CHAPTER 3

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:

Server Monitoring and Management Tools

Cisco Integrated Management Interface (CIMC)

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

http://www.cisco.com/en/US/products/ps10739/products_installation_and_configuration_guides_list.html

Server Configuration Utility

Cisco has also developed the Cisco Server Configuration Utility for C-Series servers, which can aid and 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

This utility is pre-installed on an internal Cisco Flexible Flash card inside the server (see Overview of the Pre-Installed Cisco Flexible Flash Card, page 3-40). You can also download the ISO from Cisco.com. See the user documentation for your version of the utility at the following URL:

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

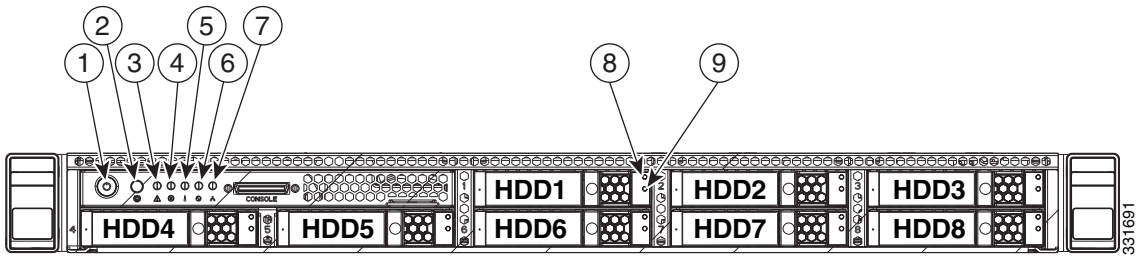
Status LEDs and Buttons

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 defines the LED states.

Figure 3-1 Front Panel LEDs



1	**Power button/Power status LED**	**6**	Power supply status LED
2	Identification button/LED	**7**	Network link activity LED
3	System status LED	**8**	Hard drive fault LED
4	Fan status LED	**9**	Hard drive activity LED
5	Temperature status LED		–

Table 3-1 Front Panel LEDs, Definitions of States

LED Name	State
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 CIMC and some motherboard functions. • Green—The server is in main power mode. Power is supplied to all server components.
Identification	• Off—The Identification LED is not in use. • Blue—The Identification LED is activated.

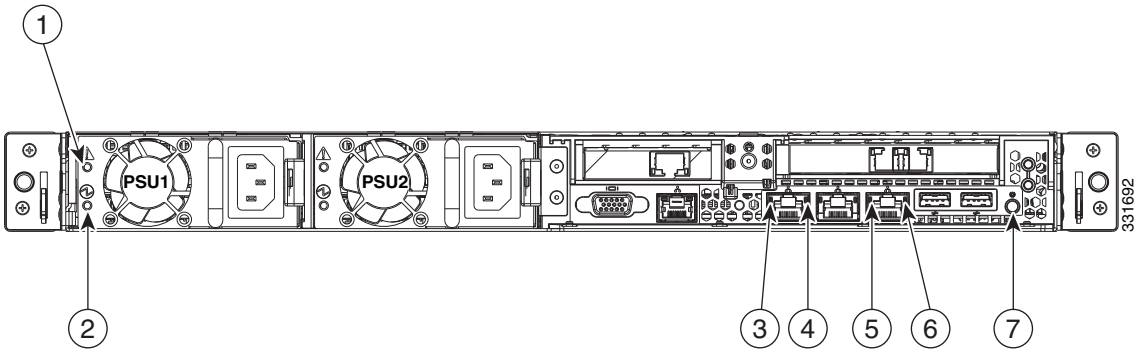
Table 3-1 Front Panel LEDs, Definitions of States (continued)

LED Name	State
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 over-temperature condition.
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.
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.
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.
Network link activity	• Off—The Ethernet link is idle. • Green—One or more Ethernet LOM ports are link-active, but there is no activity. • Green, blinking—One or more Ethernet LOM ports are link-active, with activity.
Hard drive fault	• Off—The hard drive is operating properly. • Amber—This hard drive has failed. • Amber, blinking—The device is rebuilding.
Hard drive activity	• Off—There is no hard drive in the hard drive sled (no access, no fault). • Green—The hard drive is ready. • Green, blinking—The hard drive is reading or writing data.

Rear Panel LEDs and Buttons

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

Figure 3-2 Rear Panel LEDs and Buttons



1	Power supply fault LED	**5**	1-Gb Ethernet link speed LED
2	Power supply status LED	**6**	1-Gb Ethernet link status LED
3	1-Gb Ethernet dedicated management link status LED	**7**	Rear Identification button/LED
4	1-Gb Ethernet dedicated management link speed LED		–

Table 3-2 Rear Panel LEDs, Definitions of States

LED Name	State
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, solid—A critical fault threshold has been reached, causing the power supply to shut down (for example, a fan failure or an over-temperature condition).
Power supply status	AC power supplies: • Off—There is no AC power to the power supply. • Green, blinking—AC power OK, DC output not enabled. • Green, solid—AC power OK, DC outputs OK. DC power supplies: • Off—There is no DC power to the power supply. • Green, blinking—DC power OK, DC output not enabled. • Green, solid—DC power OK, DC outputs OK.
1-Gb Ethernet dedicated management 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 LEDs, Definitions of States (continued)

LED Name	State
1-Gb Ethernet dedicated management link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
1-Gb Ethernet link speed	• Off—link speed is 10 Mbps. • Amber—link speed is 100 Mbps. • Green—link speed is 1 Gbps.
1-Gb Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
Identification	• Off—The Identification LED is not in use. • Blue—The Identification LED is activated.

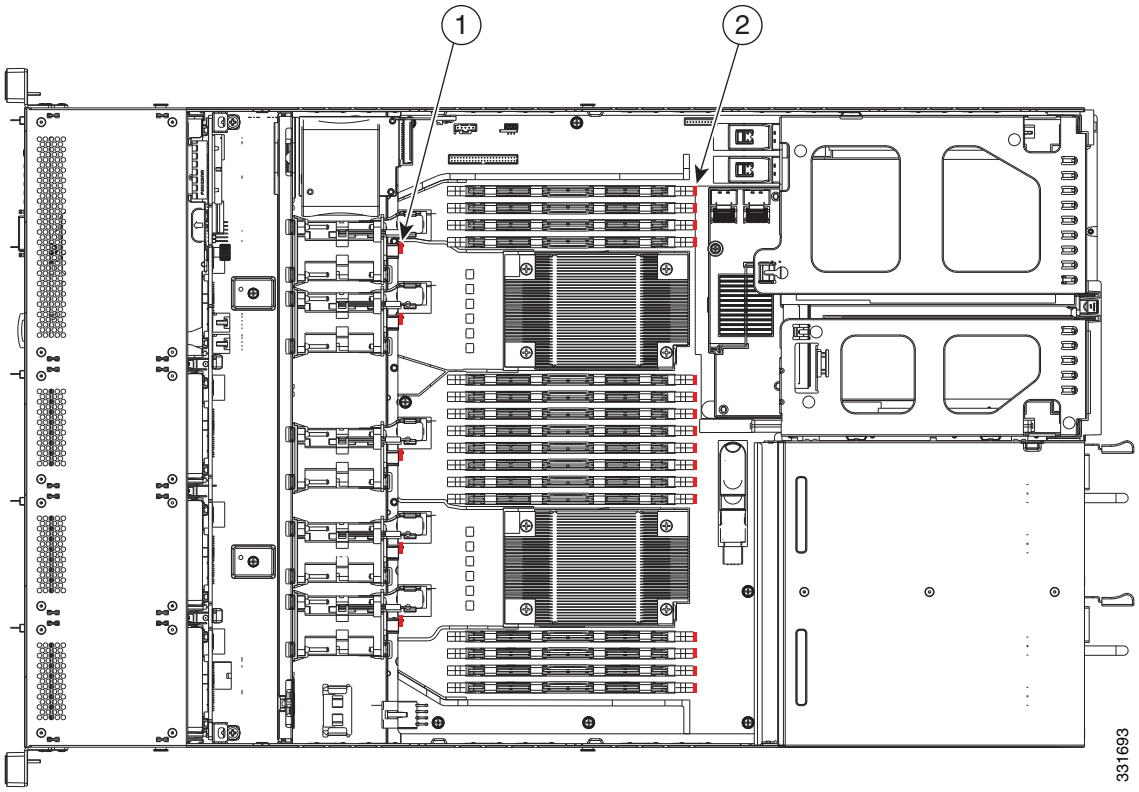
Internal Diagnostic LEDs

The server has internal fault LEDs for fan modules and DIMMs. An LED lights amber to indicate a failed component.

Note Power must be connected to the server for these LEDs to be operate.

See Figure 3-3 for the locations of these internal LEDs.

Figure 3-3 Internal Diagnostic LED Locations



1	Fan module fault LEDs (one next to each fan connector on the motherboard)	**2**	DIMM fault LEDs (one next to each DIMM socket on the motherboard)

Table 3-3 Internal Diagnostic LEDs, Definition of 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 drives can run.
- Standby power mode—Power is supplied only to the service processor and the cooling fans and it is safe to power off the server from this mode.

You can invoke a graceful shutdown or an hard shutdown by using either of the following methods:

- Use the CIMC management interface.
- Use the **Power** button on the server front panel. To use the **Power** button, follow these steps:

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 power off the server.

Removing and Replacing the Server Top Cover

To remove or replace the top cover of the server, follow these steps:

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

Step 1 Remove the top cover (see Figure 3-4):

a. Loosen the captive thumbscrew that secures the rear edge of the cover to the chassis.

b. Press the release button.

c. Using the rubber finger pads, push the top cover toward the server rear about one-half inch (1.27 cm), until it stops.

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

Step 2 Replace the top cover:

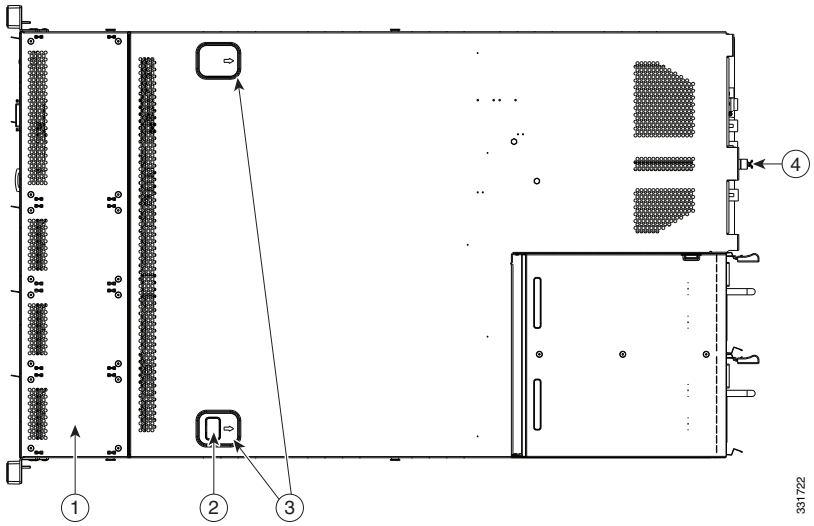
a. Place the cover on top of the server about one-half inch (1.27 cm) behind the lip of the chassis front cover panel. The cover should sit flat.

Note Make sure that the wrap-around flanged edge on the rear of the cover is correctly aligned with the chassis features so that there is clearance when sliding the cover forward.

b. Slide the top cover toward the front cover panel until it stops and the release button locks.

c. Tighten the captive thumbscrew that secures the rear edge of the cover to the chassis.

Figure 3-4 Removing the Top Cover

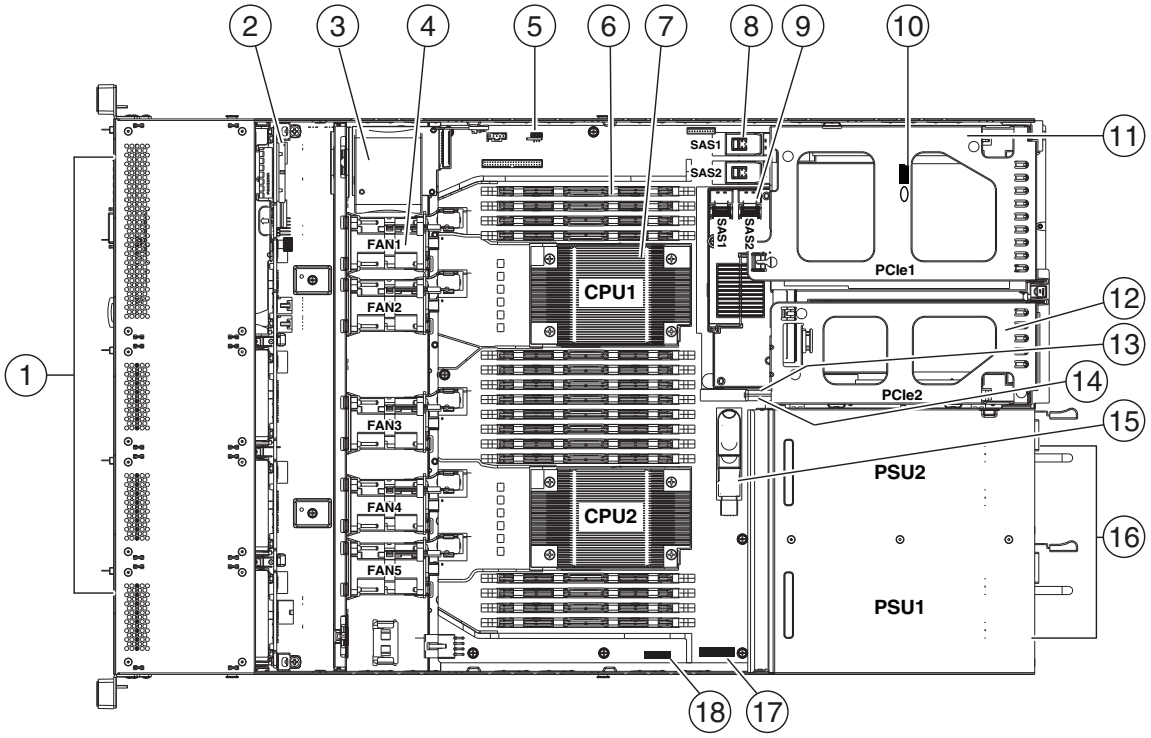


1	Front cover panel	**3**	Rubber finger pads (two)
2	Release button	**4**	Captive thumbscrew

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 and air baffles removed.

Figure 3-5 Replaceable Component Locations



1	Drives (hot-swappable, accessed through front panel)	**10**	Trusted platform module socket on motherboard
2	Drive backplane	**11**	Standard-height PCIe riser (PCIe slot 1)
3	Mounting location on air baffle for LSI battery backup unit or SuperCap Power Module (air baffle not shown)	**12**	Half-height PCIe riser (PCIe slot 2)
4	Cooling fan modules (five)	**13**	Cisco Flexible Flash card slot SD2 socket on PCIe riser 2
5	SCU upgrade ROM header (PBG DYNAMIC SKU)	**14**	Cisco Flexible Flash card slot SD1 socket on PCIe riser 2
6	DIMM slots on motherboard (sixteen)	**15**	Internal USB 2.0 port
7	CPUs and heatsinks (two)	**16**	Power supplies (two)
8	Integrated RAID mini-SAS connectors on motherboard, SASPORT 1 and SASPORT 2	**17**	RTC battery on motherboard
9	Mezzanine RAID card, mini-SAS connectors SAS1 and SAS2	**18**	Software RAID 5 key header (SW RAID KEY)

Serial Number Location

The serial number for the server is printed on a label on the top of the server, near the front.

Color-Coded Touch Points

This server has color-coded touch points that indicate thumbscrews and latches on replaceable and hot-swappable components.

- Hot-swappable components have green plastic touch points. This includes the internal cooling fans and the power supplies. (An exception is the drive trays on the front panel, which are hot-swappable but not green).
- Some replaceable but non-hot-swappable components have light-blue plastic touch-points.

Installing or 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

Warning **Class 1 laser product.**
Statement 1008

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

Tip You can press the Identification button on the front panel or rear panel to turn on a flashing Identification LED on the front and rear panels of the server. This allows you to locate the specific server that you are servicing when you go to the opposite side of the rack. You can also activate these LEDs remotely by using the CIMC interface. See the "Status LEDs and Buttons" section on page 3-2 for locations of these LEDs.

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

Replacing Hard Drives or Solid State Drives

This section includes the following information:

Drive Population Guidelines

The server has two different drive backplane options:

- The Small Form Factor drives version can hold up to eight 2.5-inch hard drives or solid state drives.
- The Large Form Factor drives version can hold up to four 3.5-inch hard drives.

The drive-bay numbering is shown in Figure 3-6.

Figure 3-6 Drive Numbering, Small Form Factor

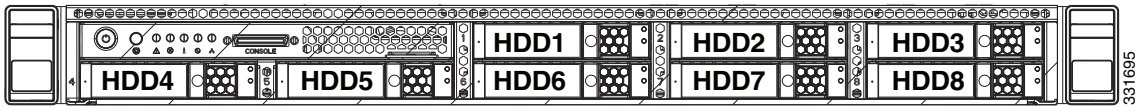
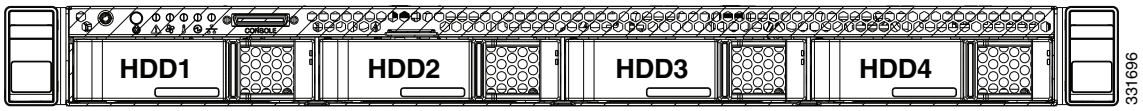


Figure 3-7 Drive Numbering, Large Form Factor



Observe these drive population guidelines for optimum performance:

- When populating drives, add drives to the lowest-numbered bays first.
- Keep an empty drive blanking tray in any unused bays to ensure proper air flow.
- You can mix hard drives and SSDs in the same server (the LFF version of the server does not support SSDs). However, You cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. That is, when you create a logical volume, it must contain all hard drives or all SSDs.

Drive Replacement Procedure

To replace or install a hot-pluggable hard drive, follow these steps:

Tip You do not have to shut down or power off the server to replace hard drives or solid state drives (SSDs) because they are hot-pluggable.

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

a. Press the release button on the face of the drive tray. See Figure 3-8.

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

c. 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.

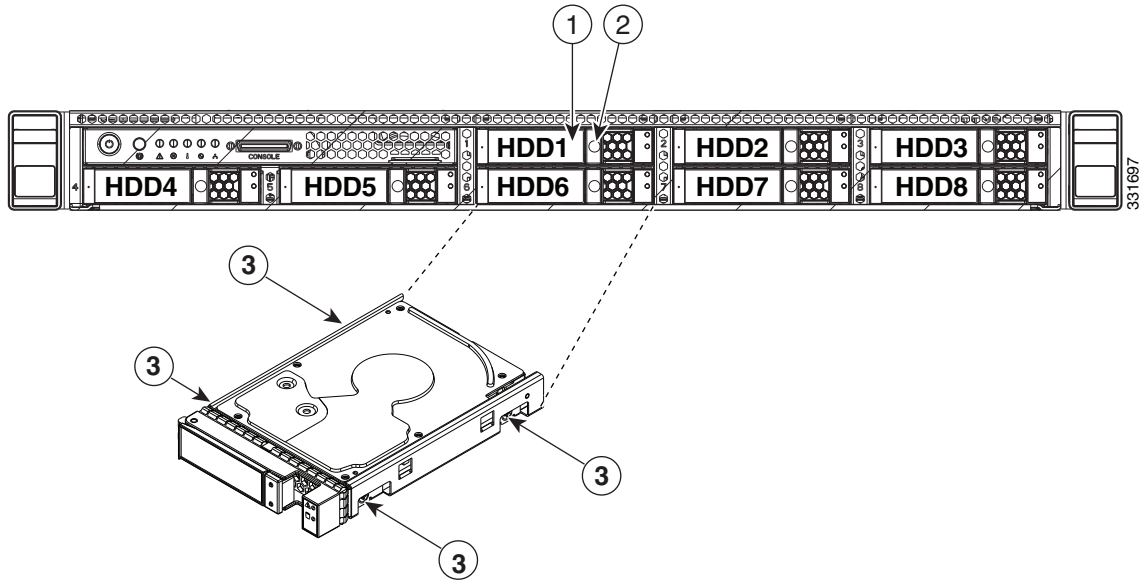
Step 2 Install a new drive:

a. Place a new drive in the empty drive tray and install 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, then close the ejector lever to lock the drive in place.

Figure 3-8 Replacing Hard Drives



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

Replacing a Drive Backplane

Note The Small Form Factor (eight-drive) and Large Form Factor (four-drive) backplanes and their corresponding chassis drive bays are factory-configurable options. When replacing a backplane, you must replace it with the same version of the backplane.

To install or replace a drive backplane, follow these steps:

Step 1 Remove the drive backplane that you are replacing. See Figure 3-9:

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Remove all drives from the server.

Tip Label the drives as you remove them to aid replacement.

e. Disconnect all cables from the backplane.

f. Loosen the two captive thumbscrews that secure the backplane to the chassis floor (see Figure 3-9).

g. Loosen the single captive thumbscrew that secures the backplane to the operations panel assembly (see Figure 3-9).

The operations panel assembly plugs into a socket on the front side of the backplane.

h. Push the operations panel assembly forward and out the front of the chassis about one inch to disengage it from the backplane. Push on the small metal handle that is engraved with an arrow (see Figure 3-9).

i. Lift straight up on the backplane to disengage it from the three supporting metal hooks on the chassis.

Step 2 Install a new drive backplane:

a. Carefully set the backplane in place so that the three slotted holes in its circuit board fit over the three supporting hooks on the chassis (see Figure 3-9).

b. Push the operations panel assembly inward until it is fully engaged with the socket on the backplane.

c. Tighten the single captive thumbscrew that secures the backplane to the operations panel assembly.

d. Tighten the two captive thumbscrews that secure the backplane to the chassis floor.

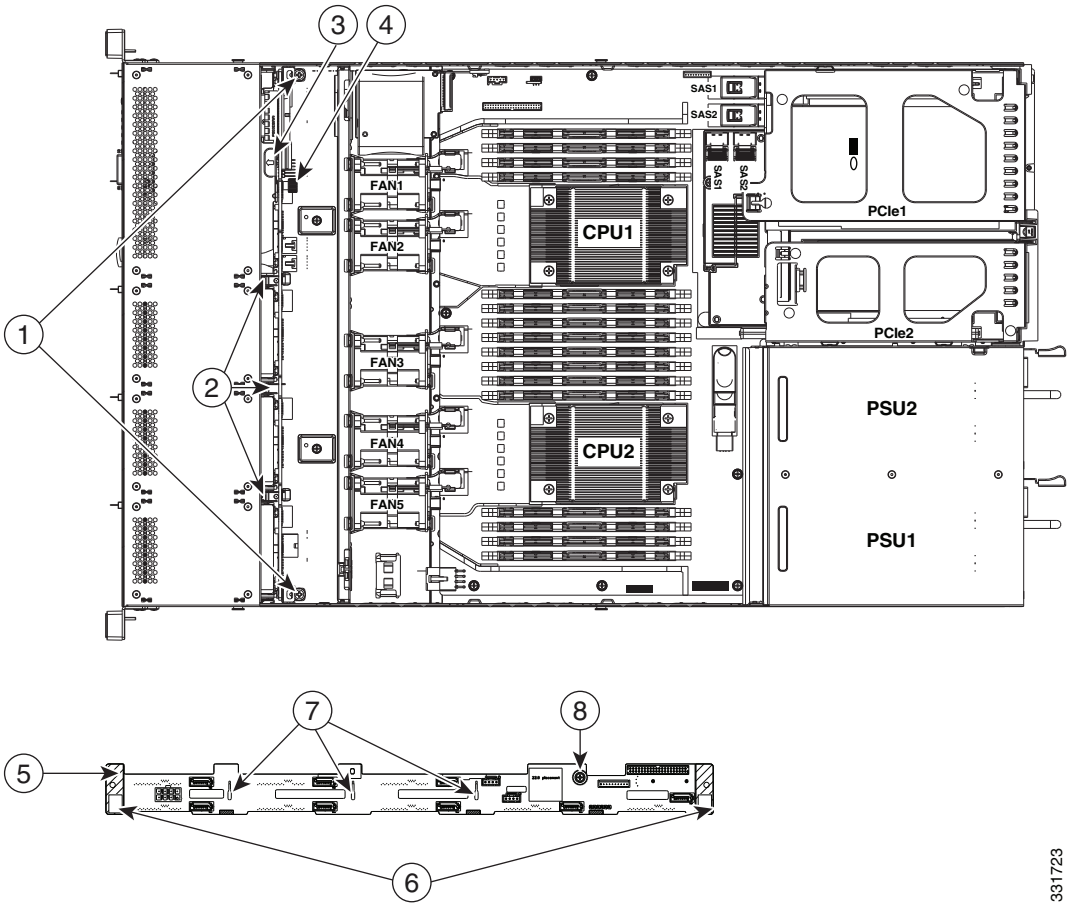
e. Reconnect all cables to the backplane.

f. Replace all drives to the server.

g. Replace the top cover.

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

Figure 3-9 Replacing the Drive Backplane



1	Captive thumbscrews (two), securing backplane to chassis floor	**5**	Backplane (SFF version shown removed from server)
2	Supporting hooks on chassis (three)	**6**	Captive thumbscrews (two), securing backplane to chassis floor
3	Operations panel assembly handle	**7**	Slotted holes for supporting hooks (three)
4	Captive thumbscrew (one) securing backplane to operations panel	**8**	Captive thumbscrew securing backplane to operations panel

Replacing Fan Modules

The five fan modules in the server are numbered as follows when you are facing the front of the server (also see Figure 3-11).

Figure 3-10 Fan Module Numbering

FAN 1	FAN 2	FAN 3	FAN 4	FAN 5

Tip Each fan module has a fault LED on the motherboard that lights amber if the fan module fails. Power must be connected to the server for these LEDs to operate.

To replace or install a hot-pluggable fan module, follow these steps:

Caution You do not have to shut down or power off the server to replace fan modules because they are hot-pluggable. However, to maintain proper cooling, do not operate the server for more than one minute with any fan module removed.

Step 1 Remove a fan module 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. 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.

b. Remove the top cover as described in "Removing and Replacing the Server Top Cover" section on page 3-8.

c. Grasp the fan module and lift straight up to disengage its connector from the motherboard.

Step 2 Install a new fan module:

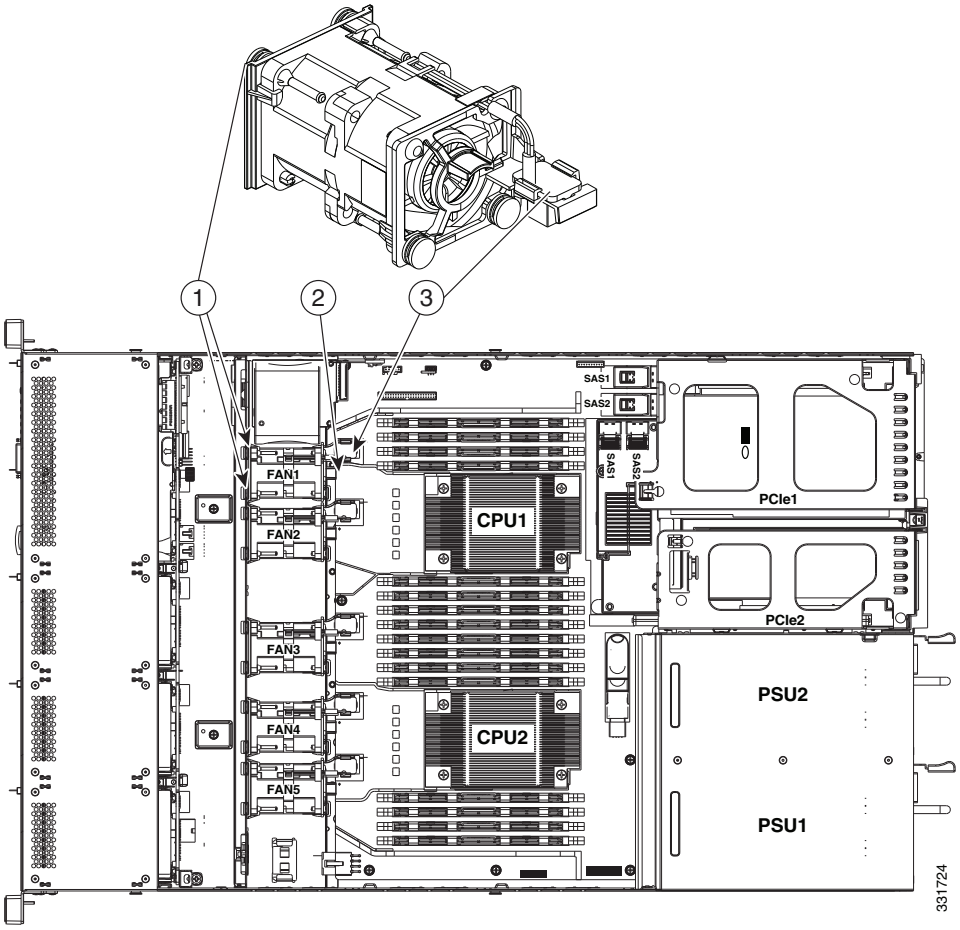
a. Set the new fan module in place, aligning its two rubber dampening gaskets with the openings in the chassis panel. See Figure 3-11.

b. Press down gently on the fan module connector to fully engage it with the connector on the motherboard.

c. Replace the top cover.

d. Replace the server in the rack.

Figure 3-11 Replacing Fan Modules



1	Rubber dampening gaskets (two on each fan module)	**3**	Fan connector to motherboard
2	Fan module fault LED on motherboard (one for each fan module)		

Replacing DIMMs

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 3rd-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 memory.

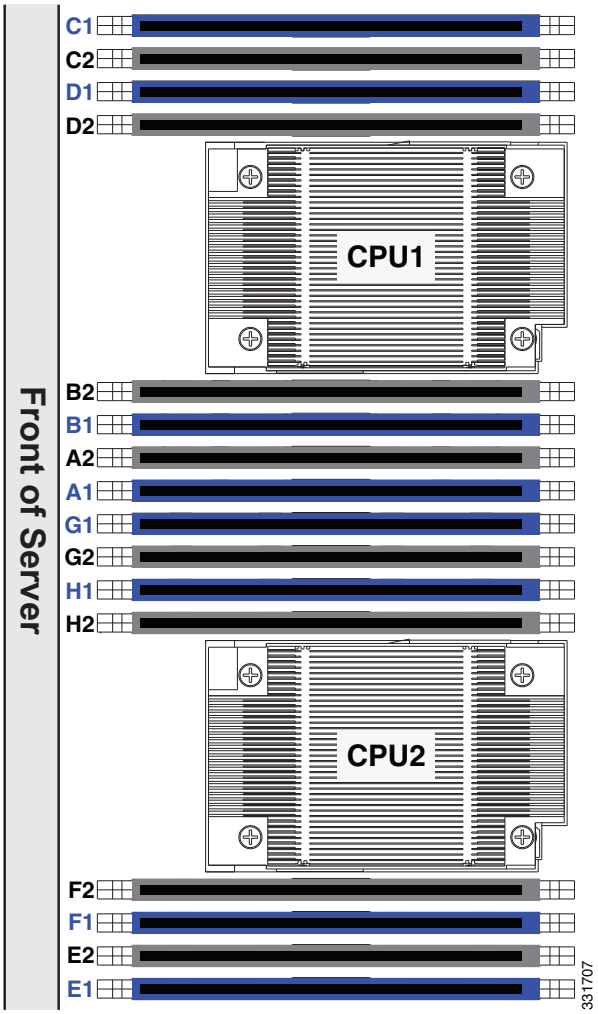
Memory Performance Guidelines and Population Rules

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

DIMM Slot Numbering

Figure 3-12 shows the numbering of the DIMM slots.

Figure 3-12 DIMM Slots and CPUs



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- Each CPU supports four memory channels.
  - CPU1 supports channels A, B, C, and D.
  - CPU2 supports channels E, F, G, and H.
- Each channel has two DIMM slots (for example, channel A = slots A1 and A2).
  - A channel can operate with one or two DIMMs installed.
  - If a channel has only one DIMM, populate slot 1 first (the blue slot).
- When both CPUs are installed, populate the DIMM slots of each CPU identically.
  - Fill blue slots in the channels first: A1, E1, B1, F1, C1, G1, D1, H1
  - Fill black slots in the channels second: A2, E2, B2, F2, C2, G2, D2, H2
- Any DIMM installed in a DIMM socket for which the CPU is absent is not recognized. In a single-CPU configuration, populate the channels for CPU1 only.

- Observe the DIMM mixing rules shown in Table 3-4.
- Memory mirroring reduces the amount of memory available by 50% because only one of the two populated channels provides data. When memory mirroring is enabled, DIMMs must be installed in sets of 4, 6, or 8 as described in Memory Mirroring, page 3-21.
- Note the following restrictions when using UDIMMs. Even though a UDIMM might be rated at 1600 MHz, actual operational speeds are slower because of the Intel implementation.
  - In Performance Mode (1.5 V operation), UDIMMs run at 1333 MHz in 1 DPC and 2 DPC configurations.
  - In Power Saving Mode (1.35 V operation), UDIMMs run at 1066 MHz in 1 DPC and 2 DPC configurations.

Table 3-4 DIMM Mixing Rules for C220 M3 Servers

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
DIMM Capacity: RDIMM = 4, 8, or 16 GB LRDIMM = 32 GB UDIMM = 4 GB	• You can mix different capacity DIMMs in the same channel (for example, A1 and A2). • You cannot mix 32 GB LRDIMMs with any RDIMM or UDIMM. • You cannot mix 4 GB UDIMMs with any RDIMM or LRDIMM.	• You can mix different capacity DIMMs in the same bank. However, for optimal performance DIMMs in the same bank (for example, A1, B1, C1, D1) should have the same capacity. • You cannot mix 32 GB LRDIMMs with any RDIMM or UDIMM. • You cannot mix 4 GB UDIMMs with any RDIMM or LRIMM.
DIMM Speed: 1866-, 1600-, or 1333-MHz	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPUs installed in the channel.	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPUs installed in the bank.
DIMM Type: RDIMMs, LRDIMMs, or UDIMMs	You cannot mix DIMM types in a channel.	You cannot mix DIMM types in a bank.

Enabling Low-Voltage DIMM Operation (Power Saving Mode)

You can enable low voltage (1.35 V) DIMM operation for all DIMMs in the server. There is a setting in the BIOS Setup utility that you can use to change the DDR memory mode to Power Saving mode, as described in the following procedure:

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

Step 2 Select the **Advanced** tab.

Step 3 Select **Low Voltage DDR Mode**.

Step 4 In the pop-up window, select either **Power Saving** or **Performance Mode**:

- Power Saving Mode–Prioritizes low-voltage memory operation.

- Performance Mode–Prioritizes performance memory operation. If you mix low-voltage DIMMs with standard DIMMs, the system defaults to this setting.

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

Memory Mirroring

When memory mirroring is enabled, 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 unless there is a simultaneous error in exactly the same location on a DIMM and its mirrored DIMM. Memory mirroring reduces the amount of memory available to the operating system by 50% because only one of the two populated channels provides data.

Note You must choose to enable memory mirroring in the server BIOS setup utility, under Advanced > Memory Configuration > Mirroring.

If you choose to enable memory mirroring, populate the DIMM slots in the order shown in Table 3-5.

Table 3-5 Memory Mirroring DIMM Population

Number of DIMMs per CPU	CPU 1 Population	CPU2 Population
4	A1, B1; A2, B2	E1, F1; E2, F2
6	A1, B1; C1, D1; A2; B2	E1, F1; G1, H1; E2, F2
8	A1, B1; C1, D1; A2, B2; C2, D2	E1, F1; G1, H1; E2, F2; G2, H2

DIMM Replacement Procedure

This section includes the following topics:

Identifying a Faulty DIMM

Each DIMM slot has a corresponding DIMM fault LED. See Figure 3-3 for the locations of these LEDs.

The LEDs light amber to indicate a faulty DIMM. Power must be present in the server for these LEDs to operate.

Replacing DIMMs

To install a DIMM assembly, follow these steps:

Step 1 Remove the DIMM that you are replacing:

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Identify the faulty DIMM by observing the DIMM slot fault LEDs on the motherboard.

e. Open the ejector levers at both ends of the DIMM slot, then lift the DIMM out of the slot.

Step 2 Install a new DIMM:

Note Before installing DIMMs, refer to the population guidelines. See Memory Performance Guidelines and Population Rules, page 3-18.

f. Align the new DIMM with the empty slot on the motherboard. Use the alignment key in the DIMM slot to correctly orient the DIMM.

g. Push down evenly on the top corners of the DIMM until it is fully seated and the ejector levers on both ends lock into place.

h. Replace the top cover.

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

Replacing CPUs and Heatsinks

This section contains the following topics:

Special Information For *Upgrades* to Intel E5-2600 v2 Series CPUs

Caution You must upgrade your server firmware to the required minimum level *before* you upgrade to Intel E5-2600 v2 Series 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 E5-2600 v2 Series CPUs are as follows:

Table 3-6 Minimum Requirements For Intel E5-2600 v2 Series CPUs

Software or Firmware	Minimum Version
Server CIMC	1.5(3)
Server BIOS	1.5(3)
Cisco UCS Manager (UCSM-managed system only)	2.1(3)

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 3-6, 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 E5-2600 v2 Series CPUs to upgrade your firmware. After you upgrade the software, return to the procedure in this section to replace the CPU and heatsink hardware.

CPU Configuration Rules

This server has two CPU sockets. Each CPU supports four DIMM channels (eight DIMM slots). See Figure 3-12.

- The server can operate with one CPU or two identical CPUs installed.
- The minimum configuration is that the server must have at least CPU1 installed. Install CPU1 first, then CPU2.

Note The following restrictions apply when using a single-CPU configuration: the maximum number of DIMMs is eight, the internal mezzanine card slot is unavailable, and PCIe slot 2 is unavailable (see Figure 3-20).

CPU Replacement Procedure

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 heatsinks and their thermal pads to ensure proper cooling. Failure to install a CPU correctly might result in damage to the server.

Caution The Pick-and-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=` for 10-, 8-, 6-, 4-, or 2-core CPUs (green); `UCS-CPU-EP2-PNP=` for v2 12-core CPUs (purple).

To install or replace a CPU heatsink and CPU, follow these steps:

Step 1 Remove the CPU and heatsink that you are replacing:

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

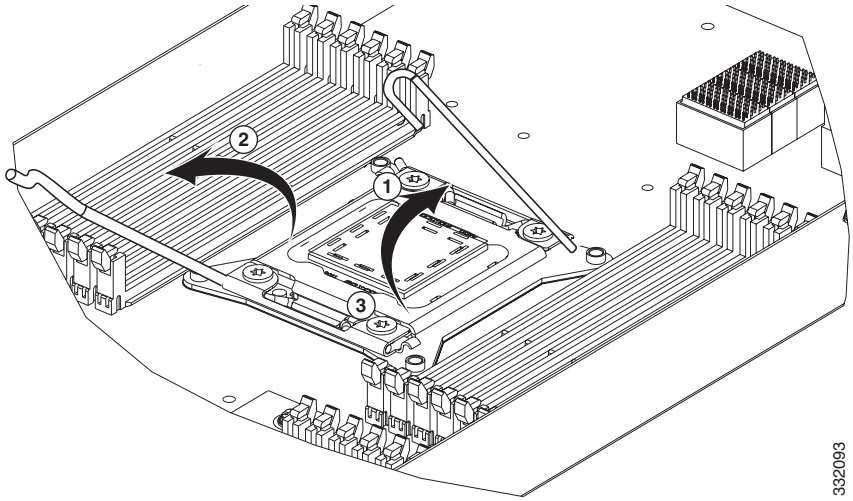
d. Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heatsink and then lift it off of the CPU.

Note Alternate loosening each screw evenly to avoid damaging the heatsink or CPU.

e. Unclip the first CPU retaining latch labelled with the icon, then unclip the second retaining latch labelled with the icon. See Figure 3-13.

f. Open the hinged CPU cover plate.

Figure 3-13 CPU Heatsink and Socket

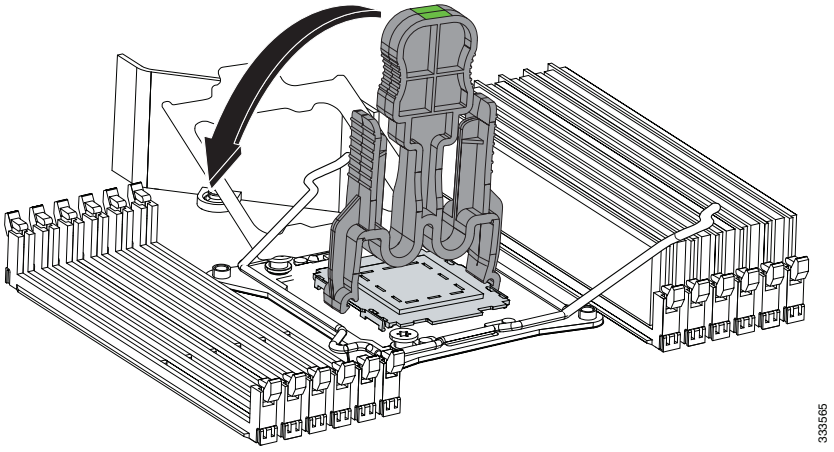


1	CPU retaining latch,	**3**	Hinged CPU cover plate
2	CPU retaining latch,		–

Step 2 Remove a protective cap or an old CPU from the socket (if present):

- If you are removing an old CPU, skip to Step 3.
- 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. Use the tool as shown in Figure 3-14 to grasp the protective cap and then pivot to remove the cap.

Figure 3-14 Protective Cap Removal Tool



Step 3 Remove an old CPU:

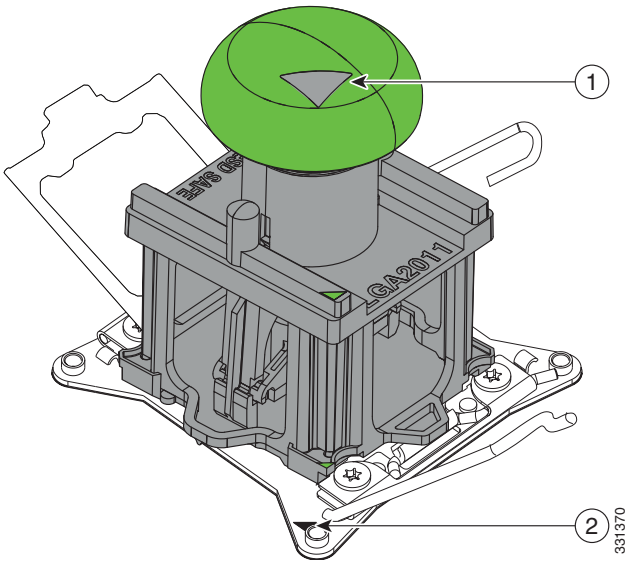
a. Set the Pick-and-Place tool on the CPU in the socket, aligning the arrow on the tool with the registration mark on the socket (the small triangular mark). See Figure 3-15.

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 anti-static surface.

Figure 3-15 Removing or Inserting a CPU



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

Step 4 Insert the new CPU into the Pick-and-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 3-16).

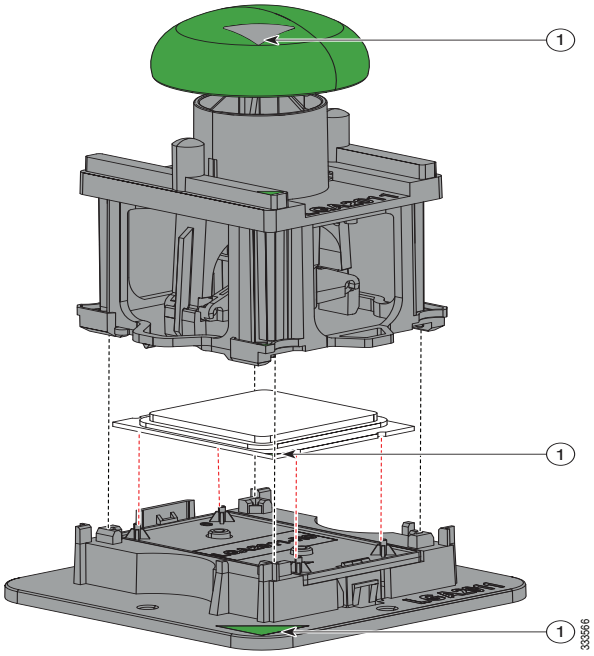
b. Press down on the top button of the tool to lock it open.

c. Set the Pick-and-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 the side lever on the tool to grasp and lock in the CPU.

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

Figure 3-16 CPU and Pick-and-Place Tool on Pedestal



1	Arrow marks for alignment		–

Step 5 Install a new CPU:

a. Set the Pick-and-Place tool with 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 3-15.

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, then clip down the CPU retaining latch with the icon. See Figure 3-13.

Step 6 Install a heatsink:

Caution The heatsink must have a new, undamaged thermal pad on the heatsink-to-CPU surface to ensure proper cooling. If you are replacing a heatsink that was previously used, you must remove the old thermal pad. If you are installing a new heatsink, skip to step d. below.

a. Apply an alcohol-based cleaning solution to the old thermal pad and let it soak for a least 15 seconds.

b. Wipe all of the old thermal pad off the old heatsink using a soft cloth that will not scratch the heatsink surface.

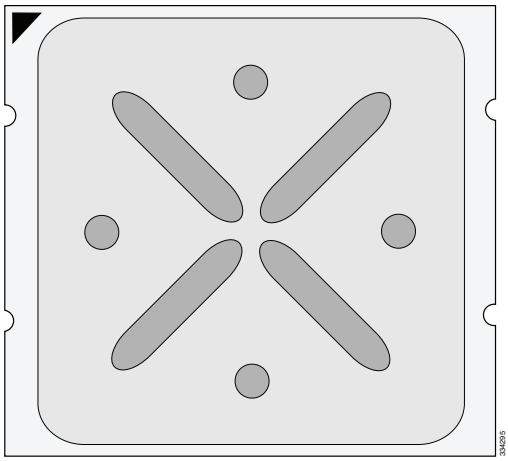
c. Apply thermal grease from an included syringe to the top of the CPU.

Apply about 2 cubic centimeters of grease (about half the syringe contents) to the top of the CPU in the pattern that is shown in Figure 3-17.

Note CPU spares come with two syringes of thermal grease; one with a blue cap and one with a red cap. The syringe with the red cap is UCS-CPU-GREASE2=, which is used with this server.

Note If you do not have a syringe of thermal grease, you can order a spare (UCS-CPU-GREASE2=).

Figure 3-17 Thermal Grease Application Pattern



d. For a new heatsink, peel the protective film from the thermal pad that is on the bottom of the new heatsink.

Note Do not apply a syringe of thermal grease if you are installing a new heatsink that already has a pre-applied thermal pad.

e. Align the heatsink captive screws with the motherboard standoffs, then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.

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

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.

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, there are additional parts that 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 re-using the existing heatsinks:
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Thermal grease kit for C220 (UCS-CPU-GREASE2=)
  - Intel CPU Pick-n-Place tool: `UCS-CPU-EP-PNP=` for 10-, 8-, 6-, 4-, or 2-core CPUs (green); or `UCS-CPU-EP2-PNP=` for v2 12-core CPUs (purple)
- Scenario 2—You are replacing the existing heatsinks:
  - Heat sink (UCSC-HS-C220M3=)
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Intel CPU Pick-n-Place tool: `UCS-CPU-EP-PNP=` for 10-, 8-, 6-, 4-, or 2-core CPUs (green); or `UCS-CPU-EP2-PNP=` for v2 12-core CPUs (purple)

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

New heatsink spares have preinstalled thermal interface material covered by a small sheet of plastic. It is important to clean the old thermal interface material off of the CPU prior to installing the heatsinks. Therefore, when ordering new heatsinks it is still necessary to order the heatsink cleaning kit at a minimum.

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 Panasonic CR2032 or equivalent.

To replace or install the motherboard CMOS battery, follow these steps:

Step 1 Remove the RTC battery (see Figure 3-18):

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Locate the RTC battery. See Figure 3-18.

e. Gently remove the battery from the holder on the motherboard.

Step 2 Install an RTC battery:

a. Gently insert the battery into the holder and inside the retaining clip.

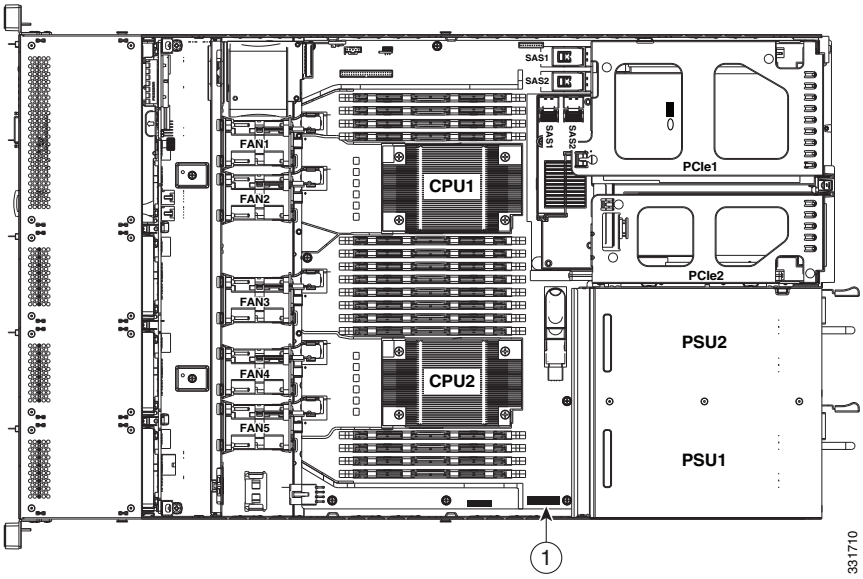
Note The positive side of the battery marked "3V+" should face the retaining clip and chassis wall.

b. Push the battery into the socket until it is fully seated.

c. Replace the top cover.

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

Figure 3-18 Replacing the Motherboard RTC Battery



1	RTC battery holder on motherboard		–

Replacing a Mezzanine Card

The server has a dedicated socket on the motherboard for a mezzanine-style RAID controller card.

Note See RAID Controller Considerations, page C-1 for more information about supported cards and cabling.

To install or replace a mezzanine card, follow these steps:

Step 1 Remove the mezzanine card that you are replacing (see Figure 3-19):

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Disconnect all cables from the mezzanine card.

Tip Label the cables before you disconnect them to aid replacement.

e. Loosen the single captive thumbscrew that secures the mezzanine card to the motherboard standoff.

f. Pull the mezzanine card toward the server front about one inch to disengage it from its motherboard socket, and then remove the card from the chassis.

Step 2 Install a new mezzanine card:

a. Set the new mezzanine card in place on the motherboard, aligning its connector with the motherboard socket. Also align the captive thumbscrew with the standoff on the motherboard.

b. Push on both ends of the mezzanine card evenly to engage the card's connector with the socket on the motherboard.

c. Tighten the single captive thumbscrew that secures the mezzanine card to the motherboard standoff.

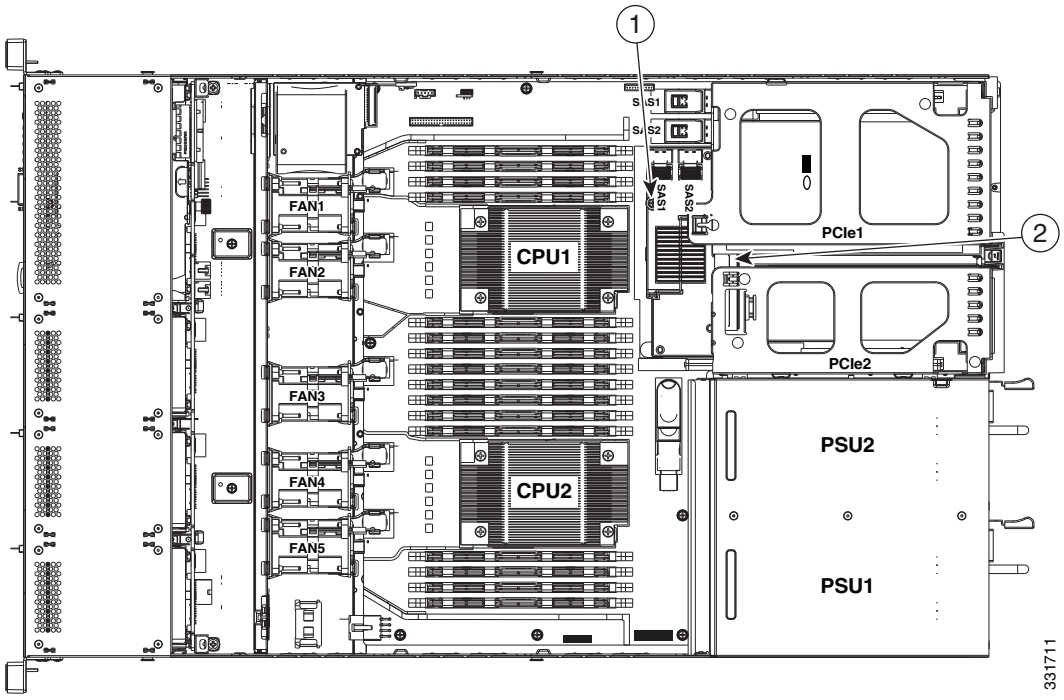
d. Reconnect cables to the mezzanine card. See RAID Controller Cabling, page C-19 for more information.

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.

g. If this was a replacement card, continue with Restoring RAID Configuration After Replacing a RAID Controller, page C-23.

Figure 3-19 Replacing the Mezzanine Card

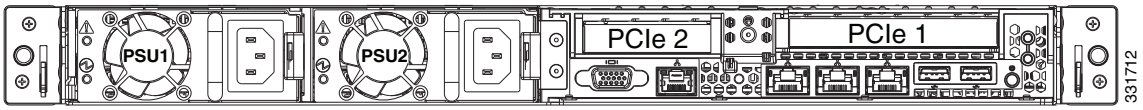


1	Captive thumbscrew	2	Mezzanine card connector on motherboard (partially visible under PCI riser 2)

Replacing a PCIe Riser

The server contains two toolless PCIe risers for horizontal installation of PCIe cards. See Table 3-7 for a description of the PCIe slots on each riser.

Figure 3-20 Rear Panel, Showing PCIe Slots



To install or replace a PCIe riser, follow these steps:

Step 1 Remove the PCIe riser that you are replacing (see Figure 3-19):

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Lift straight up on both ends of the PCIe riser to disengage its circuit board from the socket on the motherboard.

e. If the riser has a card installed, remove the card from the riser.

Step 2 Install a new PCIe riser:

a. If you removed a card from the old PCIe riser, install the card to the new riser (see Replacing a PCIe Card, page 3-35).

b. Position the PCIe riser over its socket on the motherboard and over the chassis alignment features (see Figure 3-19):

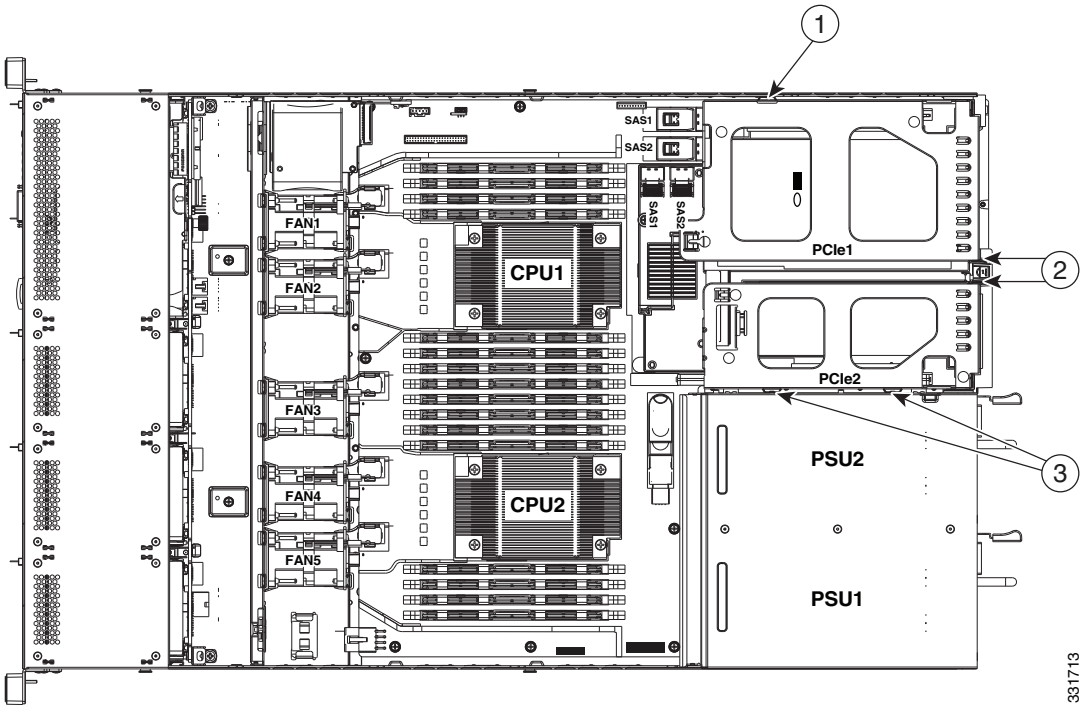
- The metal shell of the PCIe riser has alignment slots that engage with pegs on the chassis.
- The metal shell has alignment tabs that fit into slots on the chassis rear panel.

c. Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.

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 3-21 Replacing the PCIe Riser



1	Chassis alignment peg for PCIe riser 1	**3**	Chassis alignment pegs for PCIe riser 2
2	Rear alignment tabs		–

Replacing a PCIe Card

Caution Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards not qualified or sold by Cisco are the responsibility of the customer. Although Cisco will always stand behind and support 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 section includes the following topics:

PCIe Slots

The server contains two toolless PCIe risers for horizontal installation of PCIe cards. See Figure 3-22 and Table 3-7 for a description of the PCIe slots on these risers.

Figure 3-22 Rear Panel, Showing PCIe Slots

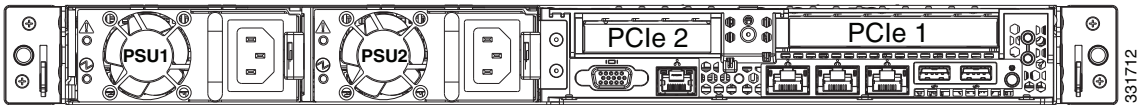


Table 3-7 PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Card Length[1]	Card Height [2]	NCSI[3] Support
1 (on riser 1)	Gen-3 x16	x24 extended	1/2 length	Full-height	Yes[4]
2 (on riser 2)[5]	Gen-3 x8	x16 connector	1/2 length	1/2 height	No

1. This is the supported length because of internal clearance.
2. This is the size of the rear panel opening.
3. Network Communications Services Interface protocol
4. Slot 1 can operate when the server is in standby power mode.
5. Slot 2 is not available in single-CPU configurations.

Replacing a PCIe Card

Note If you are installing a Cisco UCS Virtual Interface Card, there are prerequisite considerations. See Special Considerations for Cisco UCS Virtual Interface Cards, page 3-37.

Note If you are installing a RAID controller card, see RAID Controller Considerations, page C-1 for more information about supported cards and cabling.

To install or replace a PCIe card, follow these steps:

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

a. Shut down and power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 the "Removing and Replacing the Server Top Cover" section on page 3-8.

d. Remove any cables from the ports of the PCIe card that you are replacing.

Tip Label the cables when you disconnect them to aid correct connection to the new card.

e. Lift straight up on both ends of the PCIe riser to disengage it from the socket on the motherboard.

f. Pull evenly on both ends of the PCIe card to remove it from the socket on the PCIe riser.

If the riser has no card, remove the blanking panel from the rear opening of the riser.

Step 2 Install a new PCIe card:

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

Note Align and insert the card's rear panel tab into the riser's rear panel opening at the same time you align the card with the empty socket.

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

c. Ensure that the card rear panel tab sits flat against the PCIe riser rear panel opening.

d. Position the PCIe riser over its socket on the motherboard and over the alignment features (see Figure 3-21).

e. Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.

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.

h. If the card that you replaced was a RAID controller, continue with Restoring RAID Configuration After Replacing a RAID Controller, page C-23.

Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-8 describes the requirements for the supported Cisco UCS virtual interface cards (VICs).

Table 3-8 Cisco UCS C220 Requirements for Virtual Interface Cards

Virtual Interface Card (VIC)	Number of VICs Supported in Server	Slots That Support VICs [1]	Primary Slot For UCS Integration or Cisco Card NIC Mode	Minimum CIMC Firmware	Minimum VIC Firmware For Use With UCS Integration	Minimum Nexus OS on an Upstream Nexus Fabric Interconnect
Cisco UCS VIC P81E N2XX-ACPCI01	1	PCIE 1	PCIE 1	1.4(4)	2.0(2)	5.0
Cisco UCS VIC 1225 UCSC-PCIE-CSC-02	1	PCIE 1	PCIE 1	1.4(6)	2.1(0)	5.0
Cisco UCS VIC1225T UCSC-PCIE-C10T-02	1	PCIE 1	PCIE 1[2]	1.5(1)	2.1(1)	5.0

1. See PCIe Slots, page 3-35.
2. The Cisco UCS VIC1225T is not supported for UCS integration at this time.

Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards

Table 3-9 describes the requirements for the supported Cisco UCS Fusion ioDrive2 cards.

Table 3-9 Cisco UCS C220 Requirements for Fusion ioDrive2 Cards

Card	Max. Number of Cards Supported	Slots That Support Cards [1]	Minimum CIMC Firmware	Card Height (rear-panel tab)
Cisco UCS 3.0 TB MLC Fusion ioDrive2 UCSC-F-FIO-3000M	1	PCIE 1	1.5(2)	Full height
Cisco UCS 1205 GB MLC Fusion ioDrive2 UCSC-F-FIO-1205M	2	PCIE 1 PCIE 2[2]	1.5(2)	Half height[3]
Cisco UCS 785 GB MLC Fusion ioDrive2 UCSC-F-FIO-785M	2	PCIE 1 PCIE 2	1.5(2)	Half height
Cisco UCS 365 GB MLC Fusion ioDrive2 UCSC-F-FIO-365M	2	PCIE 1 PCIE 2	1.5(2)	Half height

1. See PCIe Slots, page 3-35.
2. Slot 2 is not available in single-CPU configurations.
3. A rear-panel tab adapter is required to fit the half-height cards in full-height slot 1.

RAID Controller Card Cable Routing

If the PCIe card that you are installing or replacing is a RAID controller card, see RAID Controller Considerations, page C-1 for required cables and cable routing guidelines.

Installing Multiple PCIe Cards and Resolving Limited Resources

When a large number of PCIe add-on cards are installed in the server, the system may 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 3-38
- Resolving Insufficient 16-Bit I/O Space, page 3-39

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, etc.).

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 CIMC controller and reports the following error in the Error Manager page of the BIOS Setup utility:

```
ERROR CODE  SEVERITY    INSTANCE    DESCRIPTION
146         Major       N/A         PCI out of resources error.
                                    Major severity requires user
                                    intervention but does not
                                    prevent system boot.
```

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** page.

- **Guidelines for RAID controller booting:**

  If the server is configured to boot primarily from RAID storage, make sure that the option ROMs for the slots where your RAID controllers installed are enabled in the BIOS, depending on your RAID controller configuration.

  If the RAID controller does not appear in the system boot order even with the option ROMs for those slots are 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.

  See also Factory-Default Option ROM Settings, page C-5.

- **Guidelines for onboard NIC PXE booting:**

  If the system is configured to primarily perform 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.

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 the 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 page in the CIMC WebUI to free up some 16-bit I/O resources. Each VIC uses a minimum 16 KB of 16-bit I/O resource, so disabling 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.

Replacing a Cisco Flexible Flash Card

This section includes the following topics:

Overview of the Pre-Installed Cisco Flexible Flash Card

The internal slots for these cards are on the circuit board of PCIe riser 2 (see Figure 3-23).

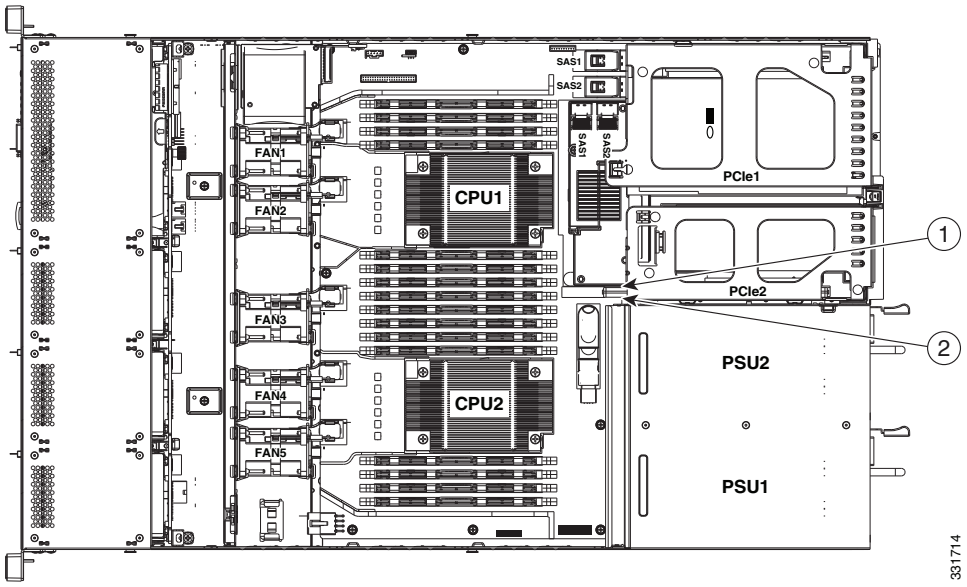
Note Dual cards are supported only with CIMC 1.5(1) or later. With releases earlier than CIMC 1.5(1), only a single card is supported and it must be in slot SD1.

The Cisco Flexible Flash card is pre-installed with three software bundles, each on one of four preconfigured virtual drives (VDs). The fourth VD allows you to install an OS or embedded hypervisor.

The VDs are configured as follows:

1. Cisco UCS Server Configuration Utility (SCU).
2. Hypervisor (HV). This is a VD that you can use for your own purposes.
3. Cisco Drivers (Drivers).
4. Cisco Host Upgrade Utility (HUU).

Figure 3-23 Cisco Flexible Flash Card Slots on PCIe Riser 2



1	Slot SD2	2	Slot SD1

Enabling a Cisco Flexible Flash Virtual Drive

Each of the VDs on the pre-installed Cisco Flexible Flash card can be separately enabled or hidden from the host. The default as shipped from the factory is for all VDs to be hidden.

To enable VDs and expose them to the host, follow these steps:

Step 1 Log in to CIMC interface for the server, using the IP address of the server.

Step 2 Navigate through GUI tabs to **Server > Inventory > Storage**.

Step 3 Click **FlexFlash-0** in the Storage Adapters list.

Step 4 Click on **Configure Operational Profile** in the Actions area.

The Operational Profile dialog opens.

Step 5 Check the box for each VD that you want to enable and expose to the host, then click **Save Changes**.

Booting a Cisco Flexible Flash Virtual Drive

When you want to access the Cisco SCU or Cisco HUU software, you boot its VD with a one-time boot option. When you want to boot the hypervisor (HV) VD, you boot it with a permanent boot order selection. See the following topics in this section:

- Booting the Cisco SCU and Cisco HUU Software VDs, page 3-41
- Booting the Hypervisor VD, page 3-41

Booting the Cisco SCU and Cisco HUU Software VDs

You can access the preinstalled Cisco SCU and Cisco HUU software bundles on a Cisco Flexible Flash card by booting their respective VDs with a one-time boot option:

Step 1 Enable the SCU or HUU VD.

See Enabling a Cisco Flexible Flash Virtual Drive, page 3-41.

Step 2 In the CIMC GUI interface, navigate through the tabs to **Server > BIOS.**

Step 3 Click **Configure Boot Override Priority**.

The Boot Override Priority dialog opens.

Step 4 Pull down the menu and select **SCU** or **HUU**, then click **OK**.

Step 5 Reboot the server.

The server boots the selected VD.

Note This is a one-time boot option. After running Cisco SCU or Cisco HUU, the server returns to its previously configured boot path.

Booting the Hypervisor VD

You can boot the hypervisor (HV) VD with a more permanent boot selection. (To change the boot order one time, use the procedure in Booting the Cisco SCU and Cisco HUU Software VDs, page 3-41.

To permanently set the boot order for an HV VD, use the following steps:

Step 1 Boot the server and watch for the prompt to press F2 to open the BIOS Setup utility.

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

Step 3 Navigate to the **Boot Options** tab.

Step 4 Use the Boot Options screen to set the HV VD to your desired boot order for the server.

Monitoring and Managing a Cisco Flexible Flash Card

You can monitor and manage your installed Cisco Flexible Flash cards by using the CIMC 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 linked below.

The links to these documents are in the C-Series documentation roadmap:

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

Synchronizing RAID After Installing a Second Cisco FlexFlash Drive

After you install or replace a second Cisco FlexFlash 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 FlexFlash 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 prompts you to confirm that you want to synchronize the Hypervisor RAID.

Step 2 Click Yes.

A dialog 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.

Cisco Flexible Flash Card Replacement Procedure

To install or replace a Cisco Flexible Flash card, follow these steps:

Step 1 Remove the Cisco Flexible Flash card that you are replacing. See Figure 3-23:

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 and Replacing the Server Top Cover" section on page 3-8.

d. Locate the Cisco Flexible Flash card that you are replacing on PCIe riser 2. See Figure 3-23.

e. Push down on the top of the Cisco Flexible Flash card, then release it to allow it to spring up in the slot.

f. Remove the Cisco Flexible Flash card from the slot.

g. Wait 10 seconds for the Cisco Flexible Flash management software to recognize and react to the absence of the card.

Step 2 Install a Cisco Flexible Flash card:

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

Note Any SD card that is installed into the Cisco Flexible Flash slot is configured with the VD partitioning described in Overview of the Pre-Installed Cisco Flexible Flash Card, page 3-40. This overwrites data on the SD card where Cisco stores the configuration metadata.

a. Insert the Cisco Flexible Flash card into the slot with the label side facing outward.

Note Dual cards are supported only with CIMC 1.5(1) or later. With releases earlier than CIMC 1.5(1), only a single card is supported and it must be in slot SD1 (see Figure 3-23).

b. Press down on the top of the card until it clicks in the slot 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 the LSI RAID Battery Backup Unit or SuperCap Power Module

This server supports installation of one RAID battery backup unit (BBU) or one SuperCap Power Module (SCPM). The unit mounts to a clip on the removable air baffle (see Figure 3-24).

Note If you are replacing a BBU on an older card, order the iBBU09 battery backup unit (UCS-RAID-BBU=). The newer SuperCap power module is not compatible with older, non-CacheVault cards.

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.

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

To replace the RAID controller BBU or SCPM, follow these steps:

Step 1 Remove a backup unit (see Figure 3-24).

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 the "Removing and Replacing the Server Top Cover" section on page 3-8.

d. Disconnect the cable from the existing backup unit.

e. Slide the backup unit free of the clips on the air baffle mounting point (see Figure 3-24).

Step 2 Install a new backup unit:

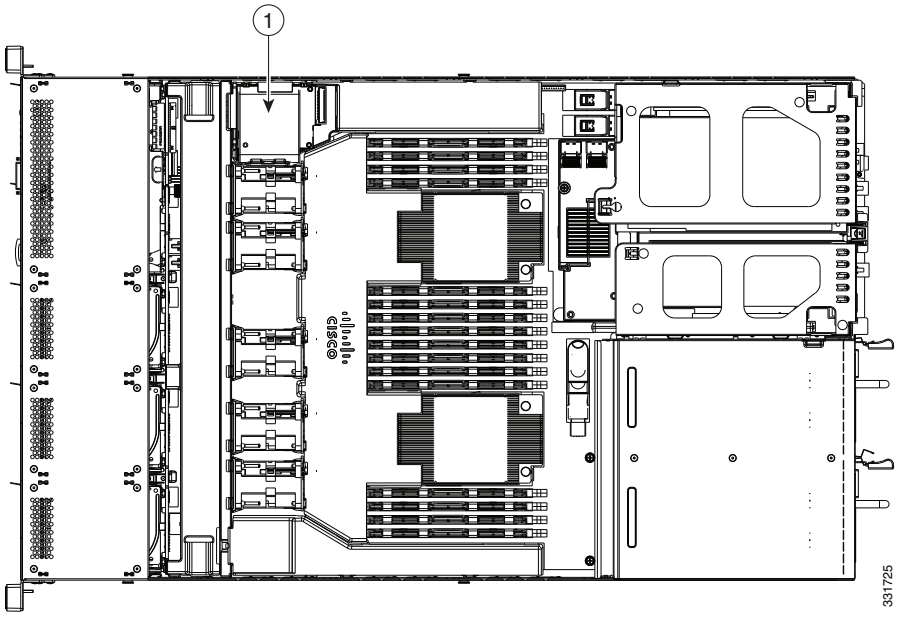
a. Slide the new backup unit into the clips on the air baffle mounting point.

b. Connect the cable from the RAID controller to the new backup unit.

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 3-24 RAID Backup Unit Mounting Location



1	RAID backup unit mounting location		–

Installing a Trusted Platform Module

The trusted platform module (TPM) is a small circuit board that attaches to a motherboard socket. The socket location is on the motherboard, below PCIe riser 1 (see Figure 3-25).

Note For security purposes, the TPM is installed with a one-way screw. It cannot be removed with a standard screwdriver.

To install a trusted platform module (TPM), follow these steps:

Step 1 Prepare the server for component installation.

a. Power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.

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 the "Removing and Replacing the Server Top Cover" section on page 3-8.

d. Is there a card installed in PCIe riser 1? See Figure 3-25.

- If there is no card installed in PCIe riser 1, you can access the TPM socket. Go to Step 2.
- If there is a card installed in PCIe riser 1, remove PCIe riser 1 from the chassis. See Replacing a PCIe Riser, page 3-33 for details.

Step 2 Install a TPM (see Figure 3-25):

a. Locate the TPM socket on the motherboard, as shown in Figure 3-25.

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 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. If you removed PCIe riser 1, replace it now. Reconnect cables to the card in the riser.

f. Replace the top cover.

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

Step 3 Enable the TPM:

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. On the BIOS Setup utility screen, select the **Advanced** tab.

d. Select **Trusted Computing** to open the TPM Security Device Configuration screen.

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

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

Step 4 Verify that the TPM 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.

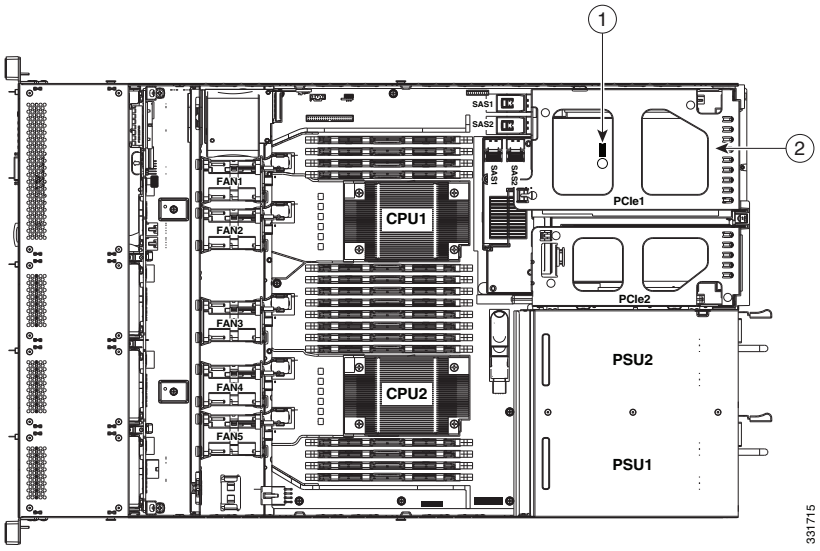
c. Select the **Advanced** tab.

d. Select **Trusted Computing** to open the TPM Security Device Configuration screen.

e. Verify that TPM SUPPORT is Enabled.

Note If you want to use the Intel Trusted Execution Technology (TXT) feature, it must be enabled in the server BIOS as described in Enabling the Intel Trusted Execution Technology (TXT) Feature For the TPM, page 3-48.

Figure 3-25 TPM Socket Location on Motherboard



1	TPM socket and screw hole on motherboard	**2**	PCIe riser 1

Enabling the Intel Trusted Execution Technology (TXT) Feature For the TPM

Intel 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. Likewise, 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.

To enable the TXT feature, follow these steps:

Step 1 Verify that a TPM is now installed and enabled in the server:

a. Either attach a VGA monitor and USB keyboard to the server, or log in remotely to the CIMC interface of the server and open a virtual KVM console window.

b. Reboot the server.

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

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

Note You must be logged in as the BIOS administrator to perform this procedure. If you have not done so already, set a BIOS administrator password on the Security tab of the BIOS Setup utility.

e. Select the **Advanced** tab.

f. On the Advanced tab, select **Trusted Computing** to open the TPM Security Device Configuration screen.

g. Verify that **TPM SUPPORT** is **Enabled**. If it is not, set TPM SUPPORT to Enabled.

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

Step 2 Enable the Intel Trusted Execution Technology (TXT) feature:

a. On the Advanced tab, select **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support screen.

Note The Intel Trusted Execution Technology feature can be enabled only when the server has a TPM installed on the TPM header.

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

Step 3 On the same screen, verify that the Intel Virtualization Technology (VT) and the Intel VT for Directed I/O (VT-d) features are enabled (the factory default).

a. On the Intel TXT(LT-SX) Hardware Support screen, verify that **VT-d Support** and **VT Support** are both listed as **Enabled**.

- If they 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.

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

c. On the Advanced tab, select **Processor Configuration** to open the Processor Configuration screen.

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

Step 4 Press **F10** to save your changes and exit the BIOS Setup utility.

Step 5 Verify that the Intel TXT, VT, and VT-d features are enabled:

a. Reboot the server.

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

c. Select the **Advanced** tab.

d. Select **Intel TXT(LT-SX) Configuration** and verify that TXT Support, VT-d Support, and VT Support are Enabled.

Replacing a SCU Upgrade ROM Module

To remove and replace a module, use the following procedure.

Step 1 Prepare the server for component installation:

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-7.

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 and Replacing the Server Top Cover, page 3-8.

Step 2 Remove the SCU upgrade ROM module:

a. Locate the module on the motherboard (see Figure C-1).

b. Grasp the printed circuit board of the module and lift it from the header.

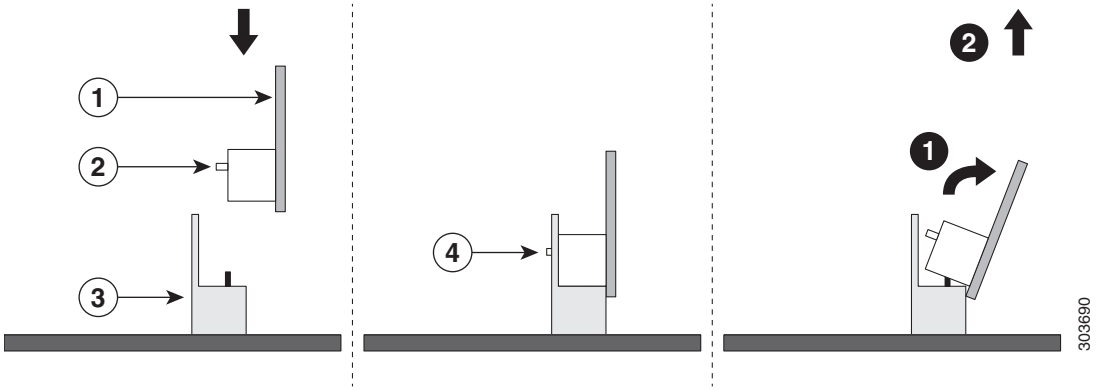
Note The module has a small retention feature that must have clearance from the header before the module can be pulled up. Tilt the module back, then pull up as shown in Figure 3-26.

Step 3 Install a new SCU upgrade ROM module:

a. Align the module with the pins in the motherboard header.

b. Gently press down on the module until it is seated and the retention feature locks into the header.

Figure 3-26 SCU Upgrade ROM Module Retention Feature



1	Printed circuit board on module	**3**	Motherboard header
2	Retention feature on module	**4**	Retention feature in installed position

For more information about using the module and embedded RAID, see Embedded MegaRAID Controller, page C-7.

Replacing a Software RAID Key Module

To remove and replace a software RAID key module, use the following procedure.

Step 1 Prepare the server for component installation:

a. Power off the server as described in Shutting Down and Powering Off the Server, page 3-7.

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 and Replacing the Server Top Cover, page 3-8.

Step 2 Remove the software RAID key module:

a. Locate the module on the motherboard (see Figure C-1).

b. Grasp the printed circuit board of the module and lift it from the header.

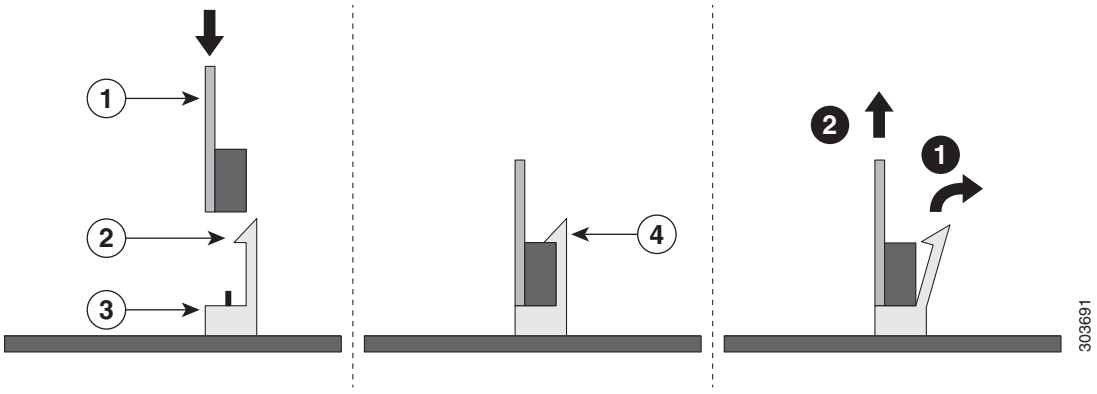
Note The module must have clearance from the retention clip on the header before the module can be pulled up. Open the retention clip, then pull up as shown in Figure 3-27.

Step 3 Install a new software RAID key module:

a. Align the module with the pins in the motherboard header.

b. Gently press down on the module until it is seated and the retention clip locks over the module.

Figure 3-27 Software RAID Key Module Retention Feature



1	Printed circuit board on module	3	Motherboard header
2	Retention feature on motherboard header	4	Retention feature in installed position

For more information about using the module and embedded RAID, see Embedded MegaRAID Controller, page C-7.

Replacing Power Supplies

The server can have one or two power supplies. When two power supplies are installed they are redundant as 1+1.

- See Power Specifications, page A-3 for more information about the power supplies.
- See Rear Panel LEDs and Buttons, page 3-4 for information about the power supply LEDs.
- See Wiring a DC Power Supply, page 3-53 for information about wiring a DC power supply.

To replace or install a power supply, follow these steps:

Note If you have ordered a server with power supply redundancy (two power supplies), you do not have to power off the server to replace power supplies because they are redundant as 1+1.

Note Do not mix power supply types in the server. Both power supplies must be either 450W AC, 650W AC, or 930W DC.

Step 1 Remove the power supply that you are replacing or a blank panel from an empty bay (see Figure 3-28):

a. Perform one of the following actions:
   - If your server has only one power supply, shut down and power off the server as described in the "Shutting Down and Powering Off the Server" section on page 3-7.
   - If your server has two power supplies, you do not have to shut down the server.

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

   For a DC power supply, release the electrical connector block from the power supply by pushing the orange plastic button on the top of the connector inward toward the power supply. Pull the connector block from the power supply.

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

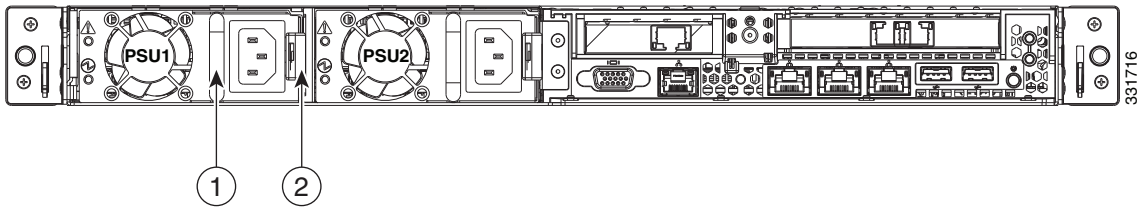
c. Connect the power cord to the new power supply.

   For a DC power supply, push the electrical connector block into the power supply.

Note To wire a DC power supply, see Wiring a DC Power Supply, page 3-53.

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

Figure 3-28 Removing and Replacing Power Supplies



1	Power supply handle	**2**	Power supply release lever

Wiring a DC Power Supply

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022**

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045**

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046**

Warning **Installation of the equipment must comply with local and national electrical codes. Statement 1074**

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1075**

Note The recommended wire gauge is 8 AWG. The minimum wire gauge is 10 AWG.

Use the following procedure to connect wires to the DC power supply connector:

Caution Before beginning this wiring procedure, turn off the DC power source from your facility's circuit breaker to avoid electric shock hazard.

Step 1 Turn off the DC power source from your facility's circuit breaker to avoid electric shock hazard.

Step 2 Remove the DC power connector block from the power supply. (The spare PID for this connector is UCSC-CONN-930WDC=.)

To release the connector block from the power supply, push the orange plastic button on the top of the connector inward toward the power supply and then pull the connector block out.

Step 3 Strip 15mm (.59 inches) of insulation off the DC wires that you will use.

Step 4 Orient the connector as shown in Figure 3-29, with the orange plastic button toward the top.

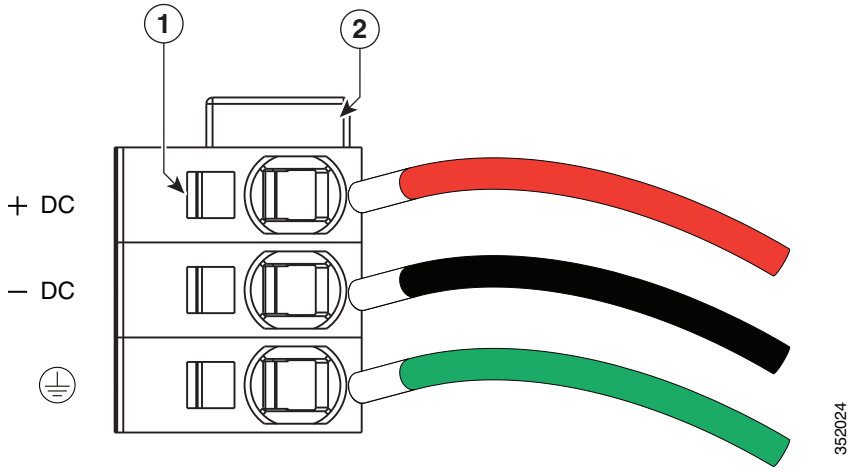
Step 5 Use a small screwdriver to depress the spring-loaded wire retainer lever on the lower spring-cage wire connector. Insert your green (ground) wire into the aperture and then release the lever.

Step 6 Use a small screwdriver to depress the wire retainer lever on the middle spring-cage wire connector. Insert your black (DC negative) wire into the aperture and then release the lever.

Step 7 Use a small screwdriver to depress the wire retainer lever on the upper spring-cage wire connector. Insert your red (DC positive) wire into the aperture and then release the lever.

Step 8 Insert the connector block back into the power supply. Make sure that your red (DC positive) wire aligns with the power supply label, "+ DC".

Figure 3-29 930 W, –48 VDC Power Supply Connector Block



1	Wire retainer lever	**2**	Orange plastic button on top of the connector

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. To enable or disable the internal USB port, follow these steps:

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, select **USB Configuration**.

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

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

Step 6 Press F10 to save and exit the utility.