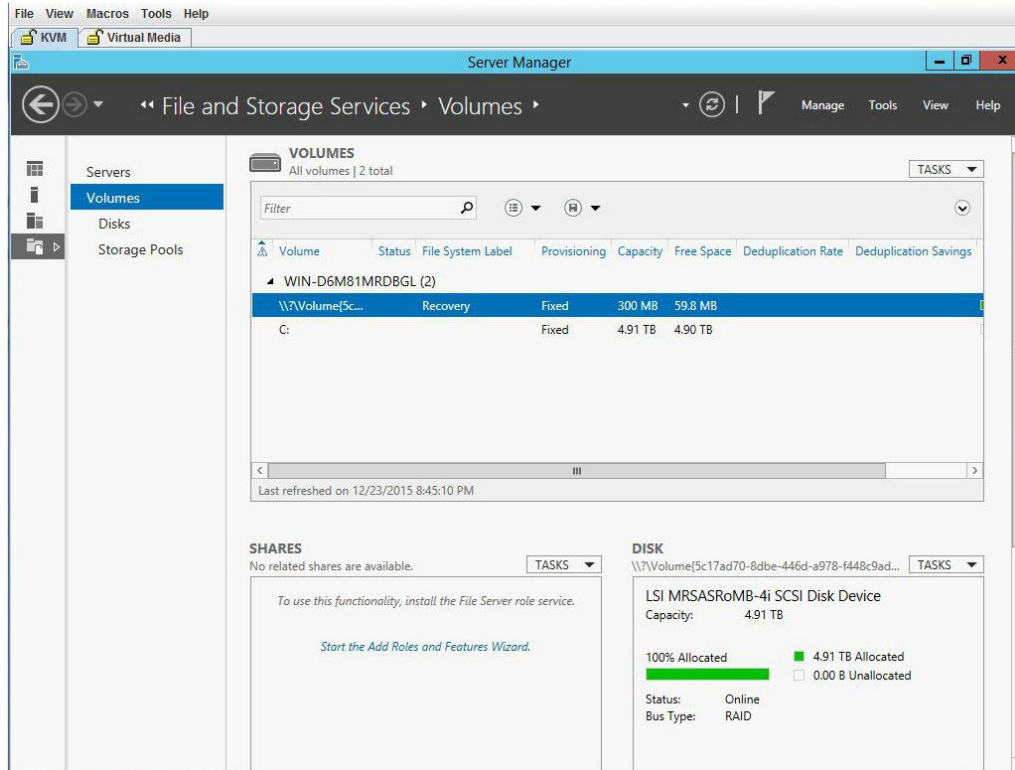
DISKPART> list disk

Disk ##  Status      Size      Free      Dyn  Gpt
-----  -
Disk 0   Online      5028 GB   0 B      ---  *
Disk 1   Online      8003 MB   0 B      ---  *
Disk 2   No Media    0 B      0 B      ---  *

DISKPART>
```

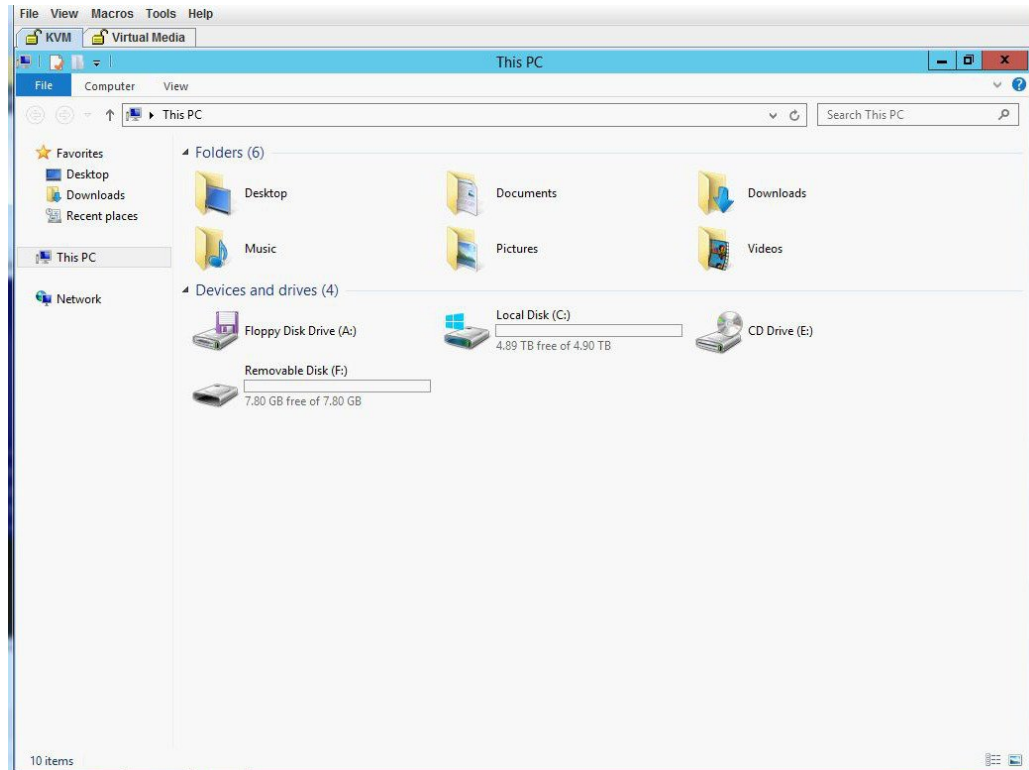
Step 12 Verify W2K12 recognizes the entire volume.

Figure 46: Verifying the Volume



Step 13 Verify W2K12 recognizes the full storage of C drive.

Figure 47: Verifying the Storage Capacity

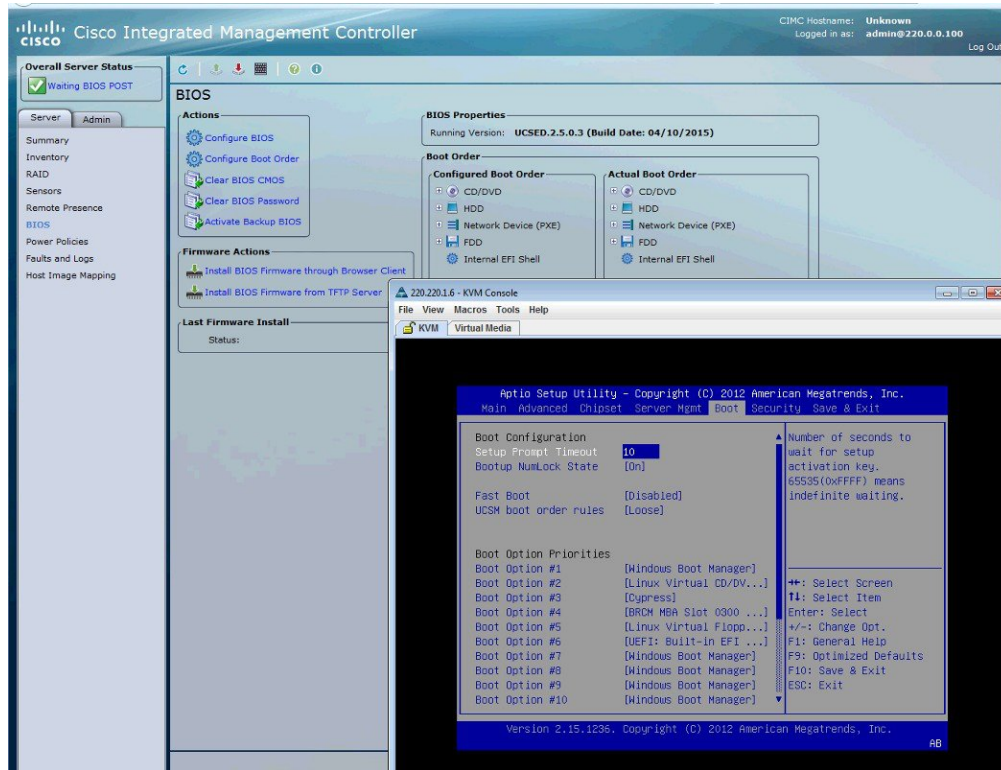


Step 14 To make W2K12 boot automatically, enter BIOS and make the following changes:

- a) Change 'UCSM boot order rules' from 'Strict' to 'Loose'. This change disallows CIMC to override BIOS boot order. The BIOS boot order will be used instead of CIMC boot order.

b) Move 'Windows Boot Manager' to top of the boot order.

Figure 48: BIOS Settings



Step 15 Finally, save your changes and exit BIOS setup.