Hewlett Packard Enterprise

HPE ProLiant DL360 Gen9 Server
User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. Hewlett Packard Enterprise assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Contents

Component identification

Front panel components

- 8SFF
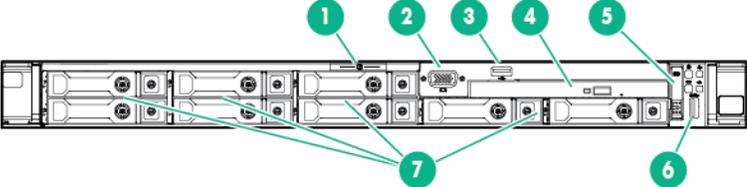
Item	Description
1	Serial label pull tab
2	Front video connector (optional)
3	USB 2.0 connector (optional)
4	Optical drive (optional)
5	Systems Insight Display (optional)
6	USB 3.0 connector
7	SAS/SATA/SSD drive bays

- 4LFF
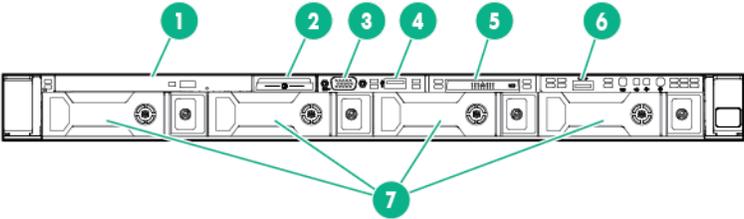
Item	Description
1	Optical drive (optional)
2	Serial label pull tab
3	Front video connector (optional)
4	USB 2.0 connector (optional)
5	Systems Insight Display (optional)
6	USB 3.0 connector
7	SAS/SATA/SSD drive bays

Front panel LEDs and buttons

- 8SFF

Item	Description	Status
1	Power On/Standby button and system power LED*	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present**
2	Health LED*	Solid green = Normal Flashing green (1 Hz/cycle per sec) = iLO is rebooting. Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical†
3	NIC status LED*	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
4	UID button/LED*	Solid blue = Activated Flashing blue: - 1 Hz/cycle per sec = Remote management or firmware upgrade in progress - 4 Hz/cycle per sec = iLO manual reboot sequence initiated - 8 Hz/cycle per sec = iLO manual reboot sequence in progress Off = Deactivated

*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "Power fault LEDs (on page 9)."

**Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

†If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

- 4LFF

Item	Description	Status
1	UID button/LED*	Solid blue = Activated Flashing blue: - 1 Hz/cycle per sec = Remote management or firmware upgrade in progress - 4 Hz/cycle per sec = iLO manual reboot sequence initiated - 8 Hz/cycle per sec = iLO manual reboot sequence in progress Off = Deactivated
2	NIC status LED*	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
3	Health LED*	Solid green = Normal Flashing green (1 Hz/cycle per sec) = iLO is rebooting. Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical†
4	Power On/Standby button and system power LED*	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present**

*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "Power fault LEDs (on page 9)."
**Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.
†To identify components in a degraded or critical state, see the Systems Insight Display LEDs, check iLO/BIOS logs, and reference the server troubleshooting guide.

UID button functionality

The UID button can be used to display the HPE ProLiant Pre-boot Health Summary when the server will not power on. For more information, see the *HPE iLO 4 User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/ilo/docs**).

Power fault LEDs

The following table provides a list of power fault LEDs, and the subsystems that are affected. Not all power faults are used by all servers.

Subsystem	LED behavior
System board	1 flash
Processor	2 flashes
Memory	3 flashes
Riser board PCIe slots	4 flashes
FlexibleLOM	5 flashes
Removable HPE Flexible Smart Array controller/Smart SAS HBA controller	6 flashes
System board PCIe slots	7 flashes
Power backplane or storage backplane	8 flashes
Power supply	9 flashes

Systems Insight Display LEDs

The Systems Insight Display LEDs represent the system board layout. The display provides status for all internal LEDs and enables diagnosis with the access panel installed. To view the LEDs, access the Systems Insight Display.
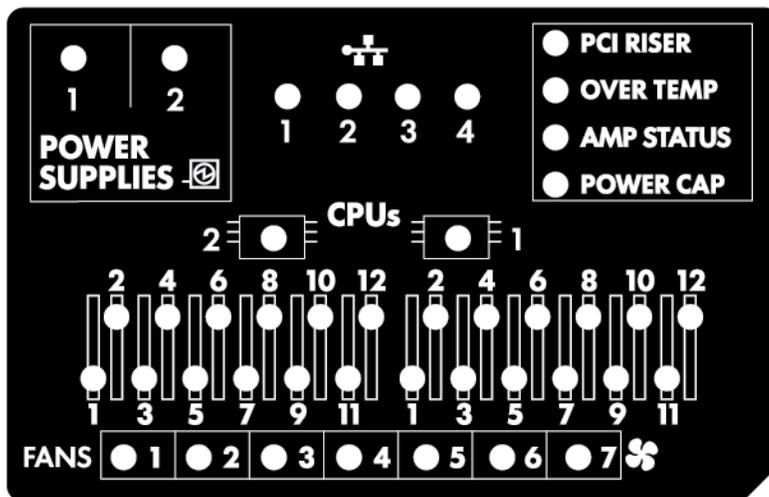
Description	Status
Processor LEDs	Off = Normal Amber = Failed processor
DIMM LEDs	Off = Normal Amber = Failed DIMM or configuration issue
Fan LEDs	Off = Normal Amber = Failed fan or missing fan

Description	Status
NIC LEDs	Off = No link to network Solid green = Network link Flashing green = Network link with activity If power is off, the front panel LED is not active. For status, see "Rear panel LEDS and buttons (on page 12)."
Power supply LEDs	Off = Normal Solid amber = Power subsystem degraded, power supply failure, or input power lost.
PCI riser LED	Off = Normal Amber = Incorrectly installed PCI riser cage
Over temp LED	Off = Normal Amber = High system temperature detected
Amp Status LED	Off = AMP modes disabled Solid green = AMP mode enabled Solid amber = Failover Flashing amber = Invalid configuration
Power cap LED	Off = System is in standby, or no cap is set. Solid green = Power cap applied

For more information, see "Systems Insight Display LED combinations (on page 10)."

Systems Insight Display LED combinations

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. Combinations of illuminated Systems Insight Display LEDs, the system power LED, and the health LED indicate system status.

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: ● Processor in socket X has failed. ● Processor X is not installed in the socket. ● Processor X is unsupported. ● ROM detects a failed processor during POST.
Processor (amber)	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot X is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: ● Only one power supply is installed and

Systems Insight Display LED and color	Health LED	System power LED	Status
			that power supply is in standby.
			● Power supply fault
			● System board fault
Power supply (amber)	Amber	Green	One or more of the following conditions may exist:
			● Redundant power supply is installed and only one power supply is functional.
			● AC power cord is not plugged into redundant power supply.
			● Redundant power supply fault
			● Power supply mismatch at POST or power supply mismatch through hot-plug addition
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.

📝 **IMPORTANT:** If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

Rear panel components
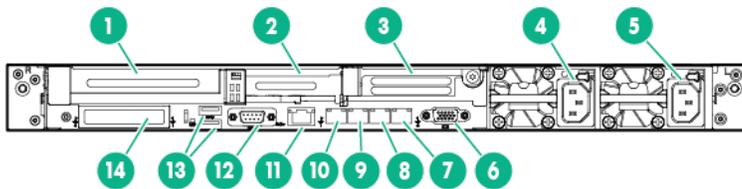
Item	Description
1	Slot 1 PCIe3 x16 (16, 8, 4, 1)
2	Slot 2 PCIe 3 x8 (8, 4, 1)
3	Slot 3 PCIe 3 x16 (16, 8, 4, 1)*
4	Power supply 2
5	Power supply 1
6	Video connector
7	NIC connector 4
8	NIC connector 3
9	NIC connector 2
10	NIC connector 1

Item	Description
11	iLO 4 connector
12	Serial connector (optional)
13	USB 3.0 connectors
14	FlexibleLOM bay

*The slot 3 PCIe 3 riser is optional and requires a second processor before installation.

Slot description example

Slot 2 PCIe3 x16 (16,8,4,2,1)
— Negotiable link width(s)
— Physical connector link width
— Gen3 signaling rate
— Slot number
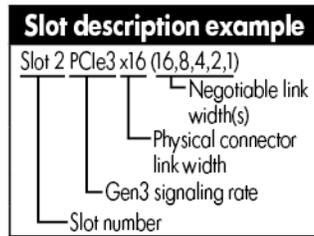
Rear panel LEDs and buttons
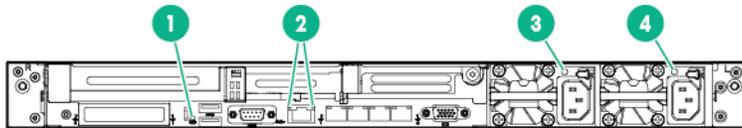
Item	Description	Status
1	UID LED	Solid blue = Identification is activated. Flashing blue = System is being managed remotely. Off = Identification is deactivated.
2L	iLO 4/standard NIC activity LED	Solid green = Activity exists. Flashing green = Activity exists. Off = No activity exists.
2R	iLO 4/standard NIC link LED	Solid green = Link exists. Off = No link exists.
3	Power supply 2 LED	Solid green = Normal Off = One or more of the following conditions exists: ● AC power unavailable ● Power supply failed ● Power supply in standby mode ● Power supply exceeded current limit
4	Power supply 1 LED	Solid green = Normal Off = One or more of the following conditions exists: ● AC power unavailable

Item	Description	Status
		● Power supply failed
		● Power supply in standby mode
		● Power supply exceeded current limit

System board components
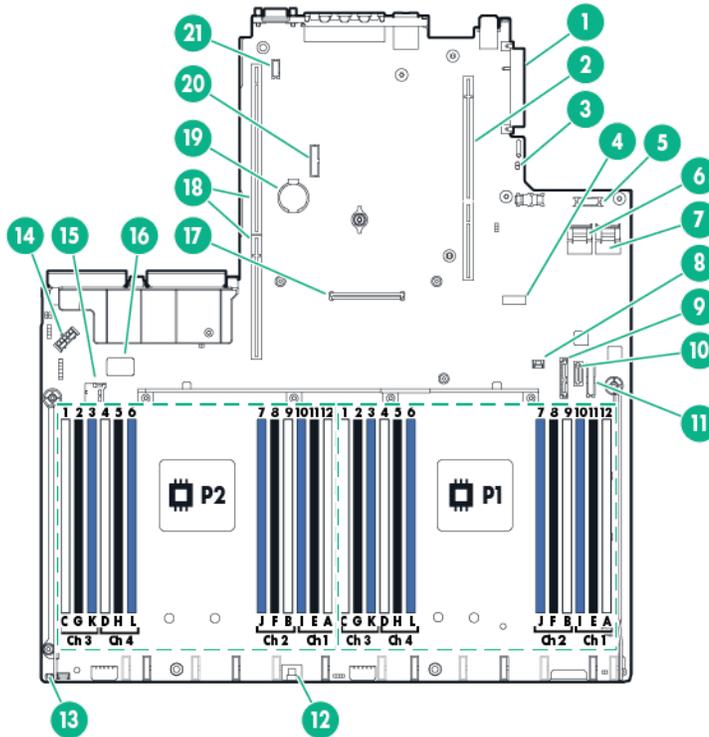
Item	Description
1	FlexibleLOM connector
2	Primary (processor 1) PCI riser connector
3	NMI jumper
4	System maintenance switch
5	Front VGA/USB 2.0 connector
6	x4 SATA port 1
7	x4 SATA port 2
8	Backplane presence detect connector
9	Optical/SATA port 5
10	SATA port 4
11	Front power/USB 3.0 connector
12	HPE Smart Storage Battery connector
13	Optional Location Discovery Services connector
14	Drive backplane power connector
15	microSD card slot
16	Dual internal USB 3.0 connector
17	Smart Array/HBA connector
18	Secondary (processor 2) PCI riser connector

Item	Description
19	System battery
20	TPM connector
21	Optional serial port connector

System maintenance switch

Position	Default	Function
S1*	Off	Off = iLO 4 security is enabled. On = iLO 4 security is disabled.
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5*	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6* **	Off	Off = No function On = Restore default manufacturing settings
S7	Off	Off = Set default boot mode to UEFI. On = Set default boot mode to legacy.
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

*You can access the redundant ROM by setting S1, S5, and S6 to On.

**When the system maintenance switch position 6 is set to the On position, the system is prepared to restore all configuration settings to their manufacturing defaults.

When the system maintenance switch position 6 is set to the On position and Secure Boot is enabled, some configurations cannot be restored. For more information, see Secure Boot configuration (on page).

> **IMPORTANT:** Before using the S7 switch to change to Legacy BIOS Boot Mode, be sure the HPE Dynamic Smart Array B140i Controller is disabled. Do not use the B140i controller when the server is in Legacy BIOS Boot Mode.

NMI jumper

The NMI jumper allows administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability problems, such as hangs or crashes in OSs, device drivers, and applications. Many crashes can freeze a system, requiring you to do a hard reset. Resetting the system erases any information that would support root cause analysis.

Systems running Microsoft® Windows® experience a blue-screen trap when the OS crashes. When this happens, Microsoft® recommends that system administrators perform an NMI event by temporarily shorting the NMI header with a jumper. The NMI event enables a hung system to become responsive again.

DIMM slots

DIMM slots are numbered sequentially (1 through 12) for each processor. The supported AMP modes use the letter assignments for population guidelines.
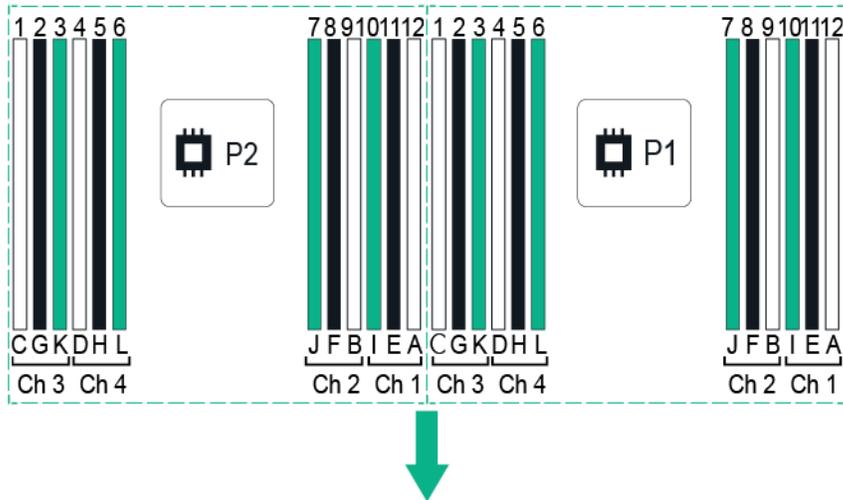
NVDIMM LEDs

When the server boots up, all LEDs flash three times. Any LED activity not described in this section indicates a possible error.
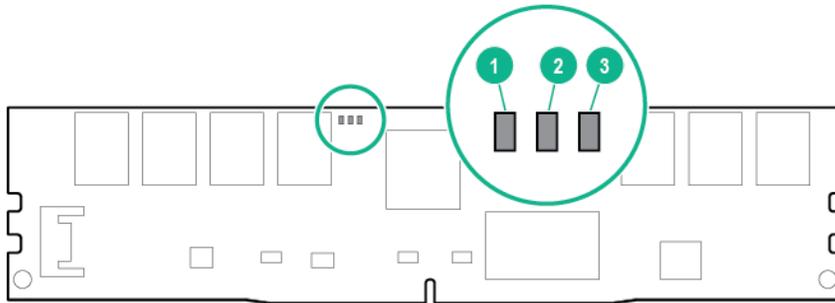
Item	LED definitions
1	• Fast-flashing blue = A backup is in progress. Do not remove the NVDIMM. • Slow-flashing blue (1 flash/15 seconds) = Normal operation.
2	Reserved
3	• Solid or flashing green = Power is available to the NVDIMM. Do not remove the NVDIMM. • Off = Power is not available to the NVDIMM.

PCIe riser board slot definitions

Primary riser cage connector, connected to processor 1

PCIe 3-slot riser cage	PCIe 2-slot x16 riser cage*

	PCIe 3-slot riser cage	PCIe 2-slot x16 riser cage*
1 - 3/4L/FH	PCIe3 x16 (16, 8,4,2,1)	PCIe3 x16 (16,8,4,2,1)
2 - LP	PCIe3 x8 (8,4,2,1)	PCIe3* x8 (8,4,2,1)
3 - LP/3/4L/FH	PCIe3 x16 (16, 8,4,2,1)**	—

*The server ships with one PCIe3 riser cage installed in the primary riser cage connector.

**The x16 PCIe3 riser cage is optional and can be converted to a FH riser. This conversion requires a second processor to be installed.

Notes:

- "Primary" denotes the riser cage is installed in the primary riser connector.

- "Secondary" denotes the riser cage is installed in the secondary riser connector.

- Installing the riser cages listed in the table above in either the primary or secondary riser connectors determines the form factor of the PCI cards supported by those riser cages.

- FL/FH denotes full-length, full-height. HL/FH denotes half-length, full-height. LP denotes low profile.

Slot description example
Slot 2 PCIe3 x16 (16,8,4,2,1)
— Negotiable link width(s)
— Physical connector link width
— Gen3 signaling rate
— Slot number
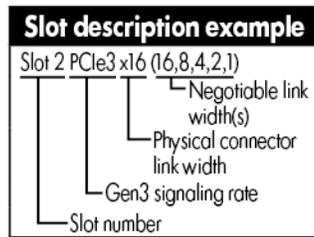
Device numbers

- 4LFF configuration
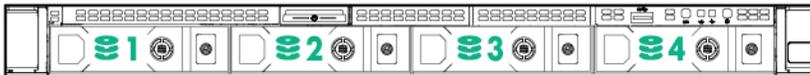
- 8SFF configuration

- 10SFF configurations

With the 10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Option, the server supports SAS, SATA, and PCIe-based NVMe drives in the following locations:

o   Bays 1 through 4 support SFF SAS and SATA drives only

o   Bays 5 through 10 support SFF PCIe-based NVMe drives only

Hot-plug SATA/SAS drive LED definitions
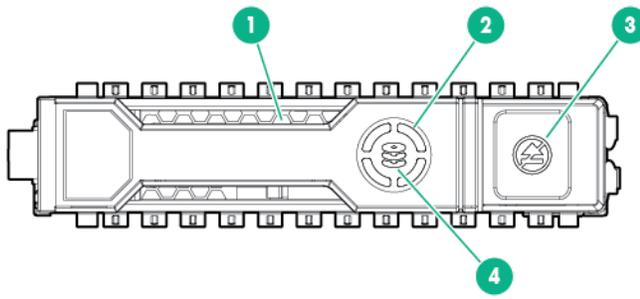
Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove*	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

NVMe SSD components

The NVMe SSD is a PCIe bus device. A device attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

> ⚠ **CAUTION:** Do not remove an NVMe SSD from the drive bay while the Do Not Remove button LED is flashing. The Do Not Remove button LED flashes to indicate the device is still in use. Removal of the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.
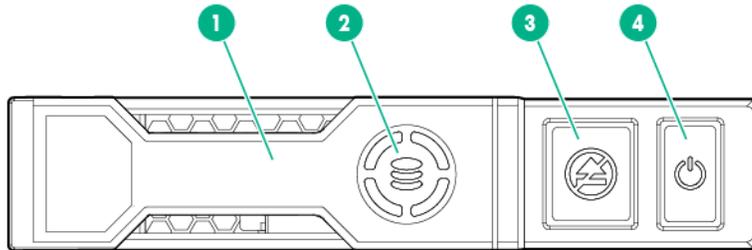
Item	Description
1	Release lever
2	Activity ring
3	Do Not Remove button
4	Power button

Hot-plug fans

> ⚠ **CAUTION:** To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.

The only two valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6	Fan bay 7
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan	Fan
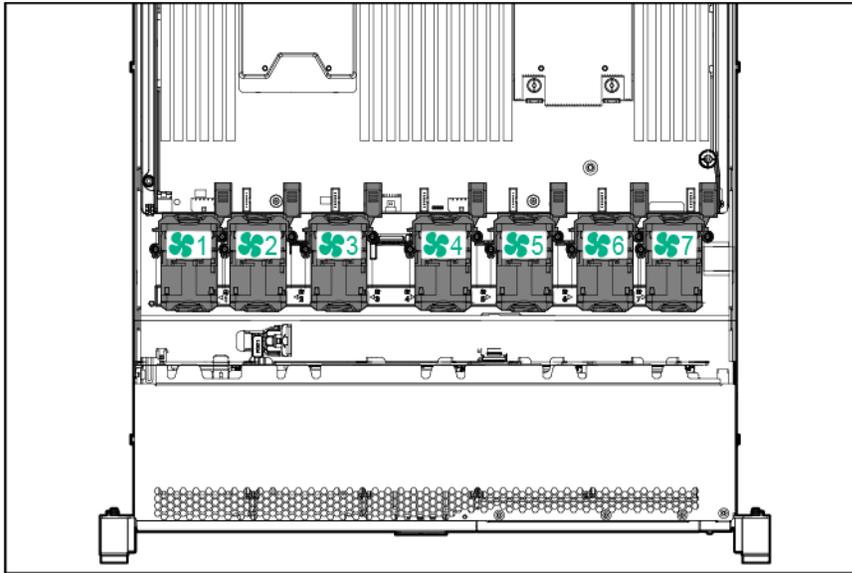
For a single-processor configuration, five fans and two blanks are required in specific fan bays for redundancy.

For a dual-processor configuration, seven fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

The high performance fan option might be necessary for the following installations:

- LR DIMM configuration

- ASHRAE compliant configurations

  For more information, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/ASHRAE**).

The server supports variable fan speeds. The fans operate at minimum speed until a temperature change requires a fan speed increase to cool the server. The server shuts down during the following temperature-related scenarios:

- At POST and in the OS, iLO 4 performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.

- When the Thermal Shutdown feature is disabled in RBSU, iLO 4 does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

  △ **CAUTION:**   A thermal event can damage server components when the Thermal Shutdown feature is disabled in RBSU.

Operations

Powering up the server

To power up the server, press the Power On/Standby button.

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

> **IMPORTANT:** When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.

- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.

- Use a virtual power button selection through iLO 4.

  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify that the server is in standby mode by observing that the system power LED is amber.

Extend the server from the rack

> **NOTE:** If the optional cable management arm option is installed, you can extend the server without powering down the server or disconnecting peripheral cables and power cords. These steps are only necessary with the standard cable management solution.

1. Power down the server (on page 20).
2. Disconnect all peripheral cables and power cords.
3. Loosen the front panel thumbscrews.
4. Extend the server on the rack rails until the server rail-release latches engage.

> **WARNING:** To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

> **WARNING:** To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

5. After performing the installation or maintenance procedure, slide the server into the rack:

      a. Slide the server fully into the rack.

      b. Secure the server by tightening the thumbscrews.

6. Connect the peripheral cables and power cords.

Remove the server from the rack

To remove the server from a Hewlett Packard Enterprise, Compaq-branded, Telco, or third-party rack:

1. Power down the server (on page 20).

2. Extend the server from the rack (on page 20).

3. Disconnect the cabling and remove the server from the rack. For more information, see the documentation that ships with the rack mounting option.

4. Place the server on a sturdy, level surface.

Remove the access panel

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

To remove the component:

1. Power down the server (on page 20).

2. Extend the server from the rack (on page 20).

3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

Install the access panel

1. Place the access panel on top of the server with the hood latch open. Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).

2. Push down on the hood latch. The access panel slides to a closed position.

3. Tighten the security screw on the hood latch.

Remove the hot-plug fan

To remove the component:

1. Do one of the following:

    o Extend the server from the rack (on page 20).

    o Remove the server from the rack (on page 21).

2. Remove the access panel (on page 21).

3. Remove the fan.
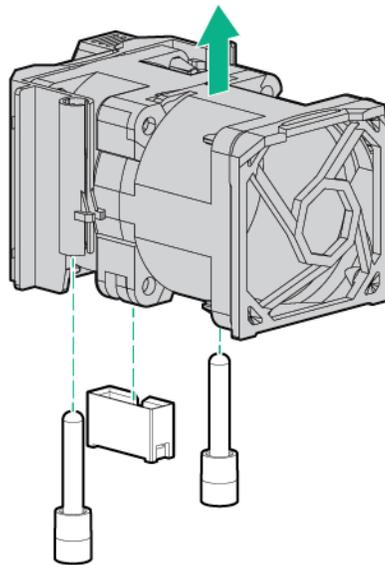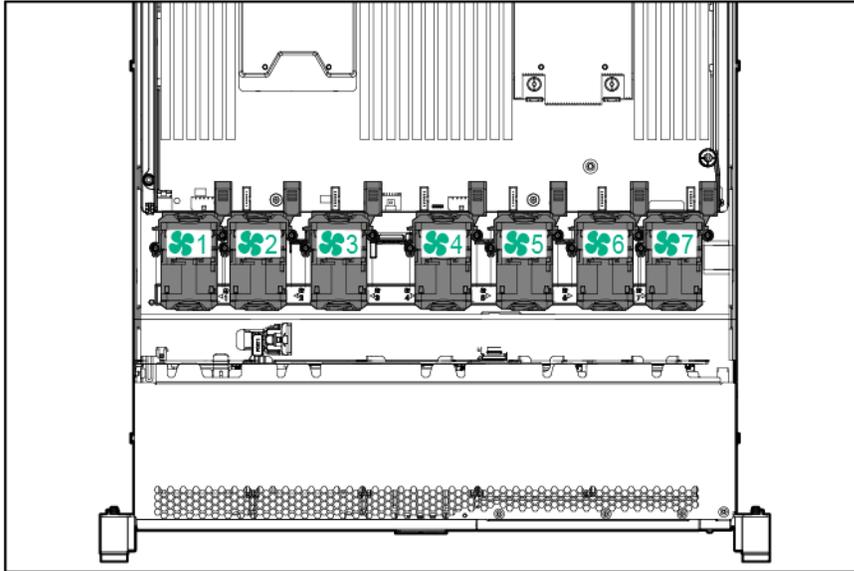
⚠ **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

📝 **IMPORTANT:** For optimum cooling, install fans in all primary fan locations. For more information, refer to the fan locations table.

To replace the component, reverse the removal procedure.

Remove the PCI riser cage

1. Back up all server data.

2. Power down the server (on page).

3. Do one of the following:

o Extend the server from the rack (on page).

o   Remove the server from the rack (on page 21).
4.   Remove the access panel (on page 21).
5.   Remove the PCI riser cage.
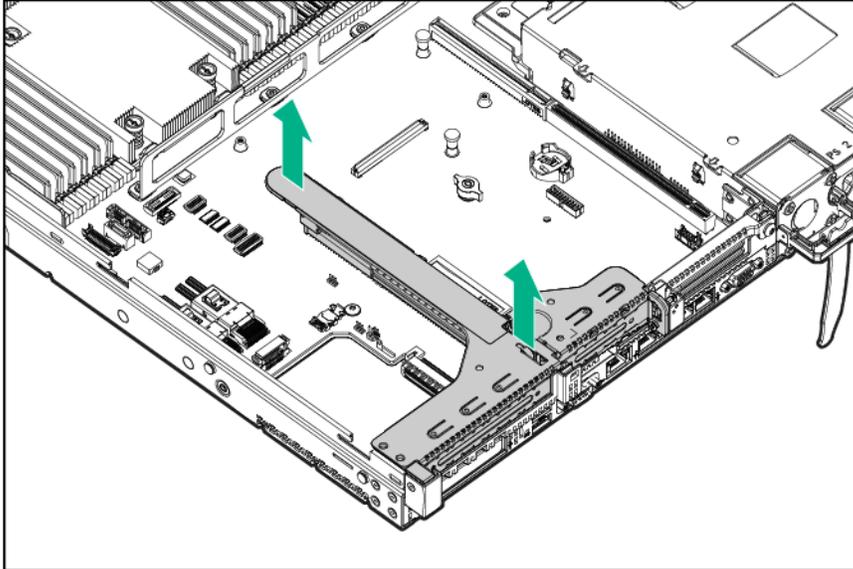
Install the PCI riser cage

1.   Install the PCI riser cage.
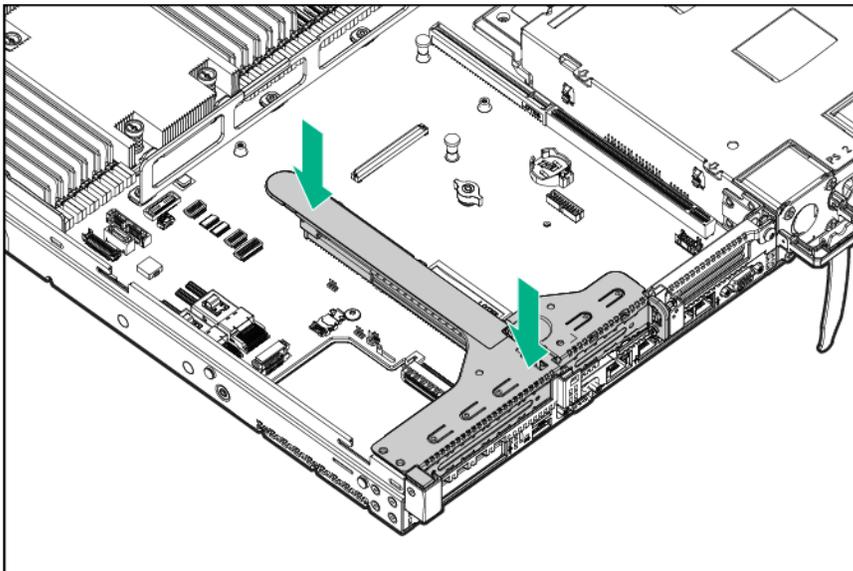
2.   Install the access panel (on page 21).
3.   Install the server into the rack.
4.   Connect each power cord to the server.
5.   Connect each power cord to the power source.
6.   Power up the server ("Powering up the server" on page 20).

Removing the 8 SFF drive backplane

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove all drives ("Removing a hot-plug SAS or SATA drive" on page 54).
6. Remove all drive blanks ("Removing the hard drive blank" on page 53).
7. Disconnect and remove all cables connected to the drive backplane.
8. Remove the 8SFF SAS/SATA drive backplane.
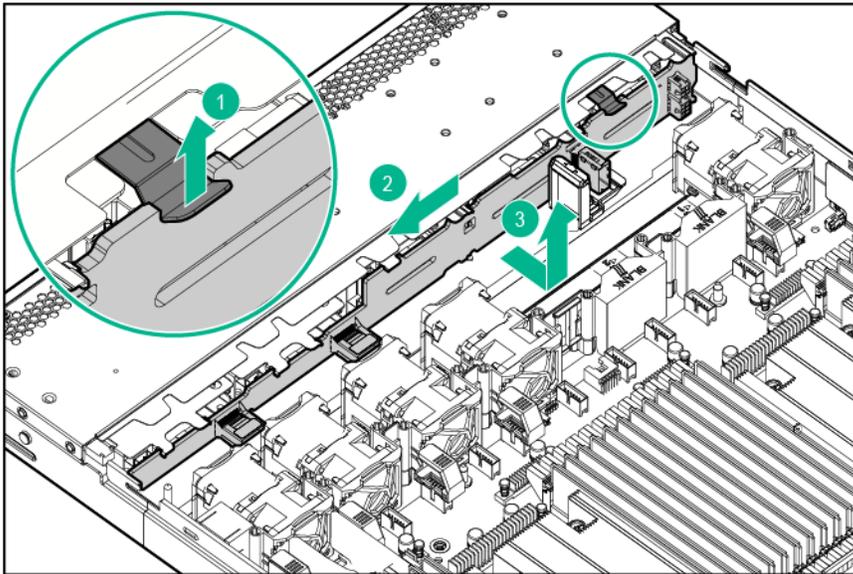
Setup

Optional services

Delivered by experienced, certified engineers, HPE support services help you keep your servers up and running with support packages tailored specifically for HPE ProLiant systems. HPE support services let you integrate both hardware and software support into a single package. A number of service level options are available to meet your business and IT needs.

HPE support services offer upgraded service levels to expand the standard product warranty with easy-to-buy, easy-to-use support packages that will help you make the most of your server investments. Some of the HPE support services for hardware, software or both are:

- Foundation Care – Keep systems running.
    o 6-Hour Call-to-Repair
    o 4-Hour 24x7
    o Next Business Day
- Proactive Care – Help prevent service incidents and get you to technical experts when there is one.
    o 6-Hour Call-to-Repair
    o 4-Hour 24x7
    o Next Business Day
- Startup and implementation services for both hardware and software
- HPE Education Services – Help train your IT staff.

For more information on HPE support services, see the Hewlett Packard Enterprise website (**http://www.hpe.com/services**).

Set up the server

Before setting up the server, be sure to read the following:

- Operational requirements
- Safety and compliance information on the HPE website:
    http://www.hpe.com/support/safety-compliance-enterpriseproducts

1. Unbox the server and verify the contents:
    o A server
    o A power cord
    o Rack-mounting hardware
    o Documentation
2. (Optional) Install hardware options.
    For installation instructions, see "Hardware options installation."
3. Install the server in a rack.
    The rack rail documentation is included with the rack rails.
    a. Connect devices.
    b. Connect network cables.

c. Connect power cords.

4. Decide how to manage the server:
   o To manage the server locally, use a KVM switch or a mouse, keyboard, and monitor.
   o To manage the server remotely, use a remote browser to connect through the iLO web interface:
   a. Verify that a network cable is connected to the iLO management port.
   b. Locate the iLO hostname or IP address:
   — If a DHCP server assigns the IP address:
   Locate the hostname on the serial label pull tab.
   Locate the iLO IP address displayed on the boot screen. You can also try pinging the hostname from a remote workstation.
   — If a static IP address is assigned, use that IP address to connect to the server iLO.
   c. Using the iLO hostname or IP address, connect to the iLO web interface, and then log in to the iLO web interface.
   ```
   <https://hostname or IP address>
   ```
   The default credentials are on the serial label pull tab.
   d. In the side navigation, click the Remote Console & Media link, and then launch a remote console.
   Remote management is started.

5. Press the Power On/Standby button.

   The iLO virtual power button can also power up the server through the iLO web interface or remote console.

6. (Optional) Create logical drives or set up RAID.
   o If a Smart Array controller is installed, press F10 at the boot screen to launch Intelligent Provisioning and then access HPE Smart Storage Administrator.
   o If no controller is installed, enable the embedded Smart Array controller in the UEFI System Utilities, and then use HPE Smart Storage Administrator.

   If you experience issues, try updating the firmware.

7. Deploy an OS or virtualization software.

   If an OS or virtualization software is already installed, Hewlett Packard Enterprise recommends updating the drivers.

   To deploy an OS to a single server:
   a. Verify that the OS is supported:

   http://www.hpe.com/info/ossupport
   b. Insert the installation media.

   On remote deployments, mount the image to a virtual drive using the iLO remote console. From the iLO Integrated Remote Console window, click Virtual Drives and then select how to mount the media.
   c. Deploy the OS.
   — To perform an automated OS installation using Intelligent Provisioning, press F10 at the boot screen.
   — To boot the server from the installation media, press F11 at the boot screen, and then select the boot device.
   d. After the OS is installed, update the drivers.

   For advanced OS deployment options, see "OS deployment options."

8. Register the server (**http://www.hpe.com/info/register**).

Operational requirements

When installing the server in a rack, select a location that meets the environmental standards described in this section.

Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 85.09 cm (33.5 in) in front of the rack.

- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.

- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

Hewlett Packard Enterprise servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

> ⚠ **CAUTION:** To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

> ⚠ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

> ⚠ **CAUTION:** When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

> ⚠ **CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:
> - Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
> - Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

For information on ambient operating temperature support above 35°C, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/ASHRAE**).

⚠ **CAUTION:** To reduce the risk of damage to the equipment when installing third-party options:
- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

⚠ **WARNING:** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

⚠ **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you might need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.

- Do not allow the overall system AC current load to exceed 80% of the branch circuit AC current rating.

- Do not use common power outlet strips for this equipment.

- Provide a separate electrical circuit for the server.

For more information on the hot-plug power supply and calculators to determine server power consumption in various system configurations, see the Hewlett Packard Enterprise Power Advisor website (**http://www.hpe.com/info/poweradvisor/online**).

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, Hewlett Packard Enterprise recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Connecting a DC power cable to a DC power source

⚠ **WARNING:** To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded Secondary circuit source. A Secondary circuit has no direct connection to a Primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
- The branch circuit overcurrent protection must be rated 27 A.

⚠ **WARNING:** When installing a DC power supply, the ground wire must be connected before the positive or negative leads.

⚠ **WARNING:** Remove power from the power supply before performing any installation steps or maintenance on the power supply.

⚠ **CAUTION:** The server equipment connects the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. For more information, see the documentation that ships with the power supply.

⚠ **CAUTION:** If the DC connection exists between the earthed conductor of the DC supply circuit and the earthing conductor at the server equipment, the following conditions must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment should be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices should not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

To connect a DC power cable to a DC power source:

1. Cut the DC power cord ends no shorter than 150 cm (59.06 in).
2. If the power source requires ring tongues, use a crimping tool to install the ring tongues on the power cord wires.

   📝 **IMPORTANT:** The ring terminals must be UL approved and accommodate 12 gauge wires.

   📝 **IMPORTANT:** The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).

3. Stack each same-colored pair of wires and then attach them to the same power source. The power cord consists of three wires (black, red, and green).

For more information, see the documentation that ships with the power supply.

Installing the server into the rack

To install the server into a rack with square, round, or threaded holes, refer to the instructions that ship with the rack hardware kit.

If you are installing the server into a telco rack, order the appropriate option kit at the RackSolutions.com website (**http://www.racksolutions.com/hp**). Follow the server-specific instructions on the website to install the rack brackets.

Use the following information when connecting peripheral cables and power cords to the server.

> ⚠ **WARNING:** This server is heavy. To reduce the risk of personal injury or damage to the equipment:
>   - Observe local occupational health and safety requirements and guidelines for manual material handling.
>   - Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. Hewlett Packard Enterprise recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
>   - Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

> ⚠ **CAUTION:** Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

1. Install the server and cable management arm into the rack. See the installation instructions that ship with the selected rail system.
2. Connect the peripheral devices to the server.
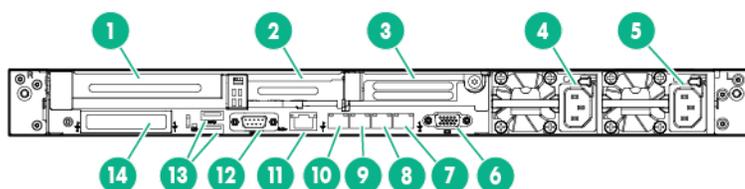
Item	Description
1	Slot 1 PCIe3 x16 (16, 8, 4, 1)
2	Slot 2 PCIe 3 x8 (8, 4, 1)
3	Slot 3 PCIe 3 x16 (16, 8, 4, 1)*
4	Power supply 2
5	Power supply 1
6	Video connector
7	NIC connector 4
8	NIC connector 3
9	NIC connector 2
10	NIC connector 1
11	iLO 4 connector
12	Serial connector (optional)
13	USB 3.0 connectors
14	FlexibleLOM bay

*The slot 3 PCIe 3 riser is optional and requires a second processor before installation.

Slot description example

Slot 2 PCIe3 x16 (16,8,4,2,1)
- Negotiable link width(s)
- Physical connector link width
- Gen3 signaling rate
- Slot number
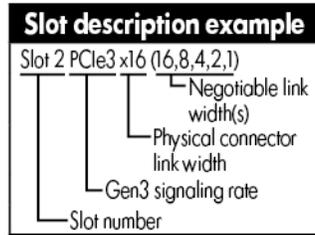
3. Connect the power cord to the server.
4. Use the hook-and-loop strap to secure the power cord.
5. Connect the power cord to the power source.

Registering the product

To experience quicker service and more efficient support, register the product at the Hewlett Packard Enterprise Product Registration website (**http://www.hpe.com/info/register**).

Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

High-performance fan option

This kit is available to meet some extended ambient operating temperatures above 35 degrees Celsius. For more information about the qualifications for extended ambient configurations, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/ASHRAE**).

To install the component:

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).

📝 **IMPORTANT:** Do not mix standard fans and high-performance fans in the same server.

5. Remove all standard fans from the fan bays.
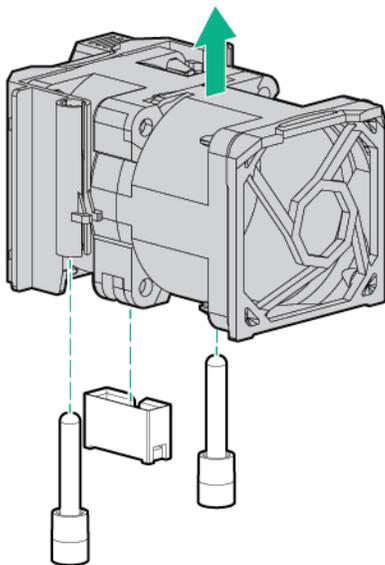
6. Remove fan blanks from the fan bays, if installed.
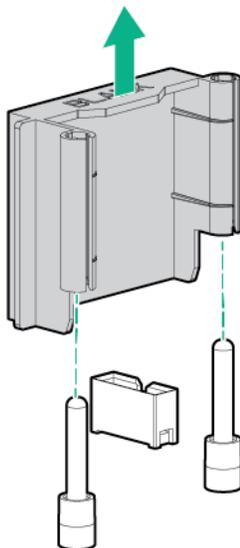
7. Install high-performance fans in each of the 7 fan bays.
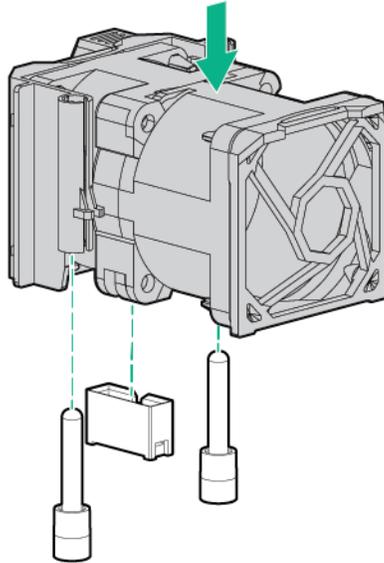
8. Install the access panel (on page).
9. Slide the server into the rack.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Press the Power On/Standby button.

The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Processor and fan option

The server supports single-processor and dual-processor operations.

⚠ **CAUTION:** To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

⚠ **CAUTION:** To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

📝 **IMPORTANT:** If installing a processor with a faster speed, update the system ROM before installing the processor.

To install the processor:
1. Power down the server (on page).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page).
   o Remove the server from the rack (on page).
4. Remove the access panel (on page).
5. Remove the processor blank.

6. Open each of the processor locking levers in the order indicated in the following illustration, and then open the processor retaining bracket.
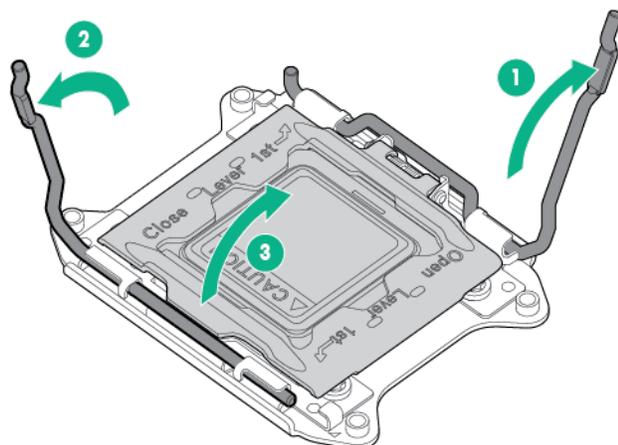
7. Remove the clear processor socket cover. Retain the processor socket cover for future use.
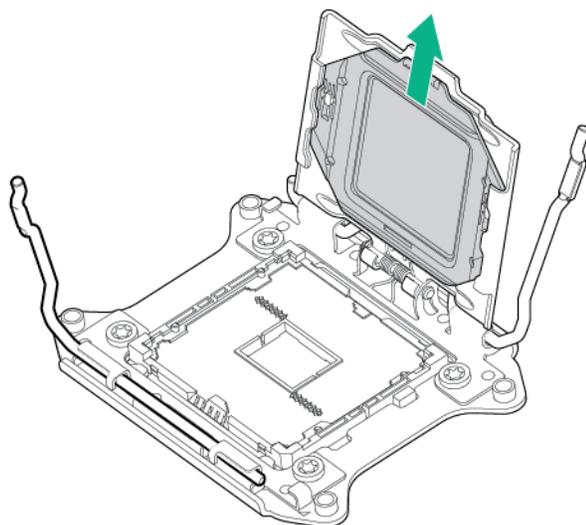
⚠ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

8. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**
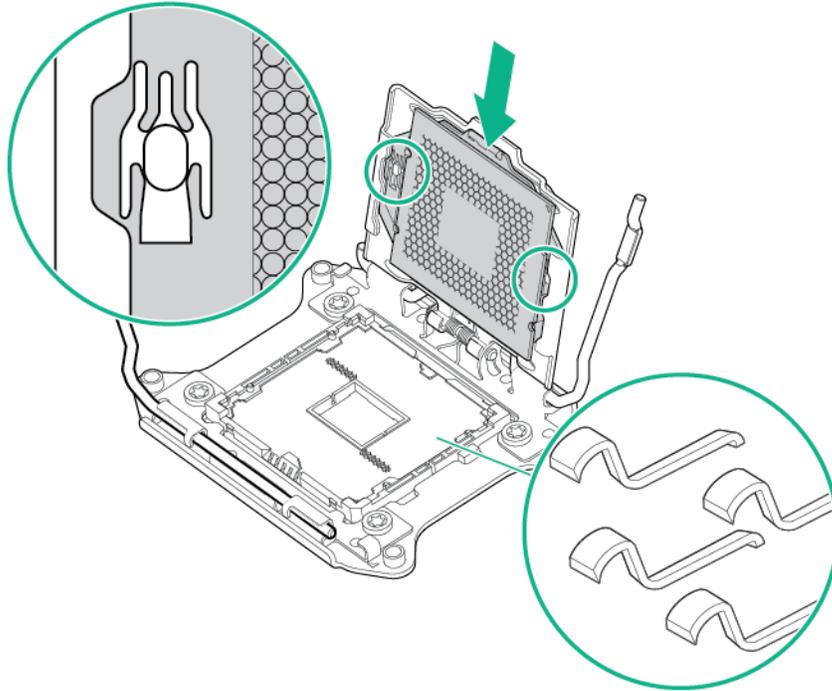
9. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

> △ **CAUTION:** Do not press down on the processor. Pressing down on the processor might damage the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

10. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.
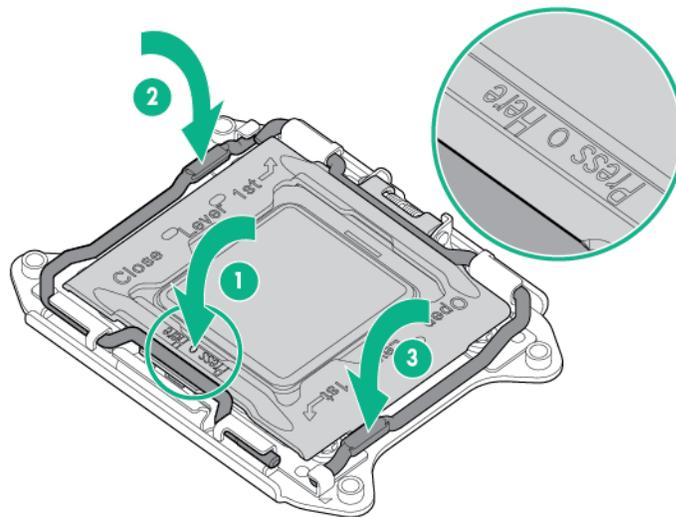
△ **CAUTION:** Close and hold down the processor cover socket while closing the processor locking levers. The levers should close without resistance. Forcing the levers closed can damage the processor and socket, requiring system board replacement.

11. Remove the heatsink cover.

△ **CAUTION:** After the cover is removed, do not touch the thermal interface media.
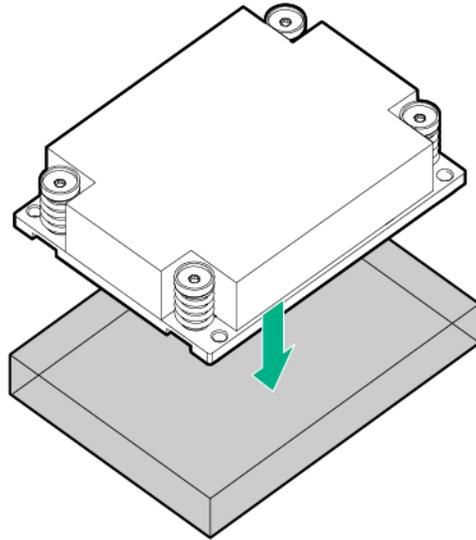
12. Install the heatsink:

   a. Position the heatsink on the processor backplate.

   b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.

   c. Finish the installation by completely tightening the screws in the same sequence.
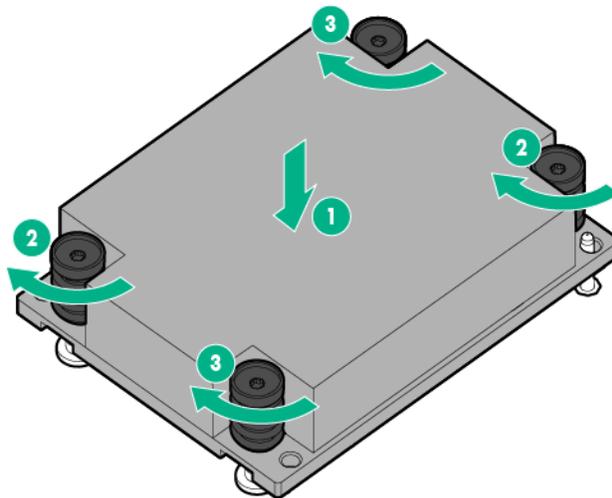
13. Remove the fan blanks from locations 1 and 2. For fan location and numbering information, see "Hot-plug fans (on page 18)" or the label attached to the chassis next to the fans.
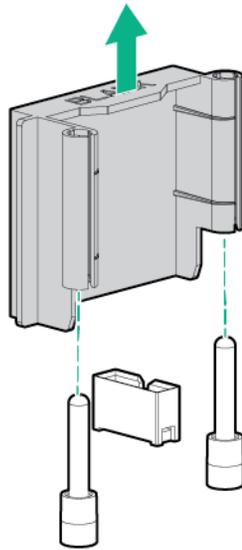
14. Install the fans into locations 1 and 2.

    ✎ **IMPORTANT:** Do not mix standard fans and high-performance fans in the same server.
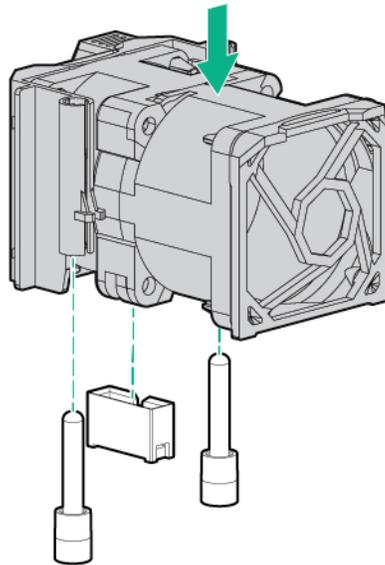
15. Install the access panel (on page 21).
16. Install the server into the rack.
17. Connect each power cord to the server.
18. Connect each power cord to the power source.
19. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

High performance heatsink

Although these heatsinks are required for certain processors, they can also be used to reduce fan power consumption with processors that only need standard-performance heatsinks.

Fan power savings varies by server configuration and workload and thus has been optimized to improve fan power in either high workloads, dense configurations, and/or extended ambient configurations.

For a list of processors that are compatible with these high-performance heatsinks, see the QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. Pressing the Power On/Standby button does not shut off system power completely. Portions of the power supply and some internal circuitry remain active until AC power is removed.

To install the component:

1. Power down the server (on page 20).

2. Remove all power:

    a. Disconnect each power cord from the power source.

    b. Disconnect each power cord from the server.

3. Do one of the following:

    o Extend the server from the rack (on page 20).

    o Remove the server from the rack (on page 21).

4. Remove the access panel (on page 21).

5. Remove the standard heatsinks.
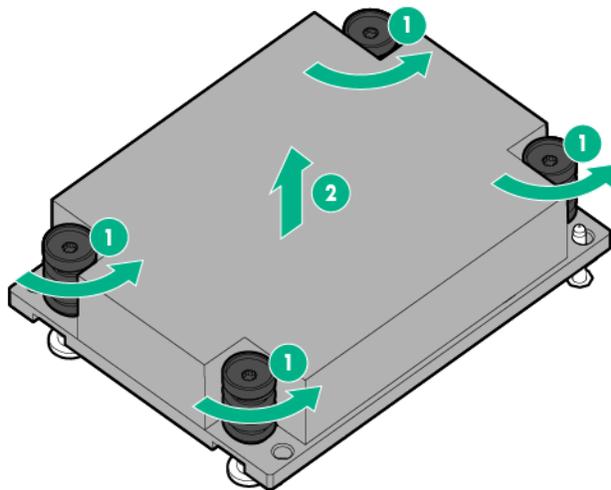
6. Clean the old thermal grease from the processor with the alcohol swab. Allow the alcohol to evaporate before continuing.

7. Remove the heatsink cover.
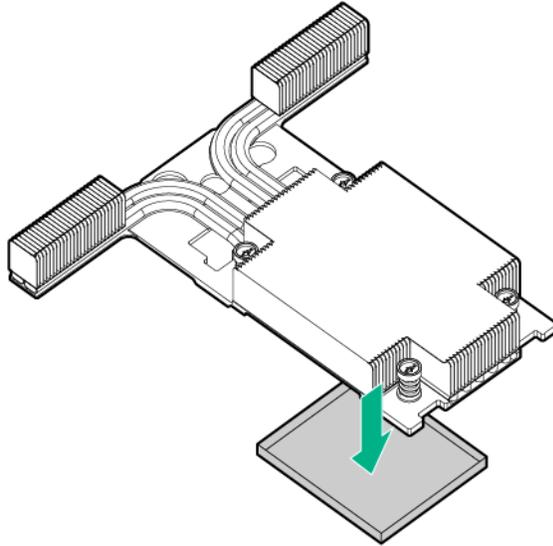
8. Install the high-performance heatsinks.
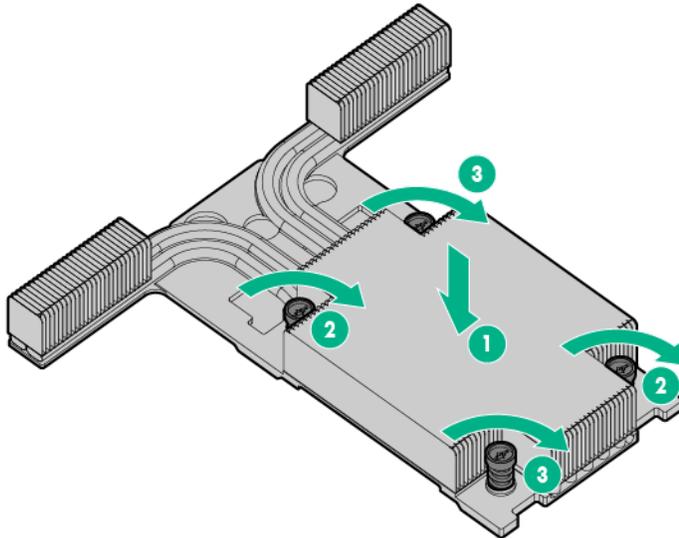
9. Install the access panel (on page 21).
10. Install the server into the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Memory options

This server supports multiple DIMM types:

- Regular RDIMMs
- LRDIMMs

- Regular RDIMMs and NVDIMM-Ns

  NVDIMM-Ns are supported when installed together with a regular RDIMM on the same system with an HPE Smart Storage Battery. For more information on NVDIMM-Ns and persistent memory, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/persistentmemory**) and the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

  📝 **IMPORTANT:** This server does not support mixing LRDIMMs or RDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM or RDIMM, the information applies to that type only. All memory installed in the server must be the same type.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

Memory-processor compatibility information

The processor installed in the server determines the type of DIMMs supported by the server. For the latest memory configuration information, see the following resources:

- The product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**)
- HPE Server Memory Configurator (**https://h22195.www2.hpe.com/DDR4memoryconfig/Home/Legal**)

DIMM type

- Intel Xeon E5-2600 v3 processors support:
  - Single-rank and dual-rank PC4-2133P (DDR4-2133) RDIMMs operating at up to 2133 MT/s
  - Dual- and quad-rank PC4-2133P (DDR4-2133) LRDIMMs operating at up to 2133 MT/s
- Intel Xeon E5-2600 v4 processors support:
  - Single-rank and dual-rank PC4-2400T (DDR4-2400) RDIMMs operating at up to 2400 MT/s
  - Single-rank PC4-2133P (DDR4-2133) NVDIMM-Ns operating at up to 2133 MT/s
  - Dual-rank and quad-rank PC4-2400T (DDR4-2400) LRDIMMs operating at up to 2400 MT/s
  - Octal-rank PC4-2400U (DDR4-2400) LRDIMMs operating at up to 2400 MT/s

DIMM specifications

DIMM specifications — Intel Xeon E5-2600 v3 processor installed

Type	Rank	Capacity (GB)	Native speed (MT/s)	Voltage
RDIMM	Single	4 or 8	2133	STD
RDIMM	Dual	8, 16, or 32	2133	STD
LRDIMM	Dual	16	2133	STD
LRDIMM	Quad	32 or 64	2133	STD

DIMM specifications — Intel Xeon E5-2600 v4 processor installed

Type	Rank	Capacity (GB)	Native speed (MT/s)	Voltage
RDIMM	Single	8 or 16	2400	STD
NVDIMM-N (RDIMM)	Single	8	2133	STD
RDIMM	Dual	16 or 32	2400	STD
LRDIMM	Dual	32	2400	STD

Type	Rank	Capacity (GB)	Native speed (MT/s)	Voltage
LRDIMM	Quad	64	2400	STD
LRDIMM	Octal	128	2400	STD

Populated DIMM speed (MT/s)

Populated DIMM speed — Intel Xeon E5-2600 v3 processor installed

Type	Rank	Capacity (GB)	1 DIMM per channel (MT/s)	2 DIMMs per channel (MT/s)	3 DIMMs per channel (MT/s)
RDIMM	Single	4 or 8	2133	2133	1600
RDIMM	Dual	8, 16, or 32	2133	2133	1600
LRDIMM	Dual	16	2133	2133	1866
LRDIMM	Quad	32 or 64	2133	2133	1866

Populated DIMM speed — Intel Xeon E5-2600 v4 processor installed

Type	Rank	Capacity (GB)	1 DIMM per channel (MT/s)	2 DIMMs per channel (MT/s)	3 DIMMs per channel (MT/s)
RDIMM	Single	8 or 16	2400	2133	1866
NVDIMM-N (RDIMM)	Single	8	2133	1866	1600
RDIMM	Dual	16 or 32	2400	2400	1866
LRDIMM	Dual	32	2400	2400	2400
LRDIMM	Quad	64	2400	2400	2400
LRDIMM	Octal	128	2400	2400	2400

The operating memory speed is a function of the rated DIMM speed, DIMMs installed per channel, processor model, and the speed selected in the BIOS/Platform Configuration (RBSU) of the UEFI System Utilities.

Depending on the processor model, the number of DIMMs installed, and whether LRDIMMs or RDIMMs are installed, the memory clock speed can be reduced to 1866 MT/s.

Maximum memory capacity

The maximum memory capacity is a function of the DIMM capacity, number of installed DIMMs, number of NVDIMMs, memory type, and number of installed processors.

Maximum memory capacity — Intel Xeon E5-2600 v3 processor installed

DIMM type	DIMM rank	Capacity (GB)	One processor (GB)	Two processors (GB)
RDIMM	Single	4	48	96
RDIMM	Single	8	96	192
RDIMM	Dual	8	96	192
RDIMM	Dual	16	192	384
RDIMM	Dual	32	384	768
LRDIMM	Dual	16	192	384
LRDIMM	Dual	32	384	768
LRDIMM	Quad	64	768	1536

Maximum memory capacity — Intel Xeon E5-2600 v4 processor installed

DIMM type	DIMM rank	Capacity (GB)	One processor (GB)	Two processors (GB)
RDIMM	Single	8	96	192
RDIMM	Single	16	192	384
RDIMM	Dual	16	192	384
RDIMM	Dual	32	384	768
LRDIMM	Dual	32	384	768
LRDIMM	Quad	64	768	1536
LRDIMM	Octal	128	1536	3072

For the latest memory configuration information, see the QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

SmartMemory

SmartMemory authenticates and unlocks certain features available only on Qualified memory and verifies whether installed memory has passed Hewlett Packard Enterprise qualification and test processes. Qualified memory is performance-tuned for ProLiant and BladeSystem servers and provides future enhanced support through Active Health and manageability software.

Persistent memory combines the performance of memory with the persistence of traditional storage. NVDIMMs are DIMMs that provide persistent memory and install in standard DIMM slots.

NVDIMM-Ns are NVDIMMs that combine DRAM with NAND flash memory, backing up the DRAM contents to flash memory on power loss and restoring from NAND flash memory to DRAM on power on. NVDIMM-Ns provide applications with the full performance capability of DRAM. NVDIMM-Ns are supported in select HPE servers, drawing power from the HPE Smart Storage Battery to perform the backup. The HPE 8GB NVDIMM is an NVDIMM-N.

For more information about NVDIMM-Ns and persistent memory, see the *HPE 8GB NVDIMM User Guide* on the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/NVDIMM-docs**).

Operation stages for NVDIMM-Ns

- While the server is powered on:
  - o Each NVDIMM-N operates at the speed of a regular DDR4 DIMM and data is stored in the DRAM.
  - o Each NVDIMM-N accesses data in the DRAM based on the processor load/store instructions and PCIe memory read and write transactions.
  - o Each NVDIMM-N is accessed using special device drivers.
  - o Each NVDIMM-N is not presented as regular system memory.
- When power to the server is lost:
  - o Each NVDIMM-N copies or backs up data from its DRAM to its NAND flash memory.
  - o Each NVDIMM-N draws power from the HPE Smart Storage Battery on the server.
- While the server is powered off, data is saved in the NAND flash memory of each NVDIMM-N.
- When the server is powered on, each NVDIMM-N restores data from its NAND flash memory to its DRAM during the server POST process.

For more information on persistent memory, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/persistentmemory**). For more information about HPE NVDIMMs, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports four channels, and each channel supports three DIMM slots, as shown in the following table.

Channel	Population order	Slot number
1	A E I	12 11 10
2	B F J	9 8 7
3	C G K	1 2 3
4	D H L	4 5 6

For the location of the slot numbers, see "DIMM slot locations ("DIMM slots" on page 15)."

This multi-channel architecture provides enhanced performance in Advanced ECC mode. This architecture also enables Online Spare Memory mode.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers indicate the DIMM slot ID for spare replacement.

For more information about NVDIMM-Ns and persistent memory, see the *HPE 8GB NVDIMM User Guide* on the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/NVDIMM-docs**).

DIMM ranks

To understand and configure memory protection modes properly, an understanding of DIMM rank is helpful. Some DIMM configuration requirements are based on these classifications.

A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8-GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, and a quad-rank DIMM would be 32 GB, and an octal-rank LRDIMM would be 64 GB.

LRDIMMs are labeled as quad- and octal-rank DIMMs. There are four and eight ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a logical dual-rank DIMM to the system. This is called Rank Multiplication. The LRDIMM buffer also isolates the electrical loading of the DRAM from the system to allow for faster operation. These two changes allow the system to support up to three LRDIMMs per memory channel, providing for greater memory capacity and higher memory operating speed compared to quad-rank RDIMMs.

Identifying DIMM and NVDIMMs

DIMMs and NVDIMMs are visibly different and contain different information on the label.

DIMM identification

To determine DIMM characteristics, see the label attached to the DIMM and refer to the following illustration and table.

8GB 1Rx4 DDR4-2400P-R
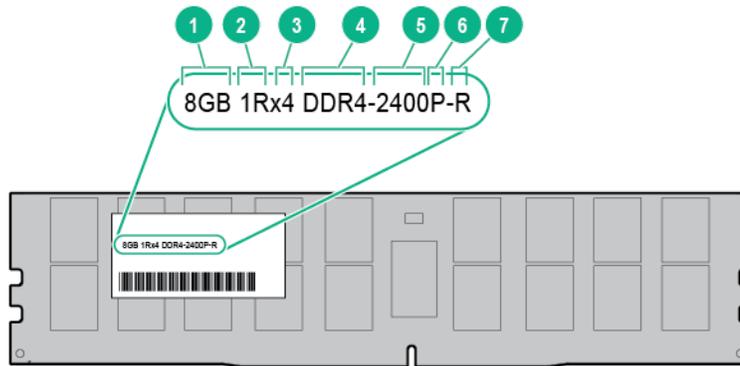
Item	Description	Definition
1	Capacity	8 GB 16 GB 32 GB 64 GB 128 GB
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank 8R = Octal-rank
3	Data width on DRAM	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4
5	Maximum memory speed	2400 MT/s
6	CAS latency	P=15 T=17
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

NVDIMM identification

To determine NVDIMM characteristics, see the full product description as shown in the following example:
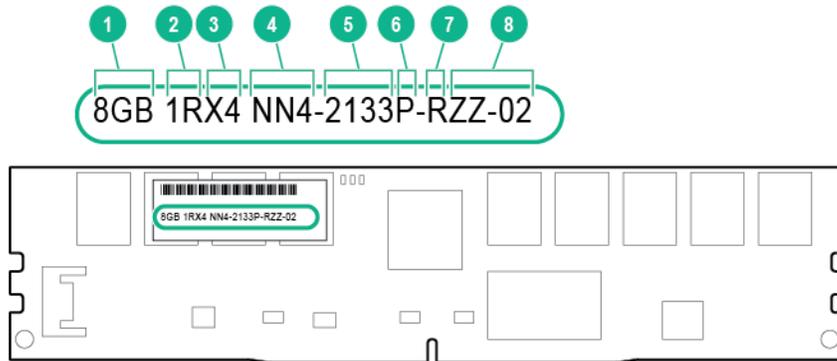
Item	Description	Definition
1	Capacity	8GB
2	Rank	1R (Single rank)
3	Data width	x4 (4 bit)
4	Memory type	NVDIMM-N
5	Maximum memory speed	2133 MT/s
6	Speed grade	P (CAS 15-15-15)
7	DIMM type	RDIMM (registered)
8	Reserved	—

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

Memory configurations

> **IMPORTANT:** When NVDIMMs are installed on a server, only the Advanced ECC AMP mode is supported.

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—Provides up to 4-bit error correction. This mode is the default option for this server.

- Online spare memory—Provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

- Mirrored memory—Provides maximum protection against failed DIMMs. Uncorrectable errors in one channel are corrected by the mirror channel.

Advanced Memory Protection options are configured in the BIOS/Platform Configuration (RBSU). If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see the *HPE UEFI System Utilities User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/ProLiantUEFI/docs**).

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server. Standard ECC can correct single-bit memory errors and detect multi-bit memory errors. When multi-bit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multi-bit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HPE Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory configuration

Online spare memory provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

Mirrored memory configuration

Mirroring provides protection against uncorrected memory errors that would otherwise result in server downtime. Mirroring is performed at the channel level to one memory channel pair that can be either:

- Channel 1 data being mirrored in channel 2

- Channel 3 data being mirrored in channel 4

If an uncorrectable error is detected in the active memory channel, data is retrieved from the mirror channel. This channel becomes the new active channel, and the system disables the channel with the failed DIMM.

General DIMM and NVDIMM-N slot population guidelines

Population requirements

- Do not mix RDIMMs, UDIMMs, and LRDIMMs.

- When NVDIMM-Ns are installed in this server, install at least one regular RDIMM in a DIMM slot associated with the first processor installed.

- Install DIMMs only if the corresponding processor is installed.

- When mixing regular DIMMs and NVDIMM-Ns in a channel, install the regular DIMMs first and then install the NVDIMM-Ns in the channel.

- When installing NVDIMM-Ns in this server and using the HPE 96W Smart Storage Battery, install a maximum of 16 NVDIMM-Ns in the server.

- When single-rank, dual-rank, and quad-rank DIMMs are populated for two DIMMs per channel or three DIMMs per channel, install the higher numbered rank DIMM first in the channel (starting from the farthest DIMM slot). For example, install the quad-rank DIMM first, the dual-rank DIMM next, and the single-rank DIMM last.

Population recommendations

- To utilize all memory channels and provide best performance when one processor is installed, install regular DIMMs in sequential alphabetic order: A, B, C, D, E, F, and so forth.

- When two processors are installed, install the regular DIMMs in sequential alphabetic order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth. If installing NVDIMM-Ns in an unbalanced configuration, see the *HPE 8GB NVDIMM User Guide* on the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/NVDIMM-docs**).

- To achieve the best performance, install only two DIMMs per channel in servers with three DIMM slots per channel. When three DIMMs per channel are populated, the speed reduces from 2400 MT/s or 2133 MT/s to 1600 MT/s.

  The operating frequency is reduced to 1867 MT/s if the following are true:

  o If any channel in the system is populated with two DIMMs per channel and at least one of them is NVDIMM.

  o If no channel in the system is configured with three DIMMs per channel.

  o If a channel in the system configured with two DIMMs per channel is populated with all regular DIMMs, an NVDIMM-N installed in a one DIMM per channel configuration runs at 2133 MT/s.

For more information about server memory, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/memory**).

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.

- DIMMs may be installed individually.

Online spare population guidelines

For Online Spare memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.

- Each channel must have a valid online spare configuration.

- Each channel can have a different valid online spare configuration.

- Each populated channel must have a spare rank. A single dual-rank DIMM is not a valid configuration.

Population order

For memory configurations with a single processor or multiple processors, DIMMs must be populated sequentially in alphabetical order (A through L).

After installing the DIMMs, use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure supported AMP modes.

Mirrored Memory population guidelines

For Mirrored Memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.

- Install DIMMs in either channel 1 and channel 2, or channel 3 and channel 4. Installed DIMMs must be identical in terms of size and organization.

- In multi-processor configurations, each processor must have a valid Mirrored Memory configuration.

Identifying the processor type

The processor type installed in the server is briefly displayed during POST. To view this information and additional processor specifications, do the following:

1. Reboot the server.

   The server restarts and the POST screen appears.

2. Press **F9**.

   The System Utilities screen appears.

3. Select **System Information** | **Processor Information**.

   The Processor Information screen shows detailed information about the processors installed in the server.

4. Press **Esc** until the main menu is displayed.

5. Select **Reboot the System** to exit the utility and resume the boot process.

Memory installation

> **△ CAUTION:** To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.

> **△ CAUTION:** DIMMs are keyed for proper alignment. Align notches in the DIMM with the corresponding notches in the DIMM slot before inserting the DIMM. Do not force the DIMM into the slot. When installed properly, not all DIMMs will face in the same direction.

> **△ CAUTION:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure.

> **△ CAUTION:** Failure to properly handle DIMMs can cause damage to DIMM components and the system board connector.

Before installing memory on the server:

- Verify that the memory is supported on the server. For more information, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

- Review the "DIMM handling guidelines (on page 50)."

- Review the "General DIMM and NVDIMM-N population guidelines ("General DIMM and NVDIMM-N slot population guidelines" on page 47)."

- If installing NVDIMM-Ns:
  - Verify that only Intel Xeon E5-2600 v4 processors are installed on the server.
  - Verify that the HPE Smart Storage Battery is installed on the server.
  - Verify that one regular RDIMM is installed on the server. The system cannot have only NVDIMM-Ns installed.
  - Update the system ROM to the supported single point system ROM release. For more information, see the Hewlett Packard Enterprise website (**http://www.hpe.com/support/NVDIMM**).
  - Review additional server requirements in the *HPE 8GB NVDIMM User Guide* on the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/NVDIMM-docs**).

- When installing DIMMs in the server, use the procedure according to the DIMM types being installed:
  - Install a DIMM ("Installing a DIMM" on page 50) — For installing regular DIMMs and LRDIMMs

o Installing an NVDIMM (on page 51) — For installing NVDIMM-Ns with an HPE Smart Storage Battery

DIMM handling guidelines

⚠ **CAUTION:** Failure to properly handle DIMMs can cause damage to DIMM components and the system board connector.

When handling a DIMM, observe the following guidelines:

- Avoid electrostatic discharge (on page 137).
- Always hold DIMMs by the side edges only.
- Avoid touching the connectors on the bottom of the DIMM.
- Never wrap your fingers around a DIMM.
- Avoid touching the components on the sides of the DIMM.
- Never bend or flex the DIMM.

When installing a DIMM, observe the following guidelines:

- Before seating the DIMM, open the DIMM slot and align the DIMM with the slot.
- To align and seat the DIMM, use two fingers to hold the DIMM along the side edges.
- To seat the DIMM, use two fingers to apply gentle pressure along the top of the DIMM.

For more information, see the Hewlett Packard Enterprise website (**http://www.hpe.com/support/DIMM-20070214-CN**).

Installing a DIMM

The server supports up to 24 DIMMs.

To install a DIMM:

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the air baffle.
6. Open the DIMM slot latches.

7. Install the DIMM.
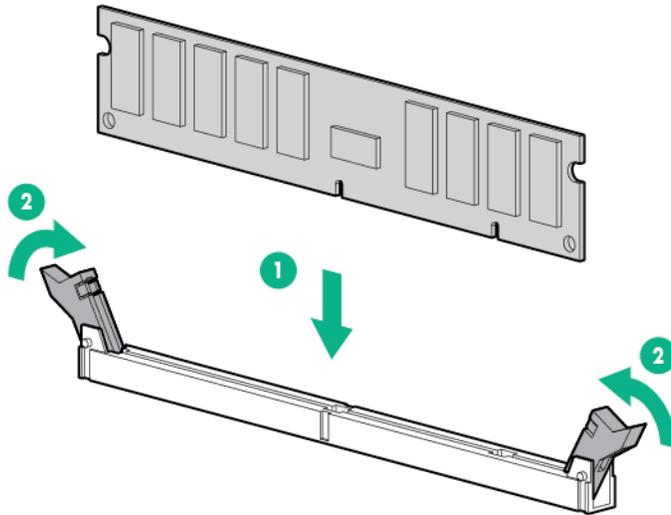
8. Install the air baffle.
9. Install the access panel (on page 21).
10. Install the server into the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ("Powering up the server" on page 20).

Use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see "Systems Insight Display LED combinations (on page 10)."

Installing an NVDIMM

> ⚠ **CAUTION:** Unlike traditional storage devices, NVDIMMs are fully integrated in with the ProLiant server. Data loss can occur when system components, such as the processor or HPE Smart Storage Battery fails. HPE Smart Storage battery is a critical component required to perform the backup functionality of NVDIMM. It is important to take action when HPE Smart Storage Battery related failures occur. Always follow best practices for ensuring data protection.

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the air baffle.
6. Locate any NVDIMM already installed in the server.
7. Verify that all LEDs on any installed NVDIMMs are off. For more information on NVDIMM LEDs, see "NVDIMM LEDs (on page 15)."

8. Install the NVDIMM.
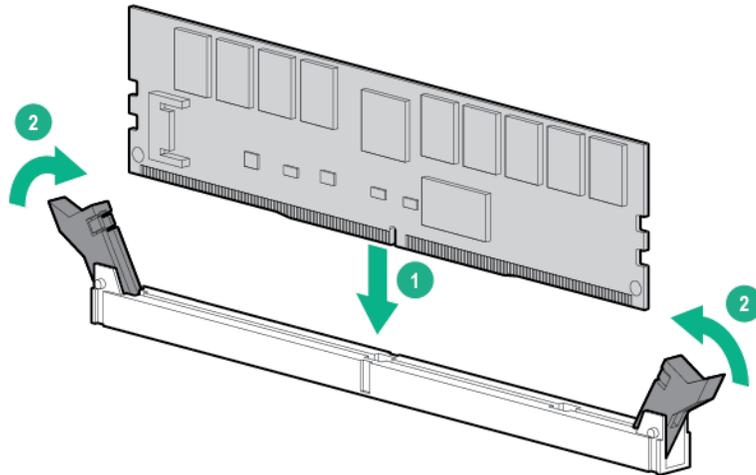
9. Install the HPE Smart Storage Battery.
10. Install the air baffle.
11. Install the access panel (on page 21).
12. Do one of the following:
    o   Slide the server into the rack.
    o   Install the server into the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server ("Powering up the server" on page 20).
16. Sanitize the NVDIMM-Ns, if required. For more information, see the HPE 8GB NVDIMM User Guide on the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/NVDIMM-docs**).

Drive options

Depending on the configuration, this server supports SAS, SATA, and NVMe drives. For more information on drive support, see "Device bay numbering ("Device numbers" on page 16)."

When adding hard drives to the server, observe the following general guidelines:

●   The system automatically sets all device numbers.

●   If only one hard drive is used, install it in the bay with the lowest device number.

●   Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Removing the hard drive blank

Remove the component as indicated.
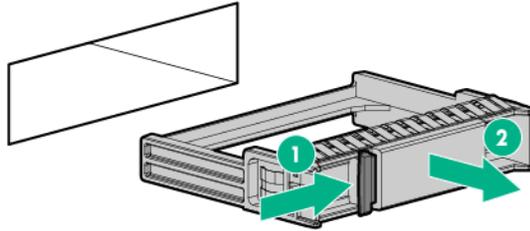
Installing a hot-plug SAS or SATA drive

The server can support 8 SAS or SATA hard drives in a SFF configuration, or 10 drives in an SFF configuration with the optional hard drive cage. In an LFF configuration, the server can support 4 SAS or SATA hard drives.

To install the component:

1.   Remove the drive blank.
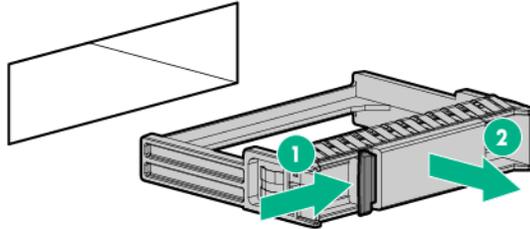
2.   Prepare the drive.
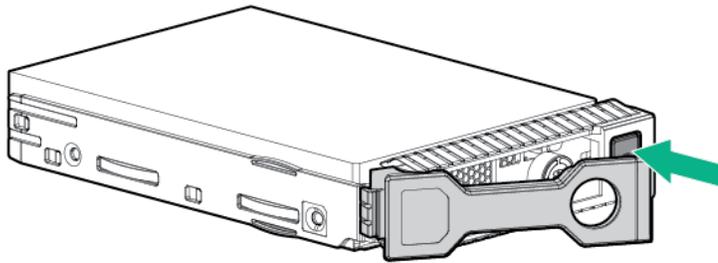
3.   Install the drive.
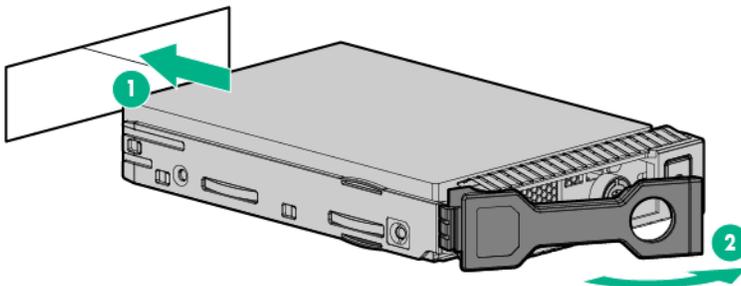
Removing a hot-plug SAS or SATA drive

⚠ **CAUTION:** For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Determine the status of the drive from the hot-plug SAS drive LED combinations.
2. Back up all server data on the drive.
3. Remove the drive.
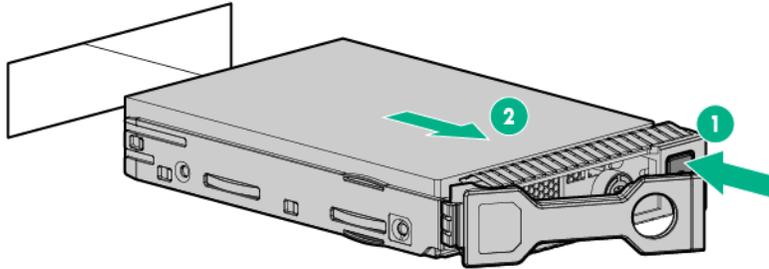
Installing the NVMe drives

NVMe drives are supported on this server when the 10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Option and/or the 2SFF Express Bay Drive Cage is installed. For more information on which bays support NVMe drives, see "Device numbers (on page 16)."

To install the drives:

⚠ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server or the enclosure unless all drive and device bays are populated with either a component or a blank.

1. Remove the drive blank, if installed.
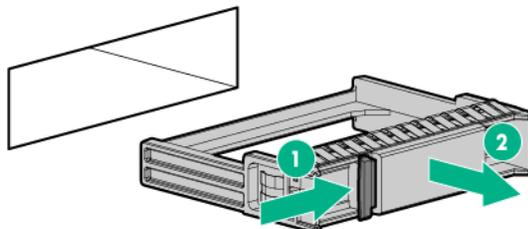
2. Press the Do Not Remove button to open the release handle.
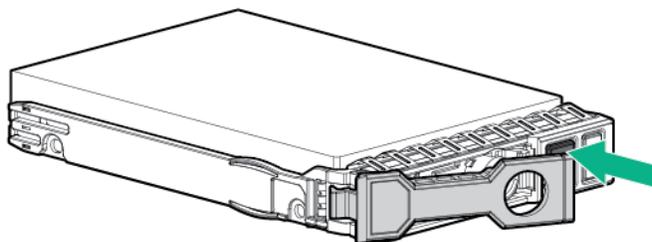
3. Install the drives.
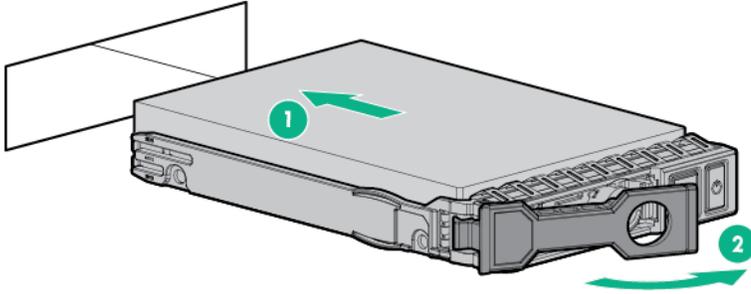
**4.** Install an SFF drive blank in any unused drive bays.
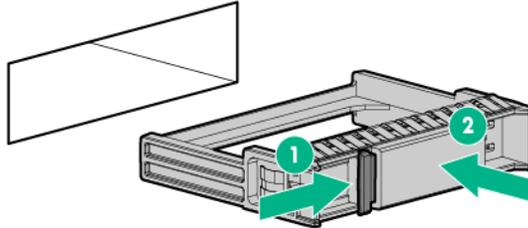
⚠ **CAUTION:** Do not remove an NVMe SSD from the drive bay while the Do Not Remove button LED is flashing. The Do Not Remove button LED flashes to indicate the device is still in use. Removal of the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.

To remove the component:

1. Press the Power button.

The Do Not Remove button LED illuminates and flashes. Do not press the button while the LED is illuminated.

2. When the Do Not Remove button LED is no longer flashing or illuminated, press the Do Not Remove button to open the release lever.
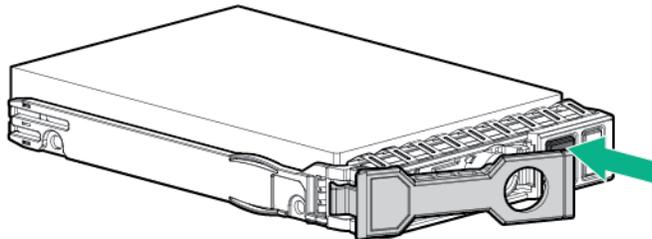
3. Remove the drive.
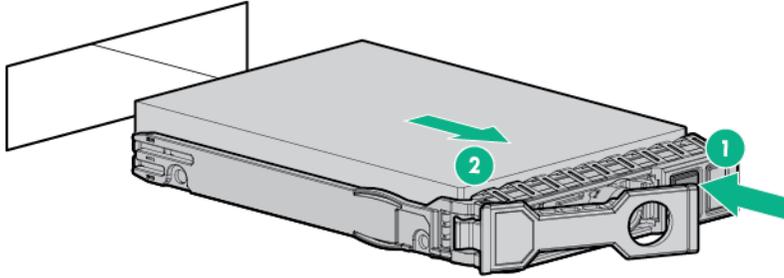

2SFF SAS/SATA drive cage assembly option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the universal media bay blank.
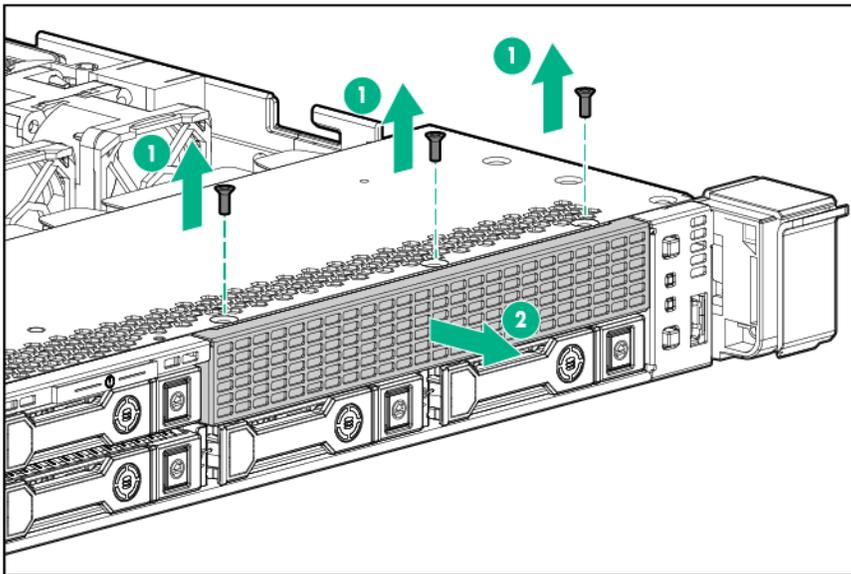
**6.** Install the drive cage assembly, and then tighten the three screws.
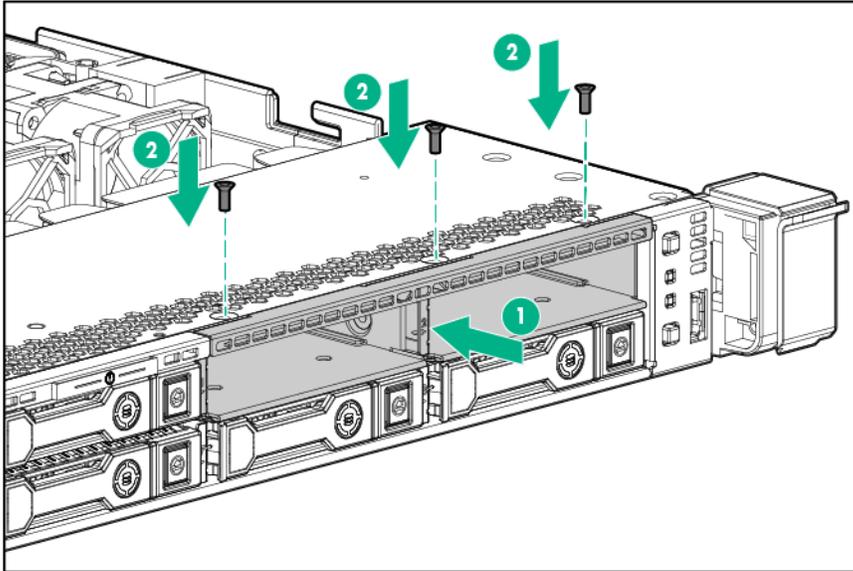
7. Connect the data cables to the SATA storage connector, the SATA optical/storage drive connector, and the backplane presence detect connector.
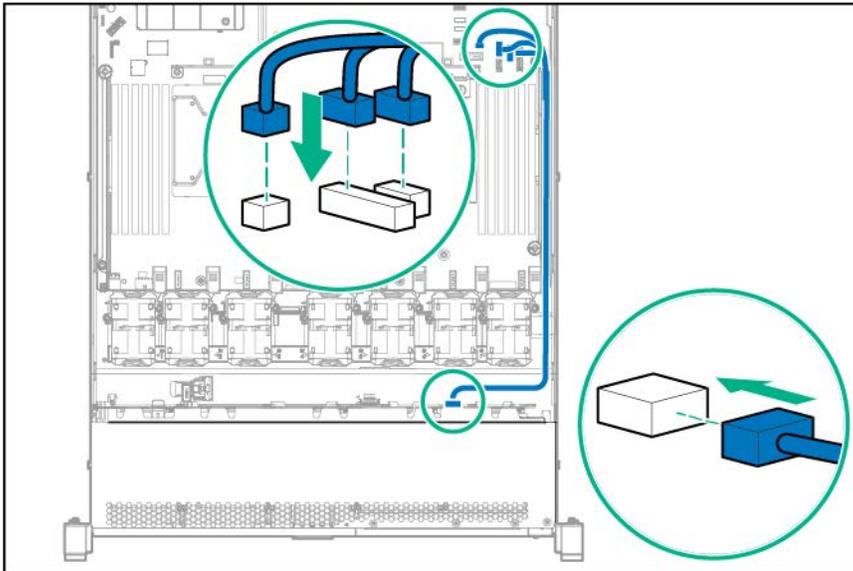
8. Connect the power cable to the left power connector on the backplane.
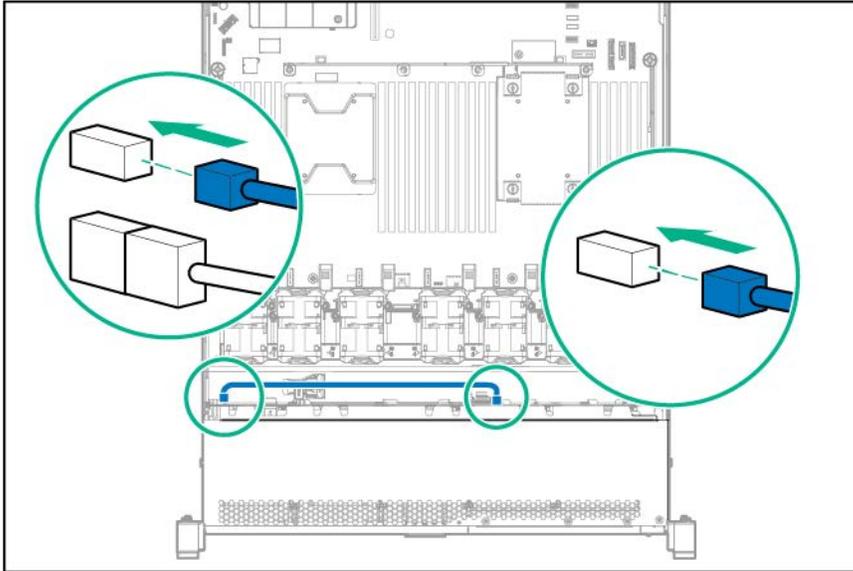
⚠ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server or the enclosure unless all drive and device bays are populated with either a component or a blank.

9. Install drives or blanks in the empty drive bays.
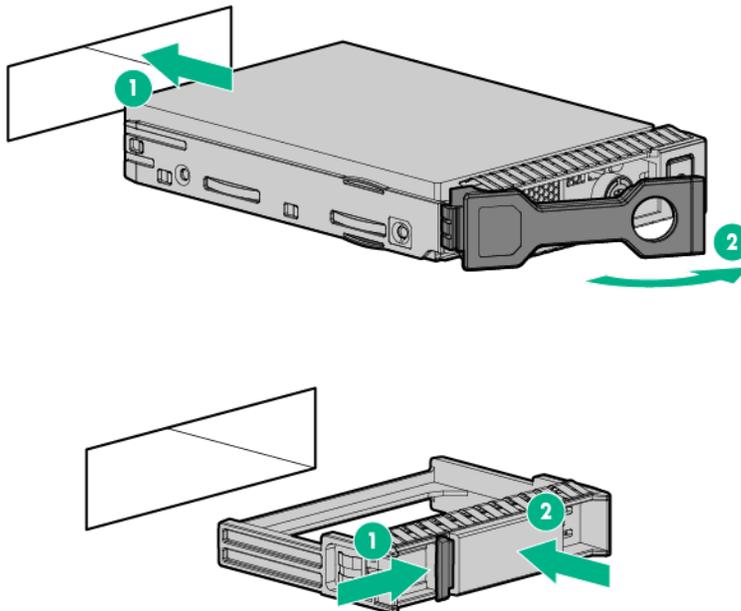

2SFF Express Bay drive backplane

⚠ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

To install the component:

1. Back up all server data.
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove all drives ("Removing a hot-plug SAS or SATA drive" on page 54) and drive blanks ("Removing the hard drive blank" on page 53).
6. Disconnect and remove all cables connected to the drive backplane.
7. Remove the universal media bay blank.
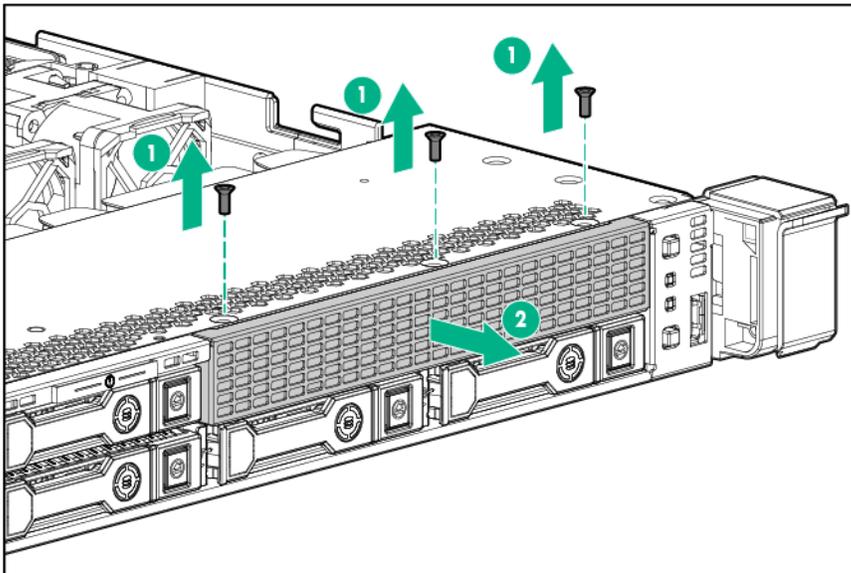
8. Install the drive cage assembly, then tighten the three screws.
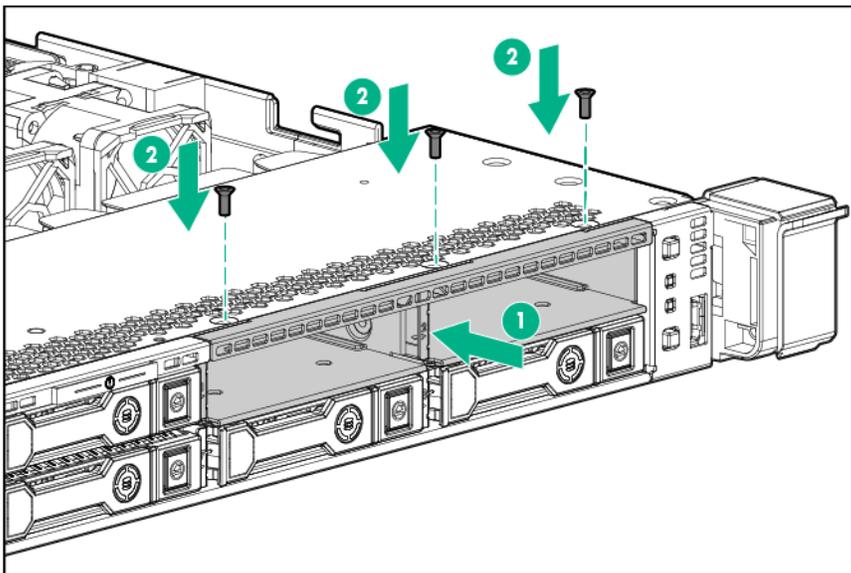
9. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).

10. Install the Express Bay bridge card in slot 1 of the primary PCI riser cage.
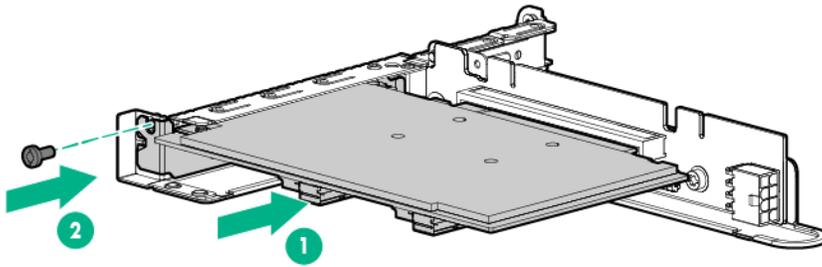
11. Install the primary PCI riser cage ("Install the PCI riser cage" on page 23).

12. Connect the data cables from the Express Bay drive cage to port 3 on the Express Bay bridge card.
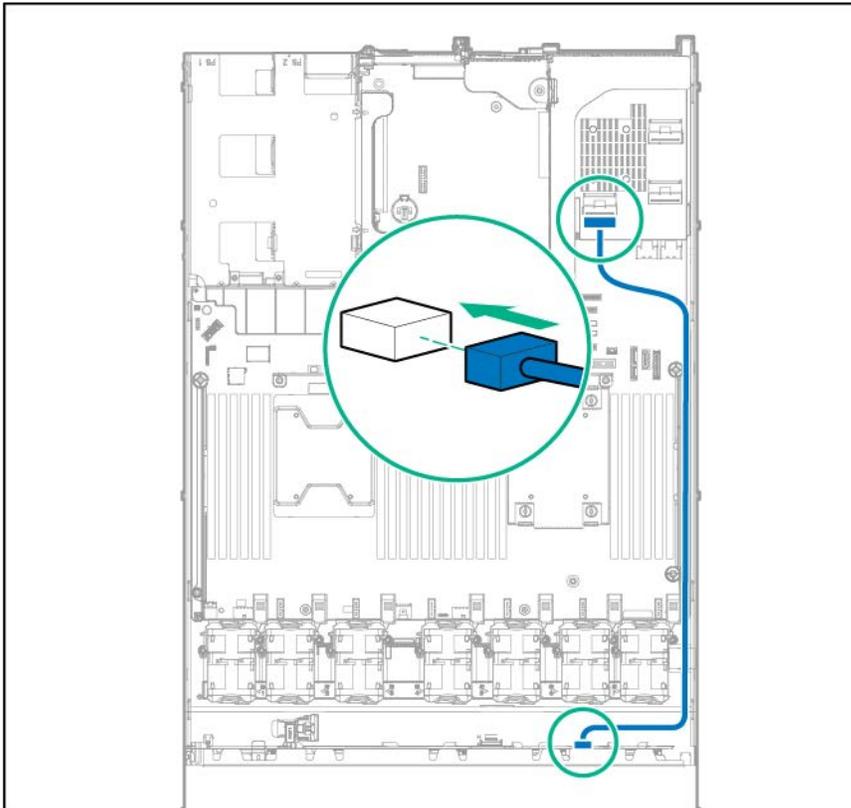
13. Connect the power cable to the left power connector on the backplane.
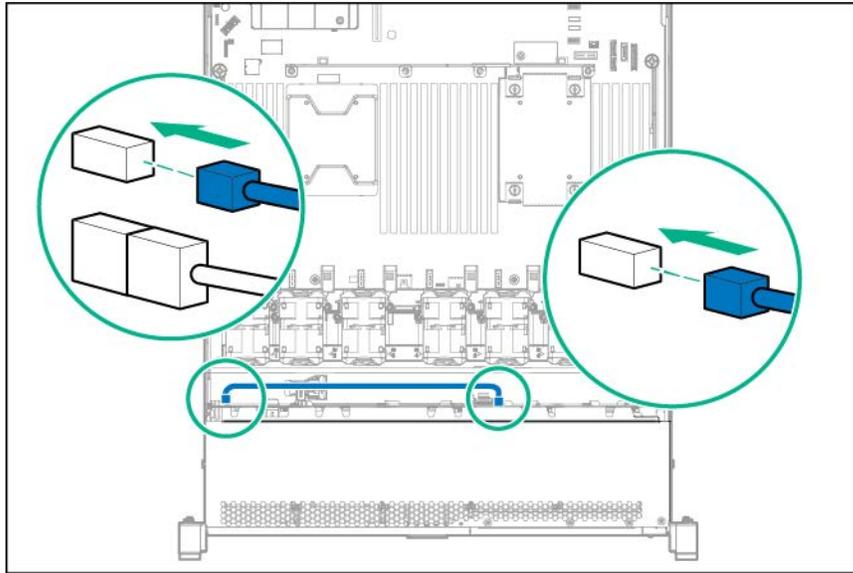
> ⚠ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server or the enclosure unless all drive and device bays are populated with either a component or a blank.

14. Install the high-performance fans ("High-performance fan option" on page 32).
15. Install the NVMe drives ("Installing the NVMe drives" on page 54).
16. Install the access panel (on page 21).
17. Install the server into the rack.
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. Press the Power On/Standby button.

    The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

# 4LFF Universal Media Bay option

> ⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

> ⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the bay blanks.

o   4 LFF optical drive blank
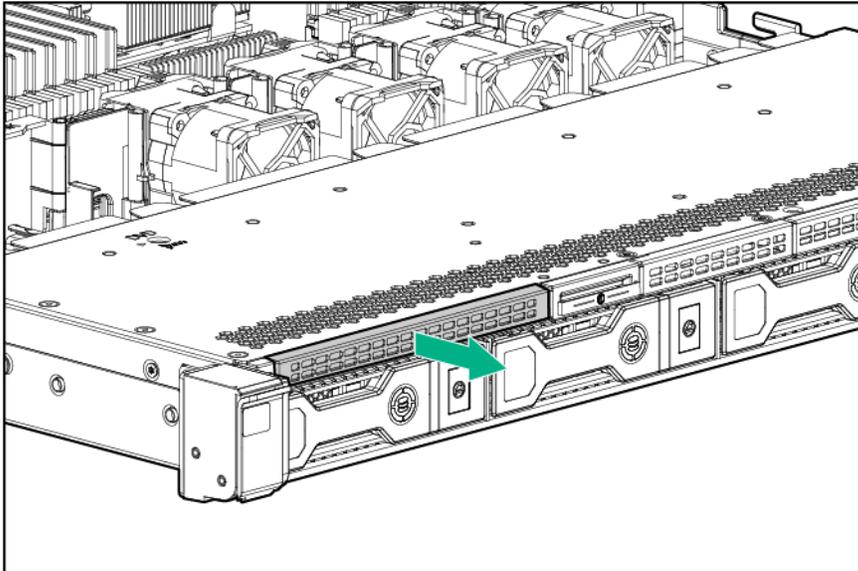
o   4 LFF VGA/USB blank
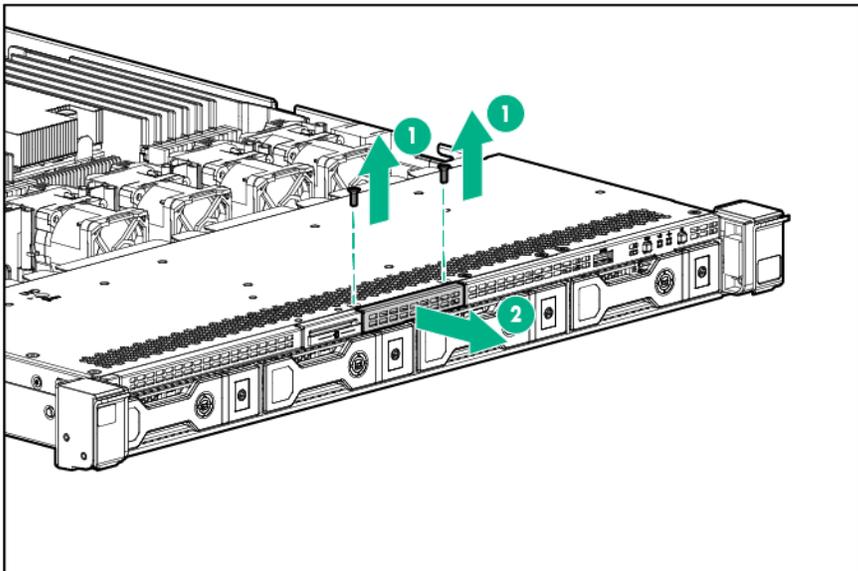
6.   Install the universal media bay option.

o   4 LFF optical drive.

After installing the 4 LFF optical drive, connect the ODD cable to the rear of the drive.
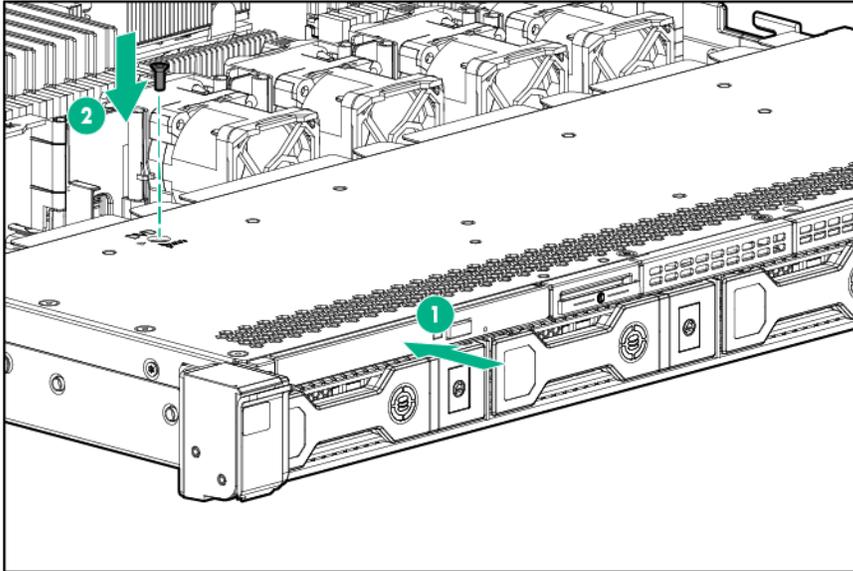

o   4 LFF VGA/USB
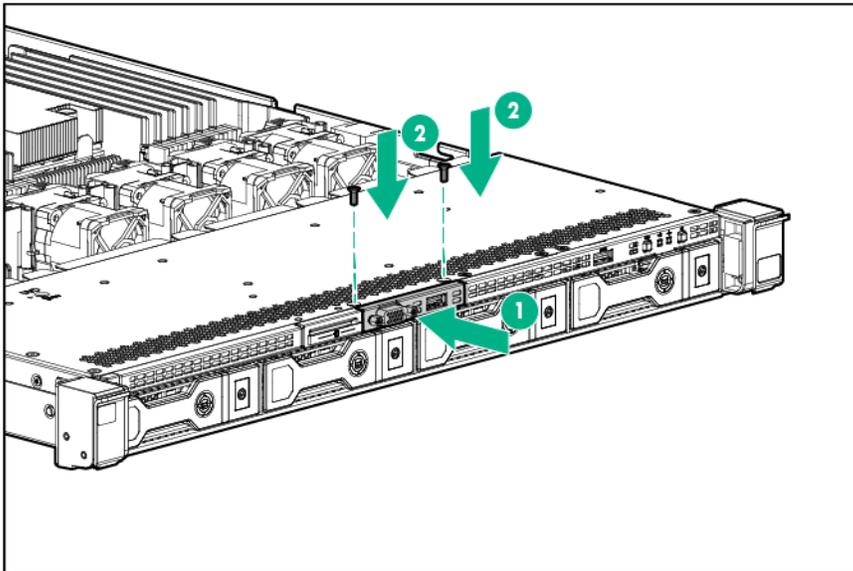
7.   Route the cables along the edge of the system board, and then connect the cables to the system board.

o   4 LFF VGA/USB connections

Connect the VGA/USB cable to the Front VGA/USB connector toward the rear of the system board.
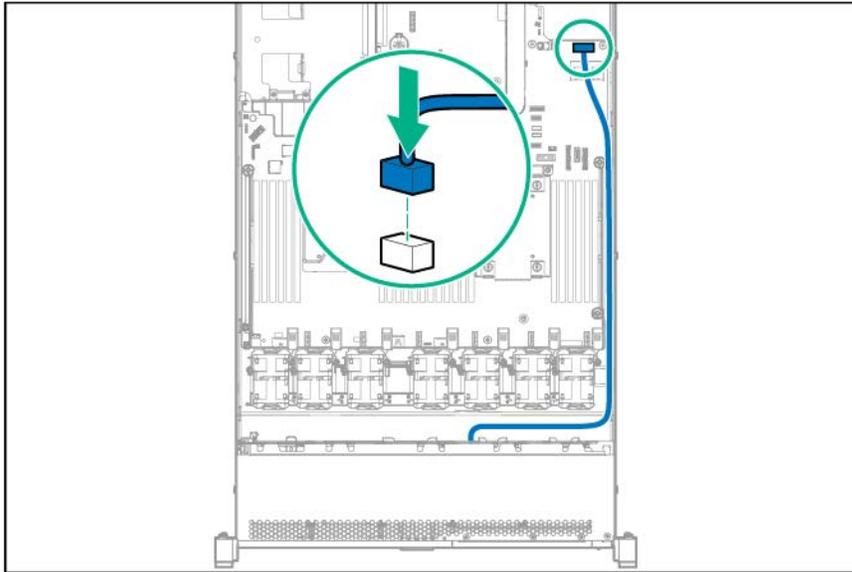
o   4 LFF optical drive connection

Connect the SATA optical cable to the SATA optical/storage drive connector.
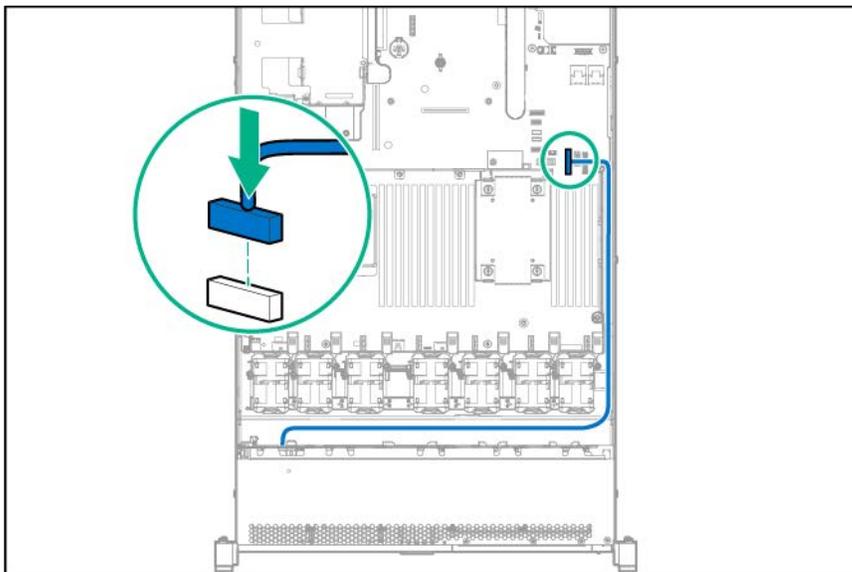
8.   Install the access panel (on page 21).

9.   Slide the server into the rack.

10.   Connect all power cords to the server, and then power up the server.

8SFF Universal Media Bay option

⚠   **WARNING:**   To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠   **CAUTION:**   To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page).
3. Do one of the following:
   o Extend the server from the rack (on page).
   o Remove the server from the rack (on page).
4. Remove the access panel (on page).
5. Remove the universal media bay blank.
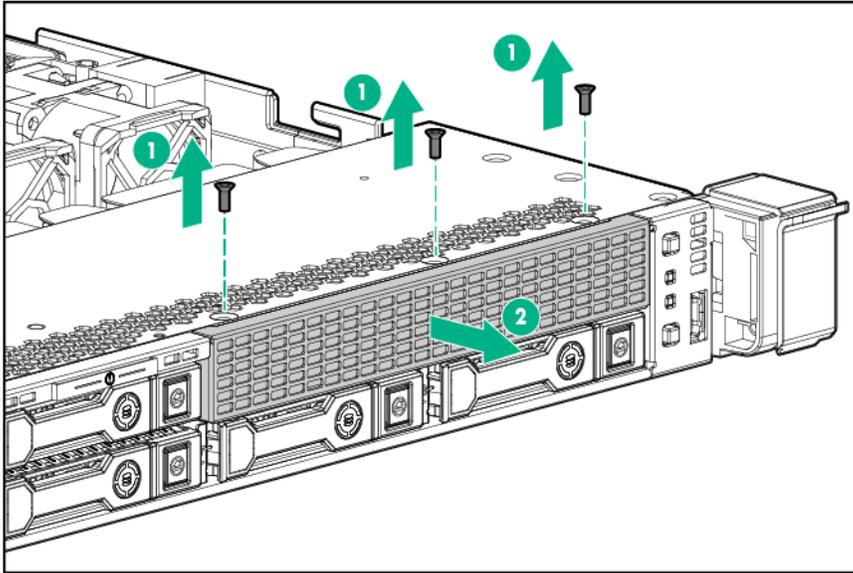
6. Install the universal media bay option.
   o 8SFF DVD-RW/VGA/USB
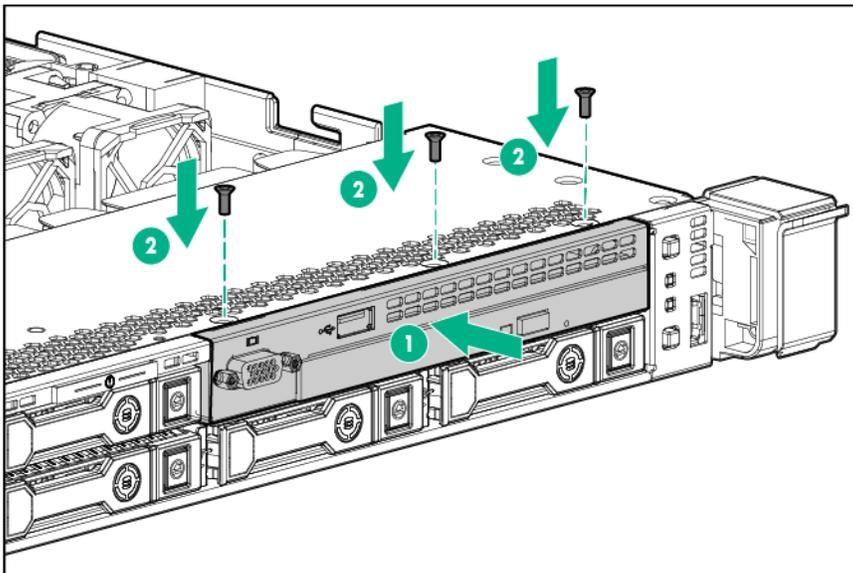
o   8SFF VGA/USB
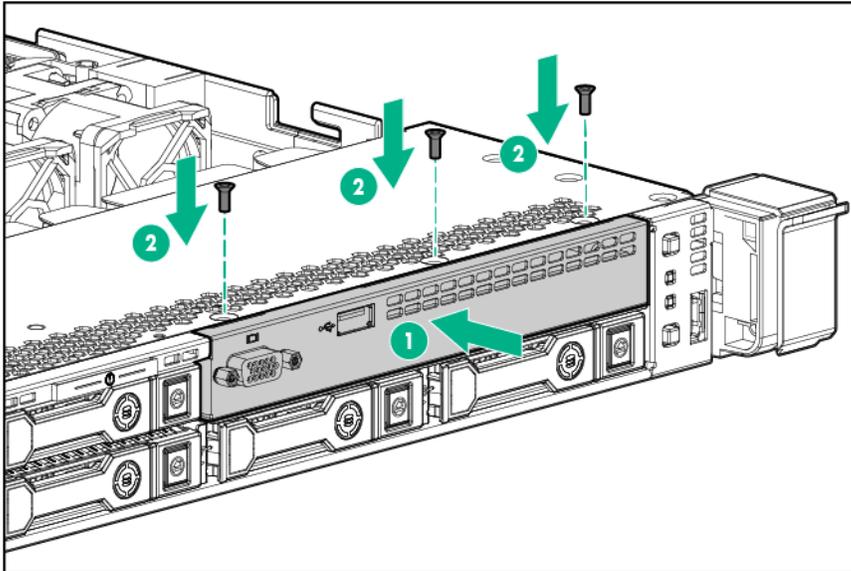
7. Route the cables along the edge of the system board, and then connect the cables to the system board.

    o   8SFF DVD-RW/VGA/USB connections

        Connect the VGA/USB cable to the Front VGA/USB connector toward the rear of the system board.

        Connect the SATA optical cable to the SATA optical/storage drive connector.
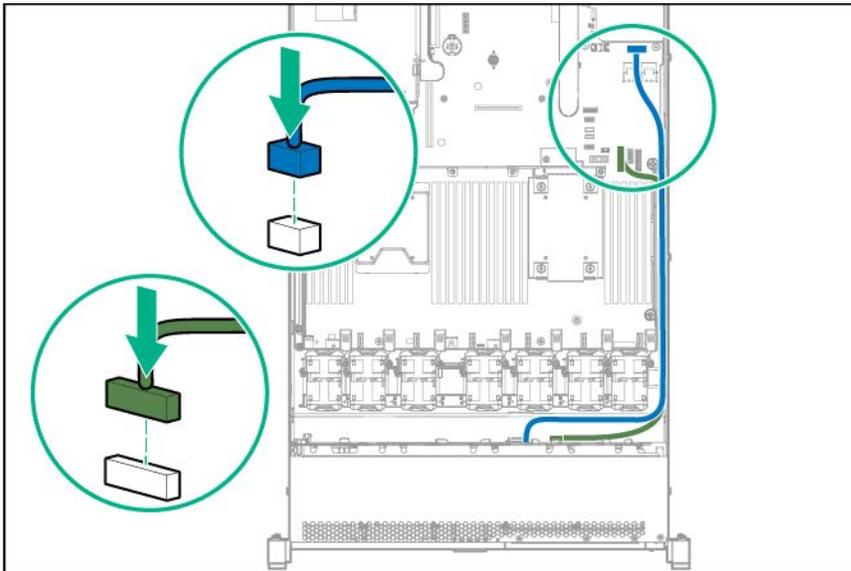
    o   8SFF VGA/USB connections

Connect the VGA/USB cable to the Front VGA/USB connector toward the rear of the system board.
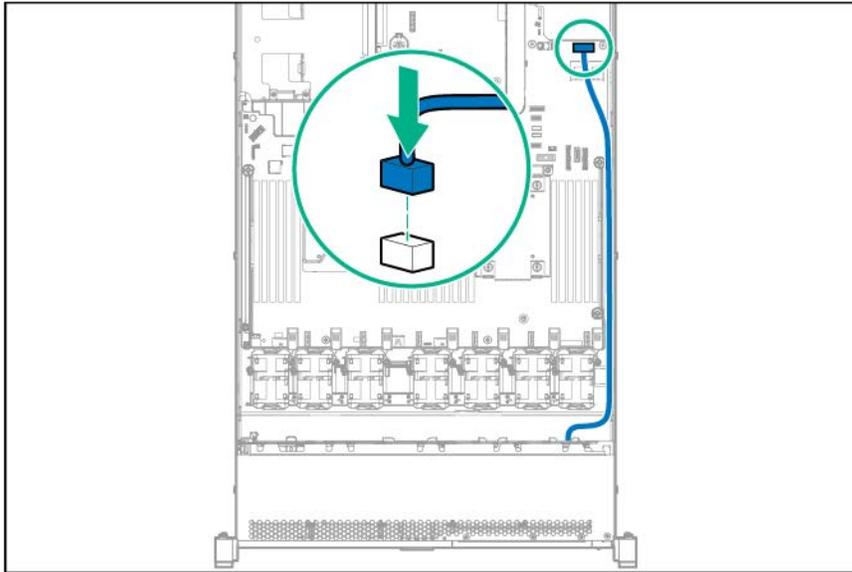
8. Install the access panel (on page 21).
9. Slide the server into the rack.
10. Connect all power cords to the server, and then power up the server.

10SFF (6 NVMe + 4 SAS/SATA) Express Bay drive backplane

The 10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Kit includes the following components:

- 8SFF Express Bay Drive Cage backplane
- 2SFF Express Bay Drive Cage backplane
- 2SFF Express Bay Drive Cage
- Express Bay Bridge Card

This option provides support for up to six SFF NVMe SSDs and four SFF SAS drives, SATA drives, or SSDs. The high-performance fans and a controller, such as the HPE Smart Array P440ar Controller, must be installed when installing this option.

For more information about NVMe SSDs, see the Hewlett Packard Enterprise website (**http://www.hpe.com/support/NVMedrive_en**). For more information on supported drives and population rules, see the server user guide on the Hewlett Packard Enterprise website. (**http://www.hpe.com/support/DL360Gen9/docs**)

To install the component:

1. Back up all server data.
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   a. Extend the server from the rack (on page 20).
   b. Remove the server from the rack (on page 21).

4. Remove the access panel (on page 21).

5. Remove all drives ("Removing a hot-plug SAS or SATA drive" on page 54) and drive blanks ("Removing the hard drive blank" on page 53).

6. Disconnect and remove all cables connected to the drive backplane.

7. Remove the 8SFF SAS/SATA drive backplane ("Removing the 8 SFF drive backplane" on page 24).

8. Install the 8SFF Express Bay backplane.
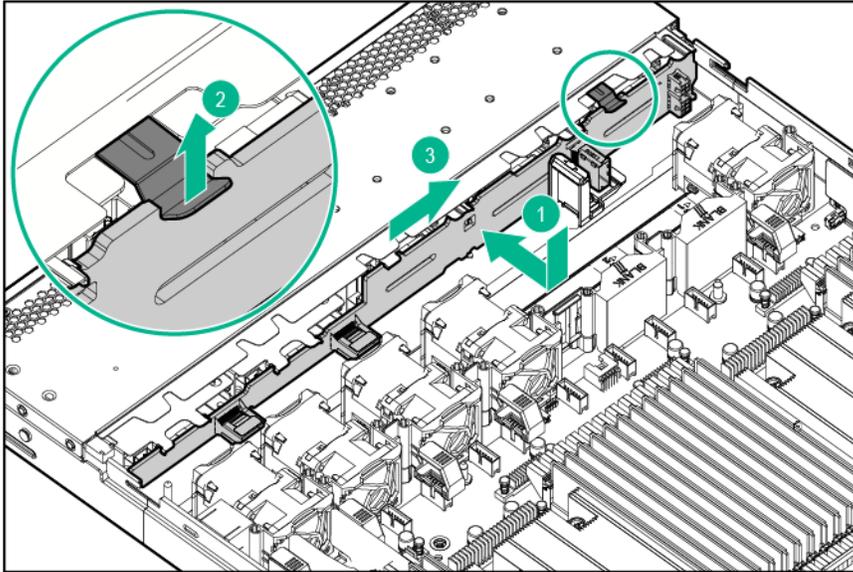
9. Install the 2SFF Express Bay Enablement Option ("2SFF Express Bay drive backplane" on page 58).

10. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).

11. Install the Express Bay Bridge card in slot 1 of the primary PCI riser cage.
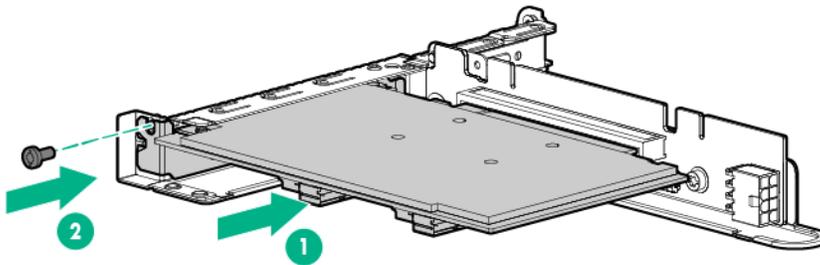
12. Install the primary PCI riser cage ("Install the PCI riser cage" on page 23).

13. Cable the 10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Options ("10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Option cabling" on page 113).

14. Install the high-performance fans ("High-performance fan option" on page 32).

15. Install the NVMe drives ("Installing the NVMe drives" on page 54). For more information on which bays support NVMe drives, see "Device numbers (on page 16)."

16. Install the SAS or SATA drives ("Installing a hot-plug SAS or SATA drive" on page 53). For more information on which bays support SAS and SATA drives, see "Device numbers (on page 16)."

17. Install the access panel (on page 21).

18. Install the server into the rack.

19. Connect each power cord to the server.
20. Connect each power cord to the power source.
21. Press the Power On/Standby button.

   The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

GPU riser and cable option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).
6. Install the GPU in the x16 slot in the primary PCI riser cage position. The PCI riser cage assembly with the full-length, full-height PCIe3 x16 riser slot is required for GPU installation. For more information, see "Full height PCIe x16 riser cage assembly option (on page 71)."

   Before installing a high-power GPU in the server, be sure that the power supplies support the installation of the option. Because of the high power requirements for the GPU, a 800-W or higher power supply might be required. For more information, see the Hewlett Packard Enterprise Configurator website (**http://www.hpe.com/info/SimpleConfigurator**).
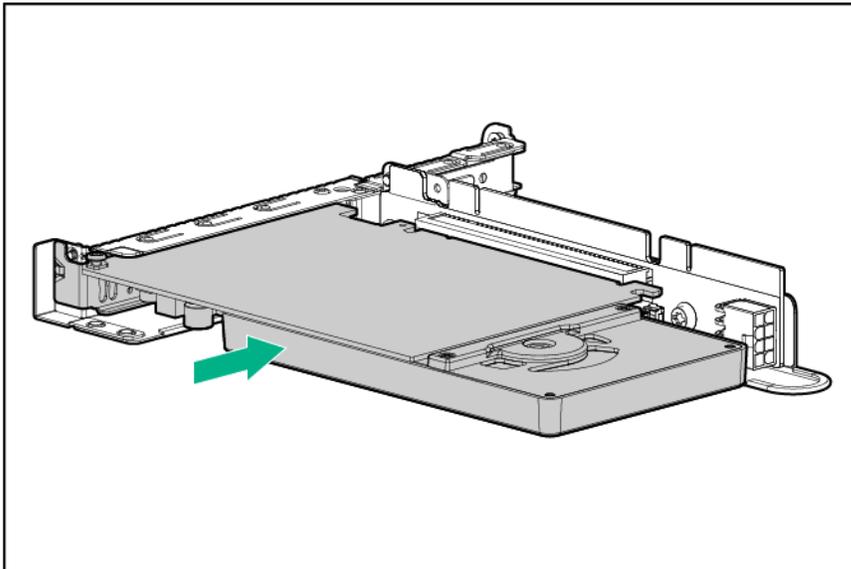
7. Install the GPU support bracket.
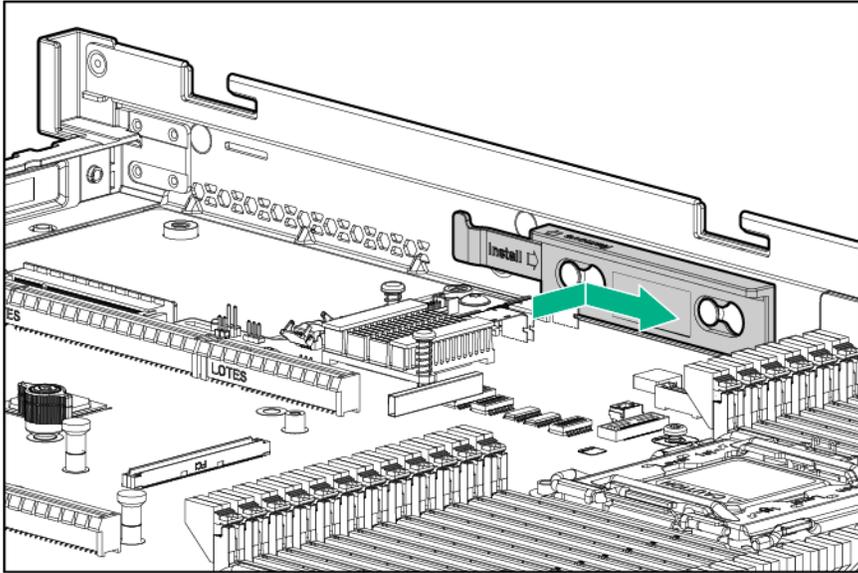
8. Install the riser cage.
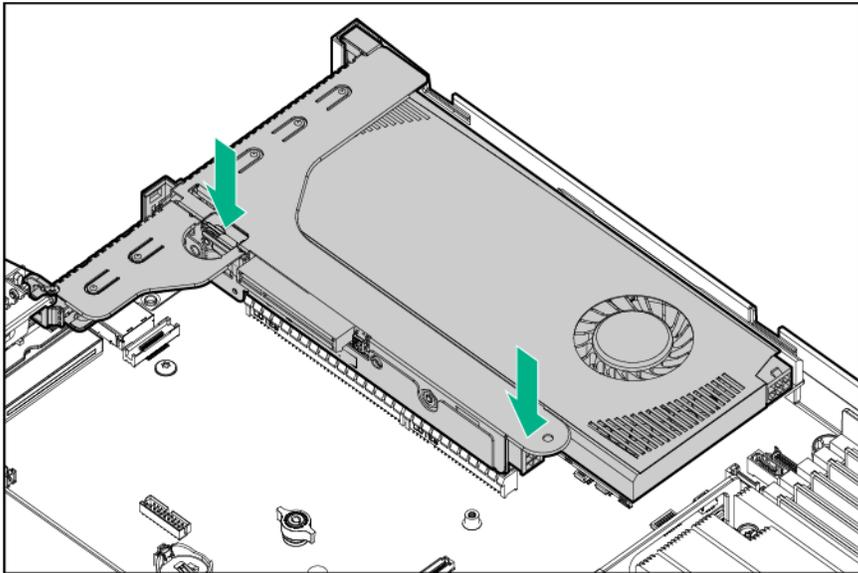
9. Connect the GPU riser cable to the GPU and the primary riser cage PCA.
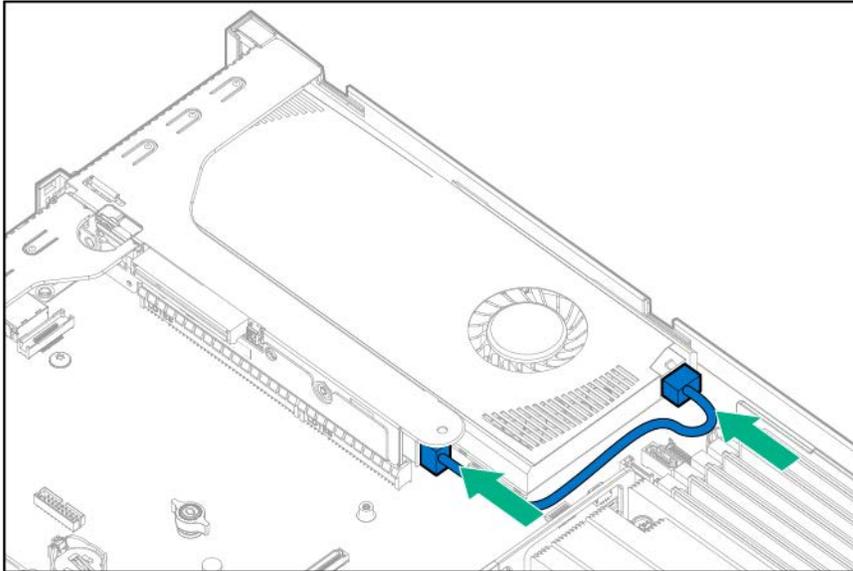
Secondary riser options

The server supports low-profile or full-height risers in the secondary riser cage position.

Full height PCIe x16 riser cage assembly option

This option includes GPU support for a secondary riser.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
  o Extend the server from the rack (on page 20).
  o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).

6. If installed, remove the low profile riser board from the secondary riser board slot. Remove the riser cage bracket from the primary PCIe riser cage.
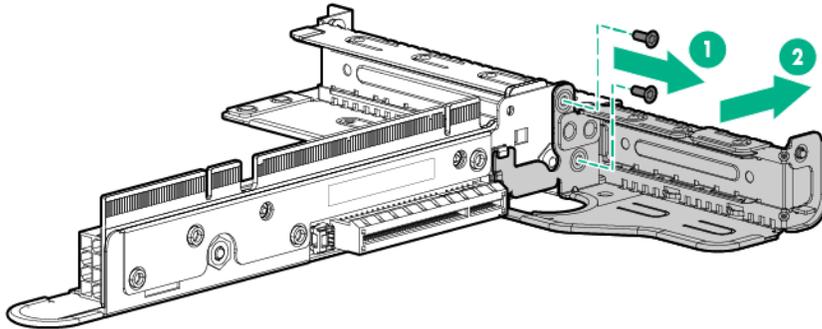
7. Lift and remove the riser cage latch.
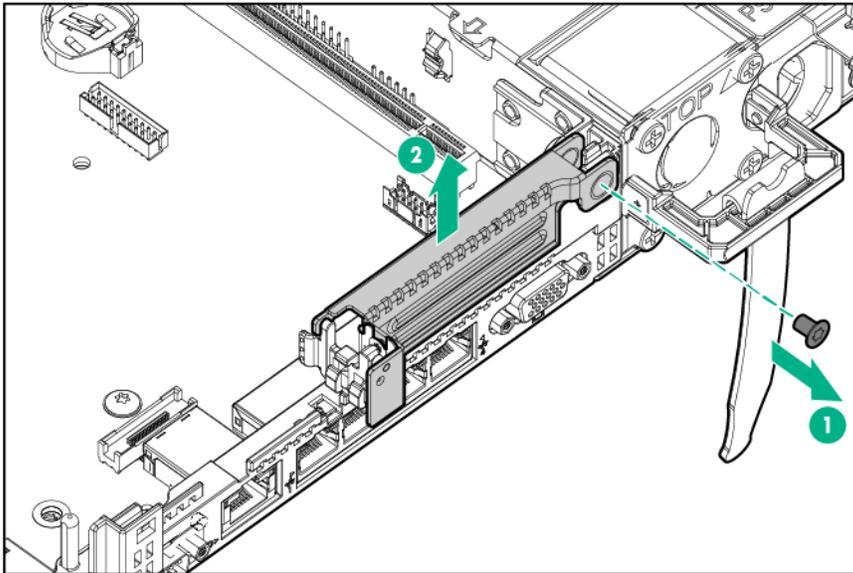
8. Install the full height PCIe x16 riser cage latch.
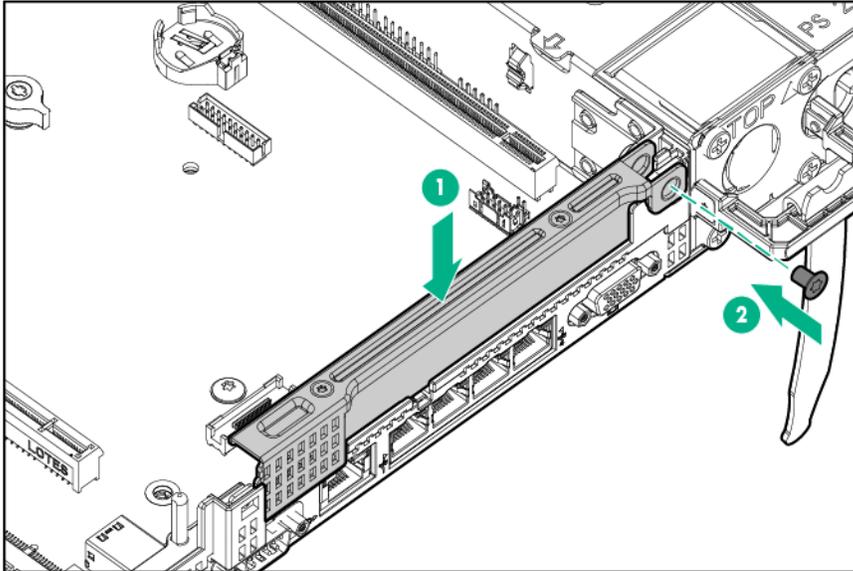
9. Align the PCIe x16 riser cage with the corresponding connector on the system board, and then press down on the riser cage.

An HPE DL360 Gen9 Smart Array P440ar Controller for 2 GPU configurations (726740-B21) is required when configuring the server with dual GPU cards. If a GPU is installed in the full height PCIe riser cage option, connect the GPU cable to the riser cage connector and the installed GPU.
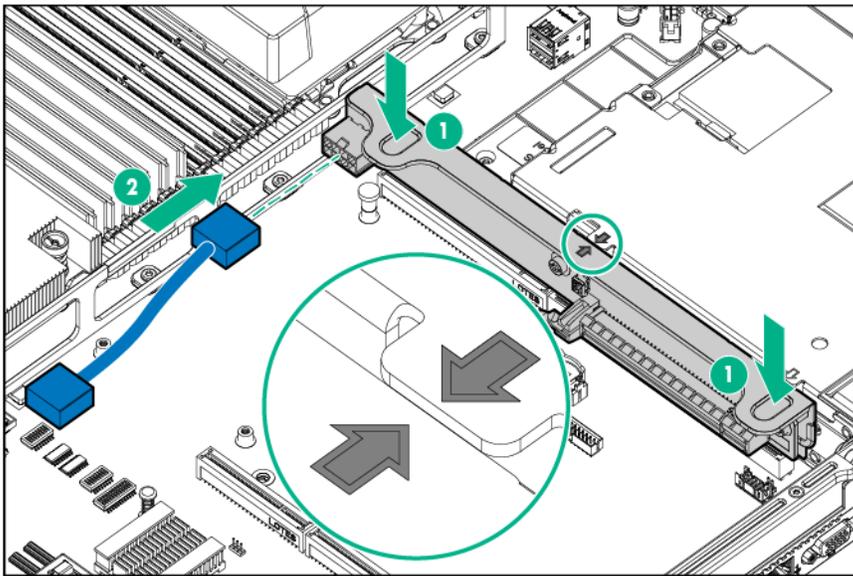
△ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all PCI slots have either an expansion slot cover or an expansion board installed.

The HPE Smart Array P440ar Controller with cut heatsink (726740-B21) allows for clearance when a GPU is installed in the secondary full-height riser cage.
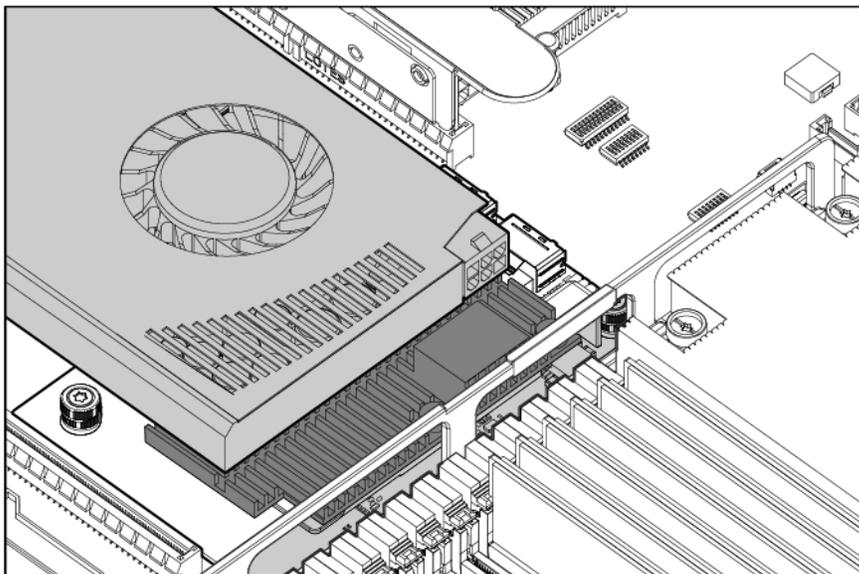
The HPE Smart Array P440ar Controller is required when 2 GPUs are installed in the server.
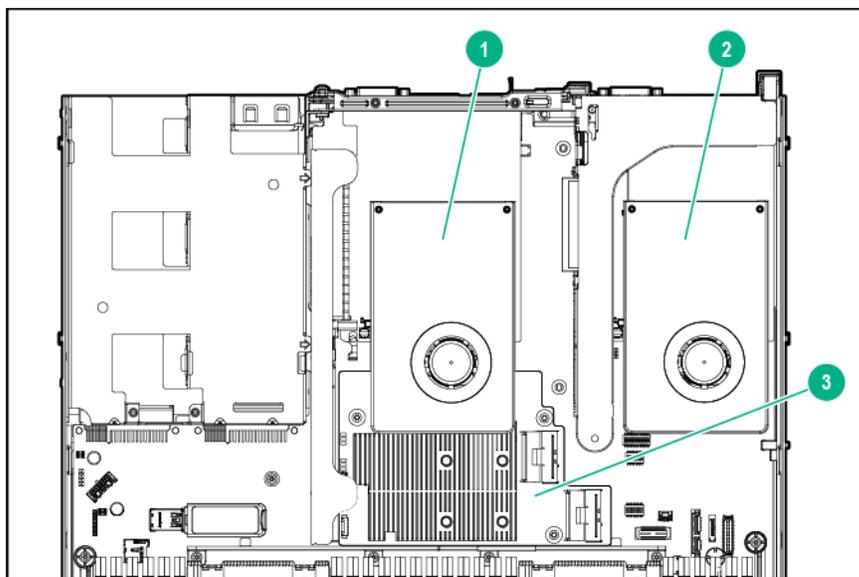
Item	Description
1	GPU 1
2	GPU 2
3	HPE Smart Array P440ar Controller

Low-profile PCIe slot riser cage option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page).
3. Do one of the following:
   o Extend the server from the rack (on page).
   o Remove the server from the rack (on page).
4. Remove the access panel (on page).
5. Install the low-profile riser cage.
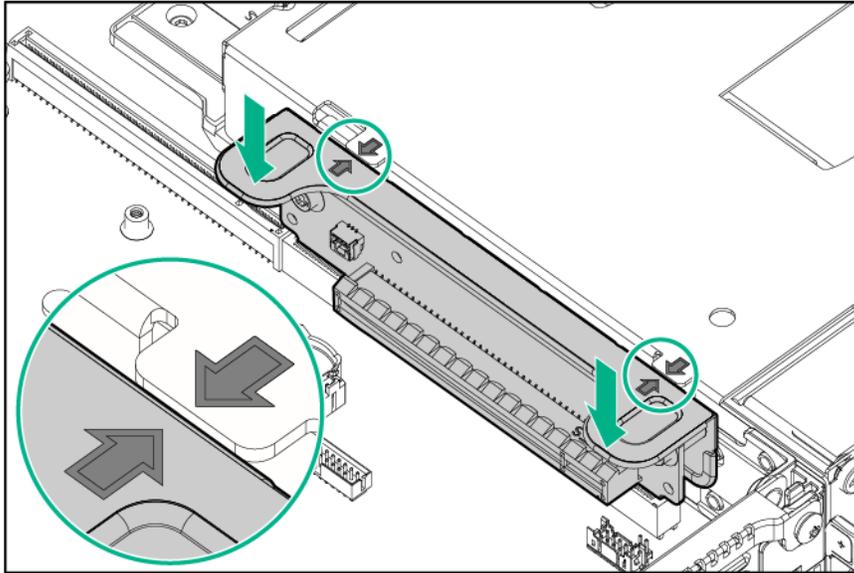
HPE Smart Storage Battery

To install the component:
1. Power down the server (on page).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page).
   o Remove the server from the rack (on page).
4. Remove the access panel (on page).

5. Install the Smart Storage battery.
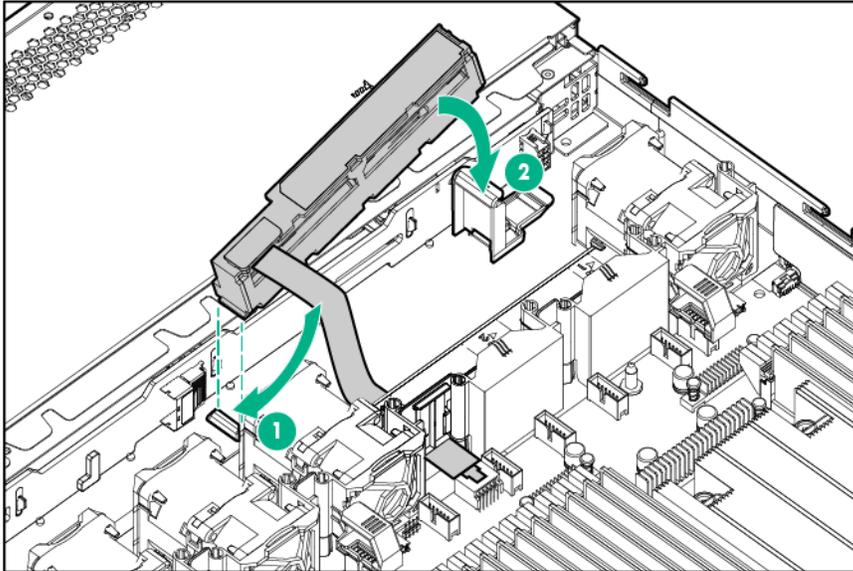
6. Connect the cable.
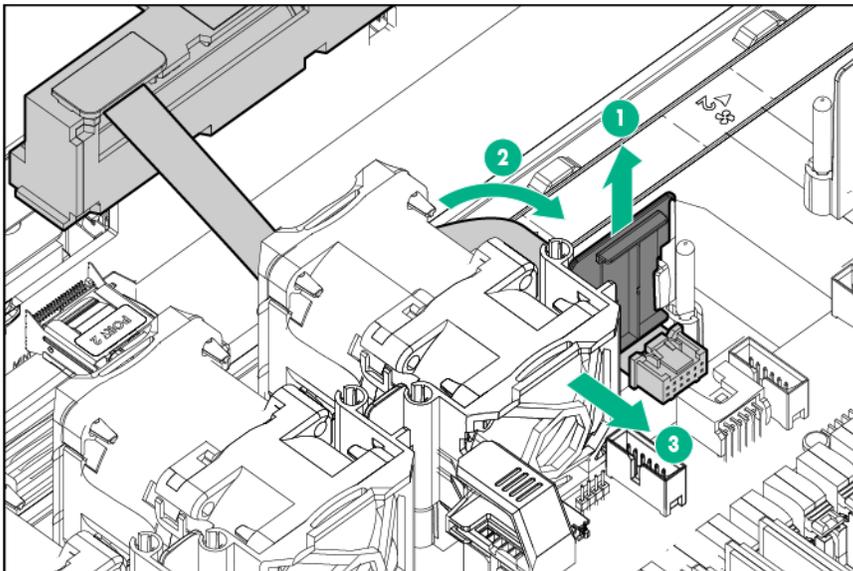
7. Install the access panel (on page 21).

8. Slide the server into the rack.

9. Connect each power cord to the server.

10. Connect each power cord to the power source.

11. Power up the server ("Powering up the server" on page 20).

HPE Smart Array P440ar Controller option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Install the HPE Smart Array P440ar controller.
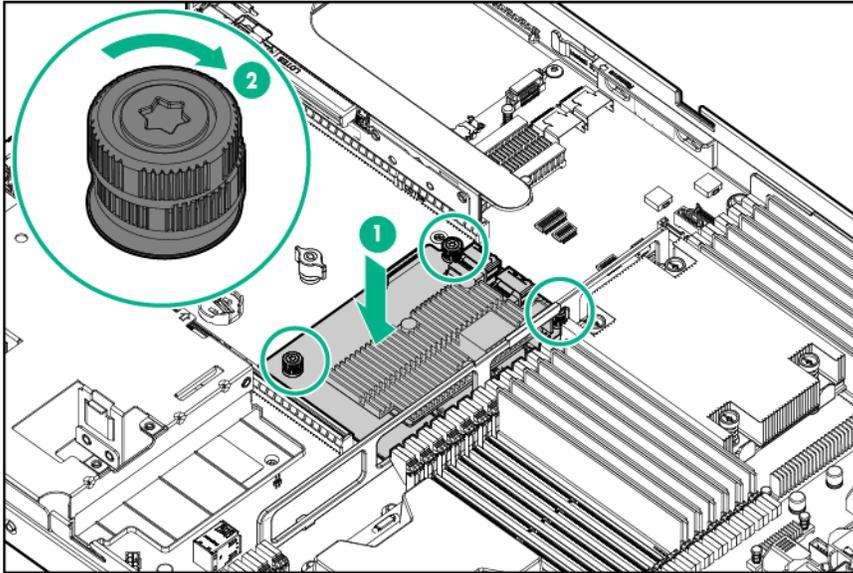

6. Connect the SAS/SATA cables to the backplane and Smart Array controller. Install the SAS/SATA cables according to their labels as Port 1 or Port 2. These labels are on the cables and their connections.
   o 8SFF

o   4LFF

HPE Smart Array P440 Controller option

⚠️   **WARNING:**   To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠️   **CAUTION:**   To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1.   Back up all server data.
2.   Power down the server (on page).
3.   Do one of the following:
     o   Extend the server from the rack (on page).
     o   Remove the server from the rack (on page).
4.   Remove the access panel (on page).
5.   Remove the primary PCI riser cage ("Remove the PCI riser cage").
6.   Remove the slot two expansion board blank.
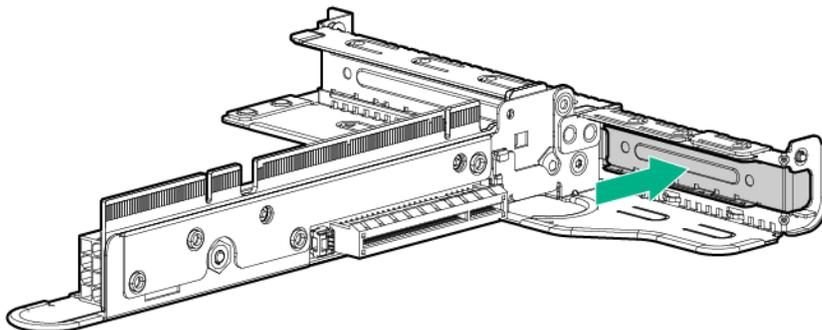
The controller board can be installed in slot 1 or slot 2.

7. Install the controller board into slot 2 of the riser cage.
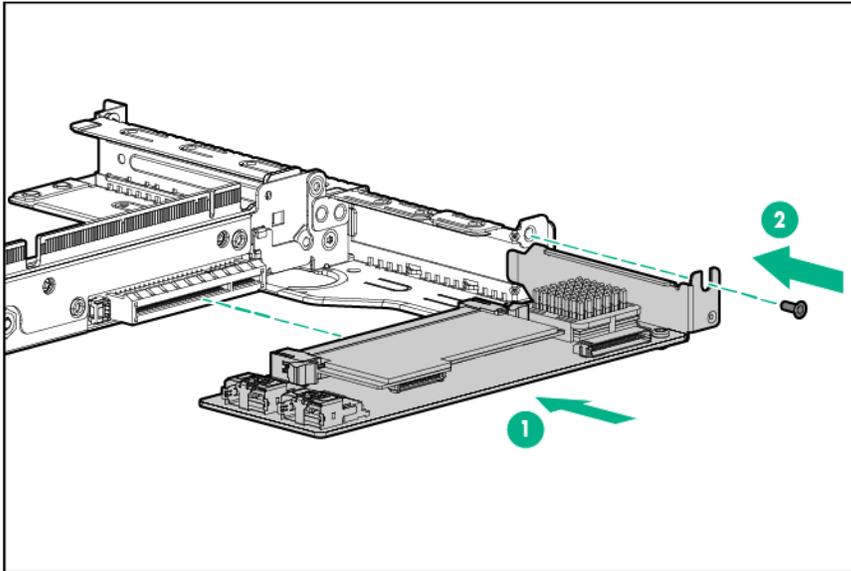
8. Install the riser cage in the server ("Install the PCI riser cage" on page 23).

9. Connect the cables from port one and two on the backplane to port one on the P440 controller board. If the H240 controller board is installed, the SAS cables will use both ports.

   o 8SFF
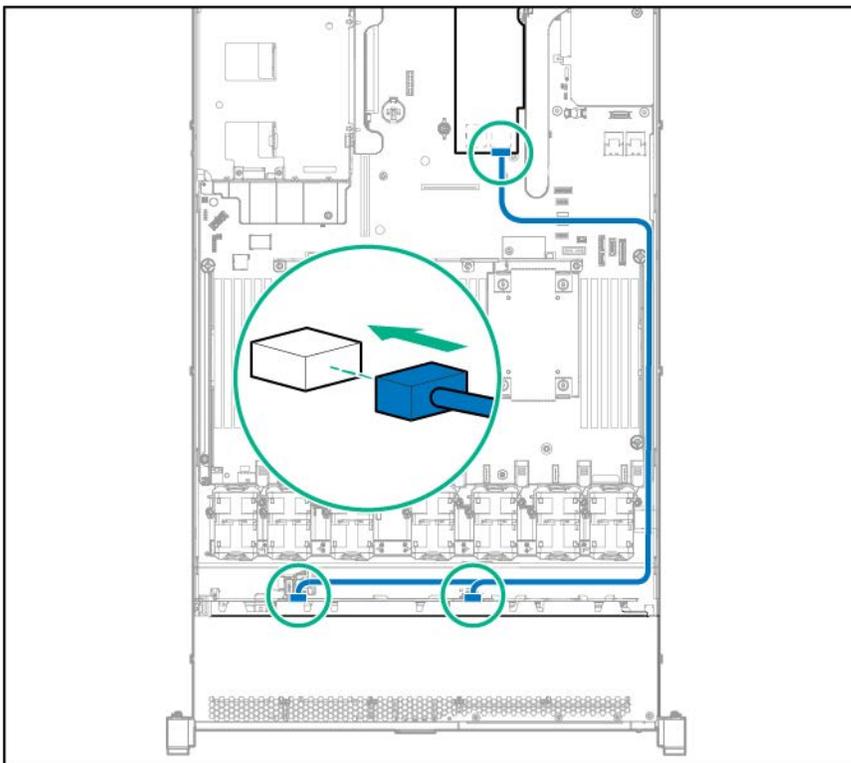
o 4LFF
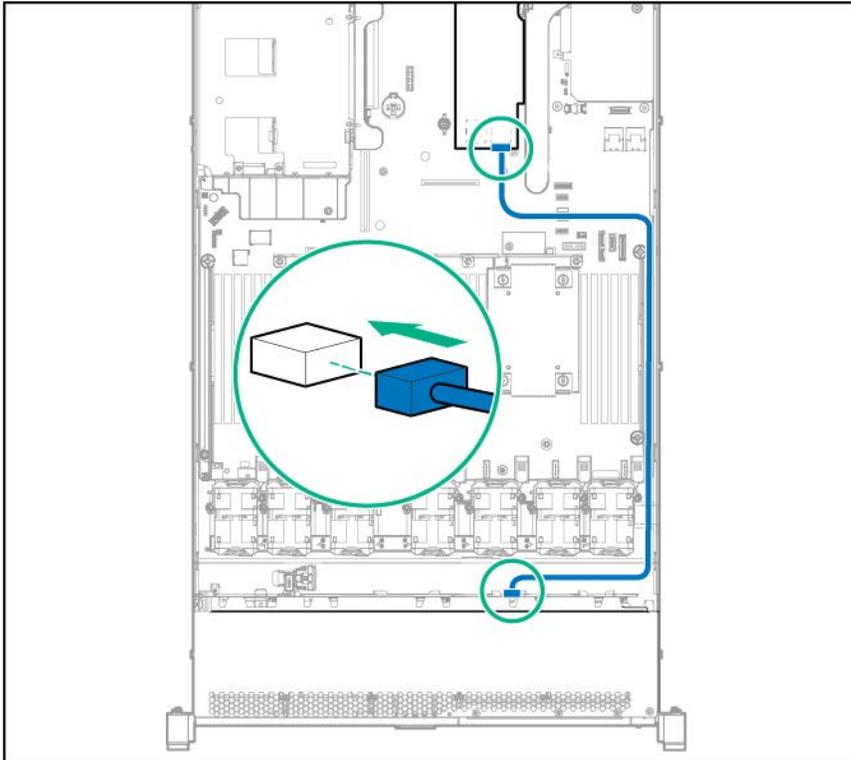

HPE Smart Array P840ar Controller option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
    o Extend the server from the rack (on page 20).
    o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).

5. Install the HPE Smart Array P840ar controller.
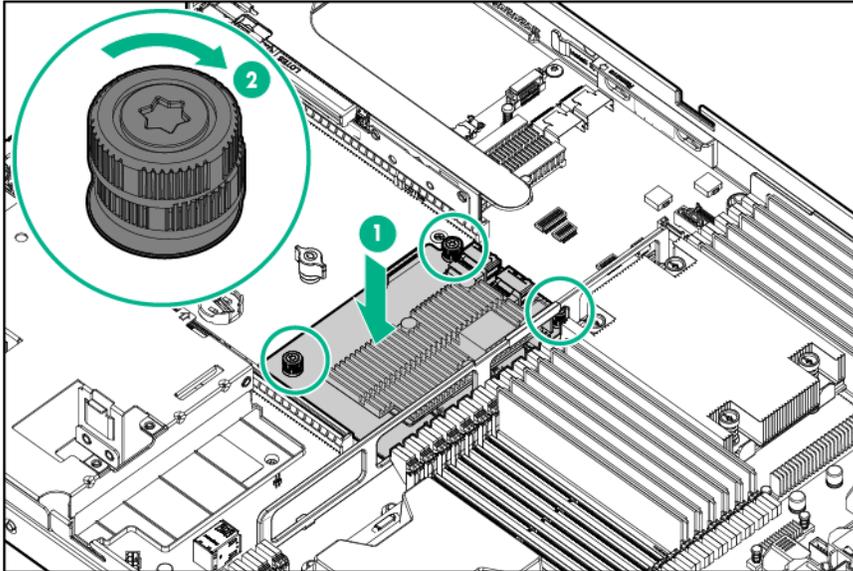
6. Connect both the Mini-SAS connectors from the 8SFF backplane to controller port 1.
7. If the optional 2SFF backplane is installed, connect the Mini-SAS cable to controller port 2.
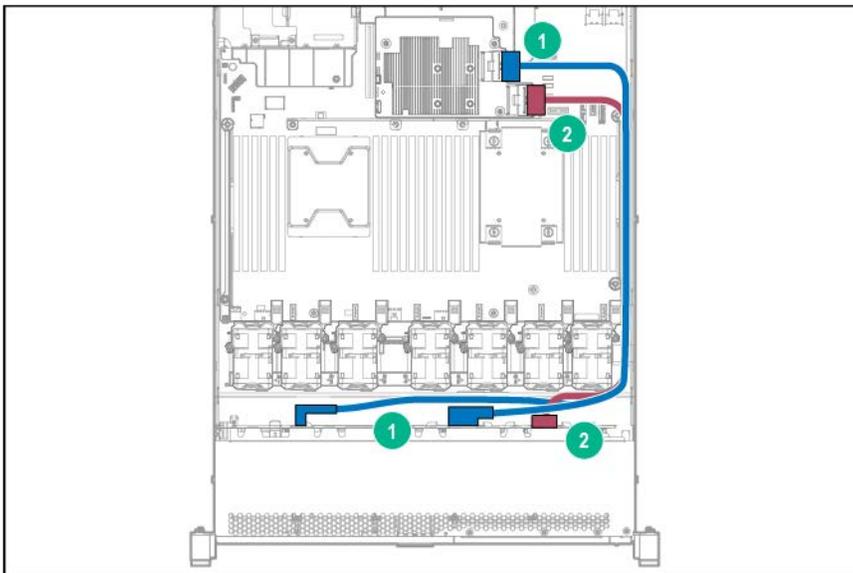

HPE Smart Array P840 Controller board option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).

- o   Remove the server from the rack (on page 21).
4.   Remove the access panel (on page 21).
5.   Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).
6.   Install the P840 controller board.
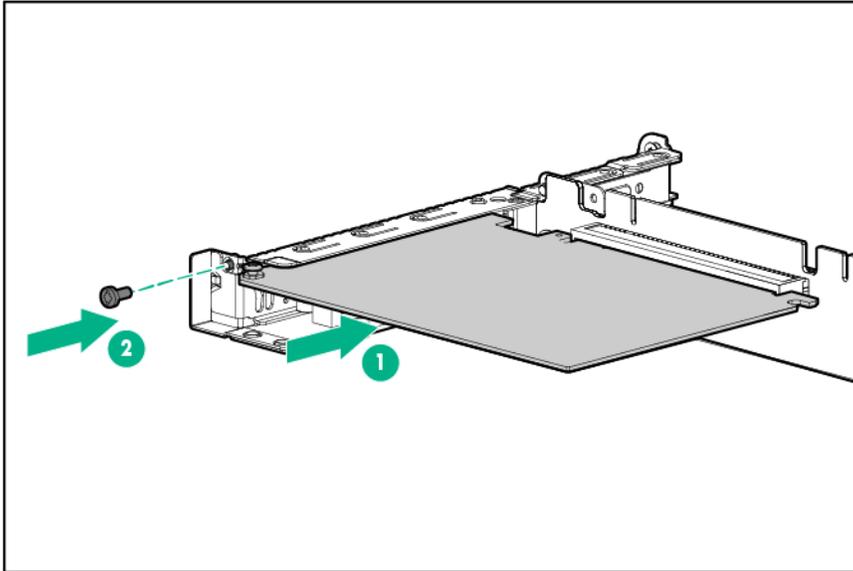
7.   Install the riser board assembly.
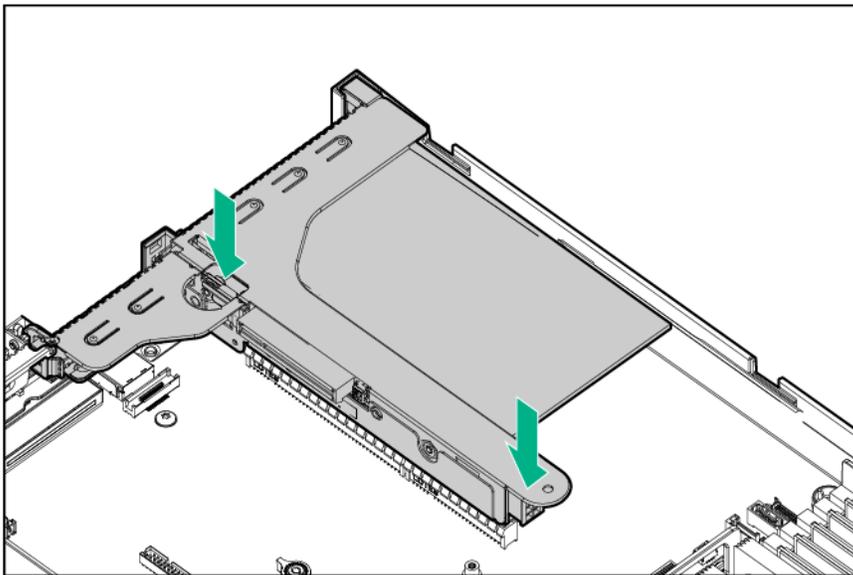
8. Connect the Mini-SAS cables from the standard backplane to port one on the optional P840 controller board.
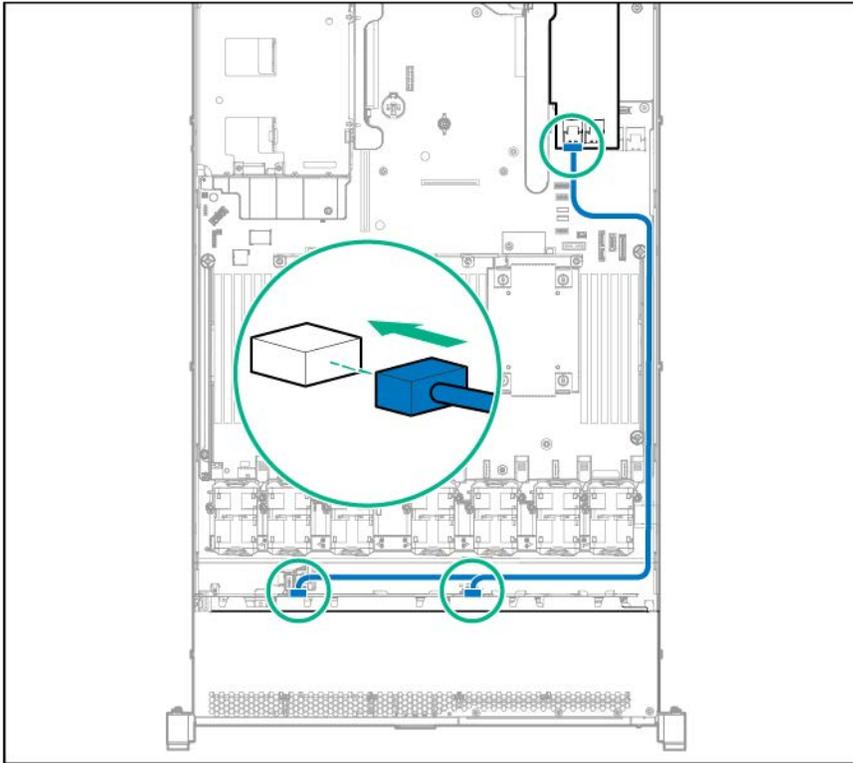
9. If the 2SFF SAS/SATA backplane is installed, connect the Mini-SAS cable from the optional backplane to port 2 on the P840 controller board.
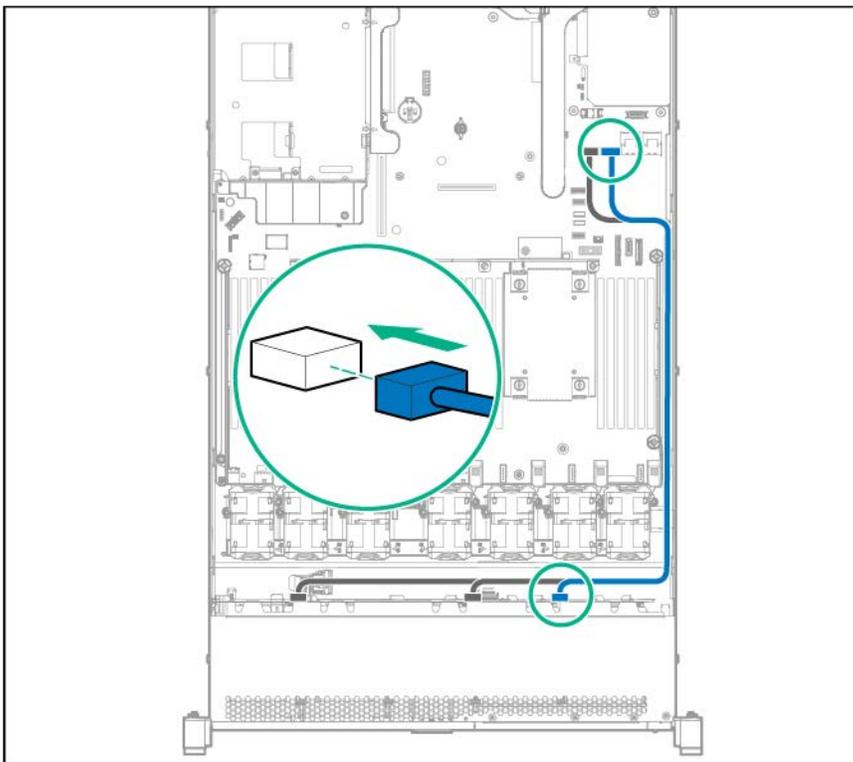
Systems Insight Display module

⚠️ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠️ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Disconnect the Power/UID/USB cable from the front power button/USB 3.0 connector on the system board.
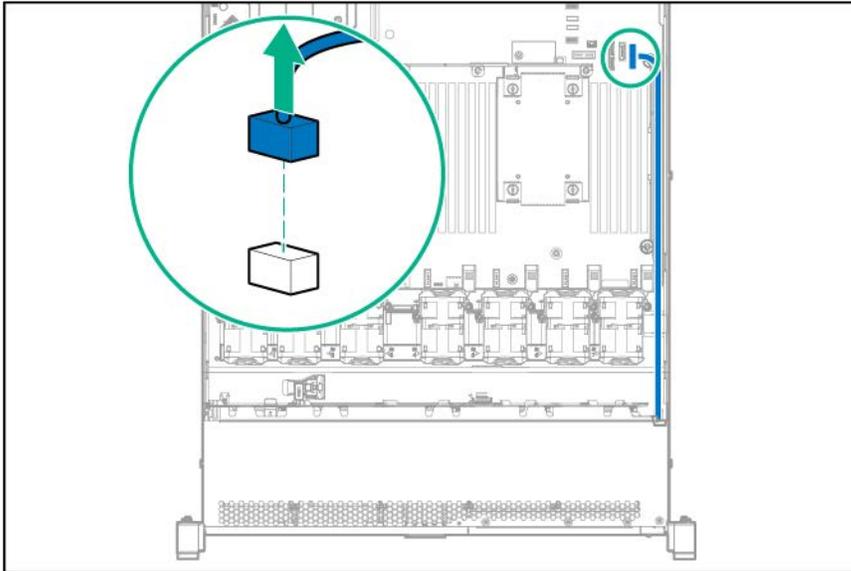
6. Remove the Power/UID/USB assembly.

o   8SFF
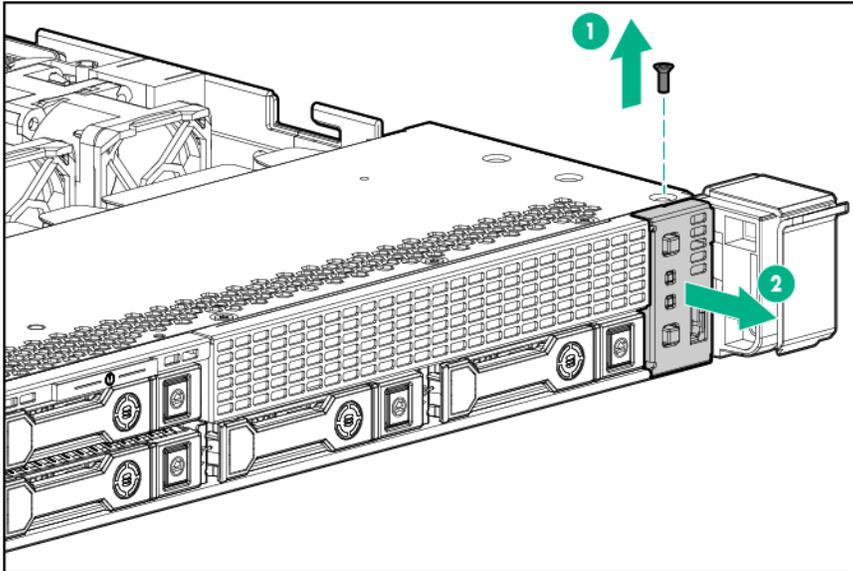
o   4LFF
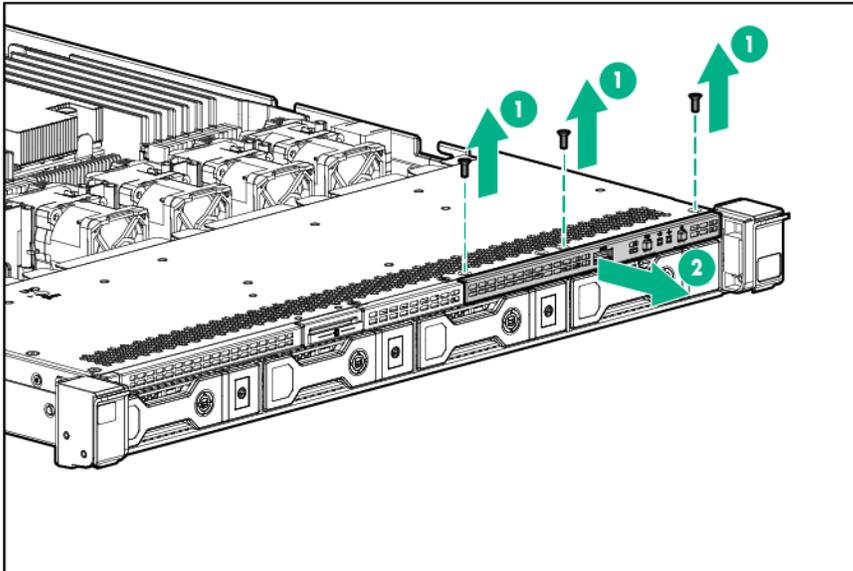
⚠   **CAUTION:**   When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

To install the SID module:

1. Guide the SID cable through the front of the server.
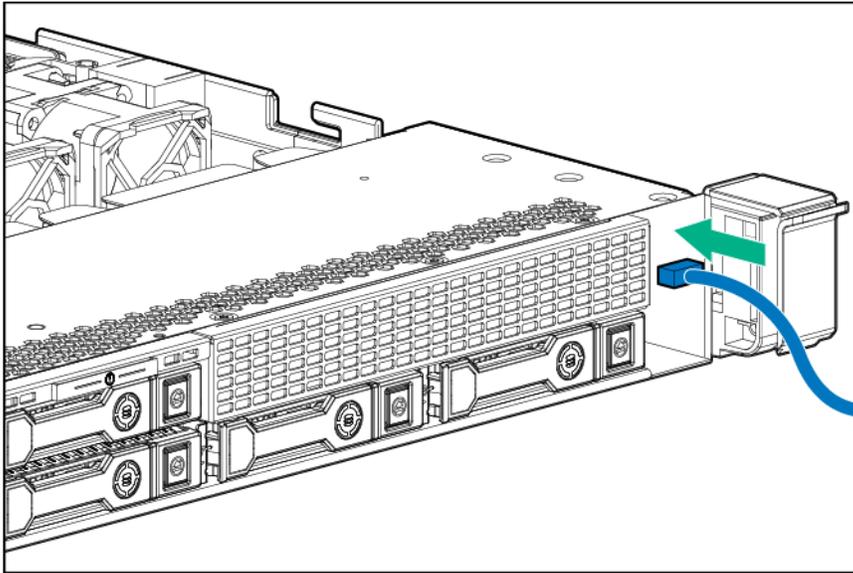
2. Install the SID module into the front panel and secure the module to the chassis with the screws from the kit.

    o   8SFF
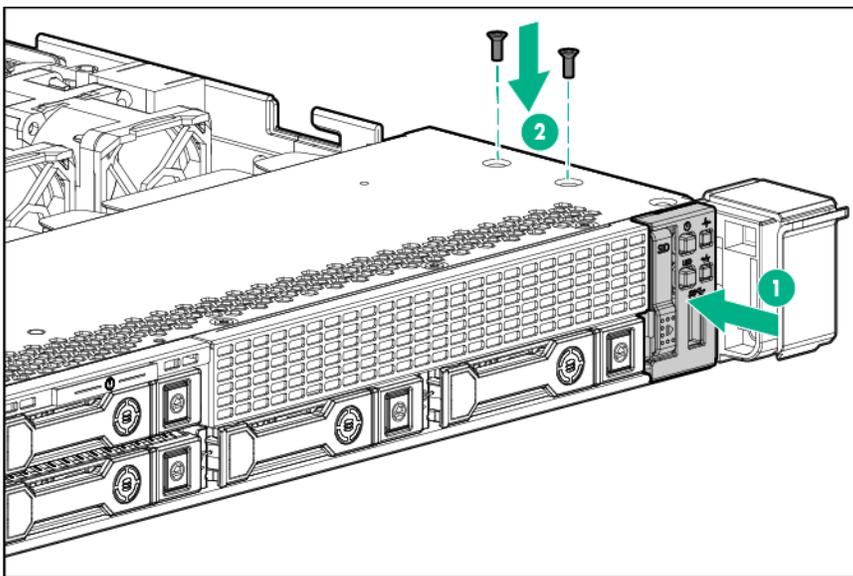
o   4LFF
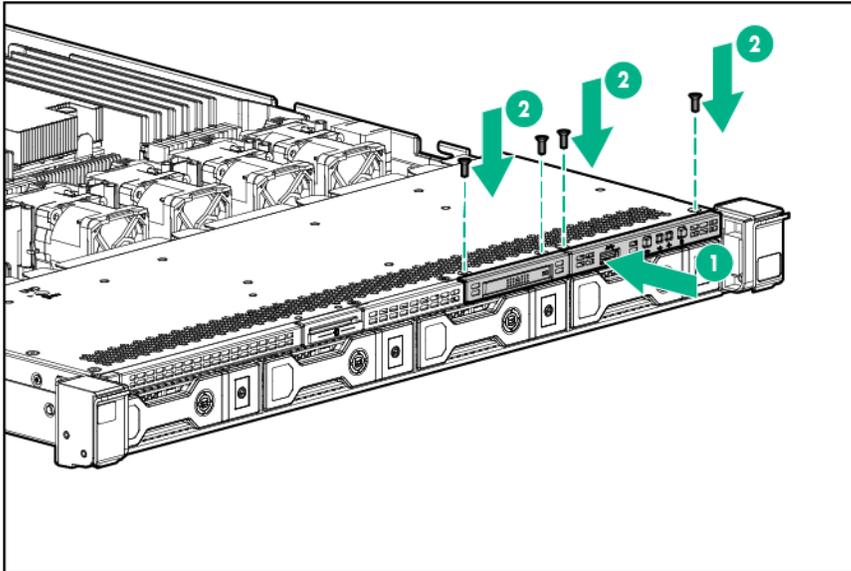
3.   Connect the SID cables to the front power button/USB 3.0 connector on the system board.
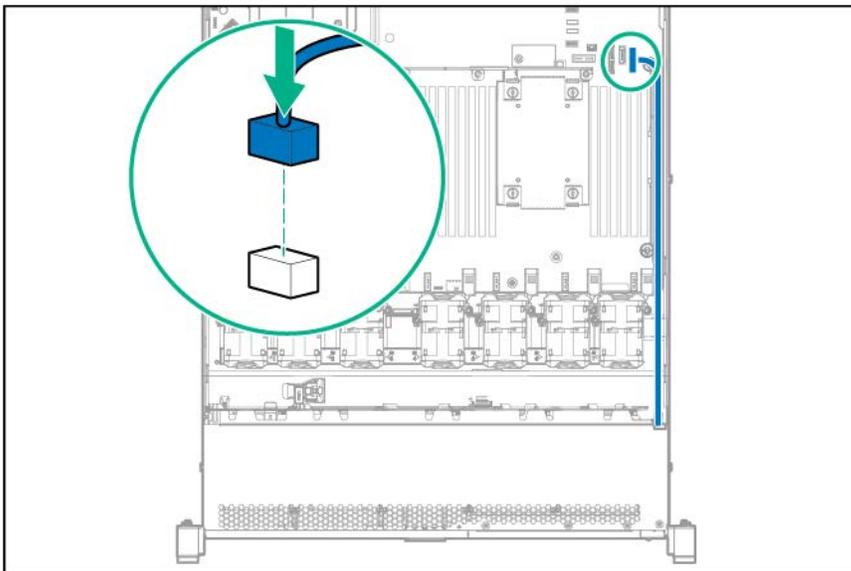
FlexibleLOM option

⚠ **WARNING:**   To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:**   To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1.   Back up all server data.
2.   Power down the server (on page 20).
3.   Do one of the following:
o   Extend the server from the rack (on page 20).
o   Remove the server from the rack (on page 21).

4. Remove the access panel (on page).

5. Remove the FlexibleLOM PCIe blank.
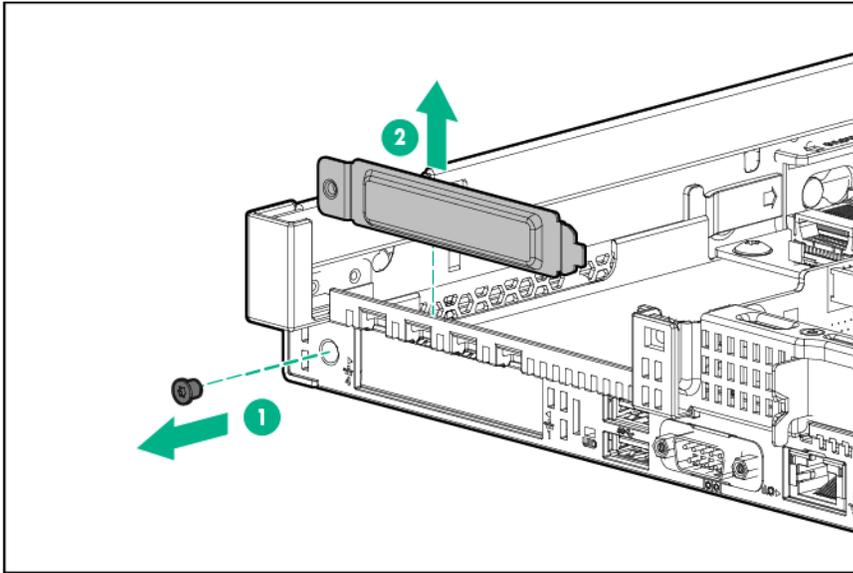
6. Install the component:

    a. Firmly seat the FlexibleLOM in the slot.

    b. Tighten the thumbscrew.
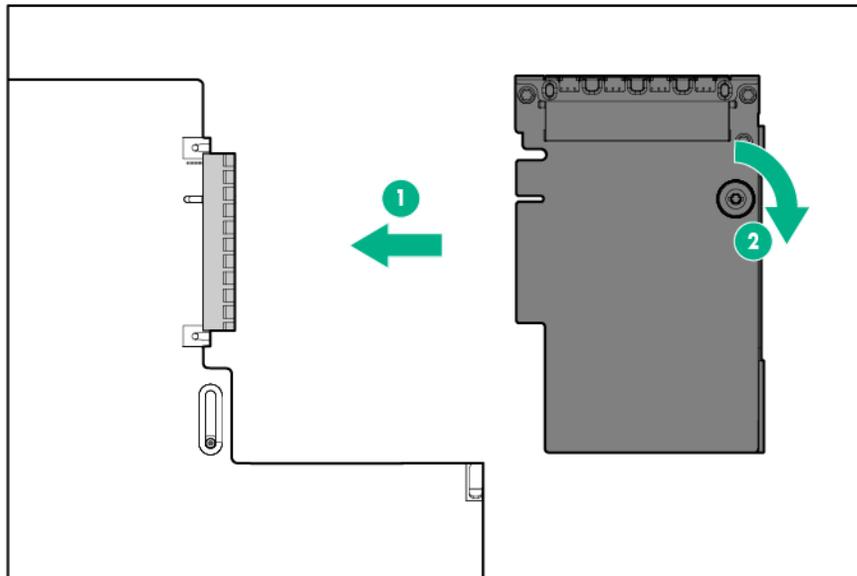
7. Install the access panel (on page).

8. Slide the server into the rack.

9. Connect the LAN segment cables.

10. Connect each power cord to the server.

11. Connect each power cord to the power source.

12. Power up the server ("Powering up the server" on page 20).

Serial cable option

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the serial cable blank.
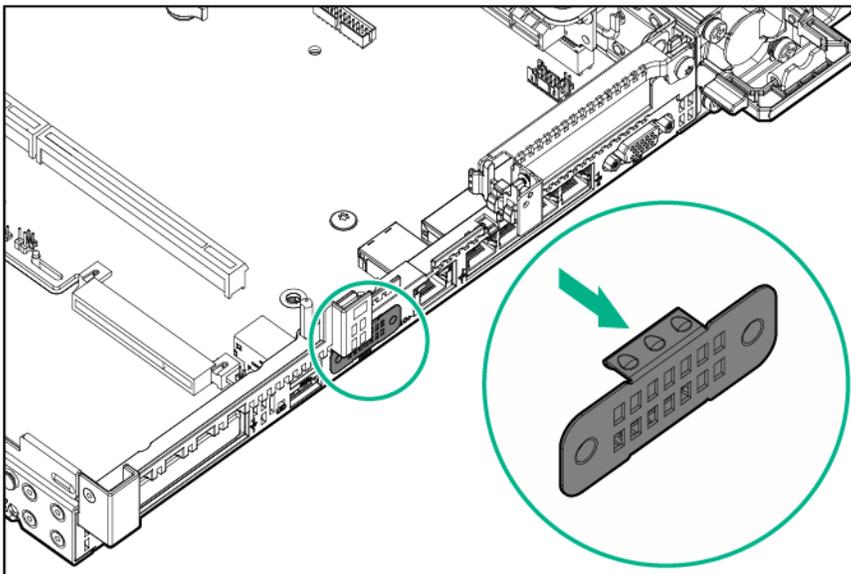
6. Connect the serial cable option. Then, remove the backing from the double-sided tape and press down where indicated.
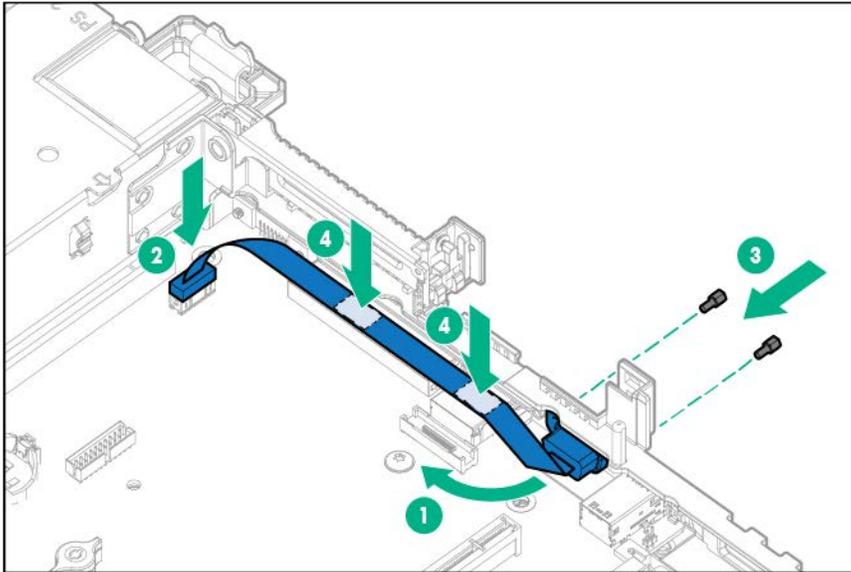
Expansion board options

The server supports PCI Express expansion boards. The server ships with PCIe riser boards and expansion slots. PCIe expansion boards are supported with optional riser boards.

Removing the expansion slot blanks

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Disconnect any external cables that are connected to the expansion board.
6. Disconnect any internal cables that are connected to the expansion board.
7. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).
8. Remove the expansion slot blank:

o   Primary PCI riser cage
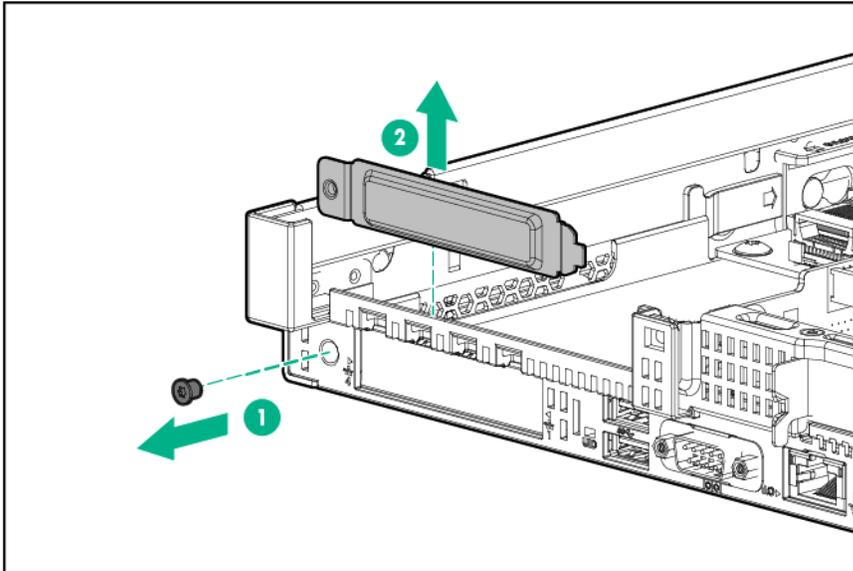
o   Secondary PCI riser cage
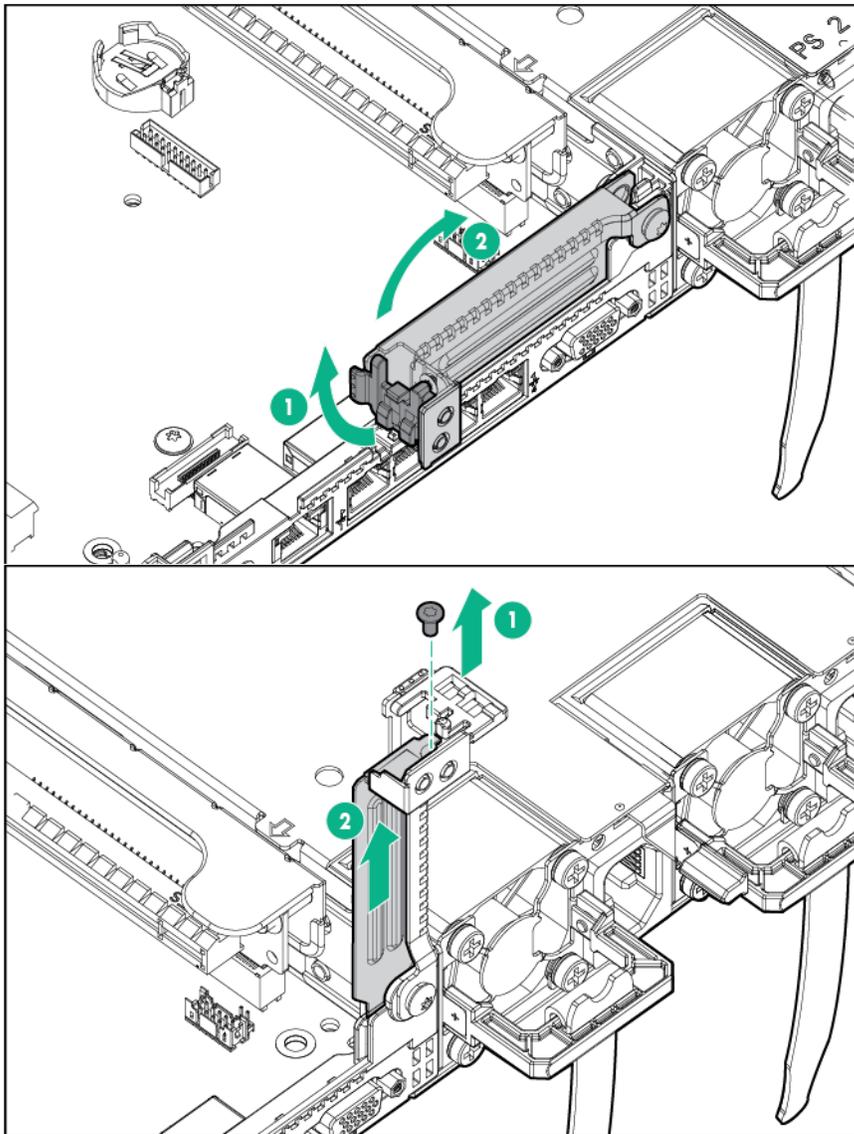
Installing an expansion board

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

1. Back up all server data.
2. Power down the server (on page 20).
3. Do one of the following:
    o Extend the server from the rack (on page 20).
    o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the primary PCI riser cage ("Remove the PCI riser cage" on page 22).
6. Remove the expansion slot blank ("Removing the expansion slot blanks" on page 90).

7. Install the expansion board:

  o Primary riser cage
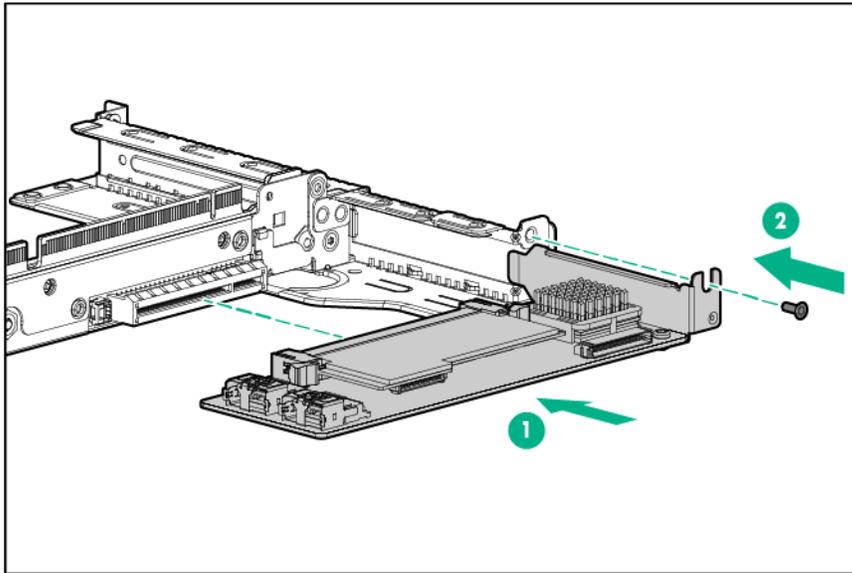
  o Secondary riser cage
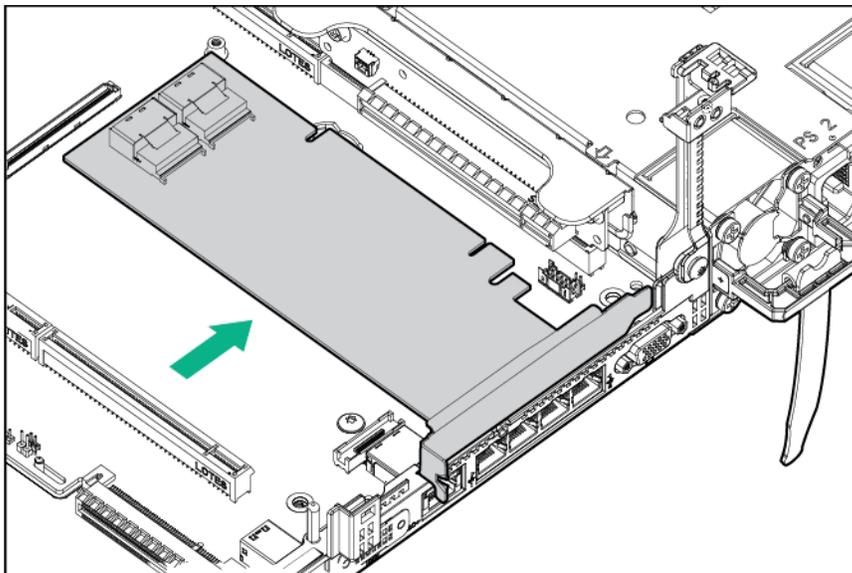
8. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.

9. Install the PCI riser cage (on page 23).

10. Install the access panel (on page 21).

11. Install the server into the rack.

12. Connect each power cord to the server.

13. Connect each power cord to the power source.

14. Power up the server ("Powering up the server" on page 20).

Location discovery services ear option

1. Remove all power:

       a. Disconnect each power cord from the power source.

       b. Disconnect each power cord from the server.

2.   Remove the access panel (on page 21).

3. Remove the hot-plug fan or fan blank from fan bay 1.
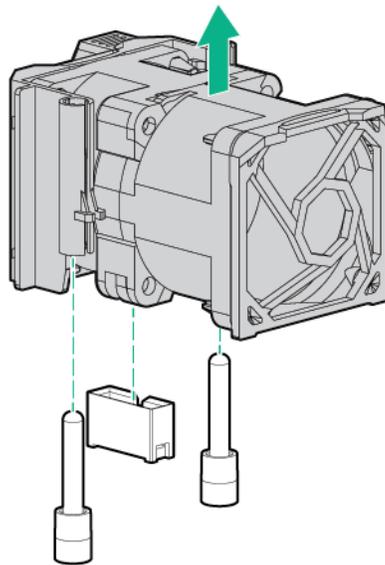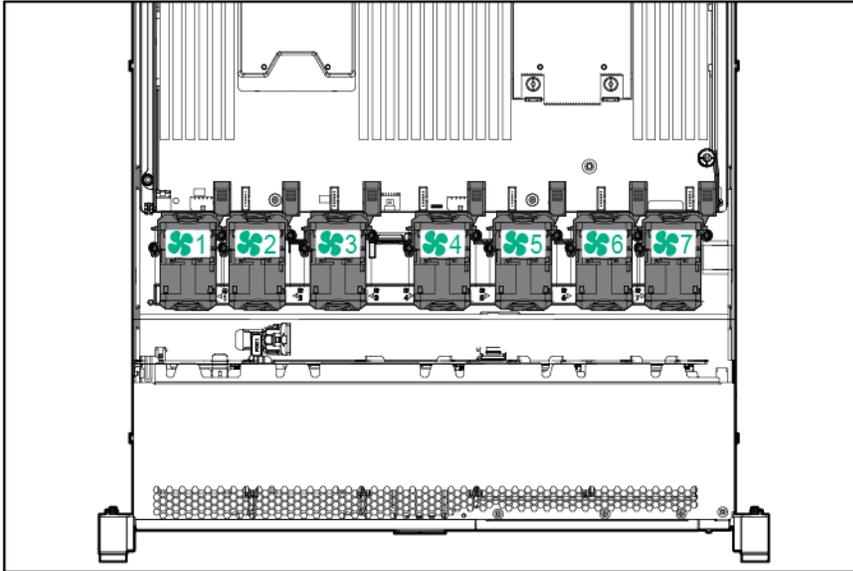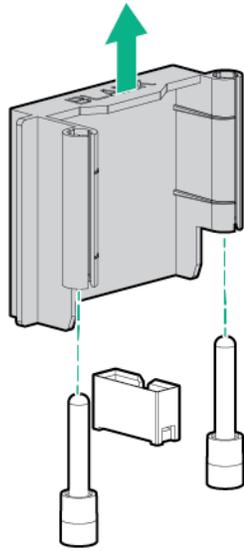
4. Remove the location discovery cable protection panel from the left side of the server.
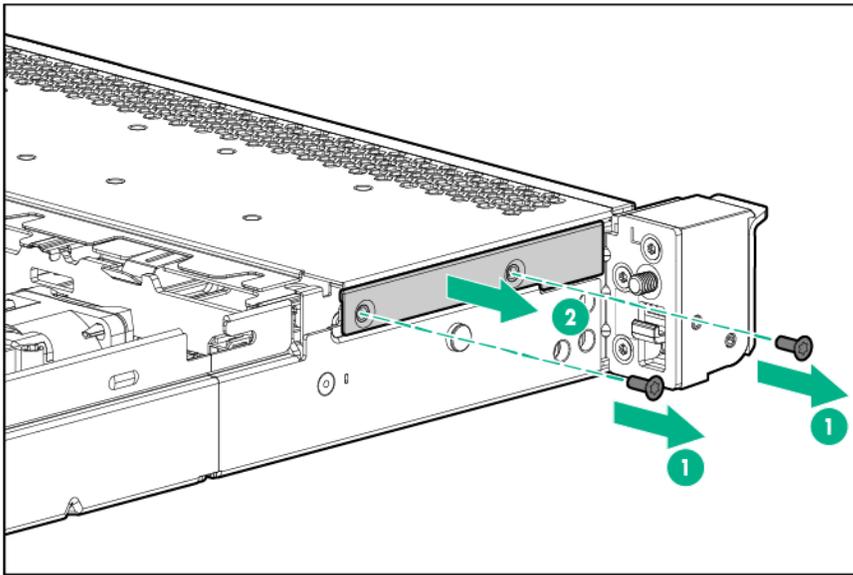
5. Remove the standard ear.
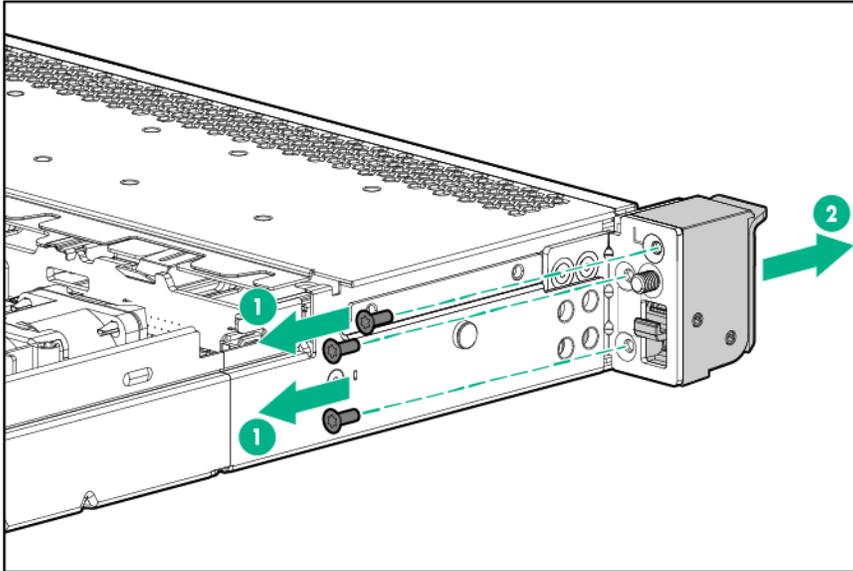
6. Install the location discovery services ear option and route the location discovery services cable through side channel.
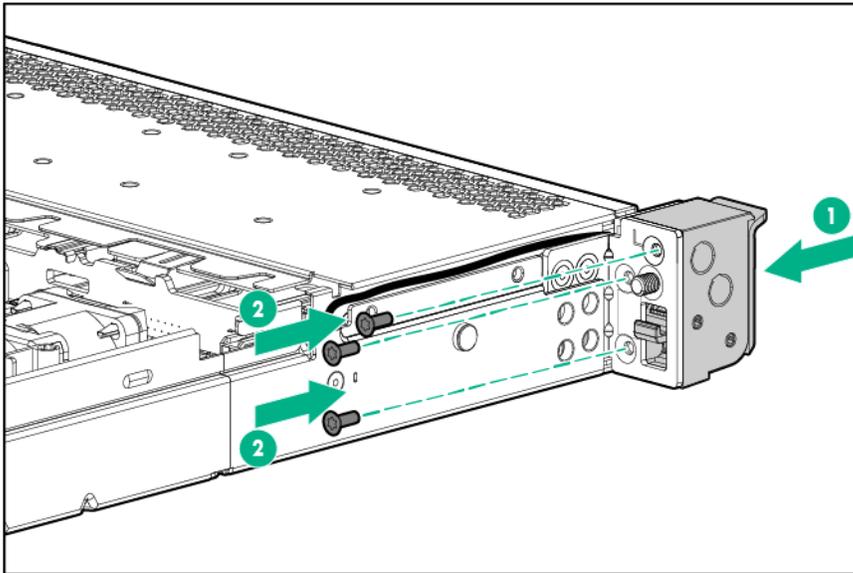
7. Install the discovery cable protection panel.
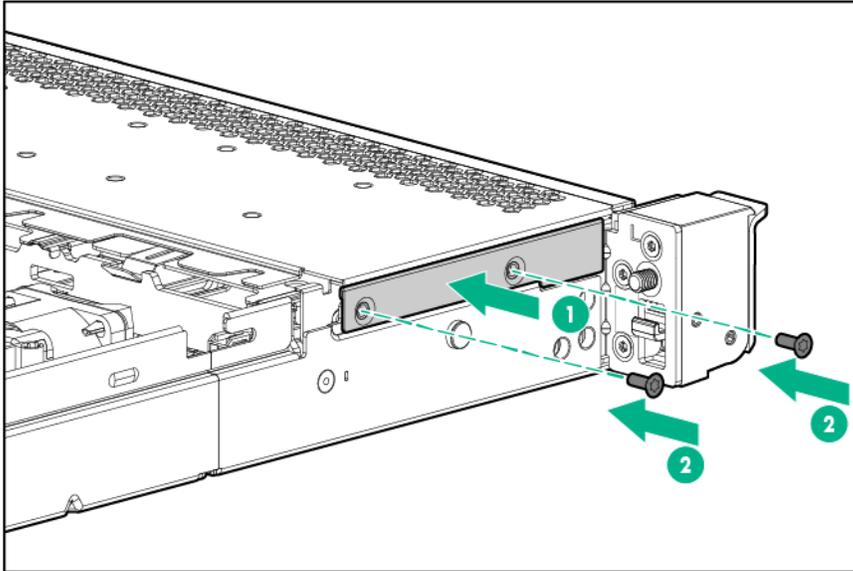
8. Connect the location discovery services cable to the location discovery services connector on the system board.
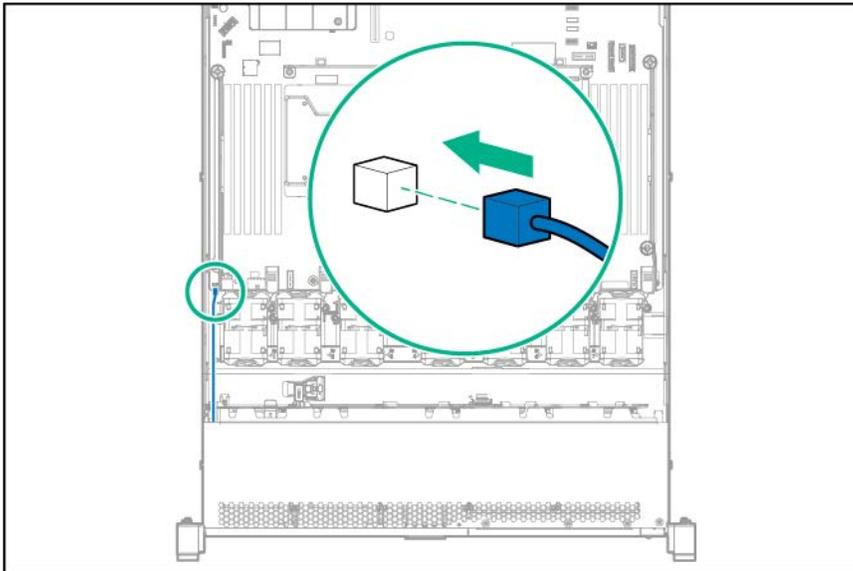
9. Install the hot-plug fan or fan blank into fan bay 1.
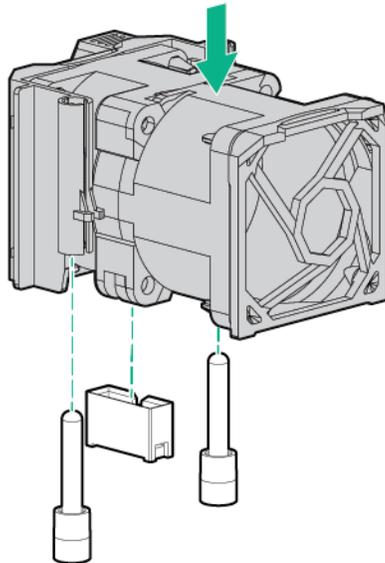
M.2 SSD Enablement Board option

The M.2 enablement board is supported in slot 1 or 2 with the full-height bracket on the primary riser cage and in slot 3 with the low-profile bracket on the secondary riser cage.

Installing an SSD module on the M.2 SSD Enablement Board

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 20).
4. Remove the access panel (on page 21).
5. Remove the PCIe riser cage ("Remove the PCI riser cage" on page 22).
6. Remove the expansion slot blank ("Removing the expansion slot blanks" on page 90).

> **IMPORTANT:** For management and monitoring of the SSD modules, use the HPE Smart Storage Administrator (**http://www.hpe.com/servers/ssa**).

7. Install the SSD module on the M.2 SSD enablement board.
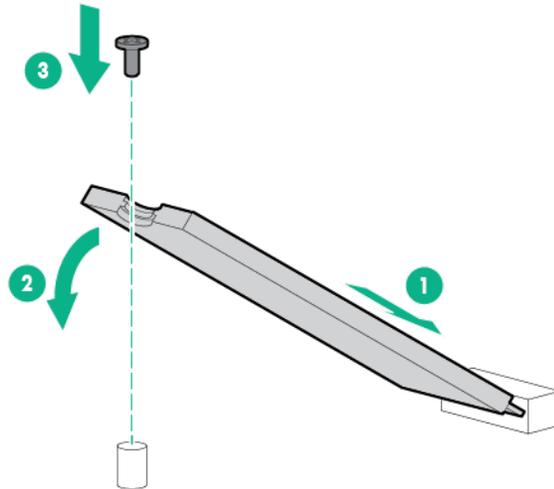
8. Install the M.2 SSD enablement board in any slot in the primary or secondary PCI riser cage ("Installing an expansion board" on page 92).
9. Install the PCI riser cage (on page 23).
10. Install the access panel (on page 21).
11. Install the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server ("Powering up the server" on page 20).

Installing an M.2 SSD Enablement Board

The M.2 SSD enablement board is supported in either slot 1 or 2 of the Primary riser cage and slot 3 on the secondary PCI riser cage.

To install the component:

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 20).
4. Remove the access panel (on page 21).
5. Remove the PCI riser cage (on page 22).
6. If the board is installed in slot 2 or 3 (the low-profile riser), then do the following:

a. Remove the full-height bracket from the M.2 SSD enablement board.
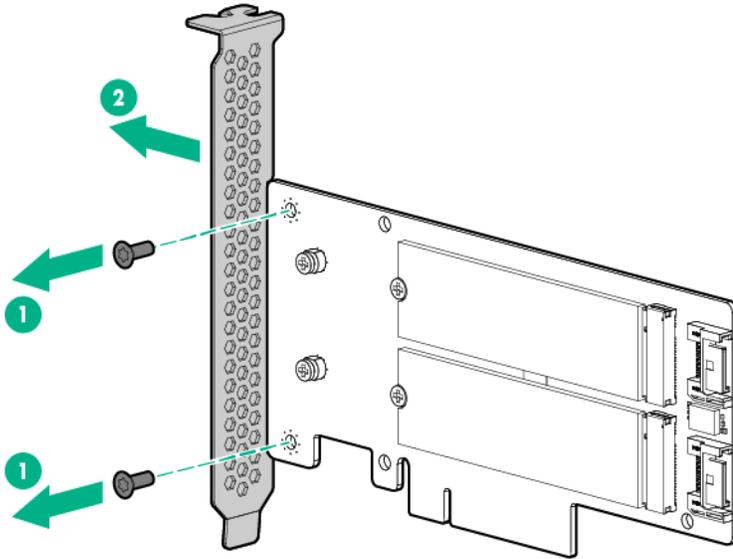
b. Install the low-profile bracket on the M.2 SSD enablement board.
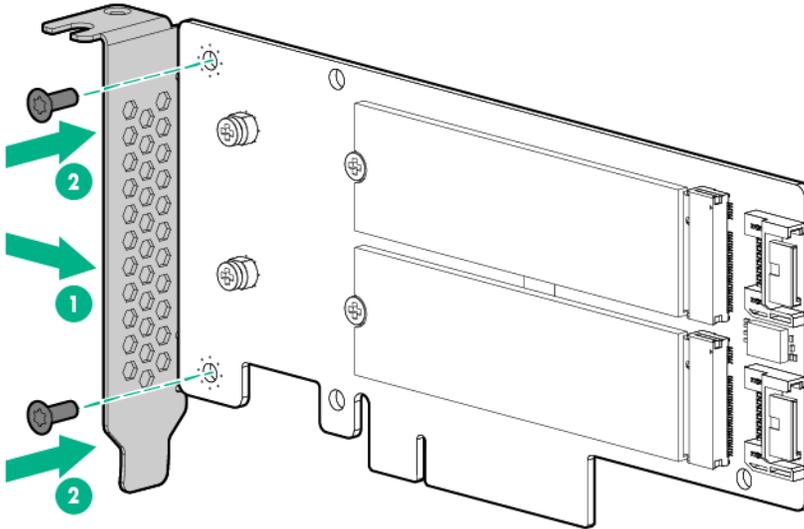
7. Remove the expansion slot cover.

8. Install the M.2 SSD enablement board into either slot 1 or 2 of the primary PCI riser or in slot 3 of the secondary PCI riser. Be sure that the correct bracket is installed as directed earlier in this process.
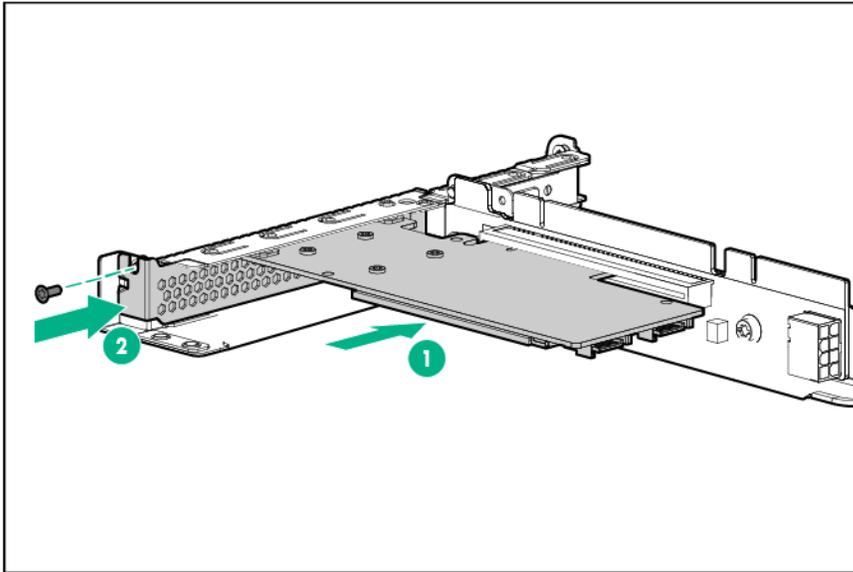
9. Connect and route the SATA cables from the M.2 SSD enablement board to the system board.

    o   M.2 SSD enablement board installed in slot 1 of the primary PCI riser
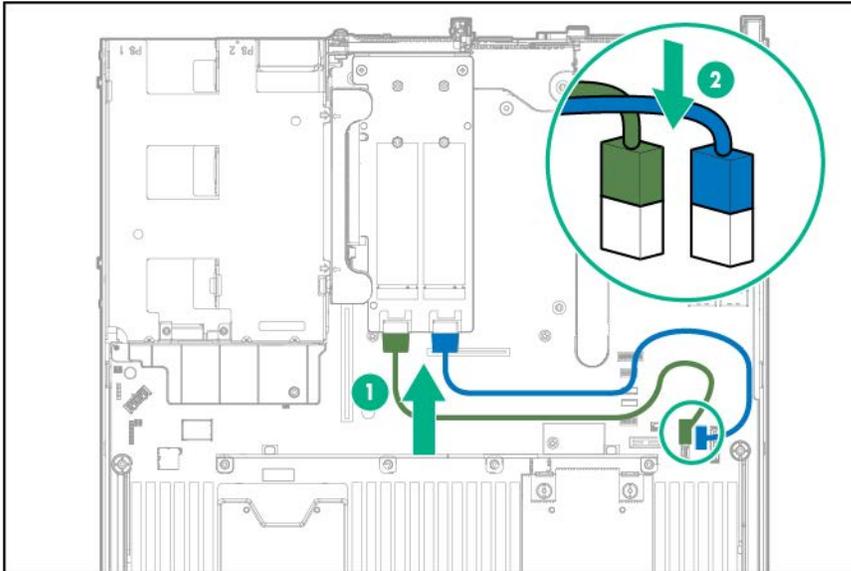
10. Install the PCI riser cage (on page 23).

11. Install the access panel (on page 21).

12. Install the server into the rack.

13. Connect each power cord to the server.

14. Connect each power cord to the power source.

15. Power up the server ("Powering up the server" on page 20).

Dual 8Gb microSD Enterprise Midline USB device

This server supports the installation of the Dual 8Gb microSD Enterprise Midline USB device on the server internal USB connector.

This USB storage device contains a dual-SD card module that supports up to two SD, SDHC, or SDXC storage cards providing data redundancy through a mirrored RAID-1 configuration. This USB storage device connects to an internal USB connector and is configured upon boot.

To locate the internal USB connector, see "System board components (on page 13)." For more information, see the Dual 8Gb microSD EM USB storage device documentation on the Hewlett Packard Enterprise website (**http://www.hpe.com/support/8GBDualMicrosd_ug_en**).

750 W Flex Slot Hot Plug Battery Backup Module

The FSBBU is a self-contained unit with internal lithium-ion batteries that provide DC 12V backup power for servers when either the main bus utility power fails or the power supply is out of regulation.

You do not have to power down the server before removing or installing an FSBBU.

Flex slot battery backup module configuration load support

The FSBBU module can be daisy chained to only one other FSBBU module. When AC power is lost to one server, then the loads of both servers will determine if the FSBBU will support the combined load.

Server #1 + FSBBU module load condition (%)	Server #2 + FSBBU module load condition (%)	Supported (Yes/No) where server #1 lost input AC power	Supported (Yes/No) where server #2 lost input AC power
10 (75W- 6.25A)	90 (675W- 56.25A)	Yes	No
20 (150W- 12.5A)	80 (600W- 50A)	Yes	No
30 (225W- 18.5A)	70 (525W- 43.5A)	Yes	No
40 (300W- 25A)	60 (450W- 37.5)	Yes	Yes
50 (375W- 31.25)	50 (375W- 31.25)	Yes	Yes
60 (450W- 37.5)	40 (300W- 25A)	Yes	Yes
70 (525W- 43.5A)	30 (225W- 18.5A)	No	Yes
80 (600W- 50A)	20 (150W- 12.5A)	No	Yes
90 (675W- 56.25A)	10 (75W- 6.25A)	No	Yes

Installing the FSBBU

⚠ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the chassis unless all bays are populated with a component or a blank.

To install the component:

1. Access the product rear panel.
2. Remove the blank.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the FSBBU or power supply blank to cool before touching it.
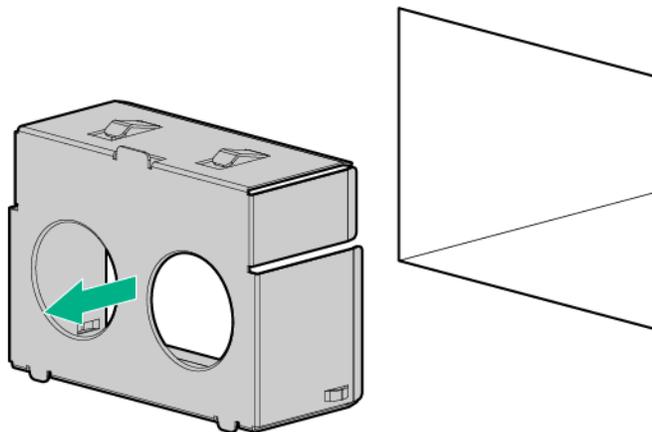
3. Press the battery check button located on the rear of the FSBBU module to check the battery condition before installing the unit into the power supply bay. To locate the battery check button and for more information on the FSBBU module LED status, see "Flex slot battery backup module LEDs and buttons (on page 105)."

4. Install the FSBBU module into the power supply bay until it clicks into place.
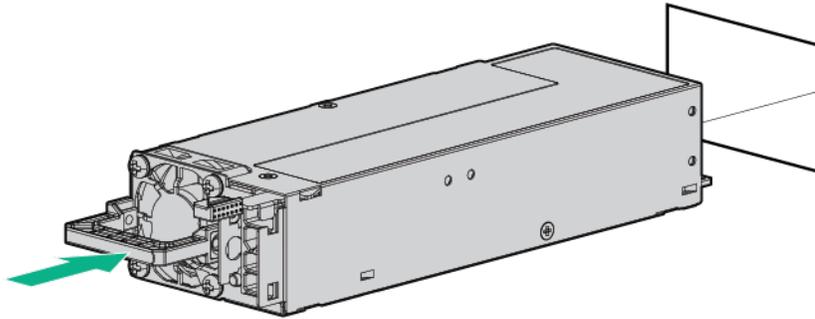
5. Connect multiple FSBBU units using a daisy chain configuration. A jumper cable (part number K9B28A) is required for a daisy chain configuration.
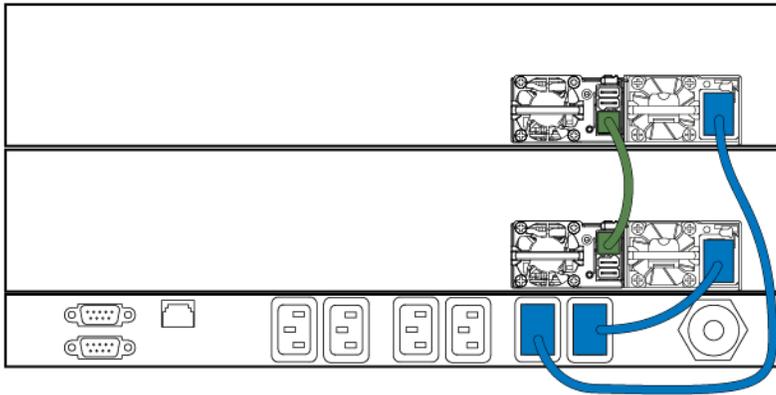
6. Charge the FSBBU module until the LED is solid green.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

Flex slot battery backup module LEDs and buttons
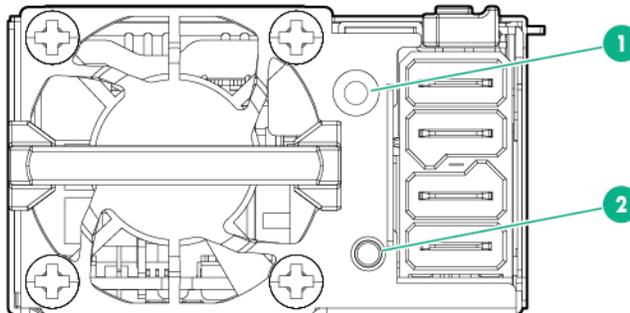
Item	Description
1	FSBBU module LED

Item	Description
2	Battery check button

When the battery check button is pressed, the LED indicates the state of the battery. The number of times that the LED flashes indicates the state of charge.

# of LED flashes	State of charge (%)
0	< 5
1	<= 30
2	31 – 69
3	>= 70

The state of the LED indicates the FSBBU operating mode.

LED	Mode/State
Off	● Ship/storage mode ● Cycle power operating
Flashing amber	● Battery diagnostic ● Active mode
Solid amber	Online mode and charger is ON
Flashing green	Discharge mode ● RSOC—70-100% frequency=0.5Hz; duty=0.5 ● RSOC—31-69% frequency=1Hz; duty=0.5 ● RSOC—0-30% frequency=1.5Hz; duty=0.5
Solid green	● Online mode and charger is OFF ● Battery is fully charged
Flashing red	Auxiliary path A/B protection
Solid red	FSBBU fault or other protections

For more information about the FSBBU module, see "750 W Flex Slot Hot Plug Battery Backup Module (on page 103)."

Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board (on page 107).
2. Retaining the recovery key/password (on page 108).
3. Enabling the Trusted Platform Module (on page 109).

   Enabling the TPM requires accessing BIOS/Platform Configuration (RBSU) in the UEFI System Utilities (on page 128).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (**http://www.microsoft.com**).

△   **CAUTION:**   Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.

- When installing or replacing hardware, Hewlett Packard Enterprise service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.

- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, Hewlett Packard Enterprise Service provides a TPM with the spare system board.

- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

- Hewlett Packard Enterprise is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Installing the Trusted Platform Module board

⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. Pressing the Power On/Standby button does not shut off system power completely. Portions of the power supply and some internal circuitry remain active until AC power is removed.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

To install the component:

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. Remove the PCI riser cage (on page 22).

⚠ **CAUTION:** Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

6. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 13).
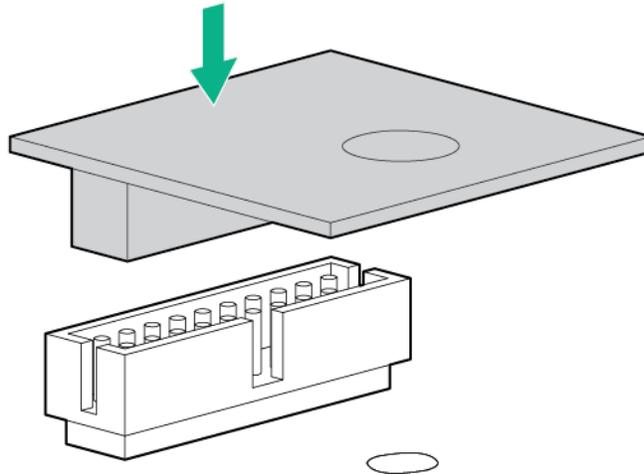
7. Install the TPM security rivet by pressing the rivet firmly into the system board.
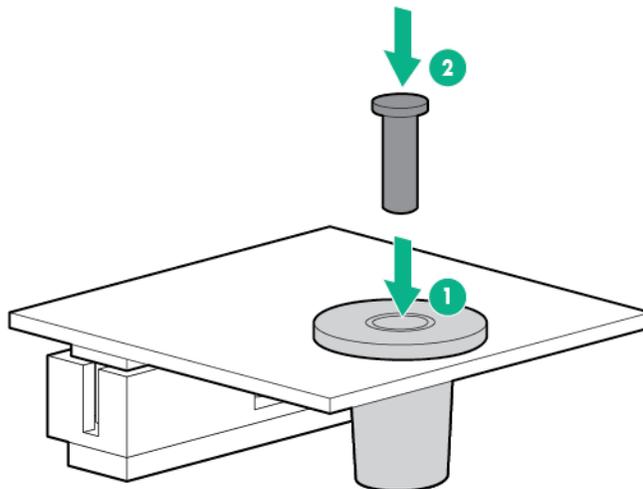
8. Install the PCI riser cage (on page 23).
9. Install the access panel (on page 21).
10. Install the server into the rack.
11. Power up the server ("Powering up the server" on page 20).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker setup, and can be saved and printed after BitLocker is enabled. When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

●   Always store the recovery key/password in multiple locations.

●   Always store copies of the recovery key/password away from the server.

- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. During the server startup sequence, press the **F9** key to access System Utilities.
2. From the System Utilities screen, select **System Configuration** > **BIOS/Platform Configuration (RBSU)** > **Server Security**.
3. Select **Trusted Platform Module Options** and press the **Enter** key**.**
4. Select **Enabled** to enable the TPM and BIOS secure startup. The TPM is fully functional in this mode.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, press the **Y** key.
7. Press the **ESC** key to exit System Utilities. Then, press the **Enter** key when prompted to reboot the server.

The server then reboots a second time without user input. During this reboot, the TPM setting becomes effective.

You can now enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.

> △ **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the Hewlett Packard Enterprise Support Center website (**http://www.hpe.com/support/hpesc**).

For more information on adjusting TPM usage in BitLocker, see the Microsoft website (**http://technet.microsoft.com/en-us/library/cc732774.aspx**).

Cabling

Cabling overview

This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

⚠ **CAUTION:**   When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

2SFF embedded SATA backplane cabling

1. Connect the data cables to the SATA storage connector, the SATA optical/storage drive connector, and the backplane presence detect connector.
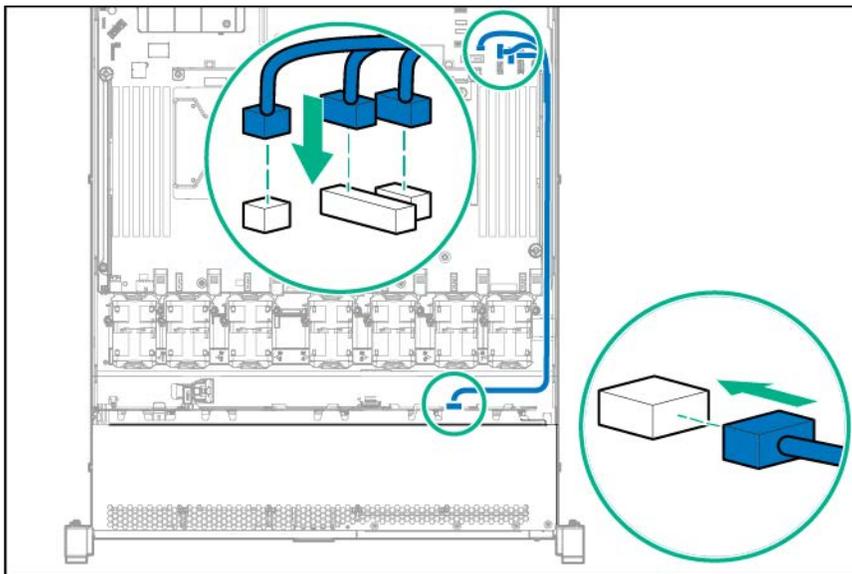
2. Connect the power cable to the left power connector on the backplane.
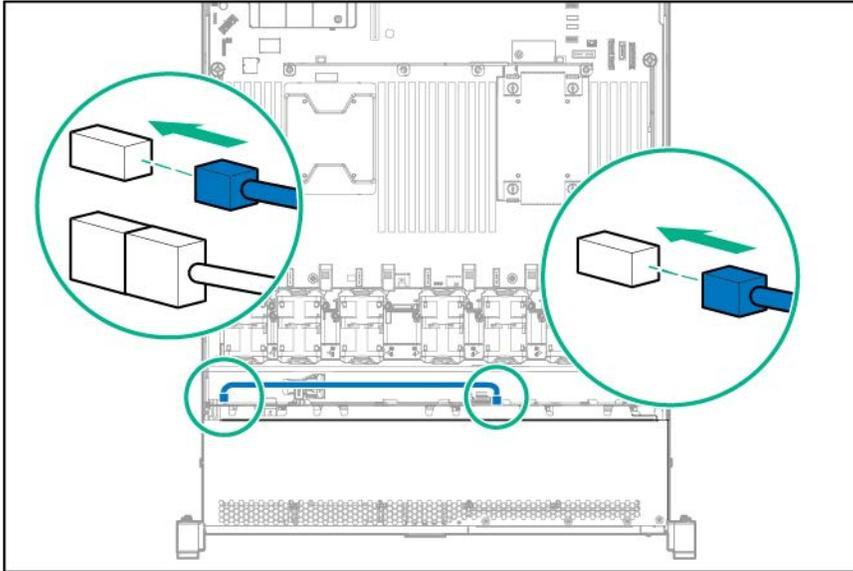
> **NOTE:** Cabling from the 2SFF SAS/SATA backplane will vary if a PCIe storage controller is installed.

4LFF Universal Media Bay cabling

Route the cables along the edge of the system board, and then connect the cables to the system board:

- **4LFF VGA/USB connections**

  Connect the VGA/USB cable to the front VGA/USB connector toward the rear of the system board.
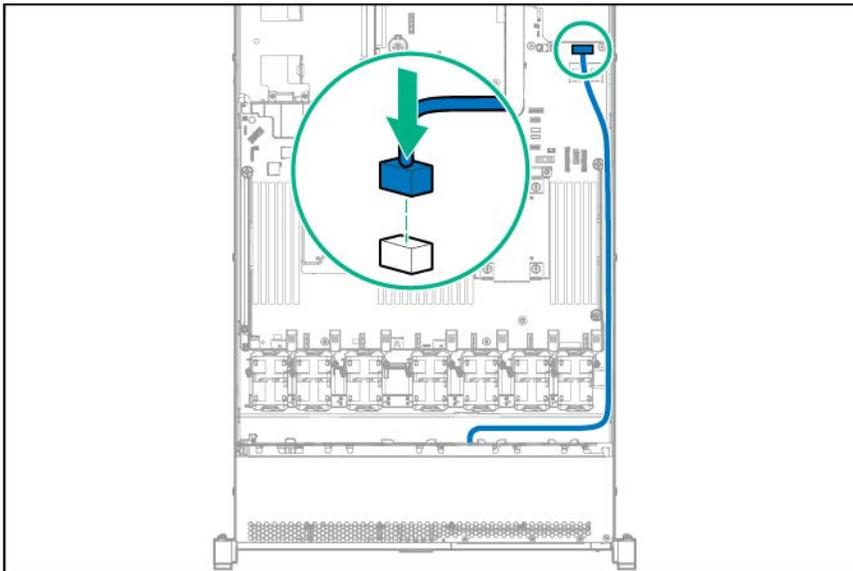
- **4LFF optical drive connection**

Connect the SATA optical cable to the SATA optical/storage drive connector.
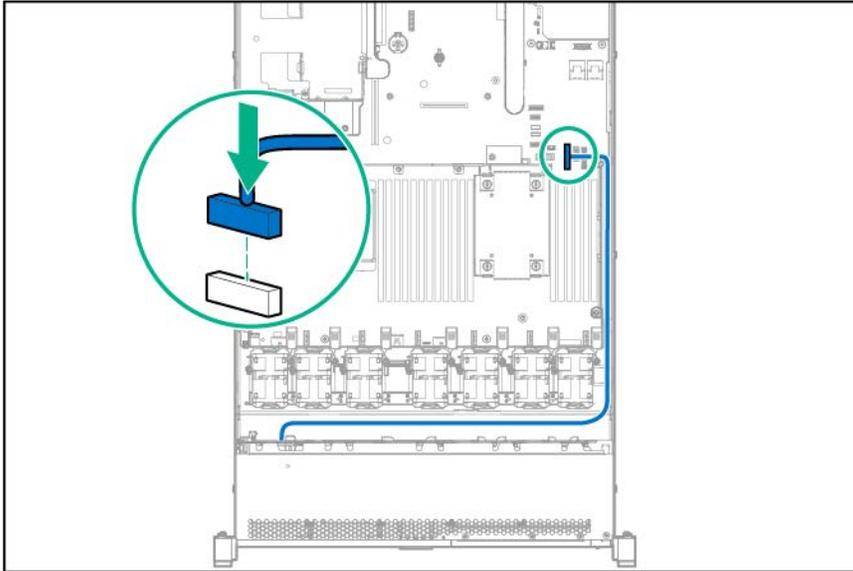
8SFF Universal Media Bay cabling

Route the cables along the edge of the system board, and then connect the cables to the system board:

- **8SFF DVD-RW/VGA/USB connections**
  - o Connect the VGA/USB cable to the front VGA/USB connector toward the rear of the system board.
  - o Connect the SATA optical cable to the SATA optical/storage drive connector.
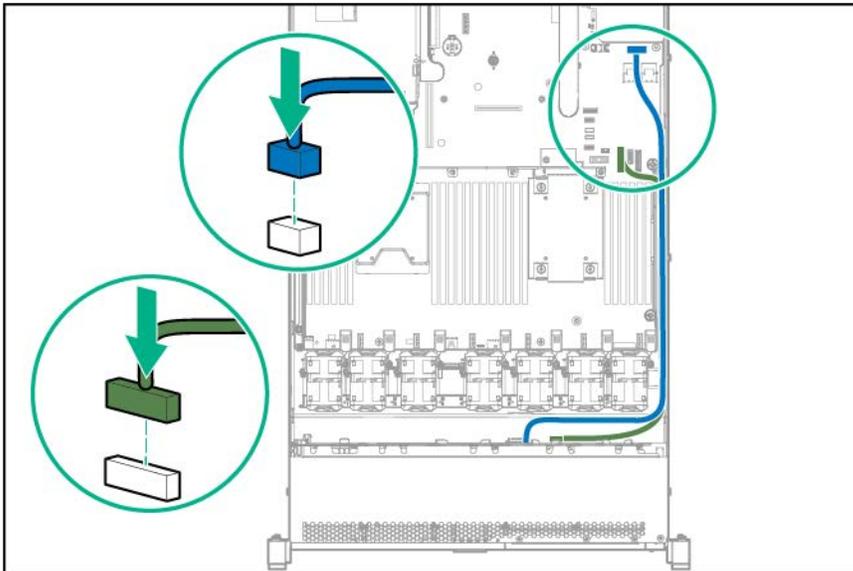
- **8SFF VGA/USB connections**

Connect the VGA/USB cable to the front VGA/USB connector toward the rear of the system board.
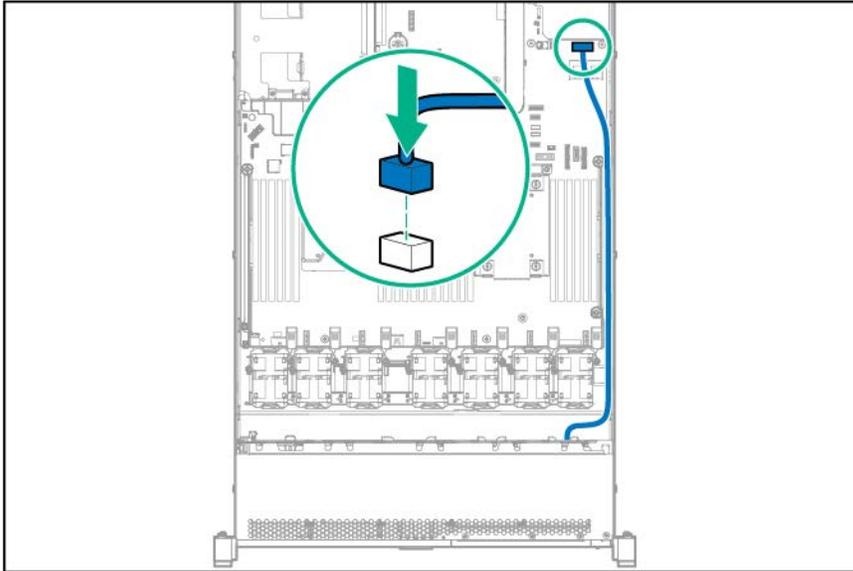
10SFF (6 NVMe + 4 SAS/SATA) Express Bay Enablement Option cabling

The Smart Array P440ar Controller is shown in the cabling diagram, but other controllers may be supported. For a list of supported controllers, see the product QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/qs**).
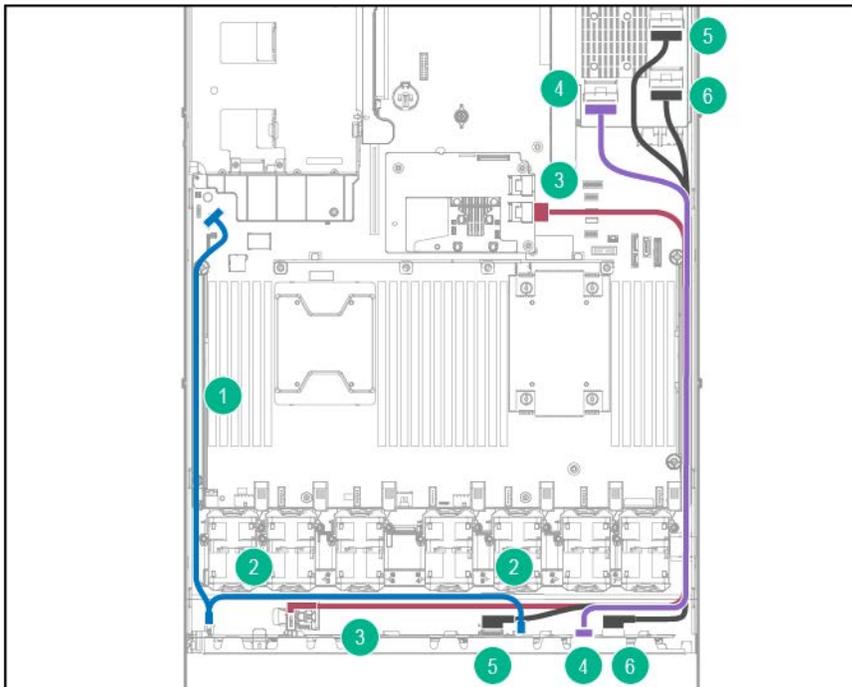
Item	Description
1	Connect the power cable from the 10SFF Express Bay backplane to the system board.

Item	Description
2	Connect the power cable from the 10SFF Express Bay backplane to the 2SFF Express Bay backplane.*
3	Connect the mini-SAS cable from the 10SFF Express Bay backplane to Port 1 on the controller (HPE Smart Array P440ar Controller shown).
4	Connect the 2SFF Express bay data cable from 2SFF Express Bay backplane to Port 3 on the HPE Express Bay Bridge Card.*
5–6	Connect the 10SFF Express bay data cable from 10SFF Express Bay backplane to Ports 1 and 2 on the HPE Express Bay Bridge Card.

*If the 2SFF Express Bay Enablement option is not installed, then this cable is not required.

HPE Smart Array P440ar controller cabling

Connect the SAS/SATA cables to the backplane and Smart Array controller. Install the SAS/SATA cables according to their labels as Port 1 or Port 2. These labels are on the cables and their connections.
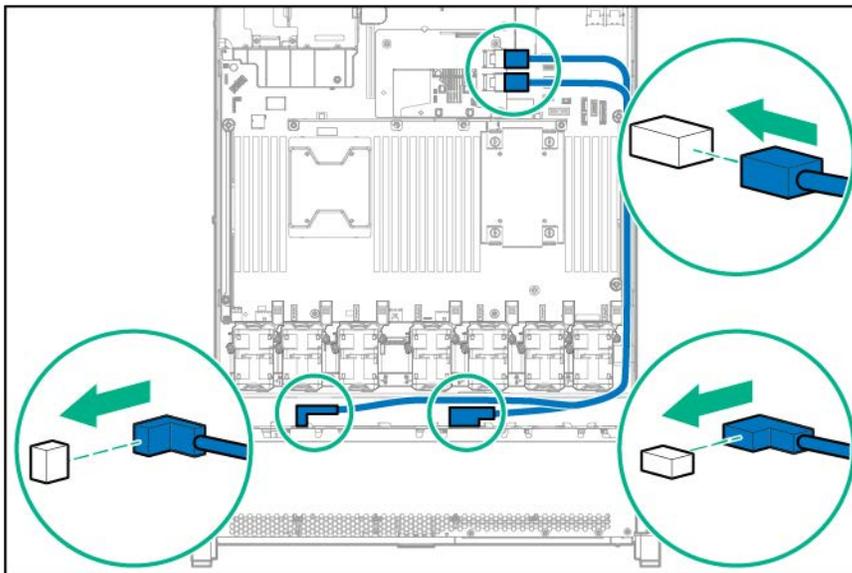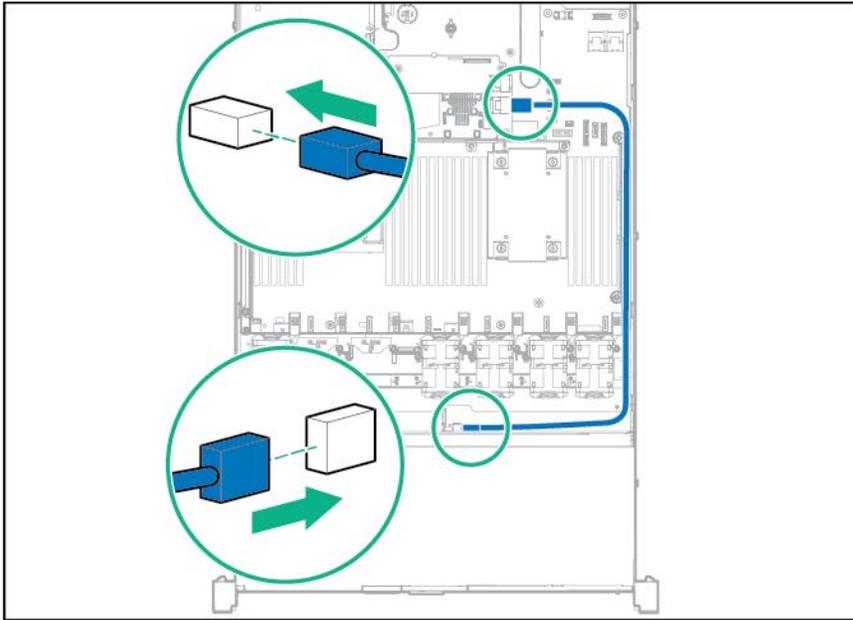
- **8SFF**

- **4LFF**

HPE Smart Array P440 Controller cabling

Connect the cables from port one and two on the backplane to port one on the P440 controller board. If the H240 controller board is installed, the SAS cables will use both ports.

- **8SFF**
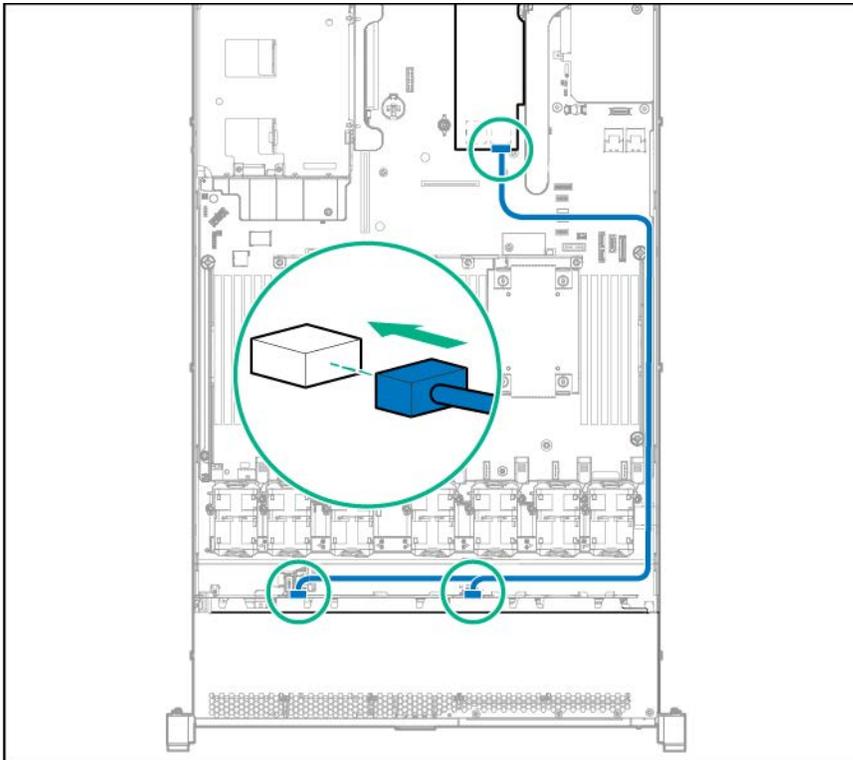
- **4LFF**
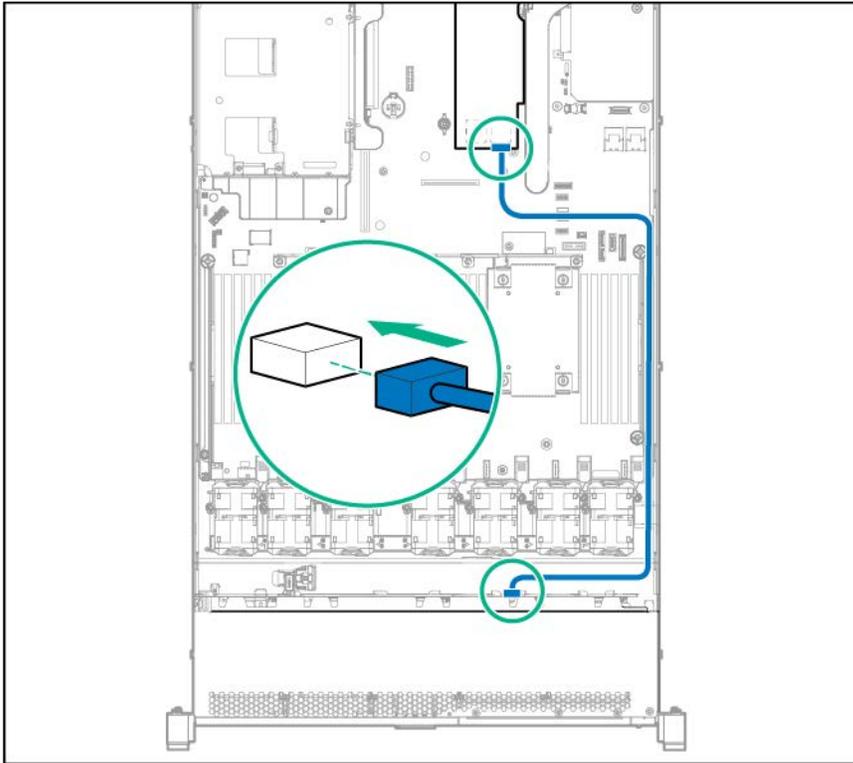
HPE Smart Array P840ar controller cabling

1. Connect both the Mini-SAS connectors from the 8SFF backplane to controller port 1.
2. If the optional 2SFF backplane is installed, connect the Mini-SAS cable to controller port 2.
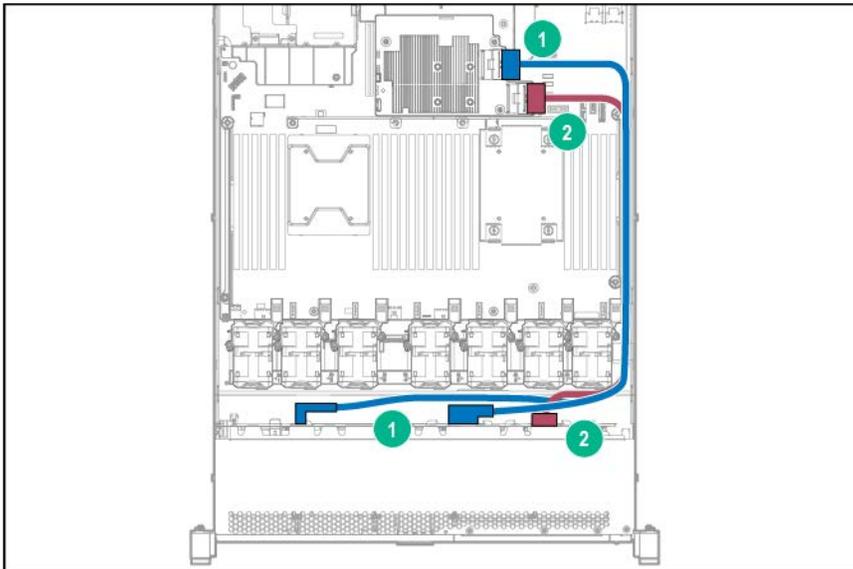
HPE Smart Array P840 Controller cabling

1. Connect the Mini-SAS cables from the standard backplane to port one on the optional P840 controller board.
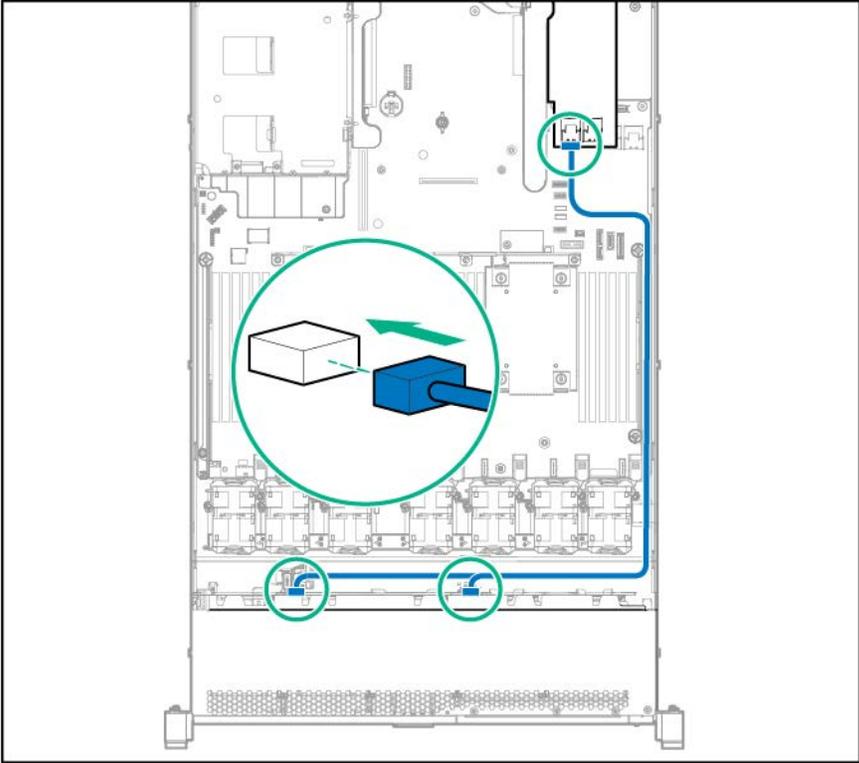
2. If the 2SFF SAS/SATA backplane is installed, connect the Mini-SAS cable from the optional backplane to port 2 on the P840 controller board.
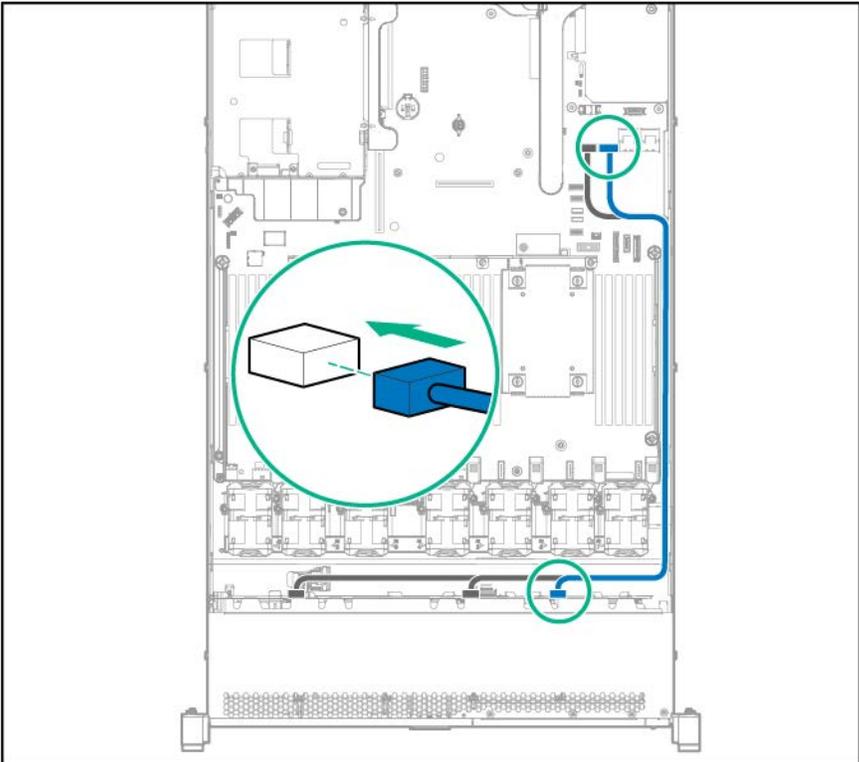
Embedded SATA cabling

⚠️ **WARNING:** Eliminate the risk of electric shock by removing all AC power from the system before installing or replacing any non-hot-plug hardware option. Disconnect all power cords to completely remove power from the server.

Connect the SATA cables from the backplane to the Mini-SAS/SATA connectors on the system board according to their labels as Port 1 or Port 2. These labels are on the cables and their connections.

- **8SFF**
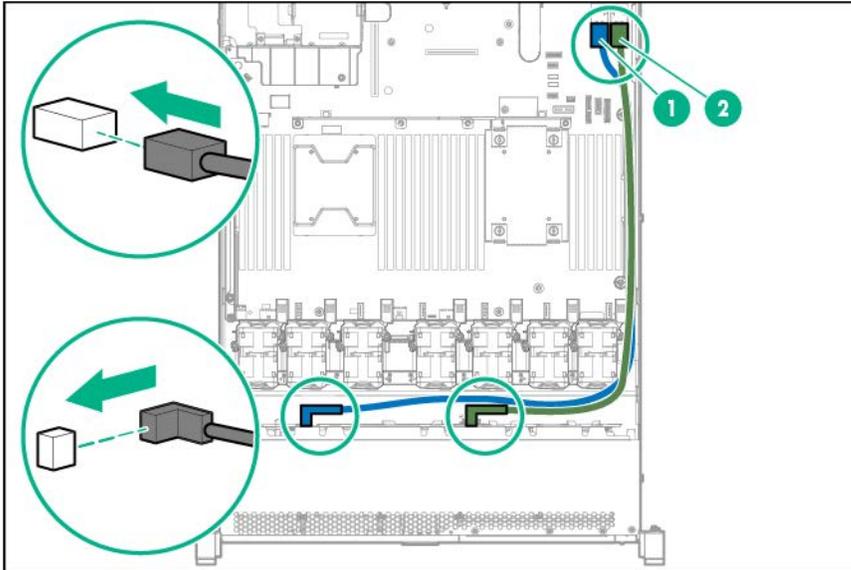
- **4LFF**

    Connect the SATA cable from port one on the backplane to port one on the system board as indicated on the connectors.
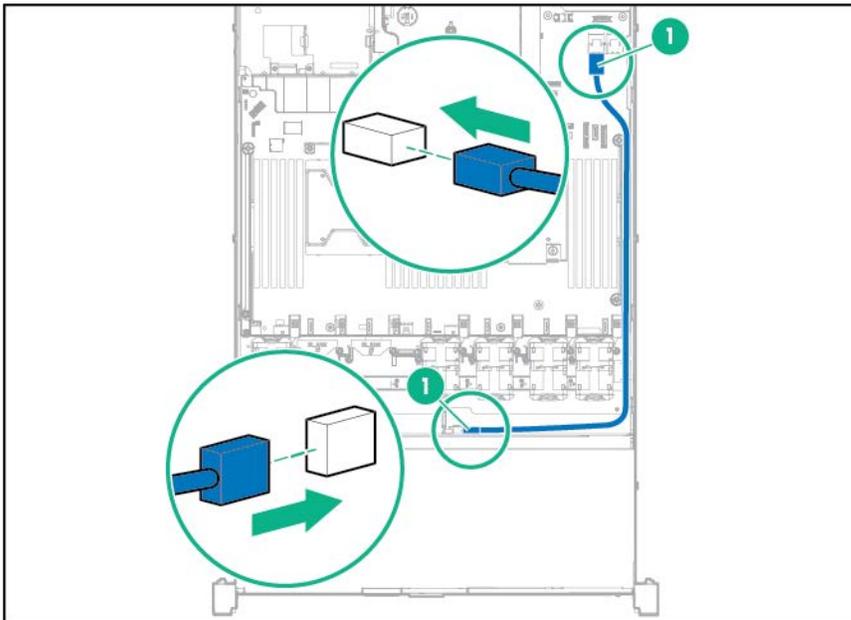
M.2 SSD Enablement Board option cabling

The M.2 SSD enablement board option is supported in both the primary and the secondary PCI riser cage.

Cable the option according to the location in the server:

- **Primary PCI riser cage**
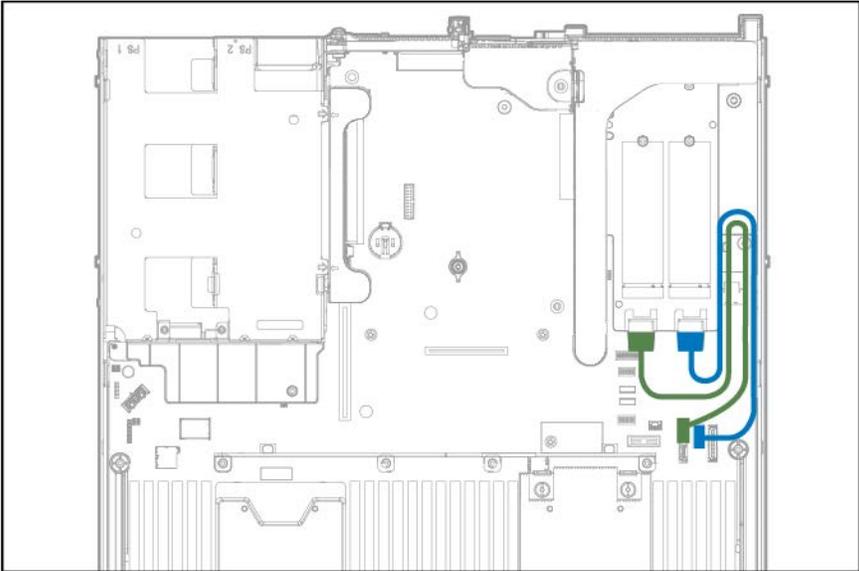
- **Secondary PCI riser cage**
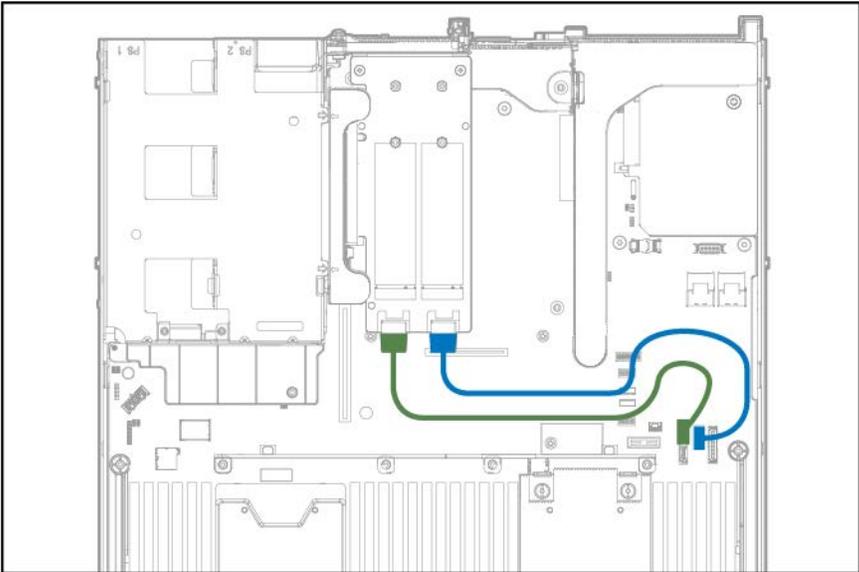
Software, firmware, and utilities

HPE Pointnext Portfolio

HPE Pointnext delivers confidence, reduces risk, and helps customers realize agility and stability. Hewlett Packard Enterprise helps customers succeed through Hybrid IT by simplifying and enriching the on-premise experience, informed by public cloud qualities and attributes.

Operational Support Services enable you to choose the right service level, length of coverage, and response time to fit your business needs. For more information, see the Hewlett Packard Enterprise website:

https://www.hpe.com/us/en/services/operational.html

Utilize the Advisory and Transformation Services in the following areas:

- Private or hybrid cloud computing

- Big data and mobility requirements

- Improving data center infrastructure

- Better use of server, storage, and networking technology

For more information, see the Hewlett Packard Enterprise website:
http://www.hpe.com/services/consulting

Proactive notifications

30 to 60 days in advance, Hewlett Packard Enterprise sends notifications to subscribed customers on upcoming:

- Hardware, firmware, and software changes

- Bulletins

- Patches

- Security alerts

You can subscribe to proactive notifications on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/pcn**).

Service Pack for ProLiant

The SPP is a comprehensive systems software (drivers and firmware) solution delivered as a single package with major server releases. This solution uses SUM as the deployment tool and is tested on all supported ProLiant servers including HPE ProLiant Gen8 and later servers.

SPP allows the following operating modes:

- Online mode – The installation occurs while the host processor is running in the normal server environment.

- Offline mode – Boots a small Linux kernel and enables updates to occur on a single server.

For more information or to download SPP, see one of the following pages on the Hewlett Packard Enterprise website:

- Service Pack for ProLiant download page (**http://www.hpe.com/servers/spp/download**)
- Smart Update: Server Firmware and Driver Updates page (**http://www.hpe.com/info/SmartUpdate**)

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HPE iLO (on page 121)	Online and Offline
Active Health System (on page 124)	Online and Offline
iLO RESTful API support (on page 125)	Online and Offline
Integrated Management Log (on page 125)	Online and Offline
Intelligent Provisioning (on page 128)	Offline
Insight Diagnostics (on page 123)	Online and Offline
Erase Utility (on page 123)	Offline
Scripting Toolkit for Windows and Linux (on page 128)	Online
Service Pack for ProLiant (on page 128)	Online and Offline
Smart Update Manager (on page 121)	Online and Offline
UEFI System Utilities (on page 128)	Offline
HPE Smart Storage Administrator (on page 128)	Online and Offline
Updating firmware or system ROM (on page 126)	

Smart Update Manager

SUM is a product used to install and update firmware, drivers, and systems software on ProLiant servers. SUM provides a GUI, a command-line scriptable interface, and an interactive command-line scriptable interface. The interfaces allow you to deploy firmware, drivers, and software for supported nodes.

For more information about SUM, see the product page on the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/hpsum**).

To download SUM, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/hpsum/download**).

To access the *Smart Update Manager User Guide*, see the Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/sum-docs**).

Operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/ossupport**).

OS deployment options

For a single server

You can use:

- Deploying an OS from Intelligent Provisioning
- Deploying an OS from installation media

For multiple servers

You can use:

- Scripting Toolkit for Windows and Linux
- iLO RESTful API support

Deploying an OS from Intelligent Provisioning

See the latest Intelligent Provisioning user guide on the HPE website (**http://www.hpe.com/info/enterprise-docs**)

Deploying an OS from installation media

For local deployments, be sure to have:

- Installation media (USB or DVD)
- The latest SPP

Fore remote deployments, be sure to have:

- Server iLO IP address or hostname
- Access to the iLO web interface
- Virtual installation media mounted in the iLO Integrated Remote Console
- The latest SPP

1. Verify that the OS is supported:

   http://www.hpe.com/info/ossupport

2. Insert the installation media.

   For remote deployments, use the iLO remote console to mount the image to a virtual drive. From the iLO Integrated Remote Console window, click **Virtual Drives** and then select how to mount the media.

3. Power up the server.

   The iLO virtual power button can also power up the server through the iLO web interface or remote console.

4. Deploy the OS.

   To boot the server from the installation media, press F11 at the boot screen, and then select the boot device.

5. After the OS is installed, **Error! Reference source not found.**.

Drivers

IMPORTANT: Always perform a backup before installing or updating device drivers.

Update drivers using any of the following **Smart Update Solutions**:

- Download the latest Service Pack for ProLiant (includes Smart Update Manager)
- Create a custom SPP download
- Download Smart Update Manager for Linux

- Download specific drivers

To locate the drivers for a server, go to the Hewlett Packard Enterprise Support Center website (**http://www.hpe.com/support/hpesc**), and then search for the product name/number.

Software

Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in ProLiant Gen8 and later servers. Intelligent Provisioning simplifies ProLiant server setup and provides a reliable and consistent way to deploy ProLiant server configurations:

- Intelligent Provisioning prepares the system for installing "off-the-shelf" and Hewlett Packard Enterprise branded versions of operating system software and integrates optimized ProLiant server support software.

- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. For specific OS support, see the *Intelligent Provisioning Release Notes* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/intelligentprovisioning/docs**).

- Intelligent Provisioning provides maintenance-related tasks using the Perform Maintenance window.

For more information about Intelligent Provisioning software and recovery media downloads, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/intelligentprovisioning**). For consolidated drive and firmware update packages, see the Smart Update: Server Firmware and Driver Updates page on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/SmartUpdate**).

HPE Smart Storage Administrator

The HPE SSA is a configuration and management tool for HPE Smart Array controllers. Starting with HPE ProLiant Gen8 servers, HPE SSA replaces ACU with an enhanced GUI and additional configuration features.

The HPE SSA exists in three interface formats: the HPE SSA GUI, the HPE SSA CLI, and HPE SSA Scripting. Although all formats provide support for configuration tasks, some of the advanced tasks are available in only one format.

Some HPE SSA features include the following:

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration

- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab

- For supported controllers, provides access to additional features.

For more information about HPE SSA, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/ssa**).

Accessing HPE SSA

1. On the Intelligent Provisioning home screen, click Perform Maintenance.
2. Select RAID Configuration from the maintenance options.

   The Smart Storage Administrator window is displayed.

Erase Utility

> **△ CAUTION:** Perform a backup before running the Erase Utility. The utility completes the following:
> - Sets the system to its original factory state
> - Deletes the current hardware configuration information, including array setup and disk partitioning
> - Erases all connected hard drives completely.
>
> Before using this utility, see the instructions in the *Intelligent Provisioning User Guide*.

Use the Erase Utility to erase drives and Active Health System logs, and to reset UEFI System Utilities settings. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.

- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen, and then select **Erase**.

For more information about the Erase Utility, see the *Intelligent Provisioning User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/intelligentprovisioning/docs**).

HPE iLO

iLO is a remote server management processor embedded on the system boards of HPE ProLiant and Synergy servers. iLO enables the monitoring and controlling of servers from remote locations. HPE iLO management is a powerful tool that provides multiple ways to configure, update, monitor, and repair servers remotely. iLO (Standard) comes preconfigured on HPE servers **without an additional cost or license**.

Features that enhance server administrator productivity are licensed. For more information, see the iLO 4 documentation on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/ilo-docs**).

Active Health System

The Active Health System monitors and records changes in the server hardware and system configuration.

The Active Health System provides:

- Continuous health monitoring of over 1600 system parameters

- Logging of all configuration changes

- Consolidated health and service alerts with precise time stamps

- Agentless monitoring that does not affect application performance

The Agentless Management Service is available in the SPP, which can be downloaded from the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/spp/download**). The Active Health System log can be downloaded manually from iLO 4 or Intelligent Provisioning and sent to Hewlett Packard Enterprise.

For more information, see the following documents:

- *iLO User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/ilo/docs**)

- *Intelligent Provisioning User Guide* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/intelligentprovisioning/docs**)

Active Health System data collection

The Active Health System does not collect information about your operations, finances, customers, employees, or partners.

Examples of data that is collected:

- Server model and serial number

- Processor model and speed

- Storage capacity and speed

- Memory capacity and speed

- Firmware/BIOS and driver versions and settings

The Active Health System does not parse or change operating system data from third-party error event log activities (for example, content created or passed through the operating system).

Active Health System log

The data collected by the Active Health System is stored in the Active Health System Log. The data is logged securely, isolated from the operating system, and separate from customer data.

When the Active Health System Log is full, new data overwrites the oldest data in the log.

It takes less than 5 minutes to download the Active Health System Log and send it to a Hewlett Packard Enterprise support professional to help you resolve an issue.

When you download and send Active Health System data to Hewlett Packard Enterprise, you agree to have Hewlett Packard Enterprise use the data for analysis, technical resolution, and quality improvements. The data that is collected is managed according to the privacy statement, available on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/privacy**).

iLO RESTful API support

HPE iLO 4 firmware version 2.00 and later includes the iLO RESTful API. The iLO RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring of the ProLiant server via iLO. The iLO RESTful API uses basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to submit or return JSON-formatted data with iLO web server.

HPE iLO 4 2.30 and later is Redfish 1.0-conformant while remaining backward compatible with the existing iLO RESTful API.

HPE iLO 4 supports the iLO RESTful API with ProLiant Gen8 and later servers. For more information about the iLO RESTful API, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/restfulinterface/docs**).

iLO RESTful API support for UEFI

The ProLiant Gen9 servers include support for a UEFI-compliant System BIOS, along with UEFI System Utilities and Embedded UEFI Shell preboot environments. ProLiant Gen9 servers also support configuring the UEFI BIOS settings using the iLO RESTful API, a management interface that server management tools can use to perform configuration, inventory, and monitoring of a ProLiant server. The iLO RESTful API uses basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to submit or return JSON-formatted data with iLO web server.

For more information about the iLO RESTful API and the RESTful Interface Tool, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/restfulinterface/docs**).

Scripting Toolkit for Windows and Linux

The STK for Windows and Linux is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The STK is designed to support ProLiant servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The STK provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information or to download the STK, see the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/proliant/stk**).

Firmware

Updating firmware or System ROM

To update system ROM, use one of the following:

Updating firmware using SPP

See "Service Pack for ProLiant".

Updating firmware using Intelligent Provisioning

HPE servers and their installed hardware options are pre-loaded with the latest firmware. However, updated firmware might be available. For ProLiant servers, use the Firmware Update utility to find and apply the latest firmware. For HPE Synergy compute modules, use HPE OneView to update the firmware. Intelligent Provisioning updates can be performed when an SPP update is available.

> △ **NOTE:** Firmware Update reflects the latest updates available as per the baseline defined in the latest SPP. Newer updates that were added outside of the latest SPP baseline do not appear on the updates list.

1. On the Intelligent Provisioning home screen, click **Perform Maintenance**.
2. From the maintenance options, select **Firmware Update**.

   The system searches for firmware on the source configured in the System Software Update settings. This might take a few minutes; wait for the display to generate the results.

   Alternatively, you can download and copy the SPP ISO to a DVD or USB key. To download SPP, see the website (**http://www.hpe.com/info/spp**). For instructions on using the ISO, see the SPP quick start guide on the website (**http://www.hpe.com/info/enterprise-docs**).

   After the system retrieves the firmware data, it checks the installed hardware components to suggest items to update. Depending on the search, you might be prompted to click Continue to begin the hardware components check.

This might take a few minutes; wait for the display to generate the results.

If no new firmware is available, the current version is displayed in the Firmware Update screen.

3. Select the items to update, and then click **Install**.

The Review Updates screen displays the selected items.

IP does not detect all hard disk driver firmware updates. If you need to update HDD firmware, and IP does not detect the firmware update, deploy updates from the SPP.

4. To install all of the selected components, click **Continue**.

5. To perform the update, click **Continue** on the notification that the installation cannot be canceled.

6. Click **Launch now** to initiate the firmware update process.

7. Click **Reboot** at the completion of the firmware update process.

Updating firmware using iLO web interface

The iLO IP address or hostname is needed to connect to the iLO web interface.

1. Download the flash file from the Hewlett Packard support site (**http://www.hpe.com/info/hpesc**).

After finding your server, set the filter to Independent OS to display ROM files.

2. Using a web browser, connect to the iLO web interface using the iLO IP address or hostname.

3. Select **Firmware & OS Software**.

4. Select **Update Firmware**.

5. Verify the file location is set to **Local file**.

6. Select **Browse…**, and then select the flash file.

7. Click the **Flash** button.

The installation is complete.

Updating firmware using UEFI GUI

UEFI Shell documentation

Type help -b for a list of commands

Type help <command> -b for command usage

1. Download the flash file from the Hewlett Packard support site (**http://www.hpe.com/info/hpesc**).

After finding your server, set the filter to Independent OS to display ROM files.

2. Copy the file to a USB or iLO virtual media.

3. Attach the media to the server.

If updating remotely through iLO, attach the media to your workstation.

4. Boot the server to **System Utilities > Embedded Applications > Embedded UEFI Shell**.

The UEFI Shell screen appears.

5. Press any key to acknowledge that you are physically present.

This step ensures that certain features, such as disabling Secure Boot or managing the Secure Boot certificates using third-party UEFI tools, are not restricted

6. If an administrator password is set, enter the password, and then press **Enter**.

The Shell> prompt is displayed.

7. Display the file system mappings, and then get the file system volume name for the USB or virtual media.

```
Shell>map –r
```

The mapping table is displayed.

8. Change the working directory to the USB or virtual media.

For example, if the USB volume name is FS0:, then enter

`Shell>FS0:`

9. List the devcies in the server with firmware.

`FS0:\>fwupdate –l`

10. Flash the firmware.

`FS0:\> fwupdate –d BIOS –f <filename>`

You can press the TAB key to complete the filename.

The installation is complete.

Updating firmware using UEFI CLI

UEFI user guide (**http://www.hpe.com/support/UEFIGen9_UG_en**)

1. Download the flash file from the Hewlett Packard support site (**http://www.hpe.com/info/hpesc**).

After finding your server, set the filter to Independent OS to display ROM files.

2. Copy the file to a USB or iLO virtual media.

3. Attach the media to the server.

If updating remotely through iLO, attach the media to your workstation.

4. Boot the server to **System Utilities > Embedded Applications > Firmware Update > System ROM**.

5. Select **Firmware File**.

6. Select flash file.

7. Select **Start Firmware Update**.

The installation is complete.

Utilities and features

POST screen options

When the server is powered on, the POST screen is displayed. The following options are displayed:

- System Utilities (F9)

  Use this option to configure the system BIOS.

- Intelligent Provisioning (F10)

  Use this option to deploy an operating system or configure storage.

- Boot order (F11)

  Use this option to make a one-time boot selection.

- Network boot (F12)

  Use this option to boot the server from the network.

UEFI System Utilities

The UEFI System Utilities is embedded in the system ROM. The UEFI System Utilities enable you to perform a wide range of configuration activities, including:

- Configuring system devices and installed options

- Enabling and disabling system features

- Displaying system information

- Selecting the primary boot controller

- Configuring memory options

- Selecting a language

- Launching other preboot environments such as the Embedded UEFI Shell and Intelligent Provisioning

For more information, see the UEFI System Utilities user guide for your product on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/UEFI/docs**).

To access mobile-ready online help for the UEFI System Utilities and UEFI Shell, scan the QR code at the bottom of the screen. For on-screen help, press the **F1** key.

Using UEFI System Utilities

To use the System Utilities, use the following keys.

Action	Key
Access System Utilities	F9 during server POST
Navigate menus	Up and Down arrows
Select items	Enter
Save selections	F10
Access Help for a highlighted configuration option*	F1

*Scan the QR code on the screen to access online help for the UEFI System Utilities and UEFI Shell.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up

- After defaults have been restored

Default configuration settings are sufficient for typical server operations; however, you can modify configuration settings as needed. The system prompts you for access to the UEFI System Utilities each time the system is powered up.

Embedded UEFI shell

The system BIOS in all ProLiant Gen9 servers includes an Embedded UEFI Shell in the ROM. The UEFI Shell environment provides an API, a command-line prompt, and a set of CLIs that allow scripting, file manipulation, and system information. These features enhance the capabilities of the UEFI System Utilities.

For more information, see the following documents:

- *UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/UEFI/docs**)

- *UEFI Shell Specification* on the UEFI website (**http://www.uefi.org/specifications**)

Enabling Embedded SATA support

For partitions larger than 2.2 TB, set the boot mode to UEFI.

1. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > System Options > SATA Controller Options > Embedded SATA Configuration**.

2. Ensure that you are using the correct AHCI or RAID system drivers for your SATA option.

3. Select a setting:

- o Enable SATA AHCI Support

    Enables the embedded chipset for AHCI.
- o Enable HP Dynamic Smart Array RAID Support

    Enables the embedded chipset for Dynamic Smart Array RAID.

4. Save your setting.

5. In UEFI mode, move this UEFI boot option to the top of the UEFI boot order list.

6. Reboot the server.

For more information, see the UEFI System Utilities user guide for your product on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/UEFI/docs**).

Changing the UEFI boot order list

1. From the System Utilities screen, select System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > UEFI Boot Settings > UEFI Boot Settings > UEFI Boot Order.

2. To navigate within the boot order list, use your pointing device or the arrow keys.

3. Drag and drop an entry or select an entry and change its order in the list:
   - o To move an entry higher in the list, press the **+** key.
   - o To move an entry lower in the list, press the **–** key.

4. Save your changes.

Changing the UEFI boot order

1. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > UEFI Boot Order**.

2. Use the arrow keys to navigate within the boot order list.

3. Press the + or – key to move an entry higher or lower in the list.

4. Press F10 to save your changes.

Changing the Legacy BIOS boot order

Boot mode is set to Legacy BIOS mode.

1. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > Legacy BIOS Boot Order**.

2. Use the arrow keys to navigate within the boot order list.

3. Press the + or – key to move an entry higher or lower in the list.

4. Press F10 to save your changes.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID:

1. During the server startup sequence, press the **F9** key to access UEFI System Utilities.

2. Select **System Configuration** > **BIOS/Platform Configuration (RBSU)** > **Advanced Options** > **Advanced System ROM Options** > **Serial Number**, and then press the **Enter** key.

3. Enter the serial number and press the **Enter** key.

    The following message appears:

    ```
    The serial number should only be modified by qualified service personnel.
    This value should always match the serial number located on the chassis.
    ```

4. To clear the warning, press the **Enter** key.

5. Enter the serial number and press the **Enter** key.

6. Select **Product ID**.

   The following warning appears:

   ```
   Warning: The Product ID should ONLY be modified by qualified service
   personnel. This value should always match the Product ID located on the
   chassis.
   ```

7. Enter the product ID and press the **Enter** key.

8. To confirm exiting System Utilities, press the **F10** key.

   The server automatically reboots.

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. You can disable ASR from the System Management Homepage or through UEFI System Utilities.

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HPE SIM

- From within the UEFI System Utilities (on page 128)

- From within the Embedded UEFI shell (on page 130)

- From within operating system-specific IML viewers:
  - o   For Windows: IML Viewer
  - o   For Linux: IML Viewer Application

- From within the iLO web interface

- From within Insight Diagnostics (on page 123)

USB support

Hewlett Packard Enterprise servers support both USB 2.0 ports and USB 3.0 ports. Both port types support installing all types of USB devices (USB 1.0, USB 2.0, and USB 3.0), but might run at lower speeds in specific situations:

- USB 3.0 capable devices operate at USB 2.0 speeds when installed in a USB 2.0 port.

- In UEFI Boot Mode, Hewlett Packard Enterprise provides legacy USB support in the preboot environment before the operating system loading for USB 1.0, USB 2.0, and USB 3.0 speeds.

- In Legacy BIOS Boot Mode, Hewlett Packard Enterprise provides legacy USB support in the preboot environment before the operating system loading for USB 1.0 and USB 2.0 speeds. USB 3.0 ports can be used with all devices in Legacy BIOS Boot Mode but are not available at USB 3.0 speeds in the preboot environment. Standard USB support (USB support from within the operating system) is provided by the OS through the appropriate USB device drivers. Support for USB 3.0 varies by operating system.

For maximum compatibility of USB 3.0 devices with all operating systems, Hewlett Packard Enterprise provides a configuration setting for USB 3.0 Mode. Auto is the default setting. This setting impacts USB 3.0 devices when connected to USB 3.0 ports in the following manner:

- **Auto (default)**—If configured in Auto Mode, USB 3.0 capable devices operate at USB 2.0 speeds in the preboot environment and during boot. When a USB 3.0 capable OS USB driver loads, USB 3.0 devices transition to USB 3.0 speeds. This mode is compatible with operating systems that do not support USB 3.0 while allowing USB 3.0 devices to operate at USB 3.0 speeds with state-of-the-art operating systems.

- **Enabled**—If Enabled, USB 3.0 capable devices operate at USB 3.0 speeds at all times (including the preboot environment) when in UEFI Boot Mode. Do not use this mode with operating systems that do not support USB 3.0. If operating in Legacy Boot BIOS Mode, the USB 3.0 ports cannot function in the preboot environment and are not bootable.

- **Disabled**—If configured for Disabled, USB 3.0 capable devices function at USB 2.0 speeds at all times.

The pre-OS behavior and default operation of the USB ports is configurable in the UEFI System Utilities. For more information, see the UEFI System Utilities user guide for your product on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/UEFI/docs**).

External USB functionality

Hewlett Packard Enterprise provides external USB support to enable local connection of USB devices for server administration, configuration, and diagnostic procedures.

For additional security, external USB functionality can be disabled through USB options in UEFI System Utilities.

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

> **NOTE:** The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, the flashing mechanism writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Troubleshooting

Troubleshooting resources

Troubleshooting resources are available for HPE ProLiant Gen9 servers in the following documents:

- The *HPE ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades.

- The *HPE ProLiant Gen9 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades.

To access the troubleshooting resources, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/Gen9-troubleshooting**).

Battery replacement

If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.

> ⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:
> - Do not attempt to recharge the battery.
> - Do not expose the battery to temperatures higher than 60°C (140°F).
> - Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
> - Replace only with the spare designated for this product.

To remove the component:

1. Power down the server (on page 20).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   o Extend the server from the rack (on page 20).
   o Remove the server from the rack (on page 21).
4. Remove the access panel (on page 21).
5. If installed, remove the secondary PCIe riser cage ("Low-profile PCIe slot riser cage option" on page 74).
6. Locate the battery ("System board components" on page 13).
7. Remove the battery.
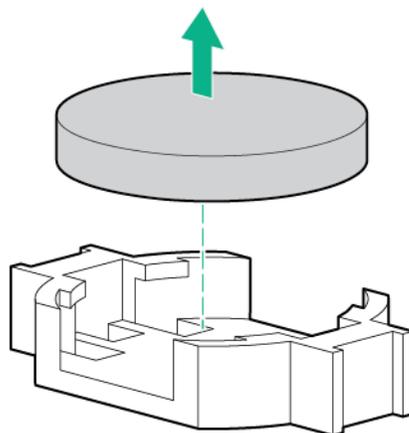
To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Warranty and regulatory information

Warranty information

HPE ProLiant and x86 Servers and Options
(**http://www.hpe.com/support/ProLiantServers-Warranties**)

HPE Enterprise Servers (**http://www.hpe.com/support/EnterpriseServers-Warranties**)

HPE Storage Products (**http://www.hpe.com/support/Storage-Warranties**)

HPE Networking Products (**http://www.hpe.com/support/Networking-Warranties**)

Regulatory information

Safety and regulatory compliance

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise website (**http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts**).

Belarus Kazakhstan Russia marking

Manufacturer and Local Representative Information

Manufacturer information:

Hewlett Packard Enterprise Company, 3000 Hanover Street, Palo Alto, CA 94304 U.S.

Local representative information Russian:

- **Russia:**

  ООО «Хьюлетт Паккард Энтерпрайз», Российская Федерация, 125171, г. Москва, Ленинградское шоссе, 16А, стр.3, Телефон/факс: +7 495 797 35 00

- **Belarus:**

  ИООО «Хьюлетт-Паккард Бел», Республика Беларусь, 220030, г. Минск, ул. Интернациональная, 36-1, Телефон/факс: +375 17 392 28 18

- **Kazakhstan:**

  ТОО «Хьюлетт-Паккард (К)», Республика Казахстан, 050040, г. Алматы, Бостандыкский район, проспект Аль-Фараби, 77/7, Телефон/факс: + 7 727 355 35 50

Local representative information Kazakh:

- **Russia:**

  ЖШС "Хьюлетт Паккард Энтерпрайз" Ресей Федерациясы, 125171, Мәскеу, Ленинград тас жолы, 16А блок 3, Телефон/факс: +7 495 797 35 00

- **Belarus:**

  «HEWLETT-PACKARD Bel» ЖШС, Беларусь Республикасы, 220030, Минск қ., Интернациональная көшесі, 36/1, Телефон/факс: +375 17 392 28 18

- **Kazakhstan:**

  ЖШС «Хьюлетт-Паккард (К)», Қазақстан Республикасы, 050040, Алматы к., Бостандык ауданы, Әл-Фараби даңғ ылы, 77/7, Телефон/факс: +7 727 355 35 50

Manufacturing date:

The manufacturing date is defined by the serial number.

CCSYWWZZZZ (serial number format for this product)

Valid date formats include:

- YWW, where Y indicates the year counting from within each new decade, with 2000 as the starting point; for example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.

- YYWW, where YY indicates the year, using a base year of 2000; for example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you must follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

- Place parts on a grounded surface before removing them from their containers.

- Avoid touching pins, leads, or circuitry.

- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (noncondensing)	
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature

* All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

For certain approved hardware configurations, the supported system inlet temperature range is extended:

- 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

- 40°C to 45°C (104°F to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

The approved hardware configurations for this system are listed on the Hewlett Packard Enterprise website (**http://www.hpe.com/servers/ASHRAE**).

Server specifications

Specification	Value
Height	4.29 cm (1.69 in)
Depth (chassis with SFF drive cage)	69.90 cm (27.50 in)
Depth (chassis with LFF drive cage)	74.98 cm (29.50 in)
Width	43.46 cm (17.11 in)
Weights	
SFF minimum (one drive, one processor, one power supply, two heatsinks, one Smart Array controller, five fans)	12.25 kg (27.00 lb)
SFF maximum (10 drives, two processors, two power supplies, two heatsinks, one Smart Array	15.31 kg (33.36 lb)

Specification	Value
controller, seven fans)	
LFF minimum (one drive, one processor, one power supply, two heatsinks, one Smart Array controller, five fans)	13.77 kg (30.36 lb)
LFF maximum (Four drives, two processors, two power supplies, two heatsinks, one Smart Array controller, seven fans)	16.78 kg (37 lb)

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HPE 500W Flex Slot Platinum Hot-plug Power Supply

- HPE 800W Flex Slot Platinum Hot-plug Power Supply (on page 140)

- HPE 800W Flex Slot Titanium Plus Hot-plug Power Supply (on page 140)

- HPE 800W Flex Slot Universal Hot-plug Power Supply (on page 141)

- HPE 800W Flex Slot -48VDC Hot-plug Power Supply (on page 141)

- HPE 1400W Flex Slot Platinum Plus Hot-plug Power Supply (on page 142)

For detailed power supply specifications, see the QuickSpecs on the Hewlett Packard Enterprise website (**http://www.hpe.com/info/proliant/powersupply**).

HPE 500W Flex Slot Platinum Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	100 to 127 VAC 200 to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	5.8 A at 100 VAC 2.8 A at 200 VAC 2.4 A at 240 VDC for China only
Maximum rated input power	580 W at 100 VAC 560 W at 200 VAC 576 W at 240 VDC for China only
BTUs per hour	1979 at 100 VAC 1911 at 200 VAC 1965 at 240 VDC for China only
Power supply output	
Rated steady-state power	500 W at 100 VAC to 127 VAC input 500 W at 200 VAC to 240 VAC input 500 W at 240 VDC input for China only
Maximum peak power	500 W at 100 VAC to 127 VAC input

	500 W at 200 VAC to 240 VAC input 500 W at 240 VDC input for China only

HPE 800W Flex Slot Platinum Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	100 to 127 VAC 200 to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240VDC
Rated input current	9.4 A at 100 VAC 4.5 A at 200 VAC 3.8 A at 240 VDC for China only
Maximum rated input power	940 W at 100 VAC 900 W at 200 VAC 912 W at 240 VDC for China only
BTUs per hour	3207 at 100 VAC 3071 at 200 VAC 3112 at 240 for China only
Power supply output	
Rated steady-state power	800 W at 100 VAC to 127 VAC input 800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 100 VAC to 127 VAC input 800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only

HPE 800W Flex Slot Titanium Plus Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	200 to 240 V AC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	4.35 A at 200 VAC 3.62 A at 240 VAC 3.62 A at 240 VDC for China only
Maximum rated input power	870 W at 200 VAC 870 W at 240 VAC 870 W at 240 VDC for China only
BTUs per hour	2969 at 200 VAC 2969 at 240 VAC 2969 at 240 VDC for China only

Power supply output	
Rated steady-state power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only

HPE 800W Flex Slot Universal Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	200 V to 277 V AC 380 VDC
Rated input frequency	50 Hz–60 Hz
Rated input current	4.5 A at 200 V AC 3.2 A at 277 V AC 2.3 A at 380 VDC
Maximum rated input power	900 W at 200 VAC 887 W at 277 VAC 874 W at 380 VDC
BTUs per hour	3071 at 200 VAC 3026 at 277 VAC 2982 at 380 VDC
Power supply output	
Rated steady-state power	800 W at 200 VAC to 277 VAC input 800 W at 380 VDC input
Maximum peak power	800 W at 200 VAC to 277 VAC input 800 W at 380 VDC input

HPE 800W Flex Slot -48VDC Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	-40 VDC to -72 VDC -48 VDC nominal input
Rated input current	26 A at -40 VDC input 19 A at -48 VDC input, nominal input 12.4 A at -72 VDC input
Rated input power (W)	936 W at -40 VDC input 912 W at -48 VDC input, nominal input 900 W at -72 VDC input
Rated input power (BTUs per hour)	3194 at -40 VDC input 3112 at -48 VDC input, nominal input 3071 at -72 VDC input

Power supply output

Rated steady-state power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power (W)	800 W at -40 VDC to -72 VDC

⚠ **WARNING:** To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded Secondary circuit source. A Secondary circuit has no direct connection to a Primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
- The branch circuit overcurrent protection must be rated 27 A.

⚠ **CAUTION:** This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment.
If this connection is made, all of the following must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system must be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices must not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

HPE 1400W Flex Slot Platinum Plus Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	200 to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	8.0 A at 200 VAC 6.7 A at 240 VAC 6.7 A at 240 VDC for China only
Maximum rated input power	1600 W at 200 VAC 1600 W at 240 VAC 1600 W at 240 VDC for China only
BTUs per hour	5459 at 200 VAC 5459 at 240 VAC 5459 at 240 VDC for China only
Power supply output	
Rated steady-state power	1400 W at 200 VAC to 240 VAC input 1400 W at 240 VDC input for China only
Maximum peak power	1400 W at 200 VAC to 240 VAC input 1400 W at 240 VDC input for

Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, see the Hewlett Packard Enterprise Power Advisor website (**http://www.hpe.com/info/poweradvisor/online**).

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website (**http://www.hpe.com/assistance**).

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website (**http://www.hpe.com/support/hpesc**).

Information to collect

- Technical support registration number (if applicable)

- Product name, model or version, and serial number

- Operating system name and version

- Firmware version

- Error messages

- Product-specific reports and logs

- Add-on products or components

- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

- To download product updates, go to either of the following:
  - o Hewlett Packard Enterprise Support Center Get connected with updates page (**http://www.hpe.com/support/e-updates**)
  - o Software Depot website (**http://www.hpe.com/support/softwaredepot**)

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page (**http://www.hpe.com/support/AccessToSupportMaterials**).

  IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Websites

- Hewlett Packard Enterprise Information Library (**http://www.hpe.com/info/enterprise/docs**)

- Hewlett Packard Enterprise Support Center (**http://www.hpe.com/support/hpesc**)

- Contact Hewlett Packard Enterprise Worldwide (**http://www.hpe.com/assistance**)

- Subscription Service/Support Alerts (**http://www.hpe.com/support/e-updates**)

- Software Depot (**http://www.hpe.com/support/softwaredepot**)

- Customer Self Repair (**http://www.hpe.com/support/selfrepair**)

- Insight Remote Support (**http://www.hpe.com/info/insightremotesupport/docs**)

- Serviceguard Solutions for HP-UX (**http://www.hpe.com/info/hpux-serviceguard-docs**)

- Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix (**http://www.hpe.com/storage/spock**)

- Storage white papers and analyst reports (**http://www.hpe.com/storage/whitepapers**)

Customer Self Repair

Hewlett Packard Enterprise products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period Hewlett Packard Enterprise (or Hewlett Packard Enterprise service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, Hewlett Packard Enterprise will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request Hewlett Packard Enterprise to replace these parts, you will be charged for the travel and labor costs of this service.

- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that Hewlett Packard Enterprise replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some Hewlett Packard Enterprise parts are not designed for customer self repair. In order to satisfy the customer warranty, Hewlett Packard Enterprise requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the Hewlett Packard Enterprise Support Center and a technician will help you over the telephone. Hewlett Packard Enterprise specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to Hewlett Packard Enterprise. In cases where it is required to return the defective part to Hewlett Packard Enterprise, you must ship the defective part back to Hewlett Packard Enterprise within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in Hewlett Packard Enterprise billing you for the replacement. With a customer self repair, Hewlett Packard Enterprise will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about the Hewlett Packard Enterprise CSR program, contact your local service provider. For the North American program, go to the Hewlett Packard Enterprise CSR website (**http://www.hpe.com/support/selfrepair**).

Réparation par le client (CSR)

Les produits Hewlett Packard Enterprise comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, Hewlett Packard Enterprise (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, Hewlett Packard Enterprise vous l'envoie directement. Il existe deux catégories de pièces CSR :

- **Obligatoire**—Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à Hewlett Packard Enterprise de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

- **Facultatif**—Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à Hewlett Packard Enterprise de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces Hewlett Packard Enterprise ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, Hewlett Packard Enterprise exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour toute assistance, appelez le Centre d'assistance Hewlett Packard Enterprise pour qu'un technicien vous aide au téléphone. Dans les documents envoyés avec la pièce de rechange CSR, Hewlett Packard Enterprise précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, Hewlett Packard Enterprise se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, Hewlett Packard Enterprise supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de Hewlett Packard Enterprise, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web Hewlett Packard Enterprise (**http://www.hpe.com/support/selfrepair**).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti Hewlett Packard Enterprise sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica Hewlett Packard Enterprise (o un centro di servizi o di assistenza Hewlett Packard Enterprise) identifica il guasto come riparabile mediante un ricambio CSR, Hewlett Packard Enterprise lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

- **Obbligatorie**—Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad Hewlett Packard Enterprise, deve sostenere le spese di spedizione e di manodopera per il servizio.

- **Opzionali**—Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad Hewlett Packard Enterprise, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti Hewlett Packard Enterprise non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, Hewlett Packard Enterprise richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico Hewlett Packard Enterprise. Nel materiale fornito con una parte di ricambio CSR, Hewlett Packard Enterprise specifica se il cliente deve restituire dei component. Qualora sia richiesta la resa ad Hewlett Packard Enterprise del componente difettoso, lo si deve spedire ad Hewlett Packard Enterprise entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di

spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di Hewlett Packard Enterprise. Nel caso di riparazione da parte del cliente, Hewlett Packard Enterprise sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di Hewlett Packard Enterprise, contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web (**http://www.hpe.com/support/selfrepair**).

Customer Self Repair

Hewlett Packard Enterprise Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn Hewlett Packard Enterprise (oder ein Hewlett Packard Enterprise Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen Hewlett Packard Enterprise dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

- **Zwingend**—Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von Hewlett Packard Enterprise vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

- **Optional**—Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von Hewlett Packard Enterprise vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Hewlett Packard Enterprise Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem Hewlett Packard Enterprise Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No" bzw. „Nein" gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das Hewlett Packard Enterprise Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien von Hewlett Packard Enterprise, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an Hewlett Packard Enterprise zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an Hewlett Packard Enterprise zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann Hewlett Packard Enterprise Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt Hewlett Packard Enterprise für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das Hewlett Packard Enterprise Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der Hewlett Packard Enterprise Website unter (**http://www.hpe.com/support/selfrepair**).

Reparaciones del propio cliente

Los productos de Hewlett Packard Enterprise incluyen muchos componentes que el propio usuario puede reemplazar (Customer Self Repair, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, Hewlett Packard Enterprise (o los proveedores o socios de servicio de Hewlett Packard Enterprise) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, Hewlett Packard Enterprise le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio**—componentes cuya reparación por parte del usuario es obligatoria. Si solicita a Hewlett Packard Enterprise que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.

- **Opcional**—componentes cuya reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que Hewlett Packard Enterprise realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes de Hewlett Packard Enterprise no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, Hewlett Packard Enterprise pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de Hewlett Packard Enterprise y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, Hewlett Packard Enterprise especificará si los componentes defectuosos deberán devolverse a Hewlett Packard Enterprise. En aquellos casos en los que sea necesario devolver algún componente a Hewlett Packard Enterprise, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, Hewlett Packard Enterprise podrá cobrarle por el de sustitución. En el caso de todas sustituciones que lleve a cabo el cliente, Hewlett Packard Enterprise se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de Hewlett Packard Enterprise, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de Hewlett Packard Enterprise CSR (**http://www.hpe.com/support/selfrepair**).

Customer Self Repair

Veel onderdelen in Hewlett Packard Enterprise producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als Hewlett Packard Enterprise (of een Hewlett Packard Enterprise Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt Hewlett Packard Enterprise dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

- **Verplicht**—Onderdelen waarvoor reparatie door de klant verplicht is. Als u Hewlett Packard Enterprise verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

- **Optioneel**—Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter Hewlett Packard Enterprise verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige Hewlett Packard Enterprise onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie is gewenst, belt u het Hewlett Packard Enterprise Support Center om via de telefoon ondersteuning van een technicus te ontvangen.

Hewlett Packard Enterprise vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan Hewlett Packard Enterprise moet worden geretourneerd. Als het defecte onderdeel aan Hewlett Packard Enterprise moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan Hewlett Packard Enterprise. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan Hewlett Packard Enterprise u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt Hewlett Packard Enterprise alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest Hewlett Packard Enterprise zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van Hewlett Packard Enterprise. Informatie over Service Partners vindt u op de Hewlett Packard Enterprise website (**http://www.hpe.com/support/selfrepair**).

Reparo feito pelo cliente

Os produtos da Hewlett Packard Enterprise são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a Hewlett Packard Enterprise (ou fornecedores/parceiros da Hewlett Packard Enterprise) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a Hewlett Packard Enterprise enviará a peça diretamente ao cliente. Há duas categorias de peças CSR:

- **Obrigatória**—Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a Hewlett Packard Enterprise substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

- **Opcional**—Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a Hewlett Packard Enterprise as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da Hewlett Packard Enterprise não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a Hewlett Packard Enterprise exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da Hewlett Packard Enterprise para que um técnico o ajude por telefone. A Hewlett Packard Enterprise especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à Hewlett Packard Enterprise. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à Hewlett Packard Enterprise, você deverá enviar a peça com defeito de volta para a Hewlett Packard Enterprise dentro do período de tempo definido, normalmente em 5 (cinco) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a Hewlett Packard Enterprise poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a Hewlett Packard Enterprise paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da Hewlett Packard Enterprise, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da Hewlett Packard Enterprise (**http://www.hpe.com/support/selfrepair**).

カスタマーセルフリペア

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、Hewlett Packard Enterprise製品には多数のカスタマーセルフリペア（CSR）部品があります。診断の際に、CSR部品を使用すれば修理ができるとHewlett Packard Enterprise（Hewlett Packard EnterpriseまたはHewlett Packard Enterprise正規保守代理店）が判断した場合、Hewlett Packard Enterpriseはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2種類があります。

- **必須** - カスタマーセルフリペアが必須の部品。当該部品について、もしもお客様がHewlett Packard Enterpriseに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。

- **任意** - カスタマーセルフリペアが任意である部品。この部品もカスタマーセルフリペア用です。当該部品について、もしもお客様がHewlett Packard Enterpriseに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注：Hewlett Packard Enterprise製品の一部の部品は、カスタマーセルフリペアの対象外です。製品の保証を継続するためには、Hewlett Packard EnterpriseまたはHewlett Packard Enterprise正規保守代理店による交換作業が必須となります。部品カタログには、当該部品がカスタマーセルフリペア除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、Hewlett Packard Enterpriseの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHewlett Packard Enterpriseに返送する必要があるかどうかが表示されています。故障部品をHewlett Packard Enterpriseに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHewlett Packard Enterpriseに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、Hewlett Packard Enterpriseから部品費用が請求されます。カスタマーセルフリペアの際には、Hewlett Packard Enterpriseは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

Hewlett Packard Enterprise 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 Hewlett Packard Enterprise（或Hewlett Packard Enterprise 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，Hewlett Packard Enterprise 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 Hewlett Packard Enterprise 更换这些部件，则必须为该服务支付差旅费和人工费用。

- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 Hewlett Packard Enterprise 为您更换这些部件，则根据为您的产品指定的保修服务类型，Hewlett Packard Enterprise 可能收取或不再收取任何附加费用。

注：某些 Hewlett Packard Enterprise 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，Hewlett Packard Enterprise 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为"否"。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 Hewlett Packard Enterprise 技术支持中心，将会有技术人员通过电话为您提供帮助。Hewlett Packard Enterprise 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 Hewlett Packard Enterprise。如果要求您将有缺陷的部件返还给 Hewlett Packard Enterprise，那么您必须在规定的期限内（通常是五 (5) 个工作日）将缺陷部件发给 Hewlett Packard Enterprise。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，Hewlett Packard Enterprise 可能会要求您支付更换费用。客户自行维修时，Hewlett Packard Enterprise 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 Hewlett Packard Enterprise 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 Hewlett Packard Enterprise 网站 (http://www.hpe.com/support/selfrepair)。

客戶自行維修

Hewlett Packard Enterprise 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間，Hewlett Packard Enterprise (或 Hewlett Packard Enterprise 服務供應商或維修夥伴) 辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 Hewlett Packard Enterprise 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 Hewlett Packard Enterprise 更換這些零件，Hewlett Packard Enterprise 將會向您收取此服務所需的外出費用與勞動成本。

- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 Hewlett Packard Enterprise 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 Hewlett Packard Enterprise 零件沒有消費者可自行維修的設計。為符合客戶保固，Hewlett Packard Enterprise 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電 Hewlett Packard Enterprise 支援中心，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，Hewlett Packard Enterprise 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 Hewlett Packard Enterprise，您必須在指定的一段時間內 (通常為五 (5) 個工作天)，將損壞的零件寄回 Hewlett Packard Enterprise。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，Hewlett Packard Enterprise 可能要向您收取替換費用。針對客戶自行維修情形，Hewlett Packard Enterprise 將負責所有運費及零件退還費用，並指定使用何家快遞/貨運公司。

如需 Hewlett Packard Enterprise 的 CSR 方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 Hewlett Packard Enterprise 的 CSR 網站frepair (http://www.hpe.com/support/selfrepair)。

고객 셀프 수리

Hewlett Packard Enterprise 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 Hewlett Packard Enterprise(또는 Hewlett Packard Enterprise 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 Hewlett Packard Enterprise는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **필수** – 고객 셀프 수리가 의무 사항인 필수 부품. 사용자가 Hewlett Packard Enterprise에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.

- **선택 사항** – 고객 셀프 수리가 선택 사항인 부품. 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 Hewlett Packard Enterprise에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 Hewlett Packard Enterprise 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. Hewlett Packard Enterprise는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 Hewlett Packard Enterprise Support Center로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. Hewlett Packard Enterprise는 결함이 발생한 부품을 Hewlett Packard Enterprise로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 Hewlett Packard Enterprise로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 Hewlett Packard Enterprise로 반환해야 합니다. 이때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 Hewlett Packard Enterprise가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, Hewlett Packard Enterprise는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

Hewlett Packard Enterprise CSR 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 Hewlett Packard Enterprise CSR 웹 사이트(http://www.hpe.com/support/selfrepair)를 참조하십시오.

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected (**http://www.hpe.com/services/getconnected**)

HPE Proactive Care services (**http://www.hpe.com/services/proactivecare**)

HPE Proactive Care service: Supported products list (**http://www.hpe.com/services/proactivecaresupportedproducts**)

HPE Proactive Care advanced service: Supported products list (**http://www.hpe.com/services/proactivecareadvancedsupportedproducts**)

Proactive Care customer information

Proactive Care central (**http://www.hpe.com/services/proactivecarecentral**)

Proactive Care service activation (**http://www.hpe.com/services/proactivecarecentralgetstarted**)

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AMP

Advanced Memory Protection

API

application program interface

ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASR

Automatic Server Recovery

CAS

column address strobe

CSA

Canadian Standards Association

CSR

Customer Self Repair

ESD

electrostatic discharge

FLR

FlexibleLOM for rack servers

FSBBU

Flex slot battery backup

GPU

graphics processing unit

HBA

host bus adapter

HPE SIM

HPE Systems Insight Manager

HPE SSA

HPE Smart Storage Administrator

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISO

International Organization for Standardization

JSON

JavaScript Object Notation

LFF

large form factor

LRDIMM

load reduced dual in-line memory module

NAND

Not AND

NMI

nonmaskable interrupt

NVDIMM

non-volatile dual in-line memory module

NVDIMM-N

non-volatile dual in-line memory module with byte-addressable interface to DRAM

NVRAM

nonvolatile memory

PCA

printed circuit assembly

PCIe

Peripheral Component Interconnect Express

PDU

power distribution unit

POST

Power-On Self-Test

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

RDP

Rapid Deployment Pack

REST

representational state transfer

RoHS

Restriction of Hazardous Substances

RSOC

relative state of charge

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SFF

small form factor

SID

Systems Insight Display

SPP

Standard Parallel Port Mode

SSD

solid-state drive

STK

Scripting Toolkit

SUM

Smart Update Manager

TMRA

recommended ambient operating temperature

TPM

Trusted Platform Module

UEFI

Unified Extensible Firmware Interface

UID

unit identification

USB

universal serial bus

VCA

Version Control Agent

VCRM

Version Control Repository Manager

VDC

voltage direct-current

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (**mailto:docsfeedback@hpe.com**). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

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