



Hewlett Packard
Enterprise

HPE Apollo 4200 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.

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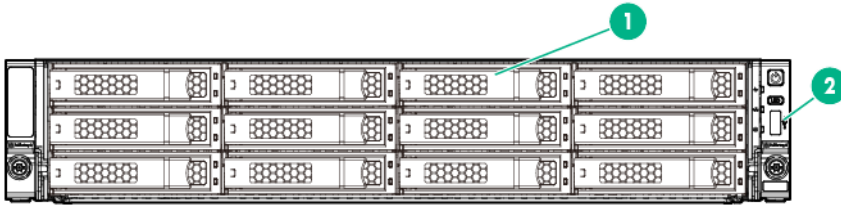
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Component identification

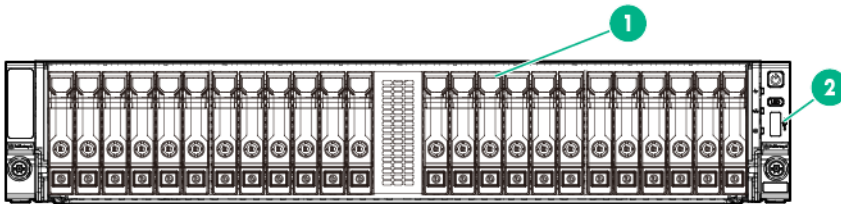
Front panel components

- LFF chassis



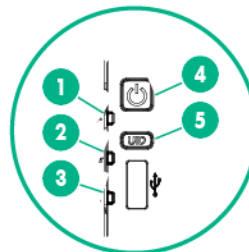
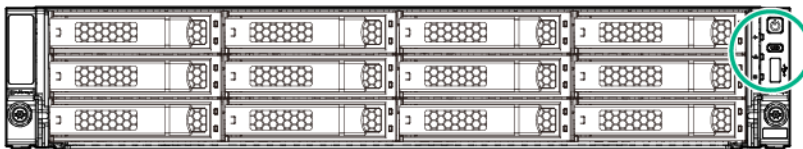
Item	Description
1	LFF hot-plug drives
2	USB 2.0 connector

- SFF chassis



Item	Description
1	SFF hot-plug drives
2	USB 2.0 connector

Front panel LEDs and buttons



Item	Description	Status
1	Health LED ¹	Solid green = Normal Flashing green (1 flash per sec) = iLO is rebooting Flashing amber = System degraded ² Flashing red (1 flash per sec) = System critical ²
2	NIC status LED ¹	Solid green = Link to network Flashing green (1 flash per second) = Network active Off = No network activity
3	Front drive health/thermal LED	Solid green = Drives supported by the SAS expander are functional. ³ Solid amber = Failure or predictive failure of one or more drives supported by the SAS expander. ³ Flashing amber (1 flash per sec) = The temperature sensor in one or more front drives is about to reach the thermal threshold. Immediately slide the front drive cages back into the chassis and keep them there until the LED turns green. ⁴ Off = No power present ⁵
4	Power On/Standby button and system power LED ¹	Solid green = System on Flashing green (1 flash per second) = Performing power on sequence Solid amber = System in standby Off = No power present ⁵
5	UID button/LED ¹	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> • 1 flash per second = Remote management or firmware upgrade in progress • 4 flashes per second = iLO manual reboot sequence initiated • 8 flashes per second = iLO manual reboot sequence in progress Off = Deactivated

¹ When these four LEDs flash simultaneously, a power fault has occurred. For more information, see **Power fault LEDs**.

² If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

³ This LED behavior applies to all front drives, as well as to the rear drives connected to the front drive cage 2 backplane.

⁴ This LED behavior depends on the iLO 08-HD Max sensor reading. For more information, see **Front drive thermal LED**.

⁵ Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the front I/O cable is disconnected.

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

Front drive thermal LED

The thermal warning function of the front drive health/thermal LED depends on the iLO 08-HD Max sensor reading. This function is disabled under these conditions:

- There are no drives in the front drive cages 1 and 2.
- The temperature sensor in one or more front drives has failed.

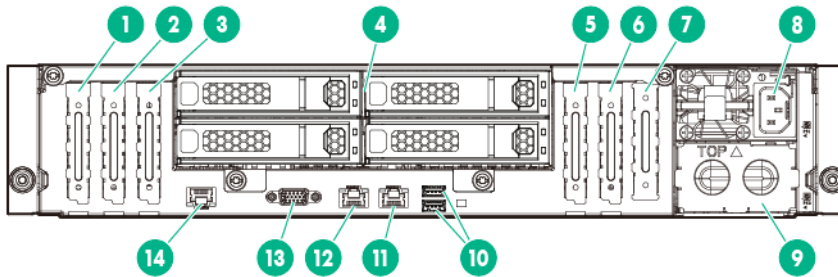
Under these conditions, iLO shows the 08-HD Max sensor reading as N/A. To view temperature sensor data, log in to iLO 4 web interface and navigate to the Information → System Information → Temperatures page.

If the 08-HD Max sensor reading shows N/A, observe the following when extending the front drive cage:

- Do not keep the drive cages out of the chassis for more than 140 sec.
- Keep the drive cages inside the chassis for at least 300 sec before extending them out again.

Rear panel components

- Rear panel with the four-bay LFF hot-plug rear drive cage option



Item	Description
1	PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board ¹
2	PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board ¹
3	PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board ¹
4	LFF hot-plug drives
5	PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options ²

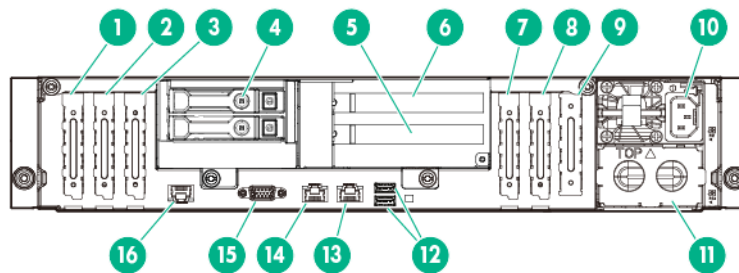
Table Continued

Item	Description
6	PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board ²
7	FlexibleLOM slot ²
8	Hot-plug power supply bay 1
9	Hot-plug power supply bay 2
10	USB 3.0 connectors
11	NIC 1/shared iLO connector
12	NIC connector 2
13	Video connector
14	Dedicated iLO management connector (optional)

¹ The PCIe expansion slots 5-7 are associated with processor 2.

² The PCIe expansion slots 1-4 and the FlexibleLOM slot are associated with processor 1.

- Rear panel with the two-bay SFF hot-plug rear drive cage and two-slot PCI riser cage options



Item	Description
1	PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board ¹
2	PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board ¹
3	PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board ¹
4	SFF hot-plug drives
5	PCIe3 x8 (8, 4, 1) riser slot 4 for full-height, half-length expansion board ²
6	PCIe3 x8 (8, 4, 1) riser slot 3 for full-height, half-length expansion board ²
7	PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options ²
8	PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board ²
9	FlexibleLOM slot ²
10	Hot-plug power supply bay 1
11	Hot-plug power supply bay 2
12	USB 3.0 connectors
13	NIC 1/shared iLO connector
14	NIC connector 2

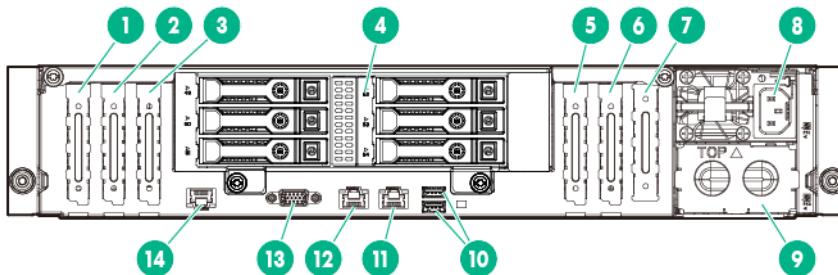
Table Continued

Item	Description
15	Video connector
16	Dedicated iLO management connector (optional)

¹ The PCIe expansion slots 5-7 are associated with processor 2.

² The PCIe expansion slots 1-4 and the FlexibleLOM slot are associated with processor 1.

- Rear panel with the six-bay SFF hot-plug rear drive cage option

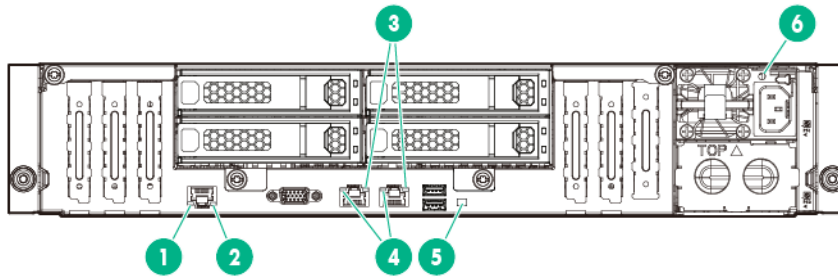


Item	Description
1	PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board ¹
2	PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board ¹
3	PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board ¹
4	SFF hot-plug drives
5	PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options ²
6	PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board ²
7	FlexibleLOM slot ²
8	Hot-plug power supply bay 1
9	Hot-plug power supply bay 2
10	USB 3.0 connectors
11	NIC 1/shared iLO connector
12	NIC connector 2
13	Video connector
14	Dedicated iLO management connector (optional)

¹ The PCIe expansion slots 5-7 are associated with processor 2.

² The PCIe expansion slots 1-4 and the FlexibleLOM slot are associated with processor 1.

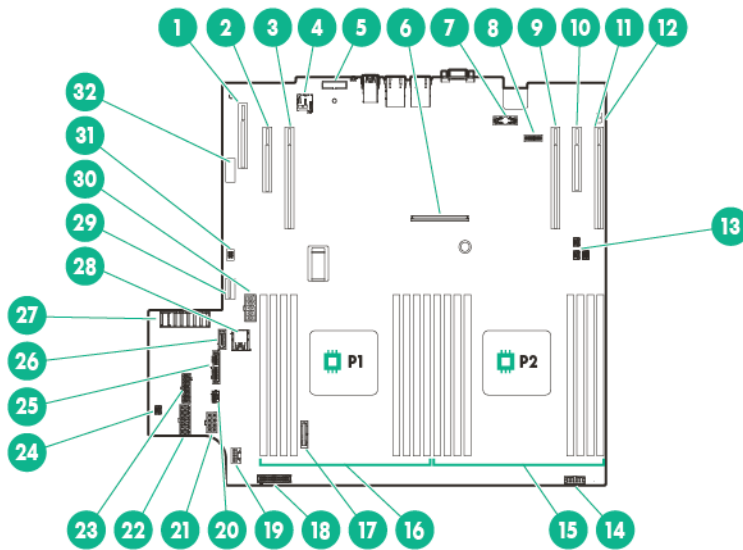
Rear panel LEDs



Item	Description	Status
1	Dedicated iLO activity LED	Solid green = Link to network Flashing green = Network active Off = No network activity
2	Dedicated iLO link LED	Green = Network link Off = No network link
3	NIC activity LED	Solid green = Link to network Flashing green = Network active Off = No network activity
4	NIC link LED	Green = Network link Off = No network link
5	UID LED	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> • 1 flash per second = Remote management or firmware upgrade in progress • 4 flashes per second = iLO manual reboot sequence initiated • 8 flashes per second = iLO manual reboot sequence in progress Off = Deactivated
6	Power supply LED	Solid green = Normal Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply error

System board components

The components shown in this section are associated with the HPE ProLiant XL420 Gen9 Server system board.



Item	Description
1	FlexibleLOM slot ¹
2	PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board ¹
3	PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options ¹
4	microSD card slot
5	TPM connector
6	Flexible Smart Array Controller slot
7	Dedicated iLO management module connector
8	System maintenance switch
9	PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board ²
10	PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board ²
11	PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board ²
12	NMI header
13	Storage backup power connectors for expansion slots 3–7
14	Front I/O connector
15	Processor 2 DIMM slots
16	Processor 1 DIMM slots
17	System battery
18	Fan signal connector
19	Smart Storage Battery connector

Table Continued

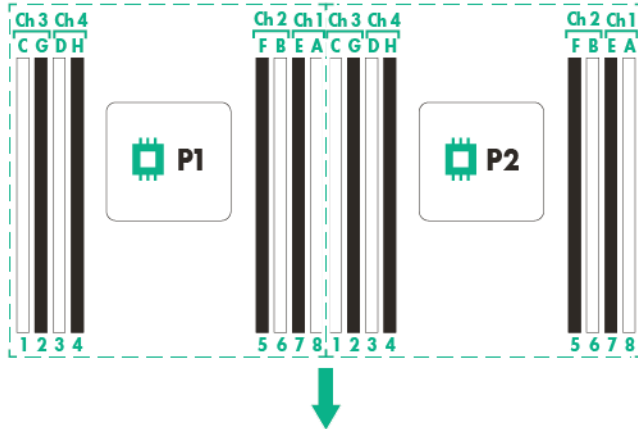
Item	Description
20	Rear SFF drive backplane detection connector
21	Fan power connector
22	Front drive cage 2 backplane power connector
23	Front drive cage 1 backplane power connector
24	Storage backup power connector for expansion slots 1–2
25	SATA 6Gb/s connector 4
26	SATA 6Gb/s connector 5
27	Power pass-through board connector
28	Internal USB 3.0 connector
29	SATA x4 connector 1
30	Rear drive cage backplane power connector
31	Front USB 2.0 connector
32	6 SFF backplane sideband connector

¹ The PCIe expansion slots 1-4 and the FlexibleLOM slot are associated with processor 1.

² The PCIe expansion slots 5-7 are associated with processor 2.

DIMM slot locations

DIMM slots are numbered sequentially (1 through 8) for each processor. The supported AMP modes use the letter assignments for population guidelines.



The arrow points to the front of the server.

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 = ROM reads system configuration as invalid.
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

To access the redundant ROM, set S1, S5 and S6 to On.

When the system maintenance S6 switch is set to the On position, the system will erase all system configuration settings from both CMOS and NVRAM on the next reboot. Clearing CMOS, NVRAM, or both deletes configuration information. Be sure to configure the server properly to prevent data loss.

Disabling the Dynamic Smart Array B140i Controller

Prerequisites

Before using the S7 switch to change the boot mode to Legacy BIOS Mode, you must first disable the Dynamic Smart Array B140i Controller.

To disable the Dynamic Smart Array B140i Controller:

Procedure

1. Reboot the server.
The server restarts and the POST screen appears.
2. Press **F9**.
The System Utilities screen appears.
3. Select **System Configuration -> BIOS/Platform Configuration (RBSU) -> System Options -> SATA Controller Options -> Embedded SATA Configuration**, and then press **Enter**.

4. Select **Enable SATA AHCI Support**, and then press **Enter**.
5. Press **F10** to save the selection.
6. Press **Y** to save the changes.

The `Change saved` confirmation prompt appears.

7. Select **Exit and resume system boot**, and press **Enter**.

The server continues the normal boot process.

NMI functionality

An NMI crash dump creates a crash dump log before resetting a system which is not responding.

Crash dump log analysis is an essential part of diagnosing reliability problems, such as failures of operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to restart the system. Resetting the system erases any information which could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a system reset.

To force the system to invoke the NMI handler and generate a crash dump log, do one of the following:

- Use the iLO Virtual NMI feature.
- Short the NMI header.

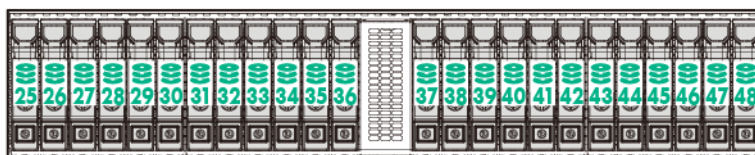
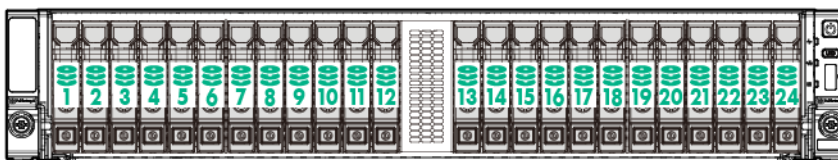
For more information, see the [Hewlett Packard Enterprise website](#).

Drive numbering

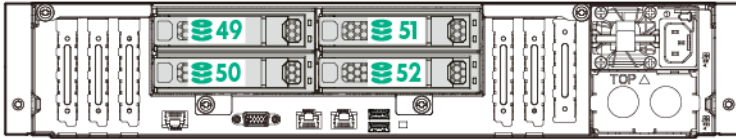
- 24-bay LFF hot-plug front drive numbering



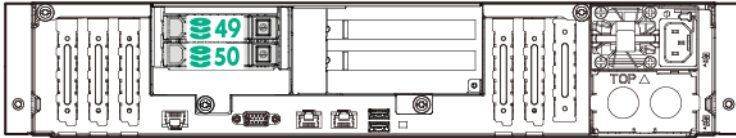
- 48-bay SFF hot-plug front drive numbering



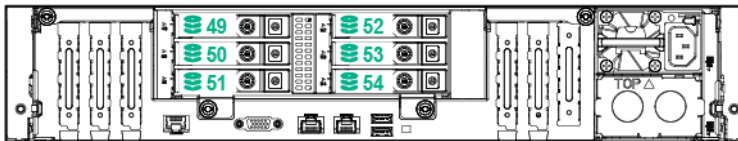
- Four-bay LFF hot-plug rear drive numbering



- Two-bay SFF hot-plug rear drive numbering



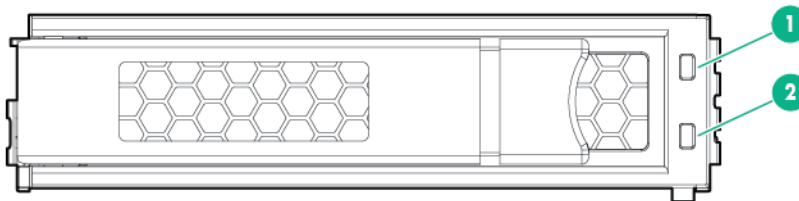
- Six-bay SFF hot-plug rear drive numbering



Drive LEDs

LFF and SFF drives have different sets of LEDs to reflect the drive status.

LFF drive LED definitions



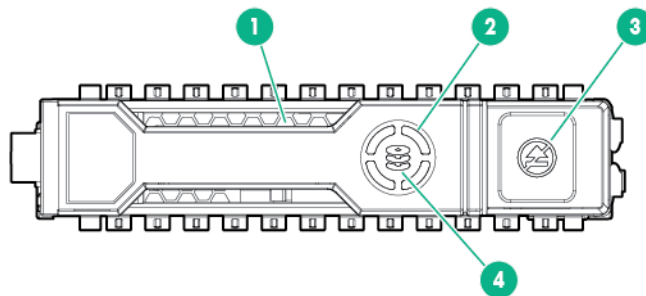
Item	Definition
1	Fault/UID (amber/blue)
2	Online/Activity (green)

Online/Activity LED (green)	Fault/UID LED (amber/blue)	Definition
On, off, or flashing	Alternating amber and blue	One or more of the following conditions exist: <ul style="list-style-type: none"> • The drive has failed. • A predictive failure alert has been received for this drive. • The drive has been selected by a management application.

Table Continued

On, off, or flashing	Solid blue	One or both of the following conditions exist: <ul style="list-style-type: none"> The drive is operating normally. The drive has been selected by a management application.
On	Flashing amber	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online but is not currently active.
1 flash per second	Flashing amber	Do not remove the drive. Removing the drive might terminate the current operation and cause data loss. The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not remove the drive until the expansion or migration is complete.
1 flash per second	Off	Do not remove the drive. Removing the drive might terminate the current operation and cause data loss. The drive is rebuilding, erasing, or is part of an array that is undergoing capacity expansion or stripe migration.
4 flashes per second	Flashing amber	The drive is active but a predictive failure alert has been received for the drive. Replace the drive as soon as possible.
4 flashed per second	Off	The drive is active and is operating normally.
Off	Solid amber	A critical fault condition has been identified for this drive and the controller has placed it offline. Replace the drive as soon as possible.
Off	Flashing amber	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

SFF 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.

The blue Locate LED is behind the release lever and is visible when illuminated.

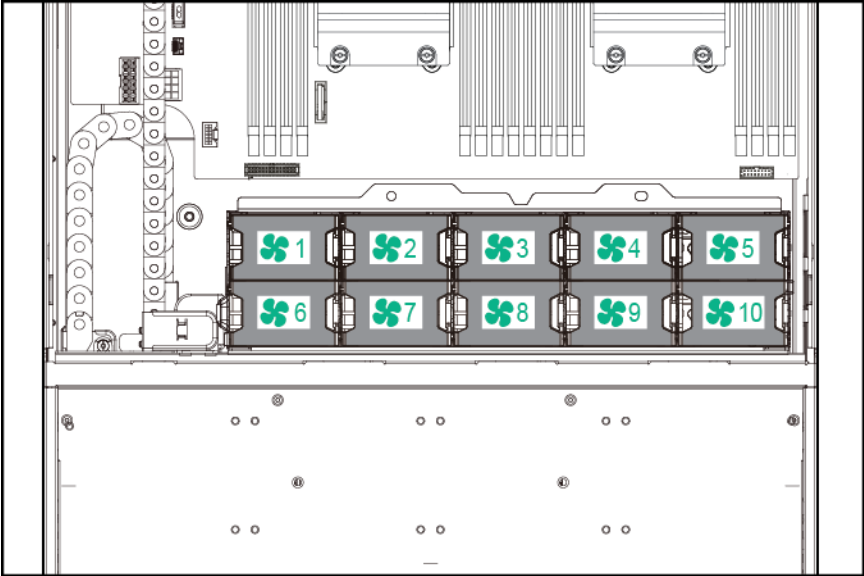
! **IMPORTANT:**

The Dynamic Smart Array B140i Controller is only available in UEFI Boot Mode. It cannot be enabled in Legacy BIOS Boot Mode. If the B140i controller is disabled, drives connected to the system board Mini-SAS connectors operate in AHCI or Legacy mode. Under this condition:

- The drives cannot be a part of a hardware RAID or a logical drive.
- The Locate, Drive status, and Do not remove LEDs of the affected drives are disabled.

Use BIOS/Platform Configuration (RBSU) in the **UEFI System Utilities** to enable or disable the B140i controller (System Configuration -> BIOS/Platform Configuration (RBSU) -> System Options -> SATA Controller Options -> Embedded SATA Configuration).

Fan location



Setup

Optional service

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.
 - 6-Hour Call-to-Repair¹
 - 4-Hour 24x7
 - Next Business Day
- Proactive Care – Help prevent service incidents and get you to technical experts when there is one.
 - 6-Hour Call-to-Repair¹
 - 4-Hour 24x7
 - Next Business Day
- Deployment service for both hardware and software
- HPE Education Services – Help train your IT staff.

¹The time commitment for this repair service might vary depending on the site's geographical region. For more service information available in your site, contact your local [HPE support center](#).

For more information on HPE support services, see the [Hewlett Packard Enterprise website](#).

Optimum environment

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 63.5 cm (25 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).

- ⚠ 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](#).

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.

Server warnings and caution

⚠ WARNING:

This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual handling.
 - Reduce the weight of the server by removing the drives and power input modules before installing or removing the server from the rack.
 - Obtain adequate assistance to lift and stabilize the server during installation or removal. Hewlett Packard Enterprise recommends that a minimum of two people are required for installing or removing the server from the rack. A third person might be required to help align the server if the server is installed higher than chest level.
 - Use caution when installing or removing the server from the rack; it is unstable when not fastened to the rails.
-

⚠ WARNING:

To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.

**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. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

**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.

Rack warnings and caution

**WARNING:**

To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single-rack installation.
 - The racks are coupled together in multiple-rack installations.
 - Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.
-

**WARNING:**

To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
 - Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.
-

**WARNING:**

To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

**WARNING:**

When installing a server in a telco rack, be sure that the rack frame is adequately secured at the top and bottom to the building structure.

△ CAUTION:

Do not operate the server for long periods with the front drive cages extended. When the front drive cages are extended while the server is powered on, do one of the following:

- If the iLO 08-HD Max sensor reading is reporting a temperature value, monitor the status of the **front drive health/thermal LED**. When this LED starts flashing amber, immediately slide the drive cages back into the chassis and keep them there until the LED turns green.
- If the iLO 08-HD Max sensor reading is reporting an N/A value, monitor how long the drive cages have been out of the chassis. Before reaching the 140 sec mark, slide the drive cages back into the chassis and keep them there for at least 300 sec before extending them out again.

Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Rack mounting hardware kit
- Printed setup documentation

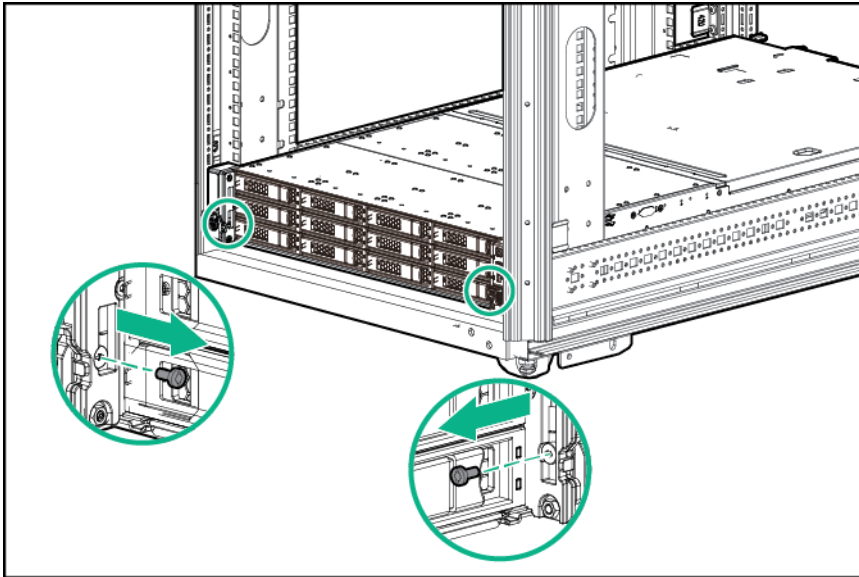
In addition to the supplied items, you might need:

- T-10/T-15 Torx screwdriver
- T-25 Torx screwdriver
- Hardware options

Extend the front drive cages out of the chassis

The front drive cages are secured to the chassis by shipping screws upon product delivery. The location and number of these shipping screws depend on how the server was shipped during product delivery. Remove these shipping screws before extending the front drive cages for the first time.

- For a server that was already mounted on a rack during product delivery, there are two screws located on the rack ears. Do the following to remove these screws:
 1. If installed, **remove the security bezel**.
 2. Remove the shipping screws on the rack ears.



- For a server that was delivered in a shipping carton, the shipping screws should have been removed before the server was first installed in the rack. See **Shipping hardware removal**.



WARNING:

To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.



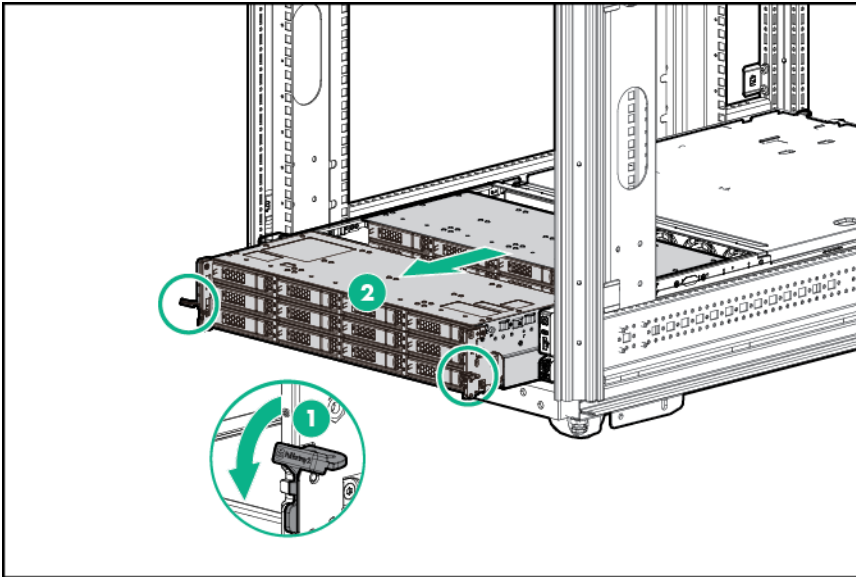
CAUTION:

Do not operate the server for long periods with the front drive cages extended. When the front drive cages are extended while the server is powered on, do one of the following:

- If the iLO 08-HD Max sensor reading is reporting a temperature value, monitor the status of the **front drive health/thermal LED**. When this LED starts flashing amber, immediately slide the drive cages back into the chassis and keep them there until the LED turns green.
- If the iLO 08-HD Max sensor reading is reporting an N/A value, monitor how long the drive cages have been out of the chassis. Before reaching the 140 sec mark, slide the drive cages back into the chassis and keep them there for at least 300 sec before extending them out again.

Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

To extend the front drive cages, pull down the front drive cage release latches and use them to extend the drive cages out of the chassis.



Shipping hardware removal

The server is secured with shipping hardware during the original product shipment. The location any type of shipping hardware installed depends on whether the server was a BTO or a CTO shipment.

- The front drive cages of a server shipped on its own (BTO) are secured by shipping screws installed on the sides of the chassis.
- The front drive cages of a server shipped in a rack (CTO shipment) are secured by shipping screws installed on the rack ears. In addition, the server is also secured to the rack rails by two rear shipping brackets.

Remove these shipping hardware prior to initial server setup.

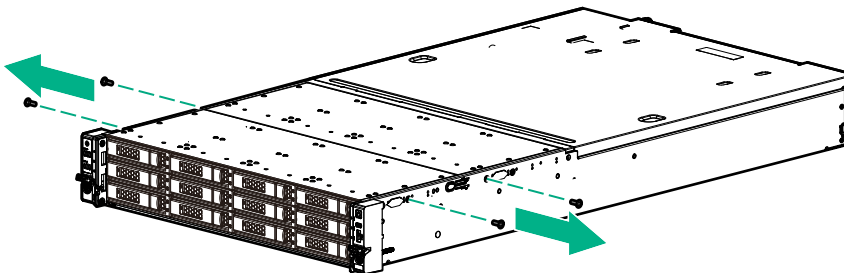
Removing the shipping screws from a BTO server

Prerequisites

Before you remove the shipping hardware, make sure that you have a T-15 Torx screwdriver available.

Procedure

1. Carefully remove the server from its packaging.
2. To allow the front drive cages to be extended out of the chassis during server operation, remove the shipping screws.



Keep these shipping screws and the server packaging materials in case there is a need to ship or transport the server at a later date.

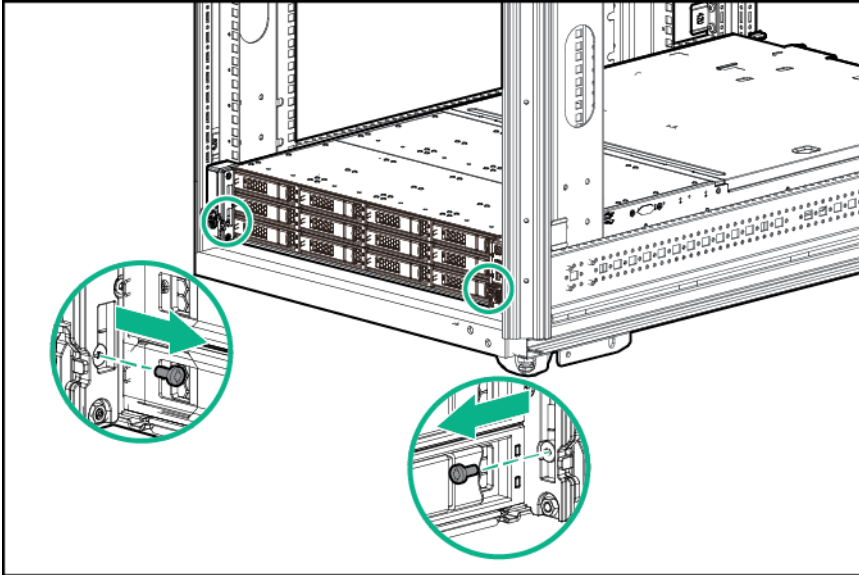
Removing the shipping screws and brackets from a CTO server

Prerequisites

Before you remove the shipping hardware, make sure that you have a T-15 Torx screwdriver available.

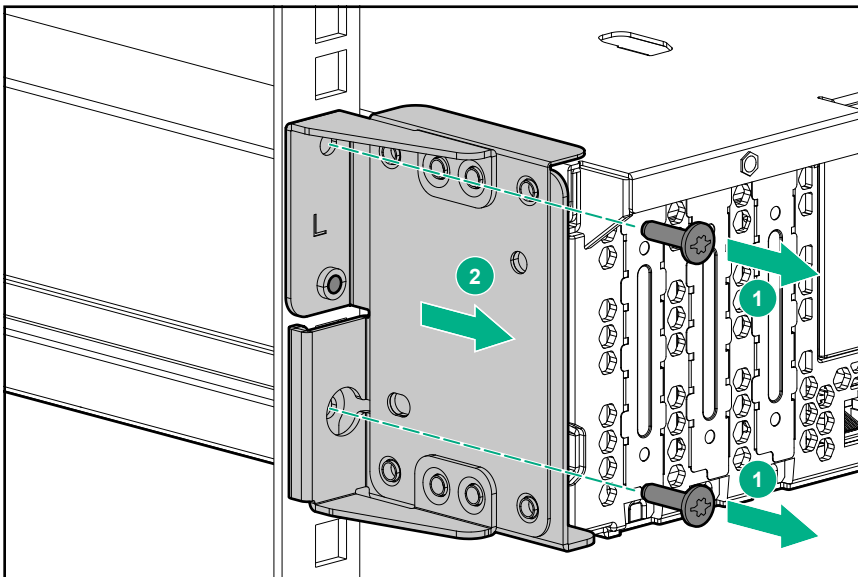
Procedure

1. Remove the shipping screws on the rack ear:
 - a. If installed, **remove the security bezel**.
 - b. Remove the shipping screws on the rack ears.



Keep these shipping screws in case there is a need to ship or transport the server at a later date.

2. Remove the rear shipping brackets.



Keep these shipping brackets in case there is a need to ship or transport the server at a later date.

3. Repeat steps 1 and 2 to remove the bracket on the other side of the server.

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to **Hardware options installation**.

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 website**. 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 very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual handling.
- Reduce the weight of the server by removing the drives and power input modules before installing or removing the server from the rack.
- Obtain adequate assistance to lift and stabilize the server during installation or removal. Hewlett Packard Enterprise recommends that a minimum of two people are required for installing or removing the server from the rack. A third person might be required to help align the server if the server is installed higher than chest level.
- Use caution when installing 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 so on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

Install the server into the rack

Steps 1 and 2 in this section only apply to the first time installation of the server into the rack.

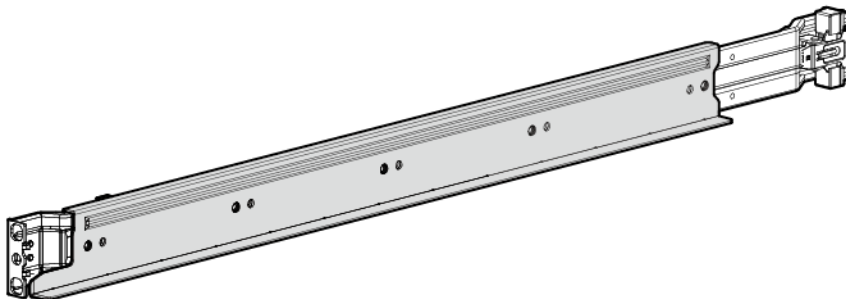
Procedure

1. Install the server rack rail in the rack.

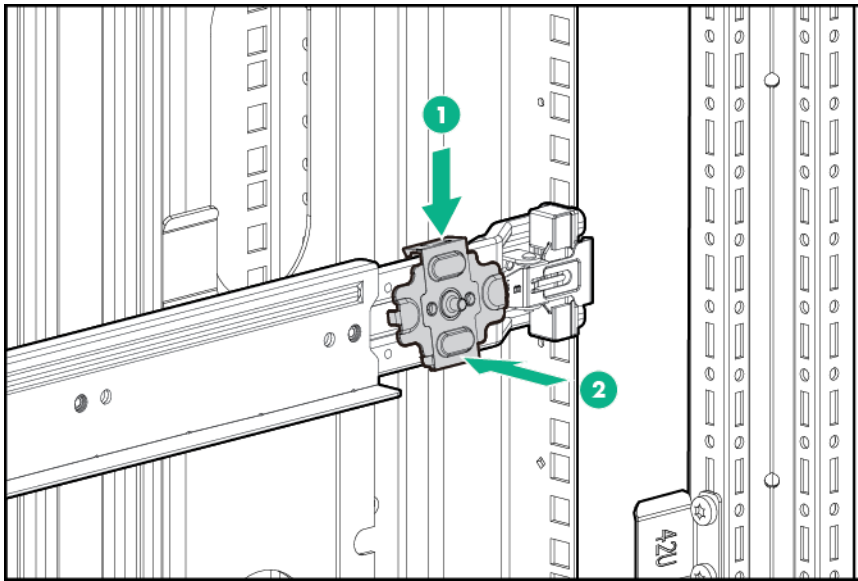
See the documentation that ships with the HPE 2U Shelf-Mount Adjustable Rail Kit.

2. The chassis retention brackets help to stabilize the server when the front drive cages are extended.

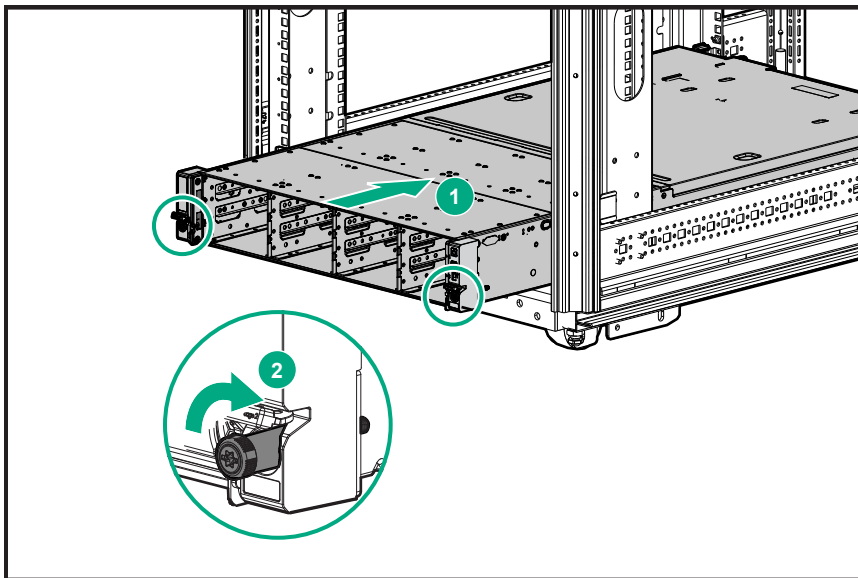
The illustration below shows the rack rail with the shelf portion highlighted in gray.



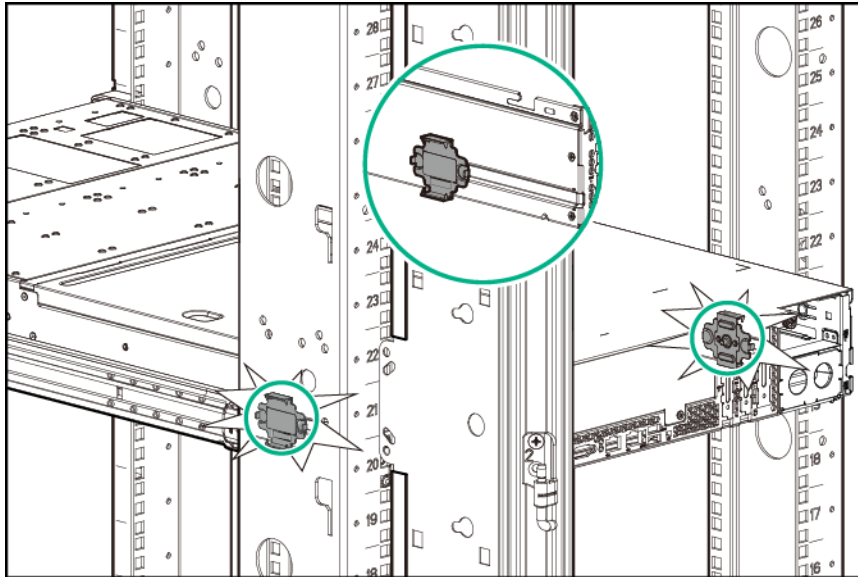
Install the chassis retention brackets on the non-shelf portion of the rack rail.



3. Install the server into the rack.
4. Tighten the rack ear thumbscrews.



5. Make sure the pins on the chassis retention brackets slot into the notches located on both sides of the chassis.



6. **Install the drives in the front drive cages.**
7. Option: **Install the security bezel.**
8. Optional: Install the drives in the rear drive cage.



WARNING:

To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

-
9. Connect peripheral devices to the server.

For information on identifying connectors, see **Rear panel components**.

10. **Install the power input module.**

11. To prevent accidental power cord disconnection when sliding the server in and out of the rack, secure the power cord in the strain relief strap attached to the power input module handle:
 - a. Unwrap the strain relief strap from the power input module handle.



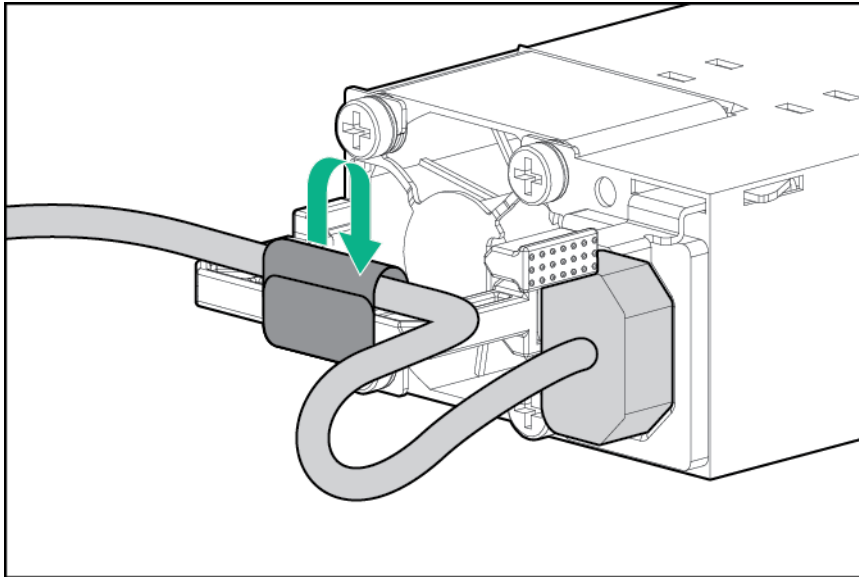
CAUTION:

To prevent possible server overheating, always populate each processor socket with a processor socket cover and a processor blank, or a processor and a heatsink.

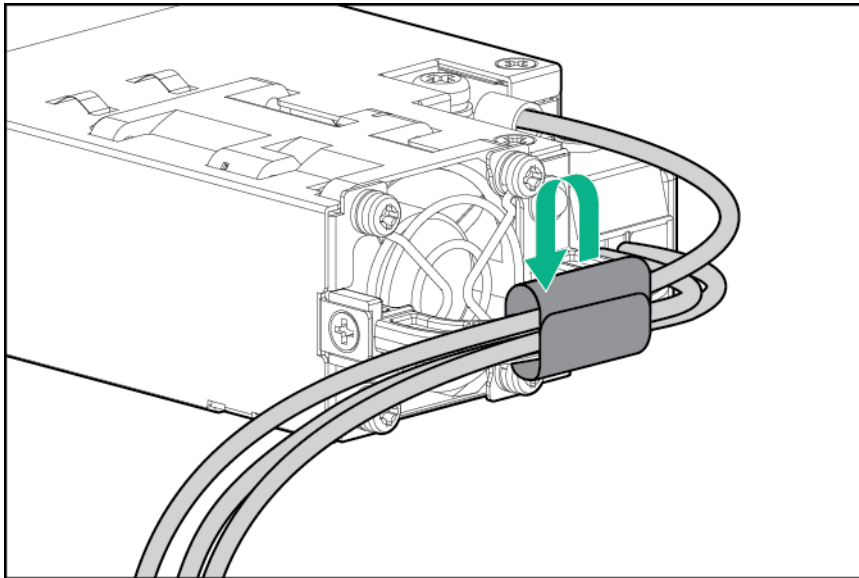
-
- b. Secure the power cord with the strain relief strap.

Roll the extra length of the strap around the power input module handle.

- AC power input module



- DC power input module



12. Employ best practices to route and manage the power cords and other cables in the server rear panel.
13. Connect the power cord to the power source.



WARNING:

To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

Installing the operating system

This ProLiant server does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. Attempting to run an unsupported operating system can cause serious and unpredictable results. For the latest information on operating system support, see the [Hewlett Packard Enterprise website](#).

Failure to observe UEFI requirements for ProLiant Gen9 servers can result in errors installing the operating system, failure to recognize boot media, and other boot failures. For more information on these requirements, see the *HPE UEFI Requirements* on the [Hewlett Packard Enterprise website](#).

To install an operating system on the server, use one of the following methods:

- Intelligent Provisioning—For single-server deployment, updating, and provisioning capabilities.
To install an operating system on the server with Intelligent Provisioning (local or remote):
 1. Connect the Ethernet cable between the network connector on the server and a network jack.
 2. Press the Power On/Standby button.
 3. During server POST, press **F10**.
 4. Complete the initial Preferences and Registration portion of [Intelligent Provisioning](#).
 5. At the 1 Start screen, click **Configure and Install**.
 6. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.
- Insight Control server provisioning—For multi-server remote OS deployment, use Insight Control server provisioning for an automated solution. For more information, see the Insight Control documentation on the [Hewlett Packard Enterprise website](#).

For additional system software and firmware updates, download the Service Pack for ProLiant from the [Hewlett Packard Enterprise website](#). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version.

For more information, see "[Keeping the system current](#)."

For more information on using these installation methods, see the [Hewlett Packard Enterprise website](#).

Selecting boot options in UEFI Boot Mode

On servers operating in UEFI Boot Mode, the boot controller and boot order are set automatically.

Procedure

1. Press the Power On/Standby button.
2. During the initial boot:
 - To modify the server configuration ROM default settings, press the **F9** key in the ProLiant POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in the English language.
 - If you do not need to modify the server configuration and are ready to install the system software, press the **F10** key to access Intelligent Provisioning.

For more information on automatic configuration, see the UEFI documentation on the [Hewlett Packard Enterprise website](#).

Registering the server

To experience quicker service and more efficient support, register the product at the [Hewlett Packard Enterprise Product Registration website](#).

Operations

Power up the server

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

Power down the server

Prerequisites

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:

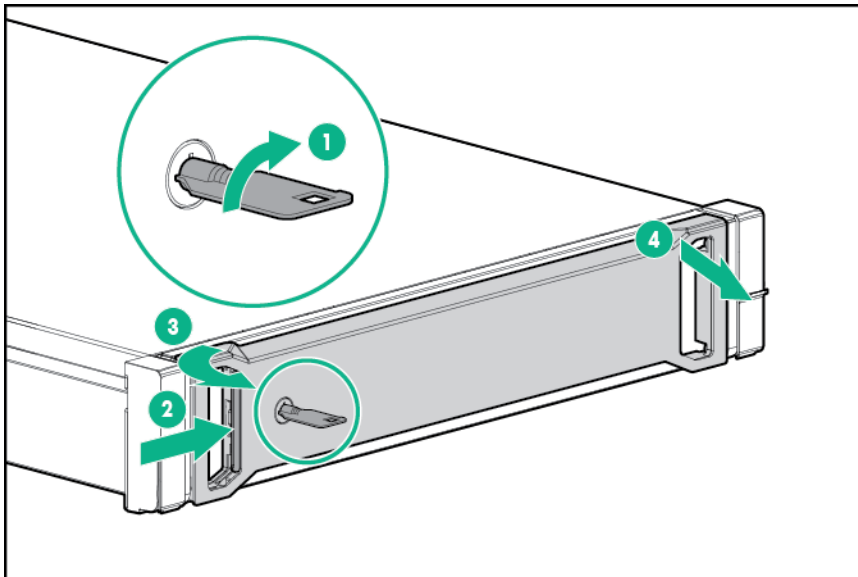
Procedure

- 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 the server is in standby mode by observing that the system power LED is amber.

Remove the security bezel

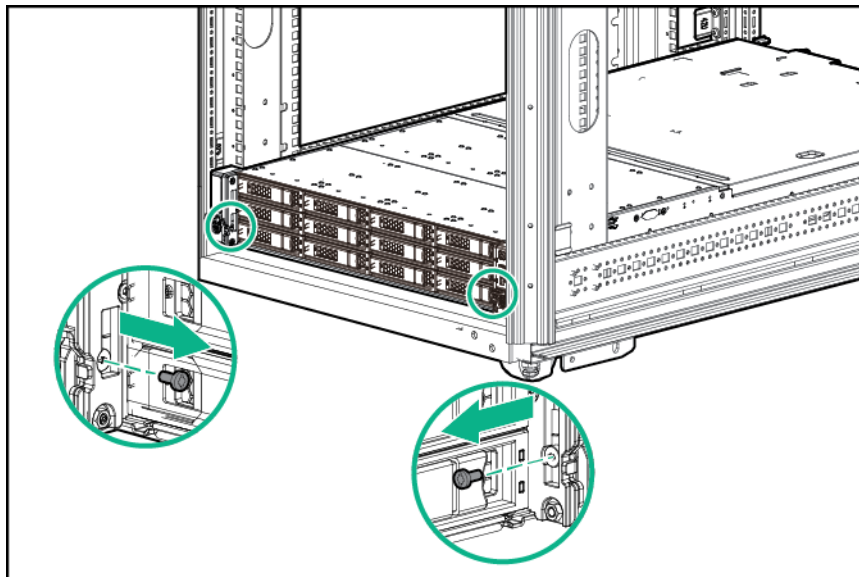
To access the front panel components, unlock and then remove the security bezel.



Extend the front drive cages out of the chassis

The front drive cages are secured to the chassis by shipping screws upon product delivery. The location and number of these shipping screws depend on how the server was shipped during product delivery. Remove these shipping screws before extending the front drive cages for the first time.

- For a server that was already mounted on a rack during product delivery, there are two screws located on the rack ears. Do the following to remove these screws:
 1. If installed, remove the security bezel.
 2. Remove the shipping screws on the rack ears.



- For a server that was delivered in a shipping carton, the shipping screws should have been removed before the server was first installed in the rack. See "[Removing the shipping screws from the front drive cages.](#)"

**WARNING:**

To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

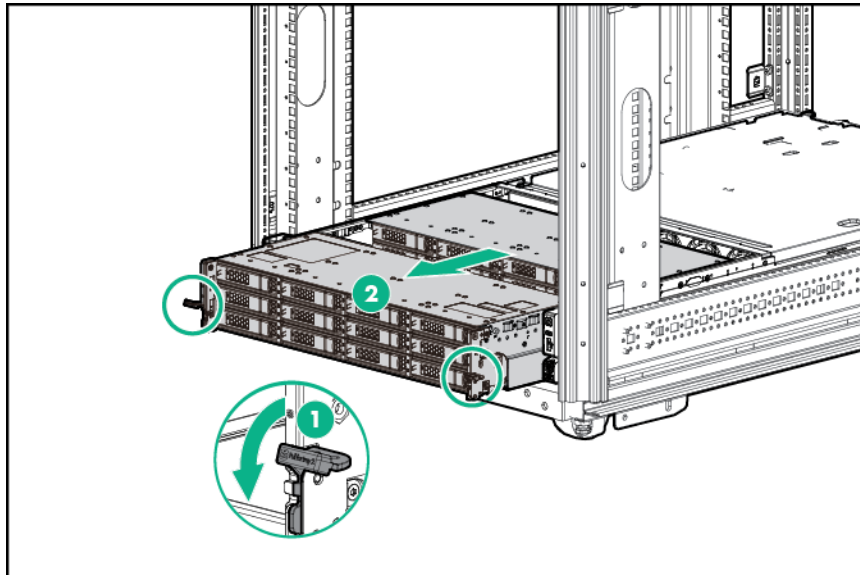
**CAUTION:**

Do not operate the server for long periods with the front drive cages extended. When the front drive cages are extended while the server is powered on, do one of the following:

- If the iLO 08-HD Max sensor reading is reporting a temperature value, monitor the status of the **front drive health/thermal LED**. When this LED starts flashing amber, immediately slide the drive cages back into the chassis and keep them there until the LED turns green.
- If the iLO 08-HD Max sensor reading is reporting an N/A value, monitor how long the drive cages have been out of the chassis. Before reaching the 140 sec mark, slide the drive cages back into the chassis and keep them there for at least 300 sec before extending them out again.

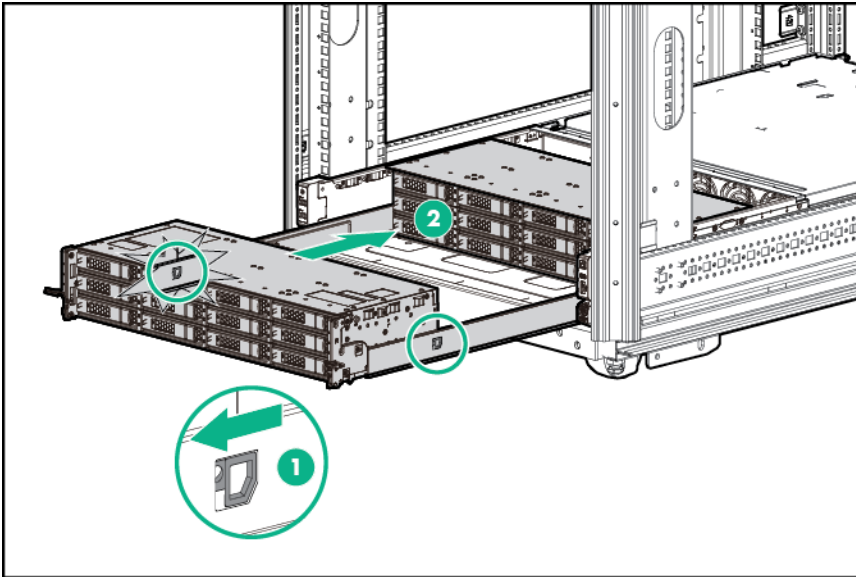
Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

To extend the front drive cages, pull down the front drive cage release latches and use them to extend the drive cages out of the chassis.



Slide the front drive cages into the chassis

After performing the installation or maintenance procedure, pull and hold the front drive cage rail release latches, and then slide the drive cages back into the chassis.



Remove a drive from the front drive cages

⚠ 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 from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.

⚠ CAUTION:
Do not operate the server for long periods with the front drive cages extended. When the front drive cages are extended while the server is powered on, do one of the following:

- If the iLO 08-HD Max sensor reading is reporting a temperature value, monitor the status of the **front drive health/thermal LED**. When this LED starts flashing amber, immediately slide the drive cages back into the chassis and keep them there until the LED turns green.
- If the iLO 08-HD Max sensor reading is reporting an N/A value, monitor how long the drive cages have been out of the chassis. Before reaching the 140 sec mark, slide the drive cages back into the chassis and keep them there for at least 300 sec before extending them out again.

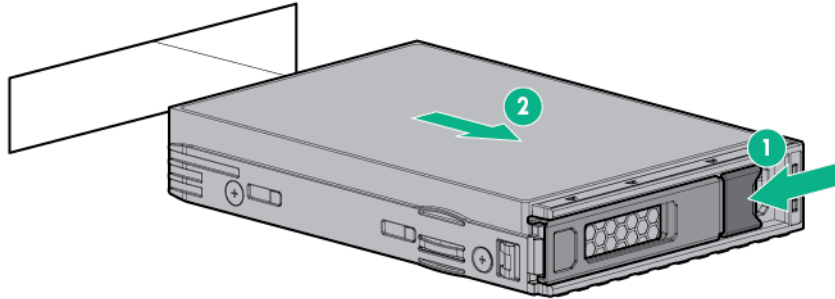
Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

⚠ CAUTION:
Do not operate the server with any of the front drive cage 1 bays empty. To maintain proper airflow and sufficient cooling in the front drive cage 1, all drive bays in this cage should have a drive or a drive blank.

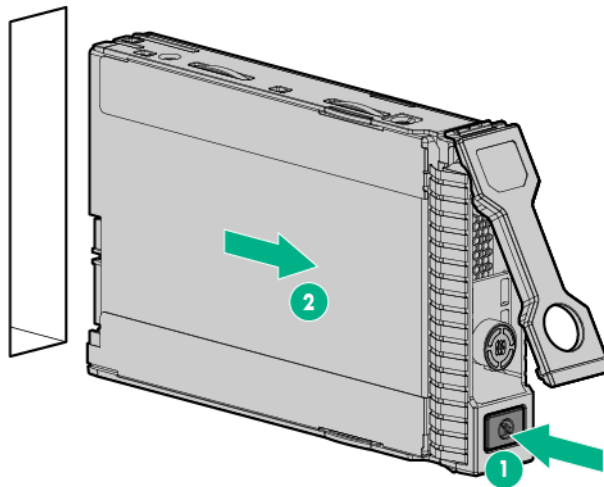
Procedure

1. Back up all server data.
2. Do one of the following:

- If you intend to remove a drive from the front drive cage 1 and the security bezel is installed, **remove the bezel**.
 - If you intend to remove a drive from the front drive cage 2, **extend the front drive cages out of the chassis**.
3. To remove an LFF drive:
 - a. Determine the status of the drive from the **drive LED definitions**.
 - b. Wait until the Online/Activity LED stops flashing.
 - c. Press the latch to open the release lever.
 - d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the bay.



4. To remove an SFF drive:
 - a. Determine the status of the drive from the **drive LED definitions**.
 - b. Wait until the icon in the Do Not Remove button stops flashing and is no longer illuminated.
 - c. Press the Do Not Remove button to open the release lever.
 - d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the bay.



Remove a drive from the rear drive cage



WARNING:

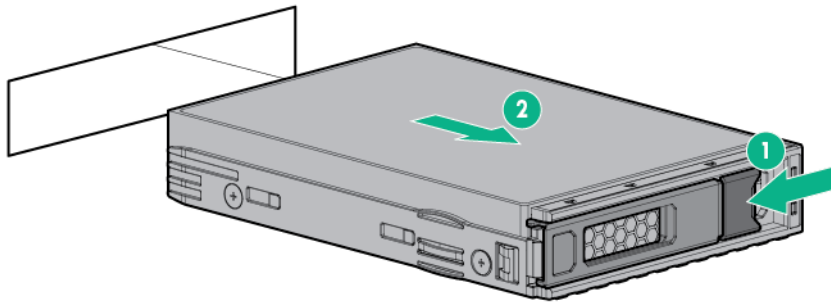
To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.

**WARNING:**

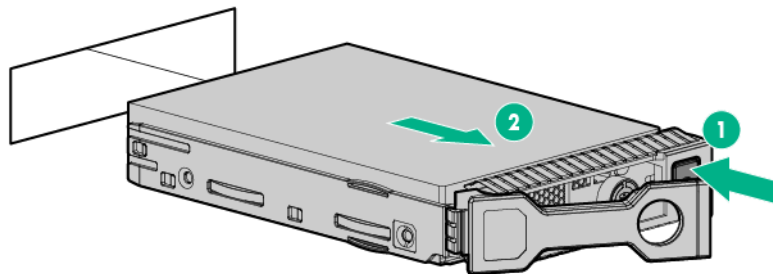
To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.

Procedure

1. Back up all server data.
2. Access the product rear panel.
3. To remove an LFF drive:
 - a. Determine the status of the drive from the **drive LED definitions**.
 - b. Wait until the Online/Activity LED stops flashing.
 - c. Press the latch to open the release lever.
 - d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the bay.



4. To remove an SFF drive: .
 - a. Determine the status of the drive from the **drive LED definitions**.
 - b. Wait until the icon in the Do Not Remove button stops flashing and is no longer illuminated.
 - c. Press the Do Not Remove button to open the release lever.
 - d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the bay.



Remove a power input module

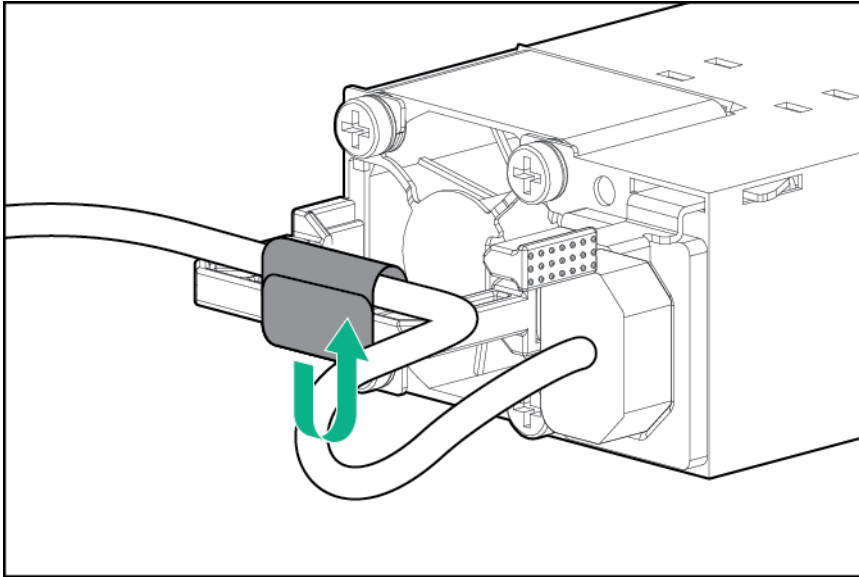
**WARNING:**

To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.

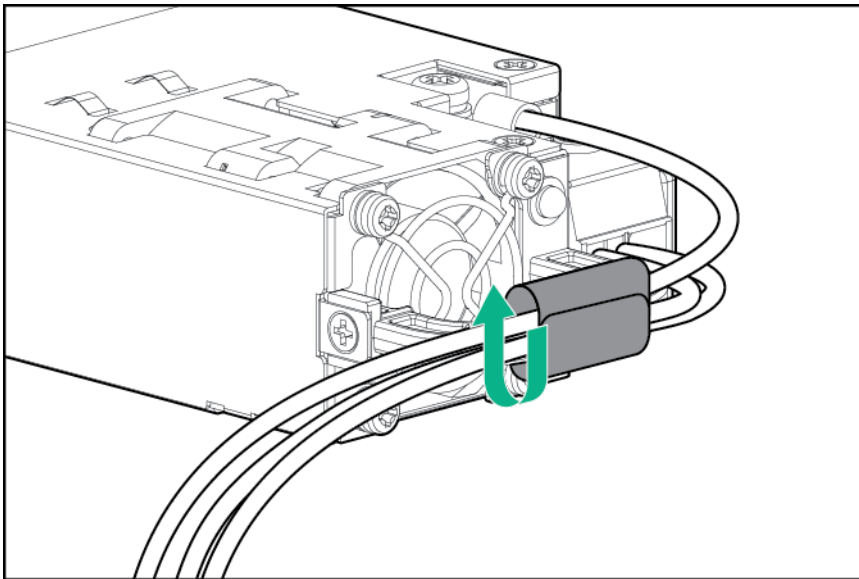
Procedure

1. If the server is using a single power input module only, remove all power from the server:

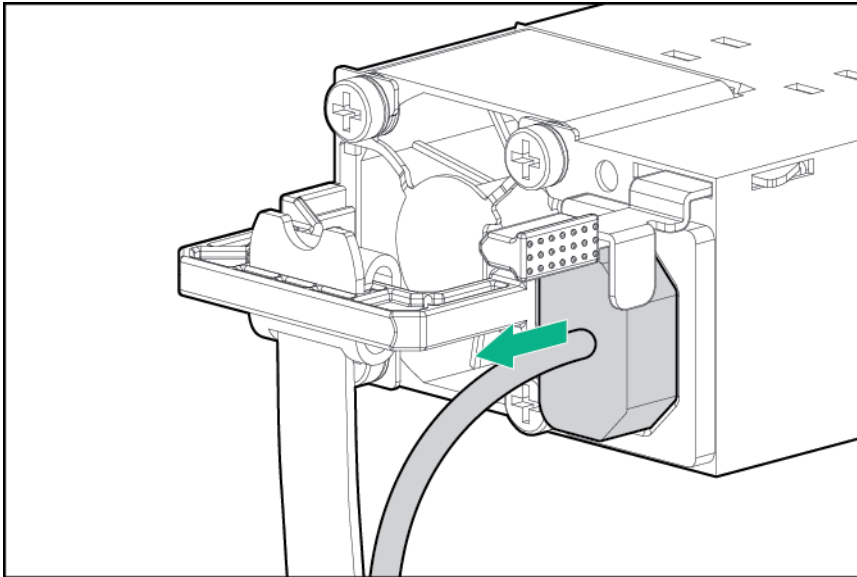
- a. Back up all server data.
 - b. **Power down the server.**
 - c. Disconnect all peripheral cables from the server.
2. Release the power cords from the strain relief straps.
 - AC power input module



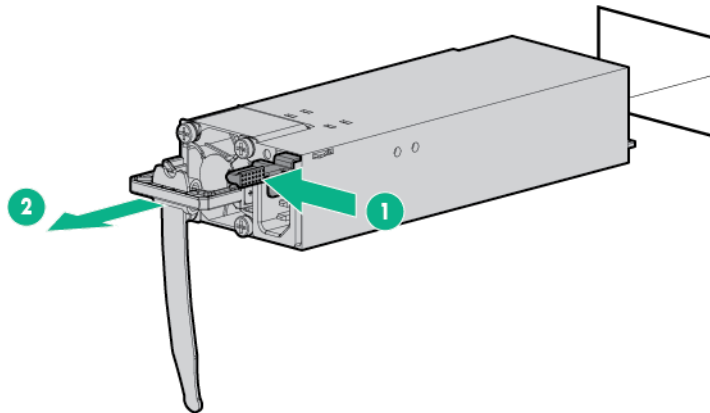
- DC power input module



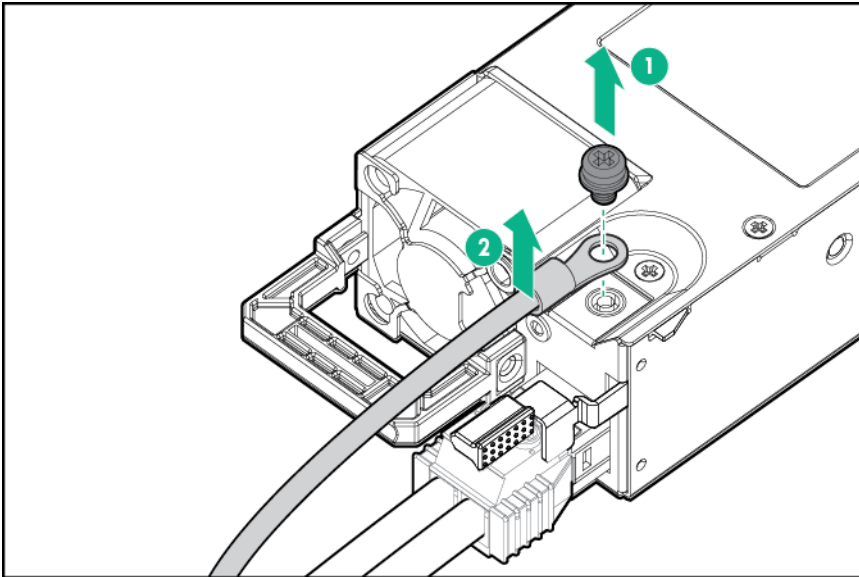
3. For an AC power input module, do the following:
 - a. Disconnect the power cord from the power input module.



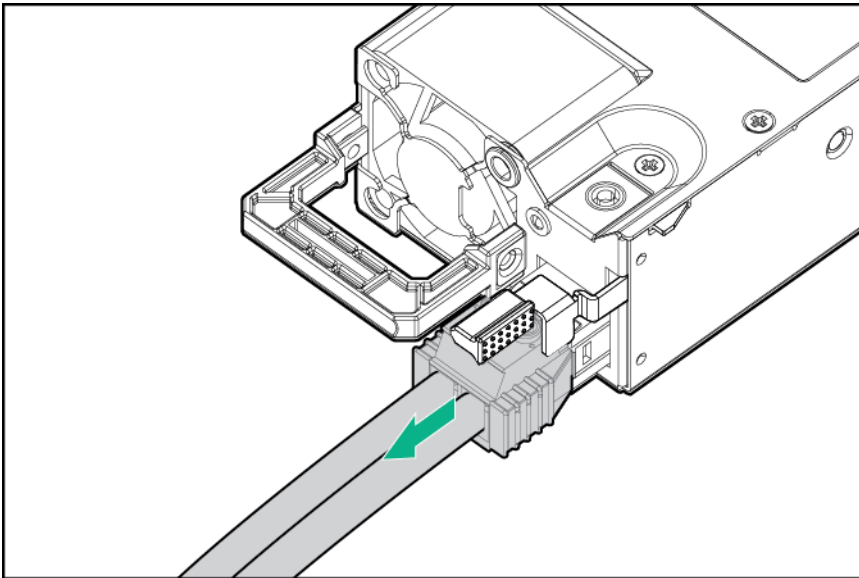
b. Remove the power input module.



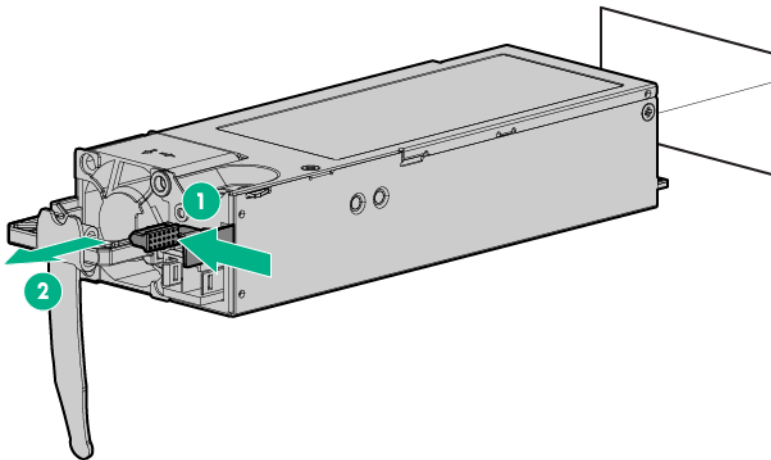
4. For a DC power input module, do the following:
 - a. Slide the power input module out of the bay just enough to access the ground cable screw.
 - b. Detach the ground (earthed) cable from the power input module.



c. Remove the terminal block connector from the power input module.



d. Remove the power input module.



Remove the server from the rack



WARNING:

To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, and the internal system components to cool before touching them.



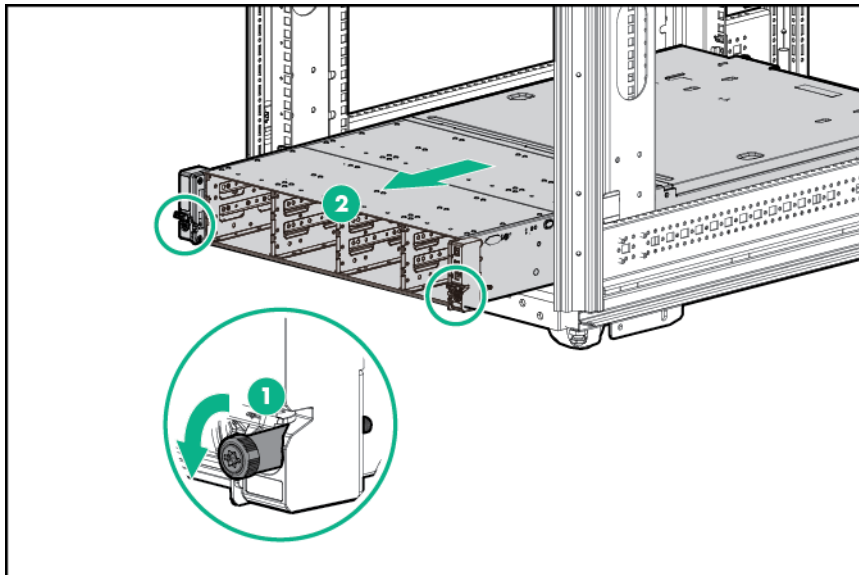
WARNING:

This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

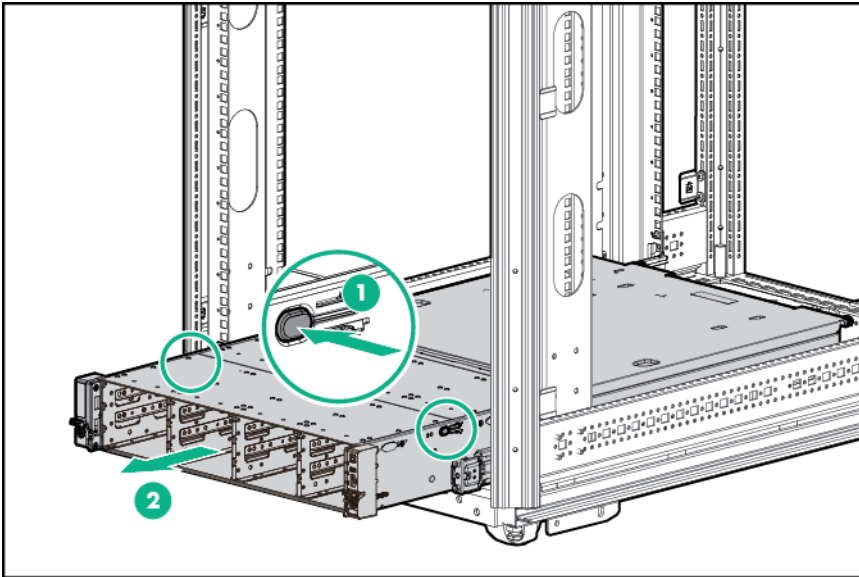
- Observe local occupational health and safety requirements and guidelines for manual handling.
- Reduce the weight of the server by removing the drives and power input modules before installing or removing the server from the server.
- Obtain adequate assistance to lift and stabilize the server during installation or removal. Hewlett Packard Enterprise recommends that a minimum of two people are required for installing or removing the server from the rack. A third person might be required to help align the server if the server is installed higher than chest level.
- Use caution when installing or removing the server from the rack; it is unstable when not fastened to the rails.

Procedure

1. Back up all server data.
2. **Power down the server.**
3. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
4. Disconnect all peripheral cables from the server.
5. Remove all installed power input modules.
6. If a rear drive cage option is installed, **remove all rear drives.**
7. **Remove all the drives installed in the front drive cages 1 and 2.**
8. Remove the server from the rack:
 - a. Loosen the rack ear thumbscrews.
 - b. Pull the thumbscrews to extend the server out of the rack until the rack rail lock is engaged.



- c. Press the server release latches, and then slide the server out of the rack.



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

Remove the access panel

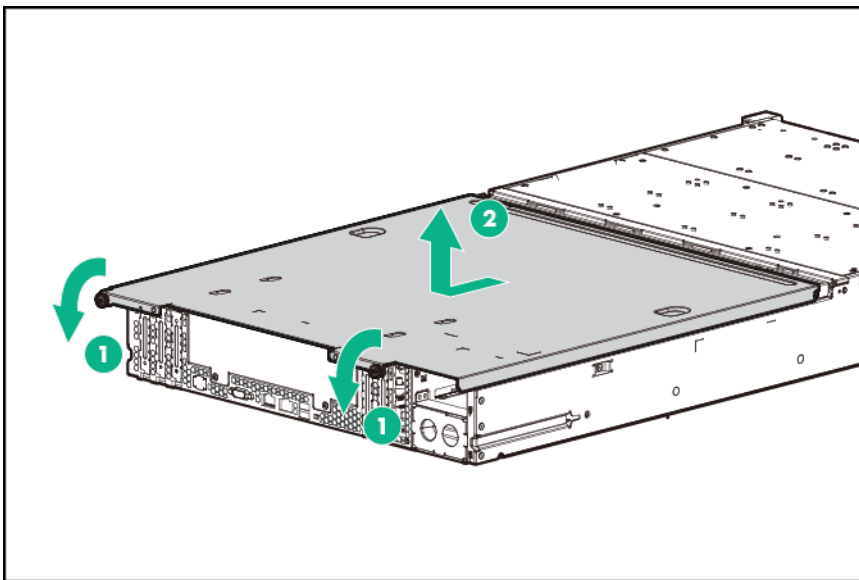


WARNING:

To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

Procedure

1. **Power down the server.**
2. **Remove the server from the rack.**
3. Use a screwdriver to loosen the access panel screws.
4. Slide the access panel toward the rear of the server, then lift it from the server.

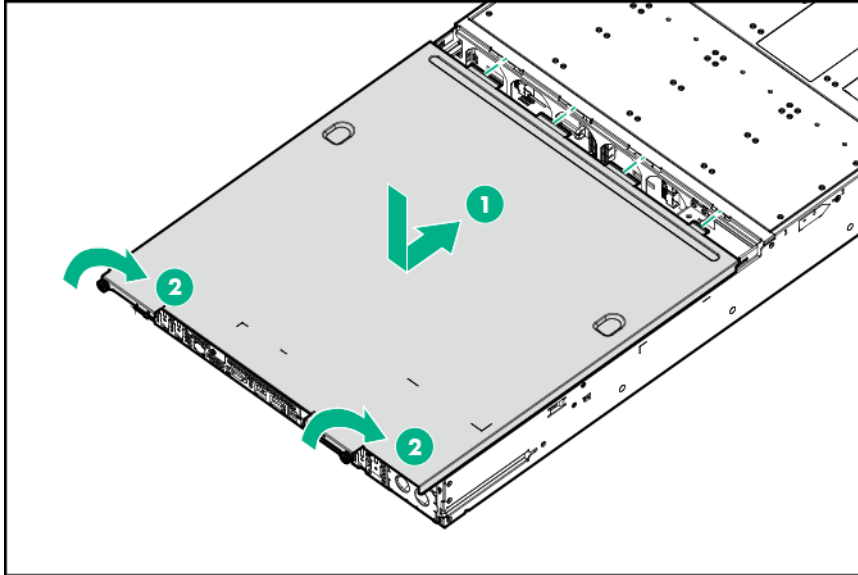


Turn the access panel over to locate the HPE Apollo 4200 Gen9 Server hood label. This label provides convenient access to component identification, LED status indicators, and system maintenance switch settings information.

Install the access panel

Procedure

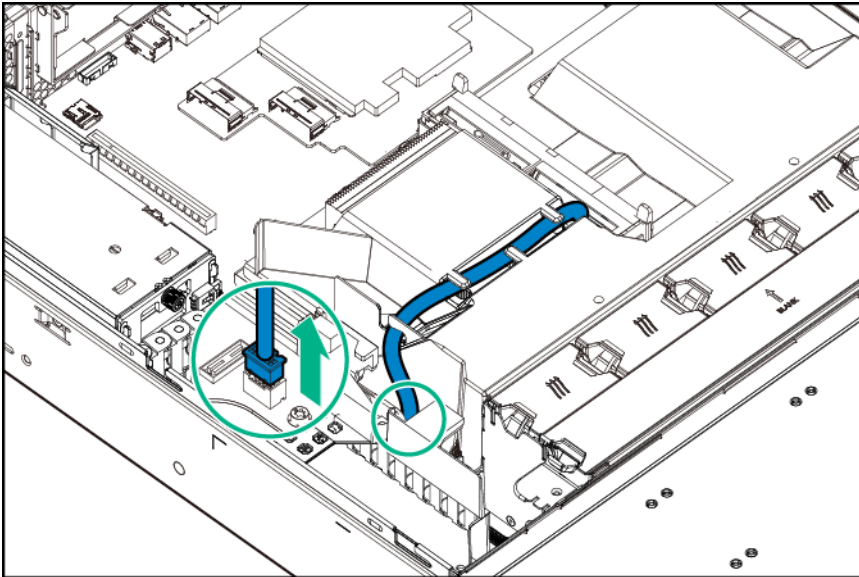
1. Place the access panel on top of the chassis, and then insert the tabs into the corresponding slots on the chassis.
2. Use a screwdriver to tighten the access panel screws



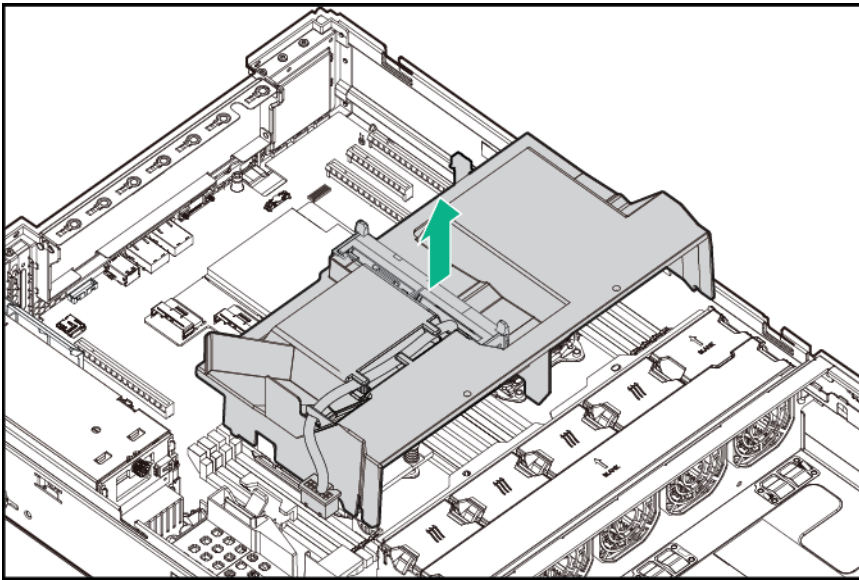
Remove the air baffle

Procedure

1. **Power down the server.**
2. **Remove the server from the rack.**
3. **Remove the access panel.**
4. Remove the air baffle:
 - a. If a Smart Storage Battery is installed on the air baffle, disconnect the battery cable.



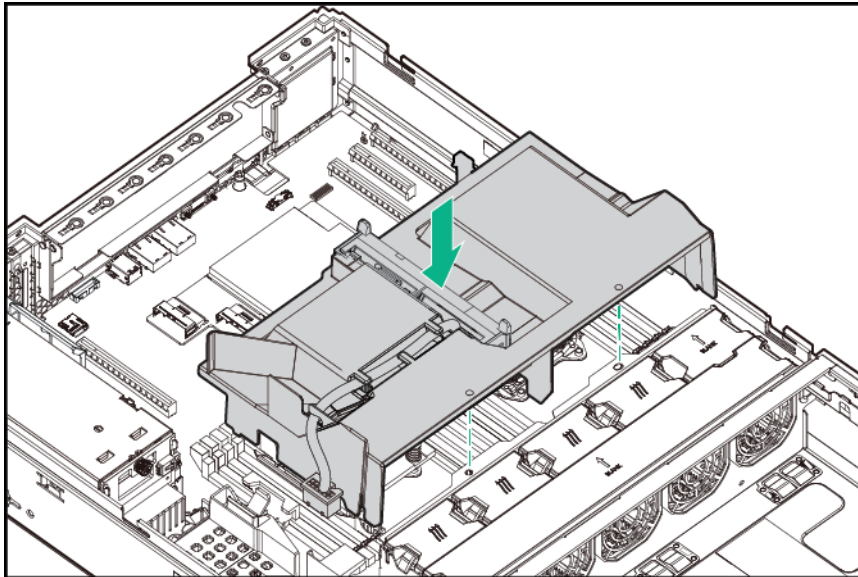
b. Remove the air baffle.



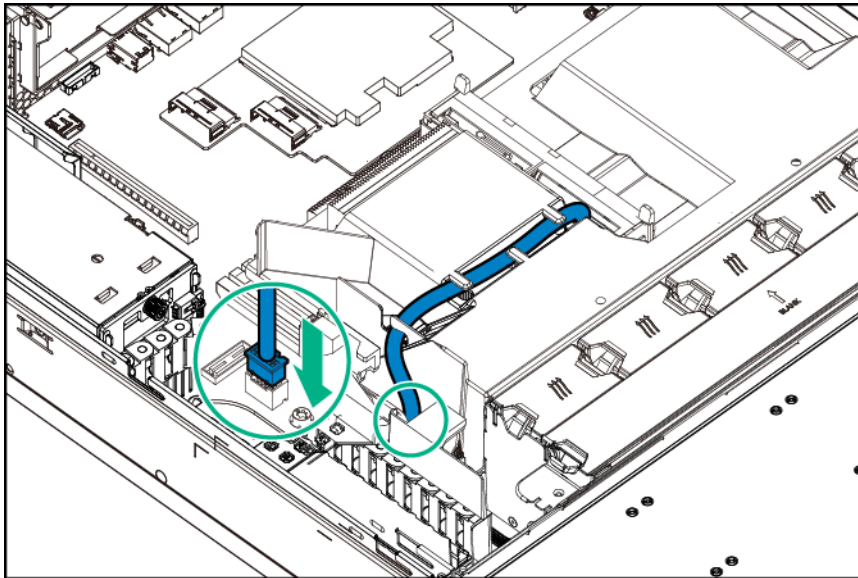
Install the air baffle

Procedure

1. Insert the guide pins on the front edge of the air baffle in the holes located on the rear edge of the fan cage.



2. If disconnected, connect the Smart Storage Battery cable.

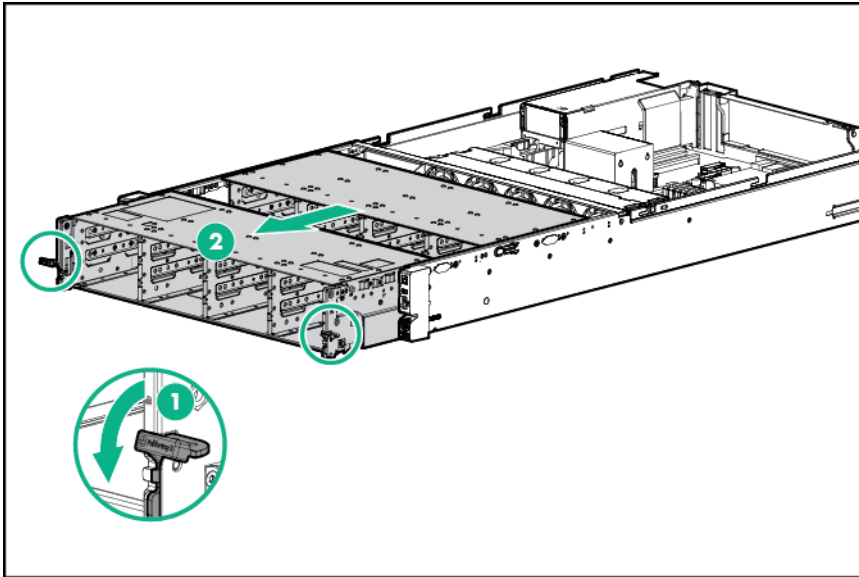


3. Install the access panel.
4. Install the server into the rack.
5. Power up the server.

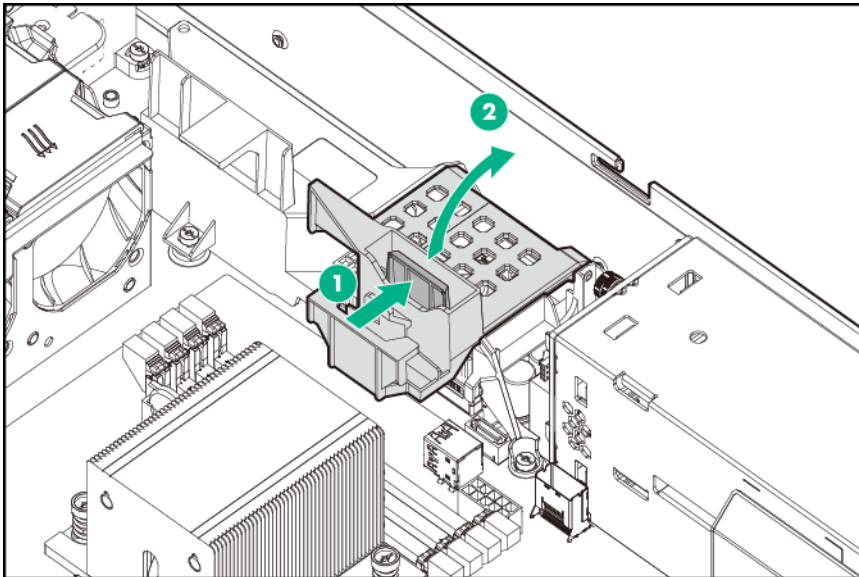
Open the cable management holder

Procedure

1. Power down the server.
2. Remove the server from the rack.
3. Remove the access panel.
4. Remove the air baffle.
5. Pull down the front drive cage release latches and use them to completely extend the drive cages out of the chassis.



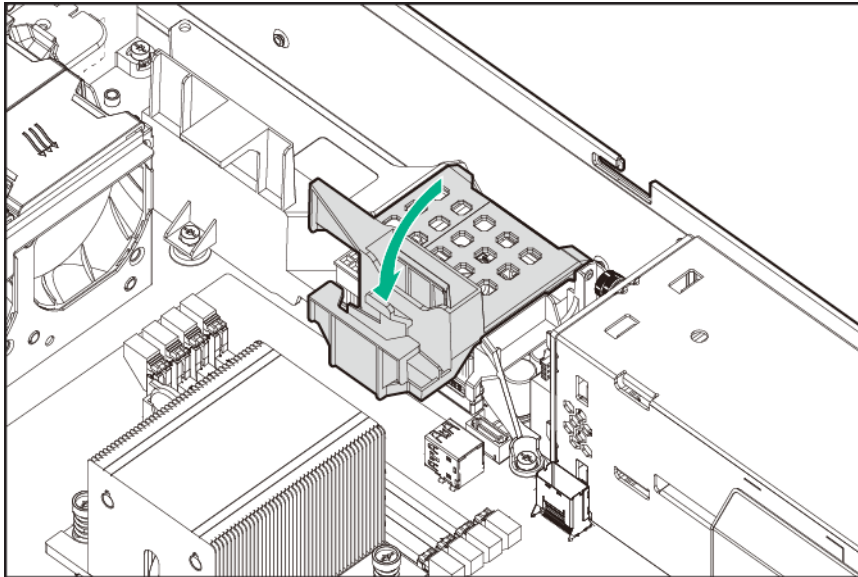
6. Disconnect all system cables secured in the cable management holder from the system board or controller board, and then release them from the holder.
7. Press and hold the cable management holder release latch, and then move the holder up.



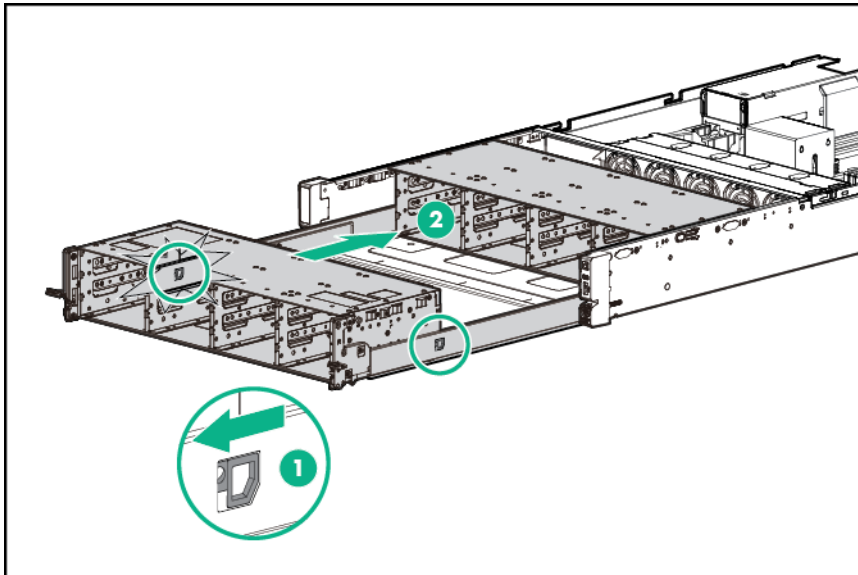
Close the cable management holder

Procedure

1. Return the cable management holder to its original position.



2. Secure all disconnected system cables in the cable management holder, and then connect them to the system board and/or controller board.
3. Pull and hold the drive cage rail release latches, and then slide the drive cages back into the chassis.



4. Install the air baffle.

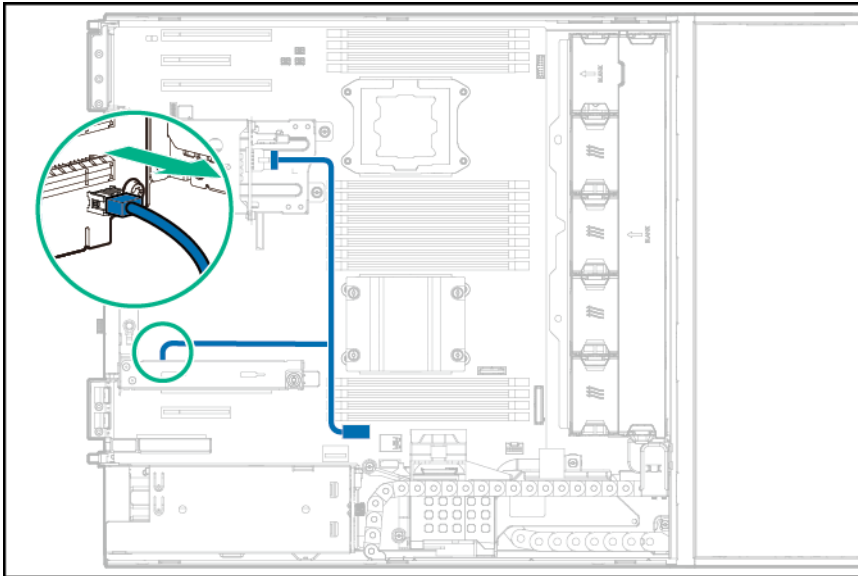
Remove the PCI riser cage

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

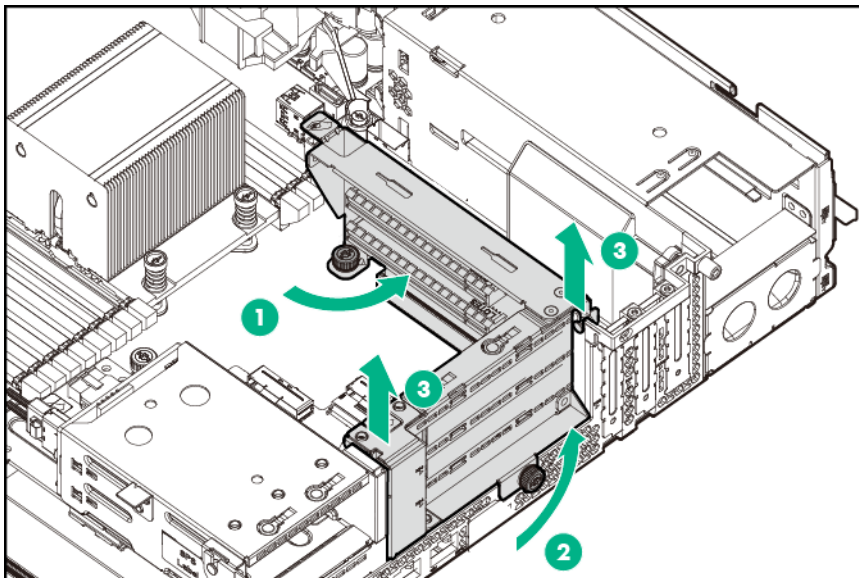
⚠ CAUTION:
To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. If expansion boards with internal cabling are installed on the PCI riser cage, disconnect all internal cables from the expansion boards to remove the cage from the server.
6. Disconnect the power cable from the riser board.



7. Remove the PCI riser cage:
 - a. Loosen the captive screw on the front end of the PCI riser cage.
 - b. Loosen the thumbscrew on the rear end of the PCI riser cage.
 - c. Grasp the PCI riser cage at the touch points and lift it out of the chassis.

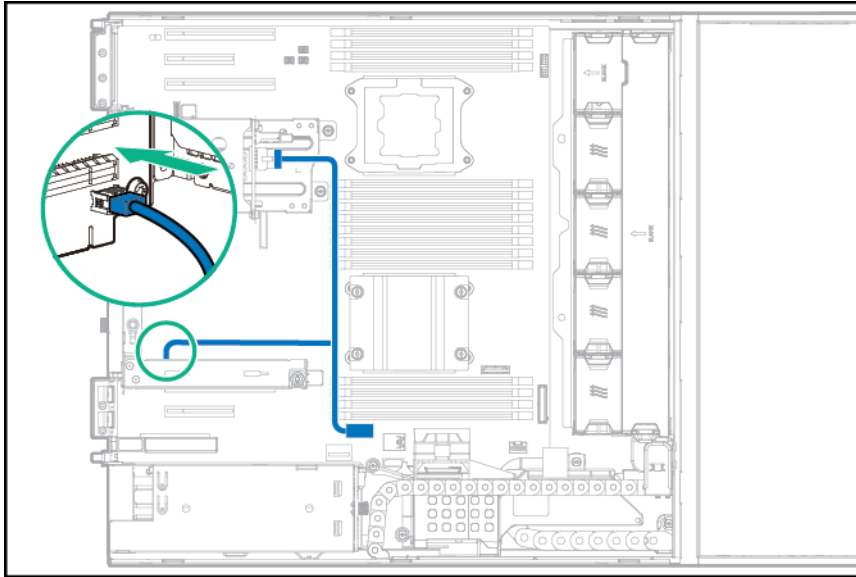


Install the PCI riser cage

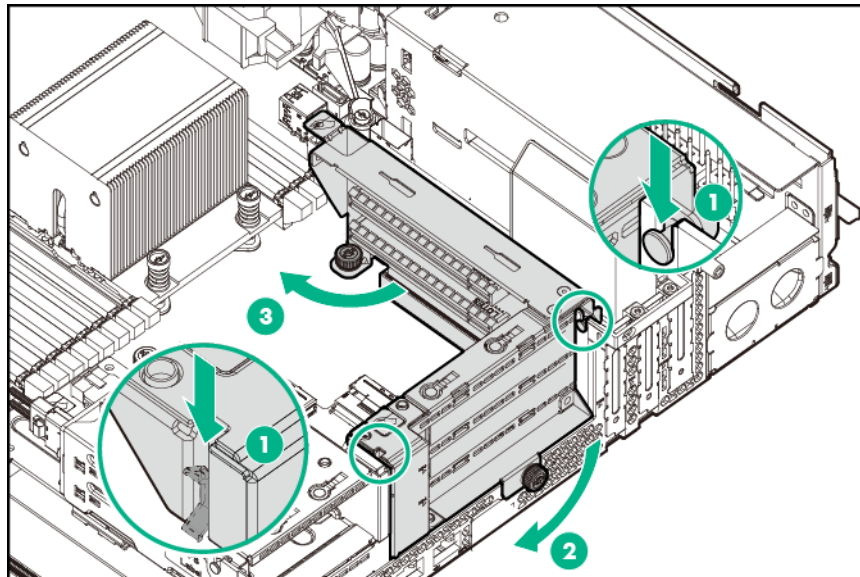
- ⚠ CAUTION:**
To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Procedure

1. Connect the power cable to the riser board.



2. Install the PCI riser cage:
 - a. On the right side of the PCI riser cage, align the small tab on the drive cage with the notch on PCI riser cage.
On the left side of the PCI riser cage, align the pin with the notch on the rear panel.
 - b. Tighten the thumbscrew to secure the PCI riser cage to the rear panel.
 - c. Tighten the captive screw to secure the PCI riser cage to the system board.



3. If cabled expansion boards are installed on the PCI riser cage, connect all necessary internal cabling to the expansion boards.

For more information on these cabling requirements, see the documentation that ships with the option.

4. **Install the access panel.**
5. **Install the server into the rack.**
6. **Power up the server.**

Remove a rear drive cage



WARNING:

To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

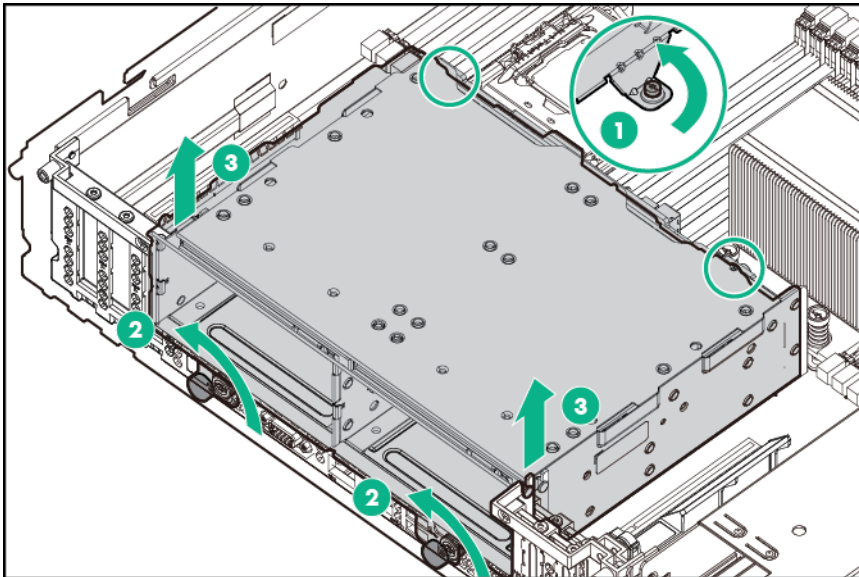


CAUTION:

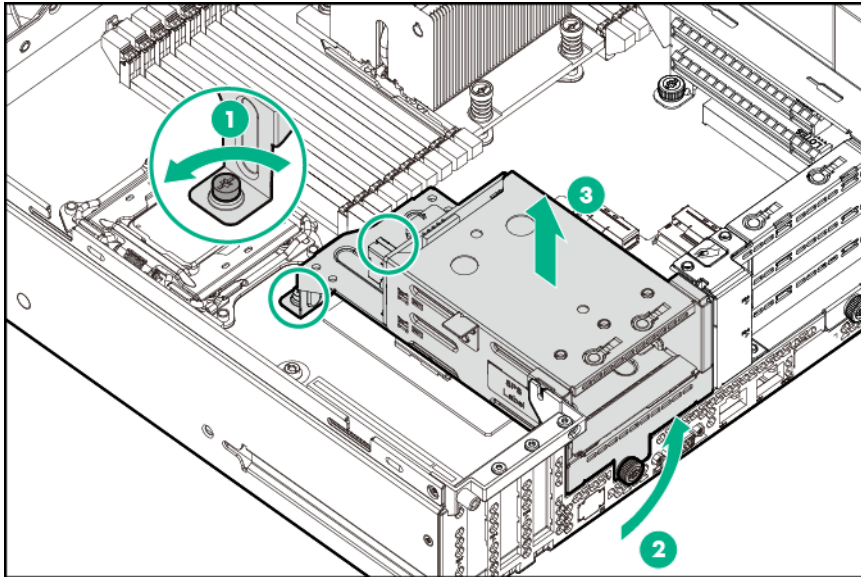
To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

Procedure

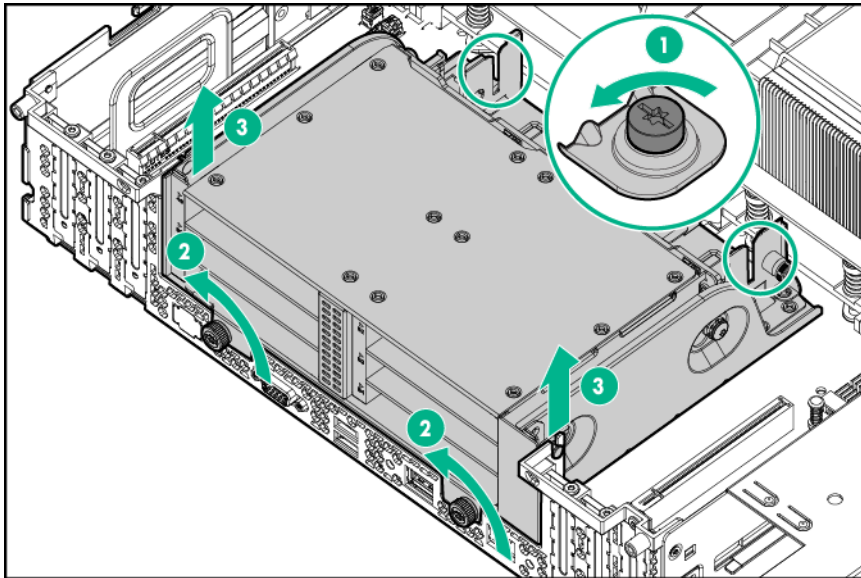
1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. Disconnect all cables from the drive backplane.
6. Remove the rear drive cage:
 - Four-bay LFF hot-plug rear drive cage removal



- Two-bay SFF hot-plug rear drive cage removal



- Six-bay SFF hot-plug rear drive cage removal

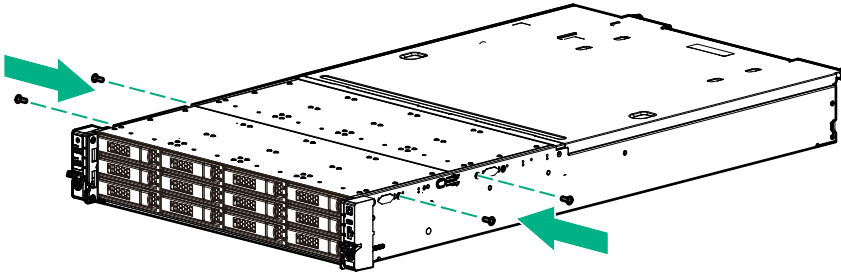


Shipping hardware installation

If you intend to transport or ship the server to a new location, make sure that the necessary shipping hardware are installed. The shipping hardware protects the server from vibration damage that might occur during server shipment.

Installing the shipping screws on a server

If you intend to transport a server on its own, use a T-15 Torx screwdriver to install the shipping screws on the sides of the front drive cages.



Installing the shipping screws and brackets on a rack-installed server



WARNING:

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



WARNING:

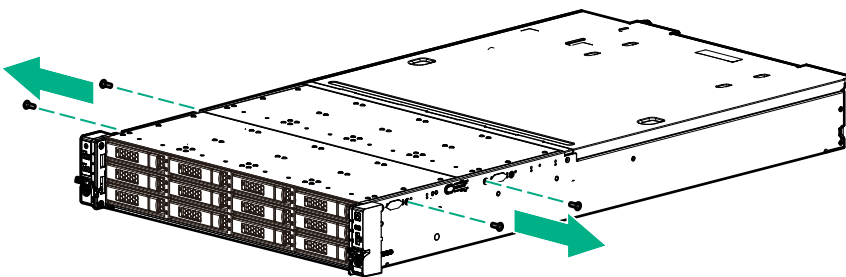
This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual handling.
- Reduce the weight of the server by removing the drives and power input modules before installing or removing the server from the rack.
- Obtain adequate assistance to lift and stabilize the server during installation or removal. Hewlett Packard Enterprise recommends that a minimum of two people are required for installing or removing the server from the rack. A third person might be required to help align the server if the server is installed higher than chest level.
- Use caution when installing or removing the server from the rack; it is unstable when not fastened to the rails.

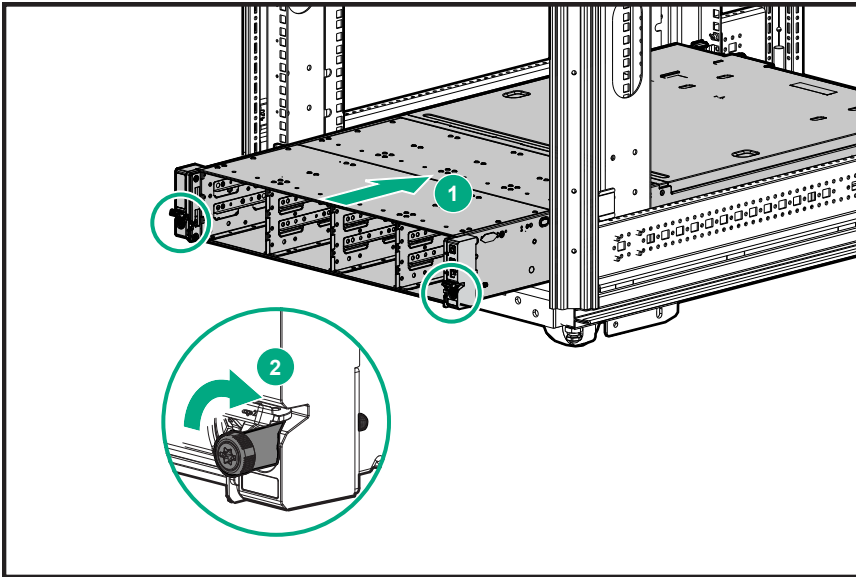
If the server was originally delivered as a BTO shipment, perform the following steps. Before you perform this procedure, make sure that you have a T-15 Torx screwdriver available.

Procedure

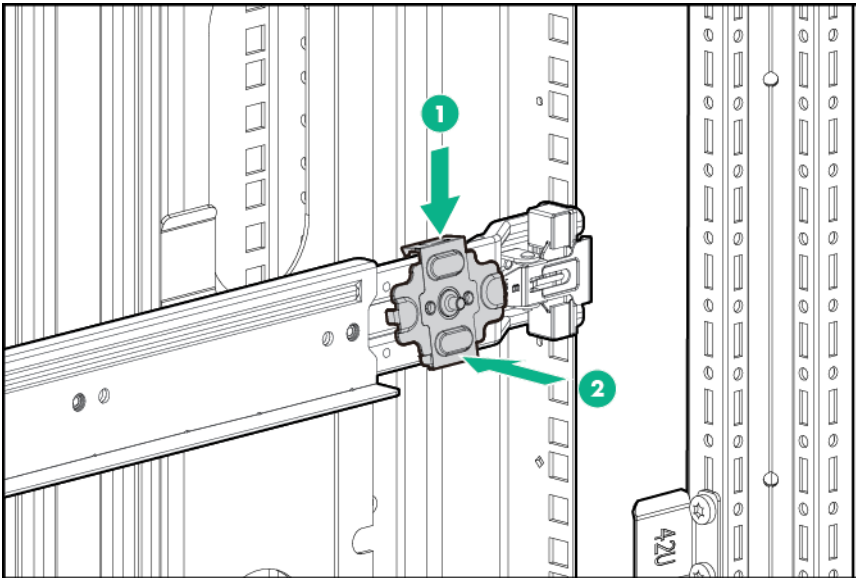
1. Remove the shipping screws installed on the sides of the chassis



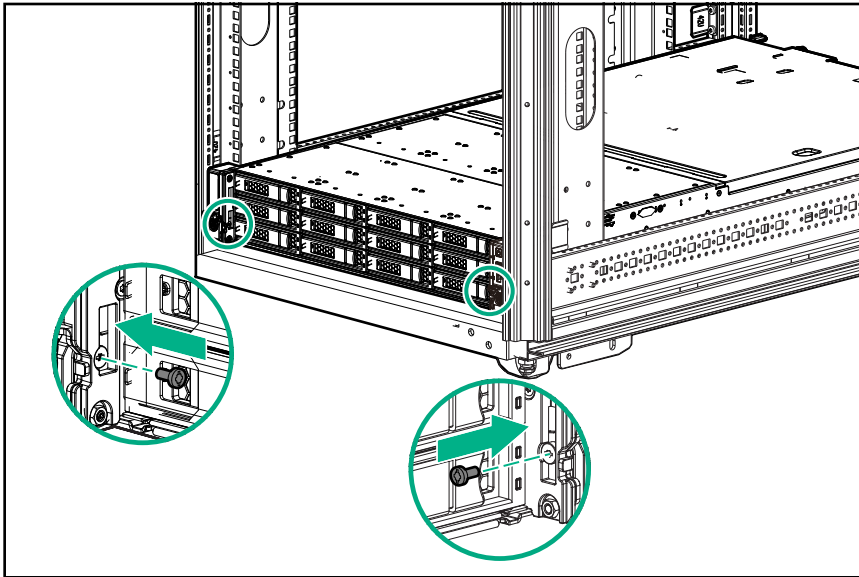
2. **Remove all installed power input modules.**
3. If a rear drive cage option is installed, **remove all rear drives.**
4. **Remove all the drives installed in the front drive cages 1 and 2.**
5. Install the server into the rack, and then tighten the rack ear thumbscrews.



6. Install the chassis retention brackets on the non-shelf portion of the rack rail.



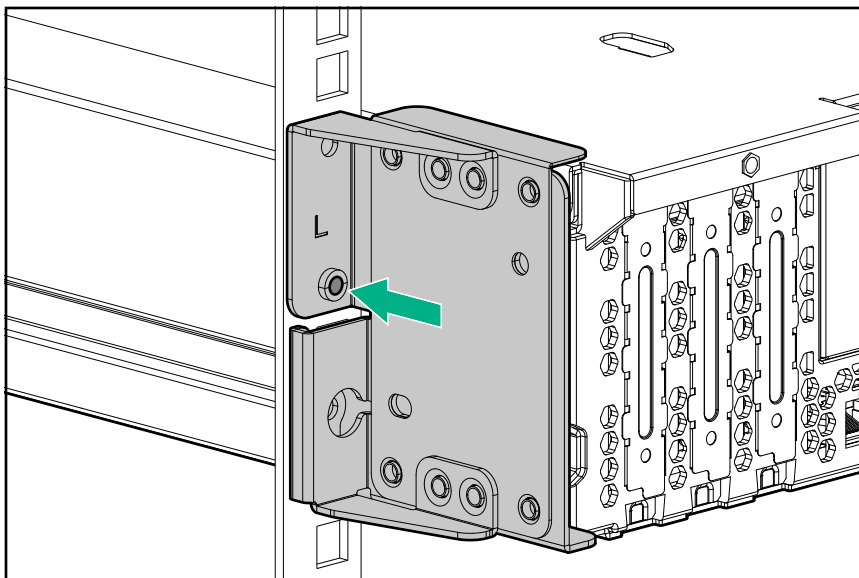
7. Reinstall all removed drives and power input modules.
8. Install the shipping screws on the rack ears.



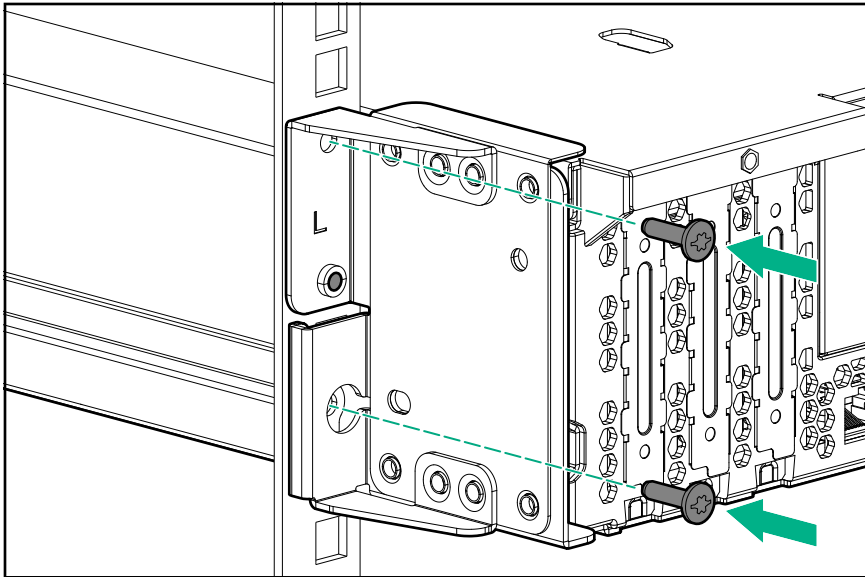
9. Install the rear shipping brackets:

The L and R markers on the shipping brackets help identify which one goes on the left and right sides of the server.

- a. Position the bracket so that the flanges rests firmly against the rack rail shelves.



- b. Install the bracket screws.



c. Repeat steps a and b to install the bracket on the other side of the server.

Hardware options installation

Introduction

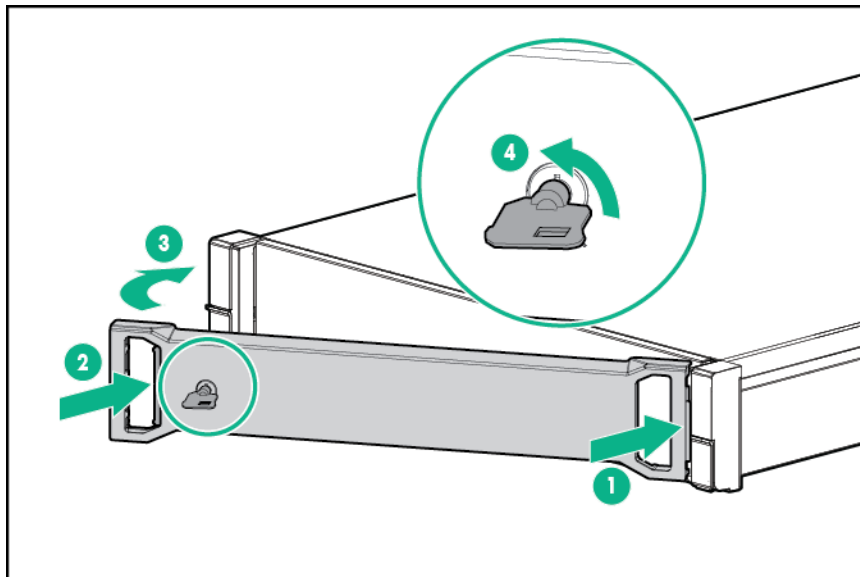
If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

⚠ 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.

Installing the security bezel option

The security bezel helps prevent unauthorized physical access to the front panel components. Install the security bezel and then lock it with the key provided with the kit.



Drive options

For a list of drive configurations supported in this server, see [Drive numbering](#).

The embedded Dynamic Smart Array B140i Controller supports SATA drive installation. For SAS support, connect the drive to the onboard Flexible Smart Array P840ar Controller or to a Smart HBA or a Smart Array Controller option.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Drive installation guidelines

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

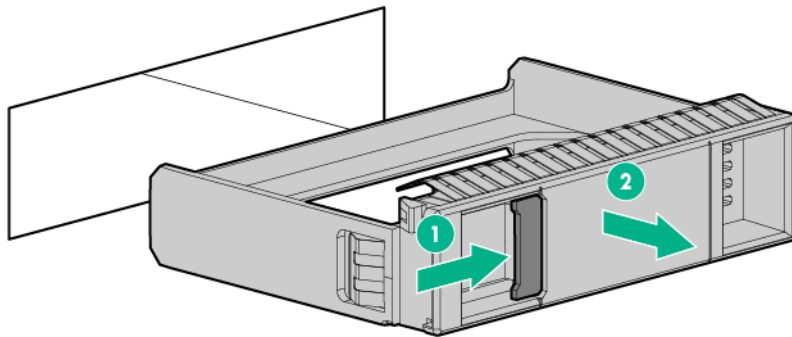
- The system automatically sets all device numbers.
- Populate drive bays based on the drive numbering sequence. Start from the drive bay with the lowest **device number**.
- All drives grouped into the same drive array must meet the following criteria:
 - They must be either all SAS or all SATA.
 - They must be either all hard drives or all solid-state drives.
 - Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Installing a hot-plug drive in the front drive cage 1

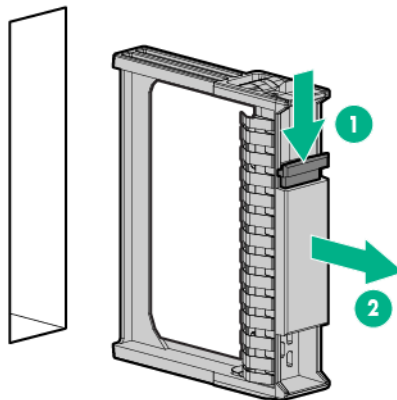
- ⚠ CAUTION:** Do not operate the server with any of the front drive cage 1 bays empty. To maintain proper airflow and sufficient cooling in the front drive cage 1, all drive bays in this cage should have a drive or a drive blank.

Procedure

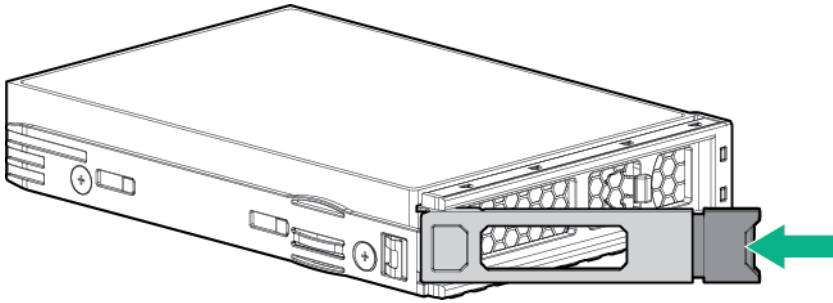
1. If installed, **remove the security bezel**.
2. Remove the drive blank:
 - LFF drive blank



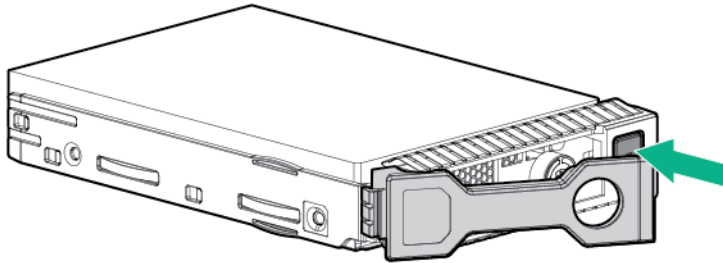
- SFF drive blank



3. Open the drive release lever:
 - LFF drive: Press the latch to open the release lever.

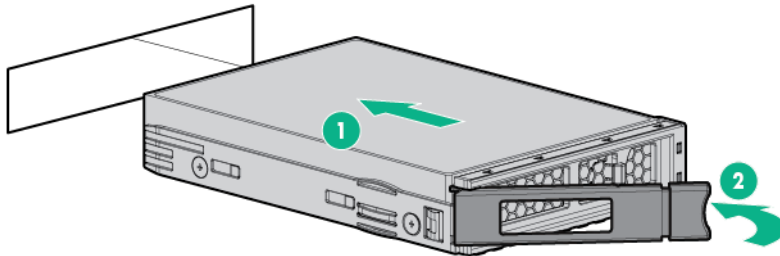


- SFF drive: Press the Do Not Remove button to open the release lever.

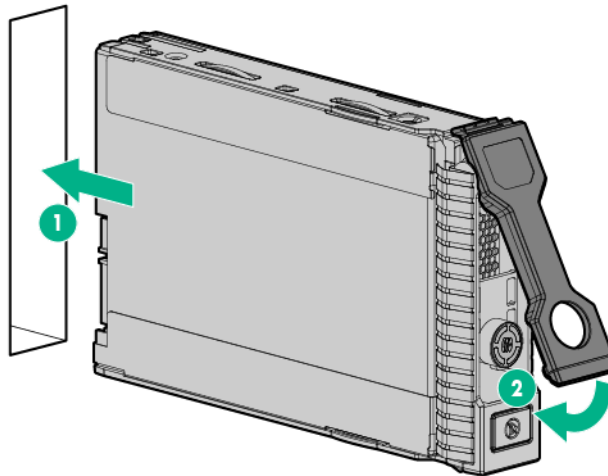


4. Install the drive:

- LFF drive



- SFF drive



5. Determine the status of the drive from the **drive LED definitions**.
6. If removed, **install the security bezel**.

To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the [Hewlett Packard Enterprise website](#).

Installing a hot-plug drive in the front drive cage 2

⚠ CAUTION:

Do not operate the server for long periods with the front drive cages extended. When the front drive cages are extended while the server is powered on, do one of the following:

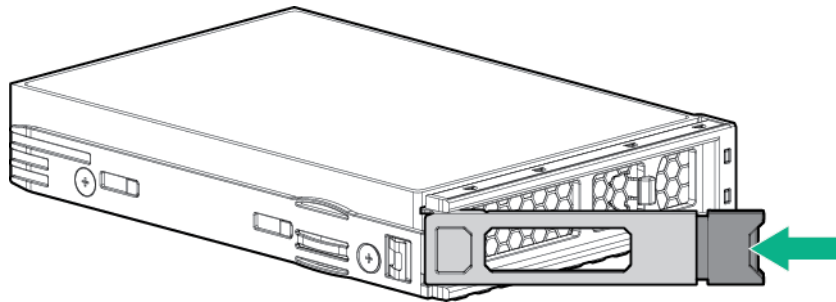
- If the iLO 08-HD Max sensor reading is reporting a temperature value, monitor the status of the **front drive health/thermal LED**. When this LED starts flashing amber, immediately slide the drive cages back into the chassis
- If the iLO 08-HD Max sensor reading is reporting an *N/A* value, monitor how long the drive cages have been out of the chassis and keep them there for at least 300 sec before extending them out again.

Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

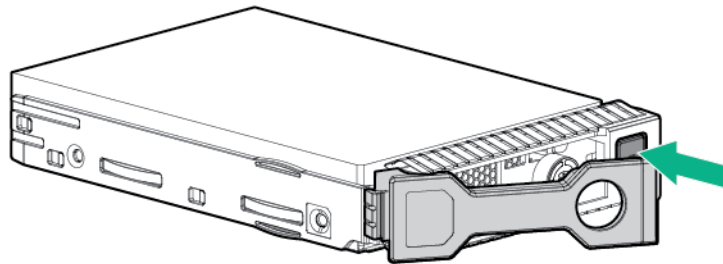
Procedure

1. **Extend the front drive cages out of the chassis.**
2. Open the drive release lever:

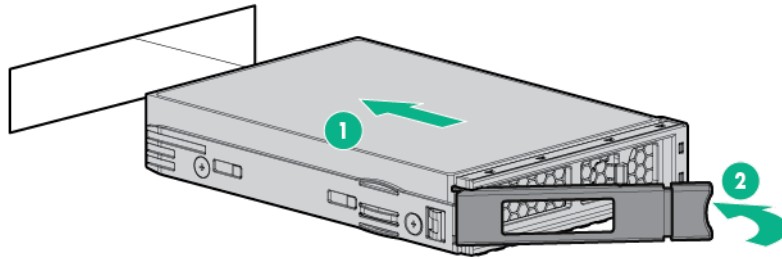
- LFF drive: Press the latch to open the release lever.



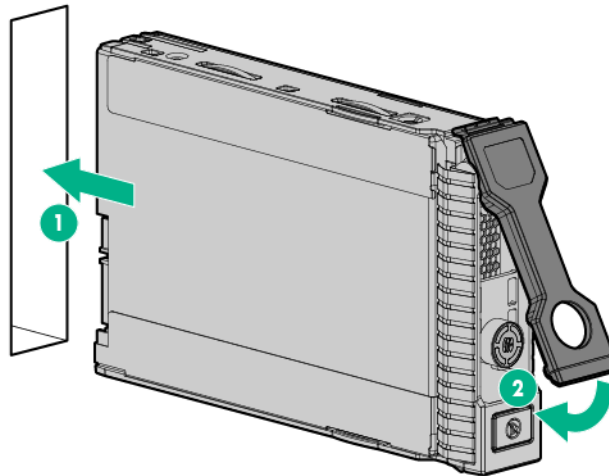
- SFF drive: Press the Do Not Remove button to open the release lever.



3. Install the drive:
 - LFF drive



- SFF drive



4. Determine the status of the drive from the **drive LED definitions**.
5. **Slide the front drive cages into the chassis.**

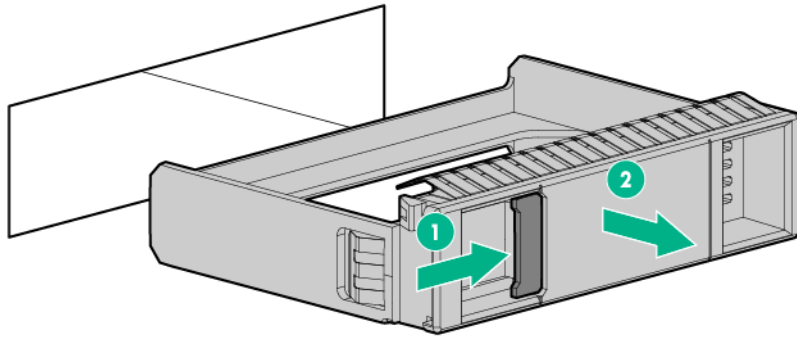
To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the [Hewlett Packard Enterprise website](#).

Installing a hot-plug drive in the rear drive cage

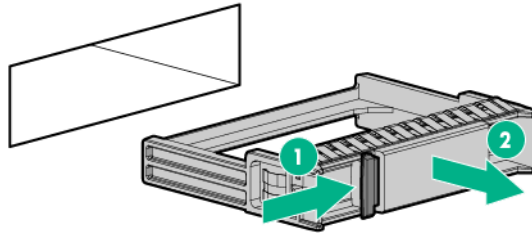
- ⚠ CAUTION:**
Do not operate the server with any of the rear drive bays empty. To maintain proper airflow and sufficient cooling in the rear drive cage, all drive bays in this cage should have a drive or a drive blank. Hewlett Packard Enterprise recommends installing at least one drive in the rear drive cage before operating the server.

Procedure

1. Access the product rear panel.
2. Remove the drive blank:
 - LFF drive blank

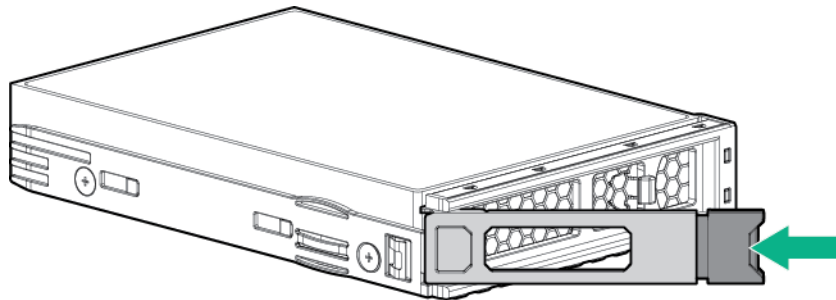


- SFF drive blank

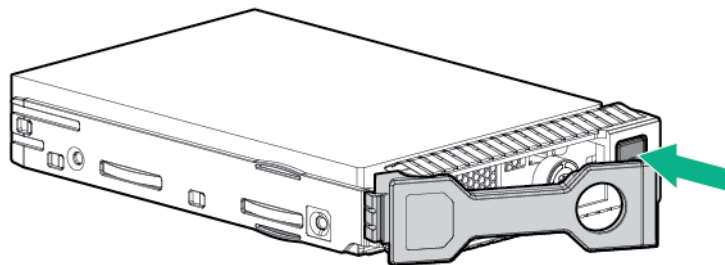


3. Open the drive release lever:

- LFF drive: Press the latch to open the release lever.

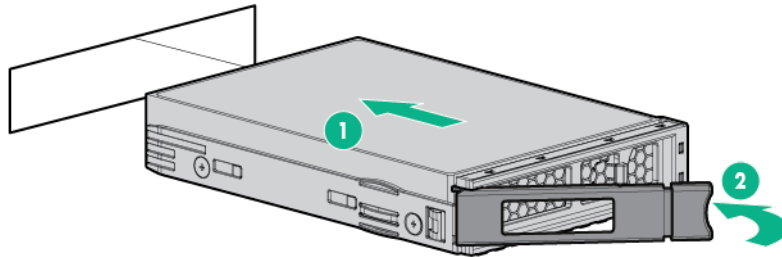


- SFF drive: Press the Do Not Remove button to open the release lever.

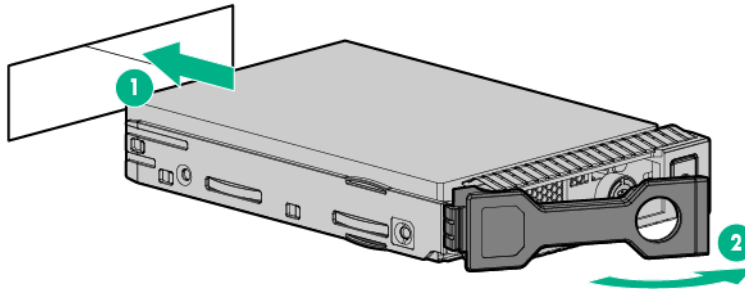


4. Install the drive:

- LFF drive



- SFF drive



5. Determine the status of the drive from the **drive LED definitions**.

To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the [Hewlett Packard Enterprise website](#).

Drive cage options

Drive cage installation cautions

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

 - ⚠ CAUTION:**
Do not operate the server with any of the rear drive bays empty. To maintain proper airflow and sufficient cooling in the rear drive cage, all drive bays in this cage should have a drive or a drive blank. Hewlett Packard Enterprise recommends installing at least one drive in the rear drive cage before operating the server.

 - ⚠ IMPORTANT:**
The 3x2 connector of the power Y-cable is reserved for PCI riser cage installation. When installing the four-bay LFF hot-plug rear drive cage or six-bay SFF hot-plug rear drive cage, do not remove the cable tie that secure the split ends of the power Y-cable together.
-

Four-bay LFF hot-plug rear drive cage option

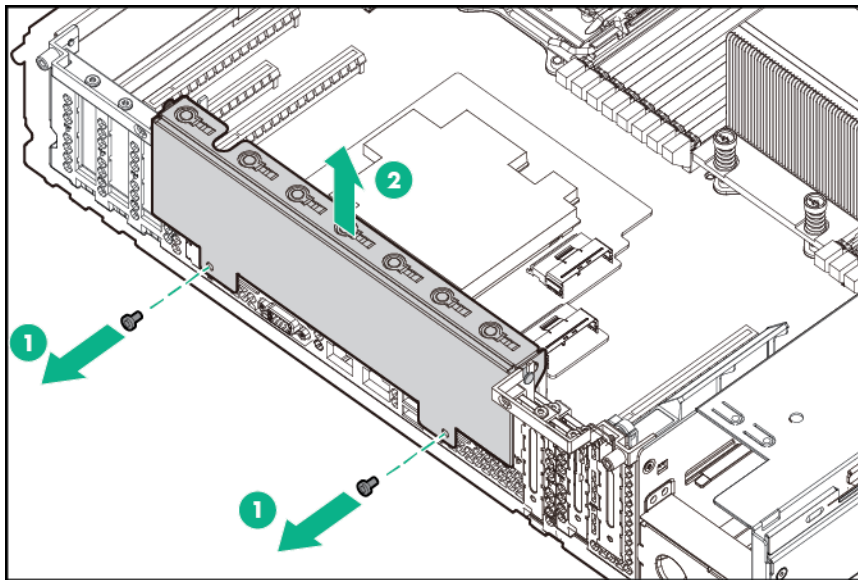
This rear drive cage option supports low-profile LFF SAS and SATA drives. These drives are assigned the drive numbers 49–52.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Install the four-bay LFF hot-plug rear drive cage

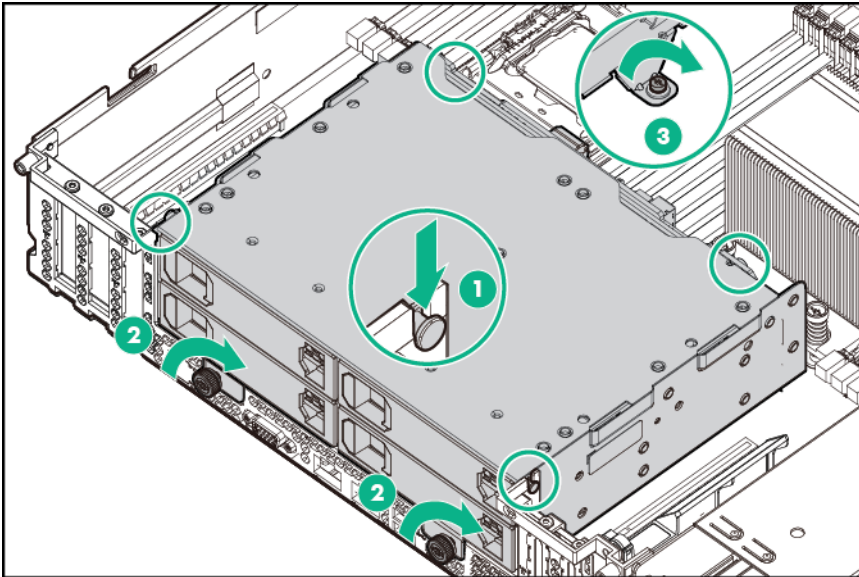
Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Remove the rear option blank.

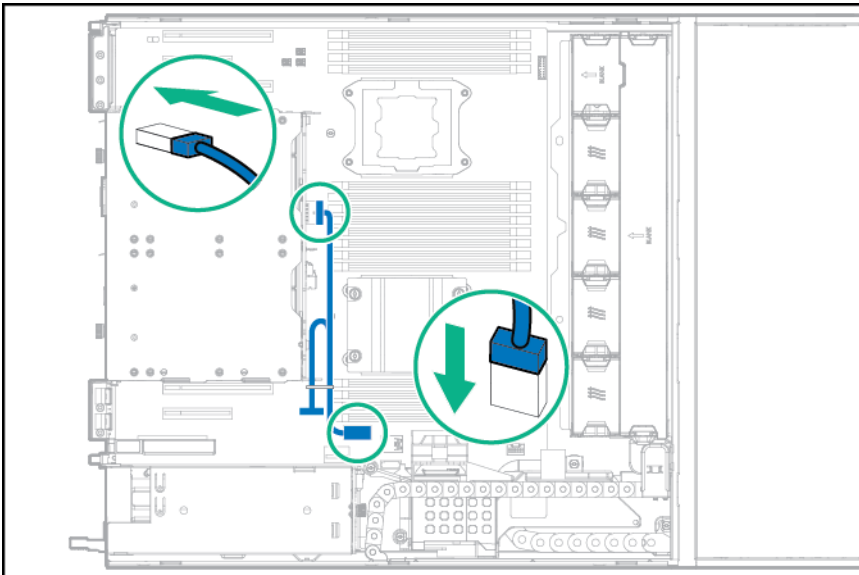


Retain the blank for future use.

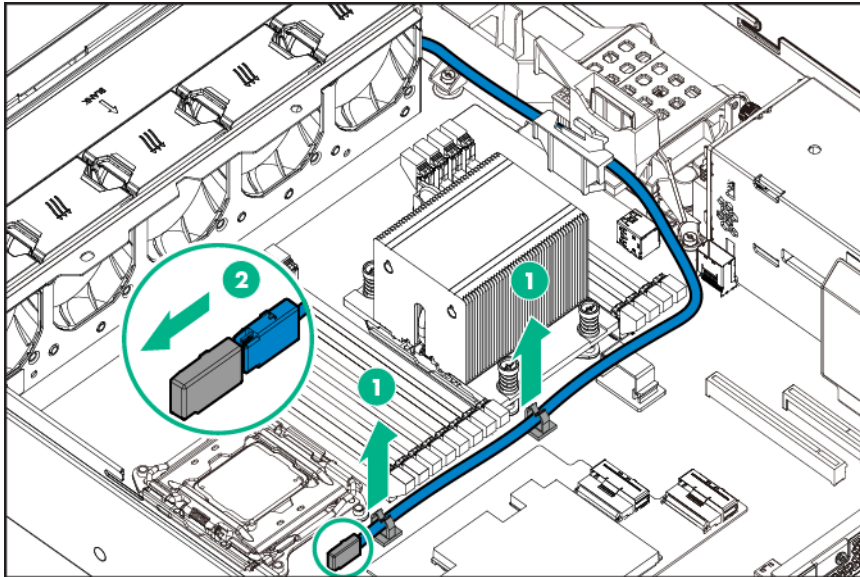
7. Install the four-bay LFF hot-plug rear drive cage:
 - a. Align the pins on the drive cage with the notches on the rear panel.
 - b. Tighten the thumbscrews to secure the drive cage to the rear panel.
 - c. Tighten the captive screws to secure the drive cage to the system board.



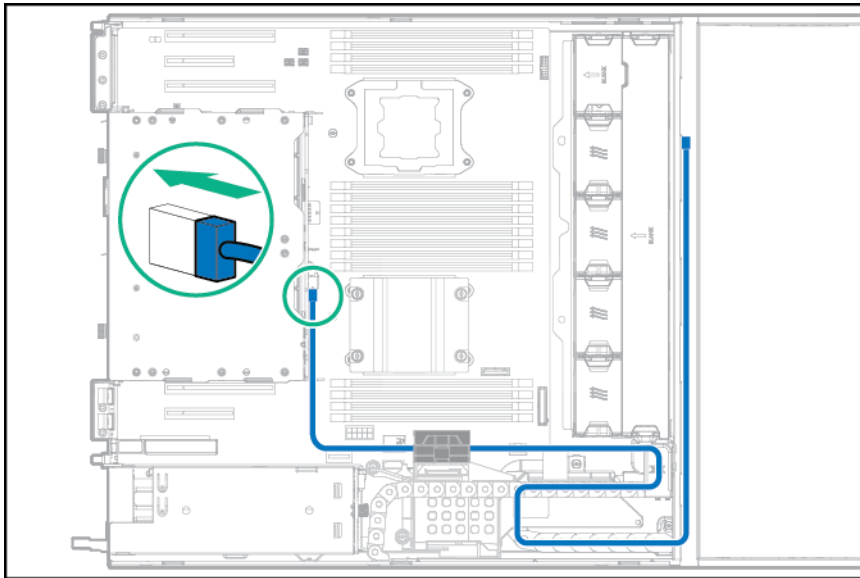
8. Connect the power Y-cable:
 - a. Connect the common 5x2 connector to the system board.
 - b. Connect the smaller 5x2 connector to the drive backplane.



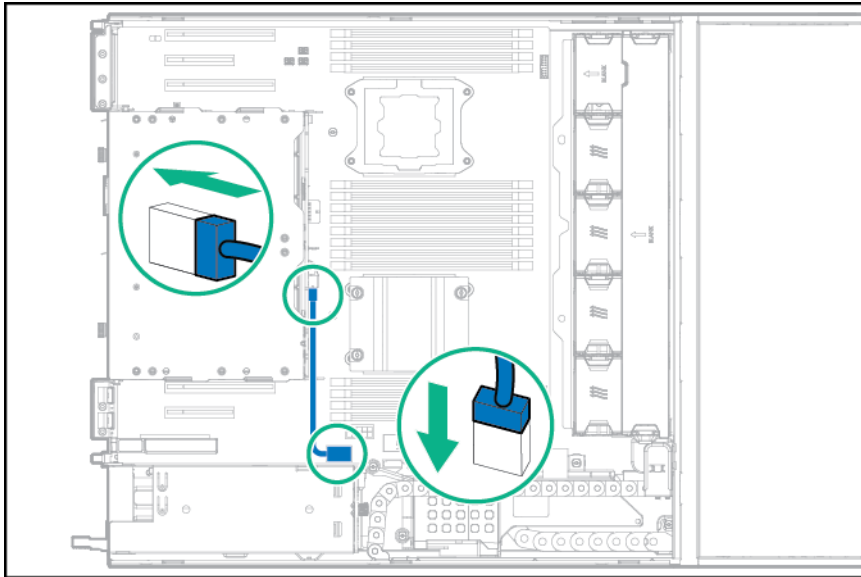
9. If you plan to use the Flexible Smart Array P840ar Controller to manage the rear LFF drives, connect the rear drive cage to the front drive cage 2 backplane:
 - a. Release the preinstalled Mini-SAS x4 cable from the system board cable clips.
 - b. Remove the plastic cover from the released Mini-SAS x4 cable.



c. Connect the released Mini-SAS x4 cable to the four-bay hot-plug LFF rear drive backplane.



10. If you plan to use the Dynamic Smart Array B140i Controller to manage the rear LFF drives, connect the rear drive cage to the system board:
 - a. Connect the Mini-SAS x4 cable included in this option kit to the drive backplane.
 - b. Connect the other end of the cable to the system board Mini-SAS connector.



11. **Install the air baffle.**
12. **Install the access panel.**
13. **Install the server into the rack.**
14. **Hewlett Packard Enterprise recommends installing at least one drive in the rear drive cage.**
Populate drive bays based on the drive numbering sequence. Start from the drive bay with the lowest device number.
15. **Power up the server.**

Two-bay SFF hot-plug rear drive cage and two-slot PCI riser cage options

⚠ CAUTION:
To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

This drive cage option supports SFF SAS and SATA HPE SmartDrives. These drives are assigned the drive numbers 49–50.

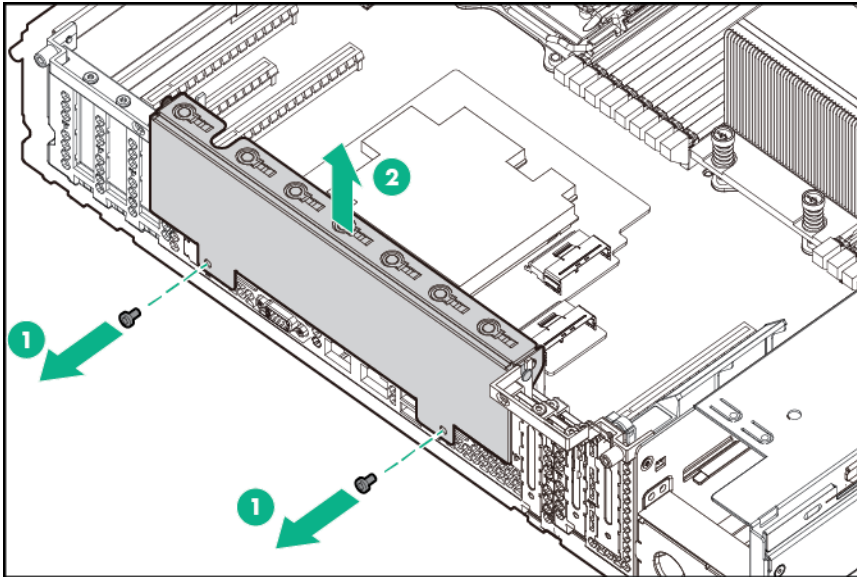
The PCI riser cage option has two PCIe3 x8 (8, 4, 1) full-height, half-length slots.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Installing two-bay SFF hot-plug rear drive cage and two-slot PCI riser cage options

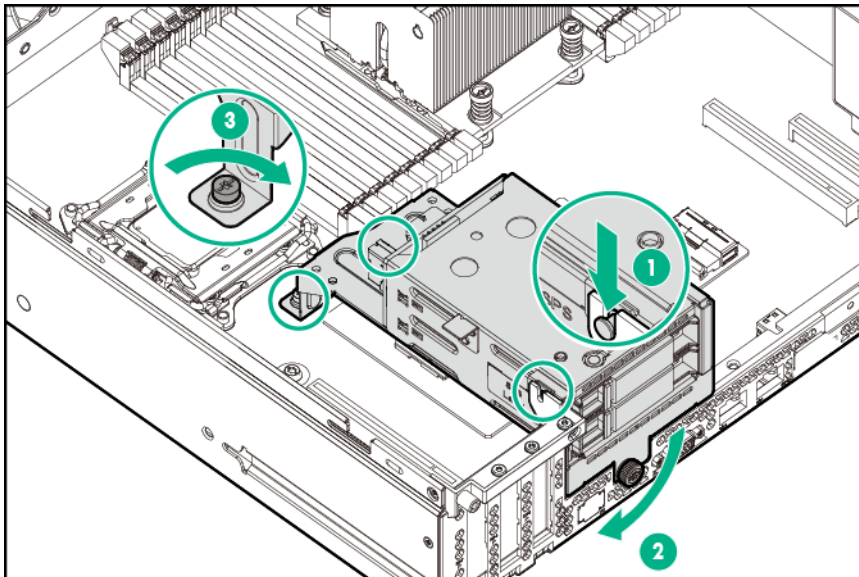
Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Remove the rear option blank.

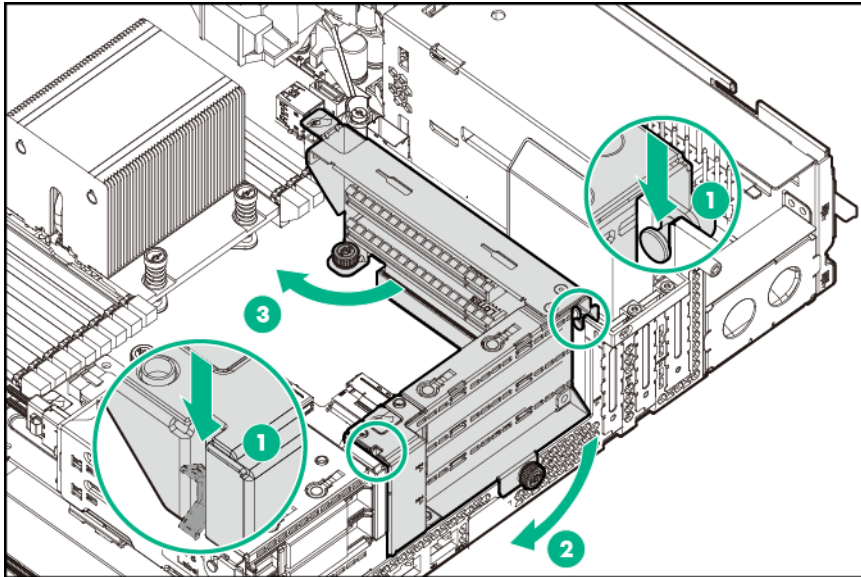


Retain the blank for future use.

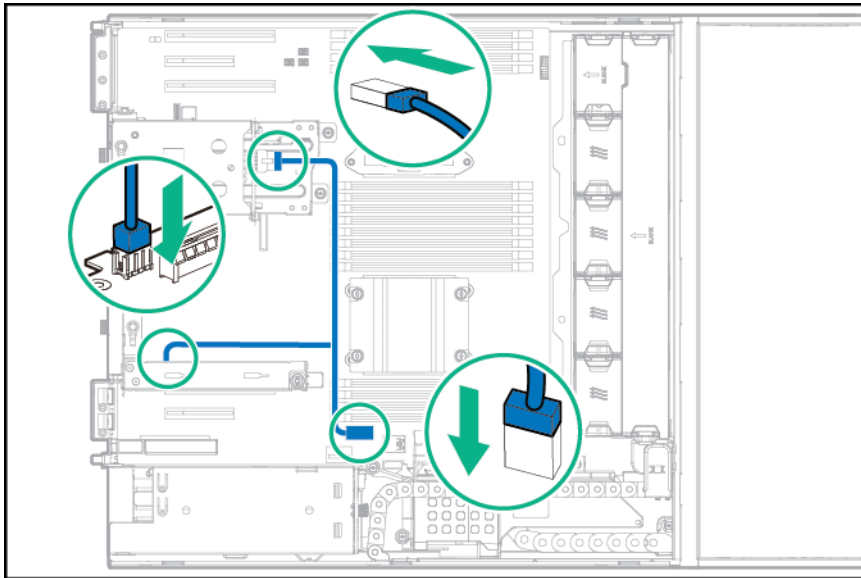
7. Install the two-bay SFF rear drive cage:
 - a. Align the pin on the drive cage with the notch on the rear panel.
 - b. Tighten the thumbscrew to secure the drive cage to the rear panel.
 - c. Tighten the captive screws to secure the drive cage to the system board.



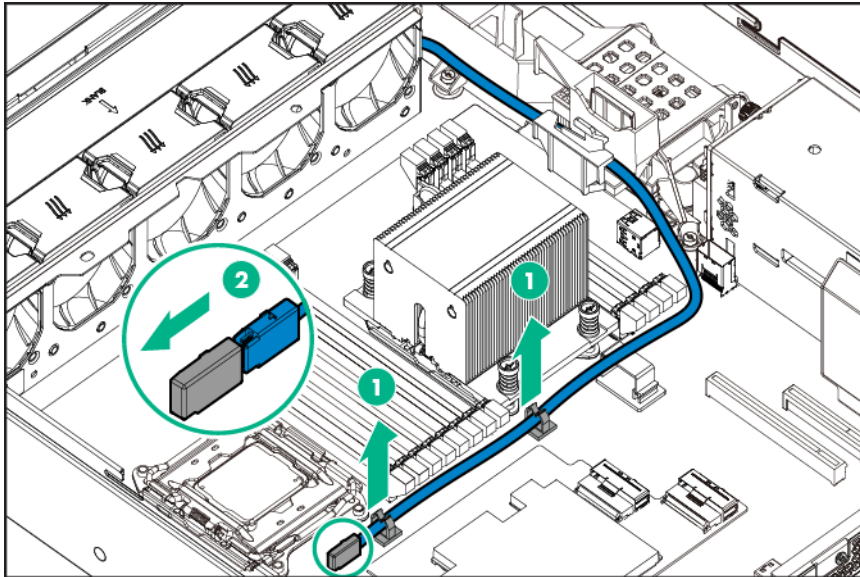
8. Install the two-slot PCI riser cage:
 - a. On the right side of the PCI riser cage, align the small tab on the drive cage with the notch on PCI riser cage.
 On the left side of the PCI riser cage, align the pin with the notch on the rear panel.
 - b. Tighten the thumbscrew to secure the PCI riser cage to the rear panel.
 - c. Tighten the captive screw to secure the PCI riser cage to the system board.



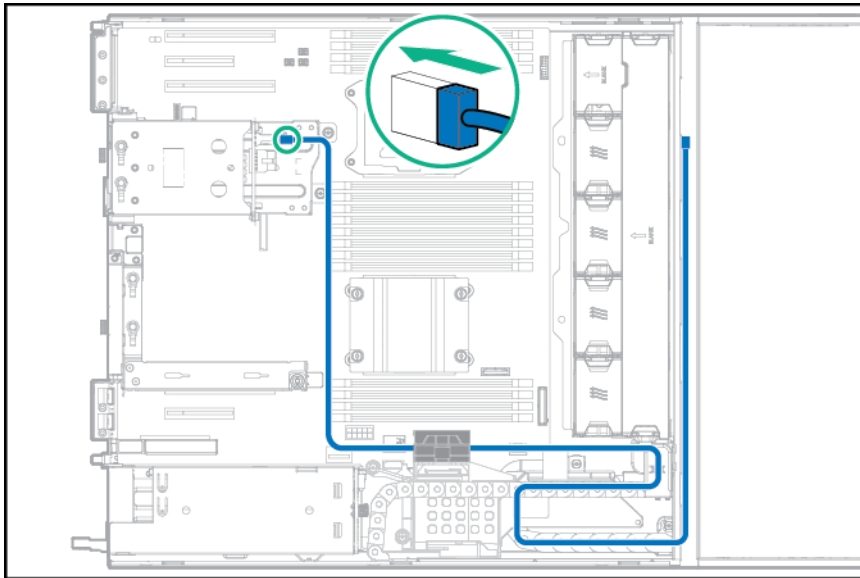
9. Remove the cable tie securing the split ends of the power Y-cable.
10. Connect the power Y-cable:
 - a. Connect the common 5x2 connector to the system board.
 - b. Connect the smaller 5x2 connector to the drive backplane.
 - c. Connect the 3x2 connector to the riser board.



11. If you plan to use the Flexible Smart Array P840ar Controller to manage the rear SFF drives, connect the rear drive cage to the front drive cage 2 backplane:
 - a. Release the preinstalled Mini-SAS x4 cable from the system board cable clips.
 - b. Remove the plastic cover from the released Mini-SAS x4 cable.

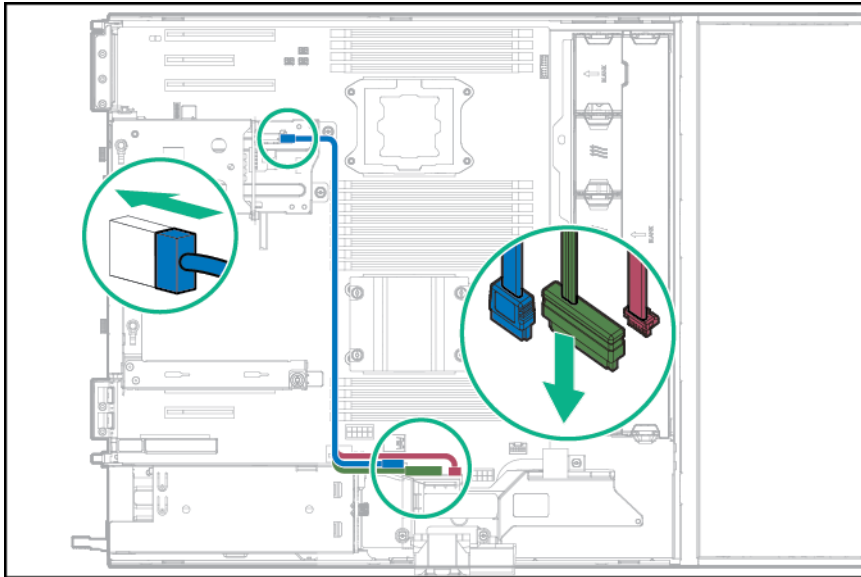


c. Connect the released Mini-SAS x4 cable to the two-bay SFF hot-plug rear drive backplane.



12. If you plan to use the Dynamic Smart Array B140i Controller to manage the rear SFF drives, connect the rear drive cage to the system board:

- a. **Open the cable management holder.**
- b. Connect the common end of the multiconnector drive signal cable to the rear drive backplane.
- c. Connect the split ends of the multiconnector drive signal cable to the system board.



d. Close the cable management holder.

13. If you are installing an expansion board in the PCI riser cage, **install it now.**
14. **Install the air baffle.**
15. **Install the access panel.**
16. **Install the server into the rack.**
17. **Hewlett Packard Enterprise recommends installing at least one drive in the rear drive cage.**

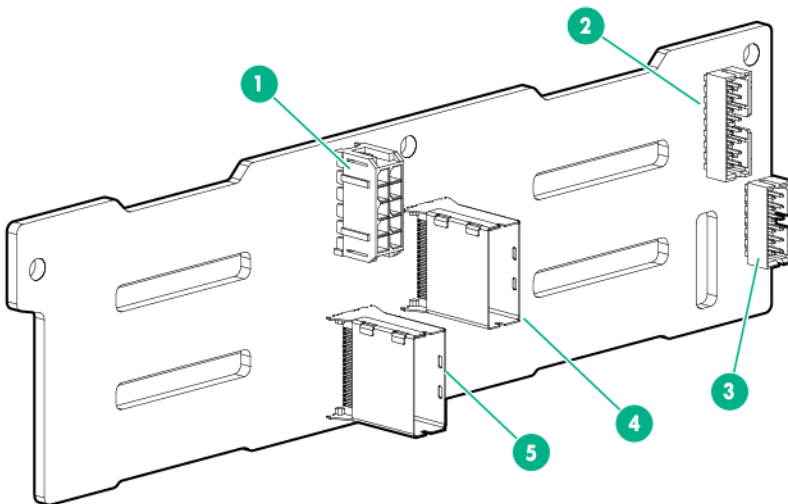
Populate drive bays based on the drive numbering sequence. Start from the drive bay with the lowest device number.

18. **Power up the server.**

Six-bay SFF hot-plug rear drive cage option

This drive cage option supports SFF SAS and SATA HPE SmartDrives. These drives are assigned the drive numbers 49–54.

The six-bay SFF rear drive backplane has the following cable connectors:



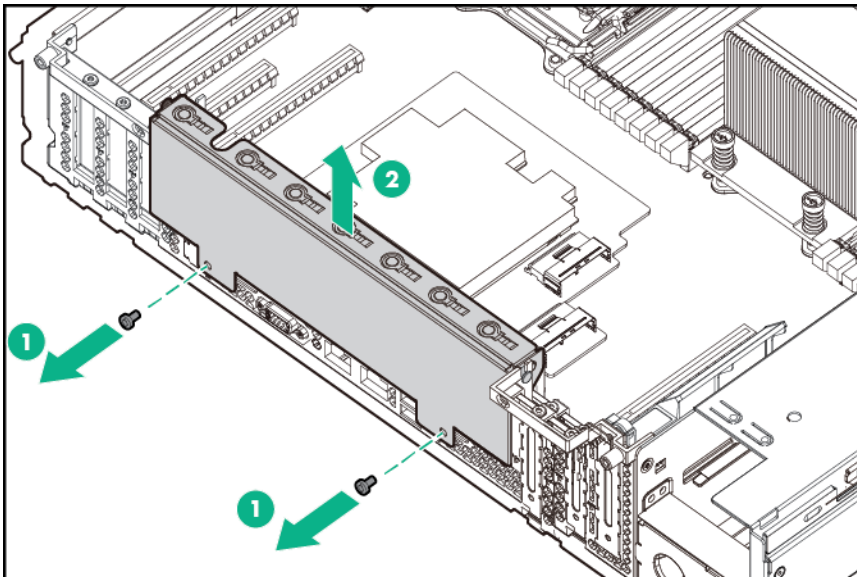
Item	Description
1	Power Y-cable connector
2	Reserved
3	Backplane sideband cable connector
4	Port 1 connector (for drives 49-52)
5	Port 2 connector (for drives 53-54)

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Install the six-bay SFF hot-plug rear drive cage option

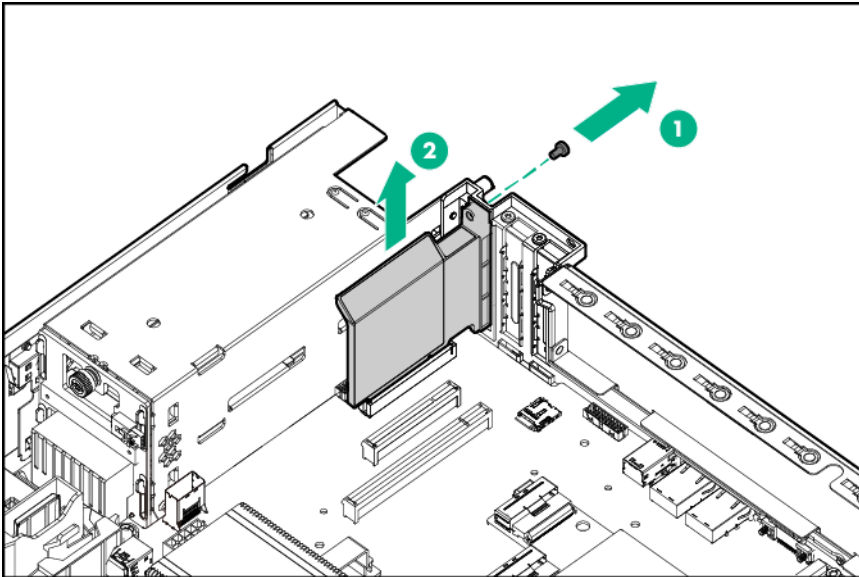
Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Remove the rear option blank.

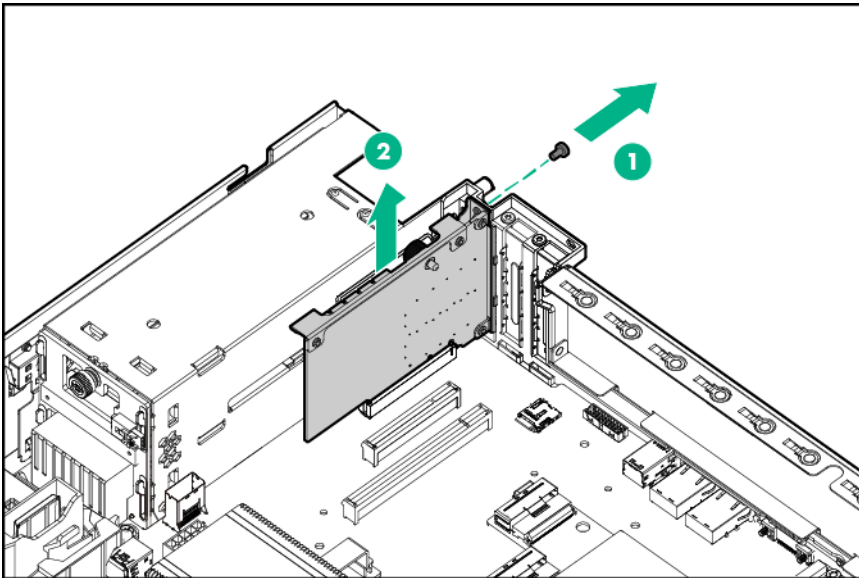


Retain the blank for future use.

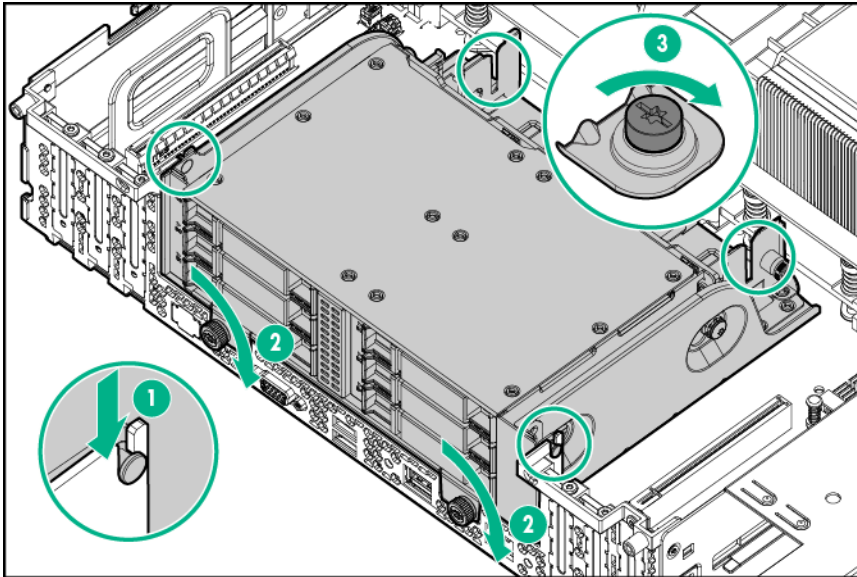
7. Do one of the following:
 - Remove the FlexibleLOM blank.



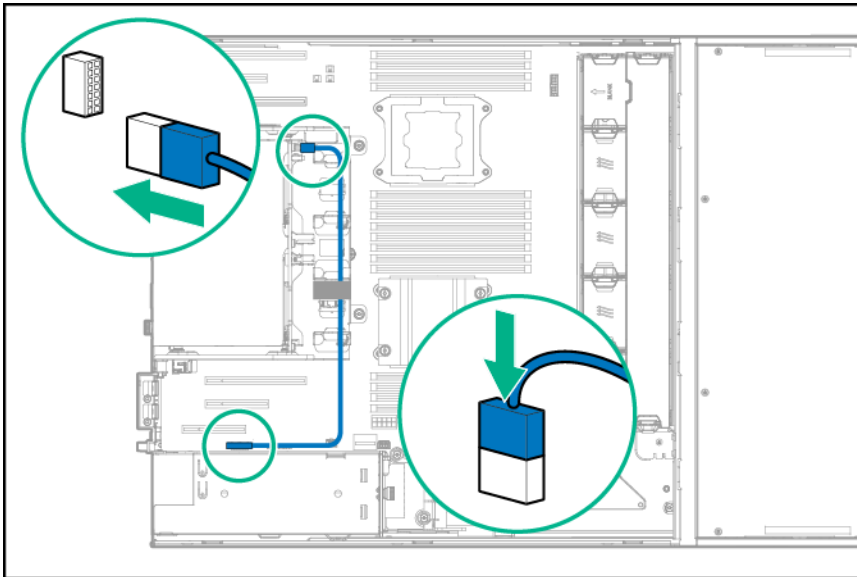
- If installed, remove the FlexibleLOM adapter.



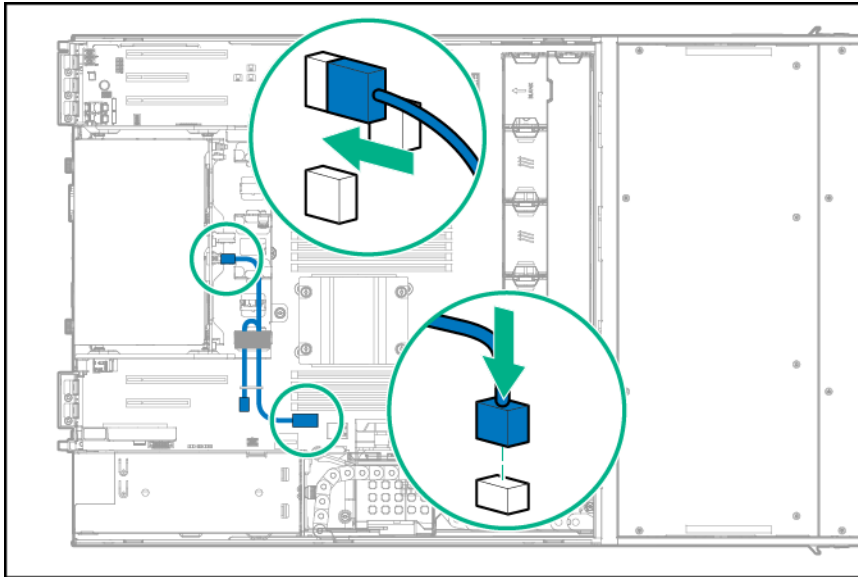
8. If you are **NOT** installing an H240 HBA or a P440 controller for the six-bay SFF rear drive cage, **open the cable management holder**.
9. Align the pins on the drive cage with the notches on the rear panel.
10. Tighten the thumbscrews to secure the drive cage to the rear panel.
11. Tighten the captive screws to secure the drive cage to the system board.



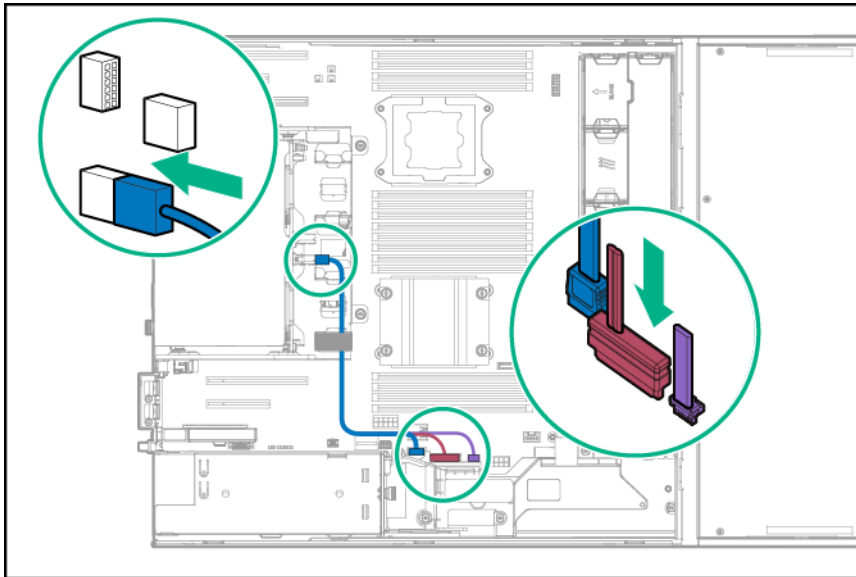
12. Connect the backplane sideband cable to the rear drive backplane and the system board.
13. Secure the cable in the rear drive cage cable clip.



14. Do one of the following:
 - a. Install the FlexibleLOM blank.
 - b. If removed, install the FlexibleLOM adapter.
15. Connect the common 5x2 connector of the power Y-cable to the system board.
16. Connect the smaller 5x2 connector of the power Y-cable to the drive backplane.
17. Secure the cable in the rear drive cage cable clip.



18. If you are **NOT** installing an H240 HBA or a P440 controller for the six-bay SFF rear drive cage, connect the multiconnector drive signal cable:
- Connect the common end of the multiconnector drive signal cable to port 2 of the rear drive backplane.
 - Connect the split ends of the multiconnector drive signal cable to the system board.
 - Secure the cable in the rear drive cage cable clip.



- Close the cable management holder.**
19. Depending on which storage controller you prefer to use for managing the rear drives, perform one of the succeeding storage cabling option procedures.
- **Connect the preinstalled Mini-SAS x4 cable.**
 - **Connect the Mini-SAS x4 cable marked as MLB.**
 - **Install the H240 HBA and its Mini-SAS x4 cables.**
 - **Install the P440 controller and its Mini-SAS Y-cable.**
20. **Install the air baffle.**
21. **Install the access panel.**
22. **Install the server into the rack.**
23. **Hewlett Packard Enterprise recommends installing at least one drive in the rear drive cage.**

Populate drive bays based on the drive numbering sequence. Start from the drive bay with the lowest device number.

24. **Power up the server.**

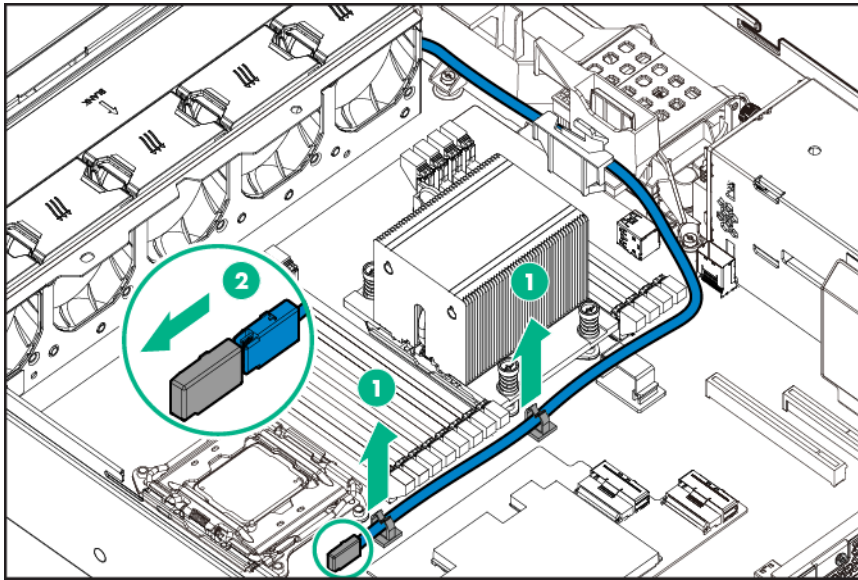
Connect the preinstalled Mini-SAS x4 cable

In this storage cabling option, the rear SFF drives 49-52 are managed by the Flexible Smart Array P840ar Controller, while drives 53-54 are managed by the onboard Dynamic Smart Array B140i Controller. Both the multiconnector drive signal cable and the preinstalled Mini-SAS x4 cable from the front drive cage 2 backplane will be in use.

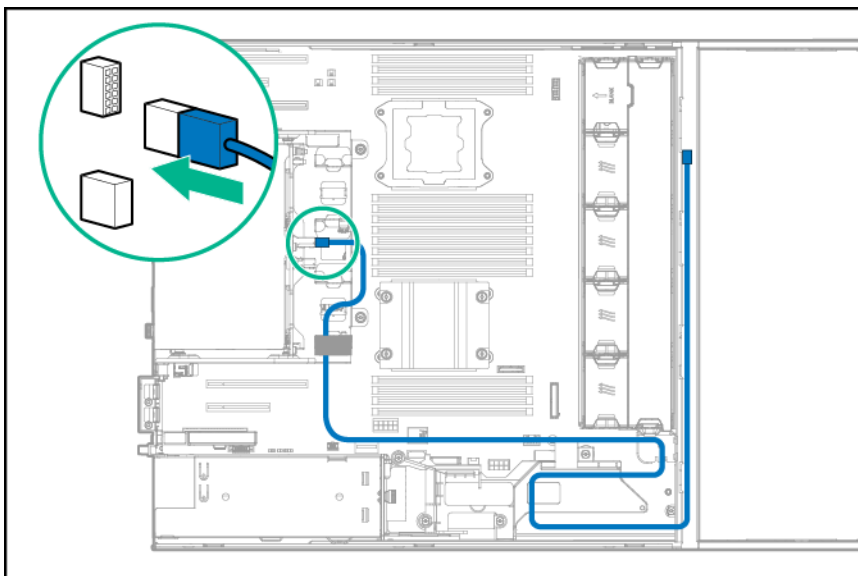
Procedure

1. Release the preinstalled Mini-SAS x4 cable from the system board cable clips.
2. Remove the plastic cover from the released Mini-SAS x4 cable.

To show the location of preinstalled Mini-SAS x4 cable clearly, the six-bay SFF drive cage image is not shown in following illustration.



3. Connect the released Mini-SAS x4 cable to port 1 of the rear drive backplane.
4. Secure the cable in the rear drive cage cable clip.

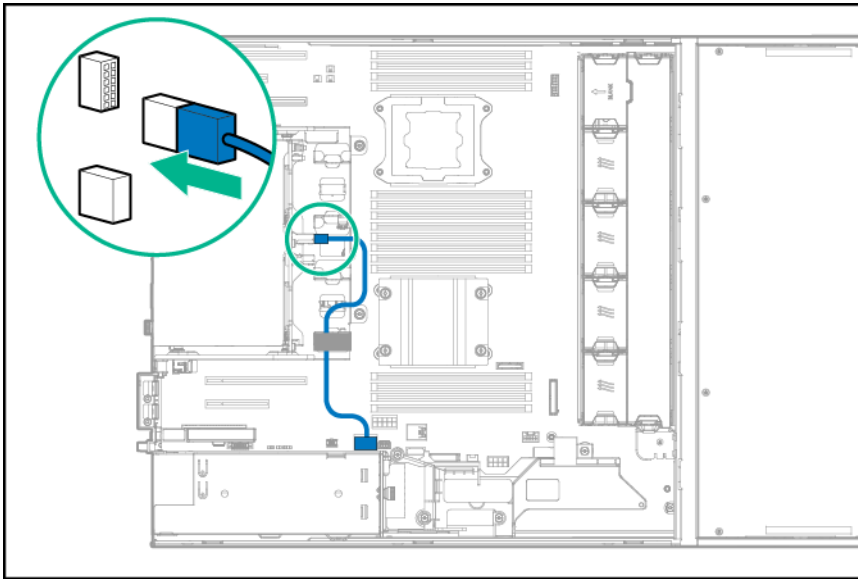


Connect the Mini-SAS x4 cable marked as MLB

In this storage cabling option, the rear SFF drives are managed by the onboard Dynamic Smart Array B140i Controller. Both the multiconnector drive signal cable and the Mini-SAS x4 cable below will be in use.

Procedure

1. Remove the plastic connector covers from the Mini-SAS x4 cable.
2. Connect the Mini-SAS x4 cable to port 1 of the rear drive backplane.
3. Connect the other end of the cable to the system board.
4. Secure the cable in the rear drive cage cable clip.

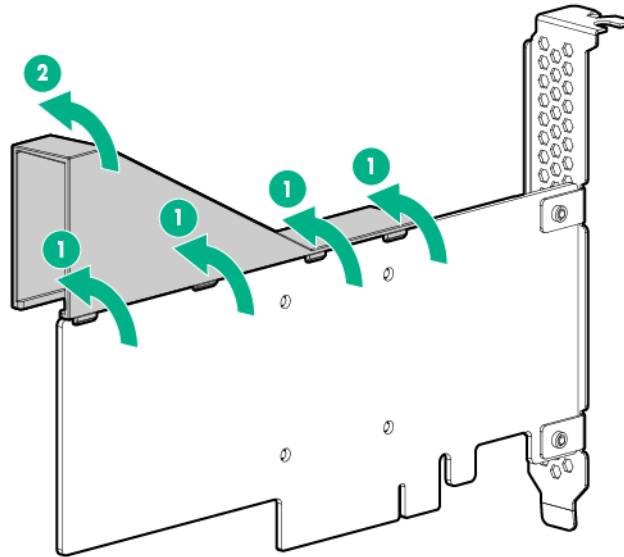


Install the H240 HBA and its Mini-SAS x4 cables

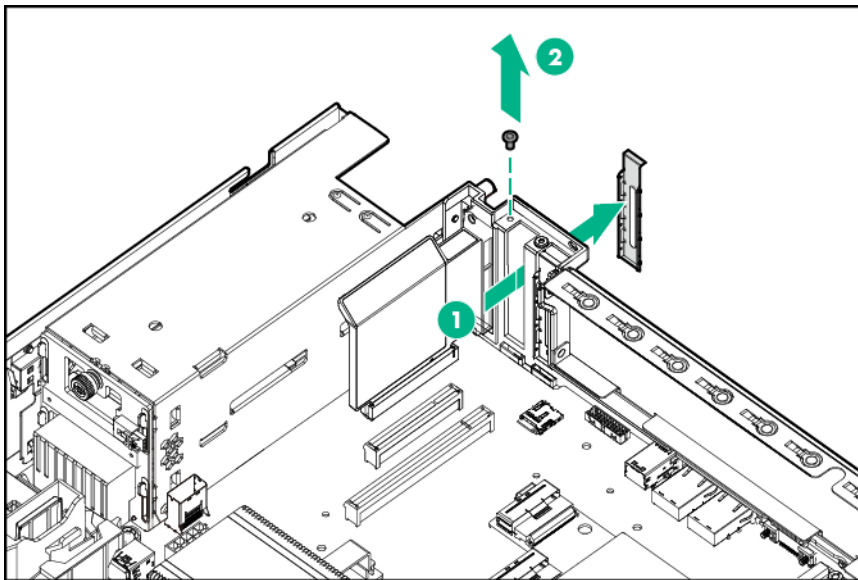
In the six-bay SFF rear drive configuration, the H240 HBA is supported in the low-profile PCIe expansion slots 1, 2, 5, 6, and 7.

Procedure

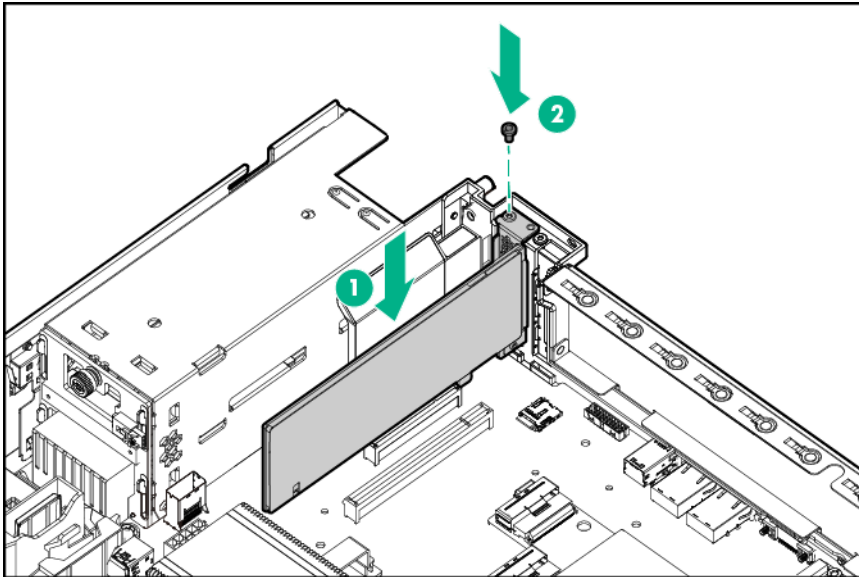
1. Remove the air scoop from the HBA.



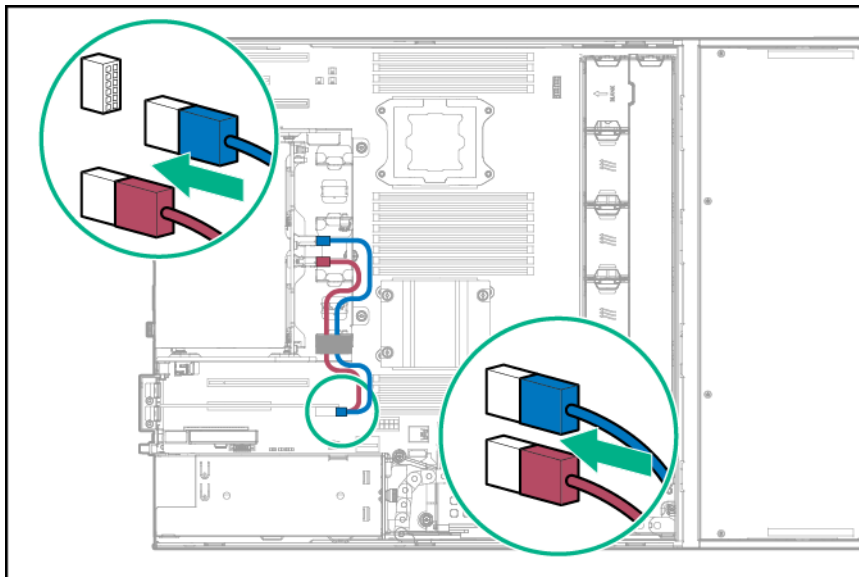
2. Remove the full-height bracket from the HBA, and attach the low-profile bracket.
For more information, see the documentation that ships with the option.
3. Remove the onboard PCI expansion slot cover.



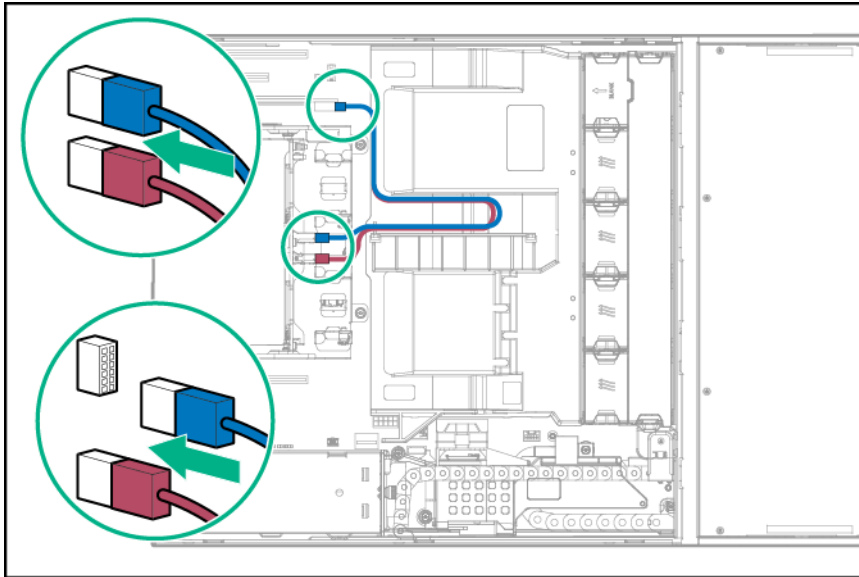
4. Install the HBA.



5. Remove the plastic connector covers from the Mini-SAS x4 cable.
6. Connect the two Mini-SAS x4 cables to the ports 1 and 2 of the drive backplane.
7. Connect the other end of the Mini-SAS x4 cables to the HBA.
8. Depending on the location of the HBA, secure the Mini-SAS cables in the rear drive cage cable clip or position them on top of the air baffle.
 - H240 HBA Mini-SAS cable connections from the PCIe expansion slot 1 or 2



- H240 HBA Mini-SAS cable connections from the PCIe expansion slot 5, 6 or 7

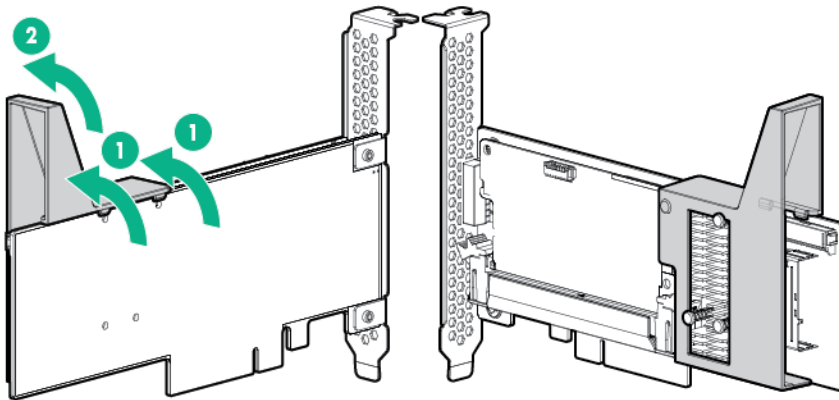


Install the P440 controller and its Mini-SAS Y-cable

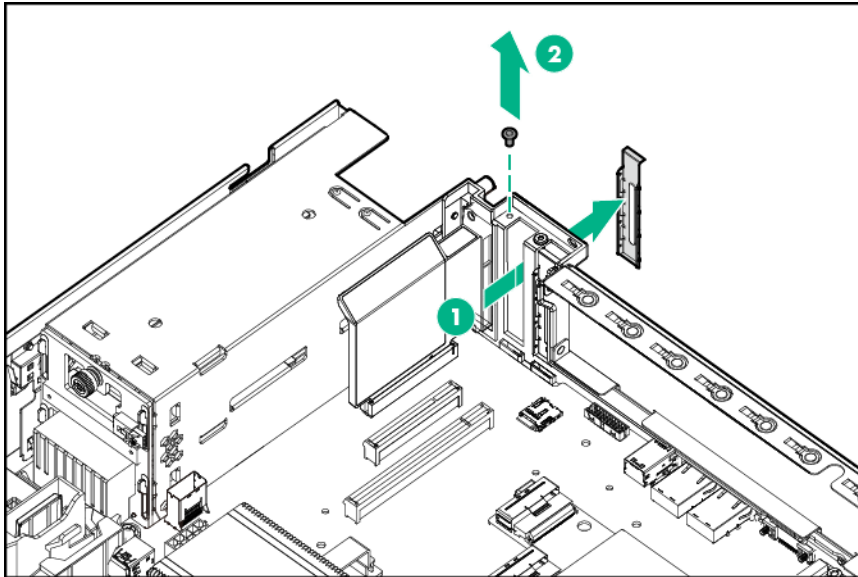
In the six-bay SFF rear drive configuration, the P440 controller is supported in the low-profile PCIe expansion slots 1, 2, 5, 6, and 7.

Procedure

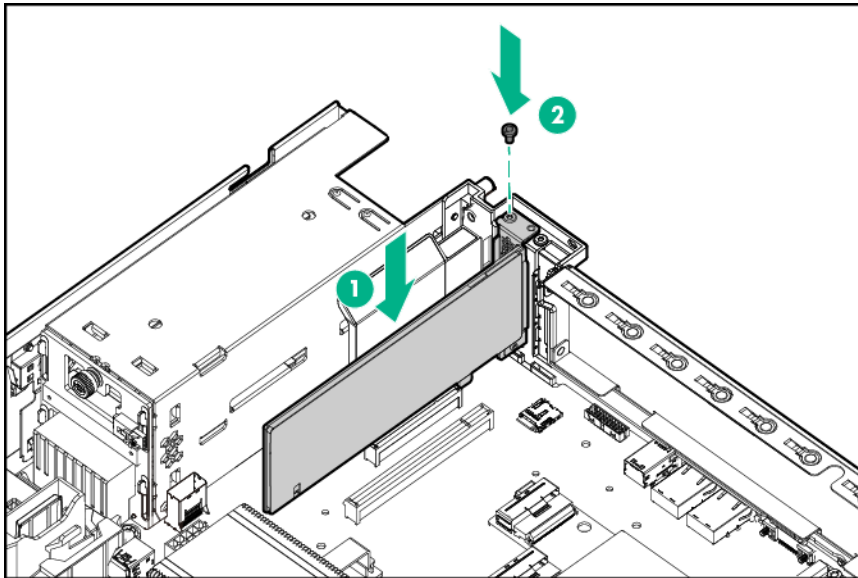
1. Remove the air scoop from the storage controller.



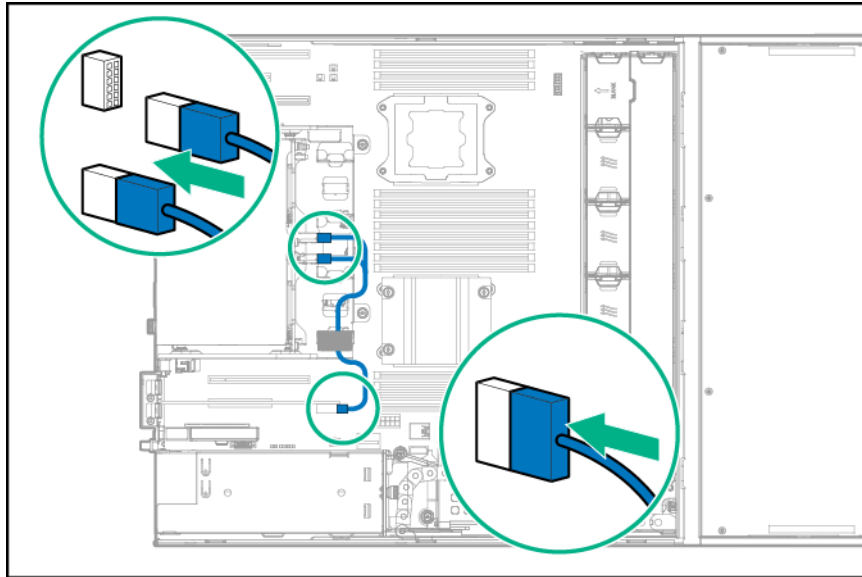
2. Remove the full-height bracket from the storage controller and attach the low-profile bracket.
For more information, see the documentation that ships with the option.
3. **If you intend to use an FBWC module, install the module on the storage controller.**
4. Remove the onboard PCI expansion slot cover.



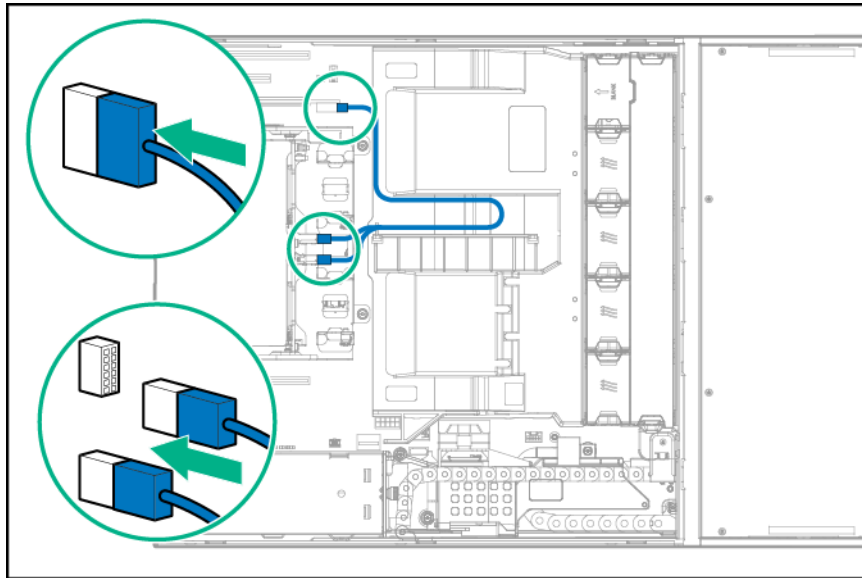
5. Install the storage controller.



6. Remove the plastic connector covers from the Mini-SAS Y-cable.
7. Remove the cable tie securing the split ends of the Mini-SAS Y-cable.
8. Connect the split ends of the Mini-SAS Y-cable to ports 1 and 2 of the rear drive backplane.
The connector marked as P1 must be connected to port 1 and the connector marked as P2 must be connected to port 2.
9. Connect the common end of the Mini-SAS Y-cable to the storage controller.
10. Depending on the location of the storage controller, secure the Mini-SAS Y-cable in the rear drive cage cable clip or position it on top of the air baffle.
 - P440 controller Mini-SAS Y-cable connections from the PCIe expansion slot 1 or 2



- P440 controller Mini-SAS Y-cable connections from the PCIe expansion slot 5, 6 or 7



Drive cable options

Use these drive cable options to install a Host Bus Adapter or a Smart Array Controller board option.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

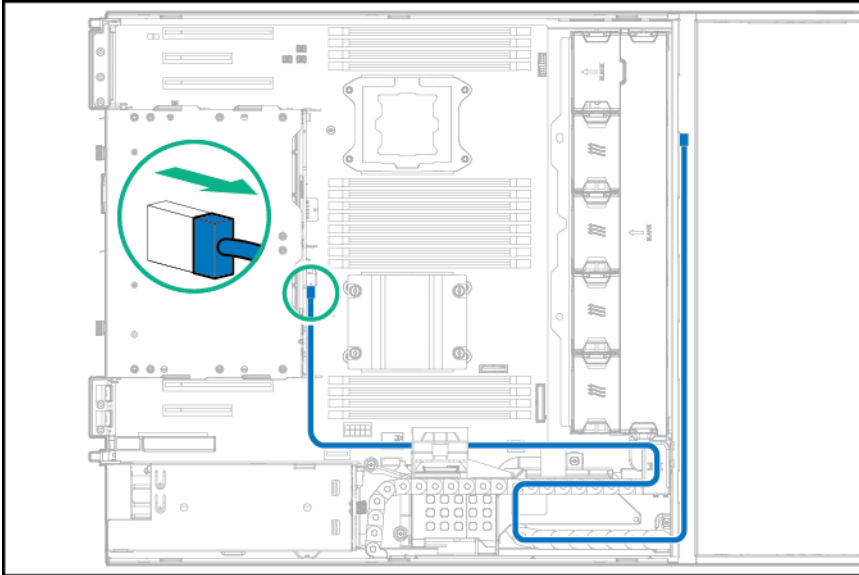
H240 Smart HBA Mini-SAS cable option for rear drive cage

This section describes how to connect an existing four-bay LFF or two-bay SFF hot-plug rear drive cage to an H240 Smart HBA using this Mini-SAS x4 cable option.

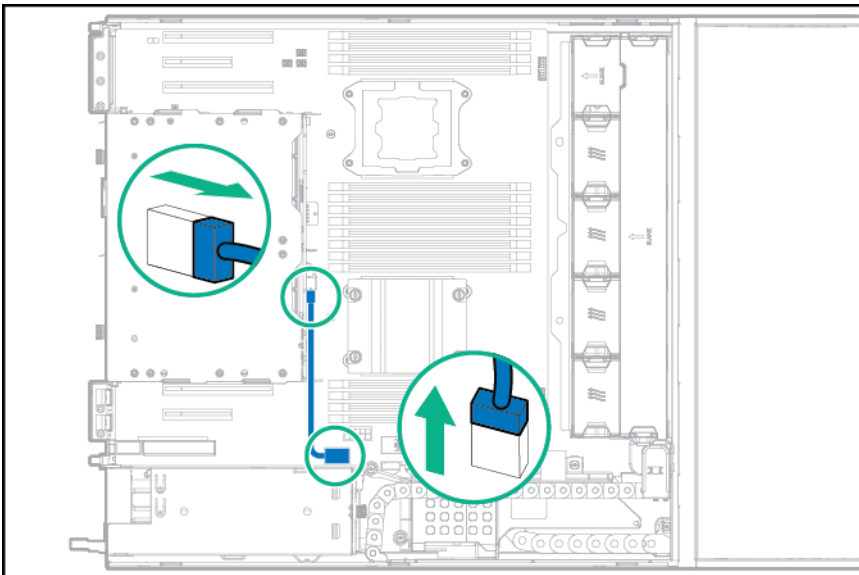
Install the H240 Smart HBA Mini-SAS cable for a rear drive cage option

Procedure

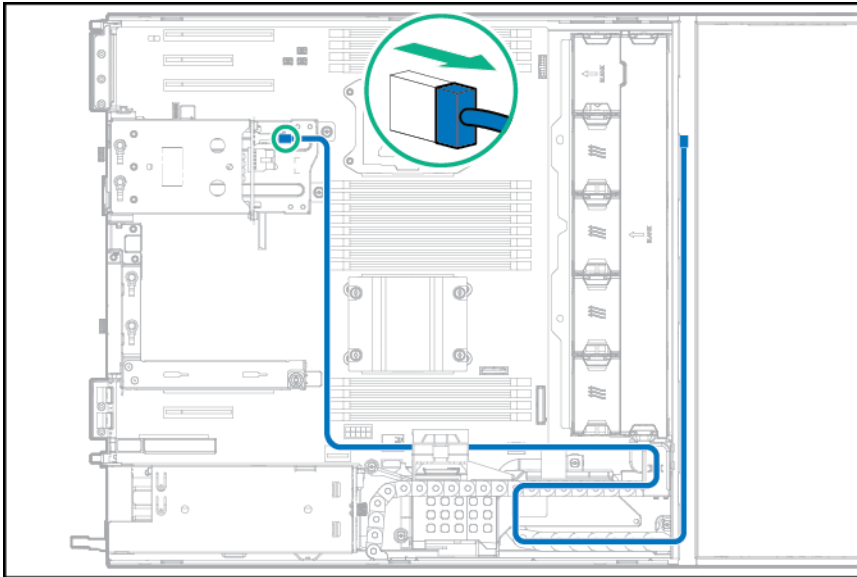
1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. If you are installing the H240 HBA for the four-bay LFF hot-plug rear drive cage, do one of the following:
 - Disconnect the Mini-SAS cable connected to the front drive cage 2 backplane from the rear drive backplane.



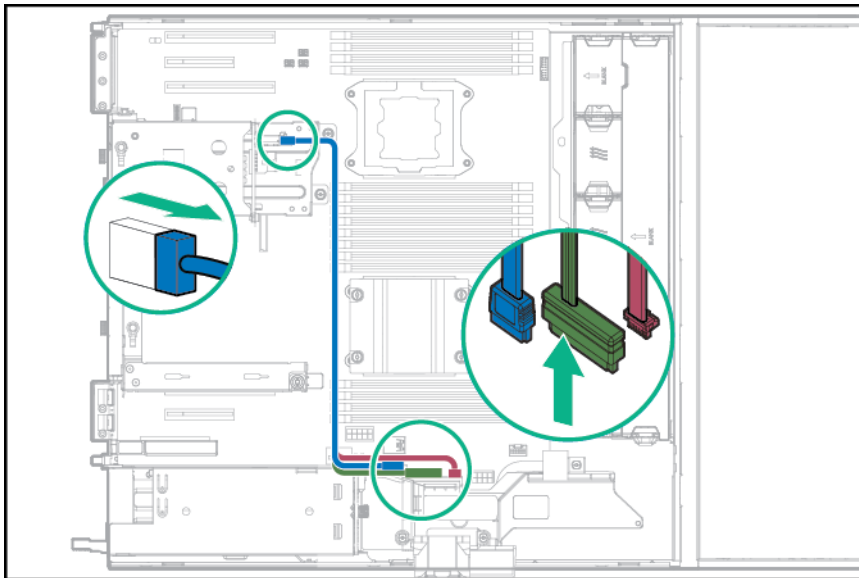
- Disconnect the Mini-SAS cable from the rear drive backplane and from the system board.



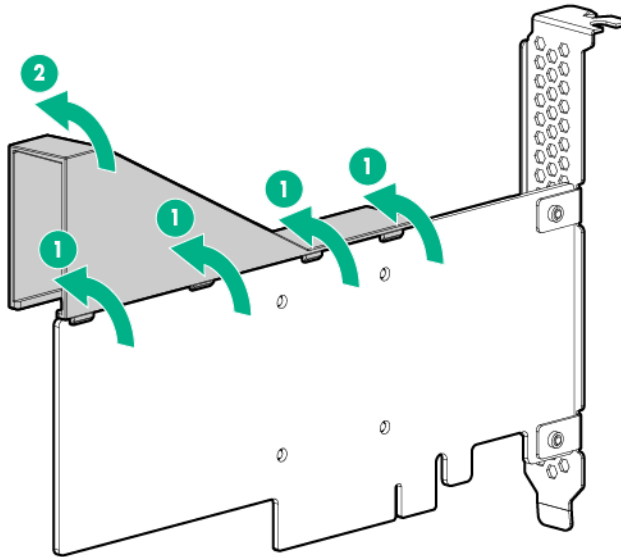
7. If you are installing the H240 HBA for a two-bay SFF hot-plug rear drive cage that is connected to the front drive cage 2 backplane, disconnect the Mini-SAS cable from the rear drive backplane.



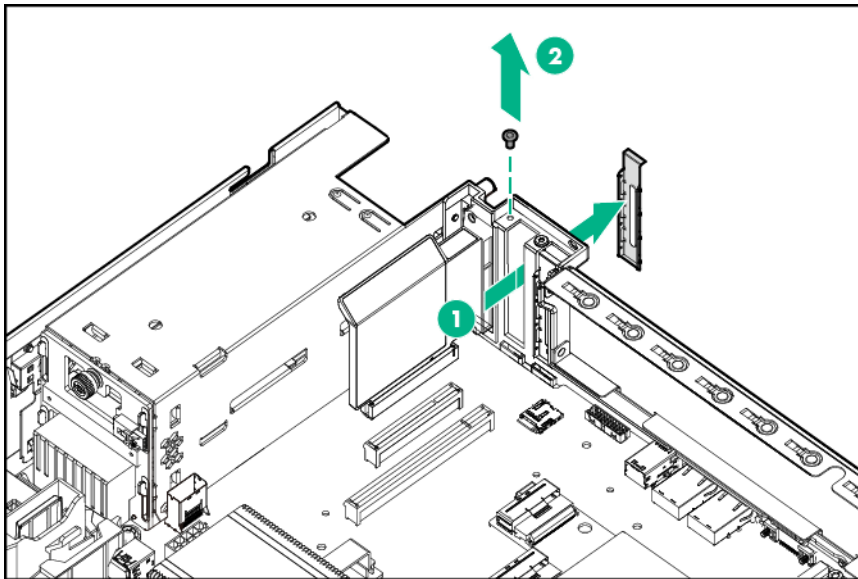
8. If you are installing the H240 HBA for a two-bay SFF hot-plug rear drive cage that is connected to the system board, disconnect the multiconnector drive signal cable:
 - a. **Open the cable management holder.**
 - b. Disconnect the multiconnector drive signal cable from the rear drive backplane and from the system board.



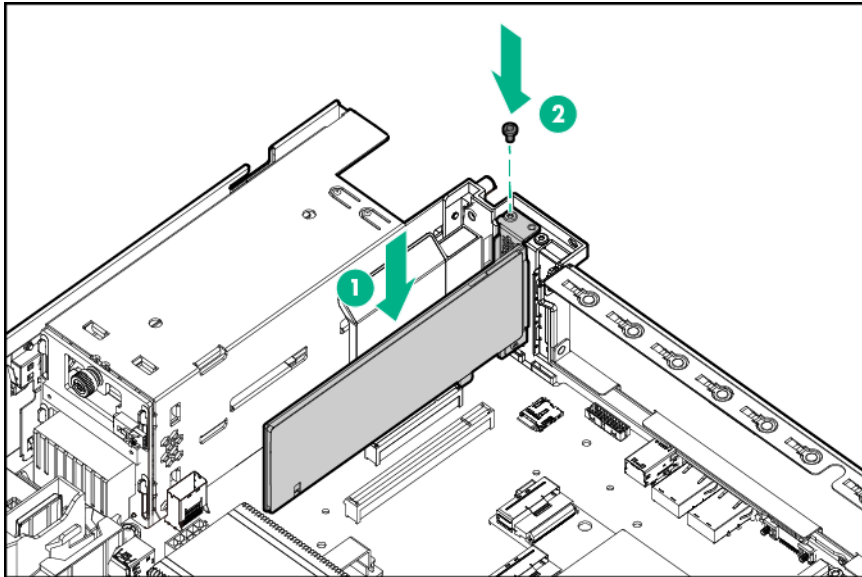
- c. **Close the cable management holder.**
9. Remove the air scoop from the HBA.



- 10.** If you intend to install the H240 HBA in any of the system board low-profile PCIe expansion slots 1, 2, 5, or 6, do the following:
- a.** Remove the full-height bracket from the HBA, and attach the low-profile bracket.
For more information, see the documentation that ships with the option.
 - b.** Remove the onboard PCI expansion slot cover.



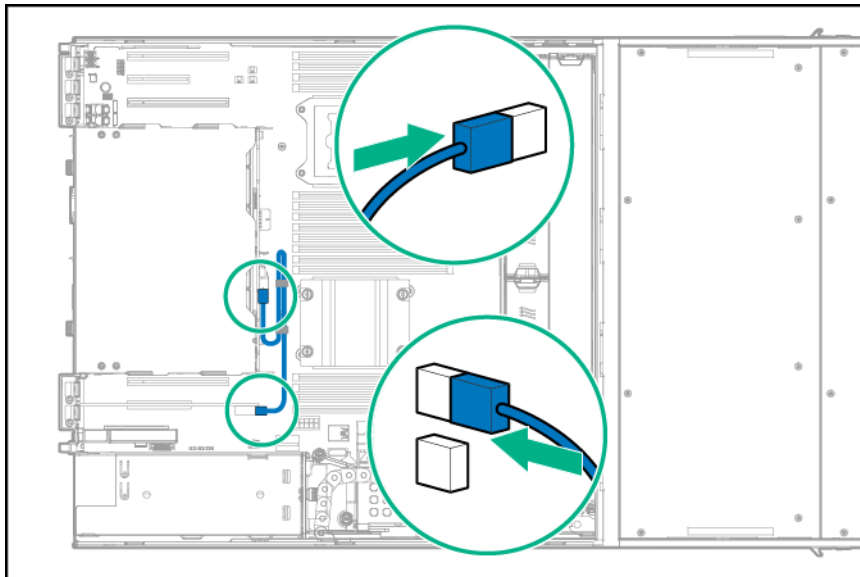
- c.** Install the HBA.



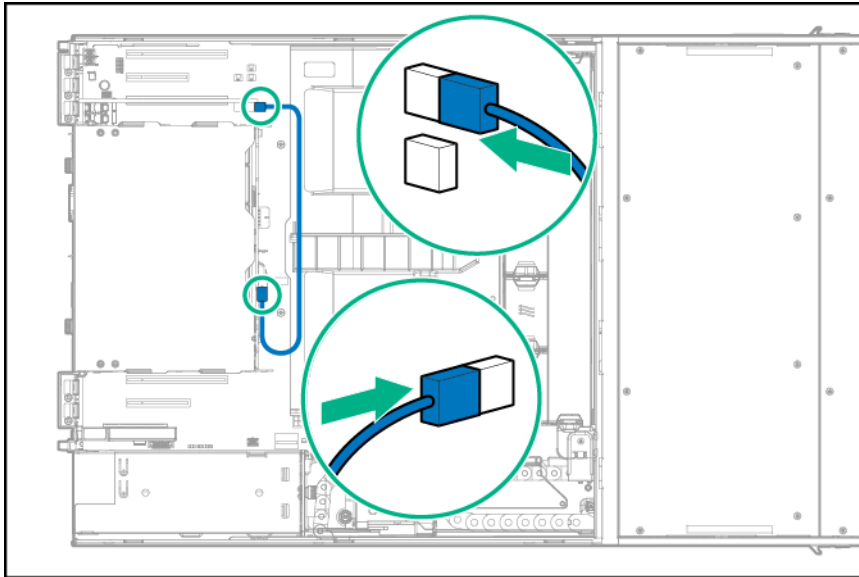
- d. Connect the Mini-SAS cable to the rear drive backplane and the HBA.
- e. For Mini-SAS cabling from the PCIe expansion slots 1 and 2, secure the Mini-SAS cable in the system board cable clips.

For Mini-SAS cabling from the PCIe expansion slots 5 and 6, position the Mini-SAS cable on top of the air baffle.

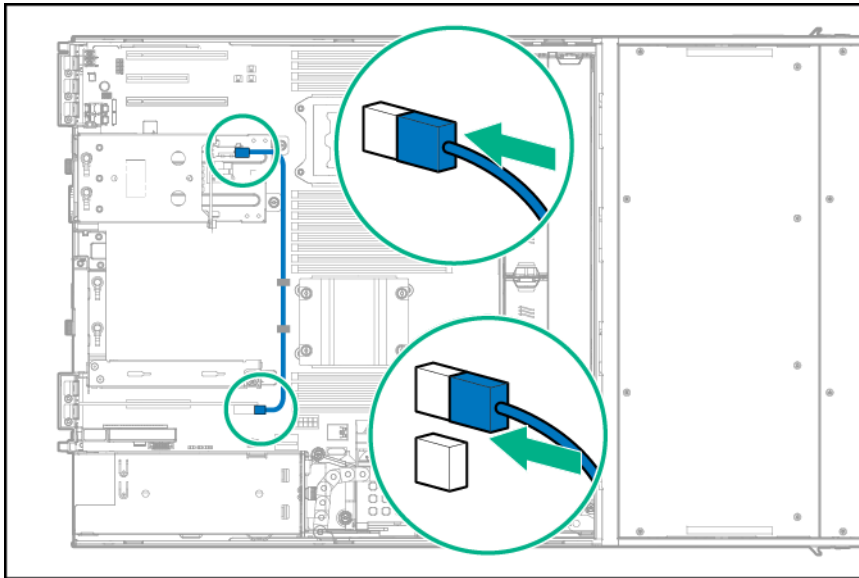
- Four-bay LFF rear drive cage – H240 HBA Mini-SAS cabling from the PCIe expansion slot 1 or 2



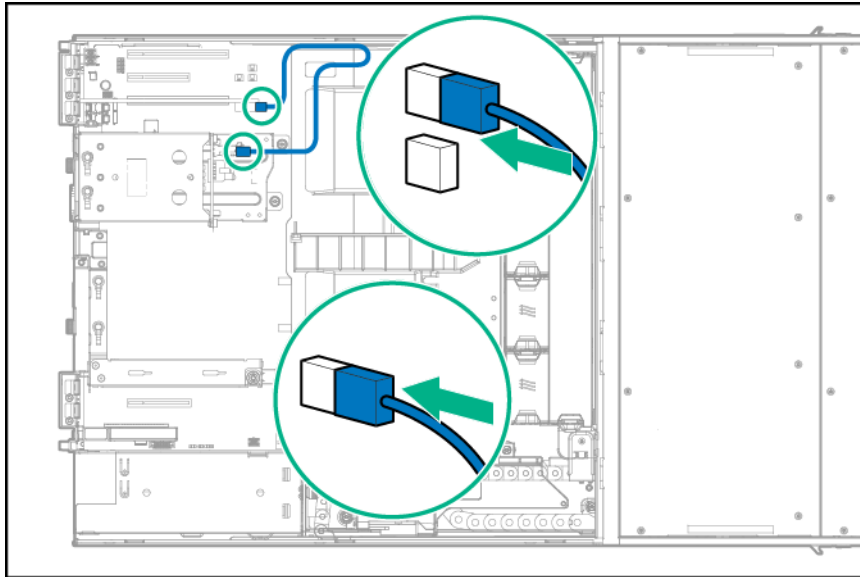
- Four-bay LFF rear drive cage – H240 HBA Mini-SAS cabling from the PCIe expansion slot 5 or 6



- Two-bay SFF rear drive cage – H240 HBA Mini-SAS cabling from the PCIe expansion slot 1

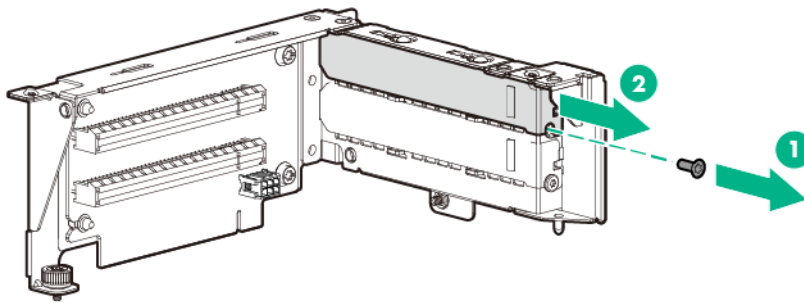


- Two-bay SFF rear drive cage – H240 HBA Mini-SAS cabling from the PCIe expansion slot 5 or 6

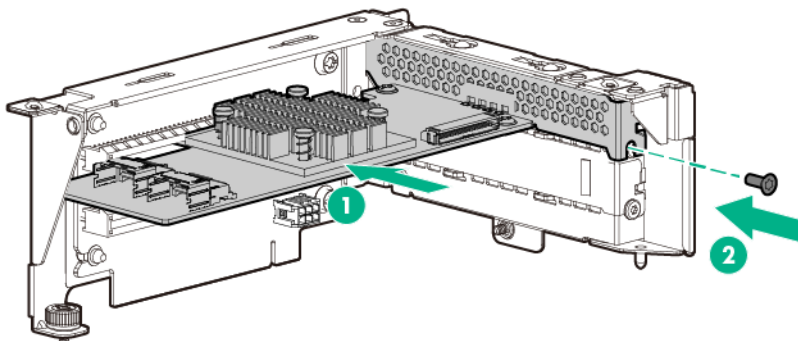


11. For the two-bay SFF rear drive cage only – If you intend to install the H240 HBA in the PCIe riser slot 3 or 4, do the following:

- a. **Remove the PCI riser cage.**
- b. Remove the riser slot cover.

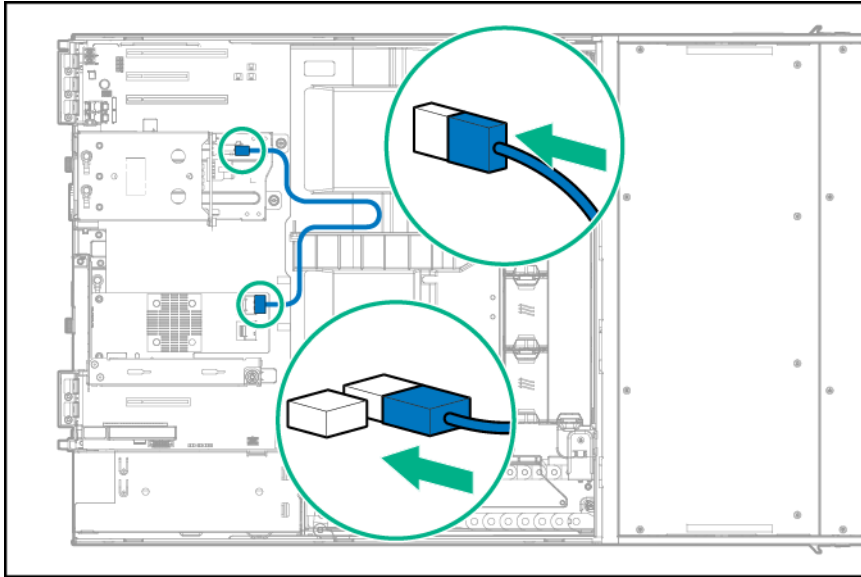


c. Install the HBA.



d. **Install the PCI riser cage.**

- e. Connect the Mini-SAS cable to the rear drive backplane and the HBA.
- f. Position the Mini-SAS cable on top of the air baffle.



12. **Install the access panel.**
13. **Install the server into the rack.**
14. **Power up the server.**

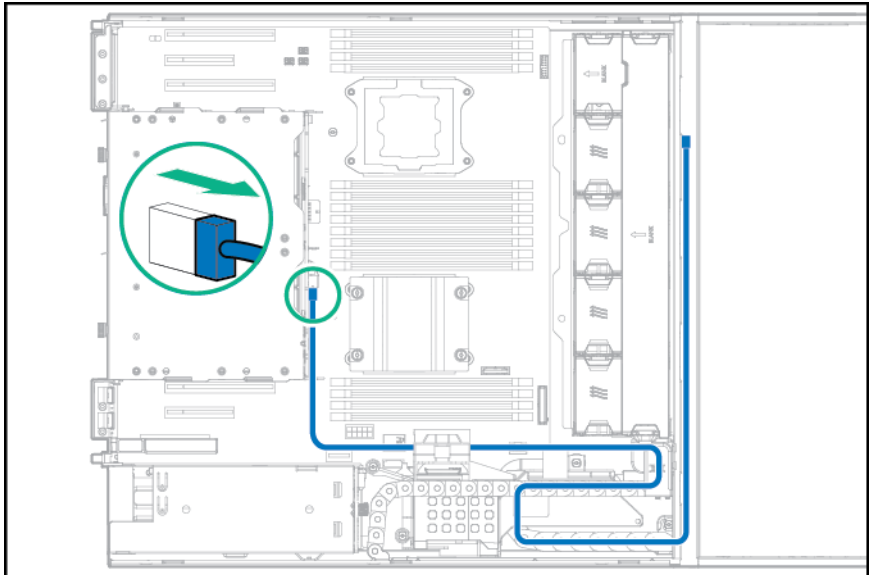
Smart Array P440 Controller Mini-SAS Y-cable option for rear drive cage

This section describes how to connect an existing four-bay LFF or two-bay SFF hot-plug rear drive cage to a Smart Array P440 controller using this Mini-SAS Y-cable option.

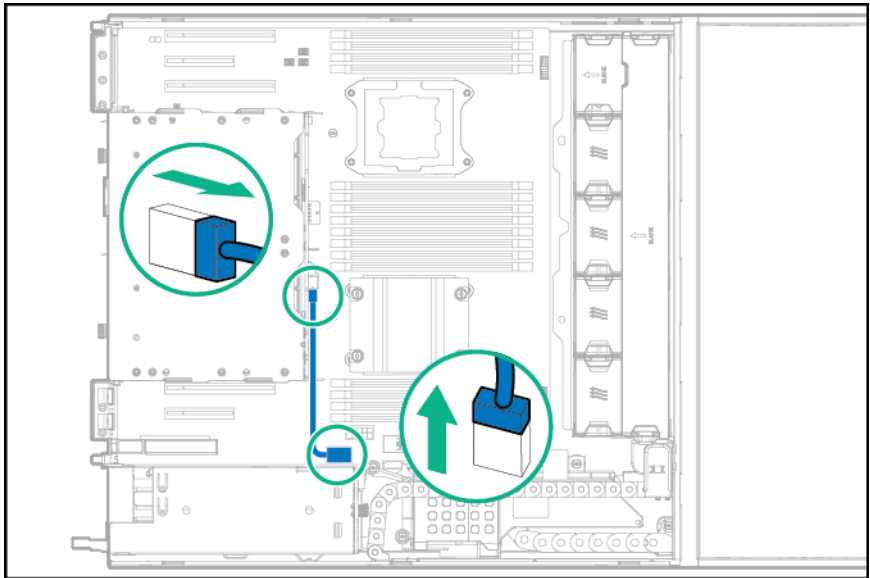
Install the Smart Array P440 Controller Mini-SAS Y-cable for a rear drive cage option

Procedure

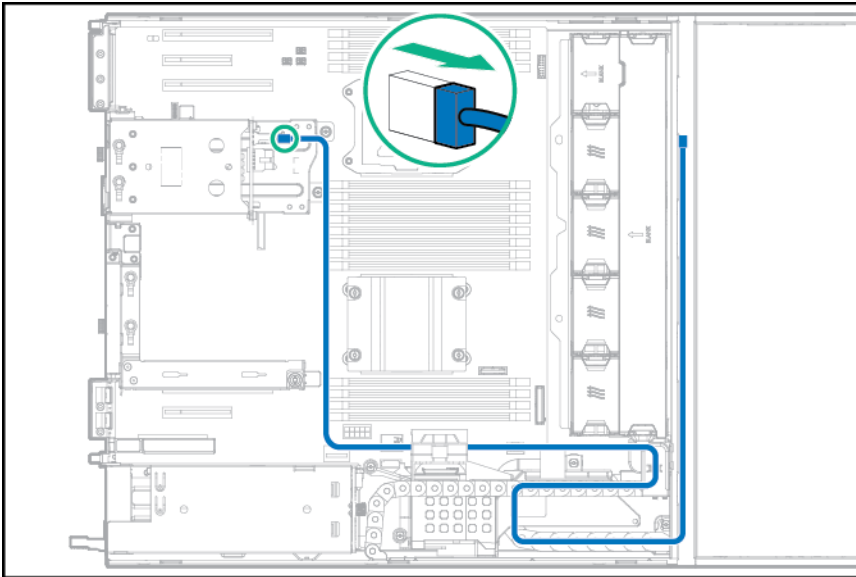
1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. If you are installing the P440 controller for the four-bay LFF hot-plug rear drive cage, do one of the following:
 - Disconnect the Mini-SAS cable connected to the front drive cage 2 backplane from the rear drive backplane.



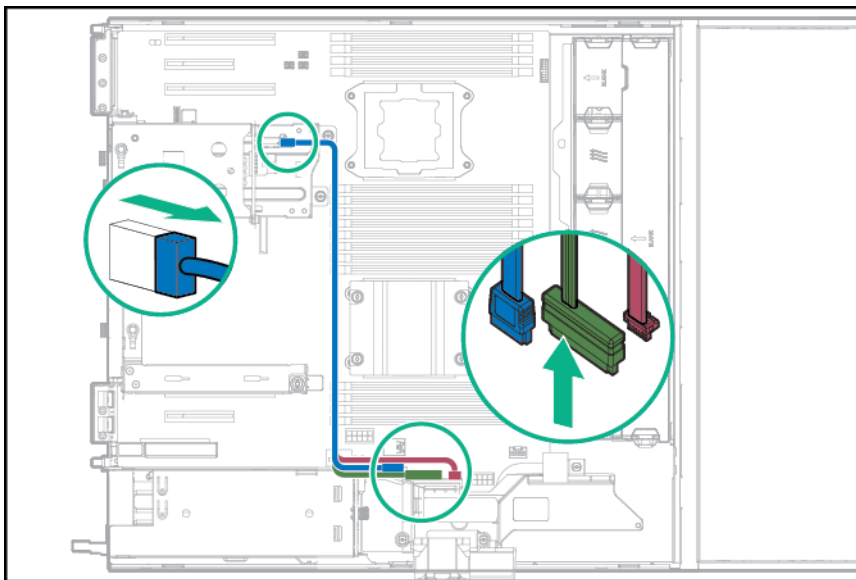
- Disconnect the Mini-SAS cable from the rear drive backplane and from the system board.



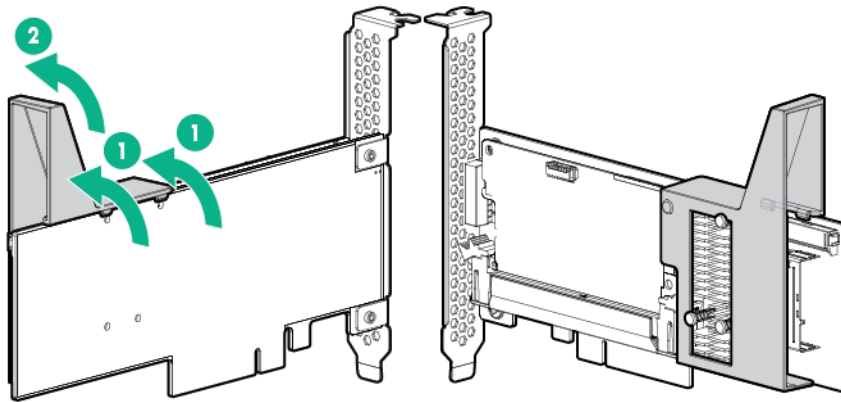
7. If you are installing the P440 controller for a two-bay SFF hot-plug rear drive cage that is connected to the front drive cage 2 backplane, disconnect the preinstalled Mini-SAS x4 cable from the two-bay SFF rear drive backplane.



8. If you are installing the P440 controller for a two-bay SFF hot-plug rear drive cage that is connected to the system board, disconnect the multiconnector drive signal cable:
 - a. **Open the cable management holder.**
 - b. Disconnect the multiconnector drive signal cable from the rear drive backplane and from the system board.



- c. **Close the cable management holder.**
9. Remove the air scoop from the storage controller.



10. If you intend to use an FBWC module, install the module on the storage controller.

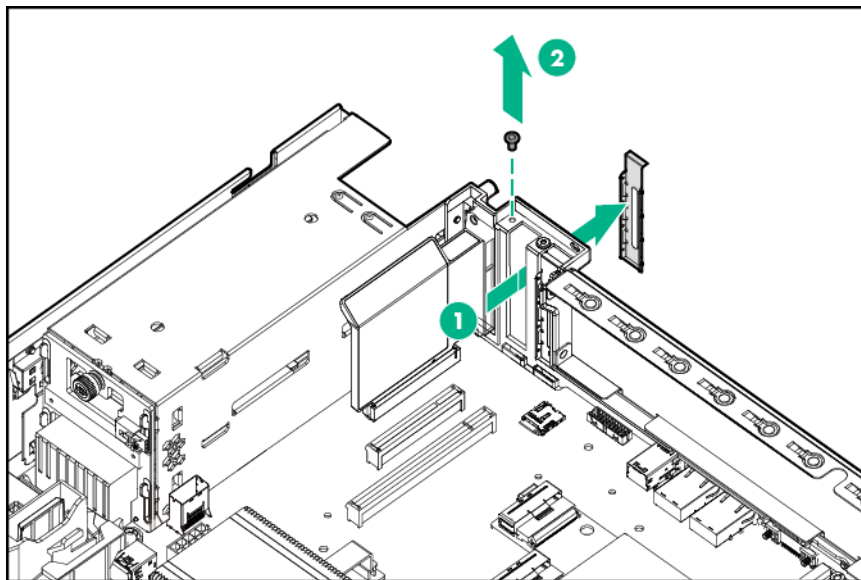
- 11.** For the four-bay LFF rear drive cage – Install the P440 controller in the low-profile PCIe expansion slots 1, 2, 5, 6 or 7:

For the two-bay SFF rear drive cage – Install the P440 controller in the low-profile PCIe expansion slots 1, 5, 6 or 7:

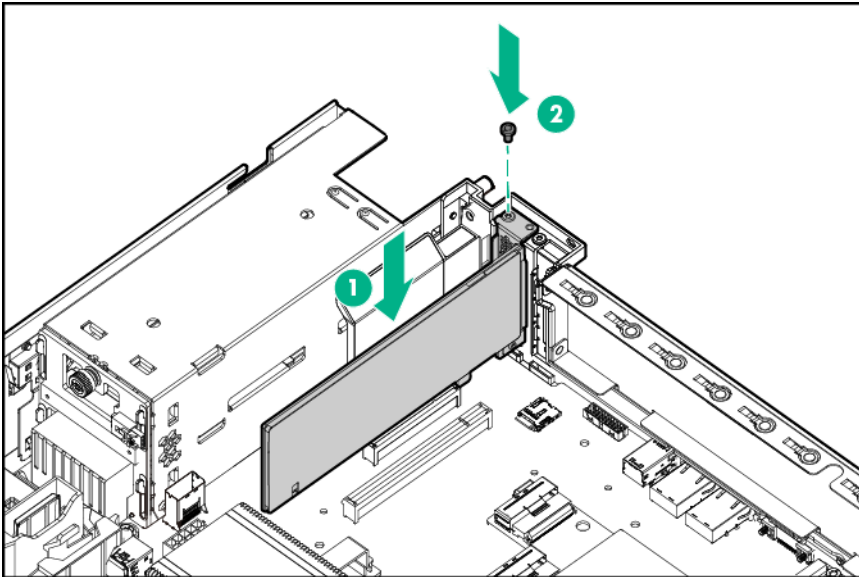
- a.** Remove the full-height bracket from the storage controller and attach the low-profile bracket.

For more information, see the documentation that ships with the option.

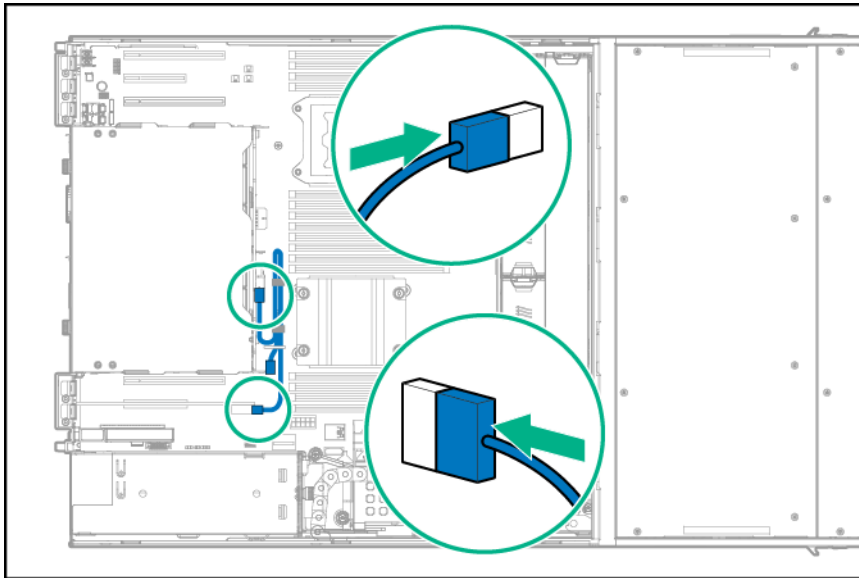
- b.** Remove the onboard PCI expansion slot cover.



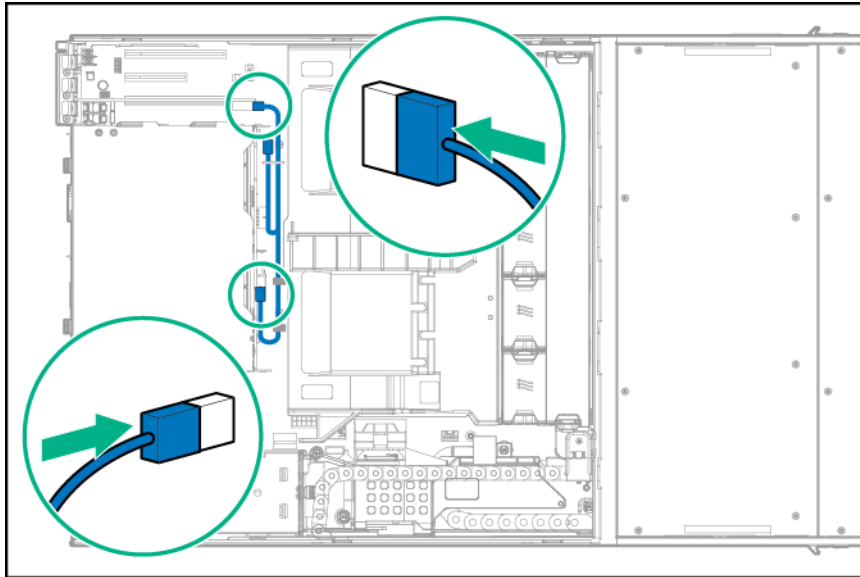
- c.** Install the storage controller.



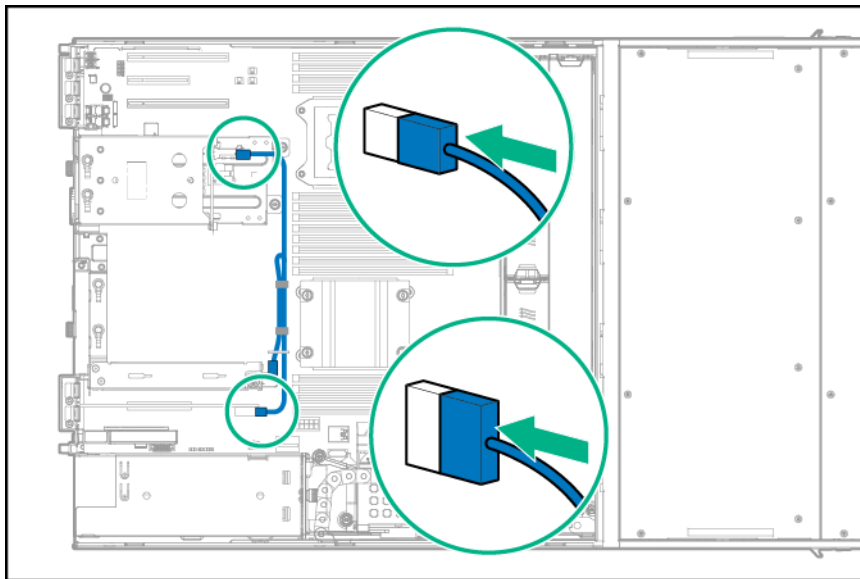
- d. Connect the Mini-SAS Y-cable to the rear drive backplane and the storage controller.
- e. Depending on the drive configuration type and the location of the controller board, secure the Mini-SAS Y-cable in the system board clips or position it on top of the air baffle.
 - Four-bay LFF rear drive cage – P440 controller Mini-SAS Y-cable connection from the PCIe expansion slot 1 or 2



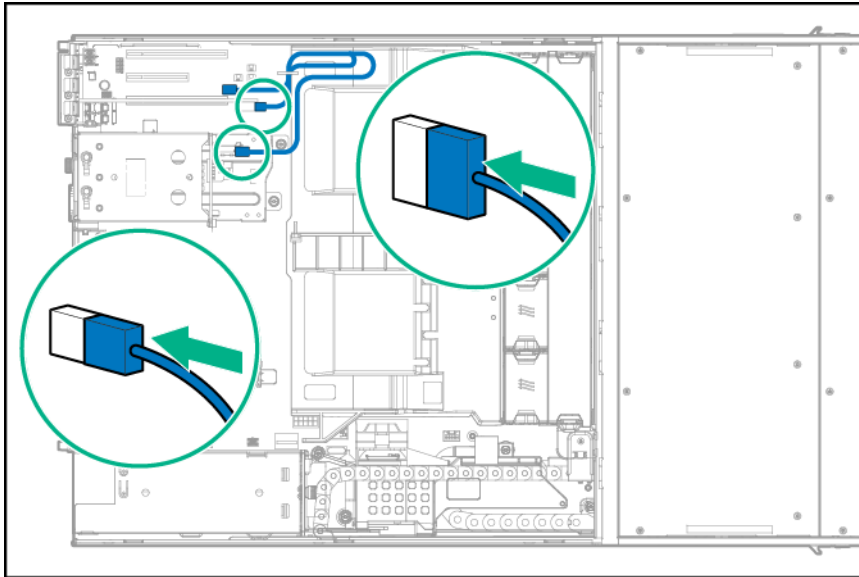
- Four-bay LFF rear drive cage – P440 controller Mini-SAS Y-cable connection from the PCIe expansion slot 5, 6 or 7



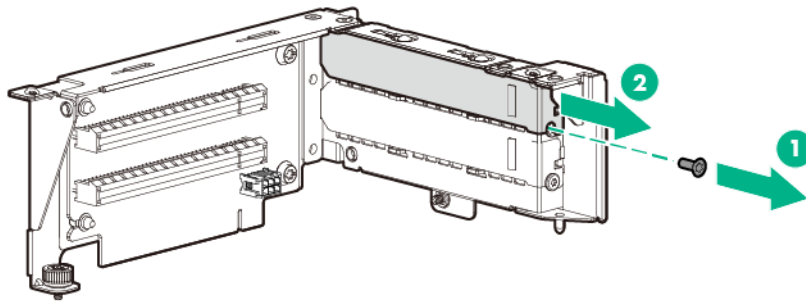
- Two-bay SFF rear drive cage – P440 controller Mini-SAS Y-cable connection from the PCIe expansion slot 1



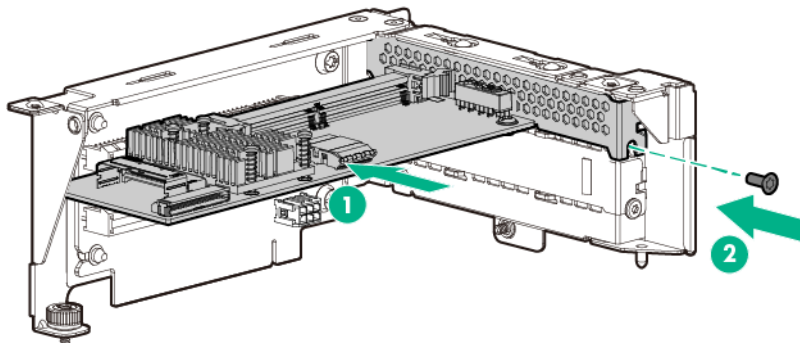
- Two-bay SFF rear drive cage – P440 controller Mini-SAS Y-cable connection from the PCIe expansion slot 5, 6 or 7



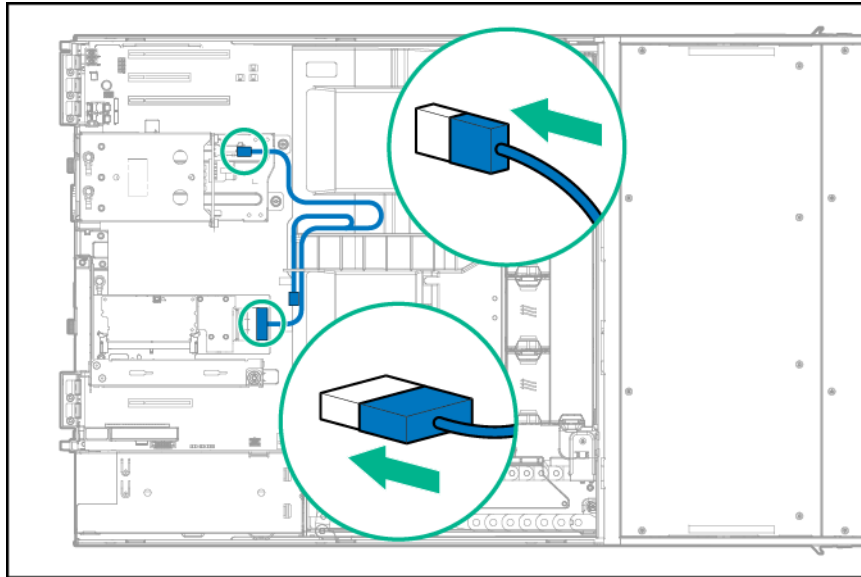
12. For the two-bay SFF rear drive cage only – Install the P440 controller in the riser board slot 3 or 4:
- a. **Remove the PCI riser cage.**
 - b. Remove the riser slot cover.



- c. Install the storage controller.



- d. **Install the PCI riser cage.**
- e. Connect the Mini-SAS Y-cable to the rear drive backplane and the storage controller.
- f. Position the Mini-SAS Y-cable on top of the air baffle.



13. **Install the access panel.**
14. **Install the server into the rack.**
15. **Power up the server.**

Storage controller options

The server ships with an embedded Dynamic Smart Array B140i Controller. This embedded controller is supported in UEFI Boot Mode only. For more information about the controller and its features, see the *HPE Dynamic Smart Array B140i RAID Controller User Guide* on the [Hewlett Packard Enterprise website](#).

Upgrade options exist for an integrated array controller. For a list of supported options, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the [Hewlett Packard Enterprise website](#).

The server supports FBWC. FBWC consists of a cache module and a Smart Storage Battery Pack. The DDR cache module buffers and stores data being written by an integrated Gen9 P-series Smart Array Controller.

This server supports the 96-W Smart Storage Battery Pack. This battery pack can support up to 24 devices. Devices in this context refer to the Smart Array Controller or NVDIMM associated with the cache module.

The battery pack might have a low charge when installed. If the battery does have low charge, a POST error message appears when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary. The internal circuitry automatically recharges the batteries and enables the battery pack. When the system is powered on this process might take approximately 2 hours.

If a system power failure occurs, a fully charged battery pack provides power for up to 150 seconds. During that interval, the controller transfers the cached data from DDR memory to flash memory, where the data remains indefinitely or until a controller retrieves the data. The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the storage drives.

⚠ CAUTION:

The cache module connector does not use the industry-standard DDR3 mini-DIMMs. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

△ CAUTION:
To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

△ CAUTION:
After the server is powered down, wait for 30 seconds, and then check the amber LED before unplugging the cable from the cache module. If the amber LED flashes after 30 seconds, do not remove the cable from the cache module. The cache module is backing up data. Data will be lost if the cable is detached when the amber LED is still flashing.

Storage controller option population guidelines

To maintain optimal thermal conditions when installing a P-series Smart Array Controller or a Smart HBA option, Hewlett Packard Enterprise recommends the following population guidelines:

Expansion slot	H240	H241	P440	P441	P841
Slot 1 PCIe3 x8 (8, 4, 1) low-profile, standup	Yes	Yes	Yes	Yes	—
Slot 2 PCIe3 x16 (16, 8, 4, 1) low-profile, standup	Yes	Yes	Yes	Yes	—
Riser slot 3 PCIe3 x8 (8, 4, 1) full-height, half-length	Yes	Yes	Yes	Yes	Yes
Riser slot 4 PCIe3 x8 (8, 4, 1) full-height, half-length	Yes	Yes	Yes	Yes	Yes
Slot 5 PCIe3 x16 (16, 8, 4, 1) low-profile, standup	Yes*	Yes	Yes*	Yes	—
Slot 6 PCIe3 x8 (8, 4, 1) low-profile, standup	Yes*	Yes	Yes*	Yes	—
Slot 7 PCIe3 x16 (16, 8, 4, 1) low-profile, standup	Yes*	Yes	Yes*	Yes	—

* When an H240 HBA or a P440 Smart Array Controller is installed in PCIe3 expansion slot 5, 6 or 7, **a rear drive cage must be installed.**

Installing the storage controller and FBWC module options

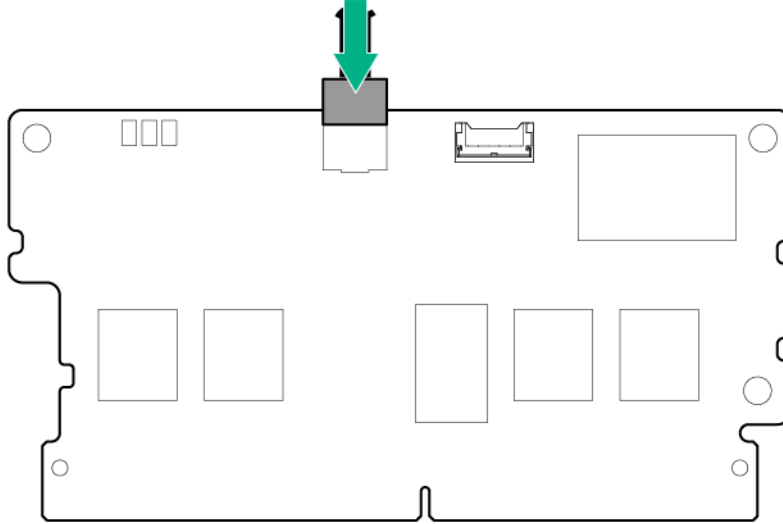
This section only covers the installation of a storage controller board option for the front drive cage 2. The front drive cage 1 is always connected to port 2 of the onboard Flexible Smart Array P840ar Controller.

In this server, Smart HBA option installation is only for external connectivity to tape drives, shared storage, and external JBODs. See the option documentation for external storage cabling information.

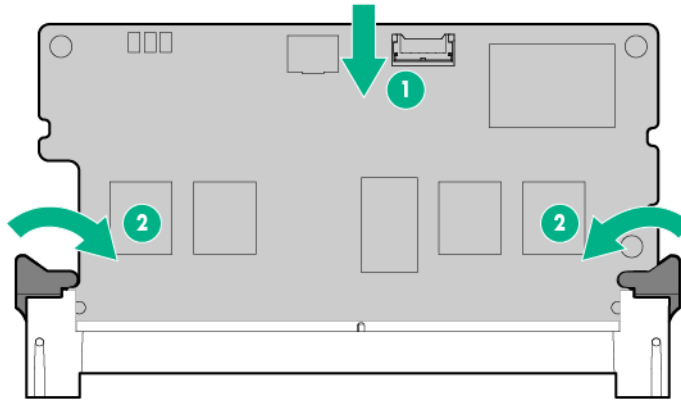
Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**

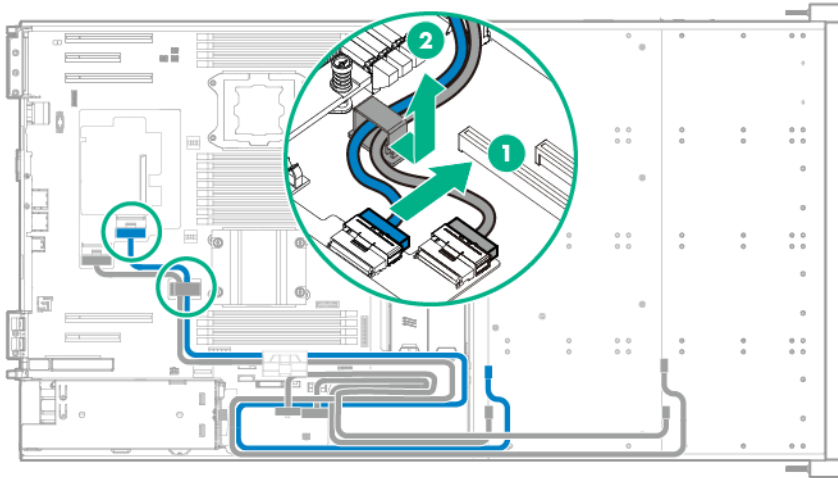
6. If installed, remove the air scoop from the storage controller/HBA.
For more information, see the documentation that ships with the option.
7. If you intend to use an FBWC module, install the module on the storage controller. Depending on the controller model, the cable connector on the cache module might be facing up or down when the module is installed on the controller board.
 - a. Connect the cache module backup power cable to the module.



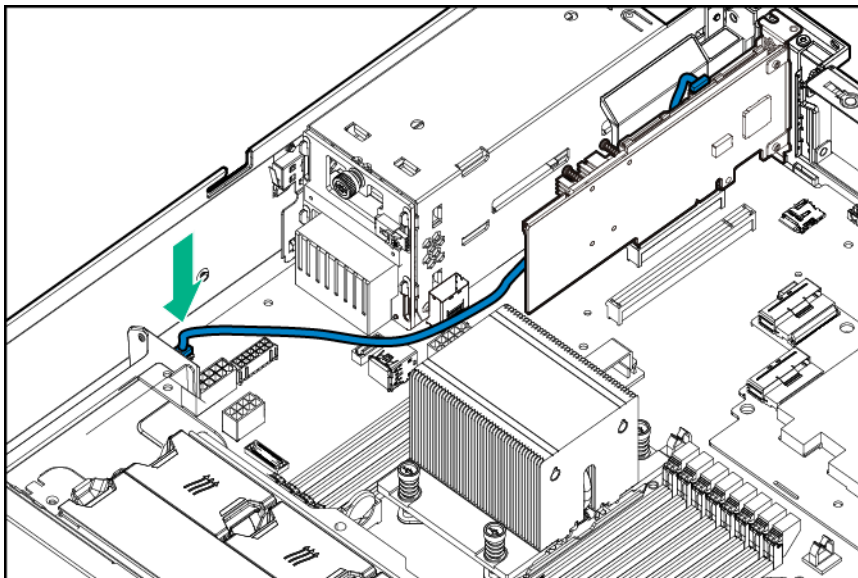
- b. Install the cache module on the storage controller.



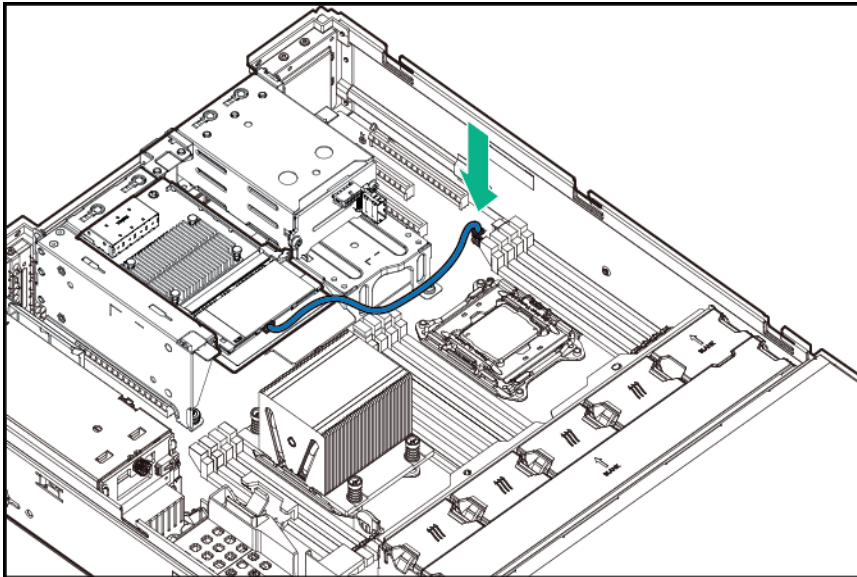
8. If installed, **remove the rear drive cage.**
9. If installed, **remove the six-bay SFF rear drive cage.**
10. If an expansion board is installed on the PCI riser cage, **remove the PCI riser cage.**
11. Disconnect the Mini-SAS Y-cable from the Flexible Smart Array P840ar Controller port 1, and then release it from the cable clip.



12. **Install the storage controller.**
13. Connect all necessary internal cables to the storage controller. For internal drive cabling information, see **Storage cabling.**
14. If a cache module is installed on a storage controller located in the onboard PCIe expansion slots 1 or 2, do the following:
 - a. **Open the cable management holder.**
 - b. Connect the cache module backup power cable to the system board.



- c. **Close the cable management holder.**
15. If a cache module is installed on a storage controller located in the PCI riser cage, connect the cache module backup power cable to any of the storage backup power connectors located in front of the onboard PCIe expansion slot 7.



16. If you are planning to install the Smart Storage Battery Pack, **install it now**.
17. **Install the air baffle**.
18. **Install the access panel**.
19. **Install the server into the rack**.
20. **Power up the server**.

For more information about the integrated storage controller and its features, select the relevant user documentation on the **Hewlett Packard Enterprise website**.

To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the **Hewlett Packard Enterprise website**.

Installing the Smart Storage Battery

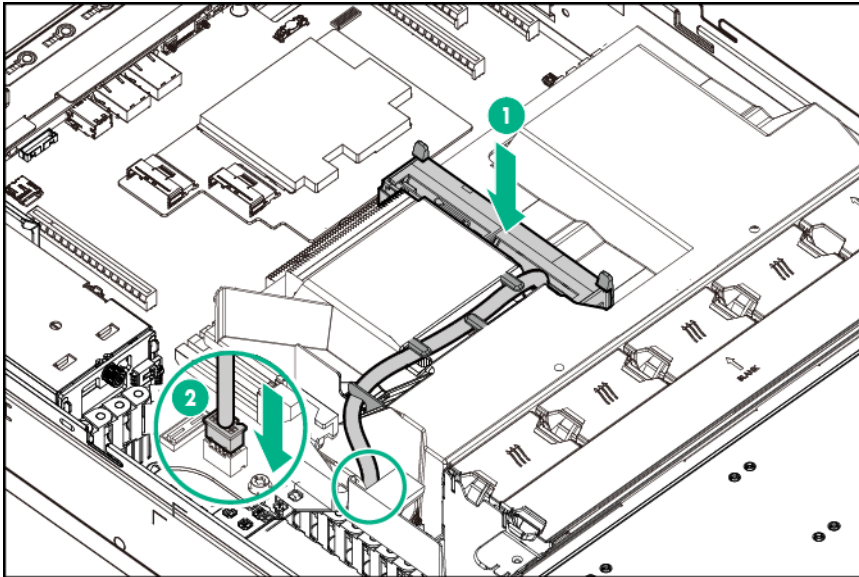
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the **Hewlett Packard Enterprise website**.

⚠ CAUTION:

In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the external drives as failed when the server is powered up.

Procedure

1. **Power down the server**.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack**.
4. **Remove the access panel**.
5. Install the Smart Storage Battery on the air baffle.
6. Secure the battery cable on the air baffle clips, and then connect the cable to the system board.



7. **Install the access panel.**
8. **Install the server into the rack.**
9. **Power up the server.**

M.2 SSD enablement board option

The M.2 SSD enablement board is supported in the following expansion slots:

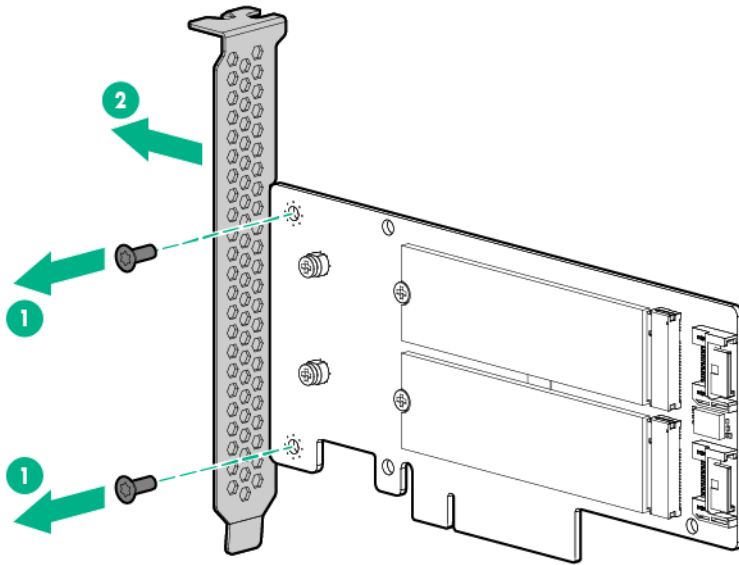
- For standup installation: PCIe3 x8 expansion slot 1, PCIe3 x16 expansion slot 2.
- For horizontal installation (two-slot PCI riser cage option required): PCIe3 x 8 riser board slot 3 and 4

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

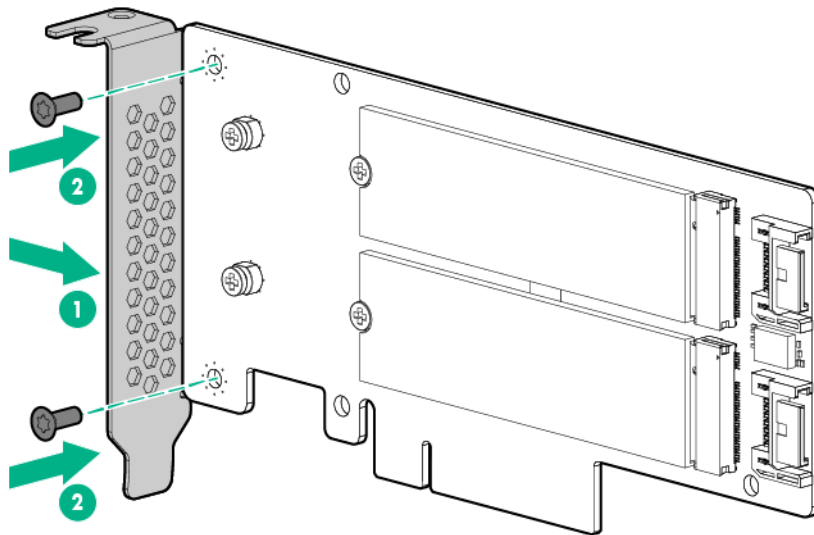
Installing the M.2 SSD enablement board

Procedure

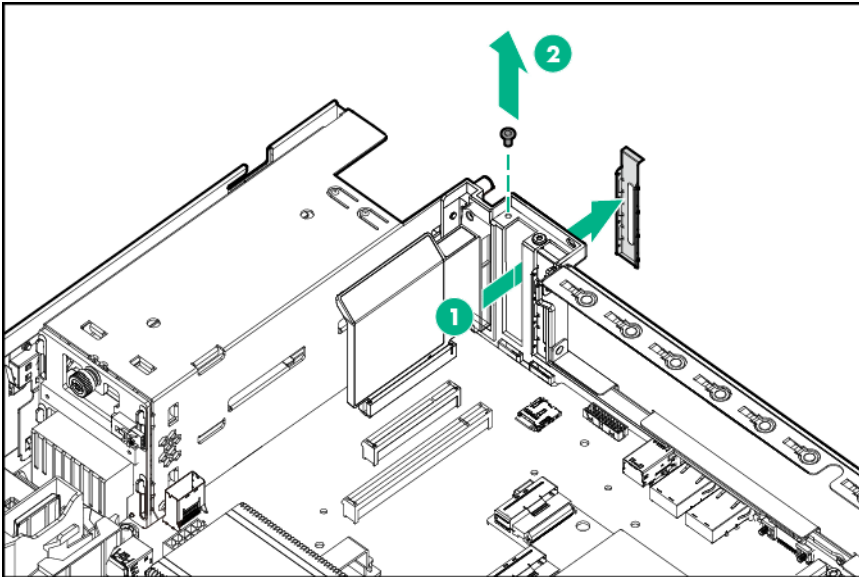
1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. To install the M.2 SSD enablement board in the onboard expansion slots, 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.

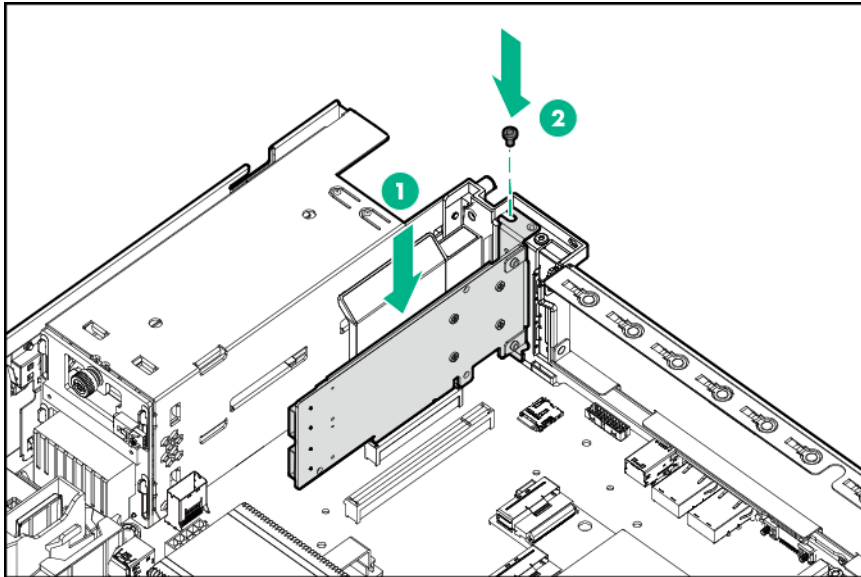


c. Remove the onboard PCI expansion slot cover.

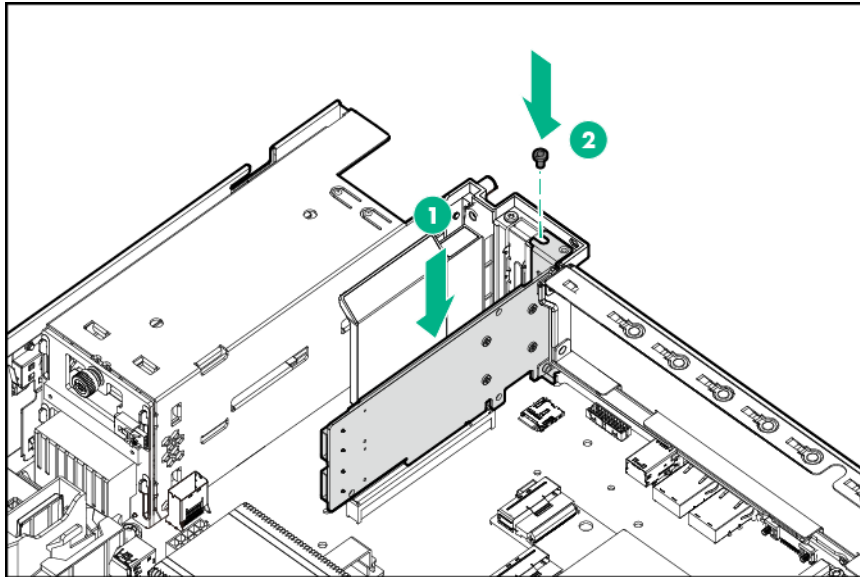


d. Install the M.2 SSD enablement board. Verify that the board is firmly seated in the slot.

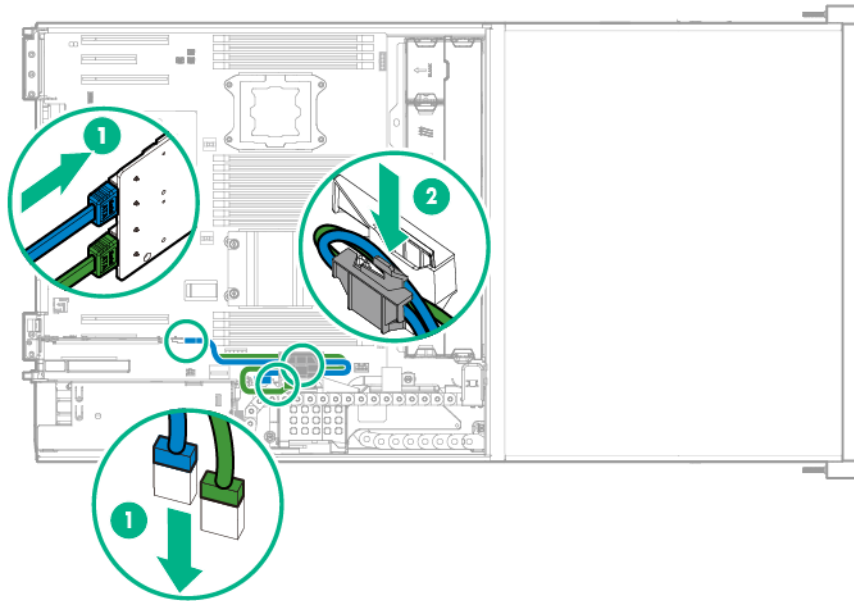
- M.2 SSD enablement board installed in the on-board PCIe3 x8 expansion slot 1



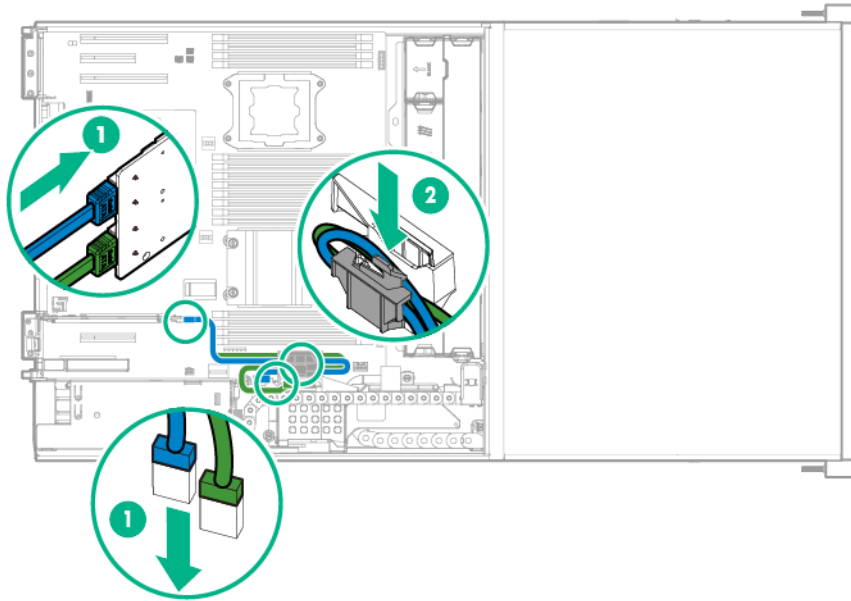
- M.2 SSD enablement board installed in the on-board PCIe3 x16 expansion slot 2



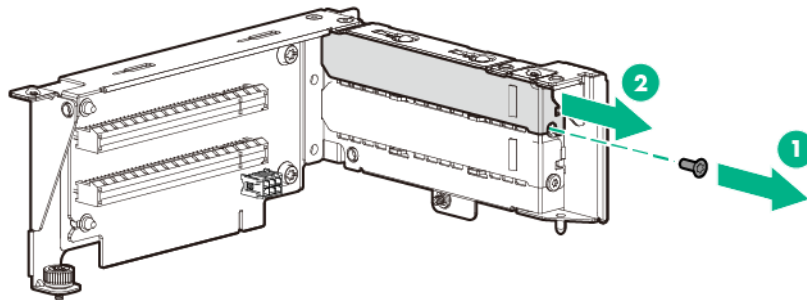
- e. **Open the cable management holder.**
- f. Connect the SATA cables to the M.2 SSD enablement board and the system board.
- g. **Close the cable management holder.**
- h. Secure the extra length of the SATA cables in the cable management holder.
 - M.2 SSD cabling from the onboard PCIe3 x8 expansion slot 1



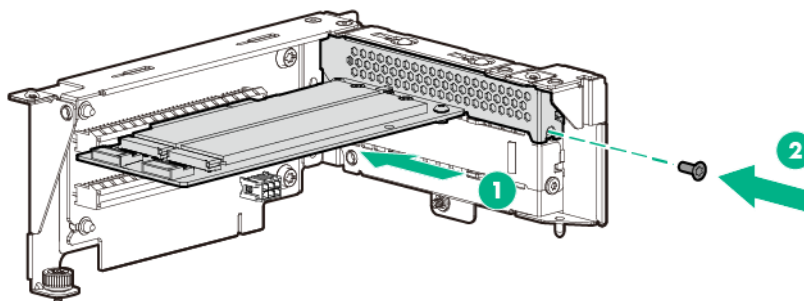
- M.2 SSD cabling from the onboard PCIe3 x16 expansion slot 2



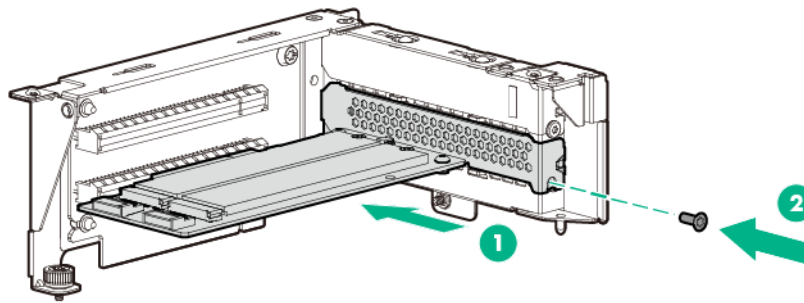
7. To install the M.2 SSD enablement board in the PCI riser cage, do the following:
- a. **Remove the PCI riser cage.**
 - b. Remove the riser slot cover.



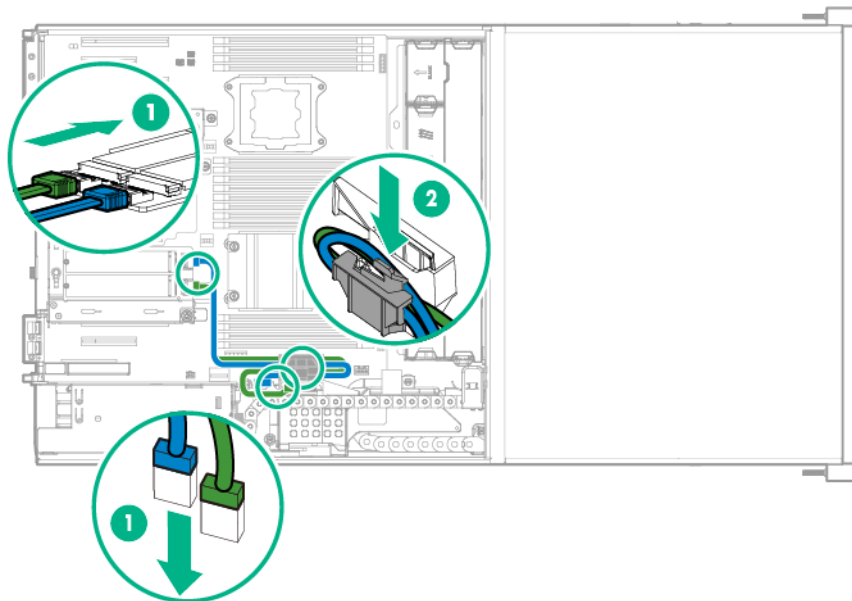
- c. Install the M.2 SSD enablement board. Verify that the board is firmly seated in the slot.
 - M.2 SSD enablement board installed in the PCIe3 x8 riser board slot 3



- M.2 SSD enablement board installed in the PCIe3 x8 riser board slot 4



- d. **Install the PCI riser cage.**
- e. **Open the cable management holder.**
- f. Connect the SATA cables to the M.2 SSD enablement board and the system board.
- g. **Close the cable management holder.**
- h. Secure the extra length of the SATA cables in the cable management holder.



8. **Install the air baffle.**
9. **Install the access panel.**
10. **Install the server into the rack.**
11. **Power up the server.**

To manage and monitor the SSD modules, use [Smart Storage Administrator](#).

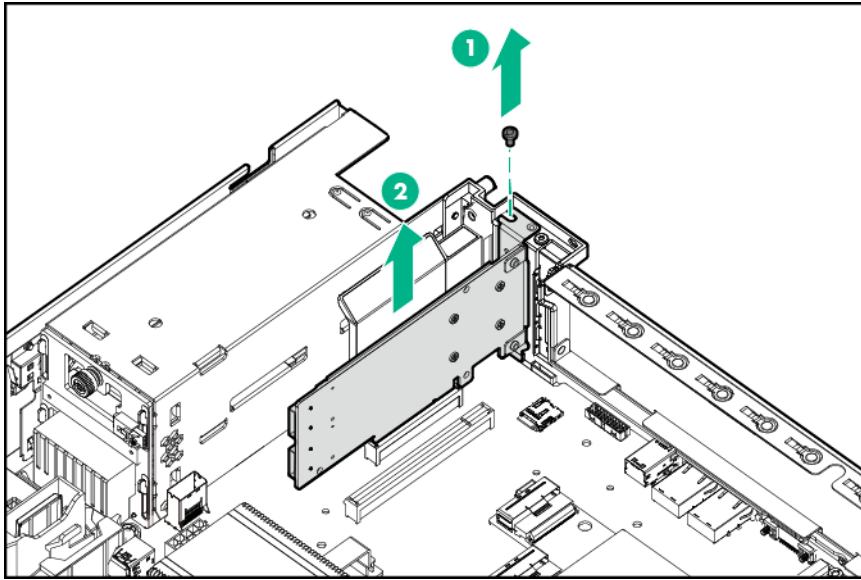
Installing an SSD module on the M.2 SSD enablement board

Procedure

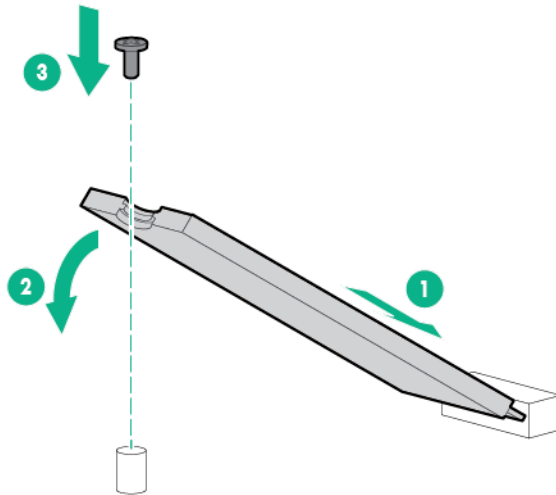
1. **Power down the server.**
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
2. Remove all power:
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**

6. Do one of the following:

- If you intend to install the SSD module in an M.2 SSD enablement board located in the PCI riser cage, make sure the board surface is accessible. **Remove the PCI riser cage as needed.**
- If you intend to install the SSD module in an M.2 SSD enablement board located in an onboard expansion slot, disconnect the existing M.2 SSD SATA cable from the enablement board, and then remove the enablement board.



7. Install the SSD module on the M.2 SSD enablement board.



8. Do one of the following:

- If removed, **install the PCI riser cage.**
- If removed, **install the M.2 SSD enablement board.**

9. **Install the air baffle.**

10. **Install the access panel.**

11. **Install the server into the rack.**

12. **Power up the server.**

Processor option

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

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Processor installation cautions

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 overheating, always populate each processor socket with a processor socket cover and a processor blank, or a processor and a heatsink.
-
- ⚠ 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.
-
- ⚠ IMPORTANT:**
Processor socket 1 must be populated at all times or the server does not function.
-

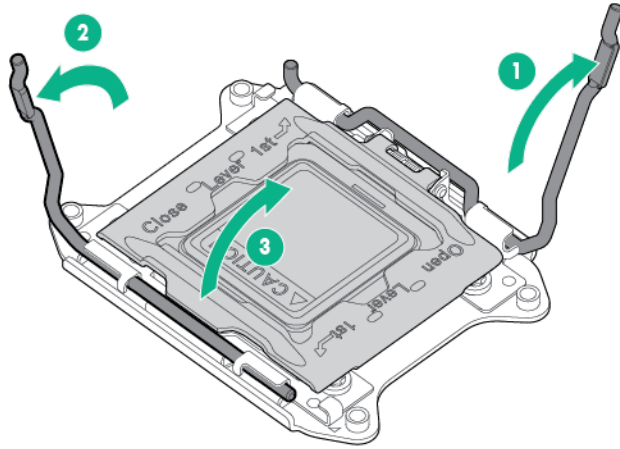
For optimum performance, Hewlett Packard Enterprise recommends:

- Use DIMMs that match the speed of the processor installed in the server. Intel Xeon E5-2600 v4 processors are optimized to work with 2400 MHz DIMMs.
- In a multiprocessor configuration, balance the total capacity of the DIMMs across the processors.

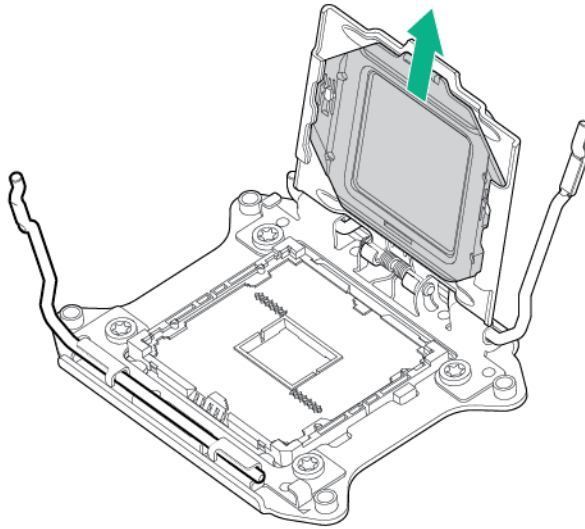
Install the processor option

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Open each of the processor locking levers in the order indicated in the following illustration, and then open the processor retaining bracket.

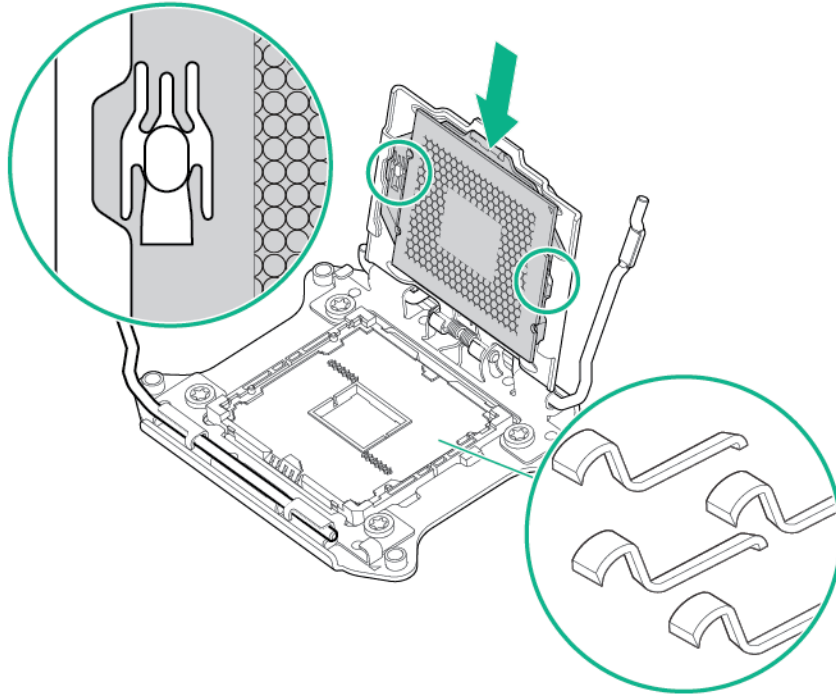


7. Remove the clear processor socket cover. Retain the processor socket cover for future use.



⚠ 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.**



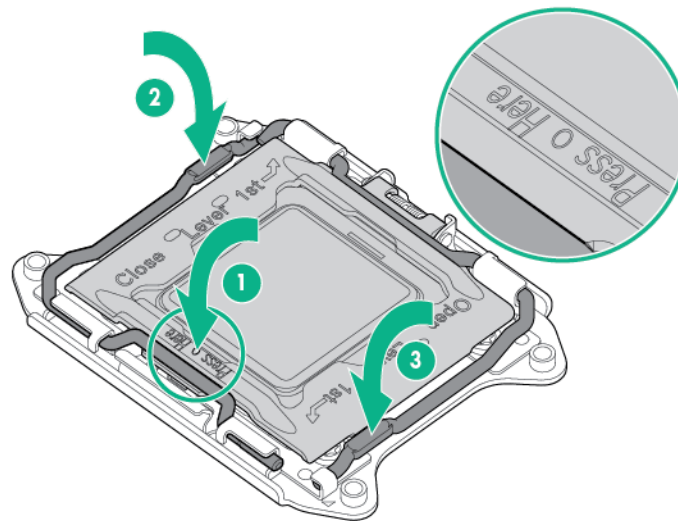
9. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.



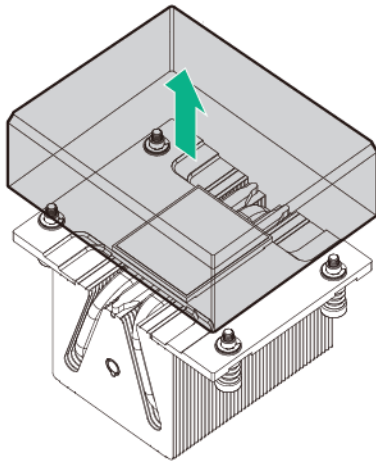
CAUTION:

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.

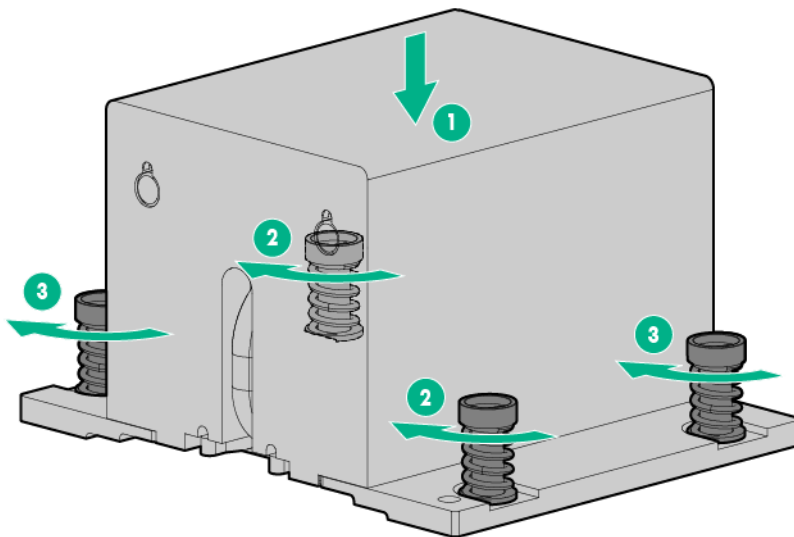


11. Remove the thermal interface protective cover from the heatsink.



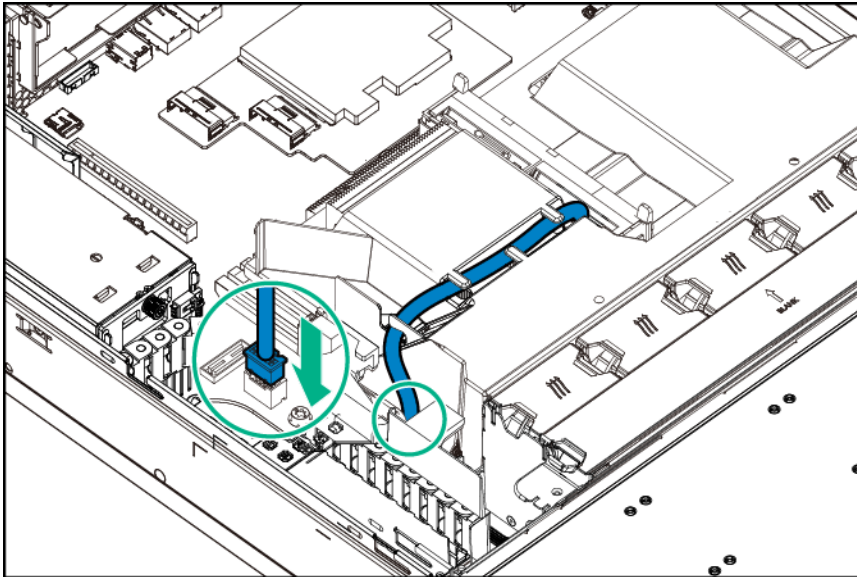
12. Install the heatsink:

- 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.

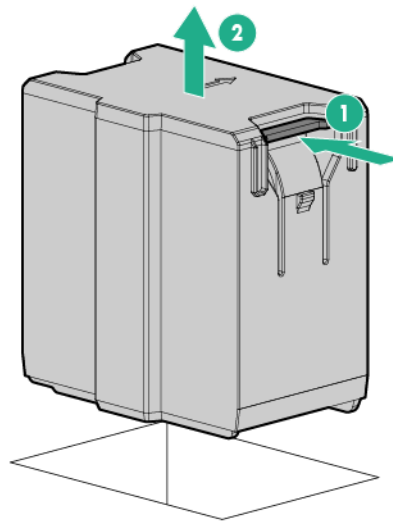


13. Install the air baffle.

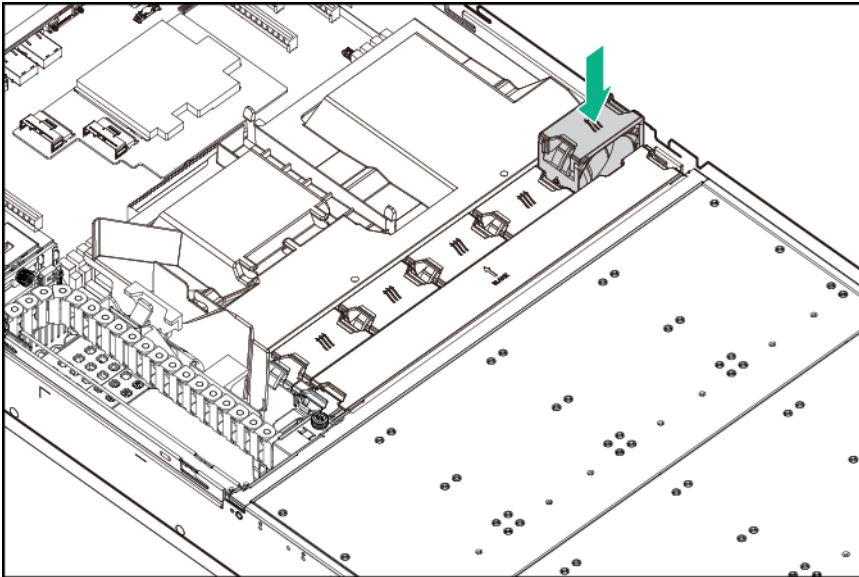
14. If disconnected, connect the Smart Storage Battery cable.



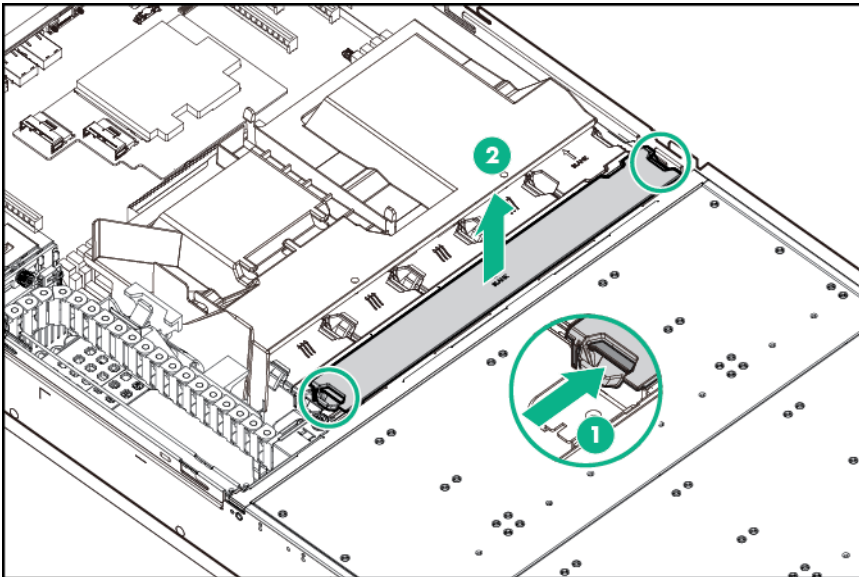
15. If the server is being upgraded from a single processor, nonredundant fan configuration to a dual-processor, nonredundant fan configuration, install the fan included in this processor option kit:
- a. Remove the fan blank from fan bay 5.



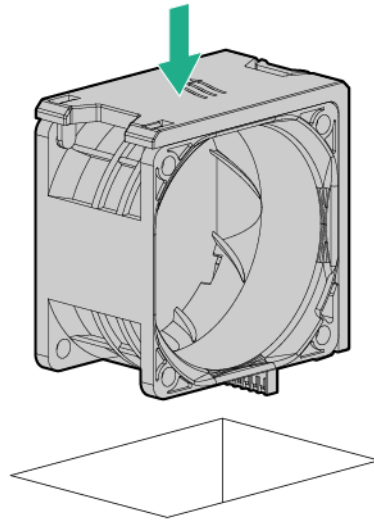
- b. Install the fan in fan bay 5.



- 16.** To enable fan redundancy in a dual-processor configuration, all 10 fan bays should be populated. Obtain a Redundant Fan Option Kit (PN 806562-B21) and install five more fans in fan bays 6–10:
- a.** Remove the fan cage cover.

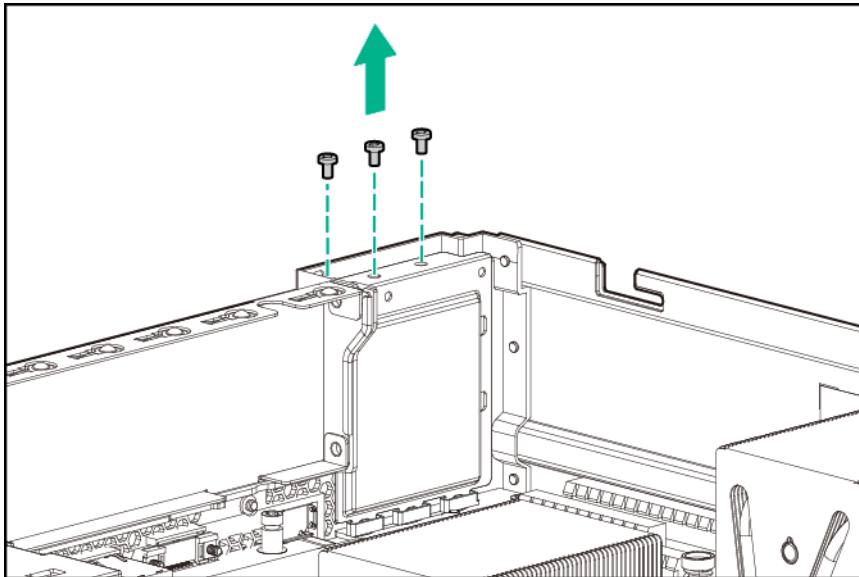


- b.** Install the fans in fan bays 6–10.

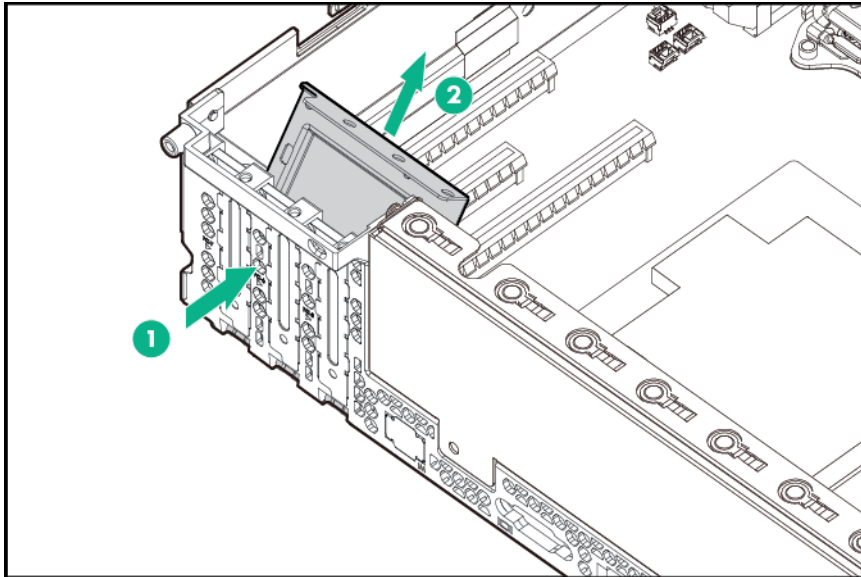


17. The PCIe expansion slots 5–7 are associated with processor 2. To enable expansion board installation in these now active slots, remove the slot cover air blocker.

a. Remove the air blocker screws.



b. Insert a pen or a small screwdriver into one of the slot cover hole to push the air blocker down, and then remove the air blocker from the chassis.



Retain the air blocker for future use.

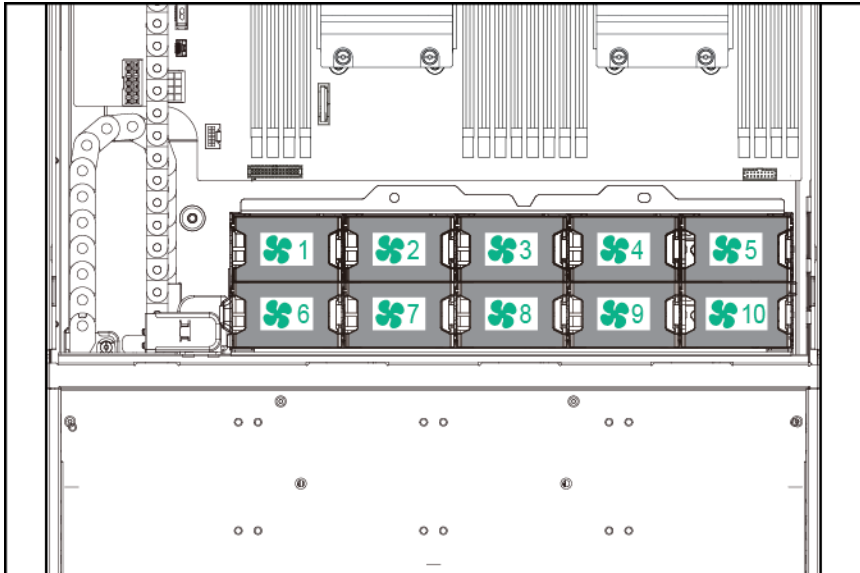
18. **Install the access panel.**
19. **Install the server into the rack.**
20. **Power up the server.**

Redundant fan option

To provide sufficient airflow to the system if a fan fails, the server supports redundant fans.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Fan population guidelines



- Single processor, non-redundant configuration:

- Fans are required in fan bays 1–4.
- Fan blank is required in fan bay 5.
- Fan bays 6–10 have a single fan cage cover.
- Single processor, redundant configuration:
 - Fans are required in fan bays 1–4 and 6–9.
 - Fan blank is required in fan bay 5.
 - Fan bay 10 is empty.
- Dual processor, non-redundant configuration:
 - Fans are required in fan bays 1–5.
 - Fan bays 6–10 have a single fan cage cover.
- Dual processor, redundant configuration—Fans are required in all 10 fan bays.

Install the fan option

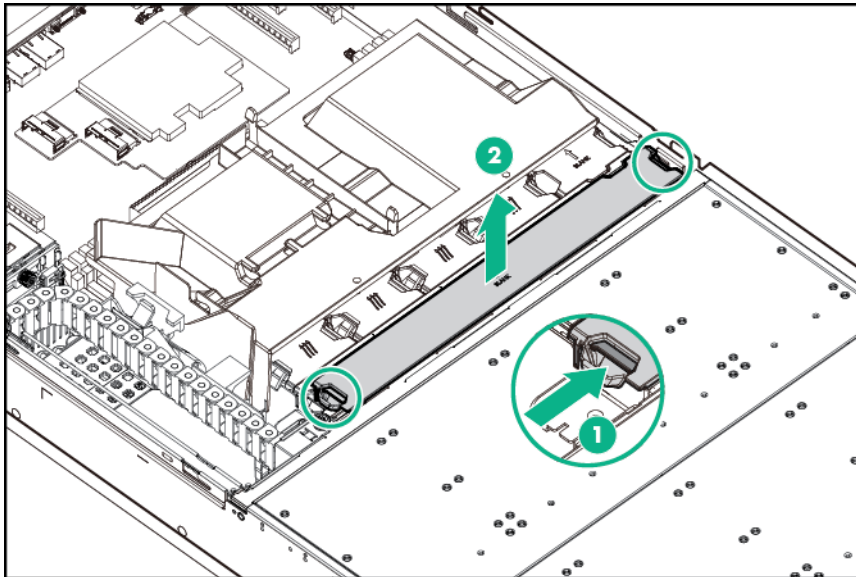


WARNING:

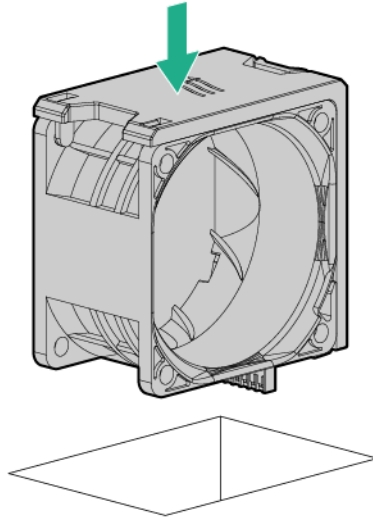
To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. Remove the fan cage cover.



6. Install the fans.



Store any unused fans as spares.

7. **Install the access panel.**
8. **Install the server into the rack.**
9. **Power up the server.**

Memory options

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

The memory subsystem in this server can support LRDIMMs or RDIMMs:

- RDIMMs offer address parity protection.
- LRDIMMs support higher densities than single-rank and dual-rank RDIMMs. This support enables you to install higher capacity DIMMs, resulting in higher system capacities and higher bandwidth.

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 of the same type.

Memory-processor compatibility information

For the latest memory configuration information, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

DIMM type

- Intel Xeon E5-2600 v3 processors are optimized for:
 - Single-rank and dual-rank PC4-2133 (DDR4-2133) RDIMMs operating at up to 2133 MT/s
 - Dual-rank and quad-rank PC4-2133 (DDR4-2133) LRDIMMs operating at up to 2133 MT/s
- Intel Xeon E5-2600 v4 processors are optimized for:
 - Single-rank and dual-rank PC4-2400T (DDR4-2400) RDIMMs operating at up to 2400 MT/s
 - Dual-rank PC4-2400T (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	2133	STD
RDIMM	Single	8	2133	STD
RDIMM	Dual	8	2133	STD
RDIMM	Dual	16	2133	STD
RDIMM	Dual	32	2133	STD
LRDIMM	Dual	16	2133	STD
LRDIMM	Quad	32	2133	STD

DIMM specifications – Intel Xeon E5-2600 v4 processor installed

Type	Rank	Capacity (GB)	Native speed (MT/s)	Voltage
RDIMM	Single	8	2400	STD
RDIMM	Single	16	2400	STD
RDIMM	Dual	16	2400	STD
RDIMM	Dual	32	2400	STD
LRDIMM	Dual	32	2400	STD
LRDIMM	Dual	64	2400	STD

Populated DIMM speed (MT/s)

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

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

Type	Rank	1 DIMM per channel (MT/s)
RDIMM	Single	2133
RDIMM	Dual	2133
LRDIMM	Dual	2133
LRDIMM	Quad	2133

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

Type	Rank	1 DIMM per channel (MT/s)
RDIMM	Single	2400
RDIMM	Dual	2400
LRDIMM	Dual	2400

Maximum memory capacity

Maximum memory capacity is a function of DIMM capacity, number of installed DIMMs, memory type, and number of installed processors.

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

DIMM type	DIMM rank	Capacity (GB)	Maximum capacity for one processor (GB)	Maximum capacity for two processors (GB)
RDIMM	Single-rank	4	32	64
RDIMM	Single-rank	8	64	128
RDIMM	Dual-rank	8	64	128
RDIMM	Dual-rank	16	128	256
LRDIMM	Dual-rank	16	128	256
RDIMM	Dual-rank	32	256	512
LRDIMM	Quad-rank	32	128	256

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

DIMM type	DIMM rank	Capacity (GB)	Maximum capacity for one processor (GB)	Maximum capacity for two processors (GB)
RDIMM	Single-rank	8	64	128
RDIMM	Single-rank	16	128	256
RDIMM	Dual-rank	16	128	256
RDIMM	Dual-rank	32	256	512
LRDIMM	Dual-rank	32	256	512
LRDIMM	Dual-rank	64	512	1024

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.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports four channels, and each channel supports one DIMM slot.

Channel	Population order	Slot number
1	A	1
2	B	2
3	C	4
4	D	3

DIMM slots are identified by number and by letter. Letters identify the population order. Slot numbers are reported by ROM messages during boot and are used for error reporting. For the DIMM slot locations, see **DIMM slot locations**.

Single-, dual-, and quad-rank DIMMs

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

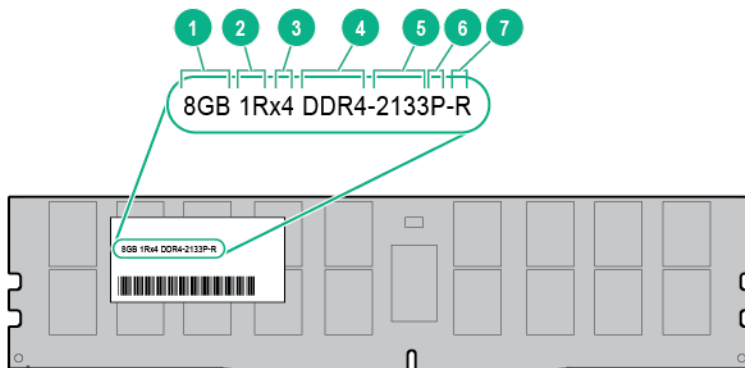
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module.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

LRDIMMs are labeled as quad-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a dual-rank DIMM to the system. The LRDIMM buffer isolates the electrical loading of the DRAM from the system to allow for faster operation. This allows higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

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



Item	Description	Definition
1	Capacity	8 GB 16 GB 32 GB 64 GB
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4

Table Continued

Item	Description	Definition
5	Maximum memory speed	2133 MT/s 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](#).

Memory configurations

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](#).

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 slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs that are optimized for the installed processor.

To identify the processor type installed in the server, use the BIOS/Platform Configuration (RBSU) of the UEFI System Utilities .

- Install DIMMs only if the corresponding processor is installed.
- Do not mix LRDIMMs and RDIMMs.
- When only one processor is installed, install DIMMs in sequential alphabetic order: Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D.
- When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, P1-D, P2-D.

For more information about server memory, see the [Hewlett Packard Enterprise website](#).

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.

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:

Procedure

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.

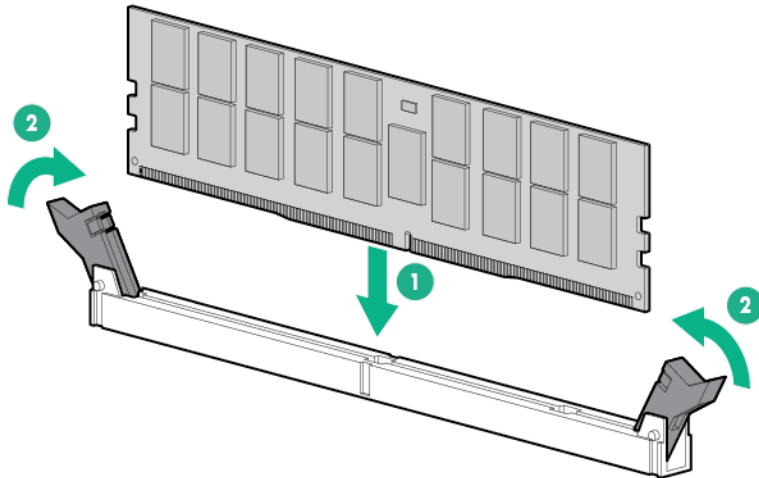
4. Press **Esc** until the main menu is displayed.

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

Installing a DIMM

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
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.**
10. **Install the server into the rack.**
11. **Power up the server.**

After installing the DIMMs, use BIOS/Platform Configuration (RBSU) in the **UEFI System Utilities** to configure the memory protection mode.

Expansion board options

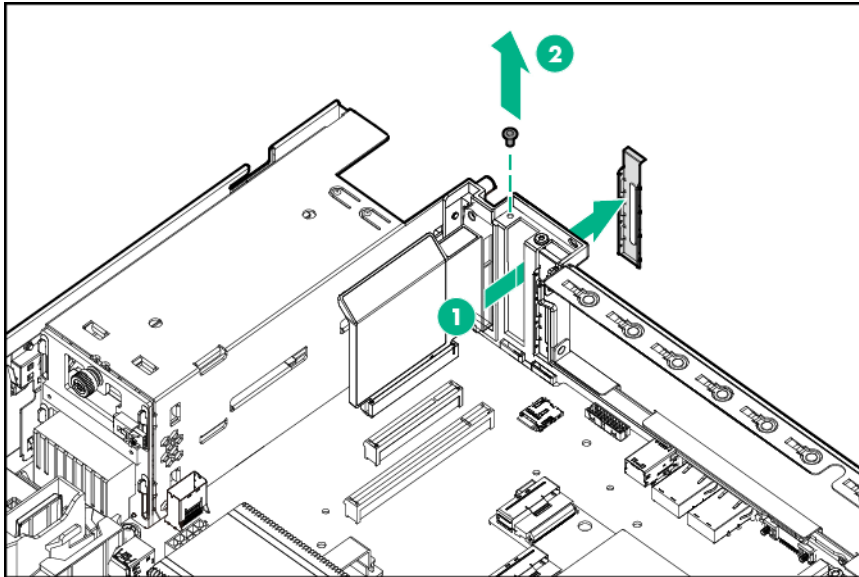
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

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

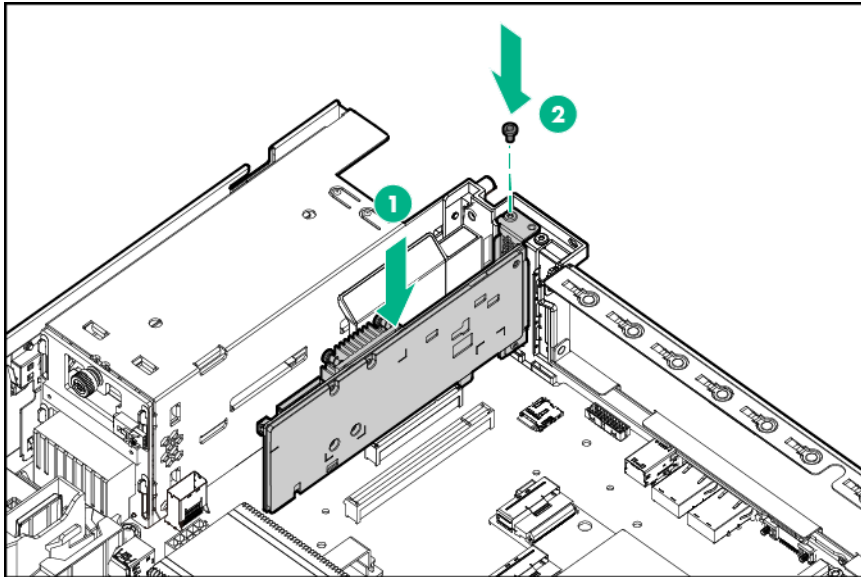
⚠ CAUTION:
To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

Procedure

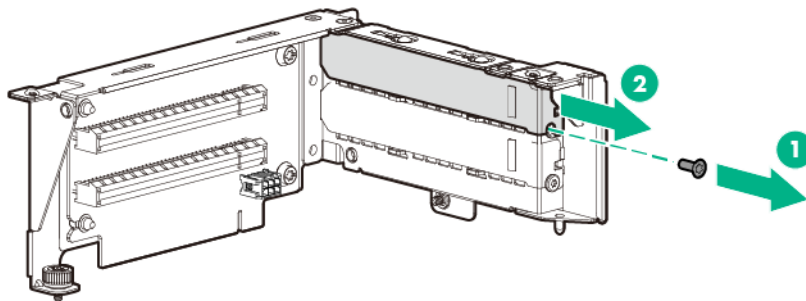
1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. To install a low-profile, standup expansion board on the system board, do the following:
 - a. If the expansion board option ships with a full-height bracket, remove that bracket and attach a low-profile one. For more information, see the documentation that ships with the option.
 - b. Remove the onboard PCI expansion slot cover.



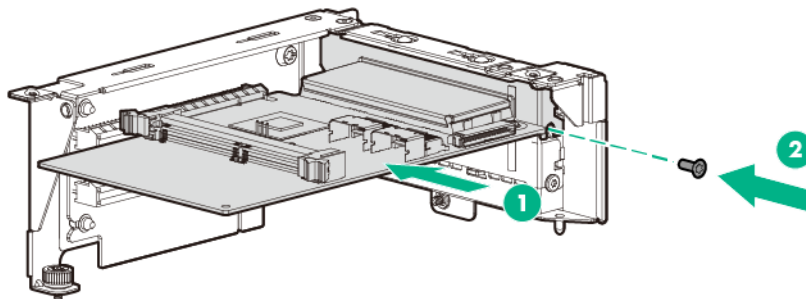
- c. Verify that any switches or jumpers on the expansion board are set properly. For more information, see the documentation that ships with the option.
- d. Install the expansion board.
Verify that the board is firmly seated in the slot.



6. To install a full-height, half-length PCIe x8 expansion board, **the two-slot PCI riser cage option is required**. To install an expansion board in this riser cage, do the following:
- a. **Remove the PCI riser cage.**
 - b. Remove the riser slot cover.



- c. Verify that any switches or jumpers on the expansion board are set properly. For more information, see the documentation that ships with the option.
- d. Install the expansion board.
Verify that the board is firmly seated in the slot.



- e. **Install the PCI riser cage.**
7. If the installed expansion board requires internal cabling to connectors covered by the air baffle, **remove the air baffle**.

8. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
9. If removed, **install the air baffle**.
10. **Install the access panel**.
11. **Install the server into the rack**.
12. Connect all necessary external cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
13. **Power up the server**.

FlexibleLOM adapter option

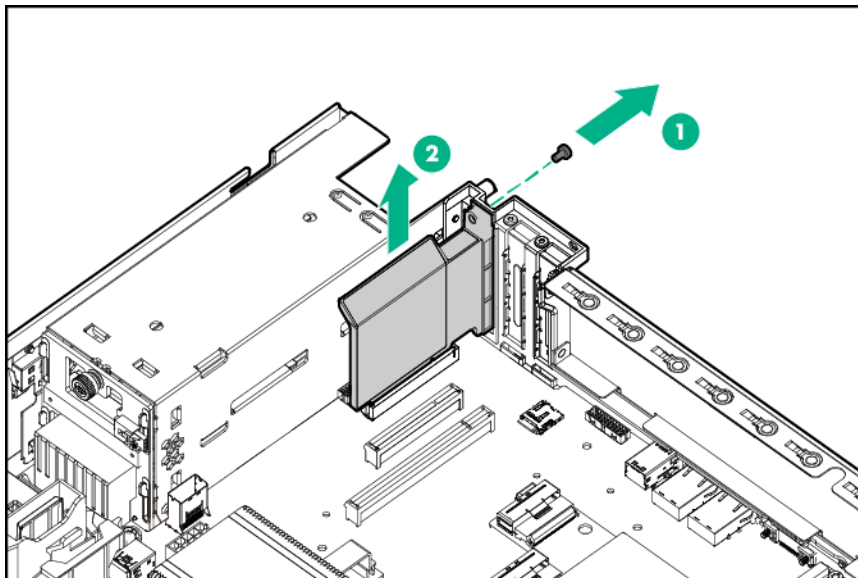
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

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

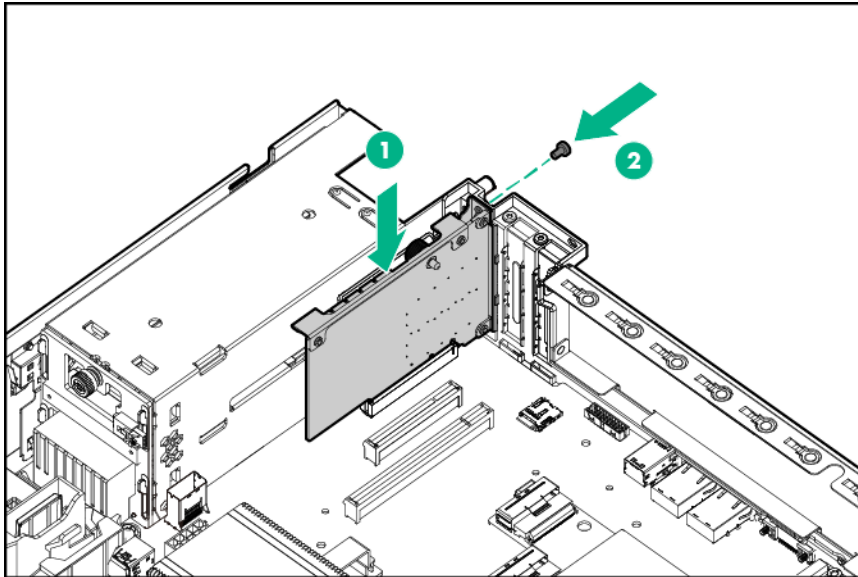
⚠ CAUTION:
To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

Procedure

1. **Power down the server**.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack**
4. **Remove the access panel**.
5. Remove the FlexibleLOM blank.



6. Install the FlexibleLOM adapter.



7. **Install the access panel.**
8. **Install the server into the rack.**
9. Connect the LAN segment cables.
10. **Power up the server.**

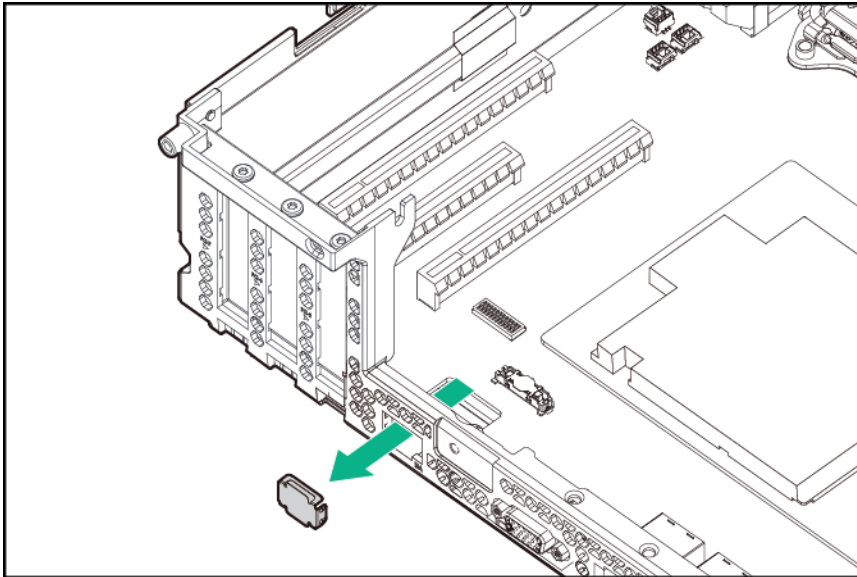
Dedicated iLO management module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

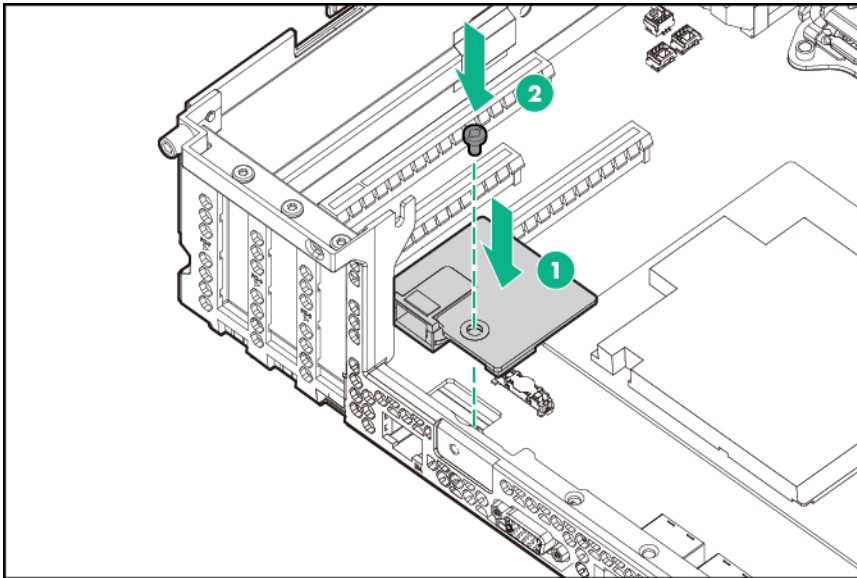
⚠ CAUTION:
To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. If installed, **remove the rear drive cage.**
6. Push the dedicated iLO management module blank out of the rear panel.



7. Install the dedicated iLO management module.



8. **If removed, install the rear drive cage and connect the drive backplane cables.**
9. **Install the access panel.**
10. **Install the server into the rack.**
11. **Power up the server.**
12. **Enable the dedicated iLO connector.**

Enabling the dedicated iLO management module

The onboard NIC 1/shared iLO connector is set as the default system iLO connector. To enable the dedicated iLO management module, use the iLO 4 Configuration Utility accessible within the HPE UEFI System Utilities.

For more information on the UEFI System Utilities, see the UEFI documentation on the [Hewlett Packard Enterprise website](#).



IMPORTANT:

If the iLO configuration settings are reset to the default values, remote access to the machine will be lost. Access the physical machine and repeat the procedure described in this section to re-enable the dedicated iLO management connector.

To enable the dedicated iLO management module:

1. During the server startup sequence after installing the module, press **F9** in the POST screen.

The System Utilities screen appears.

2. Select **System Configuration | iLO 4 Configuration Utility**.

The iLO 4 Configuration Utility screen appears.

3. Select **Network Options**, and then press **Enter**.

The Network Options screen appears.

4. Set the **Network Interface Adapter** field to **ON**, and then press **Enter**.

5. Press **F10** to save your changes.

A message prompt to confirm the iLO settings reset appears.

6. Press **Enter** to reboot the iLO settings.

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

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

The IP address of the enabled dedicated iLO connector appears on the POST screen on the subsequent boot-up. Access the Network Options screen again to view this IP address for later reference.

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**." For more information, see the Dual 8Gb microSD EM USB storage device documentation on the [Hewlett Packard Enterprise website](#).

Redundant power supply option

Install a second power input module to improve power efficiency and enable power redundancy.



WARNING:

To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the equipment.



WARNING:

To reduce the risk of injury from electric shock hazards, do not open power supplies. Refer all maintenance, upgrades, and servicing to qualified personnel.



WARNING:

To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, 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.

⚠ CAUTION:
Always install a power input module or a power supply blank into each bay to maintain proper airflow and cooling in the power enclosure. Improper airflow can lead to thermal damage.

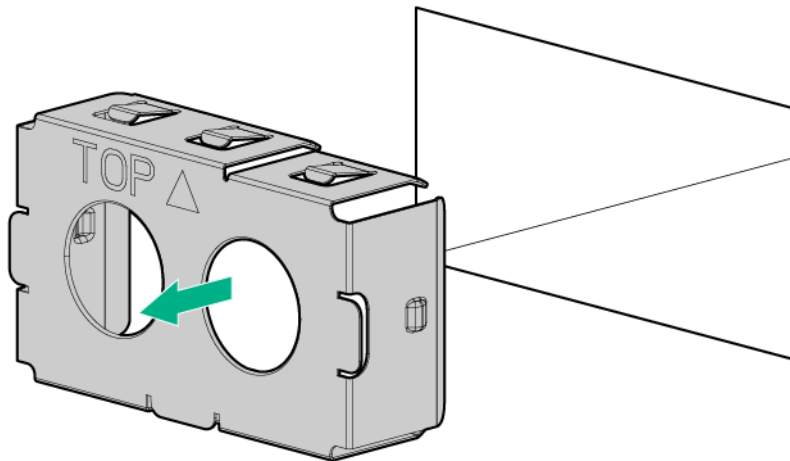
ⓘ IMPORTANT:
Mixing different types of power input modules in the same server might limit or disable some power supply features including support for power redundancy. To ensure access to all available features, all power input modules in the same server should have the same output and efficiency ratings.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

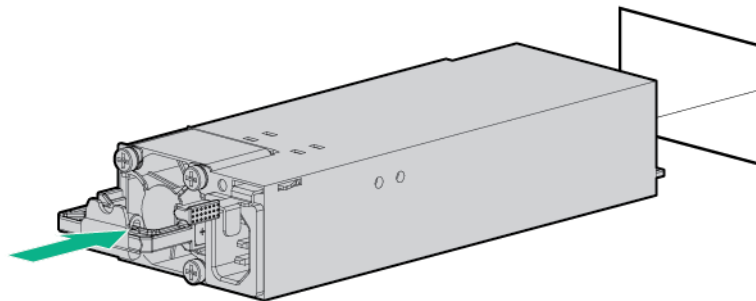
Installing a hot-plug AC power input module

Procedure

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



3. Slide the power input module into the bay until it clicks into place.



4. Connect the power cord to the power supply.

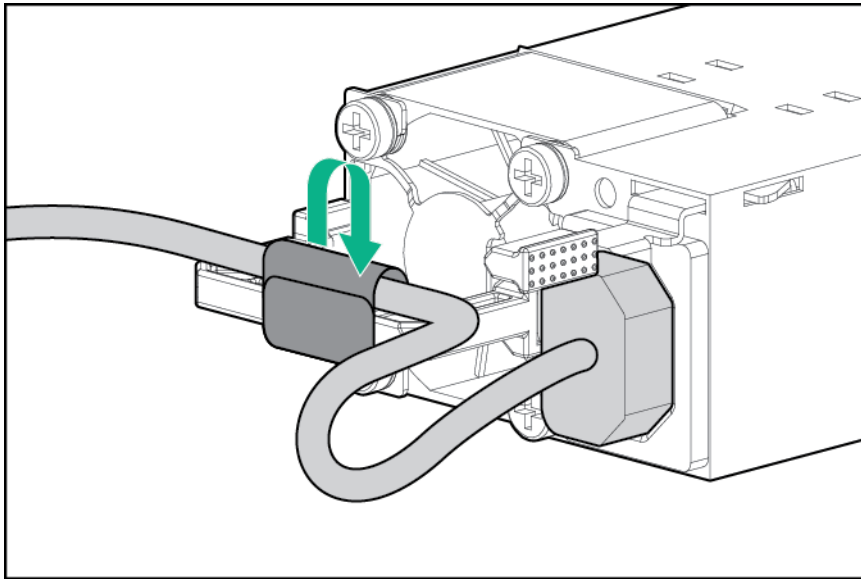
5. To prevent accidental power cord disconnection when sliding the server in and out of the rack, secure the power cord in the strain relief strap attached to the power input module handle:
 - a. Unwrap the strain relief strap from the power input module handle.



CAUTION:

Avoid tight bend radii to prevent damaging the internal wires of a power cord or a server cable. Never bend power cords and server cables tight enough to cause a crease in the sheathing.

- b. Secure the power cord with the strain relief strap. Roll the extra length of the strap around the power input module handle.



6. Connect the power cord to the AC power source.
7. Be sure that the power supply LED is green.

Installing a hot-plug DC power input module

The following input power cord option might be purchased from an authorized Hewlett Packard Enterprise reseller:

J6X43A—HPE 12 AWG 48 V DC 3.0 m Power Cord

If you are not using an input power cord option, the power supply cabling should be made in consultation with a licensed electrician and be compliant with local code.

If you are replacing the factory installed ground lug, use the KST RNB5-5 crimp terminal ring or equivalent. Use an M5-0.80 x 8 screw to attach the ground lug to the power input module.

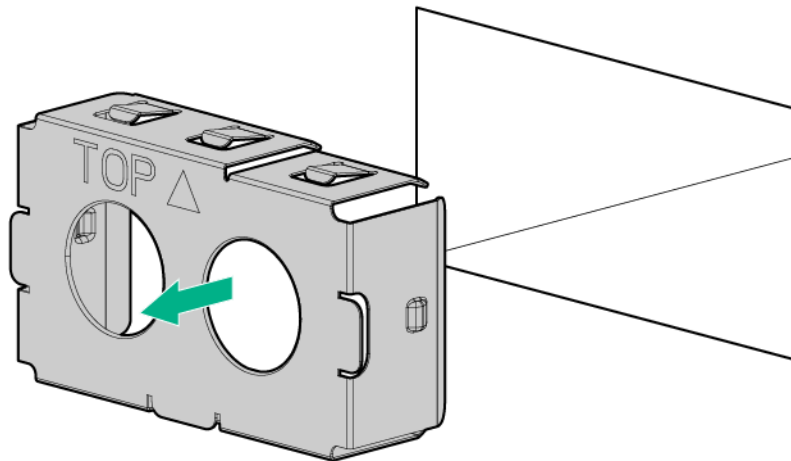
**WARNING:**

To reduce the risk of electric shock, fire, and damage to the equipment, you must install this product in accordance with the following guidelines:

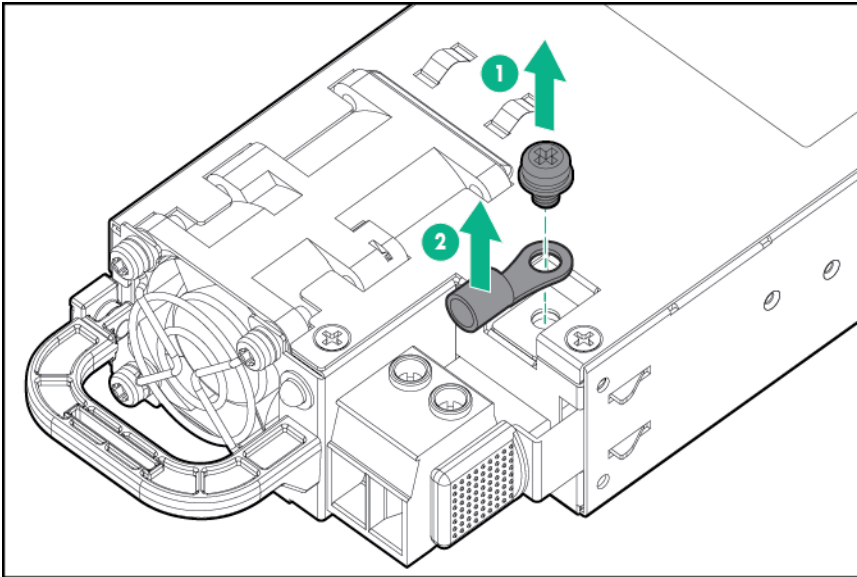
- This power supply is intended only for installation in Hewlett Packard Enterprise servers located in a restricted access location.
- This power supply is not intended for direct connection to the DC supply branch circuit. Only connect this power supply to a power distribution unit (PDU) that provides an independent overcurrent-protected output for each DC power supply. Each output overcurrent-protected device in the PDU must be suitable for interrupting fault current available from the DC power source and must be rated no more than 40A.
- The PDU output must have a shut-off switch or a circuit breaker to disconnect power for each power supply. To completely remove power from the power supply, disconnect power at the PDU. The end product may have multiple power supplies. To remove all power from the product, disconnect the power for each power supply.
- In accordance with applicable national requirements for Information Technology Equipment and Telecommunications Equipment, this power supply only connects to DC power sources that are classified as SELV or TNV. Generally, these requirements are based on the International Standard for Information Technology Equipment, IEC 60950-1. In accordance with local and regional electric codes and regulations, the DC source must have one pole (Neutral/Return) reliably connected to earth ground.
- You must connect the power supply ground screw located on the front of the power supply to a suitable ground (earth) terminal. In accordance with local and regional electric codes and regulations, this terminal must be connected to a suitable building ground (earth) terminal. Do not rely on the rack or cabinet chassis to provide adequate ground (earth) continuity.

Procedure

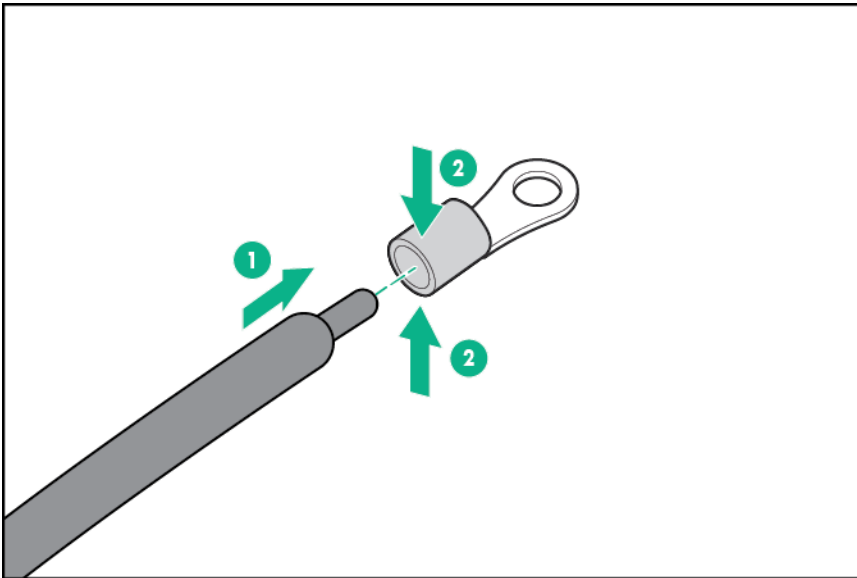
1. Access the product rear panel.
2. Remove the power supply blank.



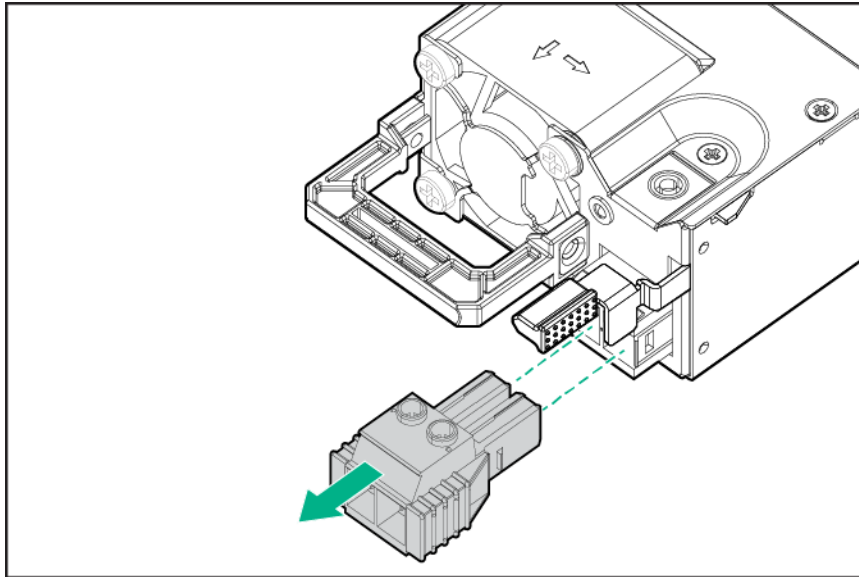
3. Remove the ring tongue.



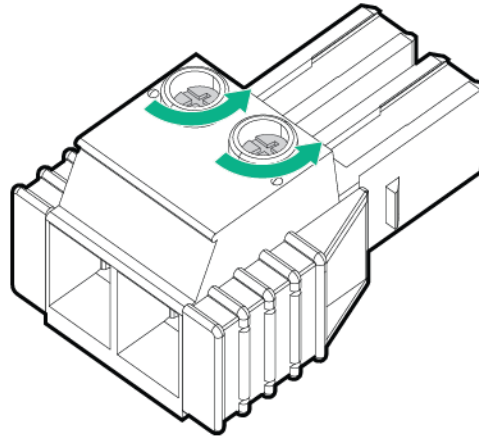
4. Crimp the ring tongue to the ground cable from the -48 V DC power source.



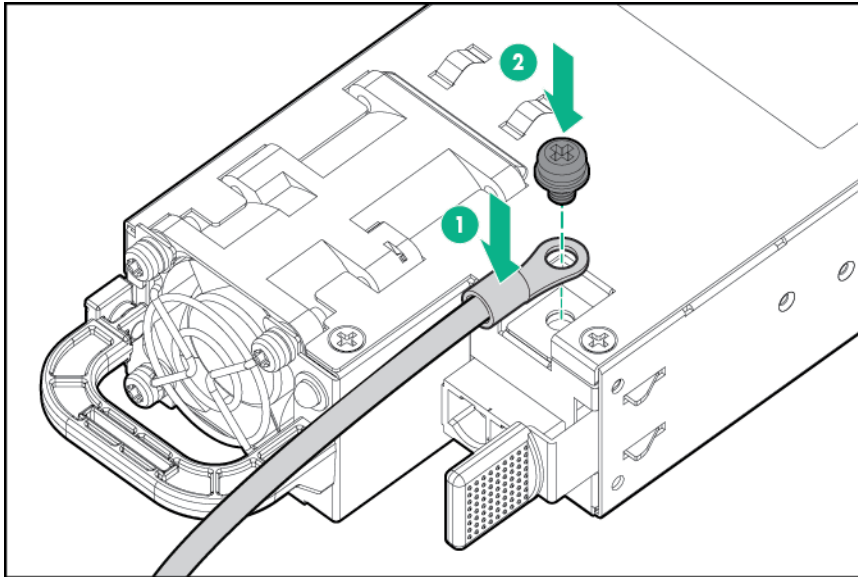
5. Remove the terminal block connector.



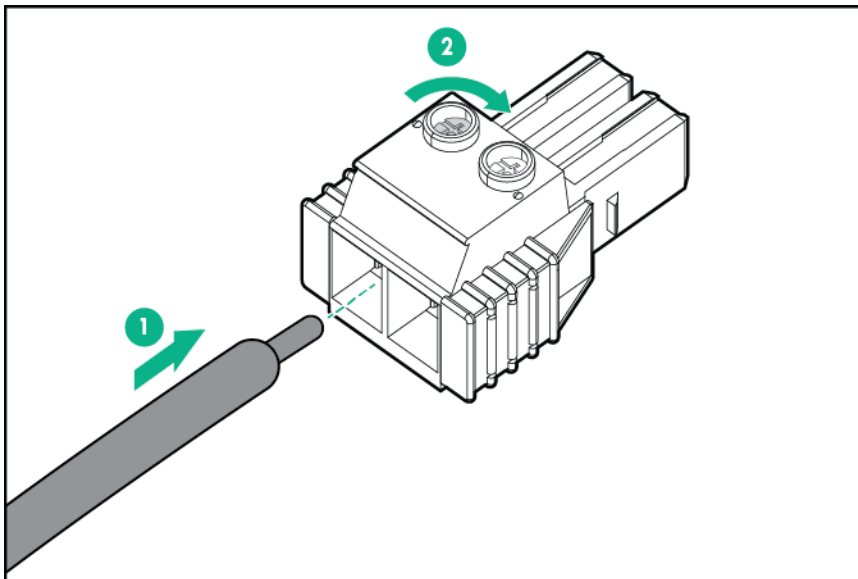
6. Loosen the screws on the terminal block connector.



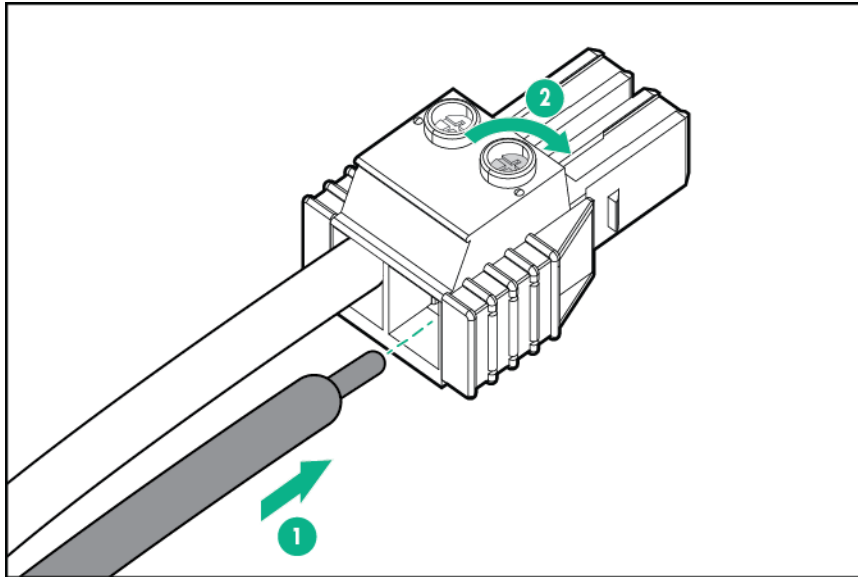
7. Attach the ground (earthed) wire to the ground screw and washer and tighten to 1.47 N m (13 lb-in) of torque. The ground wire must be connected before the -48 V wire and the return wire.
The ground wire must be connected before the -48 V wire and the return wire.



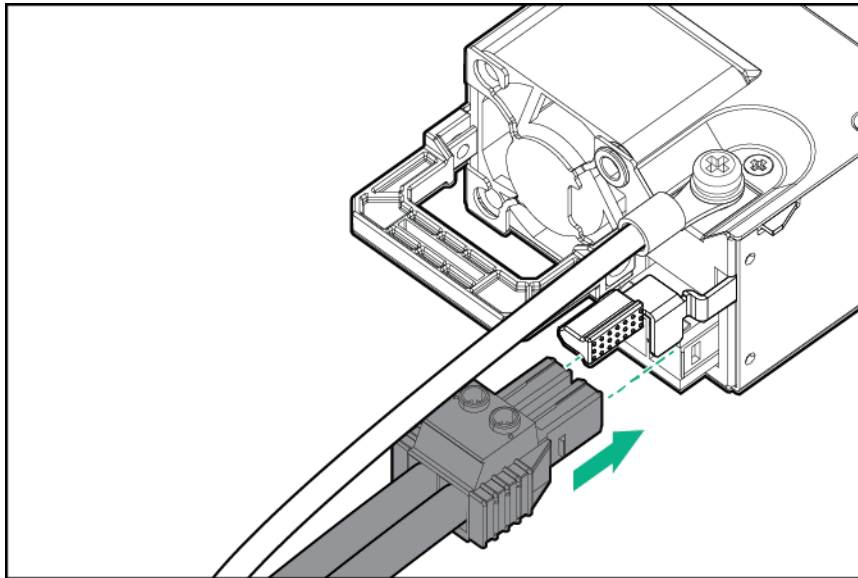
8. Insert the -48 V wire into the left side of the terminal block connector, and then tighten the screw to 1.3 N m (10 lb-in) of torque.



9. Insert the return wire into the right side of the connector, and then tighten the screw to 1.3 N m (10 lb-in) of torque.



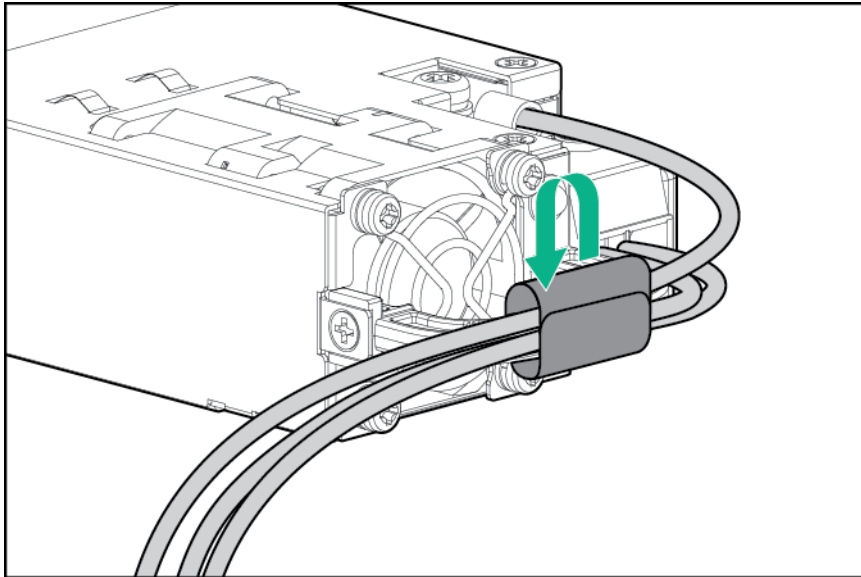
10. Install the terminal block connector in the power input module.



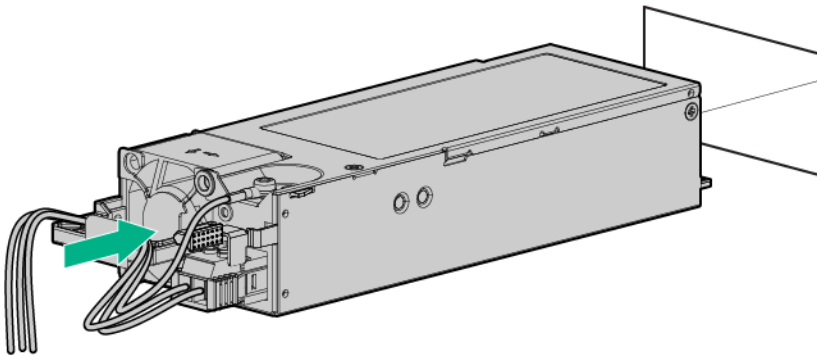
11. To prevent accidental power cord disconnection when sliding the server in and out of the rack, secure the power cord, wires, and/or cables in the strain relief strap attached to the power input module handle:
 - a. Unwrap the strain relief strap from the power input module handle.

⚠ CAUTION:
Avoid tight bend radii to prevent damaging the internal wires of a power cord or a server cable. Never bend power cords and server cables tight enough to cause a crease in the sheathing.

- b. Secure the wires and cables with the strain relief strap. Roll the extra length of the strap around the power input module handle.



12. Slide the power input module into the bay until it clicks into place.



13. Make sure the -48 V DC power source is off or the PDU breaker is in the off position, and then connect the power cord to the -48 V DC power source or PDU.
14. Turn on the -48 V power source or switch the PDU breaker to the on position to supply -48 V to the power supply.
15. Be sure that the power supply LED is green.

HP Trusted Platform Module information

The TPM is a hardware-based system security feature. It can store information securely, such as passwords and encryption keys, which can be used to authenticate the platform.

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Encryption feature. BitLocker is a data protection feature available in Microsoft Windows Server 2008 R2 SP1 and later operating systems. It helps protect user data and ensure that a server running Windows Server has not been tampered with while the system was offline. For more information on BitLocker, see the [Microsoft website](#).

This server supports TPM 1.2 and TPM 2.0. However, once the TPM version 1.2 is installed on the system board, it can no longer be upgraded to the TPM version 2.0.

Trusted Platform Module (TPM) — China Import Restrictions

Hewlett Packard Enterprise Special Reminder: Before enabling TPM functionality on this system, you must ensure that your intended use of TPM complies with relevant local laws, regulations and policies, and approvals or licenses must be obtained if applicable.

For any compliance issues arising from your operation/usage of the TPM which violates the above mentioned requirement, you shall bear all the liabilities wholly and solely. Hewlett Packard Enterprise will not be responsible for any related liabilities.

可信任平台模块 (Trusted Platform Module , TPM) 声明

HPE 特别提醒：在您在系统中启用 TPM 功能前，请您务必确认，您将要对 TPM 的使用遵守相关的当地法律、法规及政策，并已获得所需的一切事先批准及许可(如适用)。

若您未获得相应的操作/使用许可而发生的合规问题，皆由您自行承担全部责任，与 HPE 无涉。

HP Trusted Platform Module installation guidelines

△ 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 a 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, HPE 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.
- HPE 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

Procedure

1. Installing the Trusted Platform Module board.
2. Retaining the recovery key/password.
3. Enabling the Trusted Platform Module.

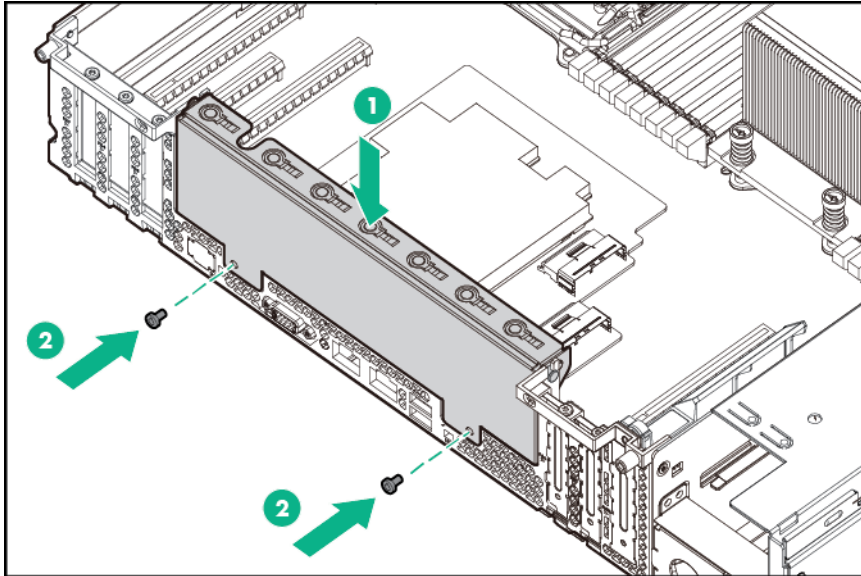
Installing the Trusted Platform Module board

△ WARNING:
To reduce the risk of personal injury from hot surfaces, allow 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.

Procedure

1. **Power down the server.**
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
 - Remove the rear option blank.



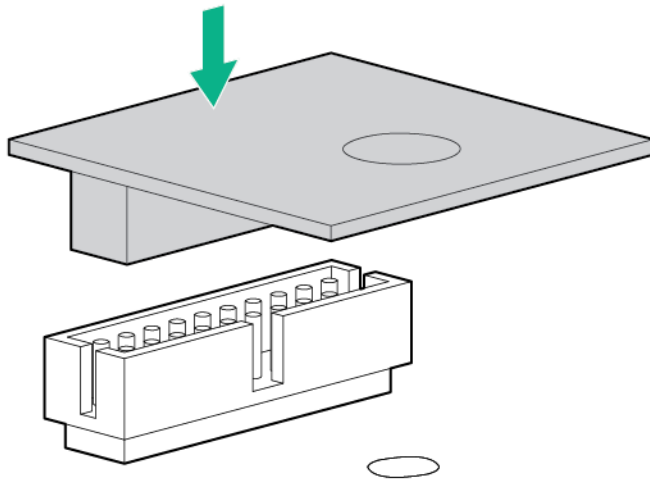
- If installed, **remove the four-bay LFF or the six-bay SFF rear drive cage.**
 - If installed, **remove the PCI riser cage.**
6. **Locate the TPM connector.**



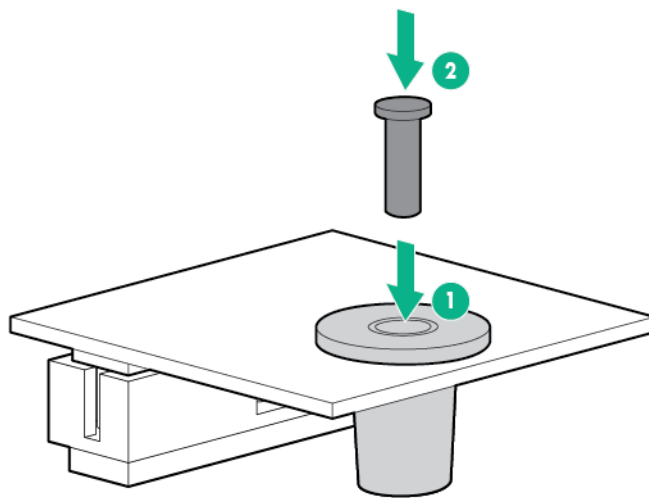
CAUTION:

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.

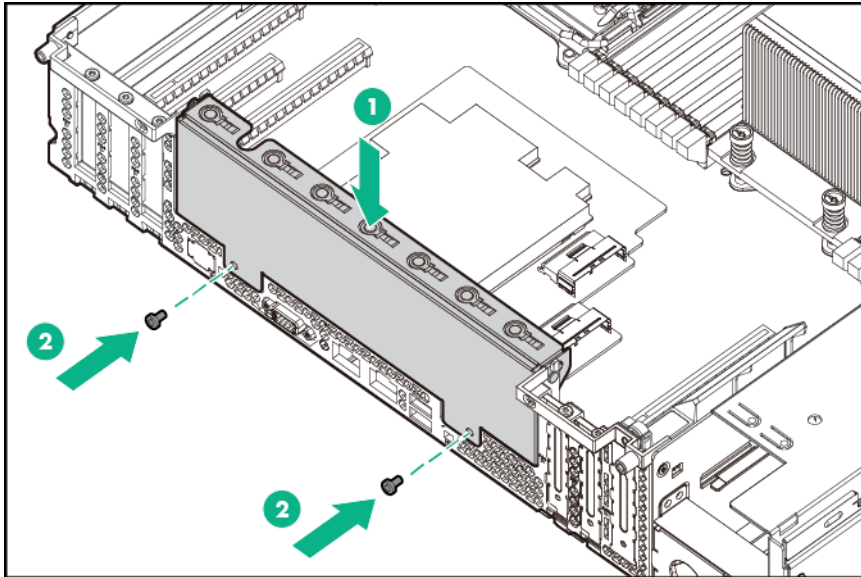
7. Install the TPM board. **Press down on the connector to seat the board.**



8. Install the TPM security rivet by pressing the rivet firmly into the system board.



9. Do one of the following:
- If removed, install the rear option blank.



- If removed, install the four-bay LFF rear drive cage.
- If removed, install the six-bay SFF rear drive cage.
- If removed, install the PCI riser cage.

10. Install the access panel.

11. Install the server into the rack.

12. Power up the server.

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



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.

Procedure

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. To set the TPM operational state:

- If TPM 1.2 is installed, then select **No Action, Enable, Disable, or Clear**.
 - If TPM 2.0 is installed, then select **No Action or Clear**.
5. Select **Visible** to set the TPM Visibility, if necessary.
 6. Press the **F10** key to save your selection.
 7. When prompted to save the change in System Utilities, press the **Y** key.
 8. Press the **ESC** key to exit System Utilities. Then, press the **Enter** key when prompted to reboot the compute module.

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

9. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.

For more information on adjusting TPM usage in BitLocker, see the Microsoft website (<http://support.microsoft.com>).

For more information on the UEFI System Utilities, see the *UEFI System Utilities User Guide for HPE ProLiant Gen9 and Synergy Servers* in the UEFI Information Library (<http://www.hpe.com/info/ProLiantUEFI/docs>).

Cabling

Cabling overview

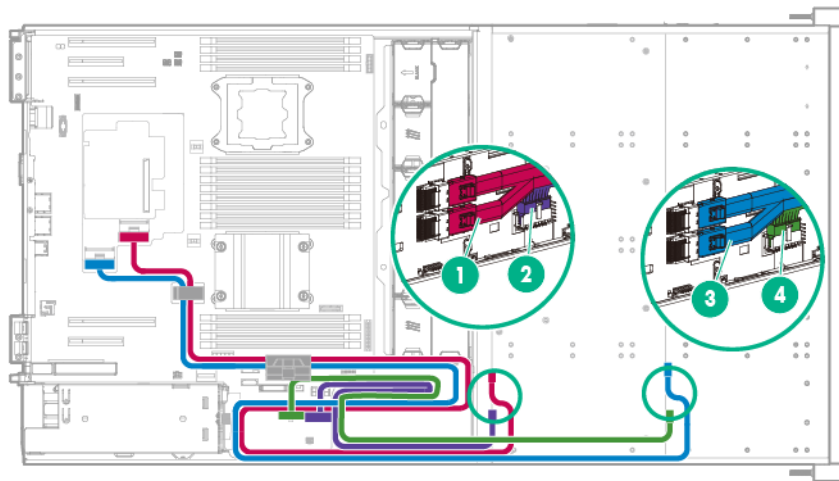
This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

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

Storage cabling

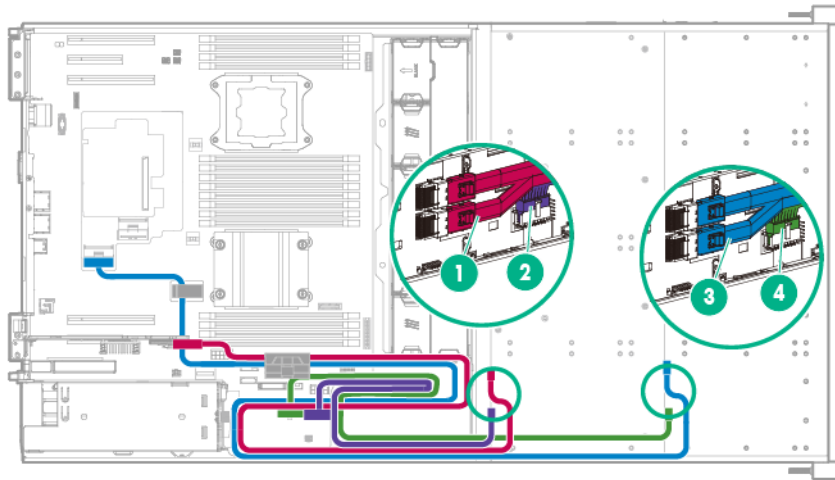
24-bay LFF hot-plug SAS/SATA front drive cabling

- Cabling for when both the front LFF drive cage 1 and 2 are connected to the Flexible Smart Array P840ar Controller



Item	Description
1	Front LFF drive cage 2 Mini-SAS Y-Cable
2	Front LFF drive cage 2 power cable
3	Front LFF drive cage 1 Mini-SAS Y-cable
4	Front LFF cage 1 power cable

- Cabling for when the front LFF drive cage 1 is connected to the Flexible Smart Array P840ar Controller and the front LFF drive cage 2 is connected to the Smart Array P440 Controller option

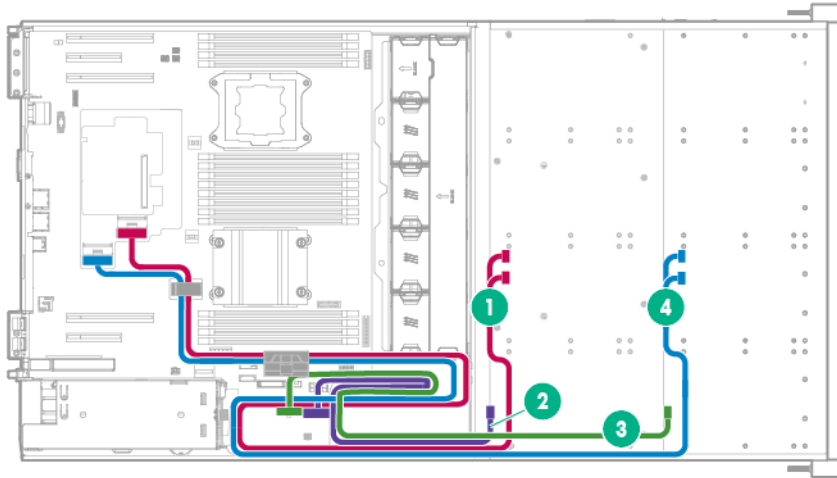


Item	Description
1	LFF front drive cage 2 Mini-SAS Y-cable
2	LFF front drive cage 2 power cable
3	LFF front drive cage 1 Mini-SAS Y-cable
4	LFF front drive cage 1 power cable

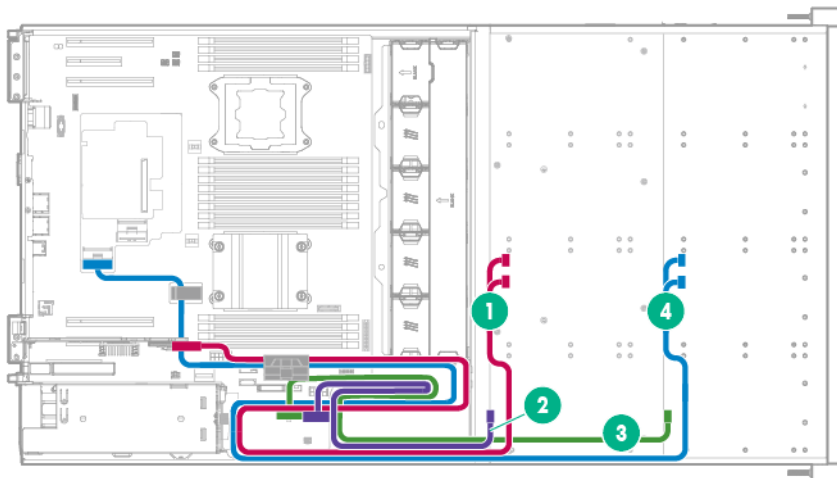
48-bay SFF hot-plug SAS/SATA front drive cabling

- Cabling for when both the front SFF drive cages 1 and 2 are connected to the Flexible Smart Array P840ar Controller

Item	Description
1	Front SFF drive cage 2 Mini-SAS Y-Cable
2	Front SFF drive cage 2 power cable
3	Front SFF drive cage 1 power cable
4	Front SFF drive cage 1 Mini-SAS Y-cable



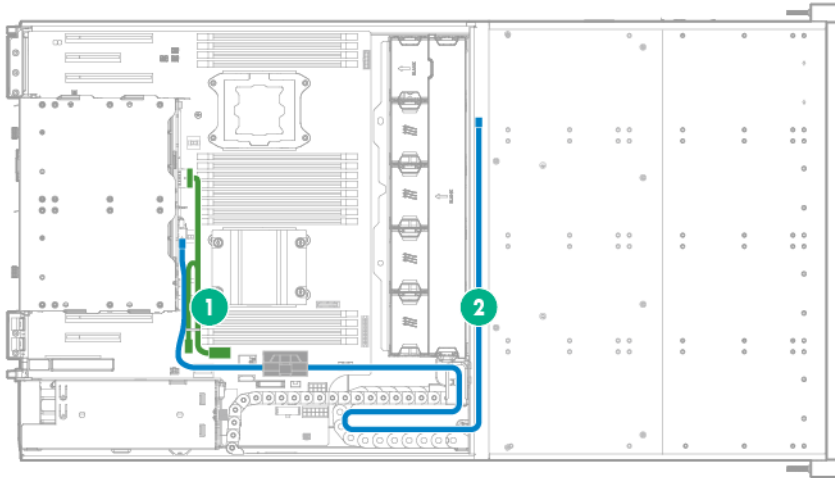
- Cabling for when the front SFF drive cage 1 is connected to the Flexible Smart Array P840ar Controller and the front SFF drive cage 2 is connected to the Smart Array P440 Controller option



Item	Description
1	Front SFF drive cage 2 Mini-SAS Y-Cable
2	Front SFF drive cage 2 power cable
3	Front SFF drive cage 1 power cable
4	Front SFF drive cage 1 Mini-SAS Y-cable

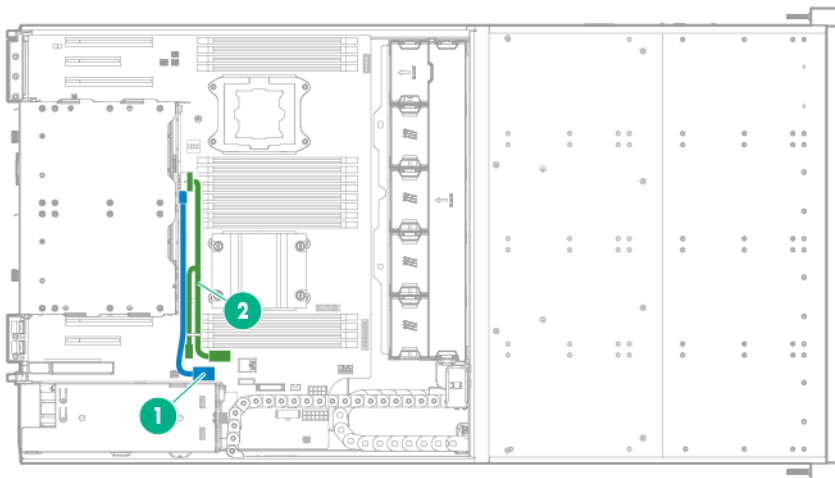
Four-bay LFF hot-plug SAS/SATA rear drive cabling

- Four-bay LFF hot-plug SAS/SATA rear drive cabling to the front drive cage 2 backplane



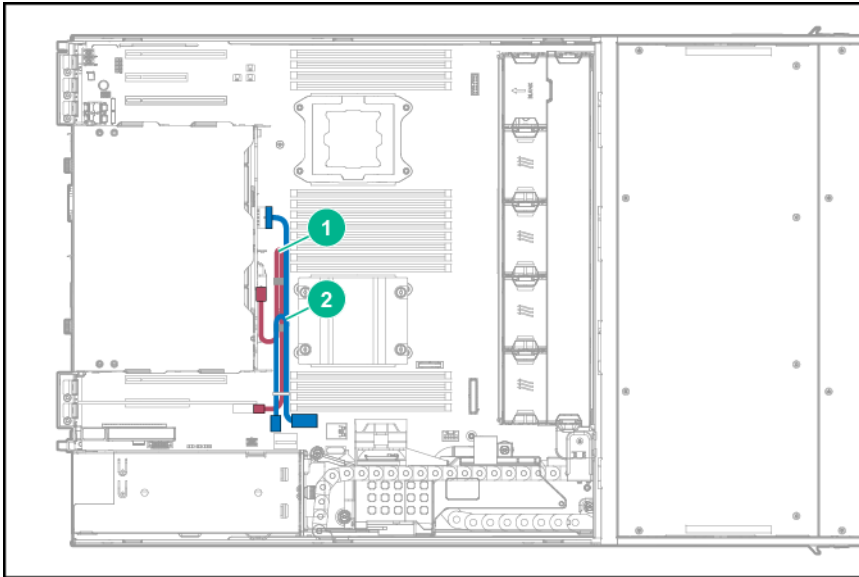
Item	Description
1	Rear LFF drive cage power cable
2	Rear LFF drive cage Mini-SAS cable

- Four-bay LFF hot-plug SATA rear drive cabling to the onboard SATA connector 1



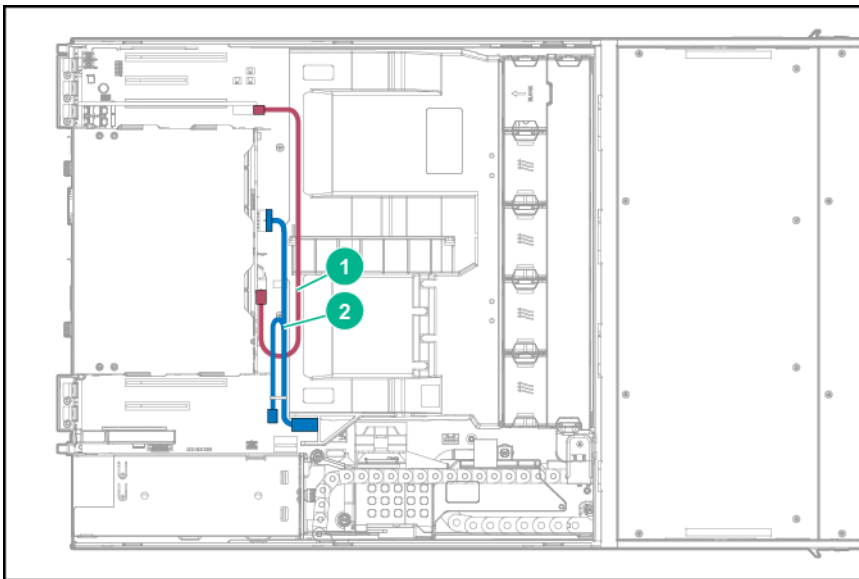
Item	Description
1	Rear LFF drive cage Mini-SAS x4 cable
2	Rear LFF drive cage power cable

- Four-bay LFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 1 or 2



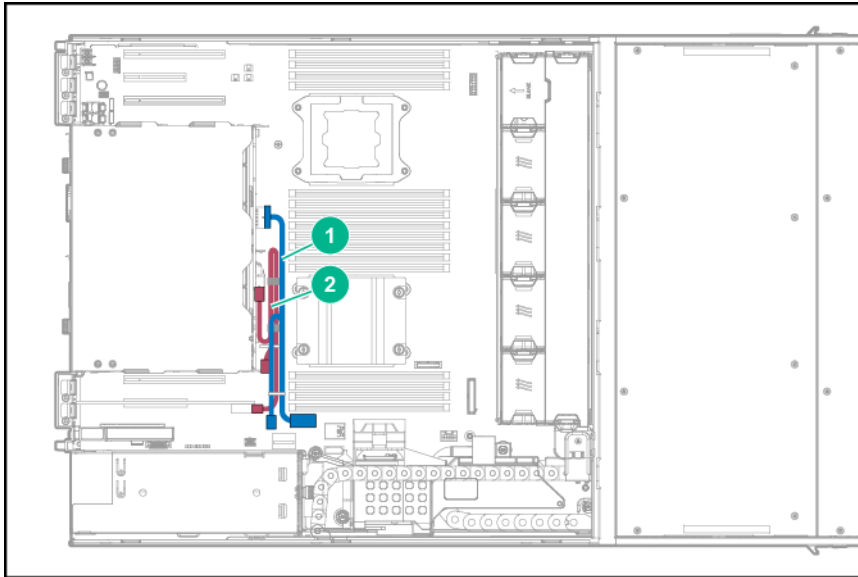
Item	Description
1	Rear LFF drive cage Mini-SAS x4 cable
2	Rear LFF drive cage power cable

- Four-bay LFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 5 or 6



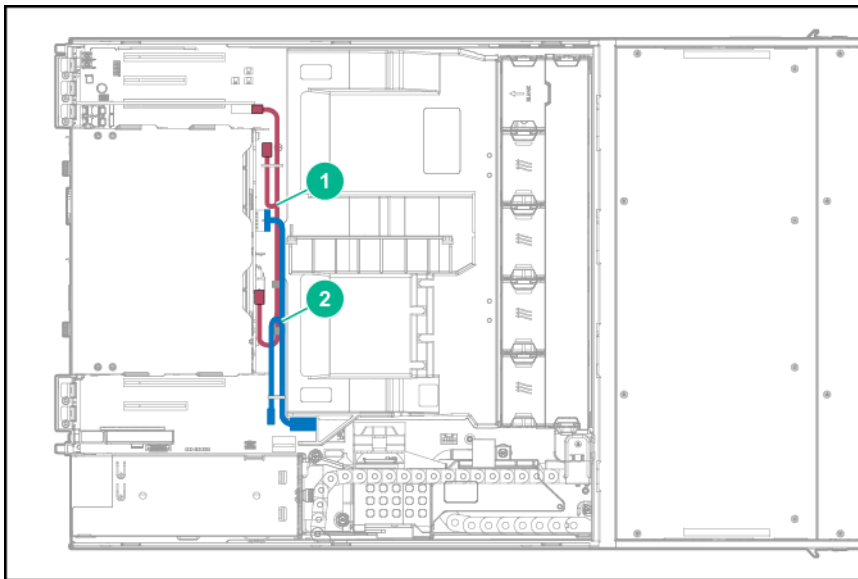
Item	Description
1	Rear LFF drive cage Mini-SAS x4 cable
2	Rear LFF drive cage power cable

- Four-bay LFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 1 or 2



Item	Description
1	Rear LFF drive cage power cable
2	Rear LFF drive cage Mini-SAS Y-cable

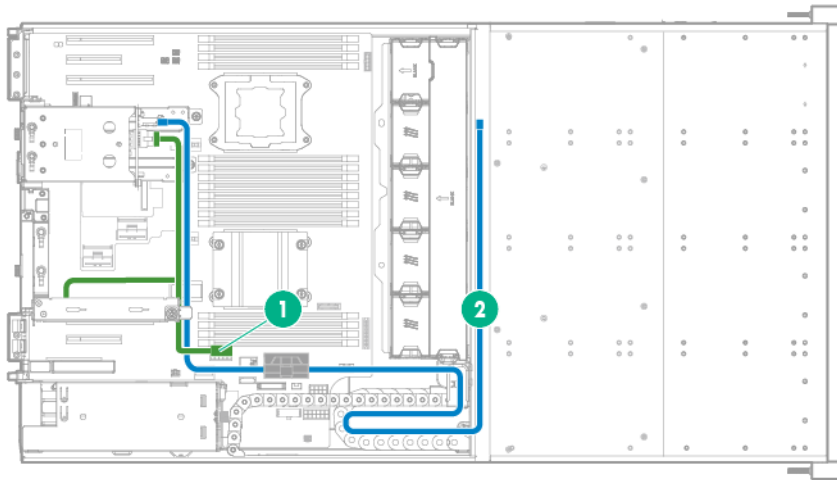
- Four-bay LFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 5, 6 or 7



Item	Description
1	Rear LFF drive cage Mini-SAS Y-cable
2	Rear LFF drive cage power cable

Two-bay SFF hot-plug SAS/SATA rear drive cabling

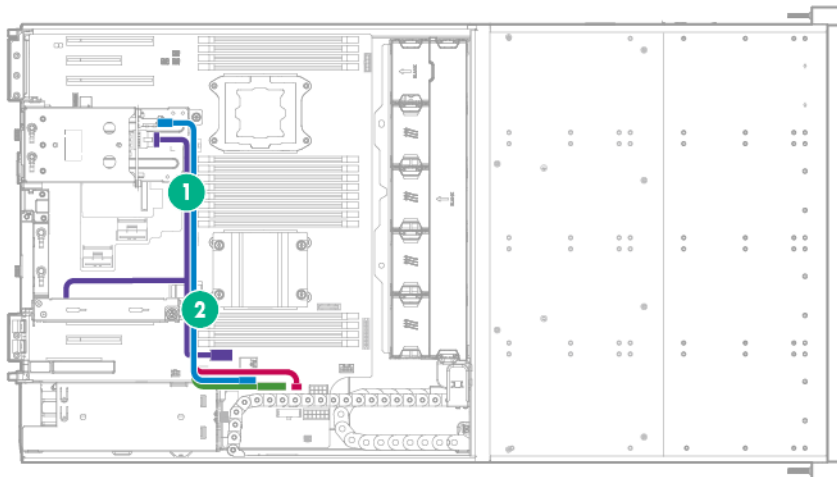
- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the front drive cage 2 backplane



Item	Description
1	Rear SFF drive cage and two-slot PCI riser board power Y-cable
2	Rear SFF drive cage Mini-SAS cable

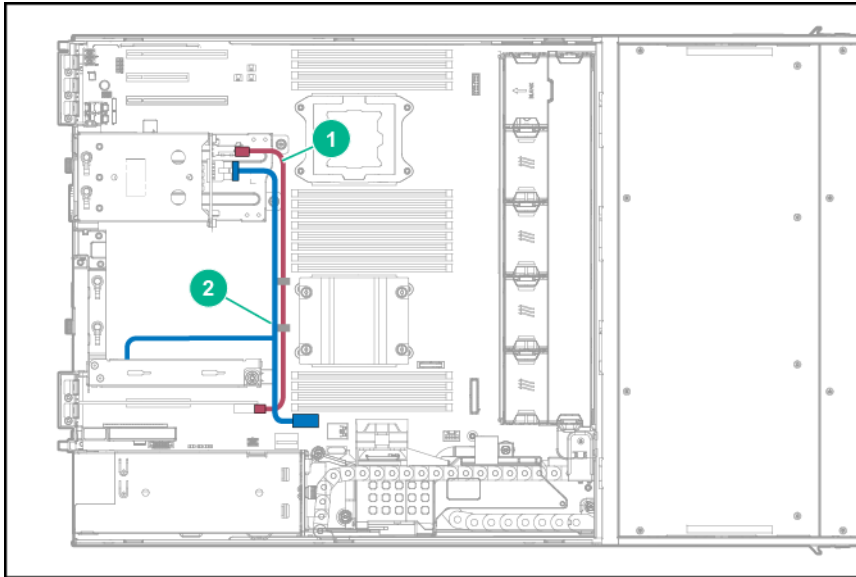
- Two-bay SFF hot-plug SATA rear drive cabling to the onboard SATA connectors 4 and 5

For clarity of the multiconnector signal cable connections, the cable management holder image is removed from the illustration below.



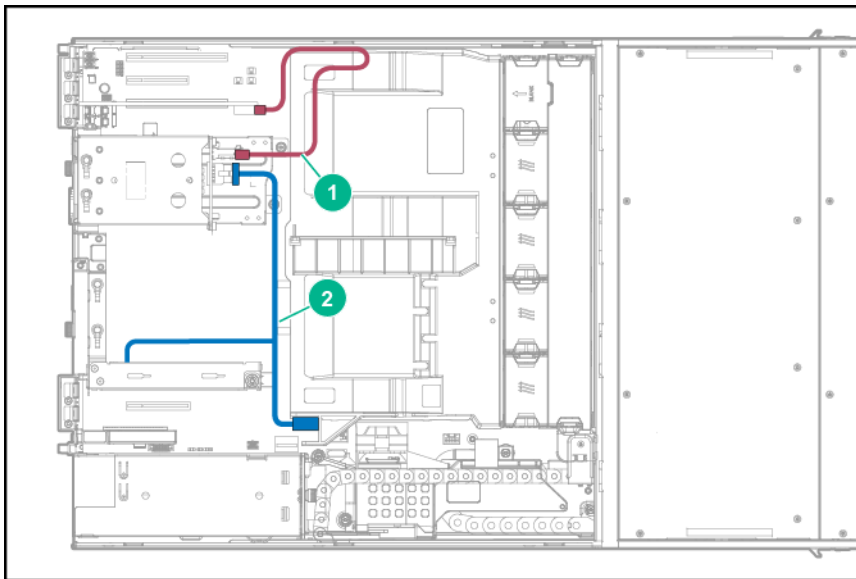
Item	Description
1	Rear SFF drive cage and two-slot PCI riser board power Y-cable
2	Rear SFF drive cage multiconnector signal cable

- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 1



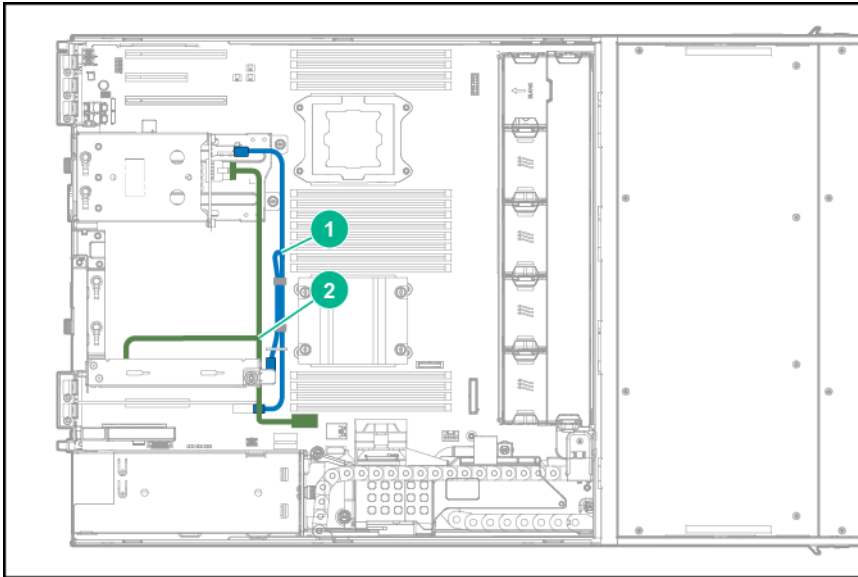
Item	Description
1	Rear SFF drive cage Mini-SAS cable
2	Rear SFF drive cage and two-slot PCI riser board power Y-cable

- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 5 or 6



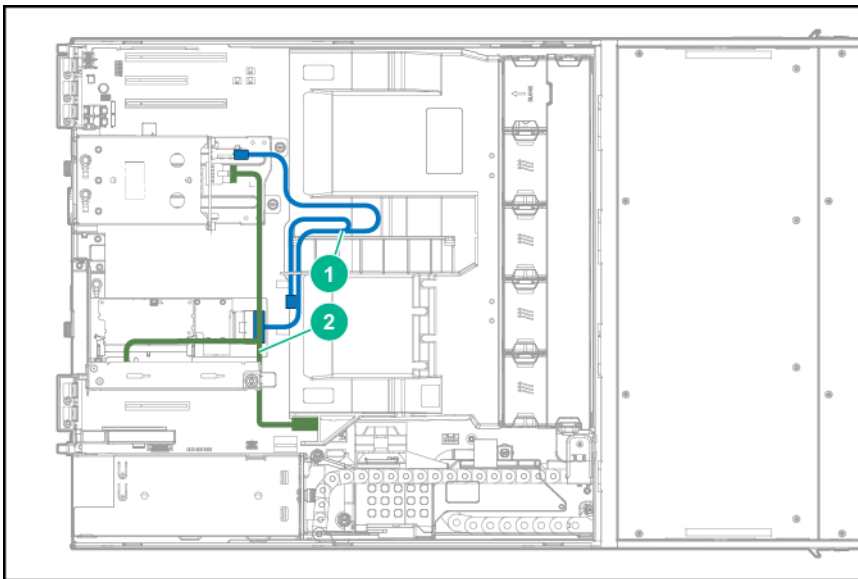
Item	Description
1	Rear SFF drive cage Mini-SAS cable
2	Rear SFF drive cage and two-slot PCI riser board power Y-cable

- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 1



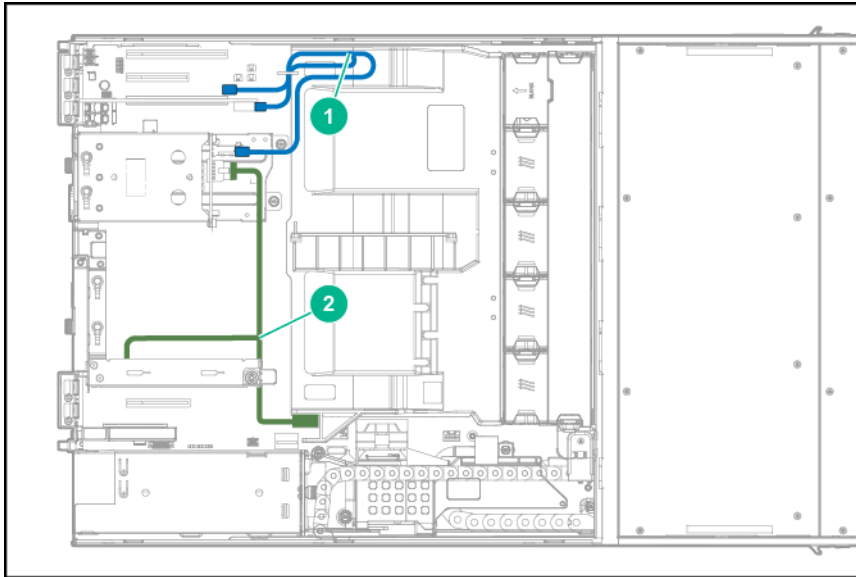
Item	Description
1	Rear SFF drive cage Mini-SAS Y-cable
2	Rear SFF drive cage and two-slot PCI riser board power Y-cable

- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe riser slot 3 or 4



Item	Description
1	Rear SFF drive cage Mini-SAS Y-cable
2	Rear SFF drive cage and two-slot PCI riser board power Y-cable

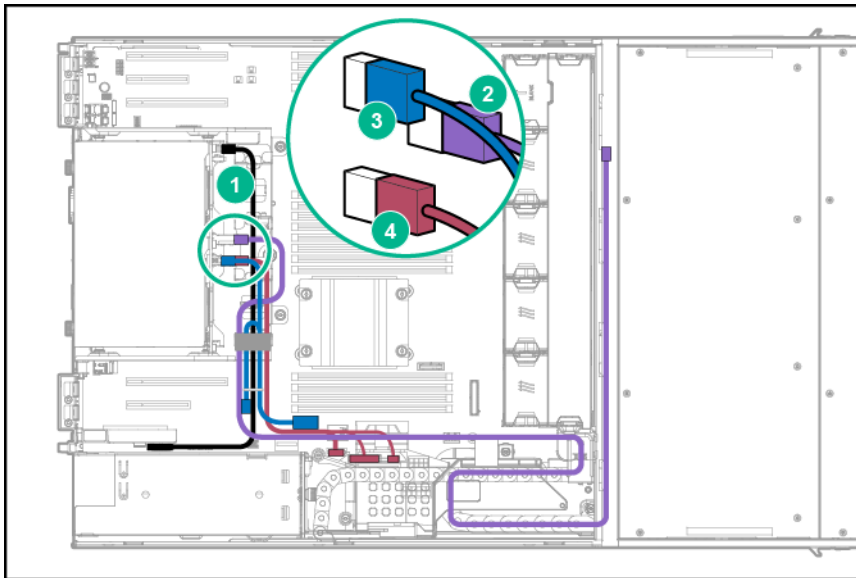
- Two-bay SFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 5, 6, or 7



Item	Description
1	Rear SFF drive cage Mini-SAS Y-cable
2	Rear SFF drive cage and two-slot PCI riser board power Y-cable

Six-bay SFF hot-plug SAS/SATA rear drive cabling

- Six-bay LFF hot-plug SAS/SATA rear drive cabling to the front drive cage 2 backplane and the onboard SATA connectors

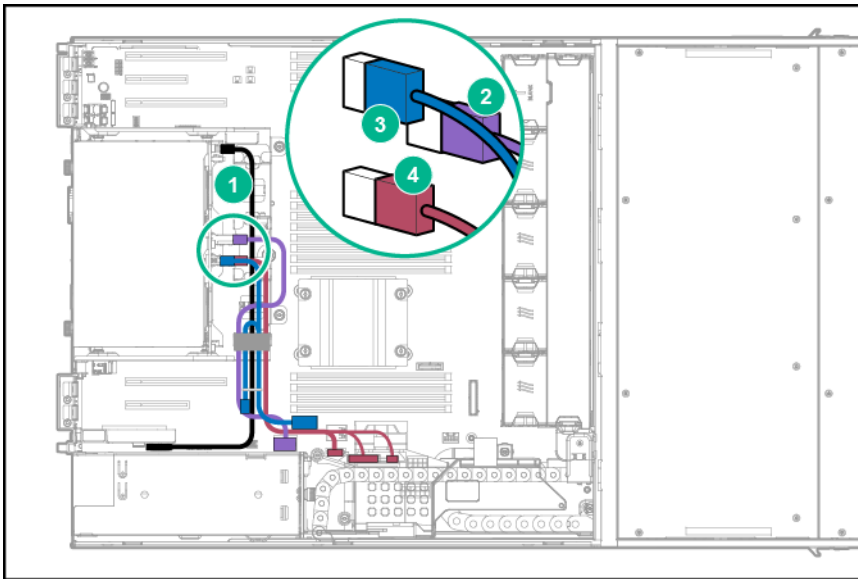


Item	Description
1	Rear SFF backplane sideband cable
2	Rear SFF drive cage preinstalled Mini-SAS x4 cable
3	Rear SFF drive cage power cable
4	Rear SFF drive cage multiconnector signal cable

Item	Description
------	-------------

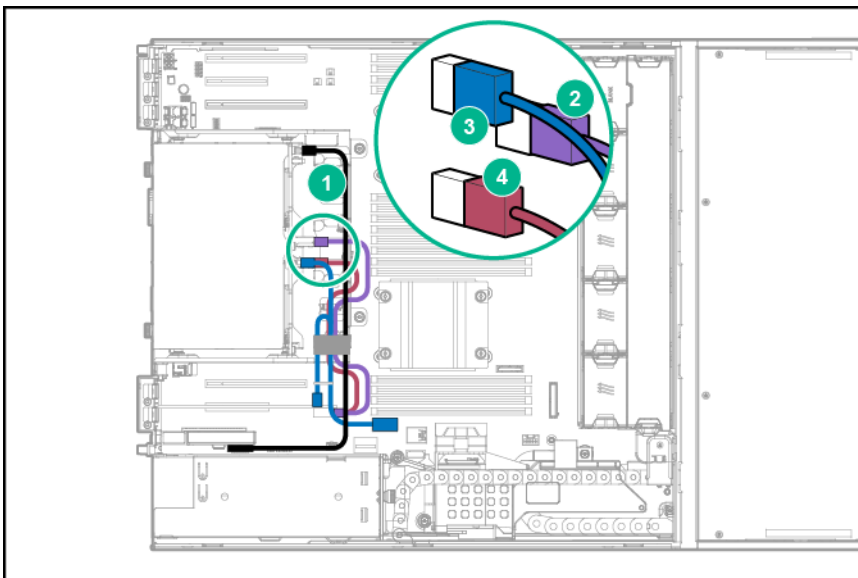
Table Continued

- Six-bay LFF hot-plug SATA rear drive cabling to the onboard Mini-SAS and SATA connectors



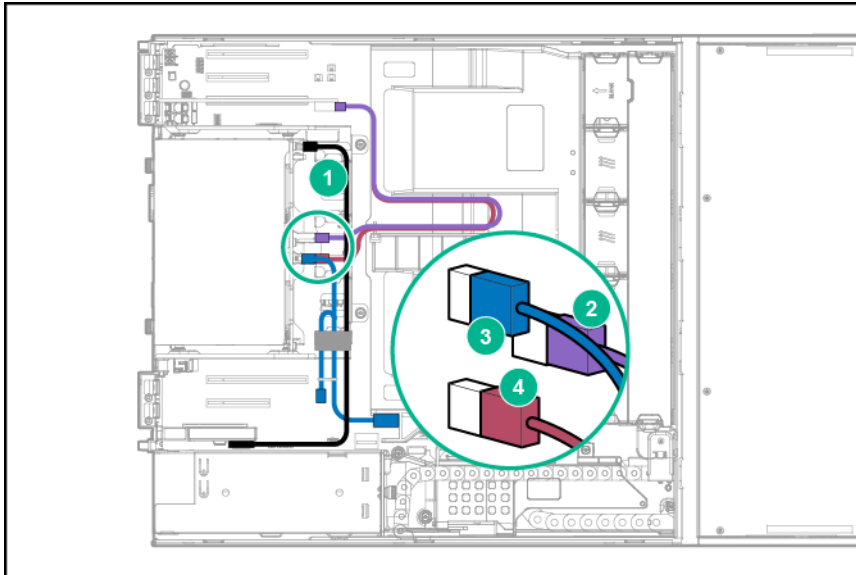
Item	Description
1	Rear SFF backplane sideband cable
2	Mini-SAS x4 cable
3	Rear SFF drive cage power cable
4	Rear SFF drive cage multiconnector signal cable

- Six-bay LFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 1 or 2



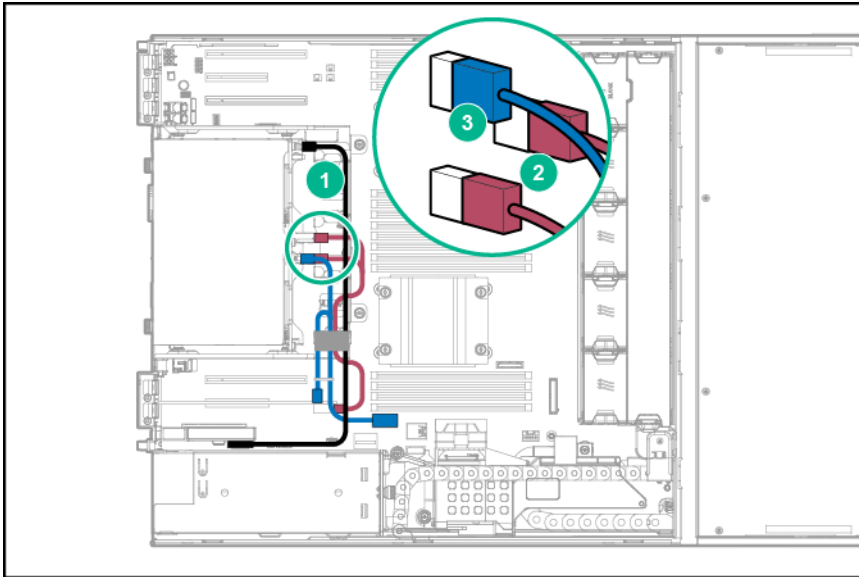
Item	Description
1	Rear SFF backplane sideband cable
2	Mini-SAS x4 cable
3	Rear SFF drive cage power cable
4	Mini-SAS x4 cable

- Six-bay LFF hot-plug SAS/SATA rear drive cabling to the H240 HBA installed in the PCIe expansion slot 5, 6 or 7



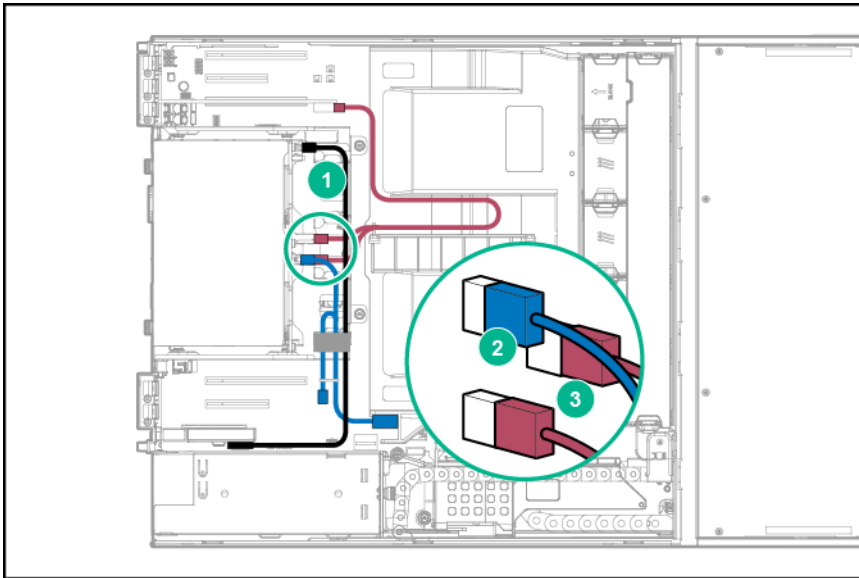
Item	Description
1	Rear SFF backplane sideband cable
2	Mini-SAS x4 cable
3	Rear SFF drive cage power cable
4	Mini-SAS x4 cable

- Six-bay LFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 1 or 2



Item	Description
1	Rear SFF backplane sideband cable
2	Mini-SAS Y-cable
3	Rear SFF drive cage power cable

- Six-bay LFF hot-plug SAS/SATA rear drive cabling to the P440 Smart Array Controller installed in the PCIe expansion slot 5, 6, or 7

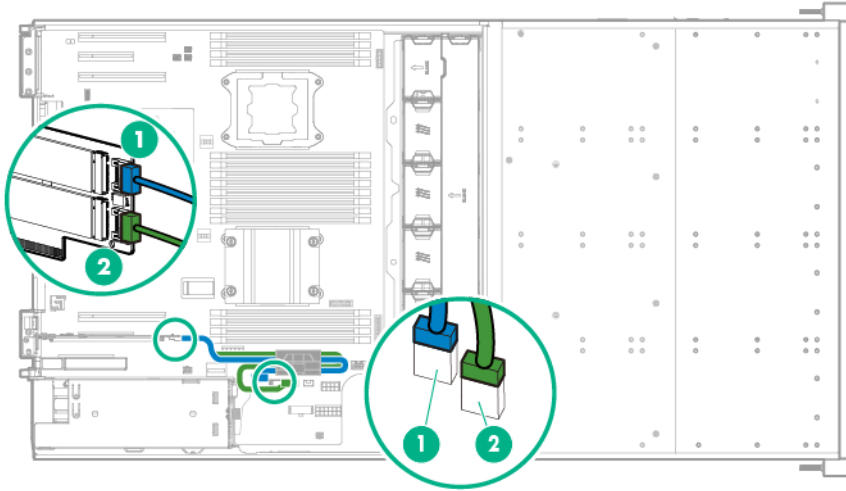


Item	Description
1	Rear SFF backplane sideband cable
2	Rear SFF drive cage power cable
3	Mini-SAS Y-cable

M.2 SSD cabling

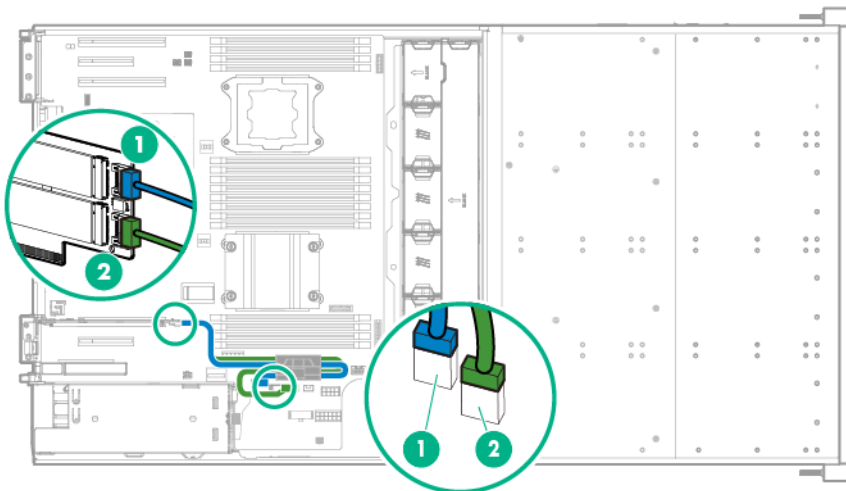
For clarity of the SATA cable connections, part of the cable management holder image is removed from this section's illustrations.

- M.2 SSD cabling from the onboard PCIe3 x 8 expansion slot 1



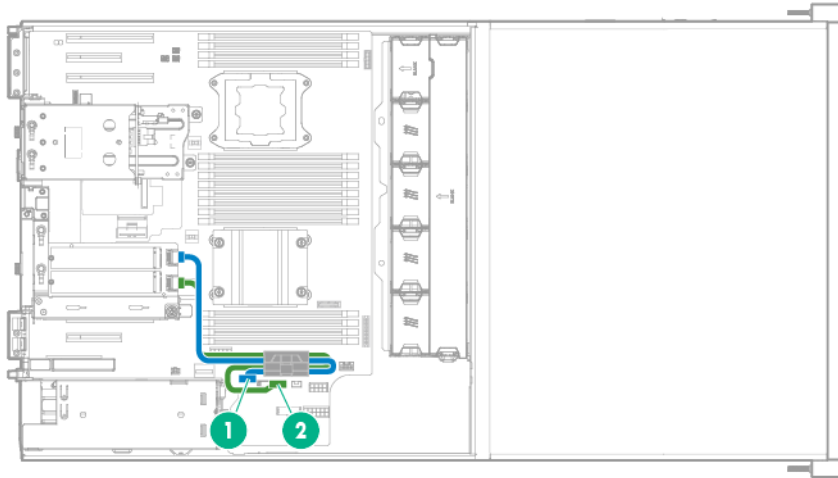
Item	Description
1	M.2 SSD 1 SATA cable
2	M.2 SSD 2 SATA cable

- M.2 SSD cabling from the onboard PCIe3 x 16 expansion slot 2



Item	Description
1	M.2 SSD 1 SATA cable
2	M.2 SSD 2 SATA cable

- M.2 SSD cabling from the PCI riser cage



Item	Description
1	M.2 SSD 1 SATA cable
2	M.2 SSD 2 SATA cable

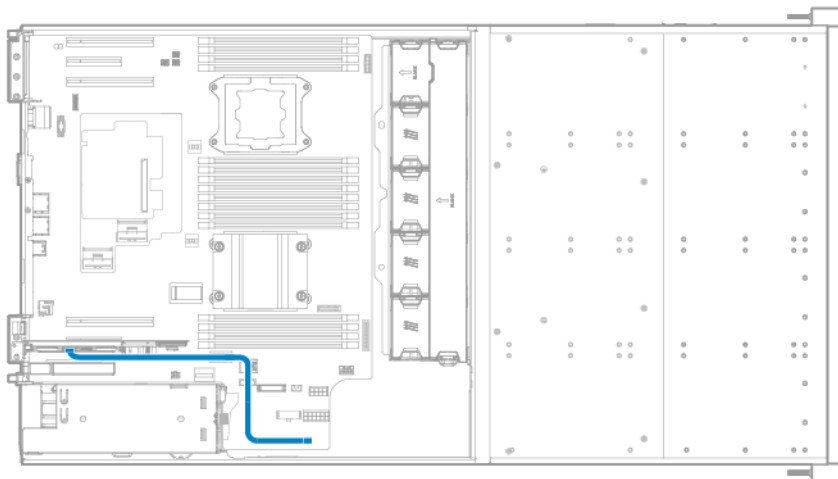
FBWC module backup power cabling

The FBWC solution is a separately purchased option. This server only supports **FBWC module installation** when a Smart Array P-Series controller is installed.

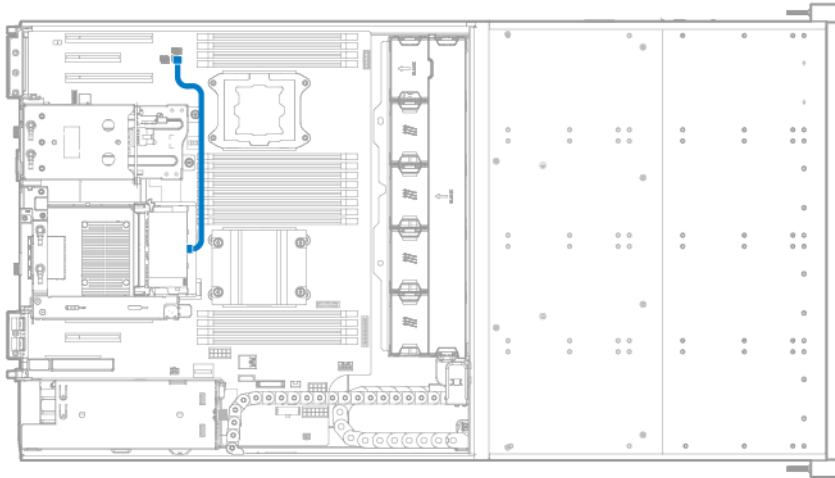
Depending on the controller option installed, the actual storage controller connectors might look different from what is shown in this section.

- FBWC module backup power cabling from a standup, Smart Array P44x Controller installed in the onboard PCIe3 x8 expansion slot 1

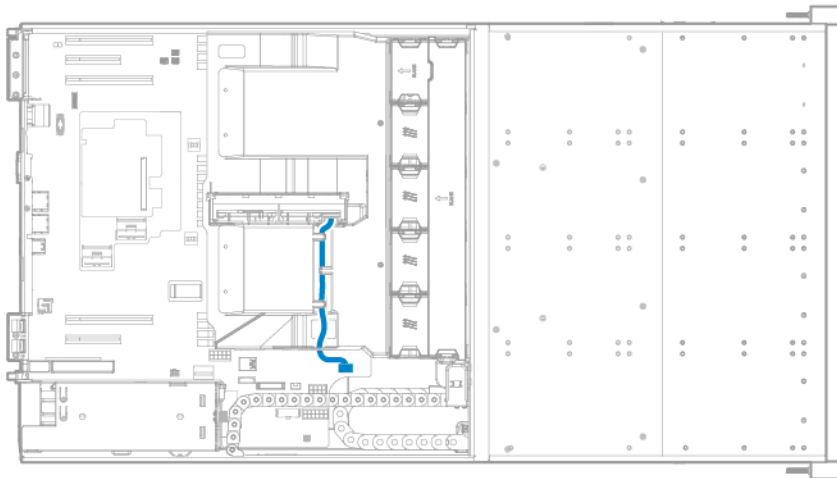
For clarity of the FBWC module backup power cabling connection, the cable management holder image is removed from the illustration below.



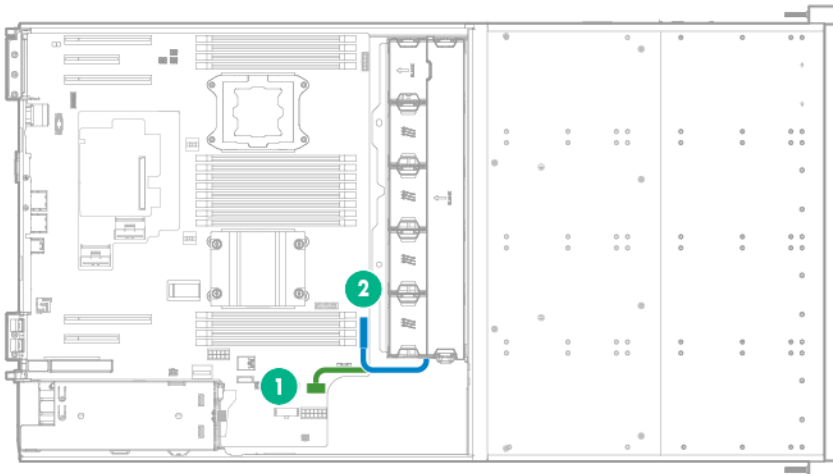
- FBWC module backup power cabling from an Smart Array P841 Controller installed in the PCI riser cage



Smart Storage Battery cabling



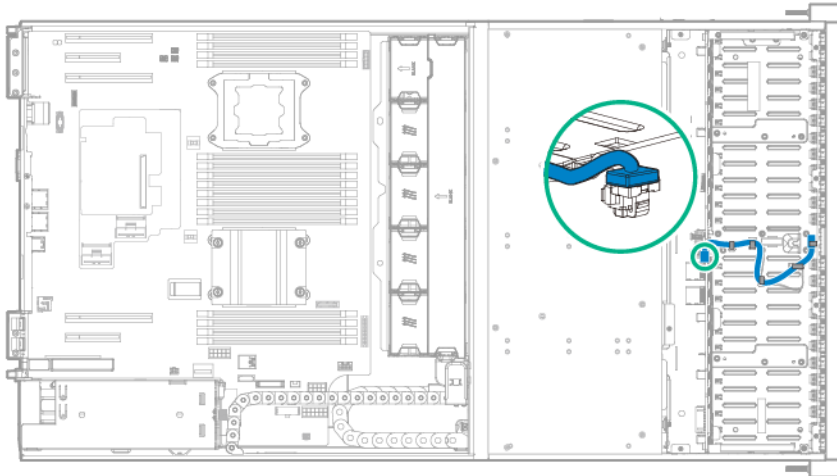
Fan assembly cabling



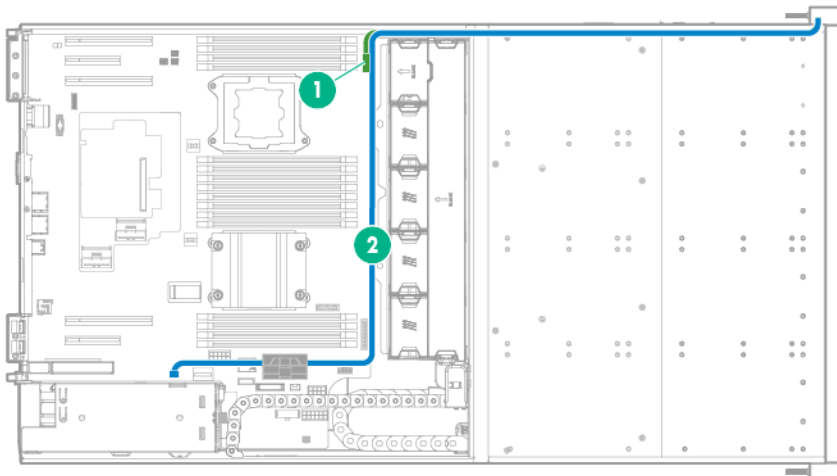
Item	Description
1	Fan assembly power cable
2	Fan assembly signal cable

Ambient temperature sensor cabling

This cable is present in SFF drive configurations only; the ambient temperature sensor function in LFF drive configurations is integrated in the front LFF drive cage 1 backplane.



Front panel cabling



Item	Description
1	Front I/O cable
2	Front USB 2.0 cable

Software and configuration utilities

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
<u>HPE iLO</u>	Online and Offline
<u>Active Health System</u>	Online and Offline
<u>iLO RESTful API support</u>	Online and Offline
<u>Integrated Management Log</u>	Online and Offline
<u>Intelligent Provisioning</u>	Offline
<u>Insight Diagnostics</u>	Online and Offline
<u>Erase Utility</u>	Offline
<u>Scripting Toolkit for Windows and Linux</u>	Online
<u>Service Pack for ProLiant</u>	Online and Offline
<u>Smart Update Manager</u>	Online and Offline
<u>UEFI System Utilities</u>	Offline
<u>HPE Smart Storage Administrator</u>	Online and Offline
<u>FWUPDATE utility</u>	Offline

Product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [HPE website](#).

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](#).

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](#). 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](#)
- *Intelligent Provisioning User Guide* on the [Hewlett Packard Enterprise website](#)

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](#).

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with one-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
- From within the Embedded UEFI shell
- From within operating system-specific IML viewers:
 - For Windows: IML Viewer
 - For Linux: IML Viewer Application
- From within the iLO web interface
- From within Insight Diagnostics

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](#).
- 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](#). For consolidated drive and firmware update packages, see the Smart Update: Server Firmware and Driver Updates page on the [Hewlett Packard Enterprise website](#).

Insight Diagnostics

The Insight Diagnostics is a proactive server management tool, available in both offline and online versions. The tool provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

The Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning.

The Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft Windows and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, see the [Hewlett Packard Enterprise website](#). The Insight Diagnostics Online Edition is also available in the SPP.

Insight Diagnostics survey functionality

Insight Diagnostics provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that the server supports. For operating systems supported by the server, see the [Hewlett Packard Enterprise website](#).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes.

Survey functionality is installed with every Intelligent Provisioning-assisted Insight Diagnostics installation, or it can be installed through the SPP.

Erase Utility



CAUTION:

Perform a backup before running the Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and 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](#).

Service Pack for ProLiant overview

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 ProLiant Gen9 and later servers.

SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to an operating system included in the ISO file so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see the <https://www.hpe.com/servers/spp/download>.

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 servers.

For more information about SUM, see the product page on the [Hewlett Packard Enterprise website](#).

To download SUM, see the [Hewlett Packard Enterprise website](#).

To access the *Smart Update Manager User Guide*, see the [Hewlett Packard Enterprise Information Library](#).

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](#).

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](#).

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

Table Continued

Action	Key
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.

Flexible boot control

This feature enables you to do the following:

- Add Boot Options:
 - Browse all FAT16 and FAT32 file systems.
 - To add a new UEFI boot option, select an X64 UEFI application with an .EFI extension. For example, adding an OS boot loader or other UEFI application as a new UEFI boot option.

The new boot option is appended to the boot-order list. When you select a file, you are prompted to enter the boot option description. This description, and any optional data to be passed to an .EFI application, is then displayed in the boot menu.

- Boot to System Utilities

After pre-POST, the boot options screen appears. During this time, you can access the UEFI System Utilities by pressing the **F9** key.

- Choose between supported modes:
 - Legacy BIOS Boot Mode
 - UEFI Boot Mode



IMPORTANT:

If the default boot mode settings are different than the user-defined settings, the system might not boot the OS installation if the defaults are restored. To avoid this issue, use the User Defined Defaults feature in UEFI System Utilities to override the factory default settings.

For more information, see the UEFI System Utilities user guide for your product on the [Hewlett Packard Enterprise Information Library](#).

Restoring and customizing configuration settings

You can reset all configuration settings to the factory default settings, or you can restore and use the system default configuration settings.

You can also configure default settings as necessary, and then save the configuration as the custom default configuration. When the system loads the default settings, it uses the custom default settings instead of the factory defaults.

Secure Boot configuration

Secure Boot is integrated in the UEFI specification on which the Hewlett Packard Enterprise implementation of UEFI is based. Secure Boot is implemented in the BIOS and does not require special hardware. Secure

Boot ensures that each component launched during the boot process is digitally signed. Secure Boot also ensures that the signature is validated against a set of trusted certificates embedded in the UEFI BIOS. Secure Boot validates the software identity of the following components in the boot process:

- UEFI drivers loaded from PCIe cards
- UEFI drivers loaded from mass storage devices
- Preboot UEFI shell applications
- OS UEFI boot loaders

When enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot. For more information about supported operating systems, see the UEFI System Utilities and Shell release notes for your server on the [Hewlett Packard Enterprise website](#).

A physically present user can customize the certificates embedded in the UEFI BIOS by adding or removing their own certificates.

When Secure Boot is enabled, the System Maintenance Switch does not restore all manufacturing defaults when set to the ON position. For security reasons, the following are not restored to defaults when the System Maintenance Switch is in the ON position:

- Secure Boot and remains enabled.
- The Boot Mode remains in UEFI Boot Mode even if the default boot mode is Legacy Boot Mode.
- The Secure Boot Database is not restored to its default state.
- iSCSI Software Initiator configuration settings are not restored to defaults.

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](#)
- *UEFI Shell Specification* on the [UEFI website](#)

Embedded Diagnostics option

The system BIOS in all ProLiant Gen9 servers includes an Embedded Diagnostics option in the ROM. The Embedded Diagnostics option can run comprehensive diagnostics of the server hardware, including processors, memory, drives, and other server components.

For more information on the Embedded Diagnostics option, see the UEFI System Utilities user guide for your server on the [Hewlett Packard Enterprise website](#).

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](#).

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:

Procedure

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.

Utilities and features

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](#).

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.

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](#).

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.

Keeping the system current

Updating firmware or System ROM

Multiple methods exist to update the firmware or System ROM:

- [Service Pack for ProLiant](#)
- [FWUPDATE utility](#)
- [FWUpdate command from within the Embedded UEFI Shell](#)
- [Firmware Update application in the UEFI System](#)
- [Online Flash components](#)

Product entitlement is required to perform updates.

FWUPDATE utility

The FWUPDATE utility enables you to upgrade the system firmware (BIOS).

To use the utility to upgrade the firmware:

1. Download the FWUPDATE flash component from the [Hewlett Packard Enterprise Support Center website](#).
2. Save the FWUPDATE flash components to a USB key.
3. Set the boot order so that the USB key will boot first using one of the following options:
 - Configure the boot order so that the USB key is the first bootable device.
 - Press the **F11** key (Boot Menu) when prompted during system boot to access the **One-Time Boot Menu**. This menu allows you to select the boot device for a specific boot and does not modify the boot order configuration settings.
4. Insert the USB key into an available USB port.
5. Boot the system.

The FWUPDATE utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

To download the flash components, see the [Hewlett Packard Enterprise Support Center website](#).

For more information about One-Time Boot Menu, see the UEFI System Utilities user guide for your product on the [Hewlett Packard Enterprise website](#).

FWUpdate command from within the Embedded UEFI Shell

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server from the [Hewlett Packard Enterprise Support Center website](#). When searching for the component, always select **OS Independent** to locate the binary file.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Boot to Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter the `Map -r` command.

For more information about accessing a file system from the shell, see the UEFI Shell user guide on the [Hewlett Packard Enterprise website](#).

6. Change to the file system that contains the System ROM Flash Binary component for your server. Enter one of the `fsx` file systems available, such as `fs0` or `fs1`, and press the **Enter** key.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Enter the `fwupdate -d BIOS -f <filename>` command to flash the system ROM.

For help on the FWUPDATE command, enter the following command:

```
help fwupdate -b
```

9. Reboot the server.

A reboot is required after the firmware update for the updates to take effect, and for hardware stability to be maintained.

For more information about the commands used in this procedure, see the UEFI Shell user guide on the [Hewlett Packard Enterprise website](#).

Firmware Update application in the UEFI System Utilities

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server from the [Hewlett Packard Enterprise Support Center website](#). When searching for the component, always select **Cross operating system** to locate the binary file.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. During POST, press **F9** to enter System Utilities.
5. Select **Embedded Applications > Firmware Update > System ROM > Select Firmware File**.
6. Select the device containing the flash file.
7. Select the flash file. This step may take a few moments to complete.
8. Select **Start firmware update** and allow the process to complete.
9. Reboot the server. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

Online Flash components

This component provides updated system firmware that can be installed directly on supported operating systems. Additionally, when used in conjunction with SUM, this Smart Component allows the user to update firmware on remote servers from a central location. This remote deployment capability eliminates the need for the user to be physically present at the server to perform a firmware update.

Drivers



IMPORTANT:

Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use **Intelligent Provisioning** and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the [Hewlett Packard Enterprise website](#).

To locate the drivers for a particular server, go to the [Hewlett Packard Enterprise Support Center website](#). Under **Select your HPE product**, enter the product name or number and click **Go**.

Software and firmware

Update software and firmware before using the server for the first time, unless any installed software or components require an older version.

For system software and firmware updates, use one of the following sources:

- Download the SPP from the [Hewlett Packard Enterprise website](#).
- Download individual drivers, firmware, or other systems software components from the server product page in the [Hewlett Packard Enterprise Support Center website](#).

Operating System Version Support

For information about specific versions of a supported operating system, refer to the [operating system support matrix](#).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can do the following:
 - View the SPP contents
 - Configure VCRM to update the repository automatically with internet downloads of the latest software and firmware from Hewlett Packard Enterprise
- VCA compares installed software versions on the server with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the following documents on the [Hewlett Packard Enterprise website](#):

- Systems Insight Manager User Guide
- Version Control Agent User Guide
- Version Control Repository Manager User Guide

To locate the documents, do the following:

1. Select **Insight Management** from the available options in Products and Solutions.
2. Select **Version Control** from the available options in Models / Subcategories.
3. Locate and download the latest document.

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](#).

HPE Technology Service Portfolio

HPE Technology Services deliver confidence, reduces risk and helps customers realize agility and stability. We help customers succeed through Hybrid IT by simplifying and enriching the on-premise experience, informed by public cloud qualities and attributes. HPE Support Services enables you to choose the right service level, length of coverage and response time to fit your business needs. Connect to HPE to help prevent problems and solve issues faster. By connecting, you will receive 24x7 monitoring, prefailure alerts, automatic call logging, and automatic parts dispatch. To learn more about getting connected, see the [Hewlett Packard Enterprise website](#).

For more information about support services, see the [Hewlett Packard Enterprise website](#).

Utilize our consulting expertise 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](#).

Change control and proactive notification

Hewlett Packard Enterprise offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of the following:

- Upcoming hardware and software changes
- Bulletins
- Patches

Let us know what Hewlett Packard Enterprise commercial products you own and we will send you the latest updates to keep your business running smoothly.

For more information, see the [Hewlett Packard Enterprise website](#).

Troubleshooting

Troubleshooting resources

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. To view the guide, select a language:

- [English](#)
- [French](#)
- [Spanish](#)
- [German](#)
- [Japanese](#)
- [Simplified Chinese](#)

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 view the guide, select a language:

- [English](#)
- [French](#)
- [Spanish](#)
- [German](#)
- [Japanese](#)
- [Simplified Chinese](#)

System battery replacement

System battery information

The server contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery that provides power to the real-time clock. If this battery is not properly handled, a risk of the fire and burns exists.

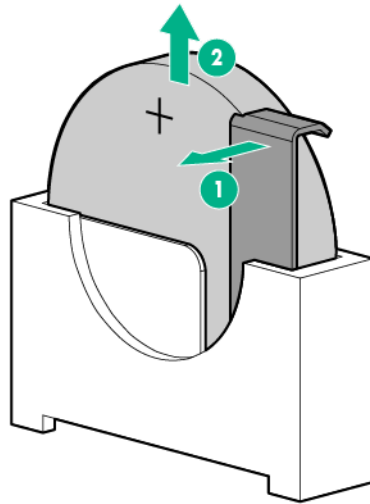
To reduce the risk of personal injury:

- 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.
- If the server no longer automatically displays the correct date and time, then replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

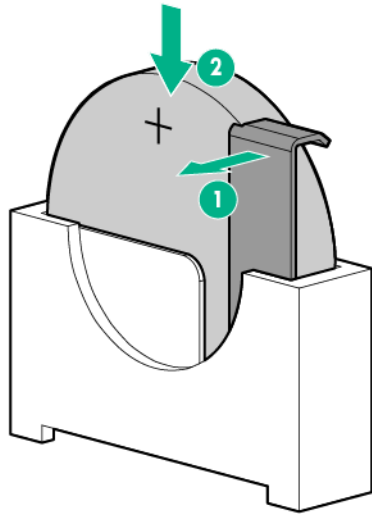
Replace the system battery

Procedure

1. Locate the battery on the system board.
2. Slightly push the metal tab, and then use the small flat-nose pliers to remove the system battery from its socket.



3. Slightly push the metal tab, then install the system battery in the socket.



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

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:

Procedure

- 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 \pm 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 range¹	—
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

¹ 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](#).

Mechanical specifications

Dimension	Value
Height	812.8 mm (32.00 in)
Depth	87.5 mm (3.44 in)
Width	448 mm (17.63 in)
Weight (approximate values)	—
24-bay LFF drive models	—
Without the four-bay rear LFF drive cage option, minimum	22.34 kg (49.25 lb)
Without the four-bay rear LFF drive cage option, maximum	39.74 kg (87.63 lb)

Table Continued

Dimension	Value
With the four-bay LFF rear drive cage option, minimum	23.20 kg (51.15 lb)
With the four-bay LFF rear drive cage option, maximum	40.60 kg (89.51 lb)
48-bay SFF drive models	—
Without the two- or six-bay rear SFF drive cage option, minimum	23.40 kg (51.59 lb)
Without the two- or six-bay rear SFF drive cage option, maximum	34.72 kg (76.54 lb)
With the two-bay SFF rear drive cage option, minimum	23.68 kg (52.21 lb)
With the two-bay SFF rear drive cage option, maximum	35.00 kg (77.16 lb)
With the six-bay SFF rear drive cage option, minimum	24.89 kg (54.87 lb)
With the six-bay SFF rear drive cage option, maximum	36.87 kg (81.28 lb)

Power supply specifications

Depending on the installed options and/or the regional location where the server was purchased, the server is configured with one of the following power input modules:

- HPE 1400 W Flex Slot Platinum Plus Hot-plug Power Supply (PN 720620-B21)
- HPE 800 W Flex Slot Platinum Hot-plug Power Supply (PN 720479-B21)
- HPE 800 W Flex Slot Titanium Hot-plug Power Supply (PN 720482-B21)
- HPE 800 W Flex Slot -48 V DC Hot-plug Power Supply (PN 720480-B21)
- HPE 800 W Flex Slot Universal Hot-plug Power Supply (PN 720484-B21)

These are HPE Flexible Slot Power Supply products for ProLiant servers. For more information about the power supply features, specifications, and compatibility, see the [Hewlett Packard Enterprise website](#).

⚠ CAUTION:
Check the system and power supply input ratings before powering up the server.

❗ IMPORTANT:
Mixing different types of power input modules in the same server might limit or disable some power supply features including support for power redundancy. To ensure access to all available features, all power input modules in the same server should have the same output and efficiency ratings.

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](#).

Warranty and regulatory information

Warranty information

[HPE ProLiant and x86 Servers and Options](#)

[HPE Enterprise Servers](#)

[HPE Storage Products](#)

[HPE Networking Products](#)

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](#).

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 қ.,
Бостандық ауданы, Әл-Фараби даңғылы, 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

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:

Hewlett Packard Enterprise Support Center

www.hpe.com/support/hpesc

Hewlett Packard Enterprise Support Center: Software downloads

www.hpe.com/support/downloads

Software Depot

www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:

www.hpe.com/support/e-updates

- 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:

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 HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

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	www.hpe.com/services/getconnected
HPE Proactive Care services	www.hpe.com/services/proactivecare
HPE Proactive Care service: Supported products list	www.hpe.com/services/proactivecaresupportedproducts
HPE Proactive Care advanced service: Supported products list	www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

Proactive Care central	www.hpe.com/services/proactivecarecentral
Proactive Care service activation	www.hpe.com/services/proactivecarecentralgetstarted

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 (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.

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
AWG	American wire gauge
CAS	column address strobe
CSA	Canadian Standards Association
CSR	Customer Self Repair
DDR3	double data rate-3
DDR4	double data rate-4
FAT	file allocation table
FBWC	flash-backed write cache
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
JBOD	just a bunch of disks
JSON	JavaScript Object Notation
LFF	large form factor
LOM	Lights-Out Management
LRDIMM	load reduced dual in-line memory module

NAND	Not AND
NMI	nonmaskable interrupt
NVDIMM	non-volatile dual in-line memory module
NVRAM	nonvolatile memory
OA	Onboard Administrator
PCIe	Peripheral Component Interconnect Express
PDU	power distribution unit
POST	Power-On Self-Test
QR code	quick response code
RBSU	ROM-Based Setup Utility
RDIMM	registered dual in-line memory module
REST	representational state transfer
RoHS	Restriction of Hazardous Substances
SAS	serial attached SCSI
SATA	serial ATA
SD	Secure Digital
SELV	separated extra low voltage
SFF	small form factor
SPP	Service Pack for ProLiant
SSD	solid-state device
STD	standard (DIMM voltage)
TMRA	recommended ambient operating temperature
TNV	telephone network voltage
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
UID	unit identification
VC	Virtual Connect
VCA	Version Control Agent

VCRM Version Control Repository Manager