Maintaining the Server

This chapter describes how to diagnose server system problems using LEDs. It also provides information about how to install or replace hardware components, and it includes the following sections:

Standalone Server Monitoring and Management Tools

Cisco Integrated Management Interface

You can monitor the server inventory, health, and system event logs by using the built-in Cisco Integrated Management Controller (Cisco IMC) GUI or CLI interfaces. See the user documentation for your firmware release at the following link: Cisco IMC configuration guides

Server Configuration Utility

Use the Cisco Server Configuration Utility (SCU) for C-Series servers to simplify the following tasks:

- Monitoring server inventory and health
- Diagnosing common server problems with diagnostic tools and logs
- Setting the BIOS booting order
- Configuring some RAID configurations
- Installing operating systems

You can download the ISO image from Cisco.com. See the user documentation for this utility at the following link: Server Configuration Utility Guides

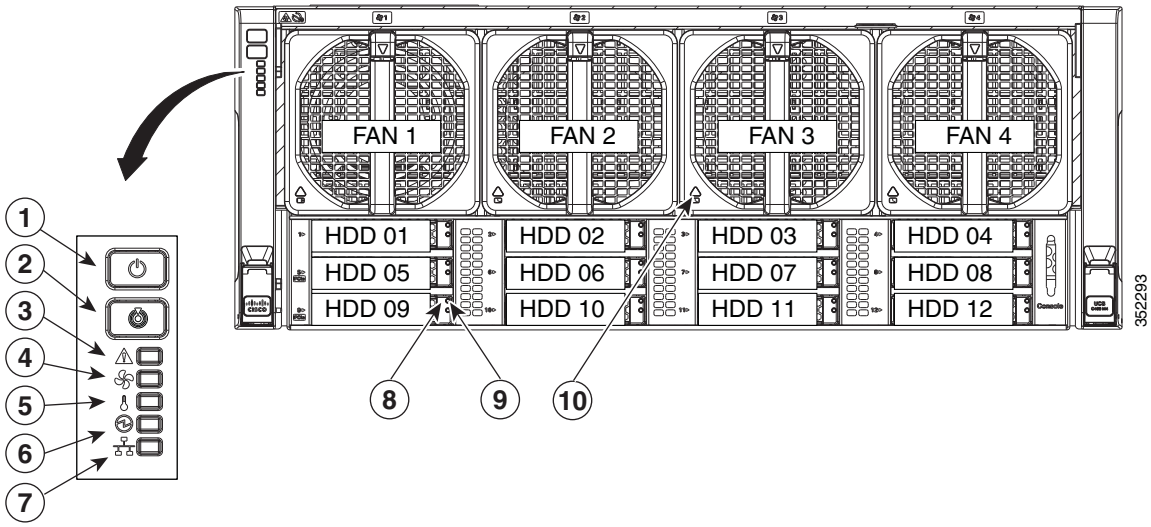
Status LEDs and Buttons

This section describes the location and meaning of LEDs and buttons and includes the following topics:

Front-Panel LEDs

Figure 3-1 shows the front-panel LEDs. Table 3-1 on page 3-3 defines the front-panel LED states.

Figure 3-1 Front-Panel LEDs



1	Power button and Power status LED	**6**	Power supply status LED
2	Identification button and LED	**7**	Network link activity LED
3	System status LED	**8**	Hard drive fault LED (on each drive tray) Note: NVMe PCIe drive LEDs have slightly different behavior. See the following table for an explanation of LED states.
4	Fan status LED	**9**	Hard drive activity LED (on each drive tray)
5	Temperature status LED	**10**	Fan fault LED (on each fan module)

Table 3-1 Front-Panel LEDs States

	LED Name	State
1	Power button/Power status LED	• Off—There is no AC power to the server. • Amber—The server is in standby power mode. Power is supplied only to the Cisco IMC and some motherboard functions. • Green—The server is in main power mode. Power is supplied to all components.
2	Identification	• Off—The Identification LED is not in use. • Blue—The Identification LED is activated.
3	System status	• Green—The server is running in normal operating condition. • Green, blinking—The server is performing system initialization and memory check. • Amber, steady—The server is in a degraded operational state. For example: – Power supply redundancy is lost. – CPUs are mismatched. – At least one CPU is faulty. – At least one DIMM is faulty. – At least one drive in a RAID configuration failed. • Amber, blinking—The server is in a critical fault state. For example: – Boot failed. – Fatal CPU and/or bus error is detected. – Server is in an over-temperature condition.
4	Fan status	• Green—All fan modules are operating properly. • Amber, steady—One fan module has failed. • Amber, blinking—Critical fault; two or more fan modules have failed.
5	Temperature status	• Green—The server is operating at normal temperature. • Amber, steady—One or more temperature sensors have exceeded a warning threshold. • Amber, blinking—One or more temperature sensors have exceeded a critical threshold.
6	Power supply status	• Green—All power supplies are operating normally. • Amber, steady—One or more power supplies are in a degraded operational state. • Amber, blinking—One or more power supplies are in a critical fault state.
7	Network link activity	• Off—The Ethernet link is idle. • Green—One or more Ethernet LOM ports are link-active. • Green, blinking—One or more Ethernet LOM ports are traffic-active.

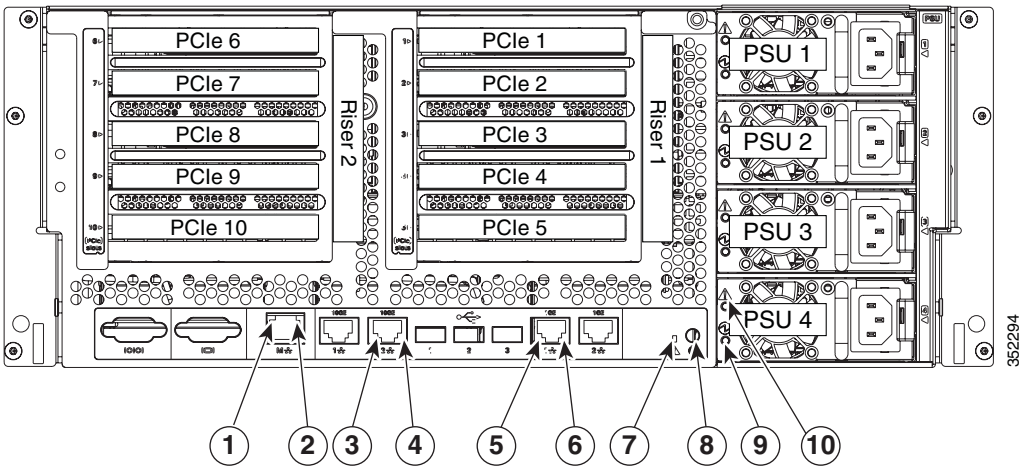
Table 3-1 Front-Panel LEDs States (continued)

	LED Name	State
8 **SAS**	SAS/SATA drive fault	• Off—The drive is operating properly. • Amber—This drive has failed. • Amber, blinking—The device is rebuilding.
9 **SAS**	SAS/SATA drive activity	• Off—There is no drive in the drive tray (no access, no fault). • Green—The drive is ready. • Green, blinking—The drive is reading or writing data.
8 **PCIe**	NVMe PCIe SSD status	• Off—The drive is not in use and can be safely removed. • Green—The drive is in use and functioning properly. • Green, blinking—the driver is initializing following insertion or the driver is unloading following an eject command. • Amber—The drive has failed. • Amber, blinking—A drive Locate command has been issued in the software.
9 **PCIe**	NVMe PCIe SSD activity	• Off—No drive activity. • Green, blinking—There is drive activity.
10	Fan fault	• Off—The fan is operating properly. • Amber—The fan has failed.

Rear-Panel LEDs and Buttons

Figure 3-2 shows the rear-panel LEDs and buttons. Table 3-2 on page 3-5 defines the rear-panel LED states.

Figure 3-2 Rear-Panel LEDs and Buttons



1	1 Gb dedicated management Ethernet link speed	**6**	10-Gb Ethernet link status
2	1 Gb dedicated management Ethernet link status	**7**	System status LED
3	1-Gb Ethernet link speed	**8**	Rear identification button and LED
4	1-Gb Ethernet link status	**9**	Power supply status
5	10-Gb Ethernet link speed	**10**	Power supply fault

Table 3-2 Rear-Panel LED States

	LED Name	State
1	1-Gb (dedicated management) Ethernet link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
2	1-Gb (dedicated management) Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
3	1-Gb Ethernet link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.

Table 3-2 Rear-Panel LED States (continued)

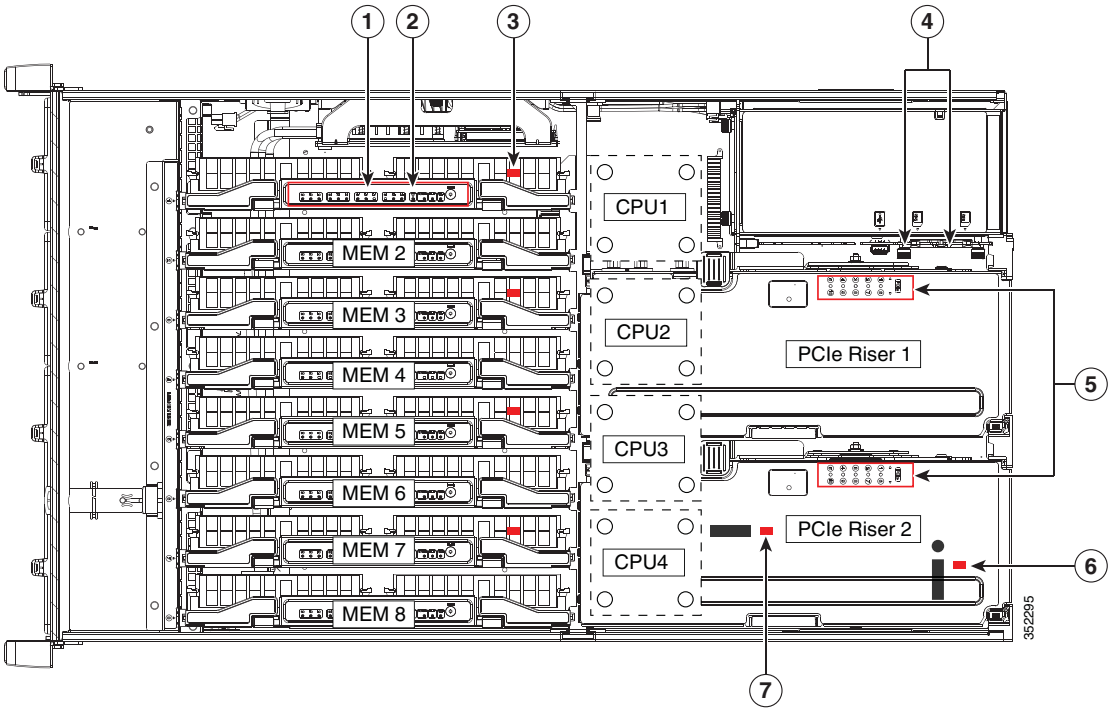
	LED Name	State
4	1-Gb Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
5	10-Gb Ethernet link speed	• Off—Link speed is 10/100 Mbps. • Amber—Link speed is 1 Gbps. • Green—Link speed is 10 Gbps.
6	10-Gb Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
7	System status	• Green—The server is running in normal operating condition. • Green, blinking—The server is performing system initialization and memory check. • Amber, steady—The server is in a degraded operational state. For example: – Power supply redundancy is lost. – CPUs are mismatched. – At least one CPU is faulty. – At least one DIMM is faulty. – At least one drive in a RAID configuration failed. • Amber, blinking—The server is in a critical fault state. For example: – Boot failed. – Fatal CPU and/or bus error is detected. – Server is in an over-temperature condition.
8	Identification	• Off—The identification LED is not in use. • Blue—The identification LED is activated.
9	Power supply AC input	• Green, steady—The power supply is operating normally and supplying DC power to the server. • Green, blinking—AC power is OK, DC output not enabled (sleep mode).
10	Power supply fault	• Off—The power supply is operating normally. • Amber, blinking—An event warning threshold has been reached, but the power supply continues to operate. • Amber, steady—A critical fault threshold has been reached, causing the power supply to shut down.

Internal Diagnostic LEDs

The server is equipped with a supercap voltage source that can activate internal fault LEDs up to 30 minutes after AC power is removed. The server has internal fault LEDs for CPU sockets, DIMM sockets, the motherboard RTC battery, PCIe sockets, TPM socket, and Cisco Flexible Flash drive bays.

To use these LEDs to identify a failed component, press the front or rear identification button with AC power removed (see Figure 3-1 or Figure 3-2 for the identification button location). See Figure 3-3 for the locations of these internal LEDs.

Figure 3-3 Internal Diagnostic LED Locations



1	DIMM fault LEDs on each memory riser (one LED for each DIMM socket)	**5**	PCIe card fault LEDs on each PCIe riser (one LED for each PCIe socket)
2	Memory riser fault LED on each memory riser	**6**	TPM fault LED on motherboard (CR9)
3	CPU fault LEDs on motherboard (directly in front of each CPU socket): • CPU1 LED = CR4 • CPU2 LED = CR5 • CPU3 LED = CR6 • CPU4 LED = CR7	**7**	RTC battery fault LED on motherboard (CR8)
4	Cisco Flexible Flash Drive fault LEDs on the media riser • Slot 1 = CR11 (on media riser) • Slot 2 = CR9 (on media riser)		

Table 3-3 Internal Diagnostic LED States

LED Name	State
Internal diagnostic LEDs (all)	• Off—Component is functioning normally. • Amber—Component has failed.

Preparing for Server Component Installation

This section describes how to prepare for component installation, and it includes the following topics:

Required Equipment

The following equipment is used to perform the procedures in this chapter:

- Number 2 Phillips-head screwdriver
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

Shutting Down and Powering Off the Server

The server can run in two power modes:

- Main power mode—Power is supplied to all server components and any operating system on your hard drives can run.
- Standby power mode—Power is supplied only to the service processor and the cooling fans. It is safe to power off the server from this mode.

You can invoke a graceful shutdown or a hard shutdown by using either the Cisco Integrated Management Controller (Cisco IMC) interface or the Power button on the front panel.

Step 1 Check the color of the Power Status LED (see the "Front-Panel LEDs" section on page 3-2).

- Green—The server is in main power mode and must be shut down before it can be safely powered off. Go to Step 2.
- Amber—The server is already in standby mode and can be safely powered off. Go to Step 3.

Step 2 Invoke either a graceful shutdown or a hard shutdown:

Caution To avoid data loss or damage to your operating system, you should always invoke a graceful shutdown of the operating system.

- Graceful shutdown—Press and release the **Power** button. The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power Status LED.
- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.

Step 3 Disconnect the power cords from the power supplies in your server to completely remove AC power and power off the server.

Removing or Replacing the Front Bezel (Optional)

You must remove the optional front bezel to access the hot-swappable drives and fan modules.

Step 1 Remove the front bezel:

- **a.** If the bezel is locked, use the key to unlock it.
- **b.** Slide the finger latch that is on the left side upward, and then swing the left edge of the bezel away from the server.
- **c.** Lift the bezel from the server and set it aside.

Step 2 Replace the front bezel:

- **a.** Align the bezel with the front of the server.
- **b.** Set the three pegs on the right-hand edge of the bezel into the three indentations in the server.
- **c.** Swing the left side of the bezel inward until the latch on the bezel engages with the server.

Removing or Replacing the Server Top Cover

Tip You do not have to remove the cover to replace fan modules, hard drives, or power supplies.

Step 1 Remove the top cover:

a. If the cover latch is locked, use a screwdriver to turn the lock 90-degrees counterclockwise to unlock it. See Figure 3-4.

b. Lift on the end of the latch with the green finger grip. The cover is pushed back to the open position as you lift the latch.

c. Lift the top cover straight up from the server and set it aside.

Step 2 Replace the top cover:

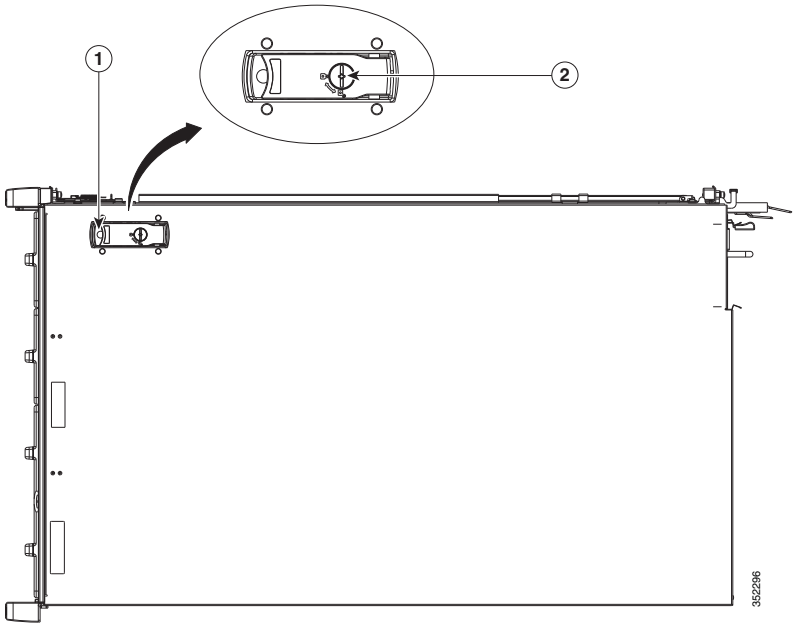
Note The latch must be in the fully open position when you set the cover back in place, which allows the opening in the latch to sit over a peg that is on the chassis.

a. With the latch in the fully open position, place the cover on top of the server about one-half inch (1.27 cm) behind the lip of the chassis front panel. The opening in the latch should fit over the peg that sticks up from the chassis.

b. Press the cover latch down to the closed position. The cover is pushed forward to the closed position as you push down the latch.

c. If desired, lock the latch by using a screwdriver to turn the lock 90-degrees clockwise.

Figure 3-4 Removing the Top Cover

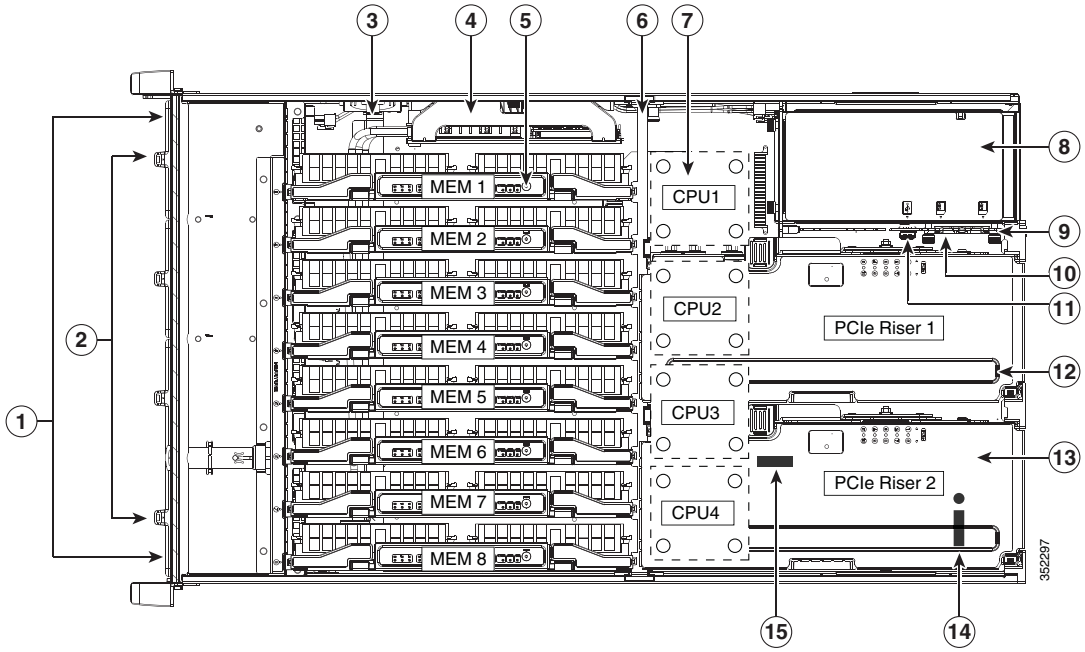


1	Cover latch	2	Cover latch lock

Replaceable Component Locations

This section shows the locations of the components that are discussed in this chapter. The view in Figure 3-5 is from the top down with the top cover removed.

Figure 3-5 Replaceable Component Locations



1	Drive bays (up to 12 2.5-inch drives) • All 12 bays support SAS/SATA drives. • Bays 5 and 9 support NVMe PCIe SSD drives and SAS/SATA drives.	**9**	Media riser card (includes two bays for Cisco Flexible Flash drives, an internal USB port, and the DIP switches)
2	Fan modules (four, hot-swappable and front-accessible)	**10**	Cisco Flexible Flash drive (SD card) bays (two on the media riser card)
3	RAID backup unit (supercap power module) mounting bracket on the chassis wall	**11**	Internal, vertical USB 2.0 port (on the media riser card)
4	RAID controller card socket (dedicated internal PCIe socket)	**12**	PCIe riser 1 (PCIe slots 1–5)
5	Memory risers with DIMMs (8 risers with 12 DIMM sockets each)	**13**	PCIe riser 2 (PCIe slots 6–10)
6	Chassis mid-brace	**14**	TPM socket and screw hole (on motherboard, not visible under riser in this view)
7	CPUs and heat sinks (two or four) The CPUs and their heat sinks are below the memory risers and PCIe risers.	**15**	RTC battery (on motherboard, not visible under riser in this view)
8	Power supplies (two or four, redundant as 2+2) Power supplies are hot-swappable.		

Hot-Swap or Hot-Plug Replacement

Certain components can be removed and replaced without powering off and removing AC power from the server. This type of replacement has two varieties: hot-swap and hot-plug.

- Hot-swap replacement—You do not have to precondition or shut down the component in the software before you remove it for the following:
  - SAS/SATA drives
  - Cooling fan modules
  - Power supplies (when 2+2 redundant)
- Hot-plug replacement—You must take the component offline before removing it and bring it back online before using it for the following:
  - Memory risers (requires operating system support)
  - NVMe PCIe SSD drives

Note See the release notes for your operating system and your Cisco IMC/BIOS release for details and restrictions on hot-plugging: Cisco IMC Release Notes.

Replacing Server Components

Warning **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**
Statement 1029

Caution When handling server components, wear an ESD strap to avoid electrostatic damage.

Caution This server weighs approximately 130 pounds (59 kilograms) when fully loaded with components. We recommend that you use a minimum of two people when lifting the server. Attempting to lift the server alone could result in personal injury or equipment damage.

This section describes how to install and replace server components, and it includes the following topics:

Replacing SAS/SATA Hard Drives or Solid State Drives

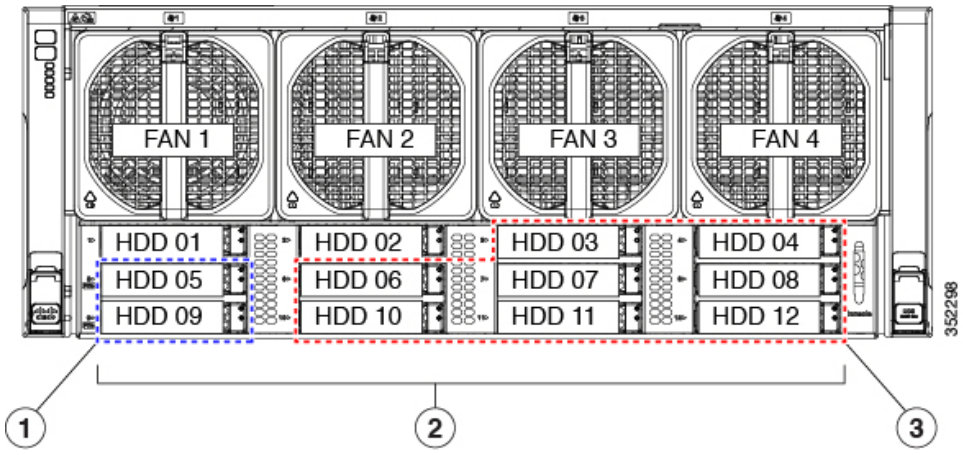
This section includes the following topics:

SAS/SATA Drive Population Guidelines

The server can hold up to 12 SAS/SATA hard drives or solid state drives (SSDs). Figure 3-6 shows the drive bays and the drive bay numbering.

All drive bays support SAS and SATA drives. Drive bays 5 and 9 also support NVMe PCIe SSDs.

Figure 3-6 Drive Bays and Drive Bay Numbering



1	Drive bays 5 and 9 These two bays support NVMe PCIe SSDs and SAS/SATA drives.	**3**	Drive bays 3, 4, 6, 7, 8, 10, 11, and 12 When using the Cisco UCS 12G SAS Modular **8-Port** RAID Controller (UCSC-MRAID12G), the 8 SAS/SATA drives must be in these 8 drive bays.
2	Drive bays 1–12 All bays support SAS and SATA drives. When using the Cisco UCS 12G SAS Modular **12-Port** RAID Controller (UCSC-MRAIDC460), you can control all 12 SAS/SATA drives.		

Observe these drive population guidelines for optimum performance:

- When using the Cisco UCS 12G SAS Modular **12-Port** RAID Controller (UCSC-MRAIDC460), you can control all 12 SAS/SATA drives. You can populate all 12 drive bays with SAS/SATA drives.
- When using the Cisco UCS 12G SAS Modular **8-Port** RAID Controller (UCSC-MRAID12G), the eight SAS/SATA drives must be in bays 3, 4, 6, 7, 8, 10, 11, and 12, as shown in Figure 3-6.

  See RAID Controller Cabling, page C-6 for information about cabling for specific bays and how those bays are grouped.
- Keep an empty drive blanking tray in any unused slots to ensure proper airflow.
- You can mix hard drives and SSDs in the same server. However, you cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. When you create a logical volume, it must contain all hard drives or all SSDs.

4K Sector Format Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. See Setting Up Booting in UEFI Mode in the BIOS Setup Utility, page 3-16 or Setting Up Booting in UEFI Mode in the Cisco IMC GUI, page 3-16.
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- Operating system support on 4K sector drives is as follows: Windows: Win2012 and Win2012R2; Linux: RHEL 6.5, 6.6, 6.7, 7.0, 7.2; SLES 11 SP3, and SLES 12. ESXi/Vmware is not supported.

Setting Up Booting in UEFI Mode in the BIOS Setup Utility

Step 1 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

Step 2 Go to the **Boot Options** tab.

Step 3 Set **UEFI Boot Options** to **Enabled**.

Step 4 Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.

Step 5 Go to the **Advanced** tab.

Step 6 Select **LOM and PCIe Slot Configuration**.

Step 7 Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.

Step 8 Press **F10** to save changes and exit the BIOS setup utility. Allow the server to reboot.

Step 9 After the OS installs, verify the installation:

a. Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

b. Go to the **Boot Options** tab.

c. Under **Boot Option Priorities**, verify that the OS you installed is listed as your **Boot Option #1**.

Setting Up Booting in UEFI Mode in the Cisco IMC GUI

Step 1 Use a web browser and the IP address of the server to log into the Cisco IMC GUI management interface.

Step 2 Navigate to **Server > BIOS**.

Step 3 Under **Actions**, click **Configure BIOS**.

Step 4 In the Configure BIOS Parameters dialog, select the **Advanced** tab.

Step 5 Go to the **LOM and PCIe Slot Configuration** section.

Step 6 Set the **PCIe Slot: HBA Option ROM** to **UEFI Only**.

Step 7 Click **Save Changes**. The dialog closes.

Step 8 Under **BIOS Properties**, set **Configured Boot Order** to **UEFI**.

Step 9 Under **Actions**, click **Configure Boot Order**.

Step 10 In the Configure Boot Order dialog, click **Add Local HDD**.

Step 11 In the Add Local HDD dialog, enter the information for the 4K sector format drive and make it first in the boot order.

Step 12 Save changes and reboot the server. The changes you made will be visible after the system reboots.

Replacing a SAS or SATA Drive

Tip You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable. To replace an NVMe PCIe SSD drive, which must be shut down before removal, see Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD, page 3-19

For information about drive tray LEDs, see Front-Panel LEDs, page 3-2.

Step 1 Remove the drive that you are replacing or remove a blank tray from an empty bay:

a. Remove the front bezel from the server, if one is attached. See Removing or Replacing the Front Bezel (Optional), page 3-9.

b. Press the release button on the face of the drive tray. See Figure 3-7.

c. Grasp and open the ejector lever and then pull the drive tray out of the slot.

d. If you are replacing an existing drive, remove the four drive tray screws that secure the drive to the tray and then lift the drive out of the tray.

Step 2 Install a new drive:

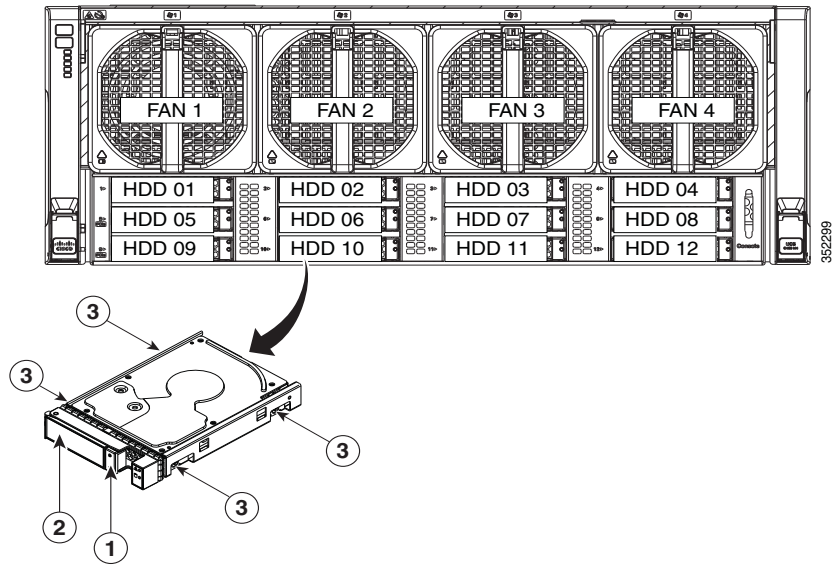
a. Place a new drive in the empty drive tray and replace the four drive tray screws.

b. With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.

c. Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

d. Replace the front bezel to the server, if you removed one.

Figure 3-7 Removing Drives



1	Release button	**3**	Drive tray securing screws (4)
2	Ejector lever		

Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD

This section is for replacing 2.5-inch small form-factor (SFF) NVMe PCIe SSDs in front-panel drive bays. To replace HHHL form-factor NVMe PCIe SSDs in the PCIe slots, see Replacing an HHHL Form Factor NVMe PCIe SSD, page 3-22.

2.5-Inch Form-Factor NVMe PCIe SSD Population Guidelines

Populate NVMe SFF 2.5-inch SSDs only in bays 5 and 9 (see Figure 3-6).

- Four-CPU systems—You can populate bays 5 and 9.
- Two-CPU systems—In a two-CPU system, bay 9 not available. Therefore, you can populate only bay 5.

Number of CPUs in System	NVMe SFF 2.5-Inch SSD Drive Bays Supported
4	Bays 5 and 9
2	Bay 5 only

2.5-Inch Form-Factor NVMe PCIe SSD Requirements and Restrictions

Observe these restrictions for NVMe SFF 2.5-inch SSDs:

- You can boot (UEFI only) from an NVMe SFF 2.5-inch SSD only with Cisco IMC 2.0(13) or later server firmware. For Cisco UCS Manager-integrated servers, booting is supported only with Cisco UCS Manager 3.1(2) or later software.
- NVMe SFF 2.5-inch SSDs support booting only in UEFI mode. Legacy boot is not supported.
- You cannot control an NVMe SFF 2.5-inch SSD with a SAS RAID controller because NVMe SSDs communicate with the server via the PCIe bus.
- You can combine NVMe SFF 2.5-inch SSDs and HHHL form-factor SSDs in the same system, but the same partner brand must be used. For example, two Intel NVMe SFF 2.5-inch SSDs and 10 HHHL form-factor HGST SSDs is an invalid configuration. A valid configuration is two *HGST* NVMe SFF 2.5-inch SSDs and 10 *HGST* HHHL form-factor SSDs.
- UEFI boot is supported in the five operating systems listed in Table 3-4, when your server is running Cisco IMC 2.0(13) or later firmware. Refer to this table for OS-informed hot-insertion and hot-removal support by operating system:

Table 3-4 2.5-Inch Form Factor NVMe SSD Hot Insertion/Hot Removal Support By OS

NVMe SSD	NVMe SSD Firmware Minimum	Win 2012	Win 2012R	RHEL 7.2	SLES 12 SP1	ESXi 6.2
Intel UCS-PCI25-8003	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-16003	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-40010	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-80010	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-38TB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-16TB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-800GB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported

Enabling Hot-Plug Support in the System BIOS

In Cisco IMC 2.0(13) and later, hot-plug (OS-informed hot-insertion and hot-removal) is disabled in the system BIOS by default.

- If the system was ordered with NVMe PCIe SSDs, the setting was enabled at the factory. No action is required.
- If you are adding NVMe PCIe SSDs after-factory, you must enable hot-plug support. See the following procedures.

Enabling Hot-Plug Support in the BIOS Setup Utility

Step 1 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

Step 2 Locate the setting: **Advanced > PCI Subsystem Settings > NVMe SSD Hot-Plug Support**.

Step 3 Set the value to **Enabled**.

Step 4 Save your changes and exit the utility.

Enabling Hot-Plug Support in the Cisco IMC GUI

Step 1 Use a browser to log into the Cisco IMC GUI for the system.

Step 2 Navigate to **Compute > BIOS > Advanced > PCI Configuration**.

Step 3 Set **NVME SSD Hot-Plug Support** to **Enabled**.

Step 4 Save your changes and exit the software.

Replacing an NVMe SFF 2.5-Inch PCIe SSD

Note OS-surprise removal is not supported. OS-informed hot-insertion and hot-removal are supported only with Cisco IMC release 2.0(13) and later and they depend on your OS version. See Table 3-4 for support by OS.

Note OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See Enabling Hot-Plug Support in the System BIOS, page 3-20.

For information about drive tray LEDs, see Front-Panel LEDs, page 3-2.

Step 1 Shut down the NVMe SFF 2.5-inch SSD to initiate an OS-informed removal. Use your operating system interface to shut down the drive, and then observe the drive-tray status LED:

- Green—The drive is in use and functioning properly. Do not remove.
- Green, blinking—the driver is unloading following a shutdown command. Do not remove.
- Off—The drive is not in use and can be safely removed.

Step 2 Remove the SSD that you are replacing:

a. Remove the front bezel from the server, if one is attached. See Removing or Replacing the Front Bezel (Optional), page 3-9.

b. Press the release button on the face of the drive tray. See Figure 3-7.

c. Grasp and open the ejector lever and then pull the drive tray out of the slot.

d. If you are replacing an existing drive, remove the four drive tray screws that secure the drive to the tray and then lift the drive out of the tray.

Step 3 Install a new SSD:

a. Place a new drive in the empty drive tray and replace the four drive tray screws.

b. With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.

c. Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

Step 4 Observe the drive-tray status LED and wait until it returns to solid green before accessing the SSD:

- Off—The SSD is not in use.
- Green, blinking—the driver is initializing following hot-plug insertion.
- Green—The SSD is in use and functioning properly.

Step 5 Replace the front bezel to the server, if you removed one.

Replacing an HHHL Form Factor NVMe PCIe SSD

The half-height, half-length- (HHHL-) form-factor NVMe PCIe SSDs install to the PCIe riser slots in the same way as a PCIe card. To install a 2.5-inch form-factor NVME SSD in the front-panel drive bays, see Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD, page 3-19.

HHHL Form-Factor NVMe SSD Population Guidelines

Observe the following population guidelines when installing HHHL form-factor NVMe SSDs:

- Four-CPU systems—You can populate up to 10 HHHL form-factor SSDs, using PCIe slots 1–10.
- Two-CPU systems—In a two-CPU system, PCIe riser 2, which has slots 6 - 10 is not available. Therefore, the maximum number of HHHL form-factor SSDs you can populate is 5, in PCIe slots 1–5.

Number of CPUs in System	PCIe Slots Supported
4	1 – 10
2	1 – 5

HHHL-Format NVMe SSD Requirements and Restrictions

Observe these restrictions for NVMe PCIe SSDs:

- You cannot boot from an HHHL form-factor NVMe PCIe SSD.
- You cannot control an HHHL form-factor SSD with a SAS RAID controller because NVMe SSDs communicate with the server via the PCIe bus.
- You can combine NVMe SFF 2.5-inch SSDs and HHHL form-factor SSDs in the same system, but the same partner brand must be used. For example, two Intel NVMe SFF 2.5-inch SSDs and 10 HHHL form-factor HGST SSDs is an invalid configuration. A valid configuration is two *HGST* NVMe SFF 2.5-inch SSDs and 10 *HGST* HHHL form-factor SSDs.

Replacing an HHHL Form-Factor NVME PCIe SSD

Note In a two-CPU server, PCIe riser 2 (PCIe slots 6–10) is not available.

Step 1 Shut down and power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

Step 2 Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

Step 3 Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Step 4 Remove the PCIe riser from the server:

- **a.** Lift on the blue plastic retaining latch at the top of the PCIe riser until the latch is vertical (see Figure 3-8). The lever action disengages the riser's connector from the motherboard socket.
- **b.** Lift straight up on both ends of the PCIe riser and remove it from the server. Set the riser on an antistatic surface.
- **c.** Open the hinged blue plastic card cover (see Figure 3-8).
- **d.** Open the hinged card-tab retainer (see Figure 3-8). Pinch the two blue finger grips toward the center and swing open the retainer.

Step 5 Pull evenly on both corners of the HHHL form-factor SSD to remove it from the socket on the PCIe riser.

Step 6 Install an HHHL form-factor SSD to the PCIe riser:

- **a.** Align the new HHHL form-factor SSD with the empty socket on the PCIe riser assembly.
- **b.** Push down evenly on both ends of the card until it is fully seated in the socket.
- **c.** Close the hinged card-tab retainer and press it down until it clicks and locks in place.
- **d.** Close the hinged blue plastic card cover.

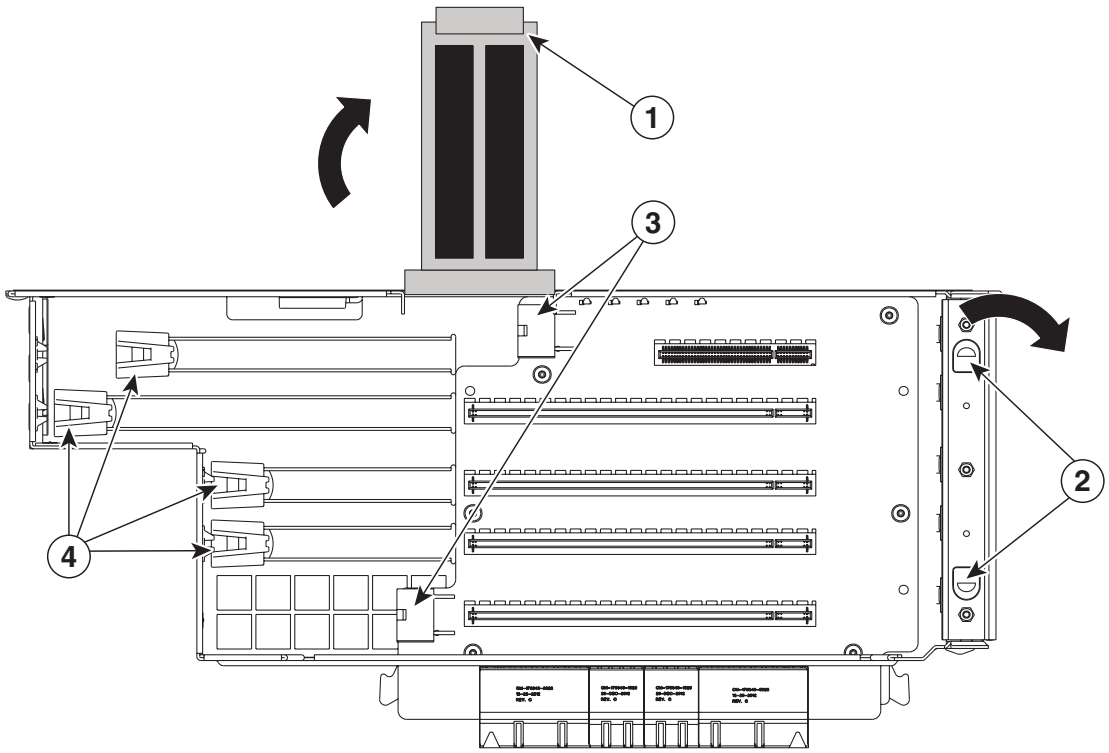
Step 7 Install the PCIe riser:

- **a.** Align the riser so that its connector is over the motherboard socket.
- **b.** With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until its connector makes contact with the motherboard socket.
- **c.** Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.

Step 8 Replace the top cover.

Step 9 Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-8 PCIe Riser Card Retention Features



1	Hinged blue plastic card cover	**3**	Power connectors
2	Hinged card-tab retainer finger grips	**4**	Adjustable card braces

Replacing Fan Modules

The four fan modules in the server are numbered as shown in Figure 3-9. You do not have to shut down or power off the server to replace fan modules because they are hot-swappable.

Tip Each fan module has a fault LED on its face that lights amber if the fan module fails.

Step 1 Remove the fan module that you are replacing (see Figure 3-9):

a. Remove the front bezel from the server, if one is attached. See Removing or Replacing the Front Bezel (Optional), page 3-9.

b. Grasp the handle on the front of the fan module while depressing the release button with your thumb.

c. Pull the fan module straight out of the bay.

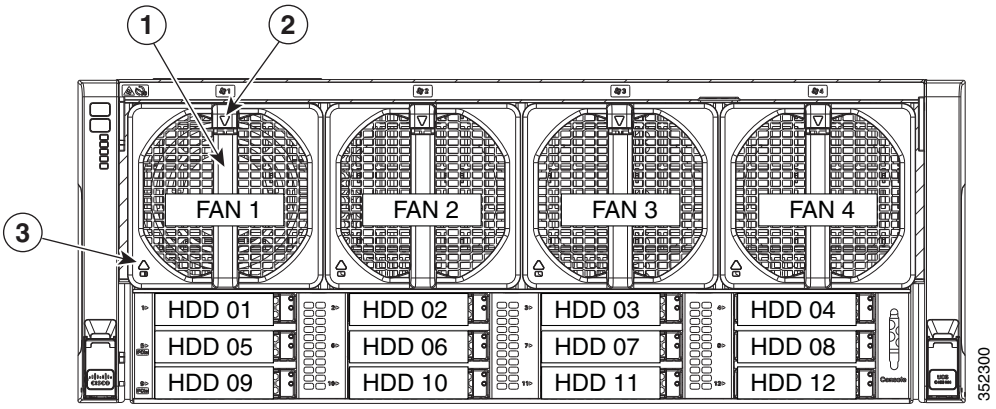
Step 2 Install a new fan module:

a. Grasp the fan module by its handle and align it with the empty fan bay.

b. Push the fan module straight into the bay until the release button clicks to lock the fan module in place.

c. Replace the front bezel to the server, if you removed one.

Figure 3-9 Fan Modules



1	Fan module handle	**2**	Fan module release button

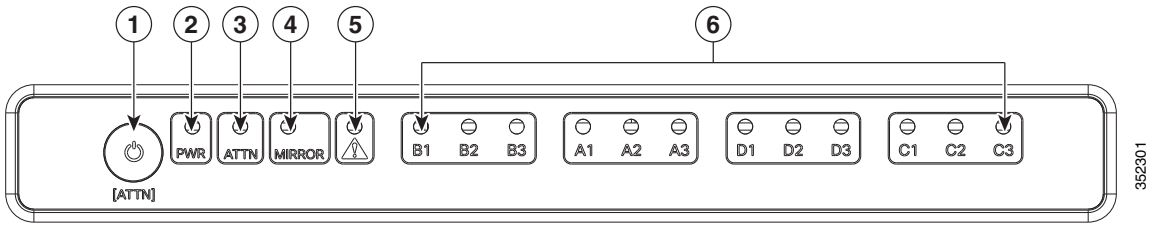
Replacing Memory Risers

Caution DDR4 memory risers are available for use with DDR4 DIMMs and EX v3 or v4 CPUs. You must upgrade the firmware before you upgrade the hardware. See Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35.

The 8 memory risers connect to motherboard sockets and each riser provides 12 DIMM slots. Each riser has two memory buffers, each with two DDR channels of three DIMMs. The memory riser is hot-pluggable when you use the Attention button to take the riser offline, as described in the procedure in this section. (This feature is available only on supported operating systems. Some operating systems support only hot-add, but not hot-remove.)

Note See the release notes for your operating system and your Cisco IMC/BIOS release for details and restrictions on hot-plugging: Cisco IMC Release Notes.

Figure 3-10 Memory Riser LEDs (Top View)



1	Attention button (used for hot-plugging)	**4**	Mirror activity LED (lights when memory mirroring is enabled in the BIOS)
2	Power LED (indicates when the riser has power)	**5**	Memory riser fault LED (indicates when the memory riser has failed)
3	Attention LED (indicates when hot-plugging is safe)	**6**	DIMM fault LEDs (indicate which DIMM on the riser has failed)

Memory Riser Population Guidelines

Use the following guidelines when populating memory risers:

- Each CPU supports two memory risers.
- The minimum memory riser configuration is one riser installed on CPU1 or CPU2, with at least one DIMM. The minimum DIMM capacity must meet the requirements of the OS installed.
- If not installing all memory risers, populate the even-numbered riser slots first to ensure optimum CPU airflow.

Identifying a Faulty Memory Riser or DIMM

The memory riser includes fault LEDs on its top panel (see Figure 3-10):

- If the memory riser fault LED is lit, replace the memory riser as described in Replacing a Memory Riser, page 3-27.
- If one or more of the numbered DIMM fault LEDs are lit, replace the corresponding DIMMs on the riser as described in Replacing DIMMs, page 3-29.

Replacing a Memory Riser

The qualified and supported part numbers for this component are subject to change over time. For the most up-to-date list of replaceable components, see the following URL and then scroll to *Technical Specifications*:

http://www.cisco.com/en/US/products/ps10493/products_data_sheets_list.html

Step 1 Remove the memory riser that you are replacing (see Figure 3-11):

a. Slide the server out the front of the rack far enough so that you can remove the top cover.

b. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Caution Memory risers are hot-pluggable, which means that you do not have to remove power from the server, but you must shut down the riser before removing it as described in the following steps.

c. Press the attention button on the top of the memory riser to shut down the riser in the BIOS (see Figure 3-10).

d. Wait until the attention LED (ATTN) and the power LED (PWR) turn off.

e. Press both green riser-latch release buttons on the top of the riser (see Figure 3-11).

f. Lift on both riser latches at the same time. The lever action disengages the riser's connector from the motherboard socket.

g. Grasp the open retaining latches and lift the memory riser straight up and out of the server.

h. To remove DIMMs from the memory riser, use the instructions in Replacing DIMMs, page 3-29.

Step 2 Install a new memory riser:

Note When you install more than one memory riser, you must install and activate one riser at a time before you install and activate the next riser. That is, do not attempt to install all risers and then activate them.

a. To install DIMMs to the new memory riser, use the instructions in Replacing DIMMs, page 3-29.

b. Ensure that the riser retaining latches are in the open position.

c. Align the riser with the empty motherboard socket and the card guides at each end of the riser (on the chassis mid-brace and the rear of the fan cage).

d. Lower the riser until it makes contact with the motherboard socket.

e. Close each retaining latch at the same time to fully engage the riser with the motherboard socket.

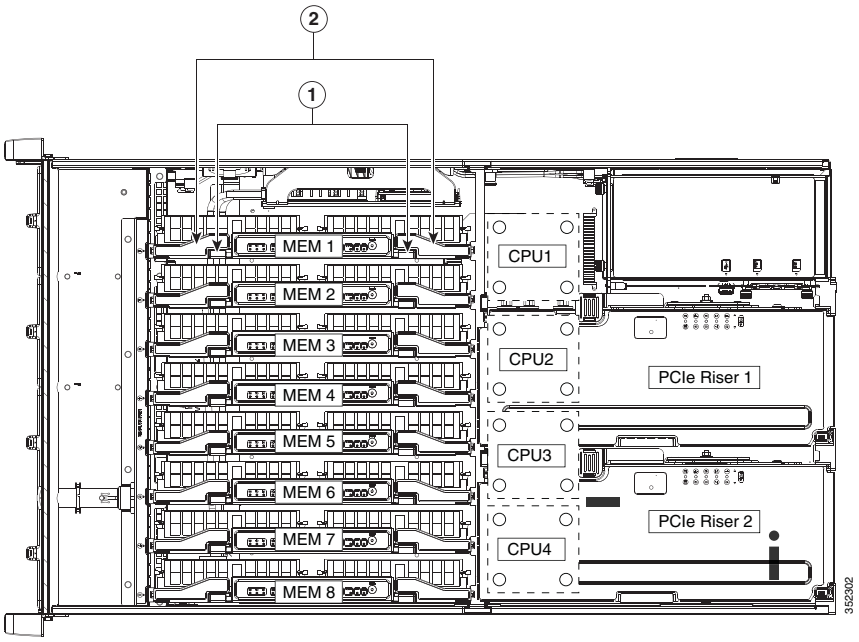
f. Press the attention button on the top of the memory riser (see Figure 3-10), and then wait until the attention LED (ATTN) turns off and the power LED (PWR) turns on.

g. If you have more memory risers to install, follow steps a. through f. for each riser.

h. Replace the top cover.

i. Replace the server in the rack.

Figure 3-11 Removing Memory Risers



1	Riser-latch release buttons (two on each riser)	**2**	Riser retaining latches (two on each riser)

Replacing DIMMs

Caution DDR4 DIMMs are available for use with DDR4 memory risers and EX v3 or v4 CPUs. You must upgrade the firmware before you upgrade the hardware. See Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35.

This section includes the following topics:

Caution DIMMs and their sockets are fragile and must be handled with care to avoid damage during installation.

Caution Cisco does not support third-party DIMMs. Using non-Cisco DIMMs in the server might result in system problems or damage to the motherboard.

Note To ensure the best server performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace the memory.

DIMM Performance Guidelines and Population Rules

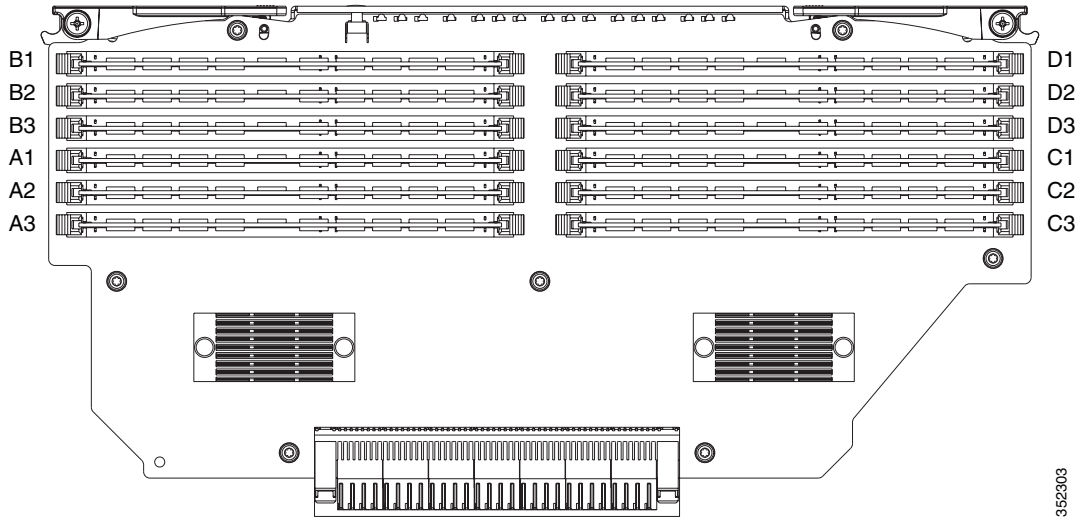
This section describes the type of memory that the server requires and its effect on performance. The section includes the following topics:

DIMM Sockets

Figure 3-12 shows the DIMM sockets and how they are numbered on a memory riser.

- Each memory riser has 12 DDR3 DIMM sockets.
- Channels are labeled with letters as shown in Figure 3-12. For example, channel A = DIMM slots A1, A2, A3.
- Each channel has three DIMM sockets. The blue socket in a channel is always socket 1.

Figure 3-12 DIMM Sockets on a Memory Riser



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- The minimum configuration without memory mirroring is one memory riser installed on a slot for CPU1 or CPU2, with one DIMM. The minimum DIMM capacity must meet the requirements of the OS installed.
- The minimum configuration with memory mirroring is one memory riser installed on a slot for CPU1 or CPU2, with two matched DIMM pairs. A matched DIMM pair is two DIMMs with the same Cisco part number (same capacity, same rank, and same buffer type (RDIMM or LRDIMM)).
- For optimal performance, spread DIMMs evenly across all CPUs and DDR channels.
- Any DIMM installed in a memory riser that corresponds to an empty CPU slot is inaccessible. In a two-CPU server, memory risers 5–8 are not available.
- Populate the DIMM 1 slots on a riser first, then the DIMM 2 slots, then the DIMM 3 slots. For example, populate the DIMM slots on a riser in this order:
  1. A1, C1, B1, D1
  2. A2, C2, B2, D2
  3. A3, C3, B3, D3
- See the following tables for the recommended population order for optimum performance.
  - Table 3-5: Two-CPU/four-riser system
  - Table 3-6: Four-CPU/eight-riser system
- Do not mix RDIMMs and LRDIMMs.
- NVIDIA K-Series and M-Series GPUs can support only less-than 1 TB memory in the server.
- NVIDIA P-Series GPUs can support 1 TB or more memory in the server.
- AMD FirePro S7150 X2 can support only less-than 1 TB memory in the server.

Table 3-5 describes the recommended population order for a two-CPU system that has four memory risers. In a two-CPU system, only CPU1 and CPU2 are populated. Only the memory risers controlled by CPU1 and CPU2 (MEM1, MEM2, MEM3, and MEM4) are populated.

Table 3-5 DIMM Population for Two-CPU/Four-Riser System Optimum Performance

No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket
First: 1	CPU1	1	A1	25	CPU1	1	B2
2	CPU2	3	A1	26	CPU2	3	B2
3	CPU1	2	A1	27	CPU1	2	B2
4	CPU2	4	A1	28	CPU2	4	B2
5	CPU1	1	C1	29	CPU1	1	D2
6	CPU2	3	C1	30	CPU2	3	D2
7	CPU1	2	C1	31	CPU1	2	D2
8	CPU2	4	C1	32	CPU2	4	D2
9	CPU1	1	B1	33	CPU1	1	A3
10	CPU2	3	B1	34	CPU2	3	A3
11	CPU1	2	B1	35	CPU1	2	A3
12	CPU2	4	B1	36	CPU2	4	A3
13	CPU1	1	D1	37	CPU1	1	C3
14	CPU2	3	D1	38	CPU2	3	C3
15	CPU1	2	D1	39	CPU1	2	C3
16	CPU2	4	D1	40	CPU2	4	C3
17	CPU1	1	A2	41	CPU1	1	B3
18	CPU2	3	A2	42	CPU2	3	B3
19	CPU1	2	A2	43	CPU1	2	B3
20	CPU2	4	A2	44	CPU2	4	B3
21	CPU1	1	C2	45	CPU1	1	D3
22	CPU2	3	C2	46	CPU2	3	D3
23	CPU1	2	C2	47	CPU1	2	D3
24	CPU2	4	C2	**Last:** 48	CPU2	4	D3

Table 3-6 describes the recommended population order for a four-CPU system that has eight memory risers.

Table 3-6 DIMM Population For Four-CPU/Eight-Riser System Optimum Performance

No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket
First: 1	CPU1	1	A1	25	CPU1	1	D1	49	CPU1	1	B2	73	CPU1	1	C3
2	CPU2	3	A1	26	CPU2	3	D1	50	CPU2	3	B2	74	CPU2	3	C3
3	CPU3	5	A1	27	CPU3	5	D1	51	CPU3	5	B2	75	CPU3	5	C3
4	CPU4	7	A1	28	CPU4	7	D1	52	CPU4	7	B2	76	CPU4	7	C3
5	CPU1	2	A1	29	CPU1	2	D1	53	CPU1	2	B2	77	CPU1	2	C3
6	CPU2	4	A1	30	CPU2	4	D1	54	CPU2	4	B2	78	CPU2	4	C3
7	CPU3	6	A1	31	CPU3	6	D1	55	CPU3	6	B2	79	CPU3	6	C3
8	CPU4	8	A1	32	CPU4	8	D1	56	CPU4	8	B2	80	CPU4	8	C3
9	CPU1	1	C1	33	CPU1	1	A2	57	CPU1	1	D2	81	CPU1	1	B3
10	CPU2	3	C1	34	CPU2	3	A2	58	CPU2	3	D2	82	CPU2	3	B3
11	CPU3	5	C1	35	CPU3	5	A2	59	CPU3	5	D2	83	CPU3	5	B3
12	CPU4	7	C1	36	CPU4	7	A2	60	CPU4	7	D2	84	CPU4	7	B3
13	CPU1	2	C1	37	CPU1	2	A2	61	CPU1	2	D2	85	CPU1	2	B3
14	CPU2	4	C1	38	CPU2	4	A2	62	CPU2	4	D2	86	CPU2	4	B3
15	CPU3	6	C1	39	CPU3	6	A2	63	CPU3	6	D2	87	CPU3	6	B3
16	CPU4	8	C1	40	CPU4	8	A2	64	CPU4	8	D2	88	CPU4	8	B3
17	CPU1	1	B1	41	CPU1	1	C2	65	CPU1	1	A3	89	CPU1	1	D3
18	CPU2	3	B1	42	CPU2	3	C2	66	CPU2	3	A3	90	CPU2	3	D3
19	CPU3	5	B1	43	CPU3	5	C2	67	CPU3	5	A3	91	CPU3	5	D3
20	CPU4	7	B1	44	CPU4	7	C2	68	CPU4	7	A3	92	CPU4	7	D3
21	CPU1	2	B1	45	CPU1	2	C2	69	CPU1	2	A3	93	CPU1	2	D3
22	CPU2	4	B1	46	CPU2	4	C2	70	CPU2	4	A3	94	CPU2	4	D3
23	CPU3	6	B1	47	CPU3	6	C2	71	CPU3	6	A3	95	CPU3	6	D3
24	CPU4	8	B1	48	CPU4	8	C2	72	CPU4	8	A3	**Last**: 96	CPU4	8	D3

Memory Mirroring Mode

When you enable memory mirroring mode in the server BIOS, the memory subsystem simultaneously writes identical data to two channels. If a memory read from one of the channels returns incorrect data due to an uncorrectable memory error, the system automatically retrieves the data from the other channel. A transient or soft error in one channel does not affect the mirrored data, and operation continues.

Memory mirroring reduces the amount of memory available to the operating system by 50 percent because only one of the two populated channels provides data.

Lockstep Channel Mode

In this mode, the main memory channel from the CPU to the memory buffer runs at the same clock rate of each of the two memory subchannels from the buffer to the DIMMs, and both DIMM subchannels are accessed simultaneously for a double-width access. For example, if the CPU channel clock speed is 1600 MHz, each of the DIMM subchannels operates at 1600 MHz. For this reason, lockstep mode is referred to as 1:1. Memory lockstep mode provides protection against both single-bit and multi-bit errors. Memory lockstep allows two memory channels to work as a single channel, moving a data word two channels wide and providing eight bits of memory correction.

Lockstep channel mode requires that all four memory channels on a CPU must be populated identically with regards to size and organization. DIMM socket populations within a channel do not have to be identical but the same DIMM slot location across all four channels must be populated the same.

For example, DIMMs in sockets A1, B1, C1, and D1 must be identical. DIMMs in sockets A2, B2, C2, and D2 must be identical. However, the A1-B1-C1-D1 DIMMs do not have to be identical with the A2-B2-C2-D2 DIMMs.

Replacing a DIMM

This section includes the following topics:

Identifying a Faulty Memory Riser or DIMM

The memory riser includes fault LEDs on its top panel (see Figure 3-10).

- If the riser fault LED is lit, replace the memory riser as described Replacing a Memory Riser, page 3-27.
- If one or more of the numbered DIMM fault LEDs are lit, replace the corresponding DIMMs as described in Replacing DIMMs, page 3-29.

Replacing DIMMs

Step 1 Remove the DIMMs that you are replacing:

a. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

b. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Caution Memory risers are hot-pluggable, which means that you do not have to remove power from the server, but you must shut down the riser before removing it.

c. Locate the memory riser that has the faulty DIMM, and then shut down and remove the riser as described in Replacing Memory Risers, page 3-26.

d. Locate the faulty DIMM and remove it from the socket on the riser by opening the ejector levers at both ends of the DIMM socket.

Step 2 Install a new DIMM:

Note Before installing DIMMs, refer to the population guidelines. See DIMM Performance Guidelines and Population Rules, page 3-29.

a. Align the new DIMM with the socket on the riser. Use the alignment key in the DIMM socket to correctly orient the DIMM.

b. Push the DIMM into the socket until it is fully seated and the ejector levers on either side of the socket lock into place.

c. Replace the memory riser to its motherboard socket and bring it back online by using the procedure in Replacing Memory Risers, page 3-26.

d. Replace the top cover.

Replacing CPUs and Heat Sinks

Caution Xeon v3 or v4 Series CPUs are available for use with DDR4 memory risers and DDR4 DIMMs. You must upgrade the firmware before you upgrade the hardware. See Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35.

This section contains the following topics:

Special Information For *Upgrades* to Intel Xeon v4 CPUs

Caution You must upgrade your server firmware to the required minimum level *before* you upgrade to Intel v4 CPUs. Older firmware versions cannot recognize the new CPUs and this results in a non-bootable server.

The minimum software and firmware versions required for the server to support Intel v4 CPUs are as follows:

Table 3-7 Minimum Requirements For Intel Xeon v4 CPUs

Software or Firmware	Minimum Version
Server CIMC	2.0(12)
Server BIOS	2.0(12)
Cisco UCS Manager (UCSM-managed system only)	2.2(8) or 3.1(2)

Note Cisco UCS Manager Release 2.2(4) introduced a server pack feature that allows Intel v4 CPUs to run with Cisco UCS Manager Release 2.2(4) or later.
The UCS Manager Capability Catalog must be updated to 2.2(7c) or later.
The server Cisco IMC/BIOS must be running the minimum version or later as described in Table 3-7.

Do one of the following actions:

- If your server's firmware and/or Cisco UCS Manager software are already at the required levels shown in Table 3-7, you can replace the CPU hardware by using the procedure in this section.
- If your server's firmware and/or Cisco UCS Manager software is earlier than the required levels, use the instructions in the Cisco UCS C-Series Servers Upgrade Guide for Intel Xeon v4 CPUs to upgrade your software. After you upgrade the software, return to the procedure in this section as directed to replace the CPU hardware.

CPU Configuration Rules

The server supports two or four CPUs. See Figure 3-12 on page 3-30 for the CPU socket numbering.

- The minimum configuration is two identical CPUs (CPU1 and CPU2).
- The server must have either two or four identical CPUs to operate; populate CPU1 and CPU2 first, then populate CPU3 and CPU4.
- In a two-CPU server (CPU1 and CPU2), the following components are not available because they require CPU3 and CPU4 to be installed:
  - PCIe riser 2 (PCIe slots 6–10)
  - Memory risers 5–8

Caution In a two-CPU system, you must have the CPU filler panel installed in place of CPU3 and CPU4 to maintain correct airflow and cooling.

Replacing a CPU and Heat Sink

Caution CPUs and their motherboard sockets are fragile and must be handled with care to avoid damaging pins during installation. The CPUs must be installed with heat sinks and their thermal pads to ensure proper cooling. Failure to install a CPU correctly might result in damage to the server.

Caution The Intel Pick-n-Place tools used in this procedure are required to prevent damage to the contact pins between the motherboard and the CPU. Do not attempt this procedure without the required tools, which are included with each CPU option kit. If you do not have the tool, you can order a spare (Cisco PID UCS-CPU-EP-PNP=).

Step 1 Prepare the server for replacement:

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Step 2 Provide clearance for removing the CPU:

a. Remove all memory risers from the server.

With power removed from the server, you do not have to shut down the memory risers before removal. Press both green riser-latch release buttons on the top of the riser (see Figure 3-11), and then lift on both riser latches at the same time.

Note It is important that each memory riser is returned to the same slot it was removed from to maintain your DIMM configuration. Label the risers or organize them in order as you remove them and set them aside on an antistatic surface.

b. Remove both PCIe risers from the server.

Lift on the retaining latch at the top of the riser until it is vertical (see Figure 3-20).

c. Remove the chassis mid-brace (see Figure 3-5 on page 3-11).

Note The securing mechanism for the mid-brace differs, depending on when the system was produced.

- Older systems have a spring-loaded plunger that secures each end of the mid-brace. Access these plungers on the inside of the chassis. Pull inward on the spring-loaded plunger that secures each end of the mid-brace, then lift straight up.
- Newer systems have two screws that secure each end of the mid-brace. Access these screws on the outside of the chassis. Remove the two screws at each end of the mid-brace, then lift straight up.

Step 3 Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heat sink, and then lift it off of the CPU.

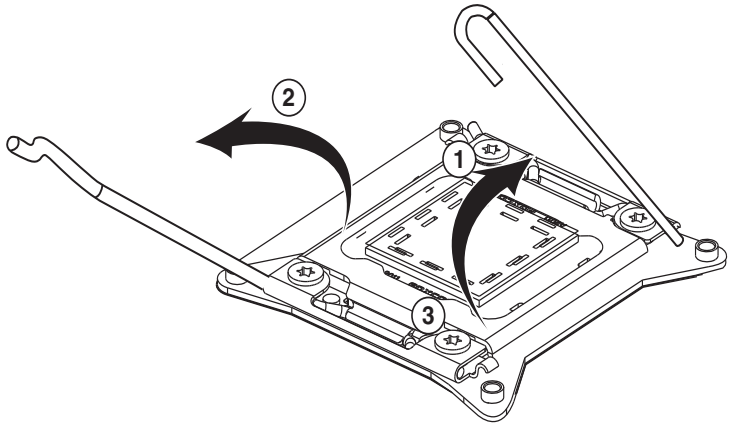
Note Loosen each screw evenly to avoid damaging the heat sink or CPU.

Step 4 Unclip the first CPU retaining latch that is labeled with the icon, and then unclip the second retaining latch that is labeled with the icon. See Figure 3-13.

Note You must hold the first retaining latch open before you can lift the second retaining latch.

Step 5 Open the hinged CPU cover plate. See Figure 3-13.

Figure 3-13 CPU Socket Retaining Latches



1	CPU retaining latch,	**3**	Hinged CPU cover plate
2	CPU retaining latch,		

Step 6 Remove a protective cap from the socket (if present).

If you are installing a new CPU to a socket that was shipped empty, the socket has a protective cap that is intended to prevent bent contact pins. If you are removing an old CPU instead, skip to Step 7.

Caution If you are adding CPUs to a server that previously had only two CPUs, remove the CPU filler panels and the PCIe filler panel, if present, to ensure correct airflow and cooling.

Step 7 Remove the old CPU:

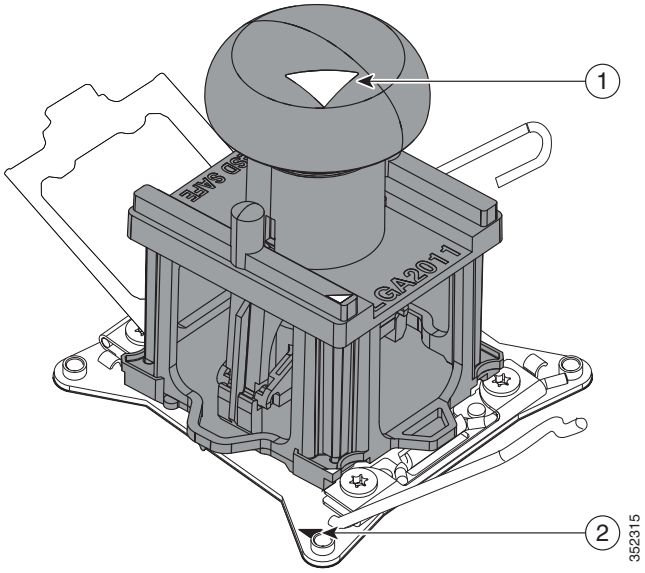
a. Set the Pick-n-Place tool on the CPU in the socket, aligning the arrow on the tool with the registration mark on the socket (the small triangular mark). See Figure 3-14.

b. Press the top button on the tool to grasp the installed CPU.

c. Lift the tool and CPU straight up.

d. Press the top button on the tool to release the old CPU on an antistatic surface.

Figure 3-14 Pick-n-Place Tool



1	Arrow on tool	**2**	Registration mark on CPU socket

Step 8 Insert the new CPU into the Pick-n-Place tool:

a. Remove the new CPU from the packaging and place it on the pedestal that is included in the kit. Align the registration mark on the corner of the CPU with the arrow on the corner of the pedestal (see Figure 3-15).

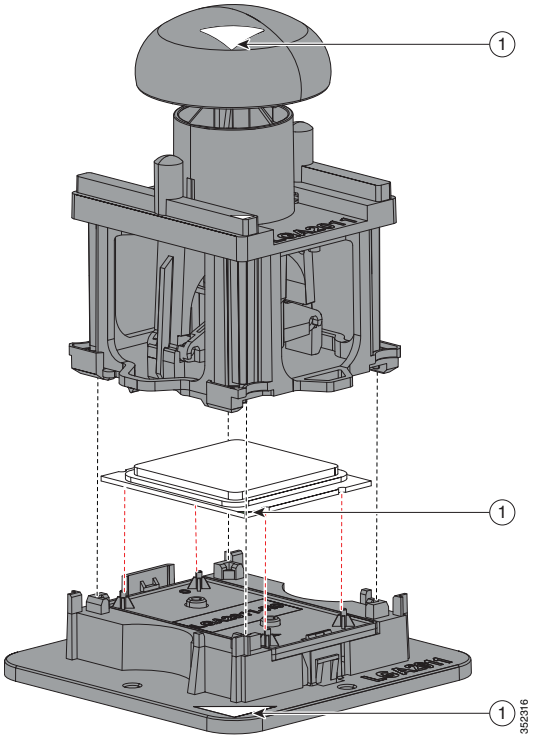
b. Press down on the top button of the tool to lock it open.

c. Set the Pick-n-Place tool on the CPU pedestal, aligning the arrow on the tool with the arrow on the corner of the pedestal. Make sure that the tabs on the tool are fully seated in the slots on the pedestal.

d. Press down on the top button of the tool to grasp and lock in the CPU.

e. Lift the tool and CPU straight up off the pedestal.

Figure 3-15 CPU and Pick-n-Place Tool on Pedestal



1	Arrow marks for alignment		

Step 9 Install a new CPU:

Note Do not install an Intel Xeon v3 or v4 Series CPU unless your server meets the minimum firmware requirements, as described in Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35.

a. Set the Pick-n-Place tool that is holding the CPU over the empty CPU socket on the motherboard.

Note Align the arrow on the top of the tool with the registration mark (small triangle) that is stamped on the metal of the CPU socket, as shown in Figure 3-14 on page 3-39.

b. Press the top button on the tool to set the CPU into the socket. Remove the empty tool.

c. Close the hinged CPU cover plate.

d. Clip down the CPU retaining latch with the icon first, and then clip down the CPU retaining latch with the icon. See Figure 3-13 on page 3-38.

Step 10 Install a heat sink:

Caution The heat sink must have a new thermal grease on the heat sink-to-CPU surface to ensure proper cooling. If you are reusing a heat sink, you must remove the old thermal grease. If you are installing a new heat sink, skip to Step c below.

a. Apply the cleaning solution, which is included with the heatsink cleaning kit (shipped with spare CPUs), to the old thermal grease and let it soak for a least 15 seconds.

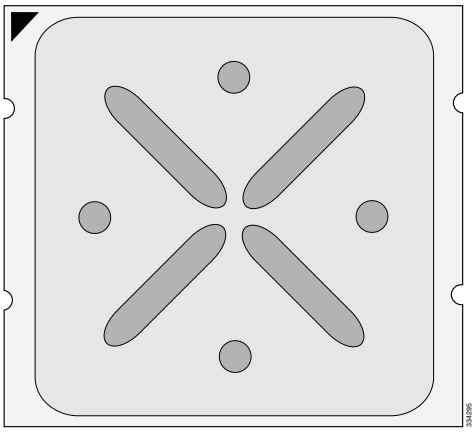
b. Wipe all of the old thermal grease off the old heat sink using the soft cloth that is included with the heatsink cleaning kit. Be careful to not scratch the heat sink surface.

c. Apply thermal grease from the syringe that is included with the new CPU to the top of the CPU.

   Apply about half the syringe contents to the top of the CPU in the pattern that is shown in Figure 3-16.

Note If you do not have a syringe of thermal grease, you can order a spare (Cisco PID UCS-CPU-GREASE3=).

Figure 3-16 Thermal Grease Application Pattern



d. Align the heat sink captive screws with the motherboard standoffs, and then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.

Note Orient the heat sink so that the arrow label on the heat sink points toward the rear of the server.

Note Alternate tightening each screw evenly to avoid damaging the heat sink or CPU.

Step 11 Replace components that you removed:

a. Replace the chassis mid-brace.

Note The securing mechanism for the mid-brace differs, depending on when the system was produced.

- Older systems have a spring-loaded plunger that secures each end of the mid-brace. Access these plungers on the inside of the chassis. Pull inward on the spring-loaded plunger that secures each end of the mid-brace while you set the mid-brace in place, then release the plungers.

  - Newer systems have two screws that secure each end of the mid-brace. Access these screws on the outside of the chassis. Set the mid-brace in place, then replace the two screws at each end.

b. Replace both PCIe risers to the server.

a. Replace all memory risers to the server.

Note It is important that each memory riser is returned to the same slot it was removed from to maintain your DIMM configuration.

Step 12 Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Additional CPU-Related Parts to Order with RMA Replacement Motherboards

When a return material authorization (RMA) of the motherboard or CPU is done on a Cisco UCS C-series server, some items might not be included with the CPU or motherboard spare bill of materials (BOM). The TAC engineer might need to add the additional parts to the RMA to help ensure a successful replacement.

- Scenario 1—You are reusing the existing heat sinks:
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Thermal grease kit for C460 M4 (UCS-CPU-GREASE3=)
  - Intel CPU Pick-n-Place tool for EX CPUs (UCS-CPU-EP-PNP=)
- Scenario 2—You are replacing the existing heat sinks:
  - Heat sink (UCSC-HS-01-EX=)
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Intel CPU Pick-n-Place tool for EX CPUs (UCS-CPU-EP-PNP=)

A CPU heat sink cleaning kit is good for up to four CPU and heat sink cleanings. The cleaning kit contains two bottles of solution, one to clean the CPU and heat sink of the old thermal interface material and the other to prepare the surface of the heat sink.

It is important to clean the old thermal interface material off of the CPU prior to installing the heat sinks. When you order new heat sinks, you must order the heat sink cleaning kit.

Replacing a RAID Controller Card

The server has a dedicated internal PCIe slot for a RAID controller card.

See also:

- Replacing a Modular RAID Controller Transportable Memory Module (TMM), page 3-44
- Replacing the Supercap Power Module (RAID Backup Unit), page 3-47

RAID Card Firmware Compatibility

Firmware on the RAID controller must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the server. If not compatible, upgrade or downgrade the RAID controller firmware accordingly using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: HUU Guides

Replacement Procedure

Step 1 Remove an internal RAID controller card (see Figure 3-17):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Loosen the single captive thumbscrew that secures the RAID card bracket to the chassis wall.

e. Grasp the metal card bracket and then lift straight up to remove the card from the motherboard socket.

f. Detach cables from the RAID controller card.

Step 2 Install an internal RAID controller card:

a. Attach cables to the new card.

Note See RAID Controller Cabling, page C-6 if you need more information.

b. Align the card and bracket over the motherboard socket. The metal bracket has alignment features that hook over flanges on the inner chassis wall to help keep the card perfectly vertical.

c. Press down on both top corners of the metal bracket to seat the card in the socket evenly.

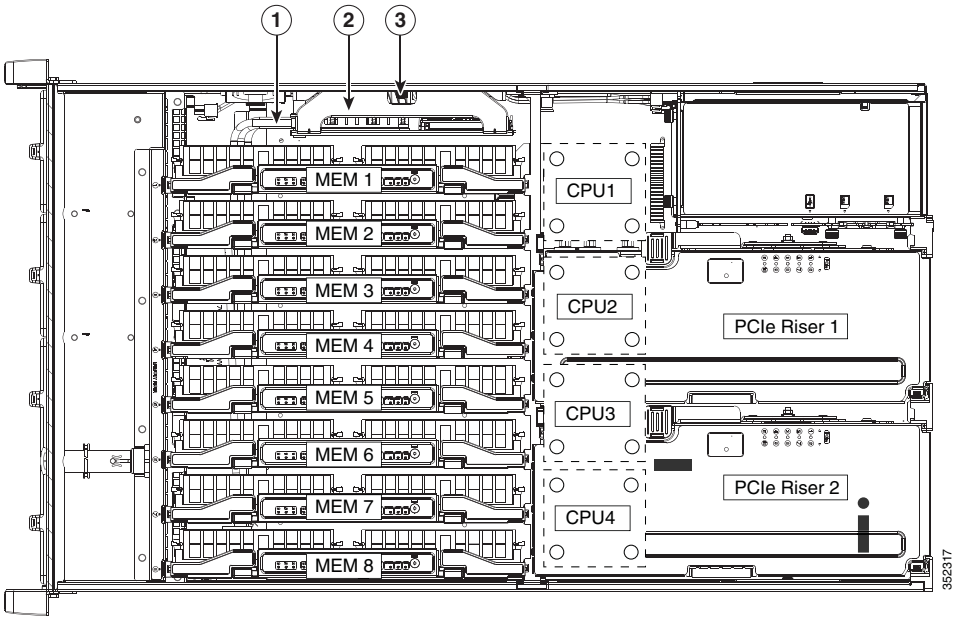
d. Tighten the captive thumbscrew on the RAID card bracket to secure it to the chassis wall.

e. Replace the top cover.

f. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Step 3 See Restoring RAID Configuration After Replacing a RAID Controller, page C-9 to restore your RAID configuration.

Figure 3-17 Internal RAID Controller Card



1	SAS cables from drive backplane	**3**	Captive thumbscrew
2	RAID controller card bracket		

Replacing a Modular RAID Controller Transportable Memory Module (TMM)

The transportable memory module (TMM) that attaches to the Cisco modular RAID controller card can be installed or replaced after-factory.

See also:

- Replacing a RAID Controller Card, page 3-43
- Replacing the Supercap Power Module (RAID Backup Unit), page 3-47

Step 1 Remove an internal Cisco modular RAID controller card (see Figure 3-17):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Loosen the single captive thumbscrew that secures the RAID card bracket to the chassis wall.

e. Grasp the metal card bracket and then lift straight up to remove the card from the motherboard socket.

f. Detach cables from the RAID controller card.

Step 2 Remove an existing TMM (if any) from a modular RAID controller card:

a. The plastic bracket on the card has a securing plastic clip at each end of the TMM. Gently spread each clip away from the TMM (see Figure 3-18).

b. Pull straight up on the TMM to lift it off the two plastic guide pegs and the socket on the card.

Step 3 Install a TMM to the modular RAID controller card:

a. Align the TMM over the bracket on the card. Align the connector on the underside of the TMM with the socket on the card. Align the two guide holes on the TMM over the two guide pegs on the card (see Figure 3-18).

Caution In the next step, keep the TMM level and parallel with the surface of the card to avoid damaging the connector or socket.

b. Gently lower the TMM so that the guide holes on the TMM go over the guide pegs on the card.

c. Press down on the TMM until the plastic clips on the bracket close over each end of the TMM.

d. Press down on the TMM to fully seat its connector with the socket on the card.

Step 4 Install an internal RAID controller card:

a. Attach SAS cables to the card.

Note See RAID Controller Cabling, page C-6 if you need more information.

Note If this is a first-time installation of your TMM, you must also install a supercap power module (SCPM). The SCPM cable attaches to a connector on the TMM. See Replacing the Supercap Power Module (RAID Backup Unit), page 3-47.

b. Connect the cable from the supercap power module (RAID battery) to the connector on the TMM (see Figure 3-18).

c. Align the card and bracket over the motherboard socket. The metal bracket has alignment features that hook over flanges on the inner chassis wall to help keep the card perfectly vertical.

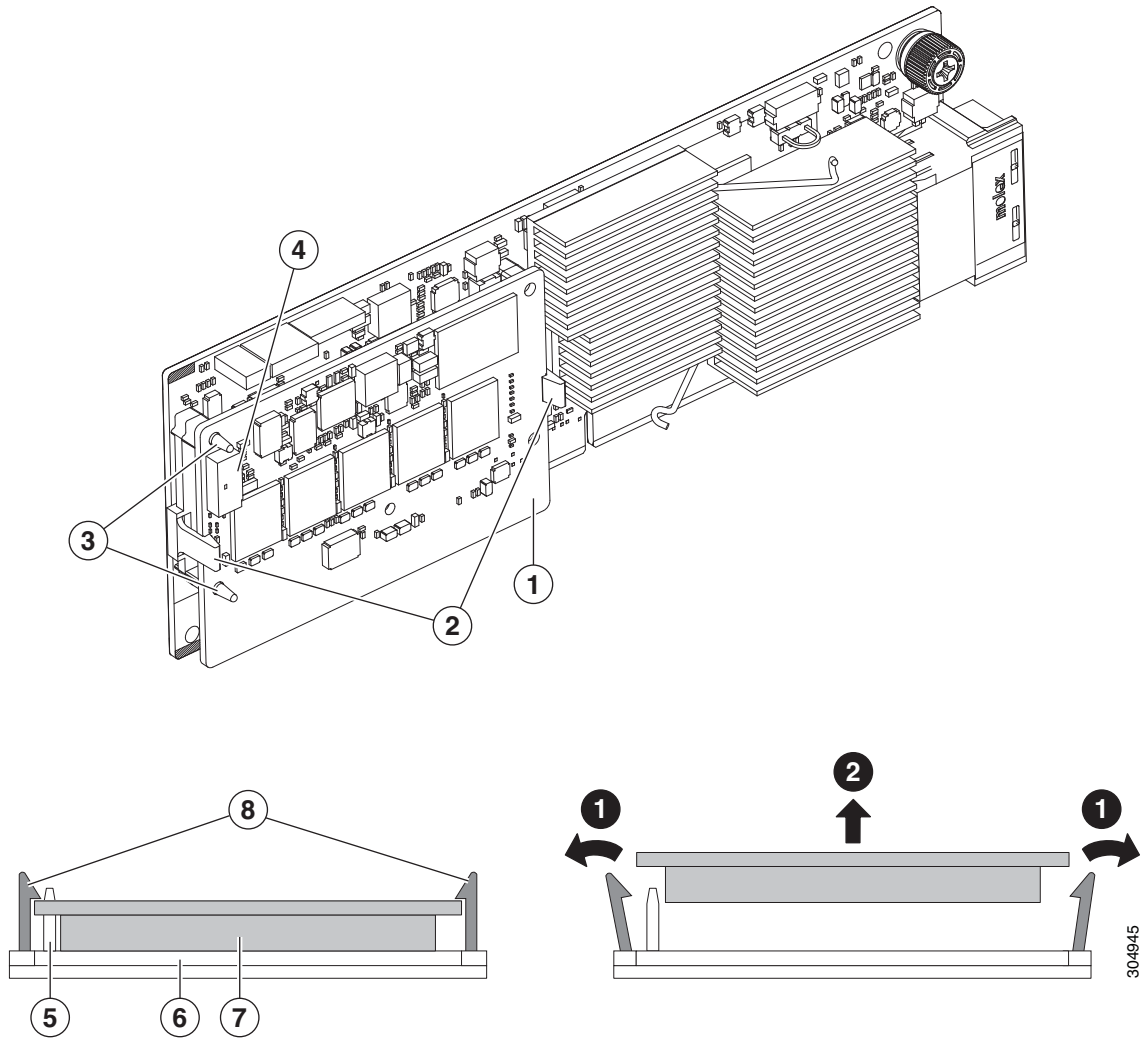
d. Press down on both top corners of the metal bracket to seat the card in the socket evenly.

e. Tighten the captive thumbscrew on the RAID card bracket to secure it to the chassis wall.

f. Replace the top cover.

g. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-18 TMM on Modular RAID Controller Card



1	TMM on modular RAID card	**5**	Side view, guide peg
2	Securing bracket clips	**6**	Side view, socket on modular RAID card
3	Guide pegs on bracket protruding through guide holes on TMM	**7**	Side view, connector on underside of TMM
4	SCPM cable connector on TMM	**8**	Side view, securing clips

Replacing the Supercap Power Module (RAID Backup Unit)

The server supports installation of one supercap power module (SCPM). This SCPM mounts in a plastic bracket on the chassis wall adjacent to the internal RAID controller card.

The SCPM provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

See also:

- Replacing a RAID Controller Card, page 3-43
- Replacing a Modular RAID Controller Transportable Memory Module (TMM), page 3-44

Step 1 Remove an SCPM (see Figure 3-19):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Disconnect the SCPM cable from the RAID controller card.

e. Pull the SCPM from the clips on the plastic SCPM bracket. There is no lock on the clip, but gentle pressure is required to free the SCPM from the bracket clips.

Step 2 Install a new SCPM:

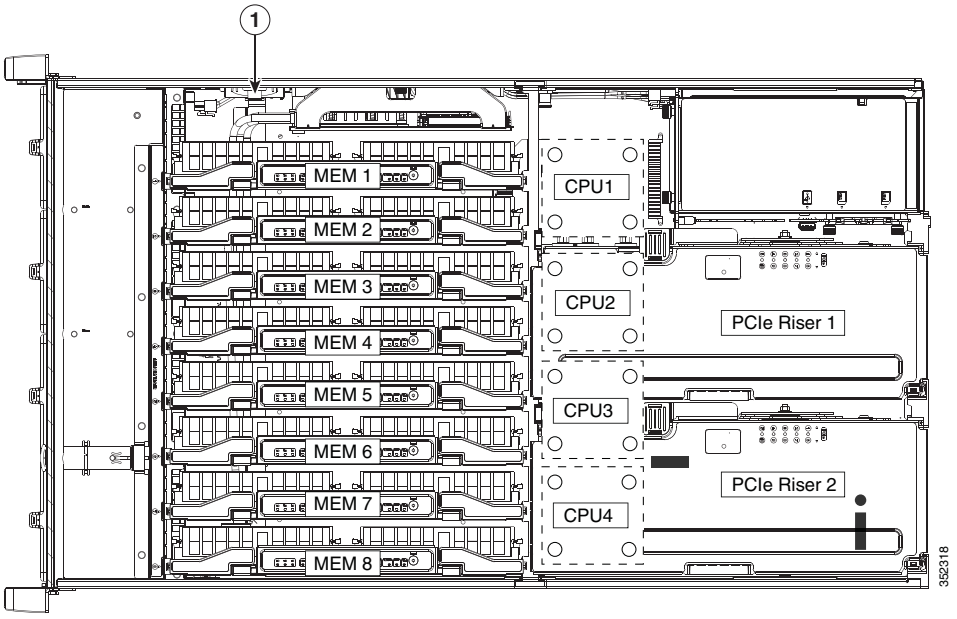
a. Slide the new SCPM into the clips on the SCPM bracket. Push in on the SCPM until the plastic bracket clips close around it.

b. Connect the cable from the new SCPM to the RAID controller card.

c. Replace the top cover.

d. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-19 Supercap Power Module Mounting Bracket



1	SCPM plastic mounting bracket		

Replacing a PCIe Riser

The server contains two PCIe risers for horizontal installation of PCIe cards. These risers each provide five horizontal slots.

Note In a two-CPU server, PCIe riser 2 is not available.

Caution If your server is configured with only one PCIe riser (riser 1), you must have the two PCIe riser filler panels installed in place of riser 2 in order to keep correct airflow and cooling.

Step 1 Remove the PCIe riser (see Figure 3-20):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Lift on the blue plastic retaining latch at the top of the riser until the latch is vertical (see Figure 3-20). The lever action disengages the riser's connector from the motherboard socket.

e. Lift straight up on both ends of the PCIe riser and remove it from the server.

Step 2 Install a new PCIe riser:

a. Align the riser so that its connector is over the motherboard socket.

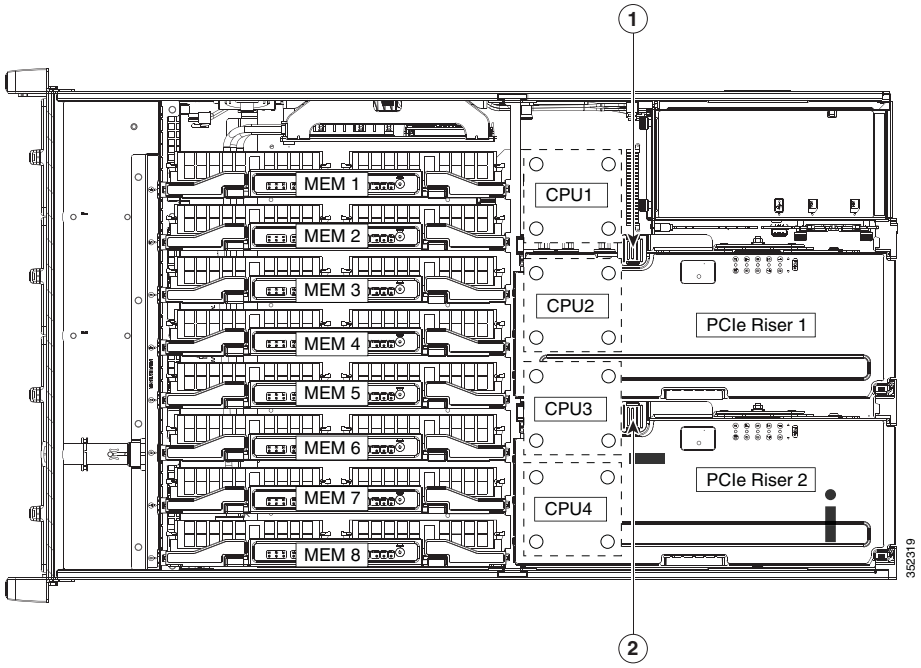
b. With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until the blue plastic retaining latch begins to close.

c. Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.

d. Replace the top cover.

e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-20 PCIe Riser Retaining Latches



1	PCIe riser 1 retaining latch (closed position)	**2**	PCI riser 2 retaining latch (closed position)

Replacing a PCIe Card

Caution Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards that are not qualified or sold by Cisco are the responsibility of the customer. Although Cisco always supports the C-Series rack-mount servers, customers using standard, off-the-shelf, third-party cards must go to the third-party card vendor for support if any issue with that particular third-party card occurs.

This server has ten PCIe expansion slots. See Figure 3-21 and Table 3-8 for information about the slots. This section includes the following topics:

PCIe Slots

Figure 3-21 shows the PCIe slot numbering. Table 3-8 lists the specifications for each slot.

Figure 3-21 PCIe Slot Numbering

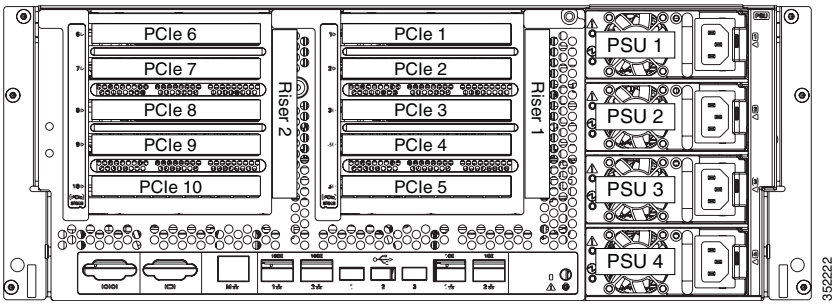


Table 3-8 PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length[1]	Card Height [2]	NCSI[3] Support	VIC Standby Power Support
Slot 1	Gen-3 x8	x8 connector	Full length	Full height	No	No
Slot 2	Gen-3 x16	x16 connector	Full length	Full height	Yes	No
Slot 3	Gen-3 x4	x16 connector	3/4 length	Full height	Yes	No
Slot 4	Gen-3 x8	x16 connector	3/4 length	Full height	Yes	Yes
Slot 5	Gen-3 x8	x16 connector	1/2 length	Full height	Yes	Yes
Slot 6	Gen-3 x8	x8 connector	Full length	Full height	No	No
Slot 7	Gen-3 x16	x16 connector	Full length	Full height	Yes	No
Slot 8	Gen-3 x8	x16 connector	3/4 length	Full height	Yes	No

Table 3-8 PCIe Expansion Slots (continued)

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length[1]	Card Height[2]	NCSI[3] Support	VIC Standby Power Support
Slot 9	Gen-3 x16	x16 connector	3/4 length	Full height	Yes	Yes
Slot 10	Gen-3 x8	x16 connector	1/2 length	Full height	Yes	Yes

1. This is the supported length because of internal clearance.
2. This is the size of the rear panel opening.
3. NCSI = Network Communications Services Interface protocol.

PCIe Configuration Guide For Optimum Performance

For the best performance, we recommend that you populate PCIe cards in the order shown in Table 3-9 for each type of add-on card.

For each card type, populate the primary slot first. Secondary slots can be used for additional cards of the same type and should be populated in the order shown in the table. The alternate slots can be used in the order shown in the table, but with reduced functionality. See Figure 3-21 for the slot locations.

Note In a two-CPU system, PCIe riser 2 (PCIe slots 6–10) is not available.

Table 3-9 PCIe Slot Population

PCIe Card Type	Primary Slot	Secondary Slots	Alternate Slots
RAID controller	Internal dedicated slot	—	—
Low-profile (half-height) network adapter	Riser 1—slot 5 Riser 2—slot 10	Riser 2—slot 8 Riser 2—slot 9 Riser 1—slot 2 Riser 2—slot 7 Riser 1—slot 1 Riser 2—slot 6	Riser 1—slot 3 Riser 1—slot 4
Cisco UCS Virtual Interface Card (x8) VIC 1225 and VIC 1225T	Riser 1—slot 4	Riser 1—slot 5 Riser 2—slot 9 Riser 2—slot 10	Riser 1—slot 3 Riser 2—slot 8 Riser 1—slot 2 Riser 2—slot 7
Cisco UCS Virtual Interface Card (x16) VIC 1285 and VIC 1385 (x16)	Riser 2—slot 9 Riser 1—slot 4 Riser 1—slot 5 Riser 2—slot 10	Riser 1—slot 2 Riser 2—slot 7	Riser 2—slot 8 Riser 1—slot 3
NVIDIA GPU	Riser 2—slot 7+6[1] Riser 1—slot 2+1	—	—

Table 3-9 PCIe Slot Population

PCIe Card Type	Primary Slot	Secondary Slots	Alternate Slots
Cisco UCS Fusion ioDrive2 Storage Accelerator	Riser 2—slot 8 Riser 1—slot 2	Riser 2—slot 7 Riser 2—slot 6 Riser 1—slot 1 Riser 2—slot 9 Riser 2—slot 10 Riser 1—slot 5	Riser 1—slot 3 Riser 1—slot 4
Cisco UCS Fusion ioDrive3 Storage Accelerator	Riser 2—slot 8 Riser 1—slot 2	Riser 2—slot 7 Riser 2—slot 6 Riser 1—slot 1 Riser 2—slot 9 Riser 2—slot 10 Riser 1—slot 5	Riser 1—slot 3 Riser 1—slot 4

1. The double-width GPU cards cover two slots.

Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-10 describes the requirements for the supported Cisco UCS virtual interface cards (VICs).

If you want to use the Cisco UCS VIC card for Cisco UCS Manager integration, also see the Cisco UCS C-Series Server Integration with UCS Manager Guides for details about supported configurations, cabling, and other requirements.

Table 3-10 Cisco UCS C460 M4 Requirements for Virtual Interface Cards

Virtual Interface Card (VIC)	Number of VICs Supported in Server	Slots that Support VICs [1]	Primary Slot for Cisco UCS Manager Integration	Primary Slot for Cisco Card NIC Mode	Minimum Cisco IMC Firmware	Minimum VIC Firmware
Cisco UCS VIC 1225 [2, 3] UCSC-PCIE-CSC-02	8	PCIE 2 PCIE 3 PCIE 4 PCIE 5 PCIE 7 PCIE 8 PCIE 9 PCIE 10	PCIE 4 PCIE 9	PCIE 4 PCIE 9	1.4(7)	2.1(0)
Cisco UCS VIC1225T UCSC-PCIE-C10T-02	8		PCIE 4 PCIE 9	PCIE 4 PCIE 9	1.5(1)	2.1(1)
Cisco UCS VIC1285 UCSC-PCIE-C40Q-02	8		Not supported at this time	PCIE 9	1.5(4)	2.2(1b)
Cisco UCS VIC1385 UCSC-PCIE-C40Q-03	8		PCIE 4 PCIE 9	PCIE 9	2.0(4)	4.0(4b)

1. See PCIe Slots, page 3-51.
2. The Cisco UCS VIC 1225 (UCSC-PCIE-CSC-02) cannot be installed in the same system with the Intel X540 Dual Port 10GBase-T Adapter (UCSC-PCIE-ITG).
3. Only one Cisco 1225 VIC can be used for both UCSM management and data traffic in the C460 M4 server. The Cisco 1225 VIC in slot 4 handles management and data traffic. If a second Cisco 1225 VIC is installed in slot 9, it is used for data traffic only.

Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards

Figure 3-10 describes the requirements for the supported Cisco UCS Fusion ioDrive2 cards.

Table 3-11 Cisco UCS C460 M4 Requirements for Fusion ioDrive2 Cards

Card	Max. Number of Cards Supported	Supporting Slots[1]	Minimum Cisco IMC Firmware	Card Height (rear-panel tab)
Cisco UCS 3.0 TB MLC Fusion ioDrive2 UCSC-F-FIO-3000M	2	PCIE 4 PCIE 9	1.5(2)	Full height
Cisco UCS 1205 GB MLC Fusion ioDrive2 UCSC-F-FIO-1205M	6	PCIE 2 PCIE 4 PCIE 5 PCIE 7 PCIE 8 PCIE 9	1.5(2)	Half height[2]
Cisco UCS 785 GB MLC Fusion ioDrive2 UCSC-F-FIO-785M	6		1.5(2)	Half height
Cisco UCS 365 GB MLC Fusion ioDrive2 UCSC-F-FIO-365M	6		1.5(2)	Half height

1. See PCIe Slots, page 3-51.
2. A rear-panel tab adapter is required to fit the half-height cards in the server's full-height slots.

Replacing a PCIe Card

Note If you are installing a Cisco UCS Virtual Interface Card (VIC), see Special Considerations for Cisco UCS Virtual Interface Cards, page 3-54. If you are installing a Cisco UCS Fusion ioDrive2 card, see Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards, page 3-55.

Note In a two-CPU server, PCIe riser 2 (PCIe slots 6–10) is not available.

Step 1 Remove a PCIe card (or a blank filler panel) from the PCIe riser assembly:

a. Shut down and power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Lift on the blue plastic retaining latch at the top of the PCIe riser until the latch is vertical (see Figure 3-20). The lever action disengages the riser's connector from the motherboard socket.

e. Lift straight up on both ends of the PCIe riser and remove it from the server. Set the riser on an antistatic surface.

f. Open the hinged blue plastic card cover (see Figure 3-22).

g. Open the hinged card-tab retainer (see Figure 3-22). Pinch the two blue finger grips toward the center and swing open the retainer.

h. If the card has a dedicated power cable, disconnect the cable from the PCIe riser power connector.

i. Pull evenly on both corners of the PCIe card to remove it from the socket on the PCIe riser.

Step 2 Install a PCIe card:

a. Align the new PCIe card with the empty socket on the PCIe riser assembly.

Note The riser assembly includes adjustable braces that can be used to support the end of a card if the card length is shorter than the slot (see Figure 3-22). You can slide these blue plastic braces to adjust for the length of your card. These braces can also be removed if they are not required.

b. Push down evenly on both ends of the card until it is fully seated in the socket.

Ensure that the card's rear-panel tab sits flat against the PCIe riser rear-panel opening.

c. If the card has a dedicated power cable, connect it to the power connector on the riser.

d. Close the hinged card-tab retainer and press it down until it clicks and locks in place.

e. Close the hinged blue plastic card cover.

f. Align the riser so that its connector is over the motherboard socket.

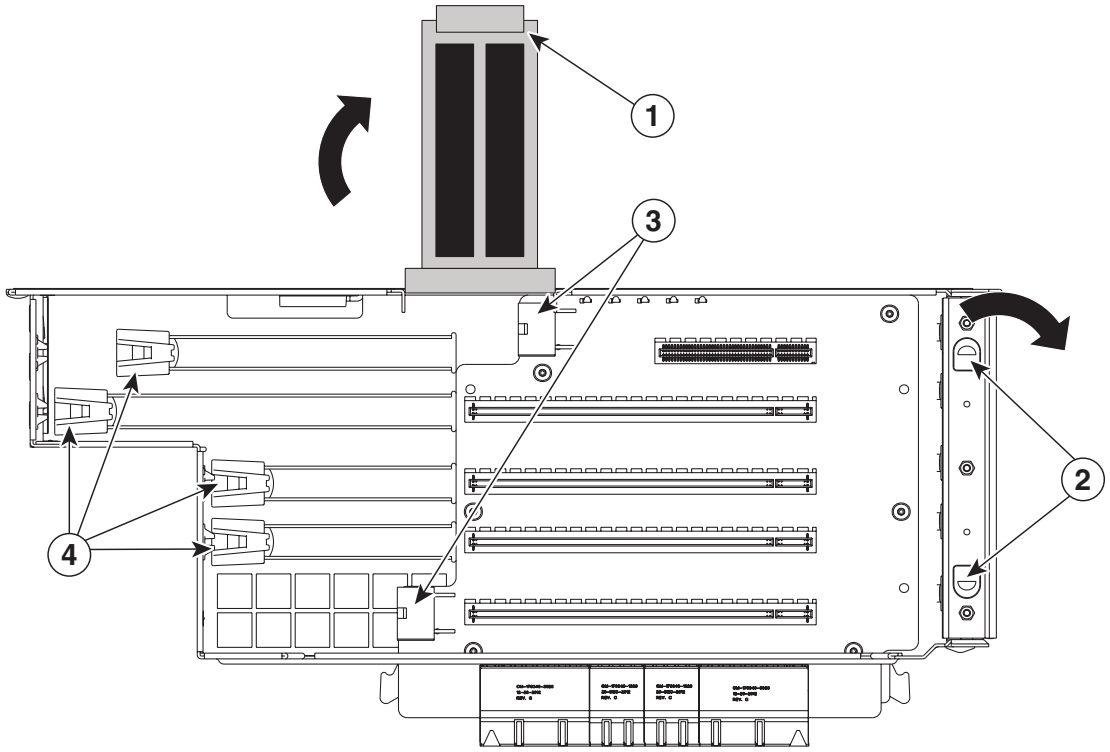
g. With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until its connector makes contact with the motherboard socket.

h. Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.

i. Replace the top cover.

j. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-22 PCIe Riser Card Retention Features



1	Hinged blue plastic card cover	**3**	Power connectors
2	Hinged card-tab retainer finger grips	**4**	Adjustable card braces

Installing Multiple PCIe Cards and Resolving Limited Resources

When a large number of PCIe add-on cards are installed in the server, the system might run out of the following resources required for PCIe devices:

- Option ROM memory space
- 16-bit I/O space

The topics in this section provide guidelines for resolving the issues related to these limited resources:

- Resolving Insufficient Memory Space to Execute Option ROMs, page 3-58
- Resolving Insufficient 16-Bit I/O Space, page 3-59

Resolving Insufficient Memory Space to Execute Option ROMs

The system has very limited memory to execute PCIe legacy option ROMs, so when a large number of PCIe add-on cards are installed in the server, the system BIOS might not able to execute all of the option ROMs. The system BIOS loads and executes the option ROMs in the order that the PCIe cards are enumerated (slot 1, slot 2, slot 3, and so on).

If the system BIOS does not have sufficient memory space to load any PCIe option ROM, it skips loading that option ROM, reports a system event log (SEL) event to the Cisco IMC controller, and reports the following error in the Error Manager window of the BIOS Setup utility:

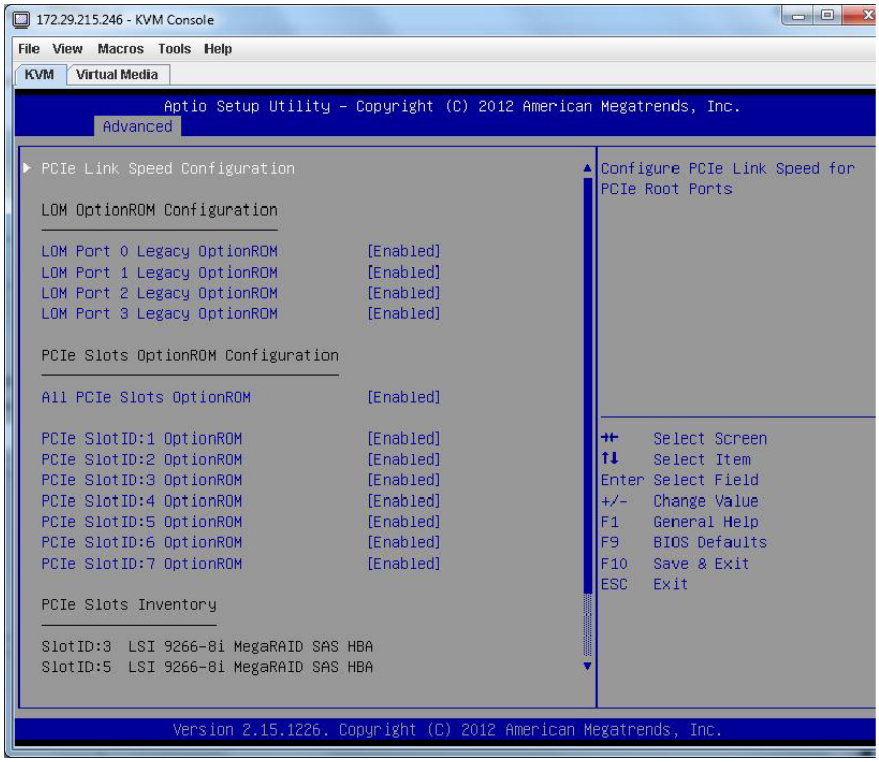
```
PCI OUT OF RESOURCES CONDITION:
ERROR: Insufficient PCI Resources Detected!!!

System is running with Insufficient PCI Resources!
In order to display this message some
PCI devices were set to disabled state!
It is strongly recommended to power off the system
and remove some PCI/PCI Express cards from the system!
To continue booting, proceed to <Save & Exit> Menu Option
and select Boot Device or <Discard Changes and Exit>.

WARNING: If you choose to continue booting some Operating
Systems might not be able to complete boot correctly!
```

To resolve this issue, disable the option ROMs that are not needed for system booting. The BIOS Setup Utility provides the setup options to enable or disable the option ROMs at the PCIe slot level for the PCIe expansion slots and at the port level for the onboard NICs. These options can be found in the BIOS Setup Utility **Advanced > PCI Configuration** window (see Figure 3-23).

Figure 3-23 BIOS Setup Utility Advanced > PCI Configuration Window



- Guidelines for RAID controller booting

  When the server is configured in the factory, the RAID controllers are installed in PCIe slot 3 or slot 5 for a single RAID controller configuration, or in both slot 3 and slot 5 for a dual RAID controller configuration.

  If the server is configured to boot primarily from RAID storage, make sure that the option ROMs for slot 3 or slot 5 are enabled in the BIOS, depending upon your RAID controller configuration. If the RAID controller does not appear in the system boot order even with the option ROMs for slot 3 and slot 5 enabled, the RAID controller option ROM might not have sufficient memory space to execute. In that case, disable other option ROMs that are not needed for the system configuration to free up some memory space for the RAID controller option ROM.

- Guidelines for onboard NIC preboot execution environment (PXE) booting

  If the system is configured to primarily perform a PXE boot from onboard NICs, make sure that the option ROMs for the onboard NICs to be booted from are enabled in the BIOS Setup Utility. Disable other option ROMs that are not needed to create sufficient memory space for the onboard NICs PXE boot.

Resolving Insufficient 16-Bit I/O Space

The system has only 64 KB of legacy 16-bit I/O resources available. This 64 KB of I/O space is divided between four CPUs in the system because the PCIe controller is integrated into the CPUs. This server BIOS has the capability to dynamically detect the 16-bit I/O resource requirement for each CPU and then balance the 16-bit I/O resource allocation between the CPUs accordingly during the PCI bus enumeration phase of the BIOS POST.

When a large number of PCIe cards are installed in the system, the system BIOS might not have sufficient I/O space for some PCIe devices. If the system BIOS is not able to allocate the required I/O resources for any PCIe devices, the following symptoms have been observed:

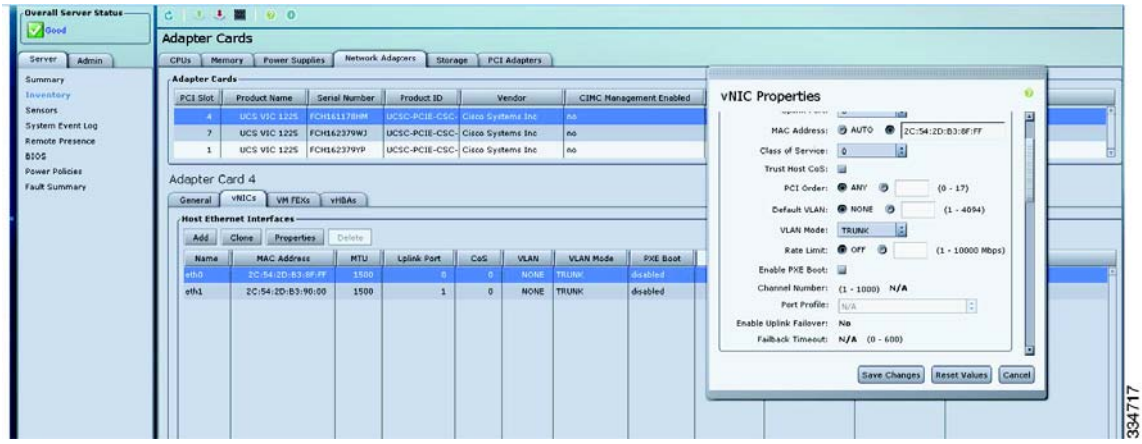
- The system might get stuck in an infinite reset loop.
- The BIOS might appear to hang while initializing PCIe devices.
- The PCIe option ROMs might take excessive time to complete, which appears to lock up the system.
- PCIe boot devices might not be accessible from the BIOS.
- PCIe option ROMs might report initialization errors. These errors are seen before the BIOS passes control to the operating system.
- The keyboard might not work.

To work around this problem, rebalance the 16-bit I/O load using the following methods:

1. Physically remove any unused PCIe cards.
2. If the system has one or more Cisco virtual interface cards (VICs) installed, disable the PXE boot on the VICs that are not required for the system boot configuration by using the Network Adapters window in the Cisco IMC GUI to free up some 16-bit I/O resources. Each VIC uses a minimum 16 KB of 16-bit I/O resource, so disabling the PXE boot on Cisco VICs would free up some 16-bit I/O resources that can be used for other PCIe cards that are installed in the system.

   Uncheck the “Enable PXE boot entry” in the vNIC properties dialog box to disable the PXE boot, as shown in Figure 3-24.

Figure 3-24 vNIC Properties Dialog Box



Replacing an NVIDIA GPU Card

See GPU Card Installation, page D-1.

Replacing the Motherboard RTC Battery

Warning **There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** [Statement 1015]

The real-time clock (RTC) battery retains system settings when the server is disconnected from power. The battery type is CR2032. Cisco supports the industry-standard CR2032 battery, which can be purchased from most electronic stores.

Step 1 Remove the RTC battery (see Figure 3-25):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Remove PCIe riser 2 from the server to provide clearance. See Replacing a PCIe Riser, page 3-49 for instructions.

e. Locate the RTC battery. See Figure 3-25.

f. Bend the battery retaining clip away from the battery and pull the battery from the socket.

Step 2 Install the RTC battery:

a. Bend the retaining clip away from the battery socket and insert the battery in the socket.

Note The flat, positive side of the battery marked "+" should face the retaining clip.

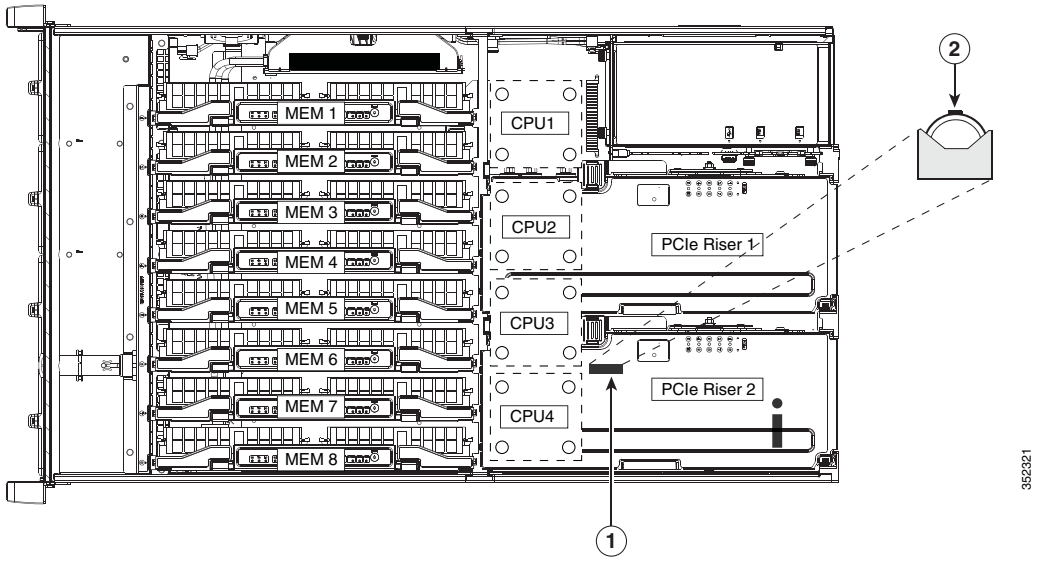
b. Push the battery into the socket until it is fully seated and the retaining clip clicks over the top of the battery.

c. Replace PCIe riser 2 to the server. See Replacing a PCIe Riser, page 3-49 for instructions.

d. Replace the top cover.

e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-25 Location of the Motherboard RTC Battery



1	RTC battery socket on motherboard, under PCIe riser 2.	**2**	Battery clip The flat, positive (+) side of the battery faces the clip.

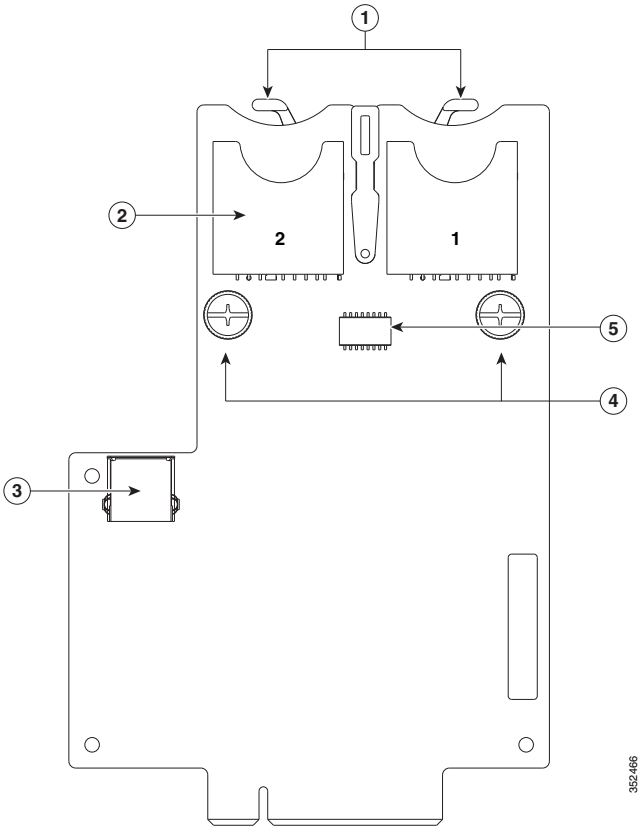
Replacing a Media Riser Card

The media riser is a modular card that has a designated motherboard socket inside the server (see Figure 3-27). The media riser provides bays for Cisco Flexible Flash drives (SD cards) and an internal USB 2.0 port. The media riser card also includes the server's DIP switch panel.

For more information about Cisco Flexible Flash cards, see Replacing a Cisco Flexible Flash Drive, page 3-65.

For more information about DIP switches, see Service DIP Switches, page 3-74.

Figure 3-26 Media Riser Card



1	SD Card retainer clips	**4**	Captive thumbscrews
2	Cisco Flexible Flash card bays (SD card bays)	**5**	DIP switch panel
3	Vertical USB 2.0 port		

Step 1 Remove the media riser card (see Figure 3-27):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Remove PCIe riser 1 to provide clearance. See Replacing a PCIe Riser, page 3-49 for instructions.

e. Loosen both thumbscrews on the media riser card.

f. Lift the media riser card straight up from the motherboard connector.

Step 2 Install a new media riser card:

a. Align the new media riser card with its designated socket on the motherboard. Use the alignment channel in the chassis rear wall to keep the card vertically straight. See Figure 3-27.

b. Push down evenly on both ends of the card until it is fully seated in its motherboard socket.

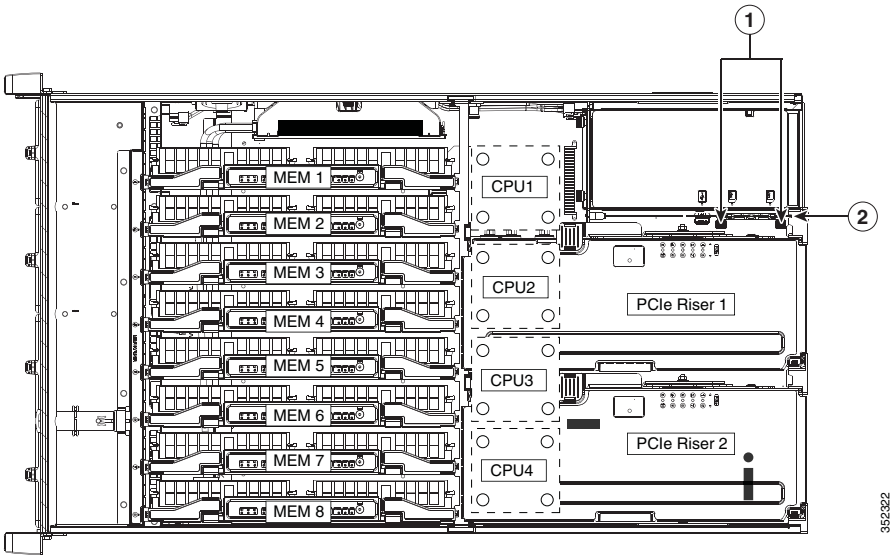
c. Tighten both thumbscrews to secure the card.

d. Replace PCIe riser 1 to the server. See Replacing a PCIe Riser, page 3-49 for instructions.

e. Replace the top cover.

f. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-27 Media Riser Card Location



1	Captive thumbscrews on media riser card	**2**	Alignment channel in chassis wall

Replacing a Cisco Flexible Flash Drive

This section includes the following topics:

Monitoring and Managing a Cisco Flexible Flash Drive

You can monitor and manage your Cisco Flexible Flash drives by using the Cisco IMC GUI interface or the CLI interface. See the *Cisco UCS C-Series Rack-Mount Server Configuration Guide* or the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide* in the documentation roadmap link below.

http://www.cisco.com/go/unifiedcomputing/c-series-doc

Synchronizing RAID After Installing a Second Cisco Flexible Flash Drive

After you install or replace a second Cisco Flexible Flash drive, you must synchronize the RAID partition by using the Cisco UCS Server Configuration Utility (SCU).

The SCU provides an option to synchronize the Hypervisor VD, configured as a RAID-1 disk. This feature is available only when both Cisco Flexible Flash drive slots are populated.

When one member slot of the SD card is corrupt, use this option to synchronize the hypervisor data across two members of the RAID-1 virtual disk. You can initiate this synchronization only if two cards are detected and the RAID-1 group is determined as unhealthy (one member is corrupt).

Step 1 Click the **Hypervisor Sync** icon on the toolbar of the SCU interface.

A dialog box prompts you to confirm that you want to synchronize the Hypervisor RAID.

Step 2 Click **Yes**.

A dialog box is displayed when the synchronization is complete.

Step 3 Click **OK**.

After you click OK, the Hypervisor Sync icon on the toolbar is greyed out.

For more information about the utility, see the Cisco UCS Server Configuration Utility User Guide.

Replacing a Cisco Flexible Flash Drive

Step 1 Remove the Cisco Flexible Flash drive that you are replacing (see Figure 3-27):

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Locate the Cisco Flexible Flash drive that you are replacing on the media riser card. See Figure 3-26.

e. Pull back the retainer clip that is over the bay Figure 3-26, and then push down on the top of the Cisco Flexible Flash drive and release it to allow it to spring up in the socket.

f. Remove the Cisco Flexible Flash drive from the socket.

Step 2 Install a Cisco Flexible Flash drive:

Note To be usable for Cisco Flexible Flash, an SD card must be at least 16 GB in size.

a. Pull the back the retainer clip, and then insert the Cisco Flexible Flash drive into the bay on the media riser card, with the label side facing outward.

b. Press down on the top of the card until it clicks in the bay and stays in place.

c. Replace the top cover.

d. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Replacing an Internal USB Drive

This section contains the following topics:

Internal USB Drive Replacement Procedure

Step 1 Remove the USB flash drive that you are replacing:

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Pull the USB flash drive from the vertical socket on the media riser card (see Figure 3-27 for the location of the media riser card).

Step 2 Install a USB flash drive:

a. Insert the new USB flash drive into the vertical socket on the media riser card.

Note For a short USB flash drive, you might need to remove PCIe riser 1 to gain clearance to the USB slot.

b. Replace the top cover.

c. Replace the server in the rack, replace cables, then power on the server by pressing the **Power** button.

Enabling or Disabling the Internal USB Port

The factory default is for all USB ports on the server to be enabled. However, the internal USB port can be enabled or disabled in the server BIOS.

Step 1 Enter the BIOS Setup utility by pressing the **F2** key when prompted during bootup.

Step 2 Navigate to the **Advanced** tab.

Step 3 On the Advanced tab, choose **USB Configuration**.

Step 4 On the USB Configuration window, select **USB Ports Configuration**.

Step 5 Scroll to **USB Port: Internal**, press **Enter**, and then choose either Enabled or Disabled from the menu.

Step 6 Press **F10** to save and exit the utility.

Installing and Enabling a Trusted Platform Module

The trusted platform module (TPM) is a small circuit board that connects to a motherboard socket and is secured by a one-way screw. The socket location is on the motherboard, under PCIe riser 2.

TPM 2.0 Considerations

Trusted platform module (TPM) version 2.0 is supported on Intel v3- or Intel v4-based platforms.

If there is an existing TPM 1.2 installed in the server, you cannot upgrade to TPM 2.0.

If there is no existing TPM in the server, you can install TPM 2.0. You must first upgrade to Intel v4 code, regardless of whether the installed CPU is Intel v3 or v4. TPM 2.0 requires Intel v4 code or later.

Caution If your Intel v3 or Intel v4 system is currently supported and protected by TPM version 2.0, a potential security exposure might occur if you downgrade the system software and BIOS to a version earlier than those shown in Table 3-12.

Note If the TPM 2.0 becomes unresponsive, reboot the server.

Table 3-12 TPM Matrix by Intel CPU Version

Intel CPU	TPM Version Supported	Minimum Cisco IMC Version	Minimum UCS Manager (UCSM) Version
Intel v3	TPM 1.2	2.0(3)	2.2(3)
	TPM 2.0	2.0(12)	2.2(8) or 3.1(2)
Intel v4	TPM 1.2	2.0(12)	2.2(8) or 3.1(2)
	TPM 2.0	2.0(12)	2.2(8) or 3.1(2)

This section contains the following procedures, which must be followed in this order when installing and enabling a TPM:

1. Installing the TPM Hardware, page 3-69
2. Enabling TPM Support in the BIOS, page 3-70
3. Enabling the Intel TXT Feature in the BIOS, page 3-72

Installing the TPM Hardware

Step 1 Prepare the server for component installation:

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

b. Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the server from the rack.

c. Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

d. Remove PCIe riser 2 to provide clearance. See Replacing a PCIe Riser, page 3-49 for instructions.

Step 2 Install a TPM:

a. Locate the TPM socket on the motherboard, as shown in Figure 3-28.

b. Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole and standoff on the TPM board with the screw hole that is adjacent to the TPM socket.

c. Push down evenly on the TPM to seat it in the motherboard socket.

d. Install the single one-way screw that secures the TPM to the motherboard.

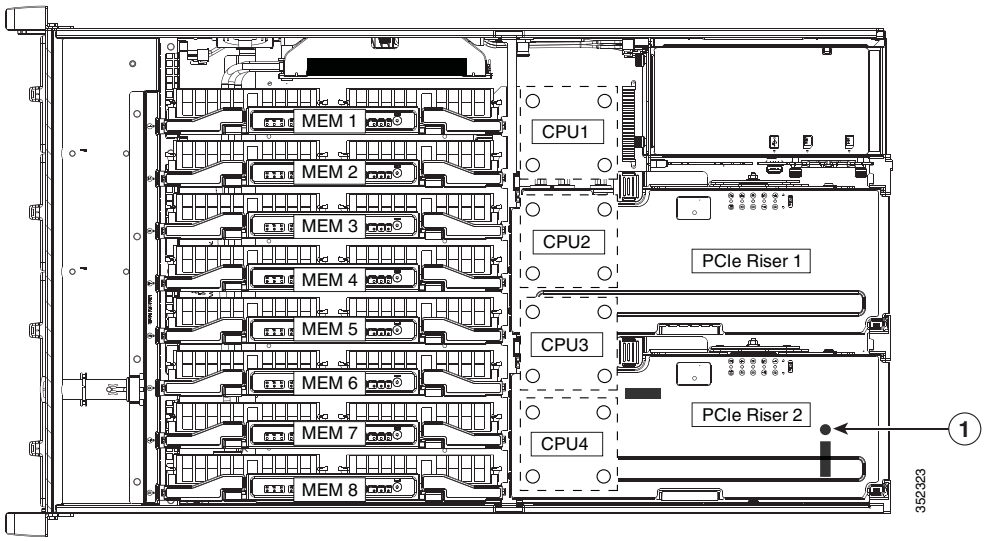
e. Replace PCIe riser 2 to the server. See Replacing a PCIe Riser, page 3-49 for instructions.

f. Replace the top cover.

g. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Step 3 Continue with Enabling TPM Support in the BIOS, page 3-70.

Figure 3-28 TPM Socket Location on Motherboard



1	TPM socket and screw hole on the motherboard under PCIe riser 2		–

Enabling TPM Support in the BIOS

Note After hardware installation, you must enable TPM support in the BIOS.

Note You must set a BIOS Administrator password before performing this procedure. To set this password, press the **F2** key when prompted during system boot to enter the BIOS Setup utility. Then navigate to **Security > Set Administrator Password** and enter the new password twice as prompted.

Step 1 Enable TPM support:

a. Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.

b. Log in to the BIOS Setup utility with your BIOS Administrator password.

c. On the BIOS Setup utility window, choose the **Advanced** tab.

d. Choose **Trusted Computing** to open the TPM Security Device Configuration window.

e. Change TPM SUPPORT to **Enabled**.

f. Press **F10** to save your settings and reboot the server.

Step 2 Verify that TPM support is now enabled:

a. Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.

b. Log into the BIOS Setup utility with your BIOS Administrator password.

c. Choose the **Advanced** tab.

d. Choose **Trusted Computing** to open the TPM Security Device Configuration window.

e. Verify that TPM SUPPORT and TPM State are Enabled.

Step 3 Continue with Enabling the Intel TXT Feature in the BIOS, page 3-72.

Enabling the Intel TXT Feature in the BIOS

Intel Trusted Execution Technology (TXT) provides greater protection for information that is used and stored on the business server. A key aspect of that protection is the provision of an isolated execution environment and associated sections of memory where operations can be conducted on sensitive data, invisibly to the rest of the system. Intel TXT provides for a sealed portion of storage where sensitive data such as encryption keys can be kept, helping to shield them from being compromised during an attack by malicious code.

Step 1 Reboot the server and watch for the prompt to press F2.

Step 2 When prompted, press **F2** to enter the BIOS Setup utility.

Step 3 Verify that the prerequisite BIOS values are enabled:

a. Choose the **Advanced** tab.

b. Choose **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support window.

c. Verify that the following items are listed as Enabled:

- VT-d Support (default is Enabled)
- VT Support (default is Enabled)
- TPM Support
- TPM State

- If VT-d Support and VT Support are already enabled, skip to Step 4.
- If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.

d. Press **Escape** to return to the BIOS Setup utility **Advanced** tab.

e. On the Advanced tab, choose **Processor Configuration** to open the Processor Configuration window.

f. Set Intel (R) VT and Intel (R) VT-d to **Enabled**.

Step 4 Enable the Intel Trusted Execution Technology (TXT) feature:

a. Return to the Intel TXT(LT-SX) Hardware Support window if you are not already there.

b. Set TXT Support to **Enabled**.

Step 5 Press **F10** to save your changes and exit the BIOS Setup utility.

Replacing Power Supplies

The server requires four 1400 W power supplies. When four power supplies are installed they are redundant as 2+2.

Note If you have ordered a server with power supply redundancy (four power supplies), you do not have to power off the server to replace power supplies because they are redundant as 2+2.

Step 1 Remove the power supply that you are replacing or a blank panel from an empty bay (see Figure 3-29):

a. Perform one of the following actions:
   - If your server has only two power supplies, shut down and power off the server as described in Shutting Down and Powering Off the Server, page 3-8.
   - If your server has four power supplies, you do not have to power off the server.

b. Remove the power cord from the power supply that you are replacing.

c. Grasp the power supply handle while pinching the release lever toward the handle.

d. Pull the power supply out of the bay.

Step 2 Install a new power supply:

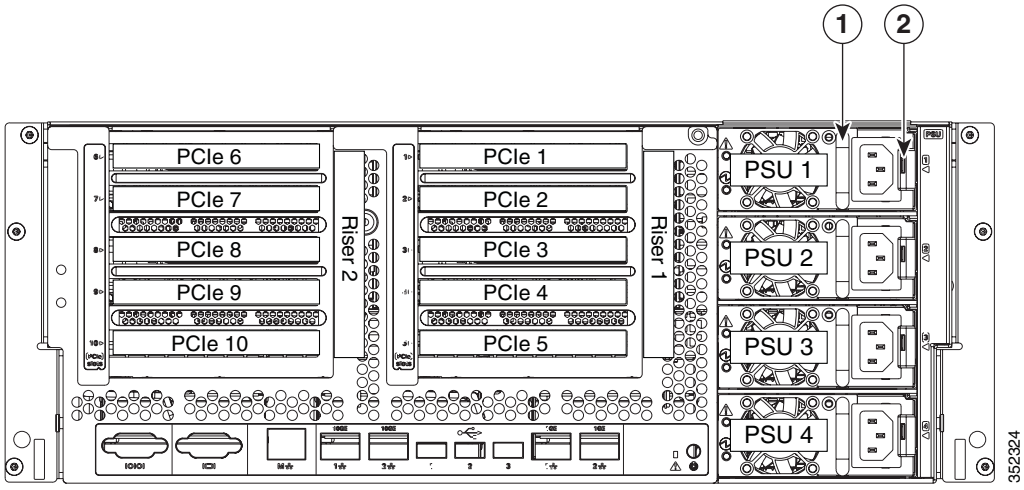
a. Grasp the power supply handle and insert the new power supply into the empty bay.

b. Push the power supply into the bay until the release lever locks.

c. Connect the power cord to the new power supply.

d. If you powered off the server, press the **Power** button to return the server to main power mode.

Figure 3-29 Removing and Replacing Power Supplies



1	Power supply handle	2	Power supply release lever

Service DIP Switches

This server includes a dual in-line package (DIP) switch panel on the media riser card.

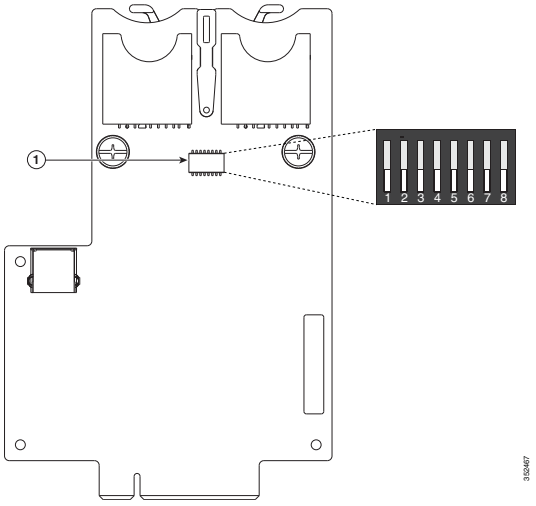
This section includes the following topics:

DIP Switch Location on the Media Riser Card

The panel of DIP switches is located on the media riser card (see Figure 3-30). The default position for all switches is open (down). See Table 3-13 for definitions of the supported switch functions.

The media riser is the removable card that also includes the Cisco Flexible Flash drive (SD card) bays and the internal USB slot. See Figure 3-27 on page 3-64 for the location of the media riser in the server.

Figure 3-30 DIP Switches on the Media Riser Card



1	DIP switch panel on the media riser card Switches are shown in the open (down) position.	–	

Table 3-13 Supported DIP Switch Functions

Switch Number	Function
1	Clear Password
2	Recover BIOS
3	Clear CMOS
4–8	Reserved

Using the Clear Password DIP Switch

You can use DIP switch #1 to clear the BIOS administrator password.

Step 1 Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

Step 2 Disconnect all power cords from the power supplies.

Step 3 Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

Step 4 Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Step 5 Locate the media riser card in the server. See Figure 3-27 on page 3-64.

Step 6 Remove PCIe riser 1 from the server to provide clearance. See Replacing a PCIe Riser, page 3-49.

Step 7 Locate the BIOS recovery DIP switch 1 on the media riser card. See Figure 3-30.

Step 8 Use a small pointed object such as a screwdriver to move DIP switch 1 to the closed (upper) position.

Step 9 Reconnect AC power cords to the server. The server powers up to standby power mode.

Step 10 Return the server to main power mode by pressing the **Power** button on the front panel.

Step 11 After the server has fully booted, power off the server again and disconnect all power cords.

Step 12 Move DIP switch 1 back to the default open (lower) position.

Note If you do not move the switch back to the default position, the Cisco IMC clears the password each time that you boot the server.

Step 13 Replace PCIe riser 1 to the server. See Replacing a PCIe Riser, page 3-49.

Step 14 Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.

Using the BIOS Recovery DIP Switch

You can use DIP switch #2 to recover a corrupted BIOS.

Note The following procedures use a `recovery.cap` recovery file. In Cisco IMC releases 3.0(1) and later, this recovery file has been renamed `bios.cap`.

Depending on which stage the BIOS becomes corrupted, you might see different behavior.

- If the BIOS BootBlock is corrupted, you might see the system get stuck on the following message:

```
Initializing and configuring memory/hardware
```

- If it is a non-BootBlock corruption, the following message is displayed:

```
****BIOS FLASH IMAGE CORRUPTED****
Flash a valid BIOS capsule file using Cisco IMC WebGUI or CLI interface.
IF Cisco IMC INTERFACE IS NOT AVAILABLE, FOLLOW THE STEPS MENTIONED BELOW.
1. Connect the USB stick with recovery.cap file in root folder.
2. Reset the host.
IF THESE STEPS DO NOT RECOVER THE BIOS
1. Power off the system.
2. Mount recovery jumper.
3. Connect the USB stick with recovery.cap (or bios.cap) file in root folder.
4. Power on the system.
Wait for a few seconds if already plugged in the USB stick.
REFER TO SYSTEM MANUAL FOR ANY ISSUES.
```

Note As indicated by the message shown above, there are two procedures for recovering the BIOS. Try procedure 1 first. If that procedure does not recover the BIOS, use procedure 2.

Procedure 1: Reboot with recovery.cap (or bios.cap) File

Step 1 Download the BIOS update package and extract it to a temporary location.

Step 2 Copy the contents of the extracted recovery folder to the root directory of a USB thumb drive. The recovery folder contains the recovery.cap (or bios.cap) file that is required in this procedure.

Note The recovery.cap (or bios.cap) file must be in the root directory of the USB thumb drive. Do not rename this file. The USB thumb drive must be formatted with either FAT16 or FAT32 file systems.

Step 3 Insert the USB thumb drive into a USB port on the server.

Step 4 Reboot the server.

Step 5 Return the server to main power mode by pressing the **Power** button on the front panel.

The server boots with the updated BIOS boot block. When the BIOS detects a valid recovery.cap (or bios.cap) file on the USB thumb drive, it displays this message:

```
Found a valid recovery file...Transferring to Cisco IMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

Step 6 Wait for server to complete the BIOS update, and then remove the USB thumb drive from the server.

Note During the BIOS update, Cisco IMC shuts down the server and the screen goes blank for about 10 minutes. Do not unplug the power cords during this update. Cisco IMC powers on the server after the update is complete.

Procedure 2: Use BIOS Recovery DIP switch and recovery.cap (or bios.cap) File

See Figure 3-30 for the location of the DIP switch on the media riser card.

Step 1 Download the BIOS update package and extract it to a temporary location.

Step 2 Copy the contents of the extracted recovery folder to the root directory of a USB thumb drive. The recovery folder contains the recovery.cap (or bios.cap) file that is required in this procedure.

Note The recovery.cap (or bios.cap) file must be in the root directory of the USB thumb drive. Do not rename this file. The USB thumb drive must be formatted with either FAT16 or FAT32 file systems.

Step 3 Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

Step 4 Disconnect all power cords from the power supplies.

Step 5 Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

Step 6 Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Step 7 Locate the media riser card in the server. See Figure 3-27 on page 3-64.

Step 8 Remove PCIe riser 1 from the server to provide clearance. See Replacing a PCIe Riser, page 3-49.

Step 9 Locate the BIOS recovery DIP switch 2 on the media riser card. See Figure 3-30.

Step 10 Use a small pointed object such as a screwdriver to move DIP switch 2 to the closed (upper) position.

Step 11 Reconnect AC power cords to the server. The server powers up to standby power mode.

Step 12 Insert the USB thumb drive that you prepared in Step 2 into a USB port on the server.

Step 13 Return the server to main power mode by pressing the **Power** button on the front panel.

The server boots with the updated BIOS boot block.

Step 14 Wait for the server to complete the BIOS update, and then remove the USB thumb drive from the server.

Note During the BIOS update, the Cisco IMC shuts down the server and the window is blank for about 10 minutes. Do not unplug the power cords during this update. The Cisco IMC will power on the server after the update is complete.

Step 15 After the server has fully booted, power off the server again and disconnect all power cords.

Step 16 Move DIP switch 2 back to the default open (lower) position.

Note If you do not move the switch back to the default position, the Cisco IMC attempts to recover the BIOS each time that you boot the server.

Step 17 Replace PCIe riser 1 to the server. See Replacing a PCIe Riser, page 3-49.

Step 18 Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.

Using the Clear CMOS DIP Switch

You can use DIP switch #3 to clear the CMOS settings.

Step 1 Power off the server as described in Shutting Down and Powering Off the Server, page 3-8.

Step 2 Disconnect all power cords from the power supplies.

Step 3 Slide the server out the front of the rack far enough so that you can remove the top cover.

Caution If you cannot safely view and access the component, remove the server from the rack.

Step 4 Remove the top cover as described in Removing or Replacing the Server Top Cover, page 3-10.

Step 5 Locate the media riser card in the server. See Figure 3-27 on page 3-64.

Step 6 Remove PCIe riser 1 from the server to provide clearance. See Replacing a PCIe Riser, page 3-49.

Step 7 Locate the BIOS recovery DIP switch 3 on the media riser card. See Figure 3-30.

Step 8 Use a small pointed object such as a screwdriver to move DIP switch 3 to the closed (upper) position.

Step 9 Reconnect AC power cords to the server. The server powers up to standby power mode.

Step 10 Return the server to main power mode by pressing the **Power** button on the front panel.

Step 11 After the server has fully booted, power off the server again and disconnect all power cords.

Step 12 Move DIP switch 3 back to the default open (lower) position.

Note If you do not move the switch back to the default position, the Cisco IMC clears the CMOS settings each time that you boot the server.

Step 13 Replace PCIe riser 1 to the server. See Replacing a PCIe Riser, page 3-49.

Step 14 Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.