Maintaining the System

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

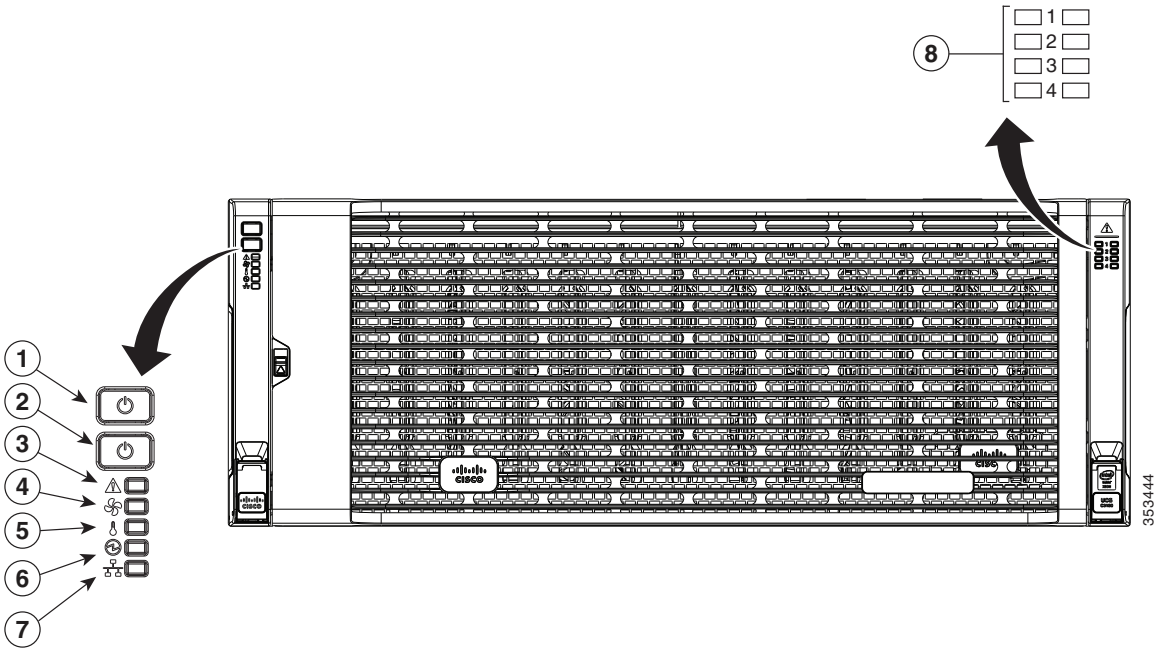
Status LEDs and Buttons

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 3-2 defines the front-panel LED states.

Figure 3-1 Front-Panel LEDs



1	System Power button and power status LED	**5**	Temperature status LED
2	System unit identification button and LED	**6**	Power supply status LED
3	System status LED	**7**	Network link activity LED
4	Fan status LED	**8**	Internal-drive status LEDs

Table 3-1 Front-Panel LEDs States

	LED Name	State
1	System Power button/power status LED	• Off—There is no AC power to the system. • Amber—The system is in standby power mode. • Green—The system is in main power mode. Power is supplied to all components.
2	System unit identification	• Off—The unit identification LED is not in use. • Blue, blinking—The unit identification LED is activated.

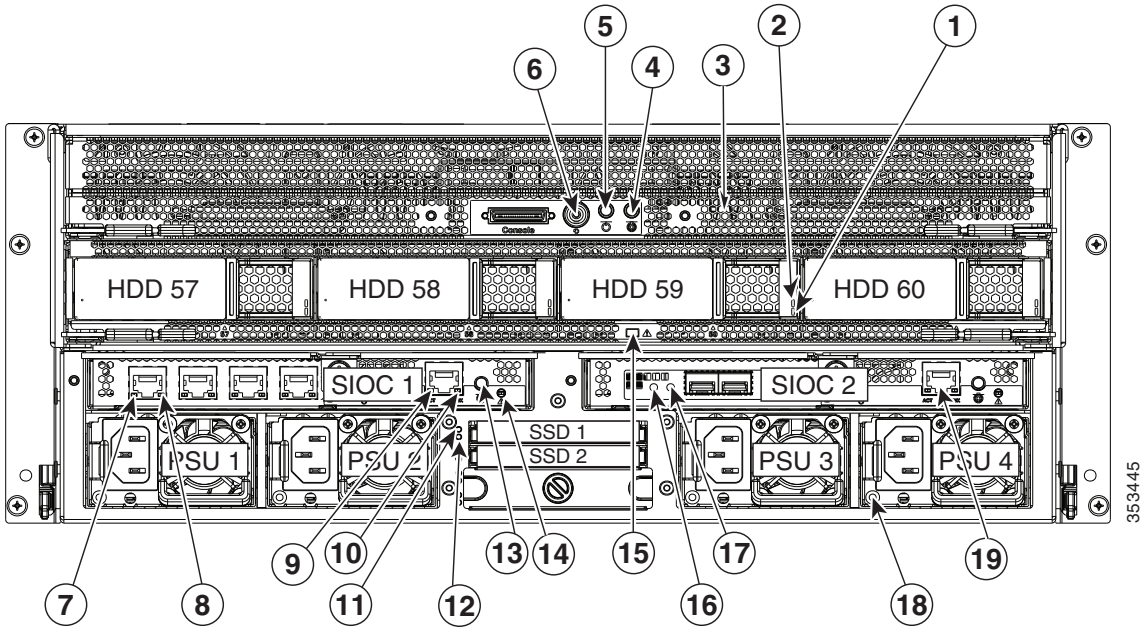
Table 3-1 Front-Panel LEDs States (continued)

	LED Name	State
3	System status	• Green—The system is running in normal operating condition. • Green, blinking—The system is performing system initialization and memory check. • Amber, steady—The system 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 system is in a critical fault state. For example: – Boot failed. – Fatal CPU and/or bus error is detected. – System 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 system 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.
8	Internal-drive status LEDs	Use these LEDs to indicate the location of a failing drive. Then open the system cover to find exactly which drive is failing by looking at the LEDs on the drive trays. • The two columns of LEDs correspond to the two halves of the internal drive compartment (under either the right- or left-side top cover). • The four numbered rows of LEDs correspond to the four horizontal rows of drive bays (14 drive bays in each row). See Figure 3-9 for an example. In this example, the red LED indicates that the failing drive is in the right half of the internal drive compartment, in row 3.

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	Drive fault (on each drive tray)	**11**	Not used at this time
2	Drive activity (on each drive tray)	**12**	Not used at this time
3	Server node health LED (behind mesh, on server node board)	**13**	Not used at this time
4	Server node unit identification button/LED	**14**	Cisco IMC (service processor) status
5	Server node Power button/LED	**15**	Drive expander module status LED
6	Server node reset button (resets controller chipset for this node)	**16**	10-Gb SFP+ port link activity (dual-port 10-Gb SFP+ adapter card only)
7	1-Gb Ethernet link speed (quad-port 1-Gb RJ-45 adapter card only)	**17**	10-Gb SFP+ port link status (dual-port 10-Gb SFP+ adapter card only)
8	1-Gb Ethernet link status (quad-port 1-Gb RJ-45 adapter card only)	**18**	Power supply status LED (each power supply)
9	1-Gb dedicated management Ethernet link speed	**19**	Port not used at this time. Use the management port on SIOC 1.
10	1-Gb dedicated management Ethernet link status		

Table 3-2 Rear-Panel LED States

	LED Name	State
1	Drive fault (only when drives are installed in drive expander module)	• Off—The drive is operating normally. • Amber—This drive has failed. • Amber, blinking—The device is rebuilding.
2	Drive activity (only when drives are installed in drive expander module)	• 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.
3	Server node health	• Green—The server node is operating normally. • Amber—The server node is in a degraded condition. Degraded condition is defined as the following: – Power supply redundancy lost – SIOC redundancy lost – Faulty or mismatched CPUs – DIMM failure – Failed drive in a RAID configuration • Amber, blinking—The server node is in a critical condition. Critical condition is defined as the following: – Boot failure – Fatal CPU and/or bus errors detected – Fatal uncorrectable memory error detected – Both SIOCs failed – Both drives in a RAID configuration failed – Excessive thermal conditions
4	Server node unit identification button/LED	• Off—The Identification LED is not in use. • Blue—The Identification LED is activated.
5	Server node power button/LED	• Off—There is no AC power to the server node. • Amber—The server node is in standby power mode. Power is supplied only to the Cisco IMC. • Green—The server node is in main power mode. Power is supplied to all server node components.
7	1-Gb Ethernet link speed (only when quad 1 Gb adapter card is installed)	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
8	1-Gb Ethernet link status (only when quad 1 Gb adapter card is installed)	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.

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

	LED Name	State
9	1-Gb (dedicated management) Ethernet link speed	• Off—Link speed is 10/100 Mbps. • Green—Link speed is 1 Gbps.
10	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.
11	Not used at this time	•
12	Not used at this time	•
13	Not used at this time	•
14	Cisco IMC (service processor) status	• Off—Cisco IMC is not ready (booting). • Green—Cisco IMC is ready.
15	Drive expander module status LED	This LED can indicate failure of an installed drive or a failure of the module. See Table 3-3 for LED interpretations.
16	10-Gb Ethernet link speed (only when dual 10 Gb adapter card is installed)	• Off—Link speed is 10/100 Mbps. • Amber—Link speed is 1 Gbps. • Green—Link speed is 10 Gbps.
17	10-Gb Ethernet link status (only when dual 10 Gb adapter card is installed)	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
18	Power supply status	• Off—No AC power input. • Green, steady—The power supply is operating normally and supplying DC power to the system. • Green, blinking—AC power is OK, DC output not enabled (sleep mode). • 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.
19	Port not used at this time	•

Table 3-3 Drive Expander Module Status LED

P3V3	P5V	HDD Present	HDD Status	LED Status
Off	None	None	None	Off
On	On	No plug-in	None	Amber
On	Fail	No plug-in	None	Amber
On	On	Plug-in	Good	Green
On	On	Plug-in	Fail	Amber

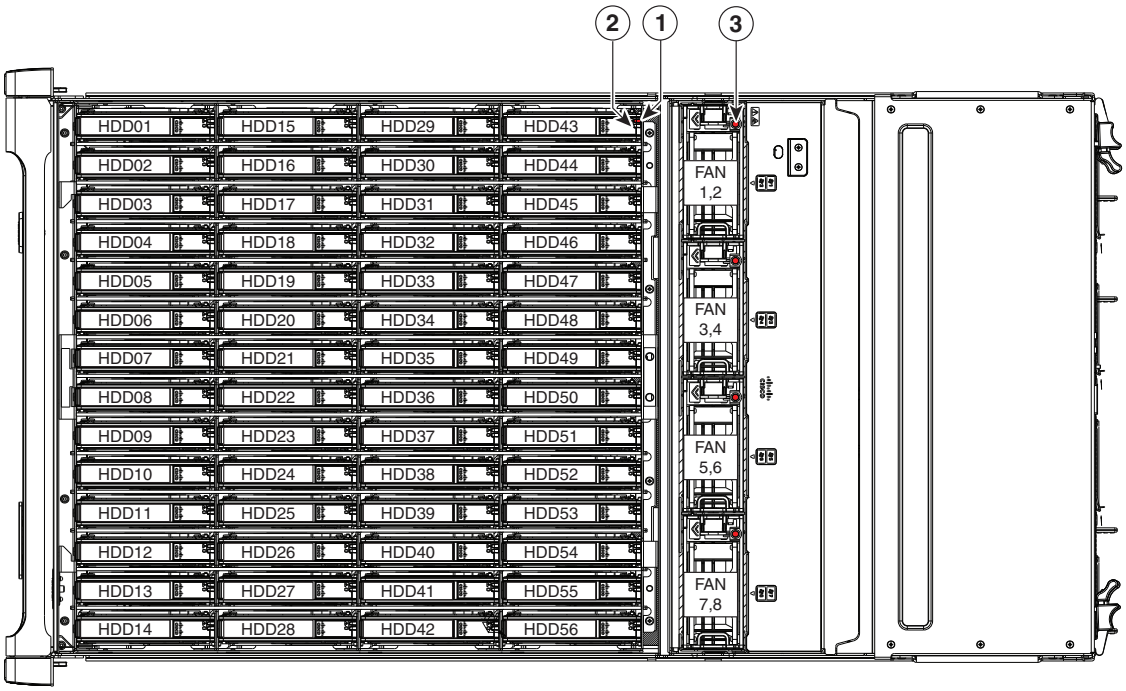
Internal Diagnostic LEDs

This section contains the following topics:

Diagnostic LEDs in the Main Chassis

The diagnostic LEDs inside the main chassis compartments can be viewed while the system is powered on. See Figure 3-3 for the locations of these internal LEDs.

Figure 3-3 Internal Diagnostic LED Locations in the Main Chassis



1	Drive fault (on each drive carrier)	**3**	Fan module fault (on each fan module)
2	Drive activity (on each drive carrier)		

Table 3-4 Internal Diagnostic LED States

	LED Name	State
1	SAS/SATA drive fault	• Off—The drive is operating properly. • Amber—This drive has failed. • Amber, blinking—The device is rebuilding.
2	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.
3	Fan fault LEDs	• Off—Component is functioning normally. • Amber—Component has failed.

Diagnostic LEDs in the Server Node

There are internal diagnostic LEDs on the edge of the server node board. These LEDs can be viewed while the server node is removed from the chassis, up to 30 minutes after AC power is removed.

There are fault LEDs for each DIMM, each CPU, the RAID card, and each system I/O controller (SIOC).

To use these LEDs to identify a failed component:

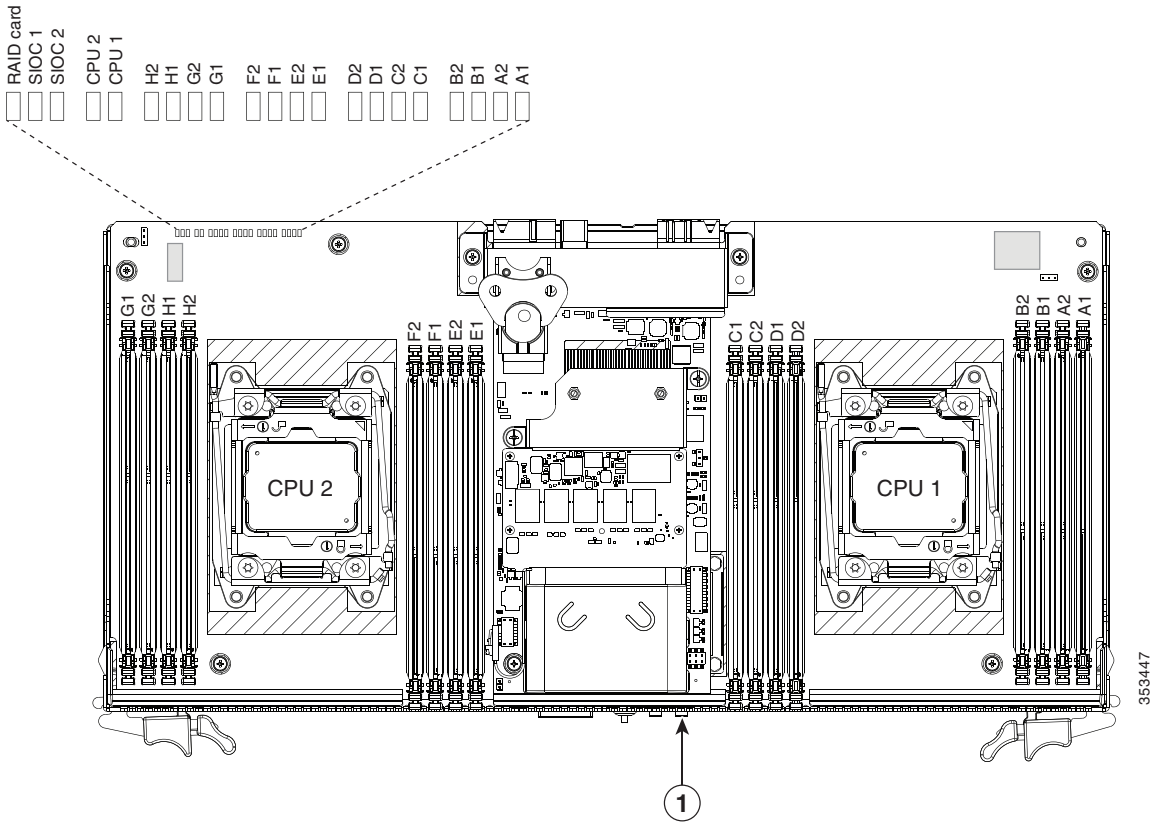
Step 1 Shut down and remove the server node from the system as described in Removing the Server Node Cover, page 3-13.

You do not have to remove the server node cover to view the LEDs on the edge of the board.

Step 2 Press and hold the server node unit identification button within 30 minutes of removing the server node from the system.

A fault LED that lights amber indicates a faulty component.

Figure 3-4 Internal Diagnostic LEDs on the Server Node Board



1	Server node unit identification button		

Preparing for System Component Installation or Replacement

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 (for CPU heat sink screws)
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

Powering On the System

The system has two power states: standby power mode and main power mode.

- Standby power mode—When you plug power cords into the power supplies and connect to power, the system powers on to standby power mode. The front panel power button/LED lights amber. Power is supplied only to the server node service processor and the cooling fans.
- Main power mode—To power the system to main power mode, press and hold the front panel power button/LED and hold it for four seconds. The front panel power button/LED lights green. Power is supplied to all system components and any operating system on your drives can run.

Shutting Down and Powering Off the System Chassis

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

To use the system power button, follow these steps:

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

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

Caution To completely remove all power from the system, you must disconnect all power cords from all power supplies.

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

Shutting Down an Individual Server Node

You can invoke a graceful shutdown or a hard shutdown of a server node by using either the Cisco Integrated Management Controller (Cisco IMC) interface, or the power button that is on the face of the server node.

Shutting Down a Server Node By Using the Cisco IMC GUI

To use the Cisco IMC GUI to shut down the server node, follow these steps:

Step 1 Use a browser and the management IP address of the system to log in to the Cisco IMC GUI.

Step 2 In the **Navigation** pane, click the **Chassis** menu.

Step 3 In the **Chassis** menu, click **Summary**.

Step 4 In the toolbar above the work pane, click the **Host Power** link.

The Server Power Management dialog opens. This dialog lists all servers that are present in the system.

Step 5 In the **Server Power Management** dialog, select one of the following buttons for the server that you want to shut down:

Caution To avoid data loss or damage to your operating system, you should always invoke a graceful shutdown of the operating system. Do not power off a server if any firmware or BIOS updates are in progress.

- Shut Down—Performs a graceful shutdown of the operating system.
- Power Off—Powers off the chosen server, even if tasks are running on that server.

It is safe to remove the server node from the chassis when the Chassis Status pane shows the Power State as Off for the server node that you are removing.

The physical power button on the server node face also turns amber when it is safe to remove the server node from the chassis.

Shutting Down a Server Node By Using the Power Button on the Server Node

To use the physical server node power button to shut down the server node only, follow these steps:

Step 1 Check the color of the server node power status LED:

- Green—The server node is powered on. Go to step Step 2
- Amber—the server node is powered off. It is safe to remove the server node from the chassis.

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. Do not power off a server if any firmware or BIOS updates are in progress.

- Graceful shutdown—Press and release the **Power** button. The software performs a graceful shutdown of the server node.
- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the power off the server node.

When the server node power button turns amber, it is safe to remove the server node from the chassis.

Opening the Main Chassis Top Covers

This system has three hinged top covers on the main chassis. Opening these covers gives access to the internal-drives compartment and the fan module compartment.

Note The internal drives and cooling fans in the system are hot-swappable and are accessed by opening the top covers. When you rack and cable the system, be sure to allow enough slack in the power and other cables so that the system can be pulled out on the slide rails far enough to allow clearance for opening the top covers.

See also:

- Removing the Server Node Cover, page 3-13
- Removing the System I/O Controller Cover, page 3-15

Step 1 Open the left or right internal-drive compartment cover to access the hot-swappable internal drives:

a. For either the right or left side cover, pull the latch release buttons on both latches toward the outer edges of the chassis. This causes the spring-loaded latches to pop up.

b. With both latches open, swing open the hinged cover from the center toward the outside.

c. To secure the cover, close it down flat and then push both latches flat until they click and lock.

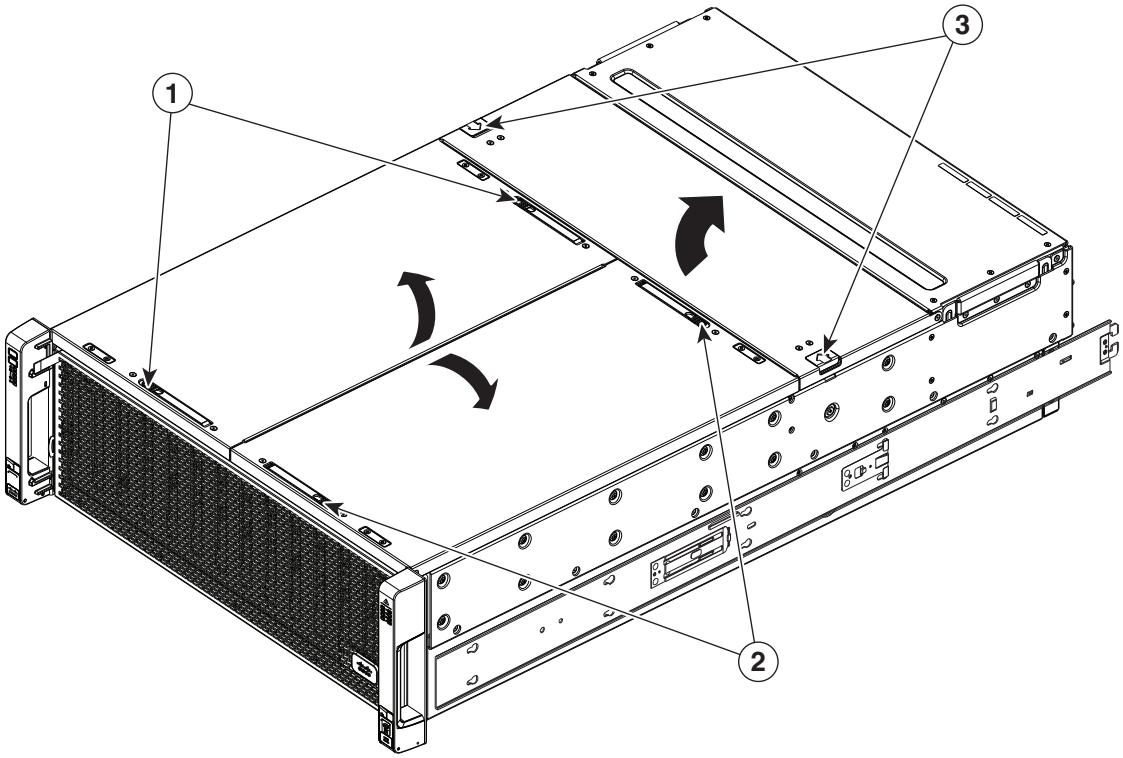
Step 2 Open the fan compartment cover to access the hot-swappable fan modules:

a. Push both latch-buttons toward the center.

b. While holding in both latch-buttons, open the hinged cover from the center toward the rear of the system.

c. To secure the cover, hold in both latch-buttons while you close the cover flat. Release the latch-buttons.

Figure 3-5 Opening the Top Covers



1	Latch-release buttons for left internal-drives compartment	**3**	Latch-release buttons for fan compartment
2	Latch-release buttons for right internal-drives compartment		

Removing the Server Node Cover

See also:

- Opening the Main Chassis Top Covers, page 3-11
- Removing the System I/O Controller Cover, page 3-15

Note You do not have to slide the system out of the rack to remove the server node from the rear of the system.

Step 1 Shut down and remove power from the entire system, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Step 3 Remove the cover from the server node:

a. Lift the latch handle to an upright position (see Figure 3-6).

b. Turn the latch handle 90-degrees to release the lock.

c. Slide the cover toward the rear (toward the rear-panel buttons) and then lift it from the server node.

Step 4 Replace the server node cover:

a. Set the cover in place on the server node, offset about one inch toward the rear. Pegs on the inside of the cover must set into the tracks on the server node base.

b. Push the cover forward until it stops.

c. Turn the latch handle 90-degrees to close the lock.

d. Fold the latch handle flat.

Step 5 Install a server node:

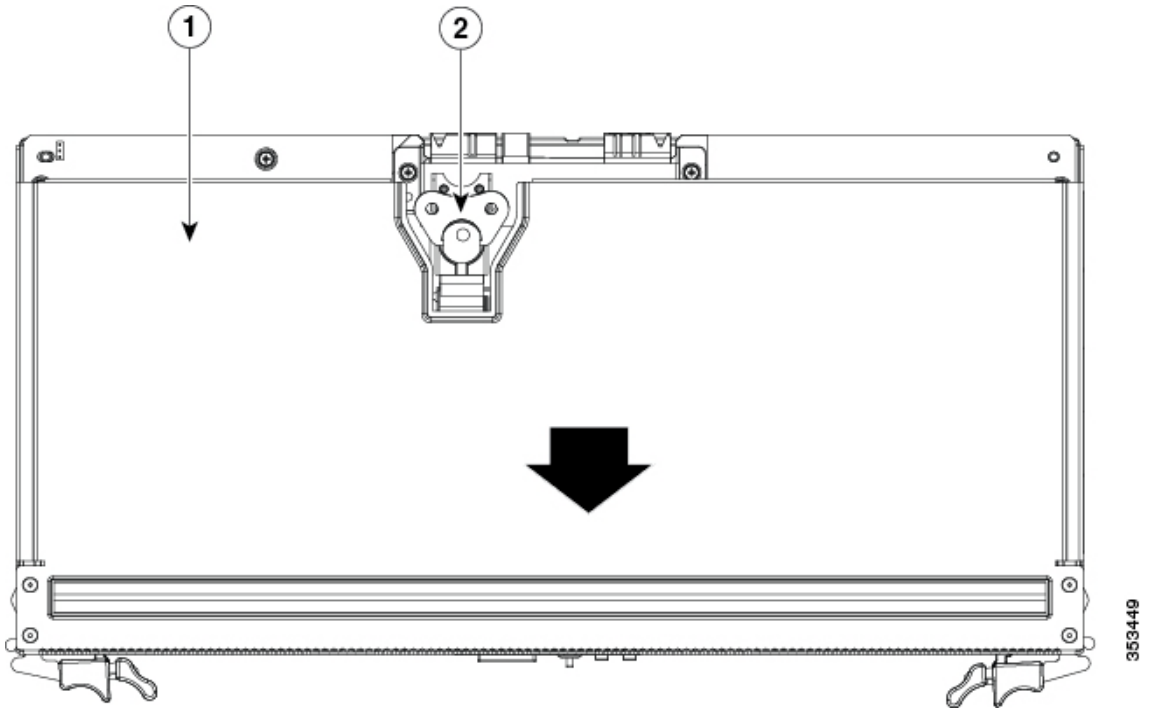
a. With the two ejector levers open, align the new server node with the empty bay.

b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 6 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Figure 3-6 Removing the Server Node Cover



1	Server node cover	**2**	Latch handle (shown in flat, closed position)

Removing the System I/O Controller Cover

See also:

- Opening the Main Chassis Top Covers, page 3-11
- Removing the Server Node Cover, page 3-13

Note You do not have to slide the system out of the rack to remove the SIOC from the rear of the system.

Step 1 Shut down and remove power from the entire system, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 2 Remove the SIOC from the system:

a. Loosen the single captive thumbscrew on the SIOC and then open its two hinged levers to evenly disengage the SIOC from its backplane connector.

b. Pull the SIOC from the system and set it on an antistatic work surface.

Step 3 Remove the SIOC cover:

a. Press the release button on the cover. See Figure 3-7.

b. Push the cover forward (toward the Molex connectors).

c. Lift the cover straight up off the SIOC.

Step 4 Replace the SIOC cover:

a. Set the cover back in place.

b. Slide the cover toward the rear (toward the rear panel buttons) until it stops and the release button clicks and locks.

Step 5 Replace the SIOC to the system:

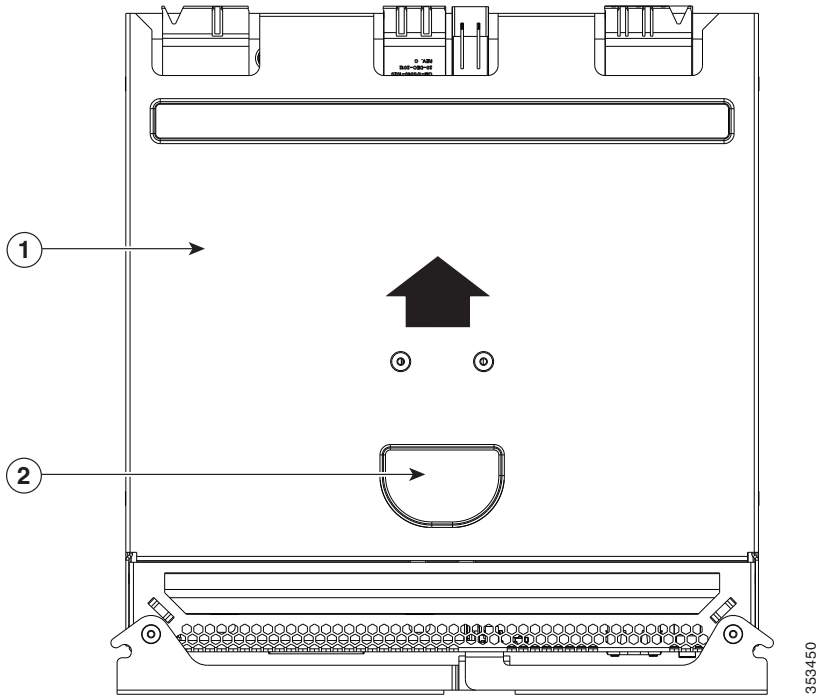
a. Push the SIOC into its bay until it stops against the internal midplane.

b. Close the two levers on the SIOC to fully engage the SIOC connector with its midplane.

c. Tighten the thumbscrew on the SIOC levers.

Step 6 Replace power cables and then power on the system by pressing and holding the power button on the front handle for four seconds.

Figure 3-7 Removing the SIOC Cover



1	SIOC cover	**2**	Release button

Installing or Replacing System 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 system components, wear an ESD strap to avoid electrostatic damage.

Caution This system weighs approximately 190 pounds (86 kilograms) when fully loaded with components. We recommend that you use a minimum of two people when lifting the system. Attempting to lift the system alone could result in personal injury or equipment damage.

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

See also Replaceable Component Locations, page 1-3.

Replacing Hard Drives or Solid State Drives

This section includes the following topics:

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 3-18 or Setting Up Booting in UEFI Mode in the Cisco IMC GUI, page 3-19.
- 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 Use a web browser and the management IP address of the system to log into the Cisco IMC GUI management interface.

Step 2 Select **Compute** and then **Server 1**.

Step 3 Click **Launch KVM** to open a virtual KVM window for the server node.

Step 4 In the Launch KVM dialog, select **Server 1** and click **Launch**.

Step 5 Reboot server node 1. Watch the KVM window for the prompt to press F2.

Step 6 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

Step 7 Go to the **Boot Options** tab.

Step 8 Set **UEFI Boot Options** to **Enabled**.

Step 9 Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.

Step 10 Go to the **Advanced** tab.

Step 11 Select **LOM and PCIe Slot Configuration**.

Step 12 Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.

Step 13 Press **F10** to save changes and exit the BIOS setup utility. Allow the server to reboot.

Step 14 After the server reboots and 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 management IP address of the system to log into the Cisco IMC GUI management interface.

Step 2 Select **Compute** and then **Server 1**.

Step 3 Select the **BIOS** tab.

Step 4 Under **BIOS Properties**, set **Configured Boot Order** to **UEFI**.

Step 5 Click **Save Changes**.

Step 6 Click **Configure Boot Order**.

Step 7 Select the **Advanced** tab.

Step 8 Click **Add Local HDD**.

Step 9 In the Add Local Disk dialog, enter the information for the 4K sector format drive. Enter a name and specify Slot **M**.

Step 10 Click **Save Changes**.

Step 11 Click **Add Virtual Media**.

Step 12 In the Add Virtual Media dialog, enter a name for your OS installation virtual media.

Step 13 Click **Save Changes**.

Step 14 Click **Close**.

Step 15 Click **Launch KVM** to open a virtual KVM window for the server node.

Step 16 In the Launch KVM dialog, select **Server 1** and click **Launch**.

Step 17 Activate virtual media. Pull down the **Virtual Media** menu on the KVM window and select **Activate Virtual Devices**.

Step 18 Reboot the server node.

Step 19 Press **F6** during the boot to enter the boot device menu.

Step 20 Select **UEFI: Cisco vKVM-Mapped vDVD** and press **Enter**.

Step 21 Proceed with the installation of your OS.

After the OS installs and the system reboots, your OS is listed as a boot option.

Replacing Hard Drives in the Internal Drive Compartment

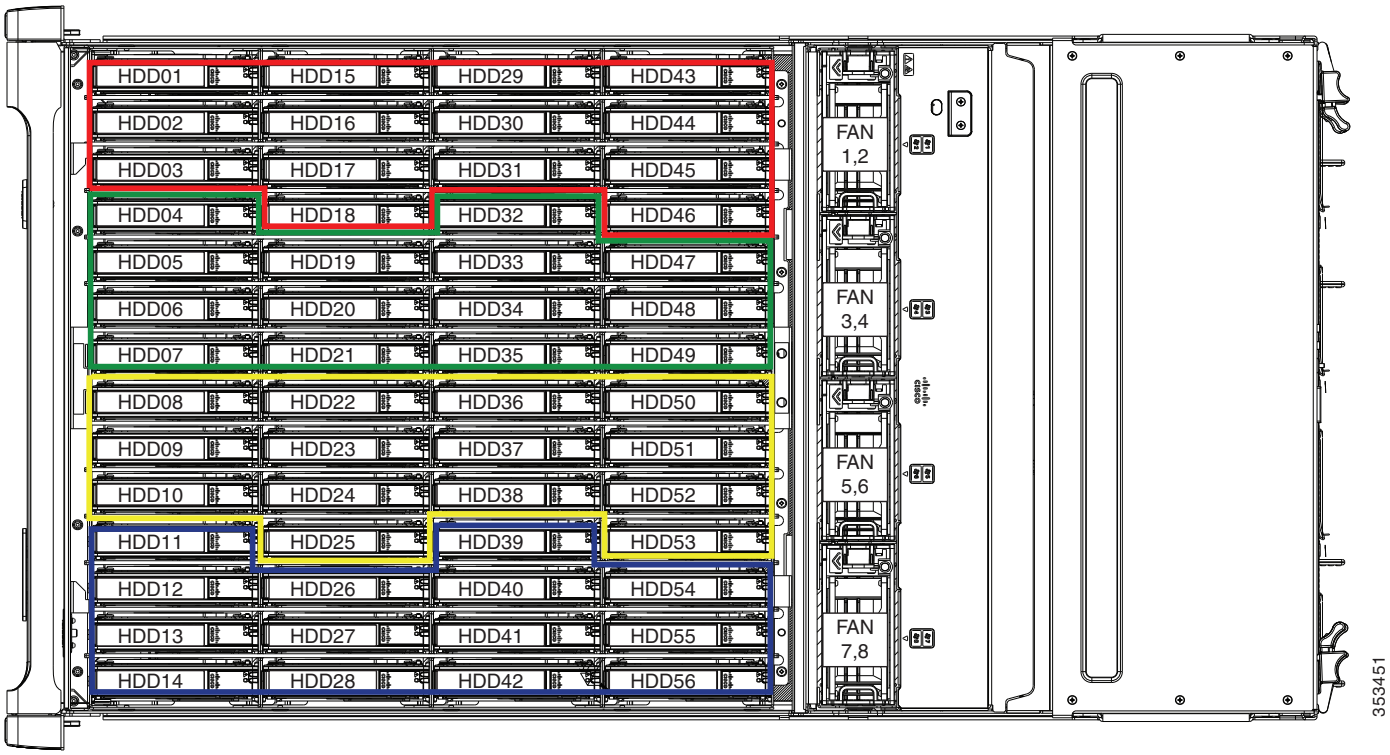
This section contains the following topics:

Internal Drive Population Guidelines

The system has 56 internal drive bays in the main chassis. Figure 3-8 shows the internal drive bay numbering. When populating internal drives, follow these guidelines:

- Populate drive bays starting from the lowest-numbered bays to the highest.
- The four colored boxes shown in Figure 3-8 represent the four power groups in which power is distributed to the drive bays. This might be useful for troubleshooting power rail problems.
- When ordering the system, it is configurable with disk multipacks. The supported configurations of multipacks are listed below. See the *Cisco UCS C3160 Rack Server Spec Sheet* for hardware ordering and configuration information.
  - The UCSC-C3X60-14HD4, UCSC-C3X60-28HD4, and UCSC-C3X60-42HD4 multipacks can be selected along with the UCSC-C3X60-SSD4 multipack.
  - The UCSC-C3X60-56HD4 multipack cannot be selected with any other multipack.
  - The UCSC-C3X60-14HD6, UCSC-C3X60-28HD6, and UCSC-C3X60-42HD6 multipacks can be selected along with the UCSC-C3X60-SSD6 multipack.
  - The UCSC-C3X60-56HD6 multipack cannot be selected with any other multipack.
  - You cannot mix 4 TB SAS-2 multipacks with 6 TB SAS-3 multipacks.

Figure 3-8 Internal Drive Bay Numbering



Identifying a Faulty Internal Drive

The system has internal-drive fault LEDs on the right-front handle (see Figure 3-1). Use these LEDs to get an indication of the location of a failing drive.

Step 1 Observe the internal-drive fault LEDs on the right-front handle.

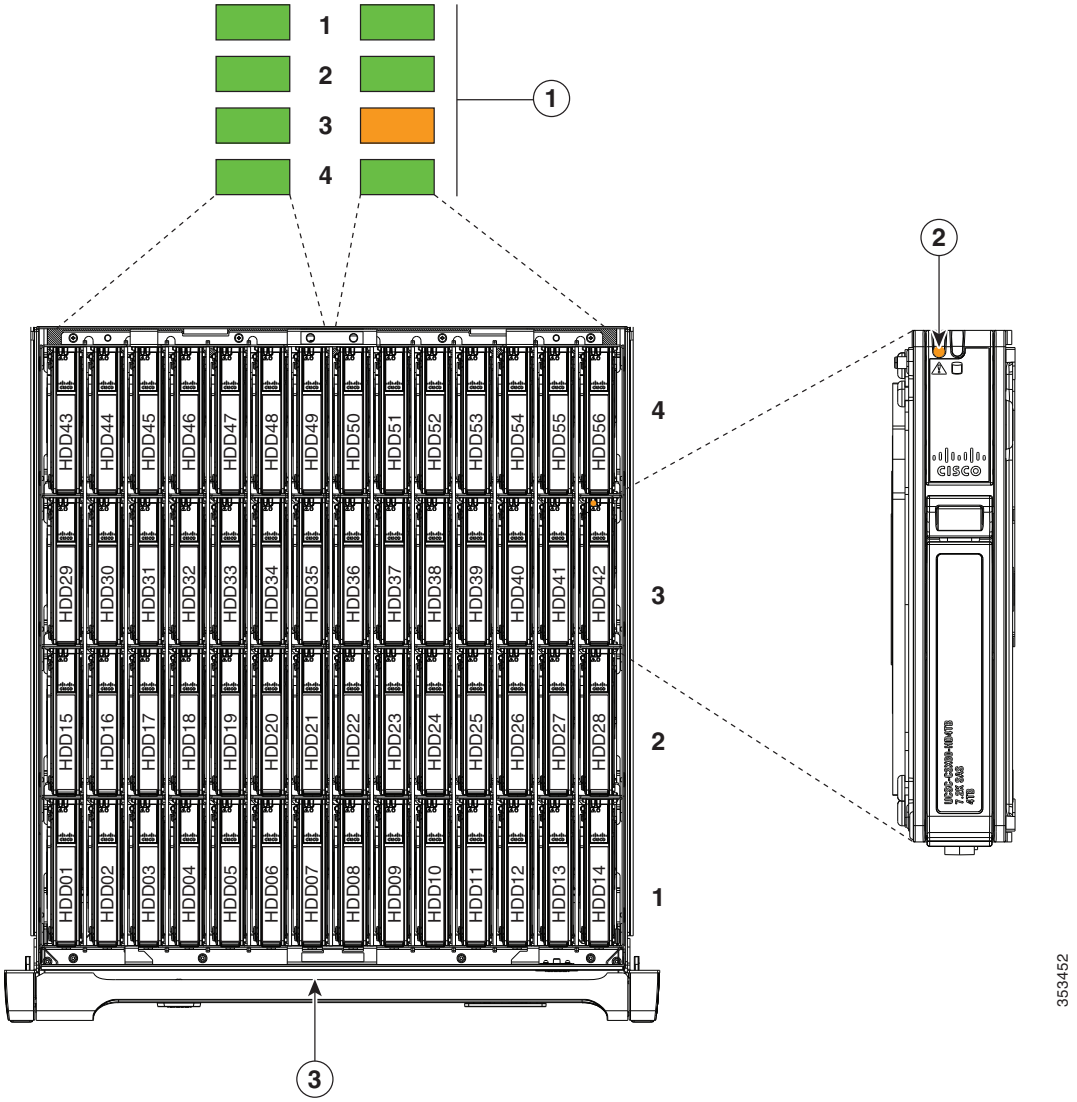
- The two columns of LEDs correspond to the two halves of the internal drive compartment (under either the right- or left-side top cover).
- The four numbered rows of LEDs correspond to the four horizontal rows of drive bays (14 drive bays in each row).

See Figure 3-9 for an example. In this example, the amber LED indicates that the failing drive is in the right half of the internal drive compartment, in row 3.

Step 2 Open the right- or left-side cover and look at the fault LEDs on the drive trays.

A solid amber fault LED indicates a failed drive.

Figure 3-9 Internal-Drive Status LED Example



1	Internal-drive fault LEDs on right-front handle of system, indicating faulty drive in right side of row 3	**3**	Front of system
2	Fault LED on drive carrier		

Replacing Internal Drives

Note SAS/SATA drives are hot-swappable and can be replaced without removing power from the system.

Step 1 Slide the system out the front of the rack far enough so that you can open the top cover.

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

Step 2 Identify a failing drive as described in Identifying a Faulty Drive Expander Module Drive, page 3-24

Step 3 Open the internal-drive compartment cover.

Step 4 Remove a faulty drive:

a. Press the release button on the drive carrier. The drive lever pops up.

b. Lift the drive lever to the fully open, 90-degree position, then lift the drive straight up out of its bay.

Spare drives are already installed in a carrier, so it is not necessary to remove the old drive from its carrier.

Step 5 Install a new drive:

Note Observe the drive population guidelines in Internal Drive Population Guidelines, page 3-20.

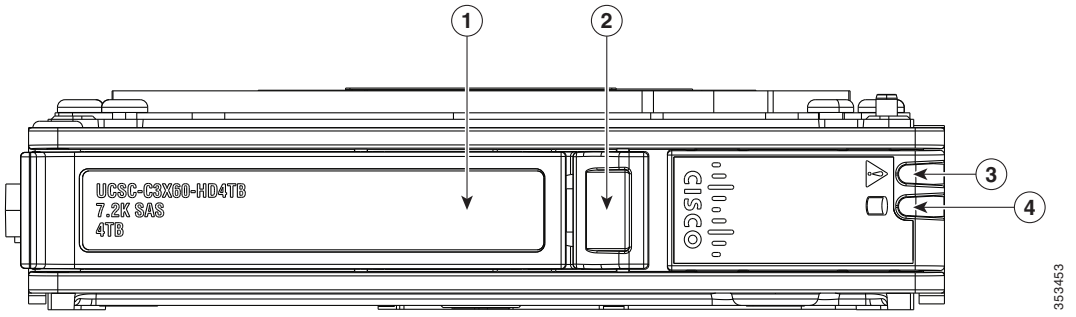
a. Align the new drive with the empty bay. Orient the drive so that its connector aligns with the connector on the board.

b. Lower the drive until it touches the board connector and the drive lever begins to close.

c. Press the drive lever down flat until it clicks and locks.

Step 6 Close the chassis cover and push the system back into the rack.

Figure 3-10 Internal Drive Carrier Features



1	Drive lever	**3**	Drive fault LED
2	Release button	**4**	Drive activity LED

Replacing Hard Drives in the Optional Drive Expander Module

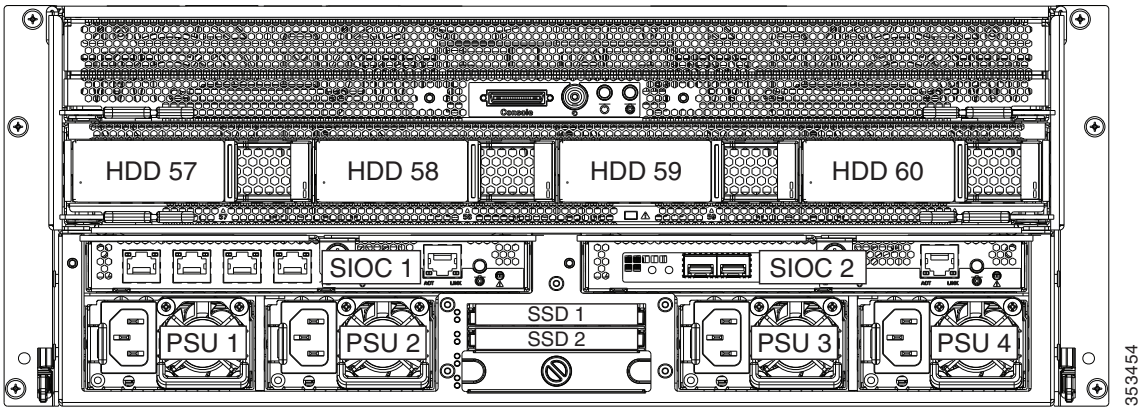
This section contains the following topics:

Drive Expander Module Drives Population Guidelines

The optional drive expander module can hold up to four 3.5-inch drives. Drive numbering is shown in Figure 3-11. When populating these drives, follow these guidelines.

- Populate drives starting with the lowest-numbered bay to the highest.

Figure 3-11 Drive Expander Module and Solid State Drive Numbering



Identifying a Faulty Drive Expander Module Drive

Each drive carrier has a fault LED that lights solid amber to indicate a failing drive.

Replacing Drive Expander Module Drives

Note SAS/SATA drives are hot-swappable and can be replaced without removing power from the system.

Step 1 Identify a failing drive as described in Identifying a Faulty Drive Expander Module Drive, page 3-24.

Step 2 Remove a faulty drive:

a. Press the release button on the drive carrier. The drive lever pops up.

b. Lift the drive lever to the fully open position, then pull the drive straight up out of its bay.

Spare drives are already installed in a carrier, so it is not necessary to remove the old drive from its carrier.

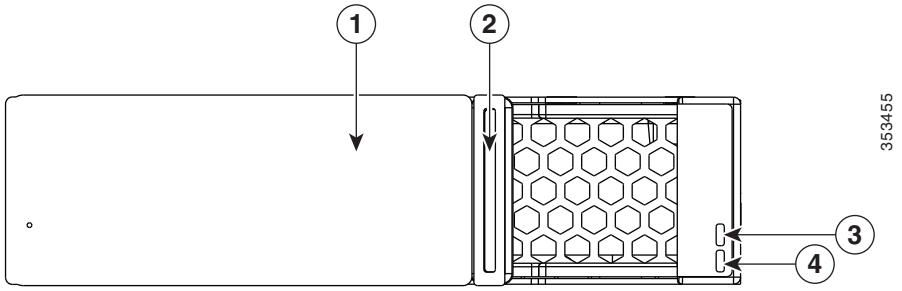
Step 3 Install a new drive:

Note Observe the drive population guidelines in Drive Expander Module Drives Population Guidelines, page 3-24.

a. Align the new drive with the empty bay and then push the drive in until it touches the board connector and the drive lever begins to close.

b. Press the drive lever down flat until it clicks and locks.

Figure 3-12 Drive Expander Module Drive Carrier Features



1	Drive lever	**3**	Drive fault LED
2	Release button	**4**	Drive activity LED

Replacing Solid State Drives in the Rear Panel Solid State Drive Bays

This section contains the following topics:

Note The two SSDs can be mirrored in a RAID 1 configuration when managed in advanced host controller interface (AHCI) mode through your Windows or Linux operating system. The AHCI SATA mode must be enabled in the BIOS, as described in Selecting SATA Mode in the BIOS for SSDs, page 3-27.

Solid State Drive Population Guidelines

There are two supported bays for solid state drives in the rear panel. Drive numbering is shown in Figure 3-11. When populating these drives, follow these guidelines.

Note At this time, only the top two solid state drive bays are supported (see Figure 3-11).

- Populate drives starting with the lowest-numbered bay to the highest.
- Keep the blanking panel in the lower two SSD bays to ensure proper air flow.

Replacing Solid State Drives

Note Solid state drives are hot-swappable and can be replaced without removing power from the system.

Step 1 Remove a faulty solid state drive:

a. Grasp and pinch the release latch toward the center.

b. Pull the solid state drive straight out of the bay.

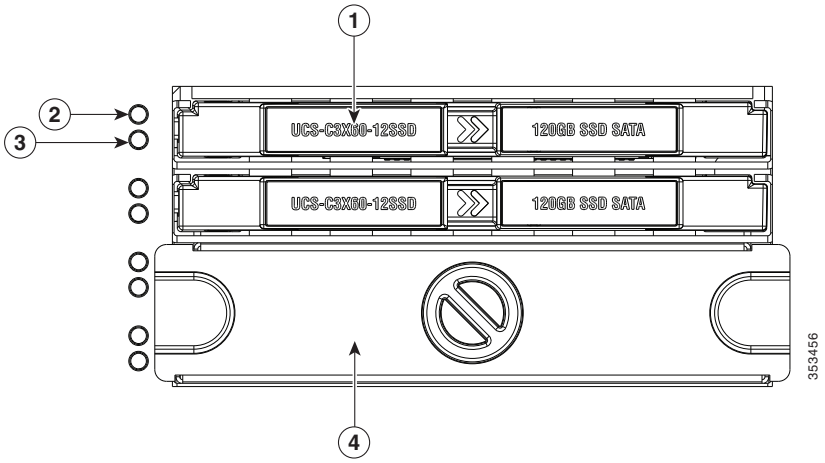
Step 2 Install a new solid state drive:

Note Observe the drive population guidelines in Solid State Drive Population Guidelines, page 3-25.

a. Align the new drive with the empty bay (with the label facing up) and then push the drive in until it touches the board connector.

b. Grasp and pinch the release latch toward the center while you push the drive fully into the bay, and then release the release latch.

Figure 3-13 Solid State Drive Bay Features



1	Release latch	**3**	Not used at this time
2	Not used at this time	**4**	Blanking panel over lower two bays, which are not used at this time

Selecting SATA Mode in the BIOS for SSDs

The default SATA mode for controlling the SSDs is AHCI Mode. If you want to control the SSD pair in AHCI mode, no further steps are necessary.

Step 1 Boot the server node and press **F2** when prompted to enter the BIOS Setup utility for that server node.

Step 2 In the utility, choose the **Advanced** tab, and then choose **SATA Configuration**.

Step 3 Set **SATA Mode** to your choice:

- Disabled—The embedded RAID controller is disabled.
- AHCI Mode [Default]—Advanced host controller interface. You can manage the SSD pair by using your operating system's storage management feature.

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

Replacing Fan Modules

Each fan module contains two fans. See Figure 3-14 for the fan numbering. The odd-numbered fan is at the top of the fan module and the even-numbered fan is at the bottom of the fan module.

You do not have to shut down or power off the system to replace fan modules because they are hot-swappable.

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

Step 1 Slide the system out the front of the rack far enough so that you can open the fan compartment cover.

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

Step 2 Open the fan compartment cover as described in Opening the Main Chassis Top Covers, page 3-11.

Step 3 Remove a fan module:

a. Grasp the two latches on the top of the fan and pinch them toward the center.

b. Lift the fan module straight out of the bay.

Step 4 Install a new fan module:

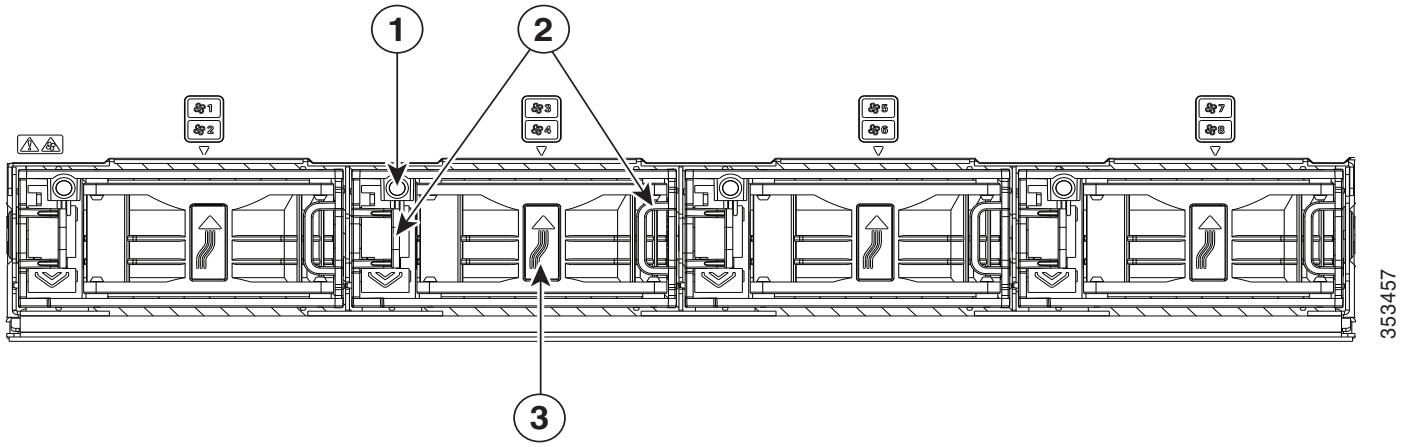
Note The arrow on the fan module that indicates the air flow direction should point to the rear of the server.

a. Align the fan module with the bay so that the connector on the bottom of the fan module is aligned with the socket on the floor of the chassis.

b. Lower the fan module until it touches the socket, then push down firmly until the latch locks.

Step 5 Close the fan compartment cover and then push the system back into the rack.

Figure 3-14 Fan Modules (Top View)

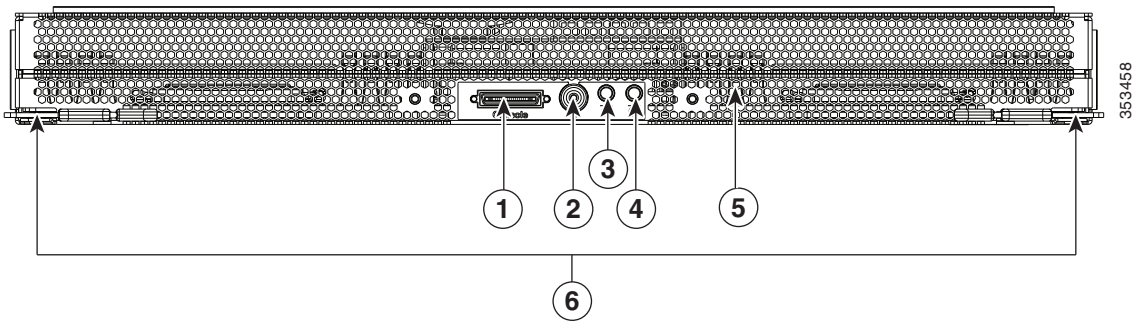


1	Fan module fault LED	**3**	Air flow direction arrow pointing toward rear of server
2	Fan module release latches		

Replacing a Server Node

The system can support one server node. The server node must be in the uppermost bay of the system.

Figure 3-15 Server Node External Features



1	KVM cable connector	**4**	Unit identification button/LED
2	Reset button (resets the controller chipset for this node)	**5**	Server node health LED (behind mesh on server node board)
3	Server node power button/LED	**6**	Ejector levers (two)

The server node is accessed from the rear of the system, so you do not have to pull the system out from the rack.

Caution Before you replace a server node, export and save the Cisco IMC configuration from the node if you want that same configuration on the new node. You can import the saved configuration to the new replacement node after you install it.

Step 1 Optional—Export the Cisco IMC configuration from the server that you are replacing so that you can import it to the replacement server node. If you choose to do this, use the procedure in Exporting Cisco IMC Configuration From a Server Node, page 3-31, then return to the next step.

Note You do not have to power off the chassis in the next step. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 2 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 3 Remove a server node from the system:

- **a.** Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).
- **b.** Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.
- **c.** Pull the server node straight out from the system.

Step 4 Install a server node:

- **a.** With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be installed into the top bay, as shown in Figure 1-2 on page 1-2.

b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 5 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 6 Perform initial setup on the new server to assign an IP address and your other preferred network settings. See Initial Server Setup, page 2-12.

Step 7 Optional—Import the Cisco IMC configuration that you saved in step 1. If you choose to do this, use the procedure in Importing Cisco IMC Configuration To a Server Node, page 3-32.

Exporting Cisco IMC Configuration From a Server Node

This operation can be performed using either the GUI or CLI interface of the Cisco IMC. The example in this procedure uses the CLI commands. For more information see *Exporting a Cisco IMC Configuration* in the CLI and GUI guides here: Configuration Guides.

Step 1 Log in to the IP address and CLI interface of the server node that you are replacing.

Step 2 Enter the following commands as you are prompted:

```
Server# scope cimc
Server /cimc# scope import-export
Server /cimc/import-export# export-config <protocol> <ip-address> <path-and-filename>
```

Step 3 Enter the user name, password, and pass phrase.

This sets the user name password, and pass phrase for the file that you are exporting. The export operation begins after you enter a pass phrase, which can be anything that you choose.

To determine whether the export operation has completed successfully, use the show detail command. To abort the operation, type CTRL+C.

The following is an example of an export operation. In this example, the TFTP protocol is used to export the configuration to IP address 192.0.2.34, in file /ucs/backups/cimc5.xml.

```
Server# scope cimc
Server /cimc # scope import-export
Server /cimc/import-export # export-config tftp 192.0.2.34 /ucs/backups/cimc5.xml
Username:xxxx
Password:****
Passphrase:***
Export config started. Please check the status using "show detail".
Server /cimc/import-export # show detail
Import Export:
Operation: EXPORT
Status: COMPLETED
Error Code: 100 (No Error)
Diagnostic Message: NONE
```

Importing Cisco IMC Configuration To a Server Node

This operation can be performed using either the GUI or CLI interface of the Cisco IMC. The example in this procedure uses the CLI commands. For more information see *Importing a Cisco IMC Configuration* in the CLI and GUI guides here: Configuration Guides.

Step 1 Log in to the IP address and CLI interface of the new server node.

Step 2 Enter the following commands as you are prompted:

```
Server# scope cimc
Server /cimc# scope import-export
Server /cimc/import-export# import-config <protocol> <ip-address> <path-and-filename>
```

Step 3 Enter the user name, password, and pass phrase.

This should be the user name, password, and pass phrase that you used during the export operation. The import operation begins after you enter the pass phrase.

The following is an example of an import operation. In this example, the TFTP protocol is used to import the configuration from IP address 192.0.2.34, from file /ucs/backups/cimc5.xml.

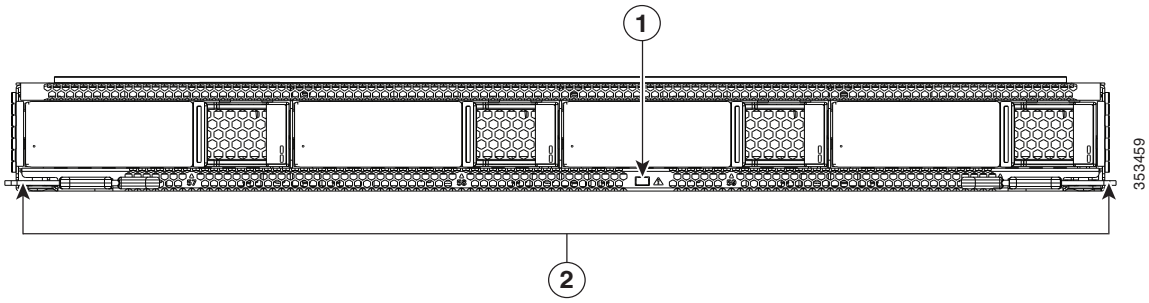
```
Server# scope cimc
Server /cimc # scope import-export
Server /cimc/import-export # import-config tftp 192.0.2.34 /ucs/backups/cimc5.xml
Username:xxxx
Password:****
Passphrase:***
Export config started. Please check the status using "show detail".
Server /cimc/import-export # show detail
Import Export:
Operation: Import
Status: COMPLETED
Error Code: 100 (No Error)
Diagnostic Message: NONE
```

Replacing a Drive Expander Module

The system can support one optional drive expander module.

Tip The module contains one fault LED that indicates when the module has failed (see Figure 3-16).

Figure 3-16 Drive Expander Module External Features



1	Drive expander module fault LED	2	Drive expander module ejector levers (two)

Note The drive expander module is hot-swappable, which means that you can remove it without shutting down system power.

The drive expander module is accessed from the rear of the system, so you do not have to pull the system out from the rack.

Step 1 Remove a drive expander module from the system:

a. Grasp the two module ejector levers and pinch their latches to release the levers (see Figure 3-16).

b. Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.

c. Pull the module straight out from the system.

Step 2 Remove any drives from the old module and move them to your new drive expander module. Install each drive to the same position that it occupied in the old module.

Step 3 Install a new drive expander module:

a. With the two ejector levers open, align the new module with the empty bay.

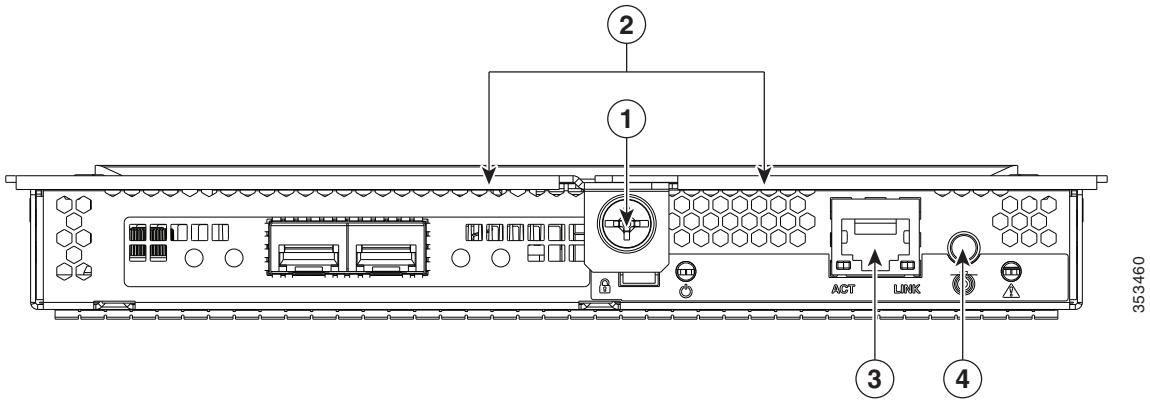
b. Push the module into the bay until it engages with the midplane connectors.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the module.

Replacing a System I/O Controller

The system can support up to two system I/O controllers (SIOCs).

Figure 3-17 SIOC External Features



1	Lever thumbscrew	**3**	1-Gb dedicated management port
2	Ejector levers	**4**	Not used at this time

You do not have to slide the system out of the rack to remove the SIOC from the rear of the system.

Step 1 Shut down and remove power from the entire system, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 2 Remove the SIOC from the system:

a. Loosen the single captive thumbscrew on the SIOC and then open its two hinged ejector levers to evenly disengage the SIOC from its midplane connector.

b. Pull the SIOC from the system.

Step 3 If you want to move an adapter card from the old SIOC to your replacement SIOC, use the procedure in Replacing an Adapter Card Inside the SIOC, page 3-55.

Step 4 Install the new SIOC:

Note If you have only one SIOC, it must be in SIOC bay 1 (see Figure 1-2 on page 1-2).

a. Push the SIOC into its bay until it stops against the internal backplane.

b. Close the two ejector levers on the SIOC to fully engage the SIOC connector with the midplane connector.

c. Tighten the thumbscrew on the SIOC ejector levers.

Step 5 Replace power cables, and then power on the system by pressing and holding the power button for four seconds.

Replacing a Power Supply

The system can have two or four power supplies. When four power supplies are installed they are redundant as 2+2.

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

Note If you have ordered a system with power supply redundancy (four power supplies), you do not have to power off the system to replace up to two 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 3-18):

a. Perform one of the following actions:
   - If your system has only two power supplies, shut down and power off the system as described in the "Shutting Down and Powering Off the System Chassis" section on page 3-9.
   - If your system has four power supplies, you do not have to power off the system.

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

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:

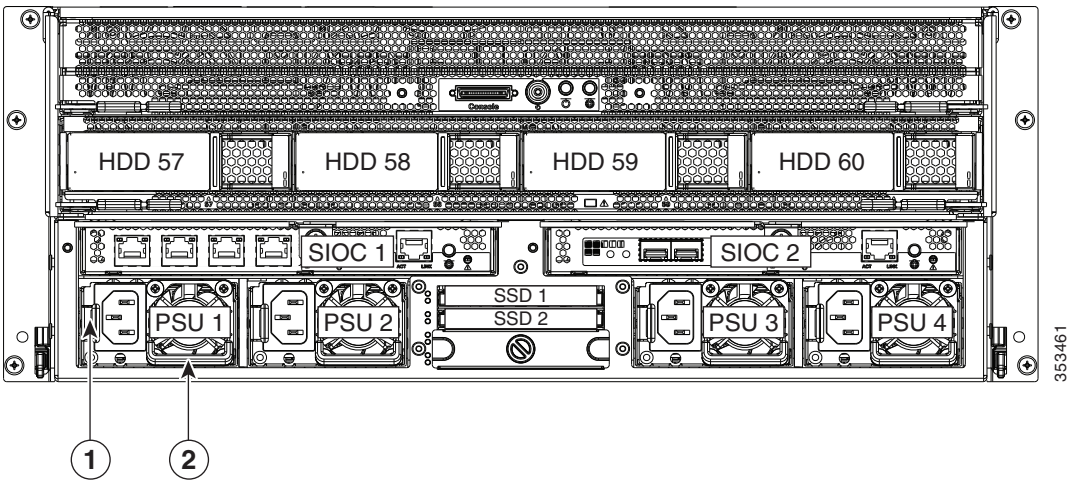
a. Grasp the power supply handle and insert the new power supply into the empty bay.

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

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

d. If you powered off the system, press and hold the system Power button for four seconds to return the system to main power mode.

Figure 3-18 Removing and Replacing Power Supplies



1	Power supply release lever	2	Power supply handle

Replacing DIMMs Inside the Server Node

The 16 DIMM sockets are inside the server node.

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 system might result in system problems or damage to the motherboard.

Note To ensure the best system 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 includes the following topics:

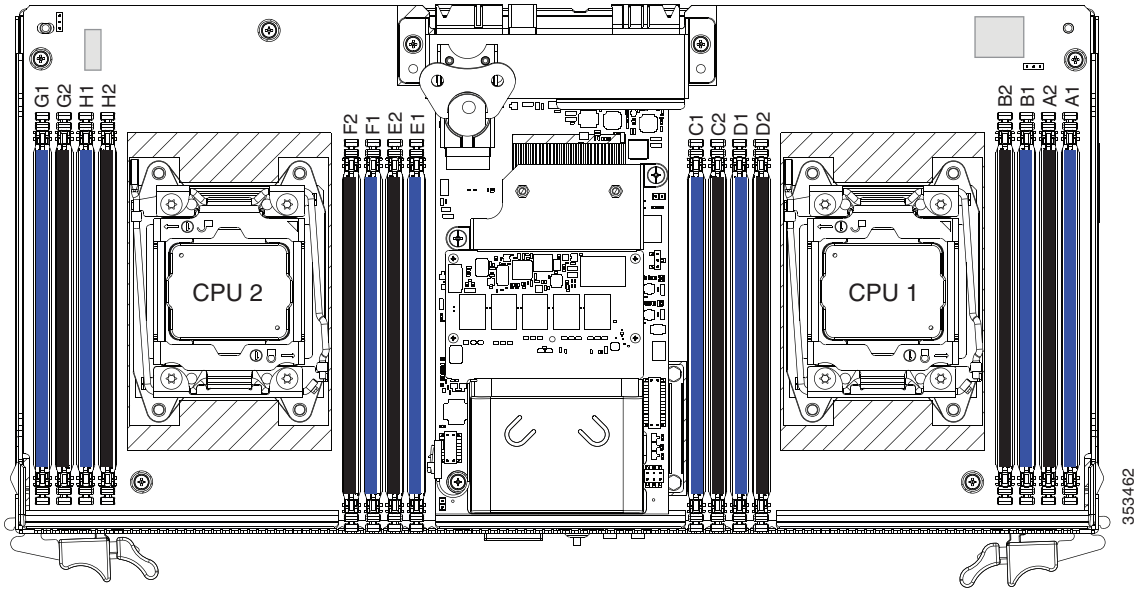
DIMM Sockets

Figure 3-19 shows the DIMM sockets and how they are numbered on a server node board.

- A server node has 16 DDR3 DIMM sockets (8 for each CPU).
- Channels are labeled with letters as shown in Figure 3-19.

  For example, channel A = DIMM sockets A1, A2.
- Each channel has two DIMM sockets. The blue socket in a channel is always socket 1.

Figure 3-19 DIMM Sockets and CPU Sockets on a Server Node Board



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- For optimal performance, spread DIMMs evenly across both CPUs and all channels.
- Populate the DIMM sockets of each CPU identically. Populate the blue DIMM 1 sockets first, then the black DIMM 2 slots. For example, populate the DIMM slots in this order:
  1. A1, E1, B1, F1, C1, G1, D1, H1
  2. A2, E2, B2, F2, C2, G2, D2, H2
- Observe the DIMM mixing rules shown in Table 3-5.

Table 3-5 DIMM Mixing Rules

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
DIMM Capacity: RDIMM = 8 or 16 GB	You can mix different capacity DIMMs in the same channel (for example, A1, A2).	• 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.

Table 3-5 DIMM Mixing Rules

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
DIMM Speed: 1600- or 1866-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	You cannot mix DIMM types in a channel.	You cannot mix DIMM types in a bank.

Memory Mirroring Mode

When you enable memory mirroring mode, 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

When you enable lockstep channel mode, each memory access is a 128-bit data access that spans four channels.

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.

DIMM Replacement Procedure

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Step 3 Remove the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 4 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 5 Install a new DIMM:

Note Before installing DIMMs, refer to the population guidelines. See DIMM Performance Guidelines and Population Rules, page 3-36.

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.

Step 6 Replace the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 7 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 8 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Replacing CPUs and Heatsinks Inside the Server Node

The CPUs are inside the server node. Although CPUs are not spared separately for this server, you might need to move your CPUs from a faulty server node module to a new server node module.

This section contains the following topics:

CPU Configuration Rules

See Figure 3-19 for the CPU socket numbering.

- The server node must have two CPUs to operate.

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 system.

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).

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Step 3 Remove the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 4 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.

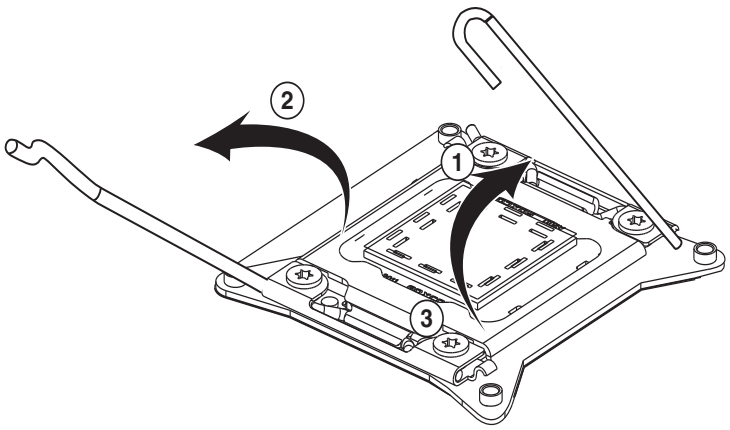
Note Loosen each screw evenly to avoid damaging the heatsink or CPU.

Step 5 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 3-20.

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

Step 6 Open the hinged CPU cover plate. See Figure 3-20.

Figure 3-20 CPU Socket Retaining Latches



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

Step 7 Remove the old CPU:

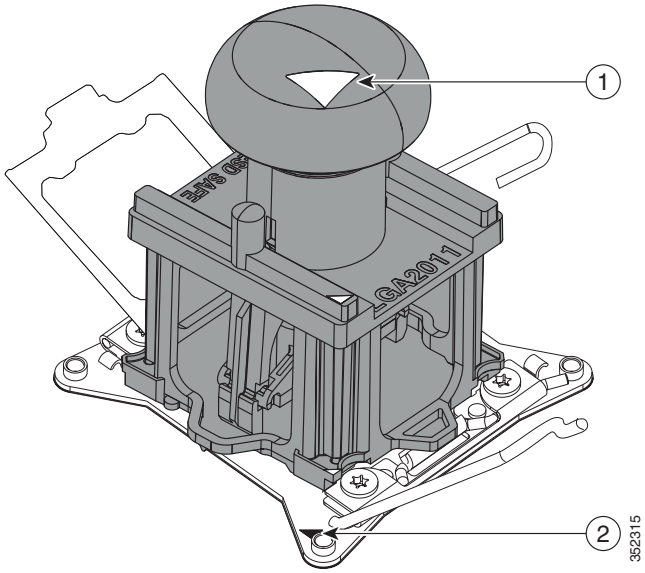
a. Set the Pick-and-Place tool on the CPU in the socket, aligning the arrow on the tool with the registration mark on the socket (the small triangular mark). See Figure 3-21.

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 3-21 Pick-and-Place Tool



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

Step 8 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 3-22).

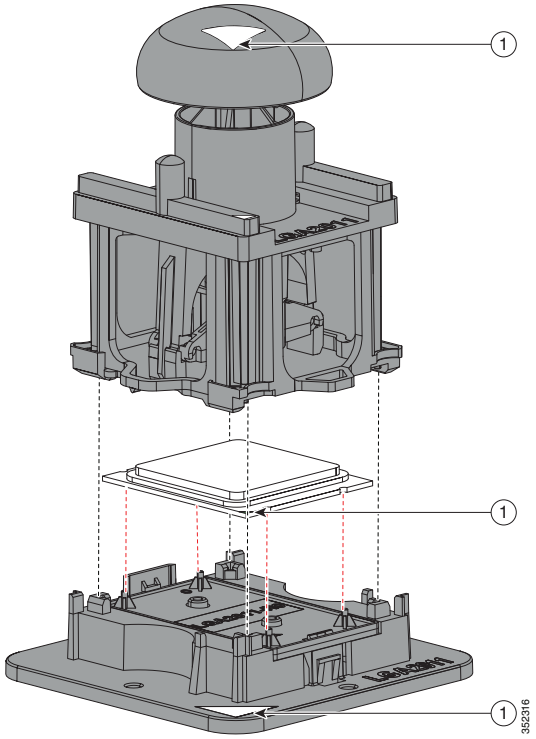
b. Press down on the top button of the tool to lock it open.

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 3-22 CPU and Pick-and-Place Tool on Pedestal



1	Arrow marks for alignment		

Step 9 Install a new CPU:

a. Set the Pick-and-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 3-21 on page 3-42.

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, then clip down the CPU retaining latch with the icon. See Figure 3-20 on page 3-41.

Step 10 Install a heatsink:

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

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

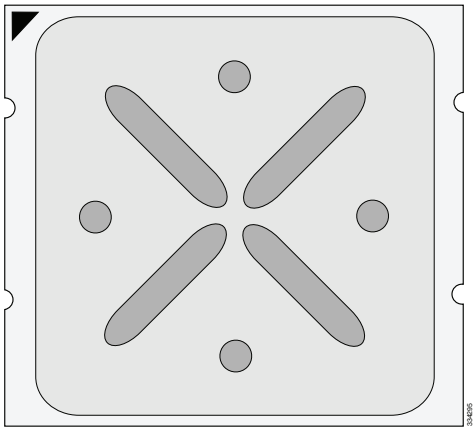
b. Wipe all of the old thermal grease off the old heatsink using a soft cloth that will not scratch the heatsink surface.

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 3-23.

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

Figure 3-23 Thermal Grease Application Pattern



d. Align the heatsink captive screws with the motherboard standoffs, and 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.

Step 11 Replace the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 12 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 13 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Additional CPU-Related Parts To Order With RMA Replacement Server Nodes

When a return material authorization (RMA) of the server node or CPU is done on a system, 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 C3160 (UCS-CPU-GREASE3=)
  - Intel CPU Pick-n-Place tool for EP CPUs (UCS-CPU-EP-PNP=)
- Scenario 2—You are replacing the existing heatsinks:
  - Heat sink (UCSB-HS-01-EP=)
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Intel CPU Pick-n-Place tool for EP CPUs (UCS-CPU-EP-PNP=)

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.

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 a RAID Controller Card Inside the Server Node

The Cisco modular RAID controller card connects to a mezzanine-style socket inside the server node. The SuperCap power module (SCPM) comes already attached to a new card, so you do not have to remove that separately.

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

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

- **a.** Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).
- **b.** Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.
- **c.** Pull the server node straight out from the system.

Step 3 Remove the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 4 Remove a Cisco modular RAID controller card:

- **a.** Loosen the two captive thumbscrews that secure the card to the board (see Figure 3-24).
- **b.** Grasp the card at both ends and lift it evenly to disengage the connector on the underside of the card from the mezzanine socket.

Step 5 Install a Cisco modular RAID controller card:

- **a.** Align the card and bracket over the mezzanine socket and the three standoffs.
- **b.** Press down on both ends of the card to engage the connector on the underside of the card with the mezzanine socket.
- **c.** Install the screw that passes through the supercap power module (backup battery) cover.

Step 6 Install the heat sink assembly to the controller card:

- **a.** Remove the protective tape from the thermal interface that is on the underside of the heatsink.
- **b.** Align the heat sink assembly and its two captive screws with the holes in the controller card.
- **c.** Tighten the two captive screws to the two standoffs that are under the controller card.

Step 7 Replace the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 8 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

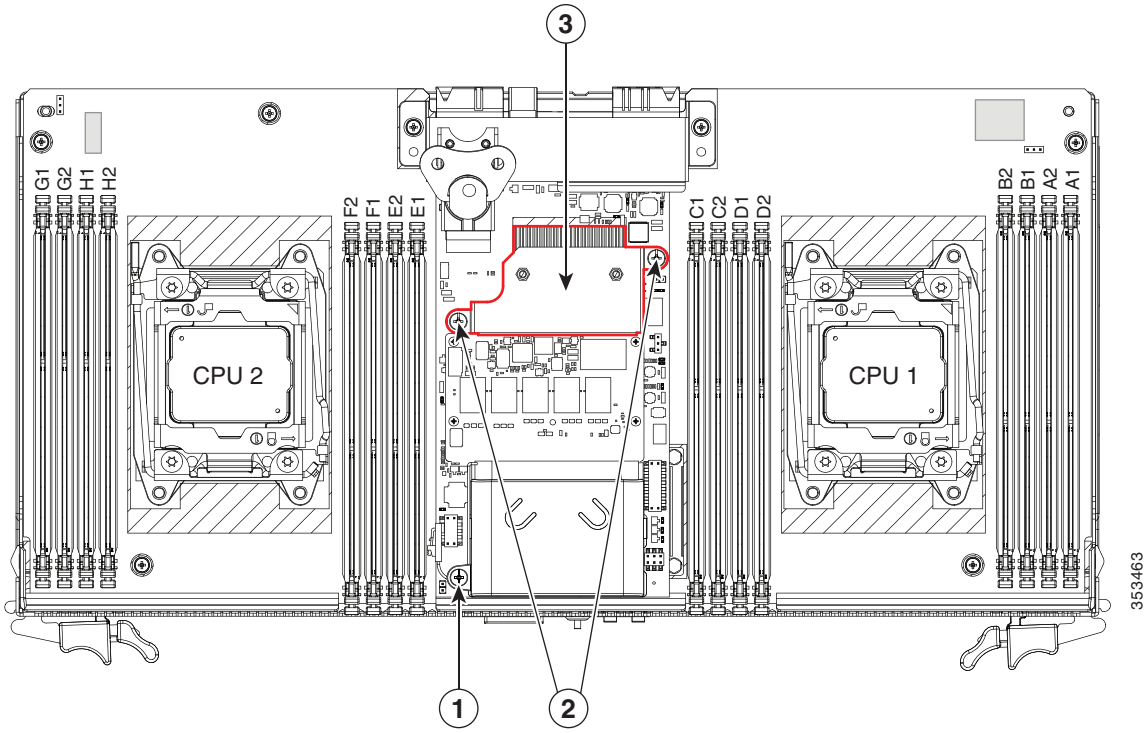
b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 9 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 10 See Restoring RAID Configuration After Replacing a RAID Controller, page C-4 to restore your RAID configuration.

Figure 3-24 Cisco Modular RAID Controller Card Inside the Server Node



1	Screw that passes through supercap power module cover to standoff	**3**	Heatsink assembly
2	Two captive screws that pass through heatsink assembly to standoffs		

Replacing an RTC Battery Inside the Server Node

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.

Note When the RTC battery is removed or it completely loses power, settings that were stored in the BMC of the server node are lost. You must reconfigure the BMC settings after installing a new battery.

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Note You do not have to remove the server node cover to access the RTC battery.

Step 3 Remove the server node RTC battery:

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

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

Step 4 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.

Step 5 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

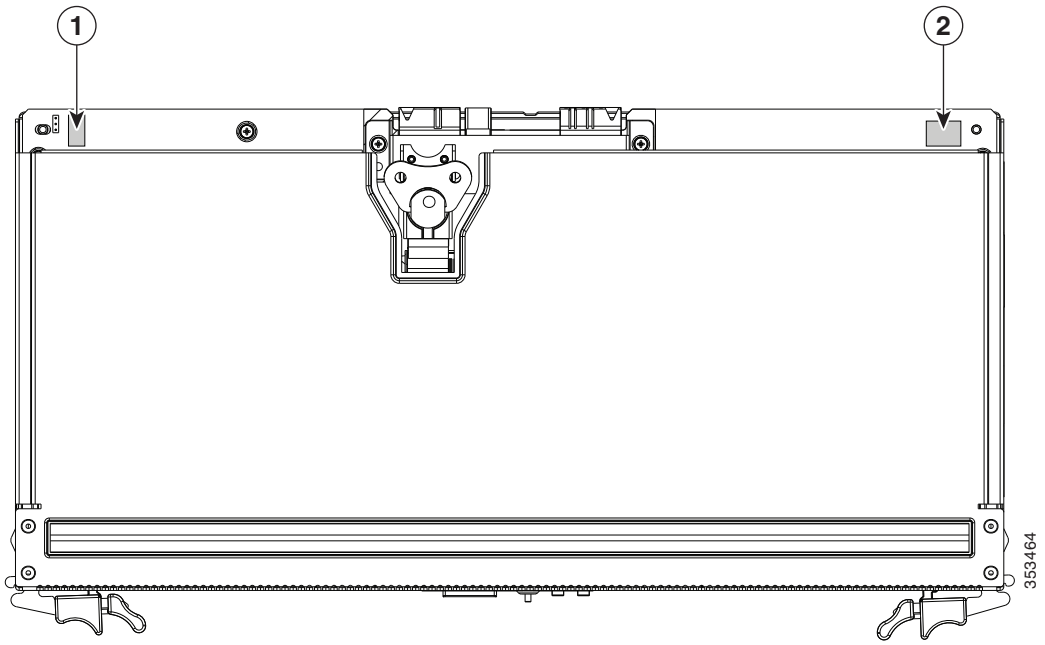
b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 6 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 7 Reconfigure the settings in the BMC of this node.

Figure 3-25 Location of the Server Node RTC Battery and USB Port



1	Server node RTC battery on board, behind edge of cover	**2**	Internal USB port on board, behind edge of cover

Replacing an Internal USB Drive Inside the Server Node

This section contains the following topics:

Internal USB Drive Replacement Procedure

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Note You do not have to remove the server node cover to access the USB port.

Step 3 Remove an existing USB flash drive from the port on the server node board. Pull the drive horizontally from the port.

Step 4 Install a USB flash drive. Insert the new USB flash drive into the horizontal socket on the server node board.

Step 5 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 6 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Enabling or Disabling the Internal USB Port

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

Step 6 Press F10 to save and exit the utility.

Installing a Trusted Platform Module (TPM) Inside the Server Node

The trusted platform module (TPM) is a small circuit board that attaches to a socket on the server node board. 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 3-51
2. Enabling TPM Support in the BIOS, page 3-53
3. Enabling the Intel TXT Feature in the BIOS, page 3-53

Installing the TPM Hardware

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

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

a. Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).

b. Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.

c. Pull the server node straight out from the system.

Note You do not have to remove the server node cover to access the TPM socket.

Step 3 Install a TPM:

a. Locate the TPM socket on the server node board, as shown in Figure 3-26.

b. Align the connector that is on the bottom of the TPM circuit board with the TPM socket. Align the screw hole 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.

Step 4 Install a server node:

a. With the two ejector levers open, align the new server node with the empty bay.

Note The server node must be in the top bay, as shown in Figure 1-2 on page 1-2.

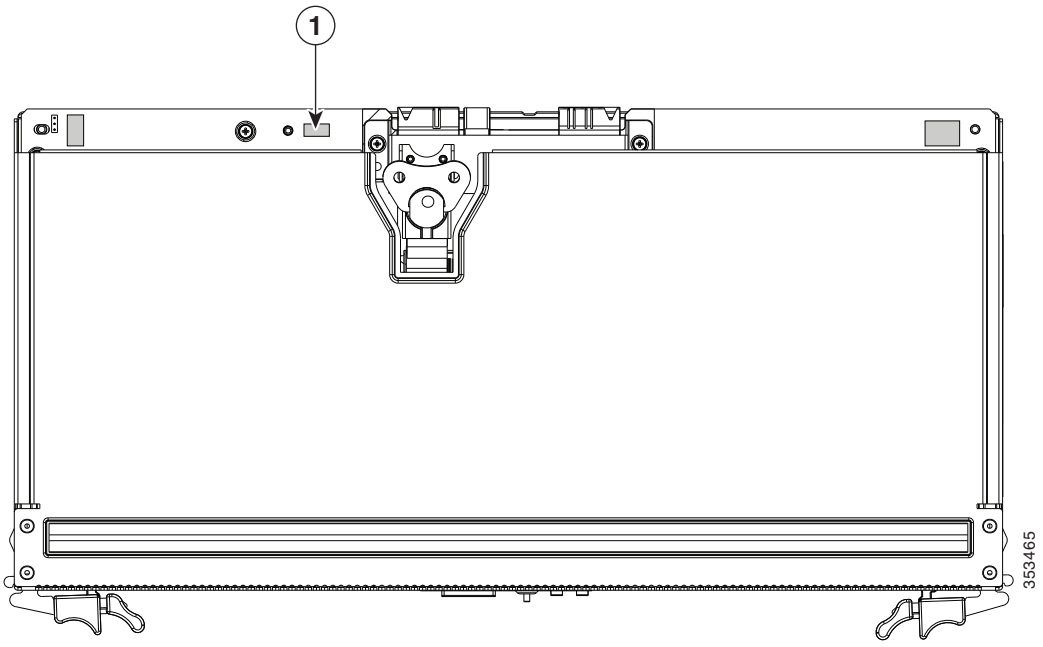
b. Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.

c. Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 5 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 6 Continue with Enabling TPM Support in the BIOS, page 3-53.

Figure 3-26 TPM Socket Location on the Server Node Board



1	TPM socket and screw hole on motherboard		

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 3-53.

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 an Adapter Card Inside the SIOC

The adapter card inside the system I/O controller (SIOC) provides rear-panel connectivity to the system.

You can have two different types of adapter card in the same system.

Step 1 Shut down and remove power from the entire system, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 2 Remove the SIOC from the system:

- **a.** Loosen the single captive thumbscrew on the SIOC and then open its two hinged ejector levers to evenly disengage the SIOC from its midplane connector.
- **b.** Pull the SIOC from the system.

Step 3 Remove the SIOC cover as described in Removing the System I/O Controller Cover, page 3-15.

Step 4 Remove an existing adapter card:

- **a.** Loosen the single captive thumbscrew that secures the adapter card to the SIOC.
- **b.** Slide the adapter card horizontally to disengage it from its socket on the SIOC board.
- **c.** Lift the adapter card up and out of the SIOC.

Step 5 Install a new adapter card:

- **a.** Set the new adapter card on the floor of the SIOC so that its connector edge is aligned with the socket and the thumbscrew is facing up.
- **b.** Slide the adapter card horizontally to fully engage its connector edge with the socket.
- **c.** Tighten the captive thumbscrew on the adapter card to secure it to the SIOC.

Step 6 Replace the cover to the SIOC.

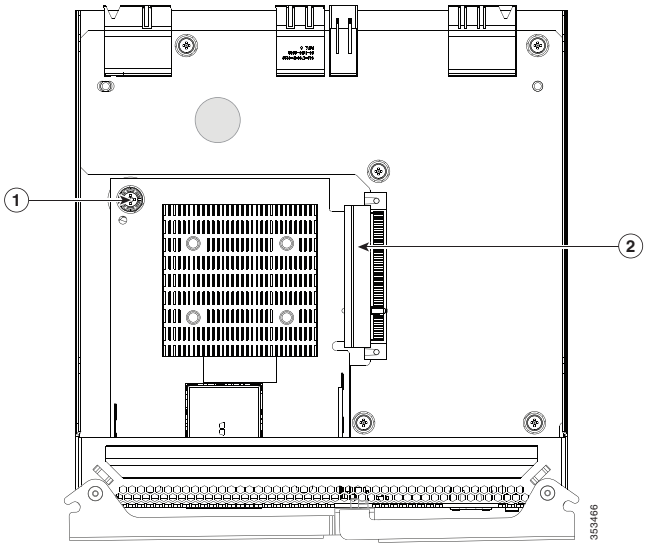
Step 7 Replace the SIOC to the system:

Note If you have only one SIOC, it must be in SIOC bay 1 (see Figure 1-2 on page 1-2).

- **a.** Push the SIOC into its bay until it stops against the internal midplane.
- **b.** Close the two levers on the SIOC to fully engage the SIOC connector with its backplane.
- **c.** Tighten the thumbscrew on the SIOC levers.

Step 8 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Figure 3-27 Replacing an Adapter Card Inside the SIOC



1	Thumbscrew on adapter card	**2**	Horizontal socket on SIOC board

Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-6 describes the considerations for the supported Cisco UCS virtual interface cards (VICs) that install to the SIOC adapter card socket.

Table 3-6 Cisco UCS C3160 Requirements for Supported VICs

Virtual Interface Card (VIC)	Number of This VIC Supported in System	Slots That Support VICs	Primary Slot for Cisco UCS Manager Integration	Primary Slot for Cisco Card NIC Mode	Minimum Cisco IMC Firmware	Minimum VIC Firmware
Cisco UCS VIC 1227 UCSC-MLOM-CSC-02	2 mLOM	Each SIOC includes one mLOM-style VIC	Not supported at this time	SIOC 1	2.0(2)	4.0(0)
Cisco UCS VIC 1227T UCSC-MLOM-C10T-02	2 mLOM		Not supported at this time	SIOC 1	2.0(4)	4.0(4b)
Cisco UCS VIC 1387 UCSC-MLOM-C40Q-03	2 mLOM		Not supported at this time	SIOC 1	2.0(9)	4.1(1d)

Note The Cisco UCS VIC 1227 (UCSC-MLOM-CSC-02) is not compatible to use in *Cisco Card* NIC mode with a certain Cisco SFP+ module. Do not use a Cisco SFP+ module part number 37-0961-01 that has a serial number in the range MOC1238*xxxx* to MOC1309*xxxx*. If you use the Cisco UCS VIC 1227 in Cisco Card NIC mode, use a different part number Cisco SFP+ module, or you can use this part number 37-0961-01 if the serial number is *not* included in the range above. See the data sheet for this adapter for other supported SFP+ modules: Cisco UCS VIC 1227 Data Sheet

Replacing an RTC Battery Inside the SIOC

The real-time clock (RTC) battery retains settings when the SIOC is disconnected from power. The battery type in the SIOC is CR1632. Cisco supports the industry-standard CR1632 battery, which can be purchased from most electronic stores.

Note When the RTC battery is removed or it completely loses power, settings that were stored in the CMC of the SIOC are lost. You must reconfigure the CMC settings after installing a new battery.

Step 1 Shut down and remove power from the entire system, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 2 Remove the SIOC from the system:

a. Loosen the single captive thumbscrew on the SIOC and then open its two hinged ejector levers to evenly disengage the SIOC from its midplane connector.

b. Pull the SIOC from the system.

Step 3 Remove the SIOC cover as described in Removing the System I/O Controller Cover, page 3-15.

Step 4 Gently pry under the battery to lift it from its socket on the SIOC board.

Step 5 Insert the new battery into the socket and then press down until it sits flat.

Step 6 Replace the cover to the SIOC.

Step 7 Replace the SIOC to the system:

Note If you have only one SIOC, it must be in SIOC bay 1 (see Figure 1-2 on page 1-2).

a. Push the SIOC into its bay until it stops against the internal midplane.

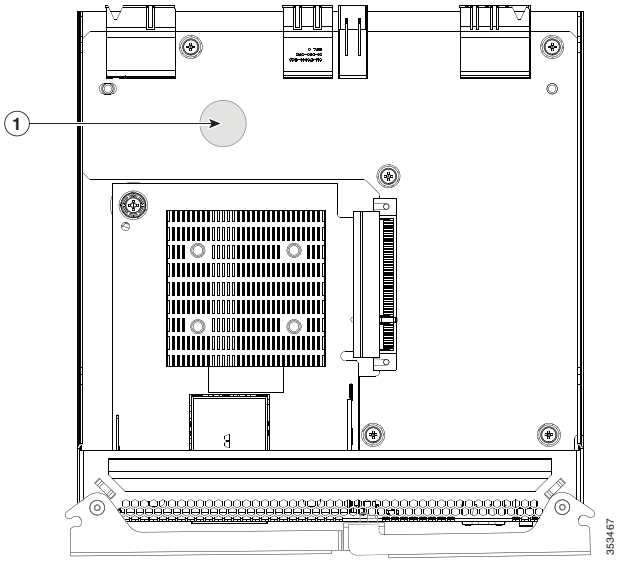
b. Close the two levers on the SIOC to fully engage the SIOC connector with its backplane.

c. Tighten the thumbscrew on the SIOC levers.

Step 8 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 9 Reconfigure the settings in the CMC for this SIOC.

Figure 3-28 Replacing an RTC Battery Inside the SIOC



1	Battery socket on SIOC board		

Service Headers on the Server Node Board

The server node board includes headers that you can jumper for certain service functions.

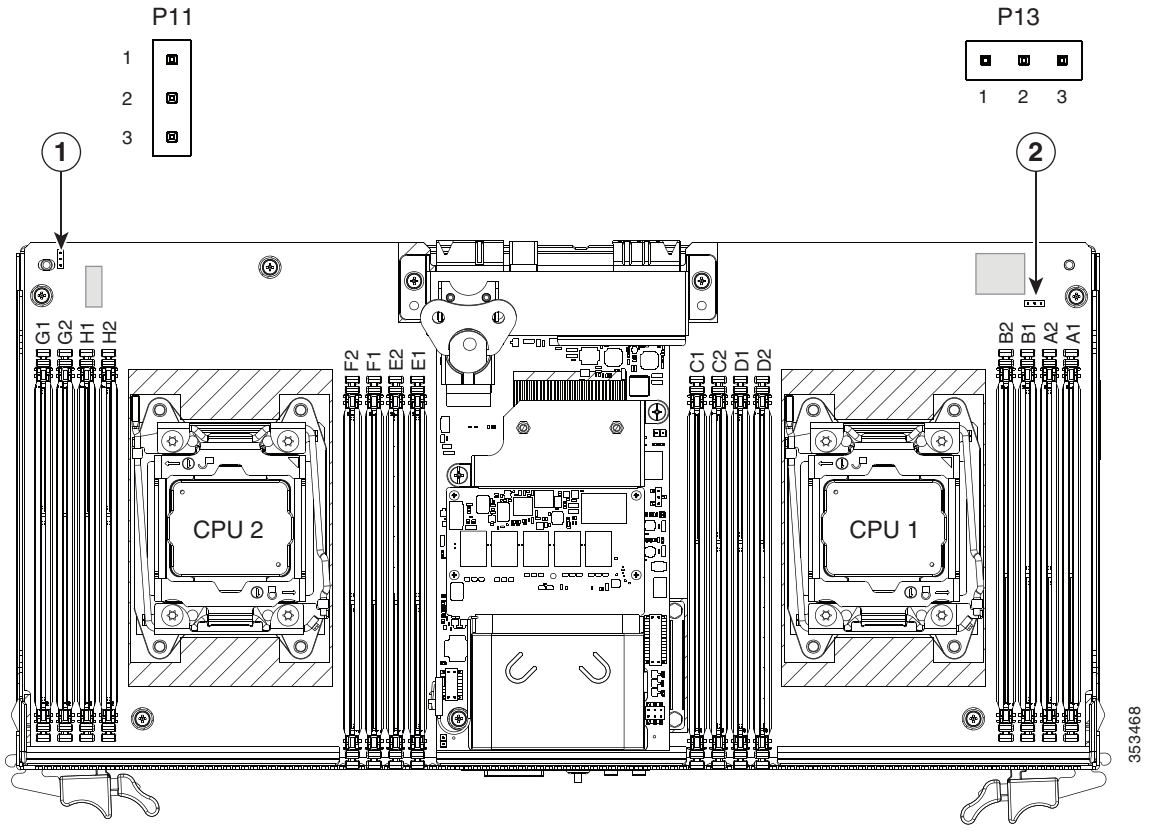
This section includes the following topics:

Service Header Locations on the Server Node Board

There are two supported, three-pin service headers on the server node board. See Figure 3-29 for the locations.

- Header P11 = Password clear
- Header P13 = CMOS clear

Figure 3-29 Service Headers on the Server Node Board



1	Header P11 = Password clear	**2**	Header P13 = CMOS clear

Using the Clear Password Header P11

You can use a jumper on header P11 to clear the administrator password.

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Remove a server node from the system:

- **a.** Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).
- **b.** Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.
- **c.** Pull the server node straight out from the system.

Note You do not have to remove the server node cover to access the header.

Step 3 Remove the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 4 Locate header P11 (see Figure 3-29).

Step 5 Install a jumper to pins 2 and 3 of the header.

Step 6 Install the server node:

- **a.** With the two ejector levers open, align the new server node with the empty bay.
- **b.** Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.
- **c.** Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 7 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Step 8 After the system has fully booted, shut it down again, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 9 Remove the server node from the system, and then remove the server node cover.

Step 10 Remove the jumper from pins 2 and 3.

Note If you do not remove the jumper, the Cisco IMC clears the password each time that you boot the server node.

Step 11 Install the server node cover, and then install server node back to the system.

Step 12 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.

Using the Clear CMOS Header P13

You can install a jumper to header P13 to clear the CMOS settings.

Note You do not have to power off the chassis in this procedure. Replacement with chassis powered on is supported if you shut down the server node before removal.

Step 1 Shut down the server node by using the software interface or by pressing the node power button, as described in Shutting Down an Individual Server Node, page 3-10.

Step 2 Physically remove a server node chassis from the system:

- **a.** Grasp the two ejector levers and pinch their latches to release the levers (see Figure 3-15).
- **b.** Rotate both levers to the outside at the same time to evenly disengage the server node from its midplane connectors.
- **c.** Pull the server node chassis straight out from the system.

Step 3 Remove the server node cover as described in Removing the Server Node Cover, page 3-13.

Step 4 Locate header P13 (see Figure 3-29).

Step 5 Install a jumper to pins 2 and 3 of the header.

Step 6 Install the server node chassis to the system:

- **a.** With the two ejector levers open, align the new server node with the empty bay.
- **b.** Push the server node into the bay until it engages with the midplane connectors and is flush with the chassis.
- **c.** Rotate both ejector levers toward the center until they lay flat and their latches lock into the rear of the server node.

Step 7 After the system has fully booted, shut it down again, as described in Shutting Down and Powering Off the System Chassis, page 3-9.

Step 8 Remove the server node from the system, and then remove the server node cover.

Step 9 Remove the jumper from pins 2 and 3.

Note If you do not remove the jumper, the Cisco IMC clears the CMOS settings each time that you boot the server node.

Step 10 Install the server node cover, and then install server node back to the system.

Step 11 Replace power cords and then power on the system by pressing and holding the power button on the front handle for four seconds.