



**Hewlett Packard
Enterprise**

HPE ProLiant DL580 Gen10 Server User Guide

Abstract

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

Part Number: 878778-009
Published: August 2019
Edition: 9

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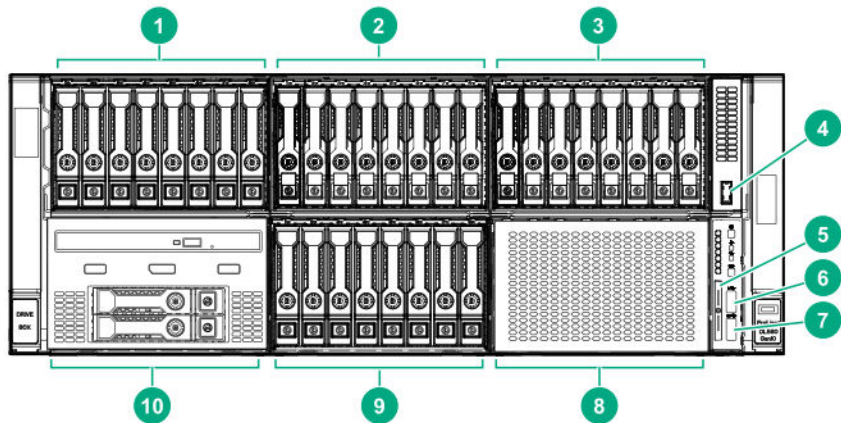
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Component identification

Front panel components

Server with power module

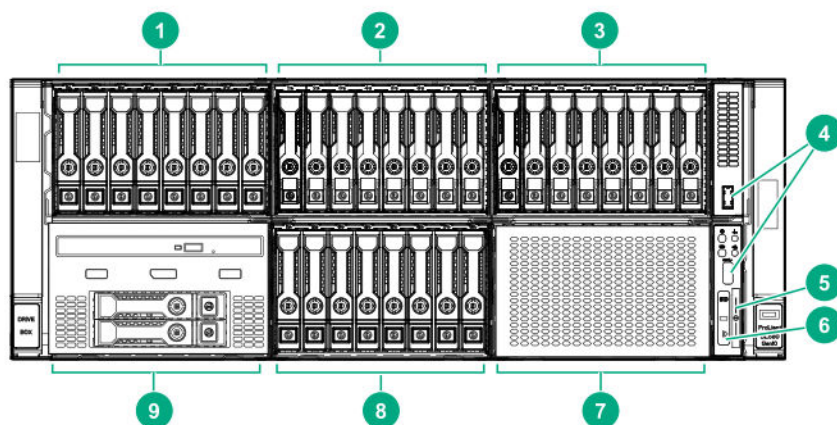


Item	Description
1	Box 1 — Supported options: <ul style="list-style-type: none">• <u>Eight-bay SFF HDD/SSD drive cage</u>• <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u>• <u>Eight-bay SFF NVMe SSD drive cage</u> (with only four NVMe drives installed)
2	Box 2 — Supported options: <ul style="list-style-type: none">• <u>Eight-bay SFF HDD/SSD drive cage</u>• <u>Eight-bay SFF NVMe SSD drive cage</u>• <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u>
3	Box 3 — Supported options: <ul style="list-style-type: none">• <u>Eight-bay SFF HDD/SSD drive cage</u>• <u>Eight-bay SFF NVMe SSD drive cage</u>• <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u>
4	Front USB 3.0 port

Table Continued

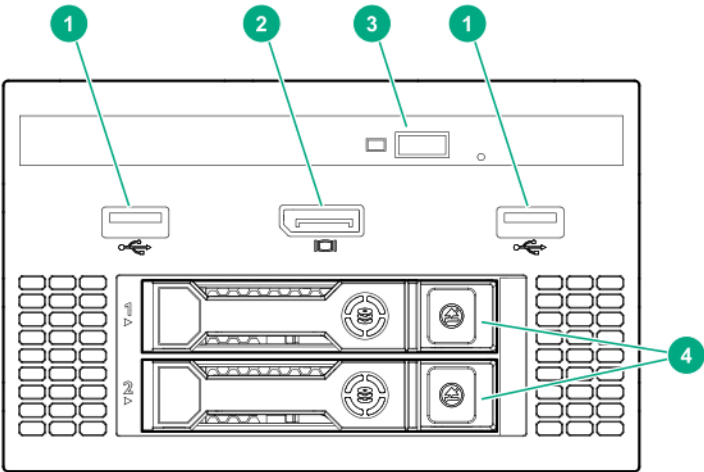
Item	Description
5	Serial number and iLO information pull tab
6	iLO Service Port (169.254.1.2)
7	Front USB 3.0 port
8	Box 6 — Supported option:
	<u>Eight-bay SFF HDD/SSD drive cage</u>
9	Box 5 — Supported option:
	<u>Eight-bay SFF HDD/SSD drive cage</u>
10	Box 4 — Supported options:
	<ul style="list-style-type: none"> • <u>Universal media bay components</u> • <u>Eight-bay SFF HDD/SSD drive cage</u>

Server with optional Systems Insight Display Module



Item	Description
1	Box 1 — Supported options: <ul style="list-style-type: none"> • <u>Eight-bay SFF HDD/SSD drive cage</u> • <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u> • <u>Eight-bay SFF NVMe SSD drive cage</u> (with only four NVMe drives installed)
2	Box 2 — Supported options: <ul style="list-style-type: none"> • <u>Eight-bay SFF HDD/SSD drive cage</u> • <u>Eight-bay SFF NVMe SSD drive cage</u> • <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u>
3	Box 3 — Supported options: <ul style="list-style-type: none"> • <u>Eight-bay SFF HDD/SSD drive cage</u> • <u>Eight-bay SFF NVMe SSD drive cage</u> • <u>Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage</u>
4	Front USB 3.0 ports (2)
5	Serial number and iLO information pull tab
6	Systems Insight Display Module
7	Box 6 — Supported option: <p><u>Eight-bay SFF HDD/SSD drive cage</u></p>
8	Box 5 — Supported option: <p><u>Eight-bay SFF HDD/SSD drive cage</u></p>
9	Box 4 — Supported options: <ul style="list-style-type: none"> • <u>Universal media bay components</u> • <u>Eight-bay SFF HDD/SSD drive cage</u>

Universal media bay components

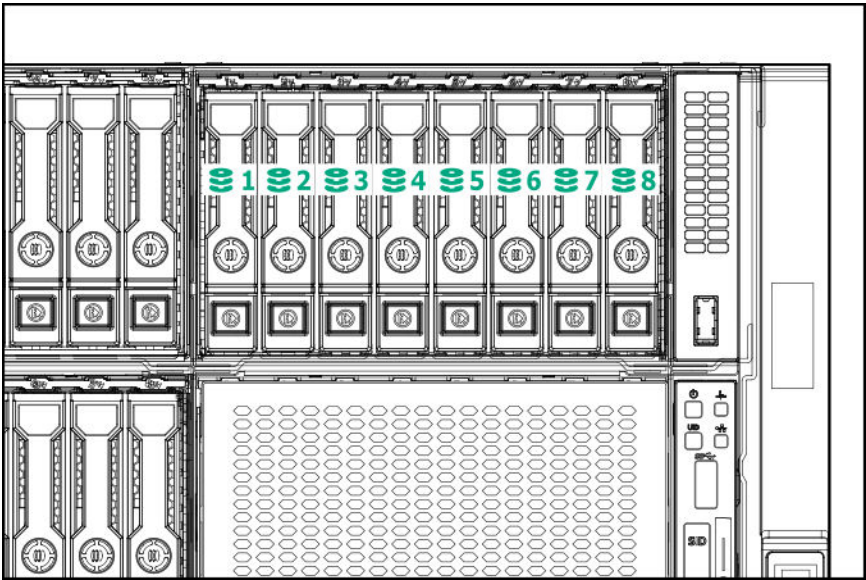


Item	Description
1	USB 2.0 port
2	Video display port
3	Optical disk drive (optional)
4	Drives (optional) ¹

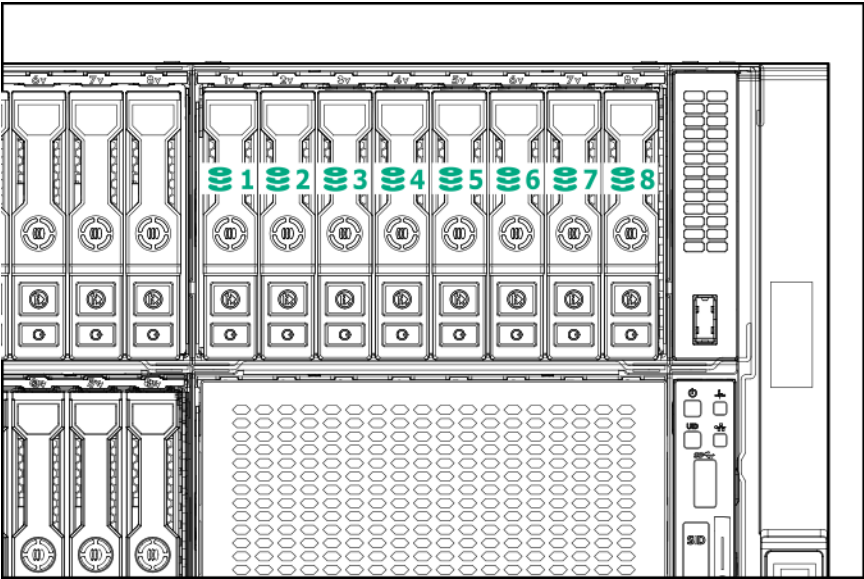
¹ Requires the two-bay SFF (Premium) drive cage

Drive bay numbering

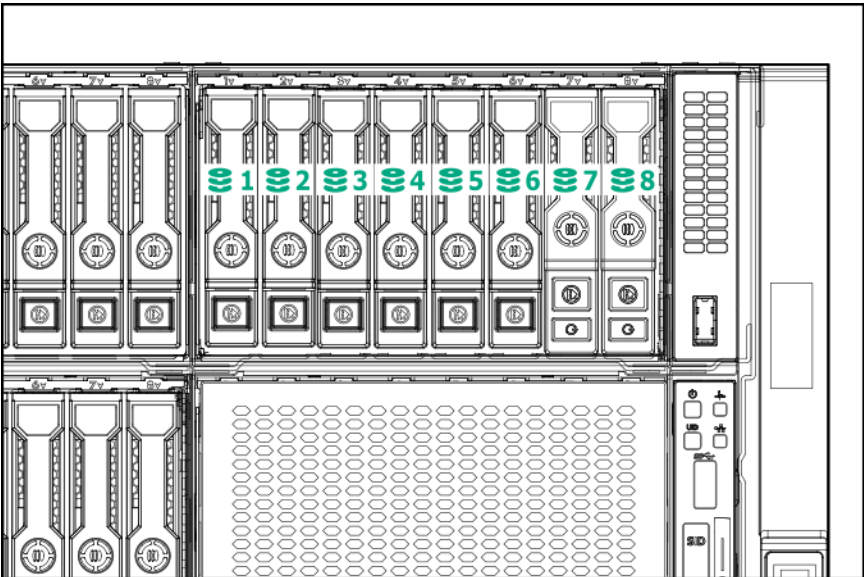
Eight-bay SFF HDD/SSD drive cage



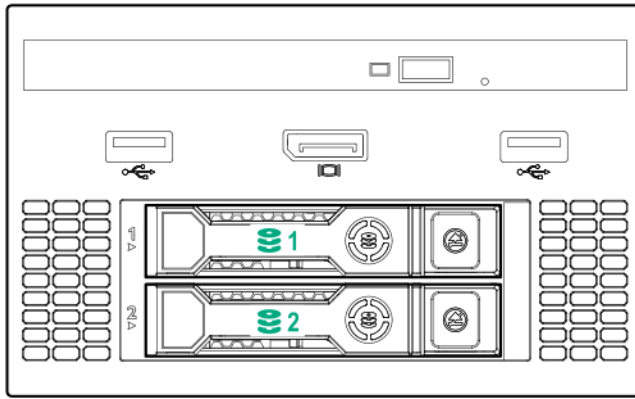
Eight-bay SFF NVMe drive cage



Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage

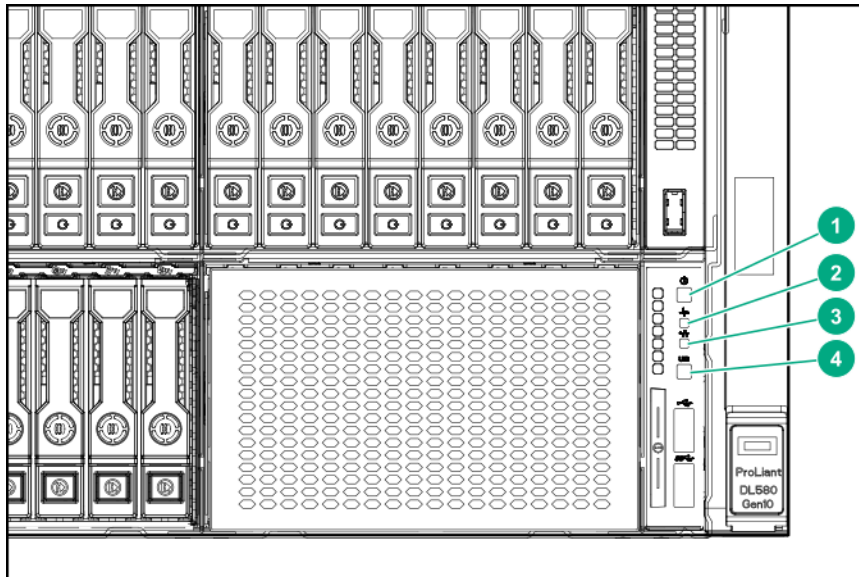


Two-bay SFF (Premium) drive cage

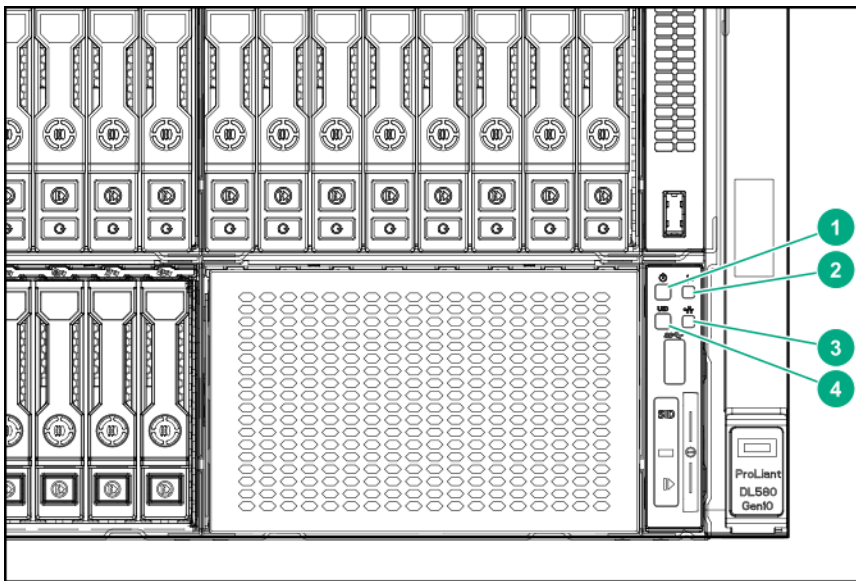


Front panel LEDs and buttons

Power switch module



Systems Insight Display module (optional)



Item	Description	Status
1	Power On/Standby button and system power LED ¹	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present ²
2	Health LED ¹	Solid green = Normal Flashing green (1 Hz/cycle per sec) = iLO is rebooting Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical ³

Table Continued

Item	Description	Status
3	NIC status LED ¹	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
4	UID button/LED ¹	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> • 1 Hz/cycle per sec = Remote management or firmware upgrade in progress • 4 Hz/cycle per sec = iLO manual reboot sequence initiated • 8 Hz/cycle per sec = iLO manual reboot sequence in progress • 1 fast flash and then off for 3 seconds = iLO Service Port status is Complete • 4 medium flashes and then off for 1 second = iLO Service Port status is Busy • 8 fast flashes and then off for 1 second = iLO Service Port status is Error Off = Deactivated

¹ When all four LEDs described in this table flash simultaneously, a power fault has occurred.

² Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

³ If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

UID button functionality

The UID button can be used to display the Server Health Summary when the server will not power on. For more information, see the latest *HPE iLO 5 User Guide* on the [Hewlett Packard Enterprise website](#).

Front panel LED power fault codes

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

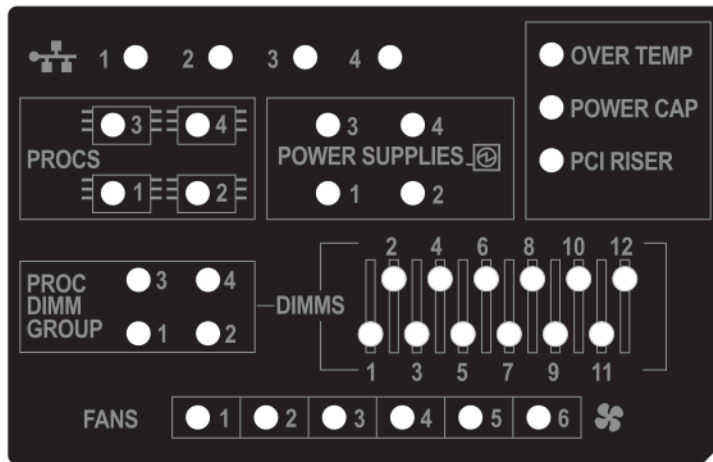
Subsystem	LED behavior
System board	1 flash
Processor	2 flashes
Memory	3 flashes
Riser board PCIe slots	4 flashes

Table Continued

Subsystem	LED behavior
FlexibleLOM	5 flashes
Removable HPE Smart Array SR Gen10 controller	6 flashes
System board PCIe slots	7 flashes
Power backplane or storage backplane	8 flashes
Power supply	9 flashes

Systems Insight Display LEDs

The Systems Insight Display LEDs represent the system board layout. The display enables diagnosis with the access panel installed.



Description	Status
Processor LEDs	Off = Normal Amber = Failed processor
DIMM LEDs	Off = Normal Amber = Failed DIMM or configuration issue
Fan LEDs	Off = Normal Amber = Failed fan or missing fan

Table Continued

Description	Status
NIC LEDs	<p>Off = No link to network</p> <p>Solid green = Network link</p> <p>Flashing green = Network link with activity</p> <p>If power is off, the front panel LED is not active. For status, see Rear panel LEDs on page 23.</p>
Power supply LEDs	<p>Off = Normal</p> <p>Solid amber = Power subsystem degraded, power supply failure, or input power lost.</p>
PCI riser LED	<p>Off = Normal</p> <p>Amber = Incorrectly installed PCI riser cage</p>
Over temp LED	<p>Off = Normal</p> <p>Amber = High system temperature detected</p>
Proc DIMM Group LED	<p>Off = Normal</p> <p>Amber = Failed DIMM or configuration issue</p>
Power cap LED	<p>Off = System is in standby, or no cap is set.</p> <p>Solid green = Power cap applied</p>

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. For more information on the combination of these LEDs, see **Systems Insight Display combined LED descriptions** on page 16.

Systems Insight Display combined LED descriptions

The combined illumination of the following LEDs indicates a system condition:

- Systems Insight Display LEDs
- System power LED
- Health LED

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	<p>One or more of the following conditions may exist:</p> <ul style="list-style-type: none"> • Processor in socket X has failed. • Processor X is not installed in the socket. • Processor X is unsupported. • ROM detects a failed processor during POST.
Processor (amber)	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot X is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	<p>One or more of the following conditions may exist:</p> <ul style="list-style-type: none"> • Only one power supply is installed and that power supply is in standby. • Power supply fault • System board fault

Table Continued

Systems Insight Display LED and color	Health LED	System power LED	Status
Power supply (amber)	Amber	Green	One or more of the following conditions may exist: <ul style="list-style-type: none"> Redundant power supply is installed and only one power supply is functional. AC power cord is not plugged into redundant power supply. Redundant power supply fault Power supply mismatch at POST or power supply mismatch through hot-plug addition
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.

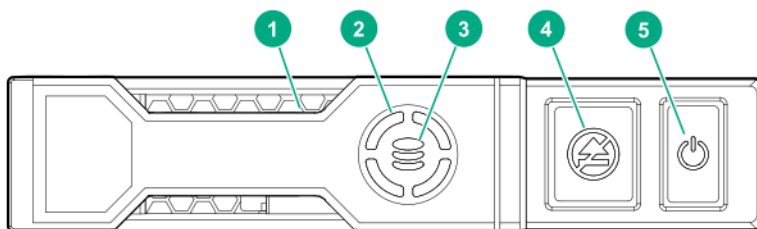
❗ **IMPORTANT:** If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

Drives

NVMe SSD LED definitions

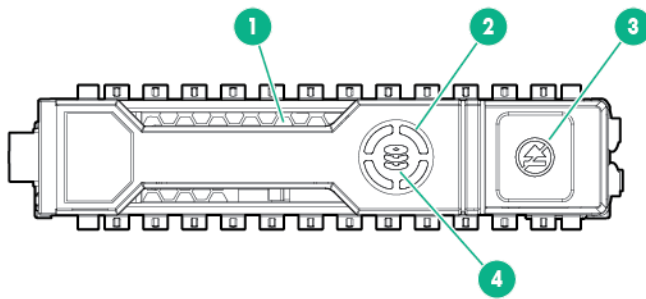
The NVMe SSD is a PCIe bus device. A device attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

⚠ **CAUTION:** Do not remove an NVMe SSD from the drive bay while the Do not remove LED is flashing. The Do not remove LED flashes to indicate that the device is still in use. Removing the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.



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	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is doing one of the following: <ul style="list-style-type: none"> • Rebuilding • Performing a RAID migration • Performing a stripe size migration • Performing a capacity expansion • Performing a logical drive extension • 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.
4	Do not remove	Solid white	Do not remove the drive. The drive must be ejected from the PCIe bus prior to removal.
		Flashing white	The drive ejection request is pending.
		Off	The drive has been ejected.
5	Power	Solid green	Do not remove the drive. The drive must be ejected from the PCIe bus prior to removal.
		Flashing green	The drive ejection request is pending.
		Off	The drive has been ejected.

SAS/SATA drive components and LEDs



Item	Description	Status
1	Locate	<ul style="list-style-type: none"> • 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 LED	<ul style="list-style-type: none"> • Rotating green = Drive activity. • Off = No drive activity.
3	Do not remove LED	<ul style="list-style-type: none"> • 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 LED	<ul style="list-style-type: none"> • 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.

Drive guidelines

⚠ CAUTION: Do not remove an NVMe SSD from the drive bay while the Do Not Remove button LED is flashing. The Do Not Remove button LED flashes to indicate the device is still in use. Removal of the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.

Depending on the configuration, this server supports SAS, SATA, and NVMe drives.

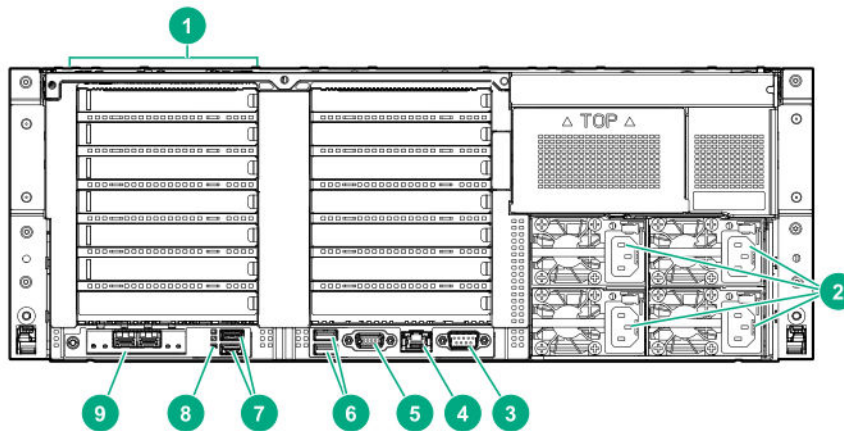
Observe the following general guidelines:

- For drive numbering, see **Drive bay numbering** on page 10.
- The NVMe SSD is a PCIe bus device. Do not remove a device attached to a PCIe bus without allowing it to first complete and cease the signal/traffic flow.
- The system automatically sets all device numbers.

- If only one hard drive is used, install it in the bay with the lowest device number.
- Drives must be the same capacity to provide the greatest storage space efficiency when drives are grouped into the same drive array.

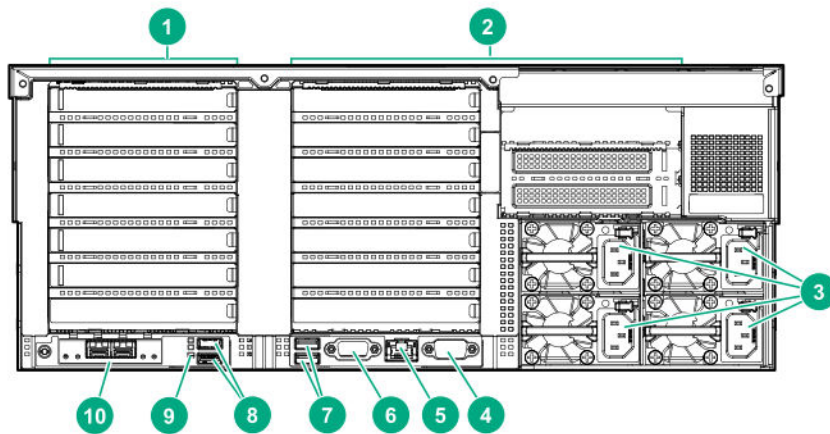
Rear panel components

Rear panel (standard)



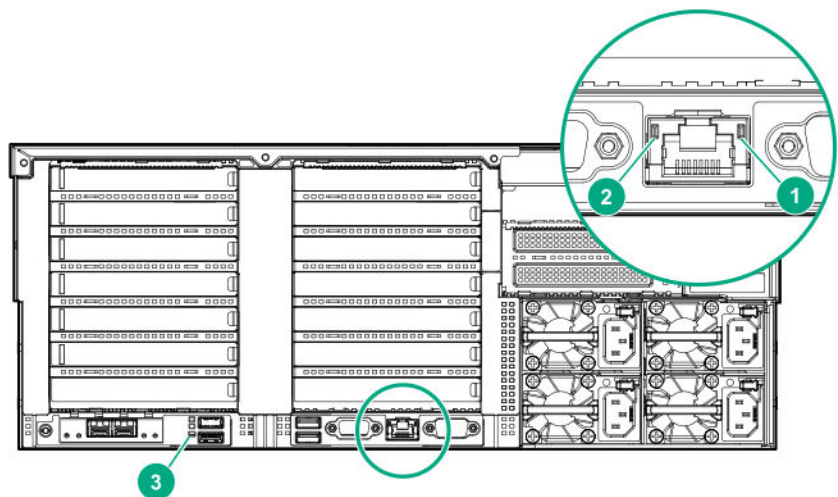
Item	Description
1	Primary PCIe riser slots 1-7
2	Power supplies (4)
3	Serial port
4	iLO Management Port
5	Video port
6	Rear USB 2.0 ports (2)
7	Rear USB 3.0 ports (2)
8	UID LED
9	FlexibleLOM (optional)

Rear panel with optional butterfly riser cage



Item	Description
1	Primary PCIe riser slots 1-7
2	Butterfly PCIe riser slots 8-16 (optional)
3	Power supplies (4)
4	Serial port
5	iLO Management Port
6	Video port
7	Rear USB 2.0 ports (2)
8	Rear USB 3.0 ports (2)
9	UID LED
10	FlexibleLOM (optional)

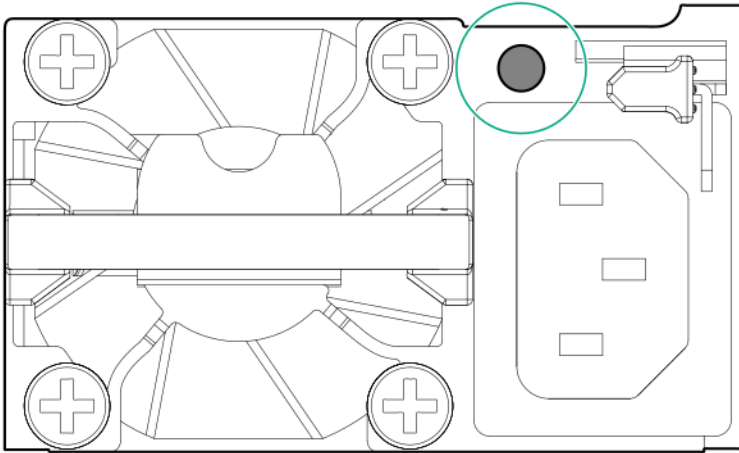
Rear panel LEDs



Item	Description	Status
1	Activity LED	Off = No network activity Solid green = Link to network Flashing green = Network activity
2	Link LED	Off = No network link Green = Network link
3	UID LED	Solid blue = Activated Flashing blue: <ul style="list-style-type: none">• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress• 4 Hz/cycle per sec = iLO manual reboot sequence initiated• 8 Hz/cycle per sec = iLO manual reboot sequence in progress• 1 fast flash and then off for 3 seconds = iLO Service Port status is Complete• 4 medium flashes and then off for 1 second = iLO Service Port status is Busy• 8 fast flashes and then off for 1 second = iLO Service Port status is Error Off = Deactivated

Power supply LEDs

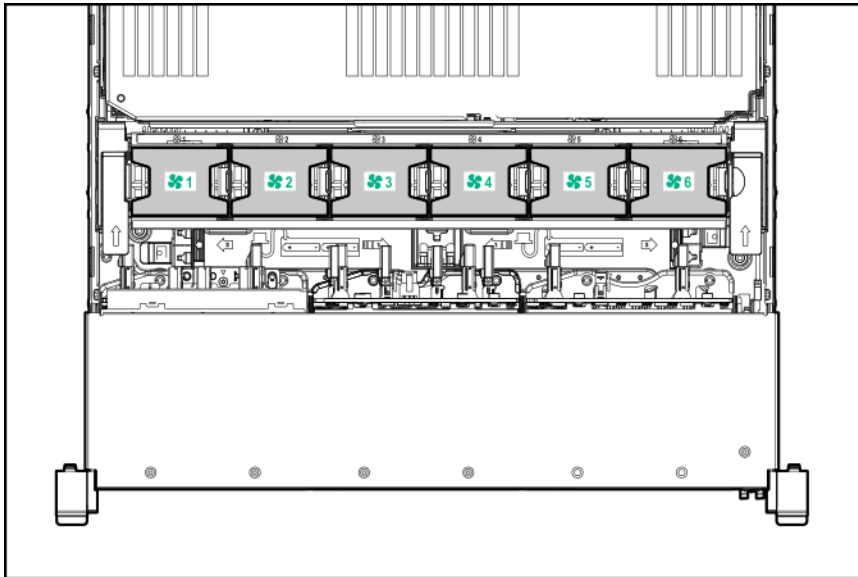
The power supply LED is located on each power supply.



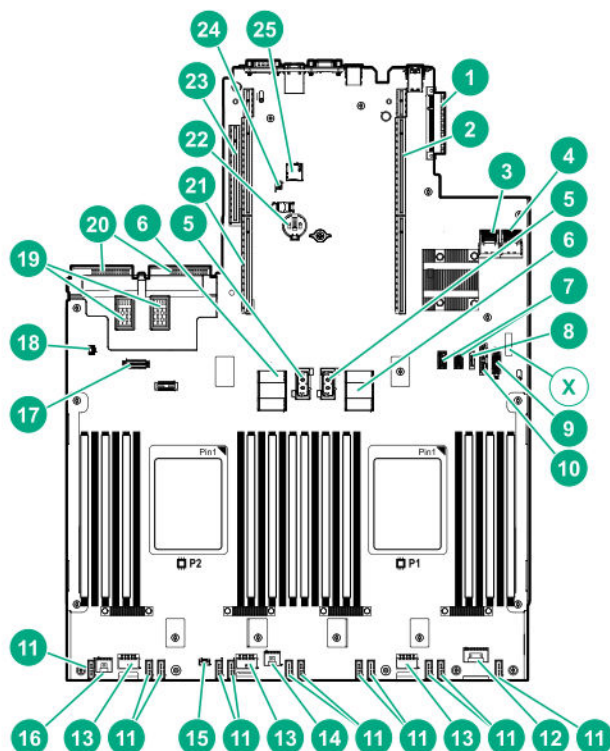
LED Status	Description
Off	System is off or power supply has failed.
Solid Green	Normal

Fan bay numbering

The server requires 12 fans, with two fans per bay.



System board components



Item	Description
1	FlexibleLOM connector
2	Primary PCIe riser connector (processor 1 required)
3	x4 SATA port 1
4	x4 SATA port 2
5	Upper processor mezzanine connector — Power (2)
6	Upper processor mezzanine connector — Signals (2)
7	USB 3.0 (2)
8	x1 SATA port
X	System maintenance switch
9	Front USB 3.0 connector and iLO Service Port
10	x1 SATA port / Optical Drive port
11	Fan connectors (12)
12	Front power switch connector
13	Drive backplane power connectors (3)
14	Energy pack connector 1 (system board and controllers) ¹
15	Optional 2SFF HDD x1 SATA board sideband connector

Table Continued

Item	Description
16	Energy pack connector 2 (processor mezzanine board) ²
17	Universal media bay USB/Display port connector
18	Intrusion detection switch connector
19	Power supply connectors (PS3, PS4)
20	Power supply connectors (PS1, PS2)
21	Secondary PCIe riser connector (processor 2 required)
22	System battery
23	Tertiary PCIe riser connector (processor 2 required)
24	TPM connector
25	microSD connector

¹ The energy pack connected to this connector provides backup power to the DIMM slots and controllers installed on the system board.

² The energy pack connected to this connector provides backup power to the DIMM slots on the processor mezzanine tray.

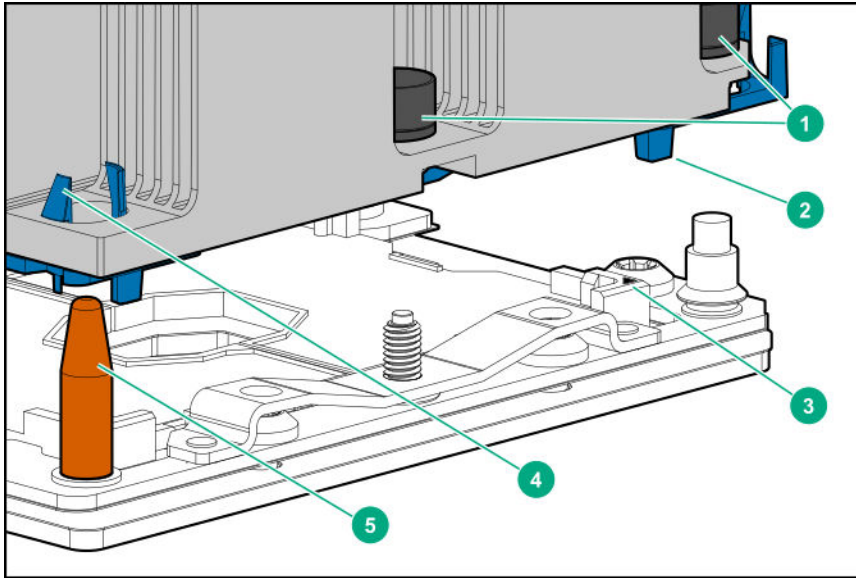
NOTE: This server supports only the HPE Smart Storage Battery.

System maintenance switch descriptions

Position	Default	Function
S1 ¹	Off	Off = iLO security is enabled. On = iLO security is disabled.
S2	Off	Reserved
S3	Off	Reserved
S4	Off	Reserved
S5 ¹	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6 ^{1, 2, 3}	Off	Off = No function On = Restore default manufacturing settings
S7	Off	Reserved
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

- ¹ To access the redundant ROM, set S1, S5, and S6 to On.
- ² When the system maintenance switch position 6 is set to the On position, the system is prepared to restore all configuration settings to their manufacturing defaults.
- ³ When the system maintenance switch position 6 is set to the On position and Secure Boot is enabled, some configurations cannot be restored. For more information, see **Secure Boot** on page 170.

Processor, heatsink, and socket components



Item	Description
1	Heatsink nuts
2	Processor carrier
3	Pin 1 indicator ¹
4	Heatsink latch
5	Alignment post

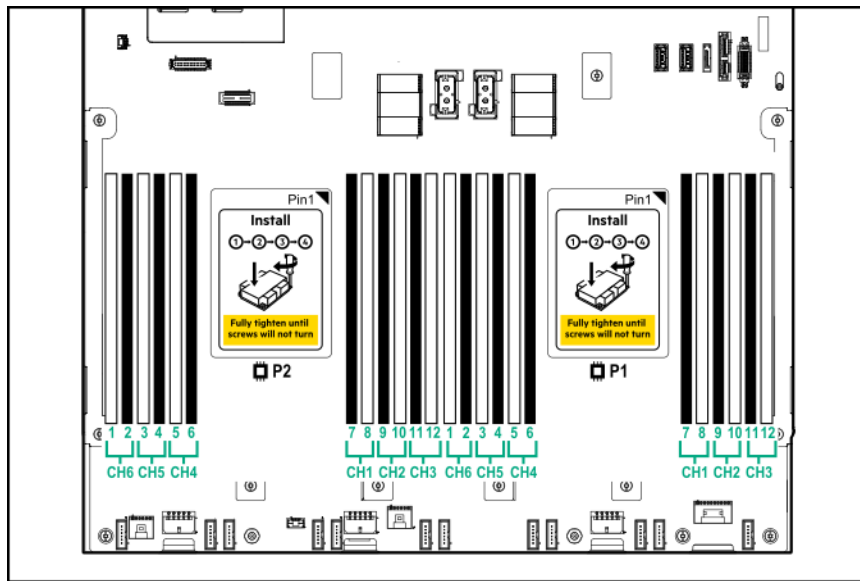
¹ Symbol also on the processor and frame.

DIMM slot locations

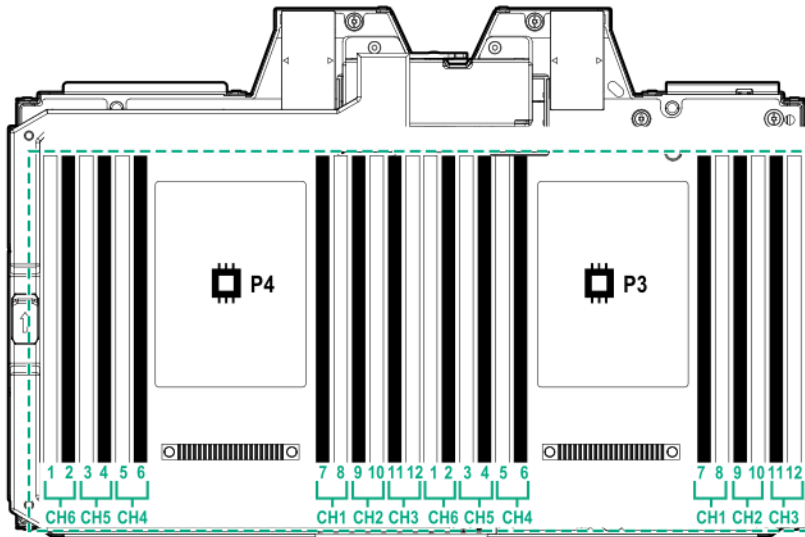
DIMM slots are numbered sequentially (1 through 12) for each processor on the system and mezzanine boards.

For specific DIMM population information, see the DIMM population guidelines on the Hewlett Packard Enterprise website (<http://www.hpe.com/docs/memory-population-rules>).

System board DIMM slots

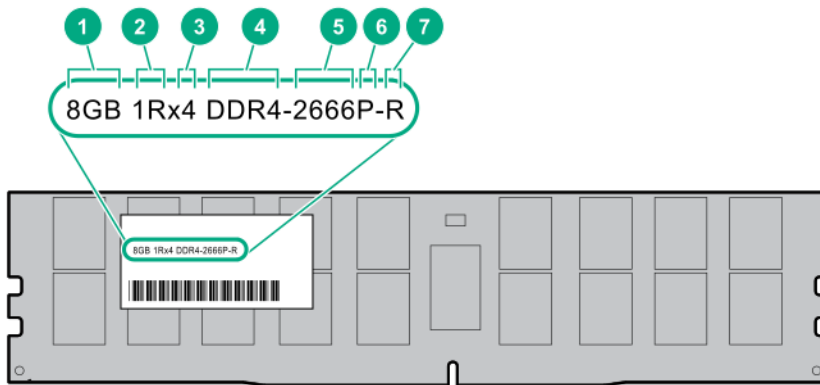


Processor mezzanine board DIMM slots



DIMM label identification

To determine DIMM characteristics, see the label attached to the DIMM. The information in this section helps you to use the label to locate specific information about the DIMM.



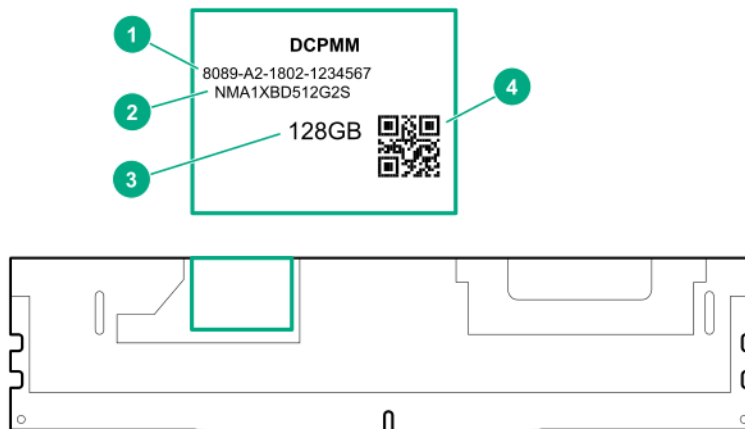
Item	Description	Example
1	Capacity	8 GB 16 GB 32 GB 64 GB 128 GB
2	Rank	1R = Single rank 2R = Dual rank 4R = Quad rank 8R = Octal rank
3	Data width on DRAM	x4 = 4-bit x8 = 8-bit x16 = 16-bit
4	Memory generation	PC4 = DDR4
5	Maximum memory speed	2133 MT/s 2400 MT/s 2666 MT/s 2933 MT/s

Table Continued

Item	Description	Example
6	CAS latency	P = CAS 15-15-15 T = CAS 17-17-17 U = CAS 20-18-18 V = CAS 19-19-19 (for RDIMM, LRDIMM) V = CAS 22-19-19 (for 3DS TSV LRDIMM) Y = CAS 21-21-21 (for RDIMM, LRDIMM) Y = CAS 24-21-21 (for 3DS TSV LRDIMM)
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced) E = Unbuffered ECC (UDIMM)

For more information about product features, specifications, options, configurations, and compatibility, see the HPE DDR4 SmartMemory QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/support/DDR4SmartMemoryQS>).

HPE Persistent Memory module label identification

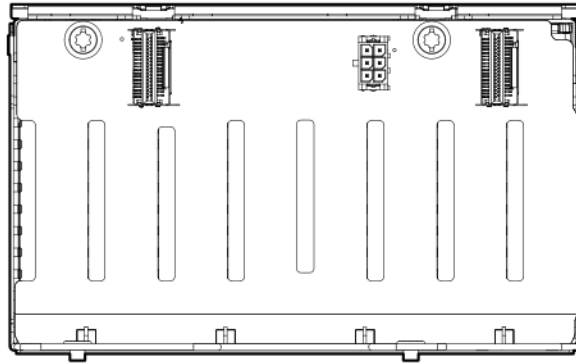


Item	Description	Example
1	Unique ID number	8089-A2-1802-1234567
2	Model number	NMA1XBD512G2S
3	Capacity	128 GB 256 GB 512 GB
4	QR code	Includes part number and serial number

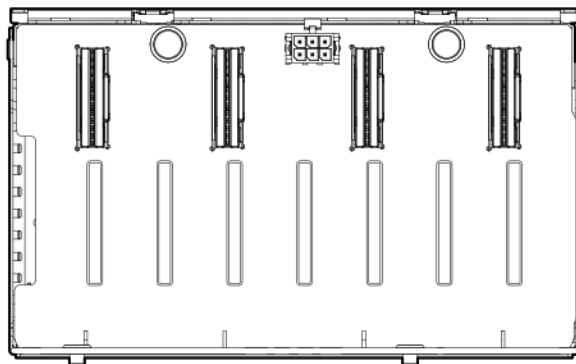
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/support/persistentmemoryQS>).

Drive cage backplane identification

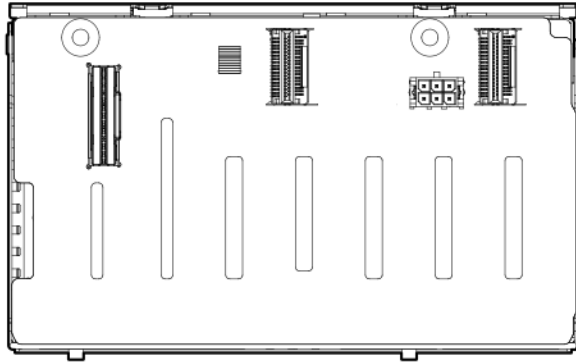
Eight-bay SFF HDD/SSD drive cage backplane



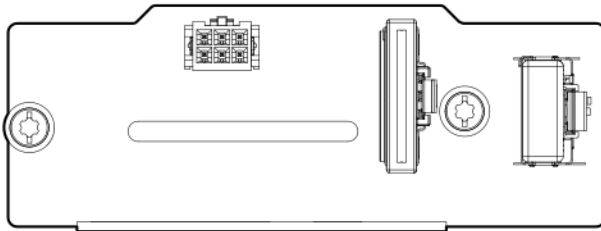
Eight-bay SFF NVMe SSD drive cage backplane



Two-bay NVMe/Six-bay SFF HDD (Premium) drive cage backplane

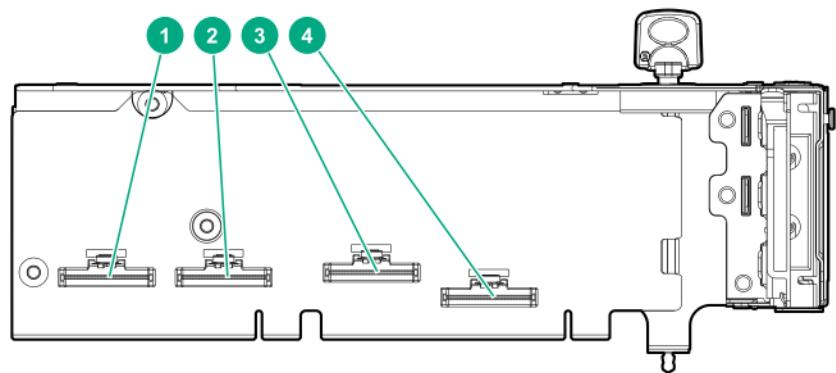


Two-bay SFF (Premium) drive cage backplane



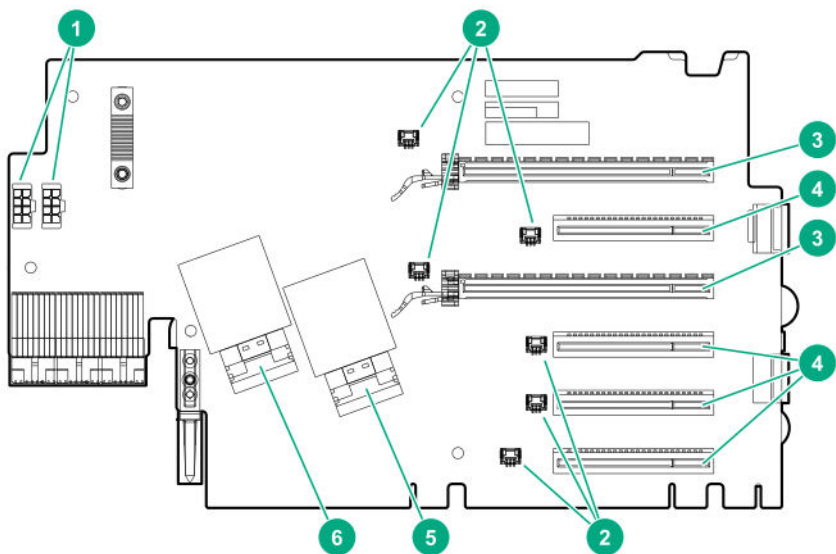
Riser board components

4 port Slimline riser



Item	Description
1–4	x8 Slimline NVMe connectors

6 slot riser board

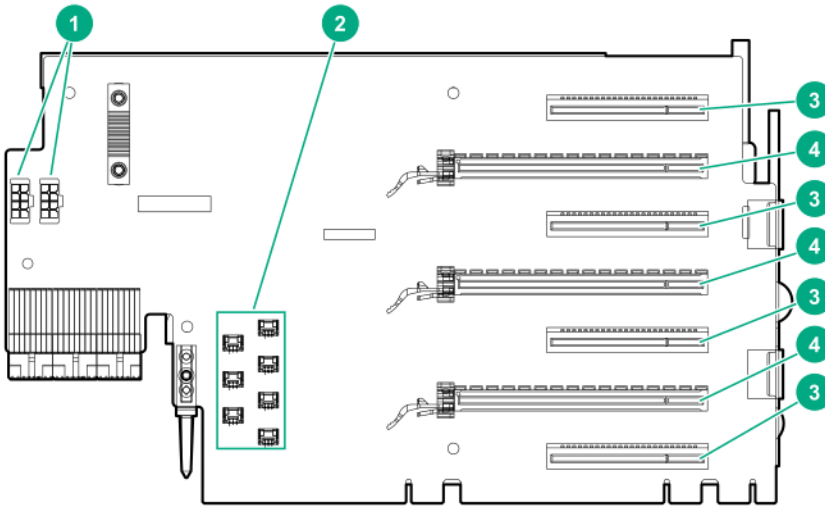


Item	Description
1	GPU power connectors (2)
2	Controller backup power connectors (6)
3	x16 connectors (2)

Table Continued

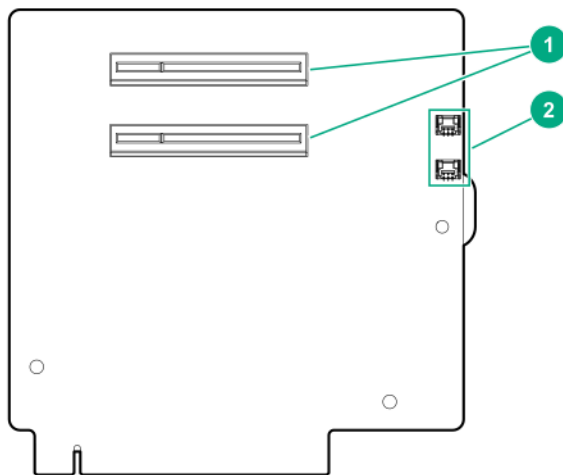
Item	Description
4	x8 connectors (4)
5	NVMe slimline connector J4
6	NVMe slimline connector J3

7 slot riser board



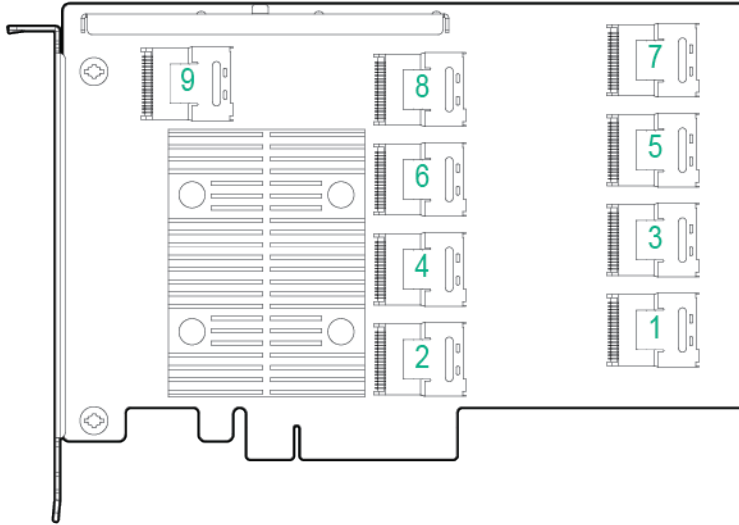
Item	Description
1	GPU power connectors (2)
2	Controller backup power connectors (7)
3	x8 connectors (4)
4	x16 connectors (3)

Tertiary riser board

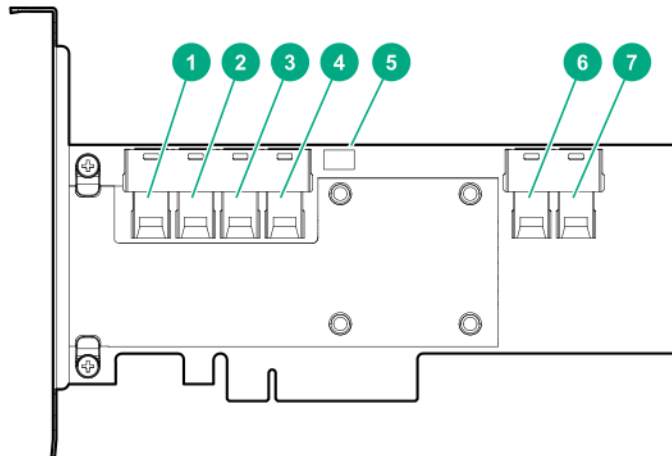


Item	Description
1	x8 connectors (2)
2	Controller backup power connectors

HPE 12G SAS Expander Card port numbering



HPE Smart Array P824i-p MR Gen10 Controller



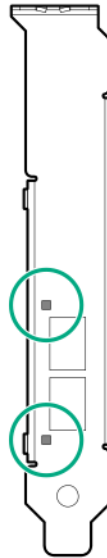
Components

Item	Description
1	Internal SAS port 1i
2	Internal SAS port 2i

Table Continued

Item	Description
3	Internal SAS port 3i
4	Internal SAS port 4i
5	Controller backup power cable connector
6	Internal SAS port 5i
7	Internal SAS port 6i

HPE InfiniBand HDR/Ethernet 940QSFP 56x16 adapter LEDs



Link LED status ¹	Description
Off	A link has not been established.
Solid amber	Active physical link exists
Blinking amber	4 Hz blinking amber indicates a problem with the physical link.
Solid green	A valid logical (data activity) link exists with no active traffic.
Blinking green	A valid logical link exists with active traffic.

¹ 2-port adapter LEDs are shown. The 1-port adapters have only a single LED.

Operations


Power up the server

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

- Press the Power On/Standby button.
- Use the virtual power button through iLO.

Power down the server

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


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

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

- Press and release the Power On/Standby button.
This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.
This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO.
This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

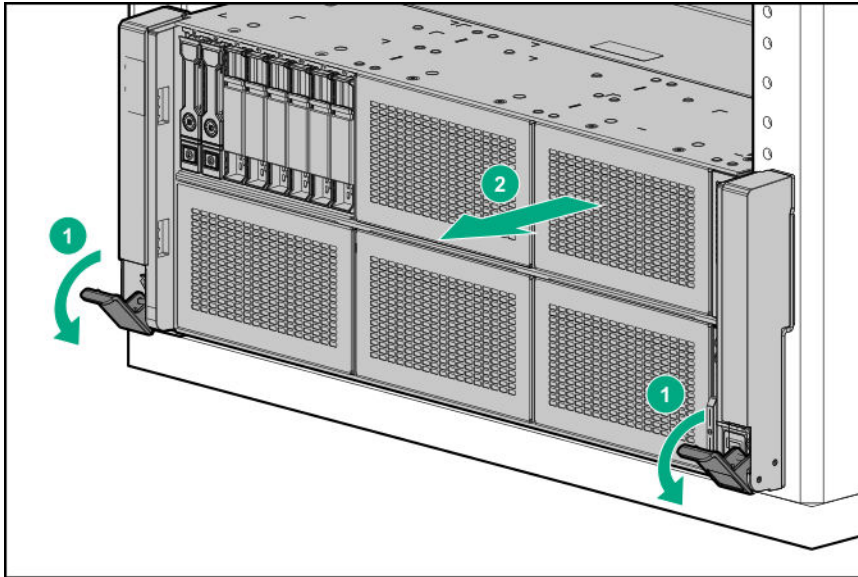
Before proceeding, verify that the server is in standby mode by observing that the system power LED is amber.

Extending the server from the rack

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

Procedure

Pull down the quick release levers on each side of the server, and then extend the server from the rack.

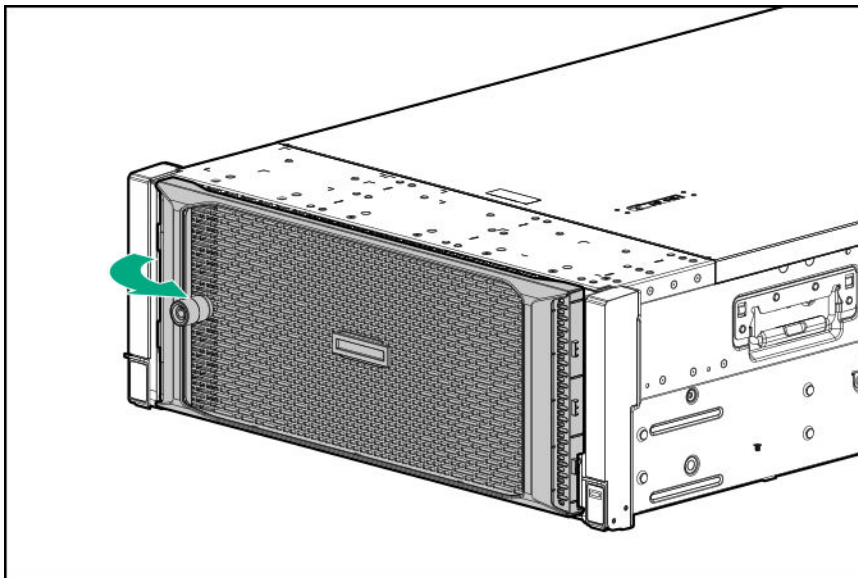


Removing the server from the rack

Procedure

1. **Power down the server** on page 37.
2. Extend the server from the rack (**Extending the server from the rack** on page 37).
3. Disconnect the cabling and remove the server from the rack.
For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

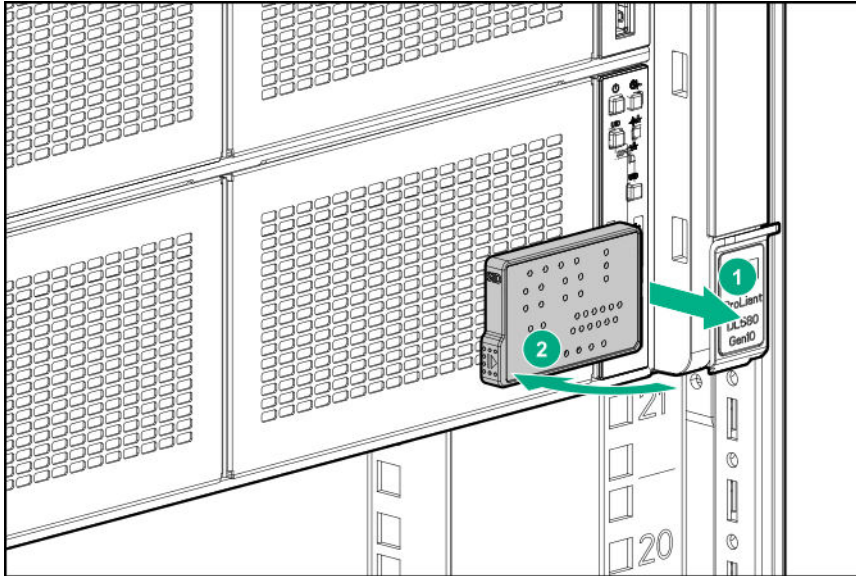
Removing the bezel



Accessing the Systems Insight Display

Procedure

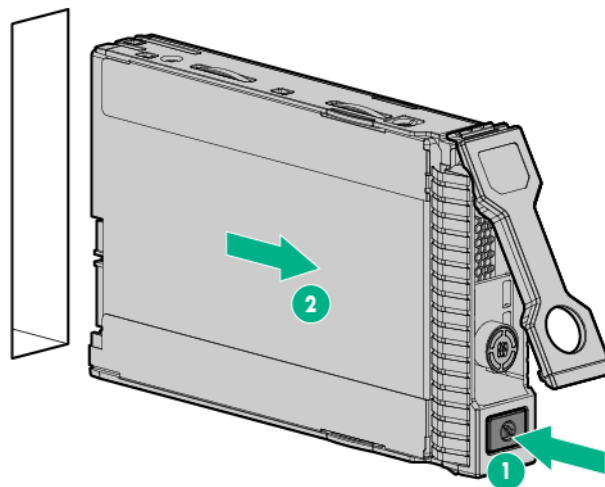
1. Press and release the panel.
2. Pull out the display to fully extend it, and then rotate the display to view the LEDs.



Removing a hot-plug SAS or SATA drive

Procedure

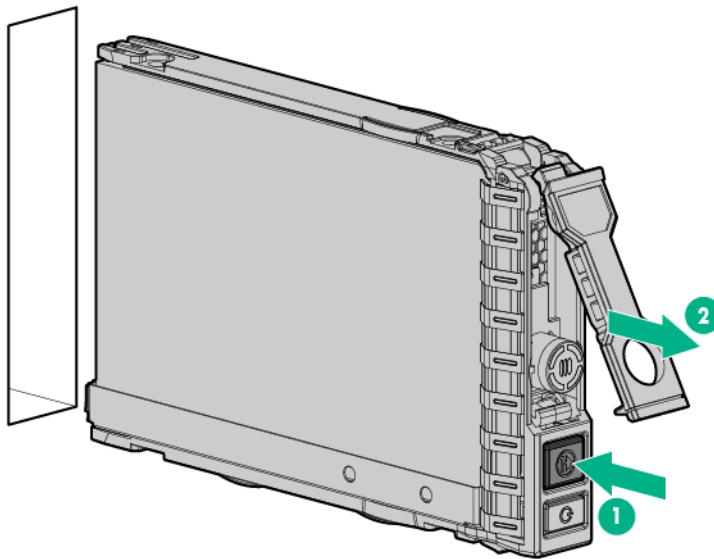
1. Determine the status of the drive from the drive LED definitions (**SAS/SATA drive components and LEDs** on page 19).
2. Back up all data on the drive.
3. Remove the drive.



Removing an NVMe drive

Procedure

1. Determine the status of the drive from the drive LED definitions ([NVMe SSD LED definitions](#)).
2. Back up all server data.
3. Remove the drive:
 - a. Push the Power button.
The Do Not Remove button will illuminate and flash. Do not press the button while it is illuminated.
 - b. When the flashing stops and the icon on the button is no longer illuminated or flashing, press the Do Not Remove button to release the release lever.
 - c. Pull the release lever to disengage the drive from the backplane, and slide the drive out of the drive bay.



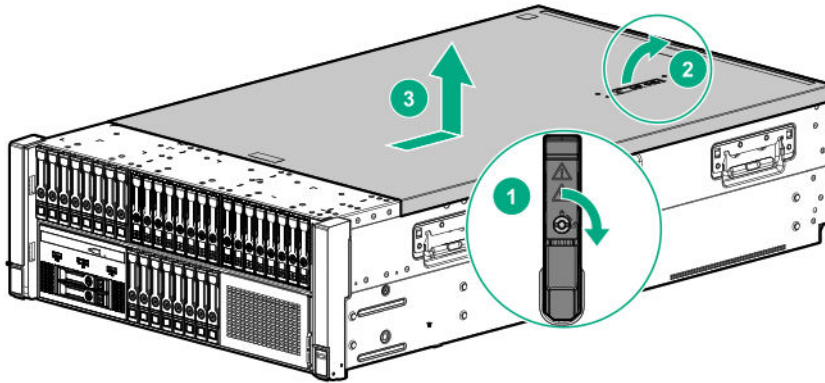
Removing the access panel

-
- ⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.
-
- ⚠ CAUTION:** 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.
-
- ⚠ CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.
-

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. If the locking latch is locked, use a T-15 Torx screwdriver to unlock the latch.
5. Open the locking latch.

The access panel slides back, releasing it from the chassis.
6. Lift and remove the access panel.



Turn the access panel over to locate the server label. This label provides convenient access to component identification and LED status indicators.

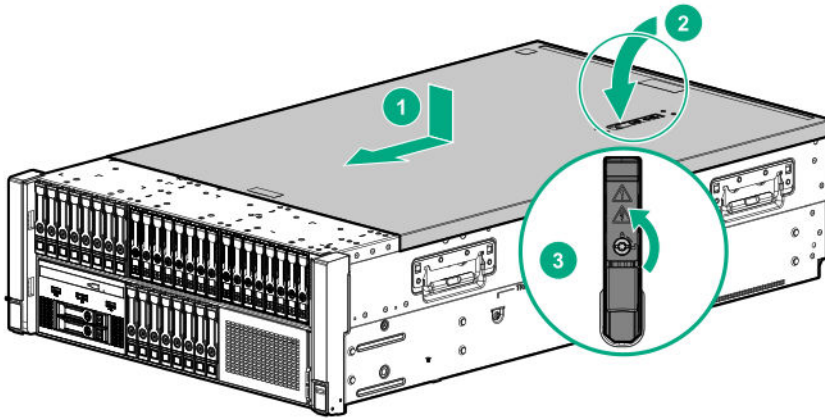
Installing the access panel

Procedure

1. Place the access panel on top of the server with the latch open.

Allow the panel to extend past the rear of the server by approximately 1.25 cm (0.5 in).
2. Push down on the latch.

The access panel slides to a closed position.
3. Tighten the security screw on the latch.



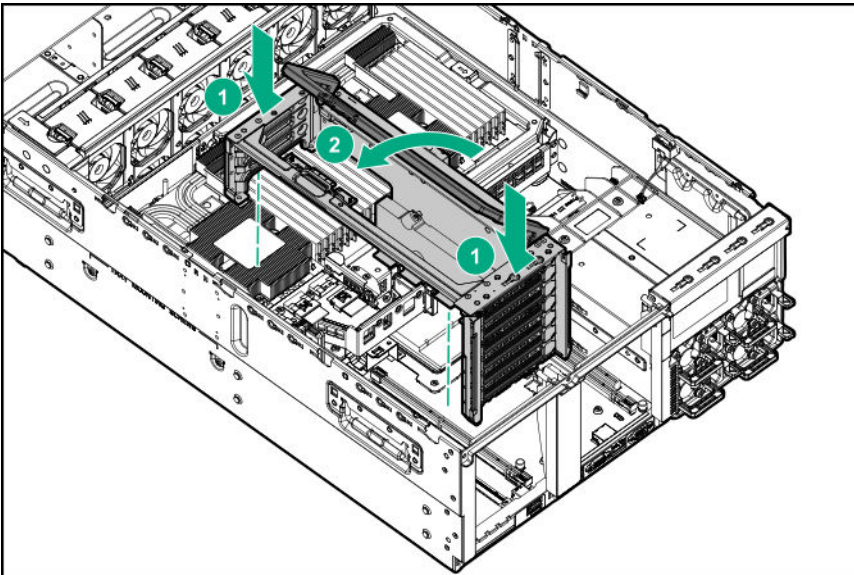
Installing the primary PCIe riser cage

- CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCIe riser cage.

Procedure

1. Install the primary PCIe riser cage.

- CAUTION:** To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.



2. Install the access panel ([Installing the access panel](#) on page 41).
3. Install the server into the rack ([Installing the server into the rack](#) on page 59).
4. Connect each power cord to the server.

5. Connect each power cord to the power source.

6. **Power up the server** on page 37.

Removing a PCIe riser cage

⚠ CAUTION: To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCIe riser cage.

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

Procedure

1. **Power down the server** on page 37.

2. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

3. Do one of the following:

- Extend the server from the rack (**Extending the server from the rack** on page 37).
- Remove the server from the rack (**Removing the server from the rack** on page 38).

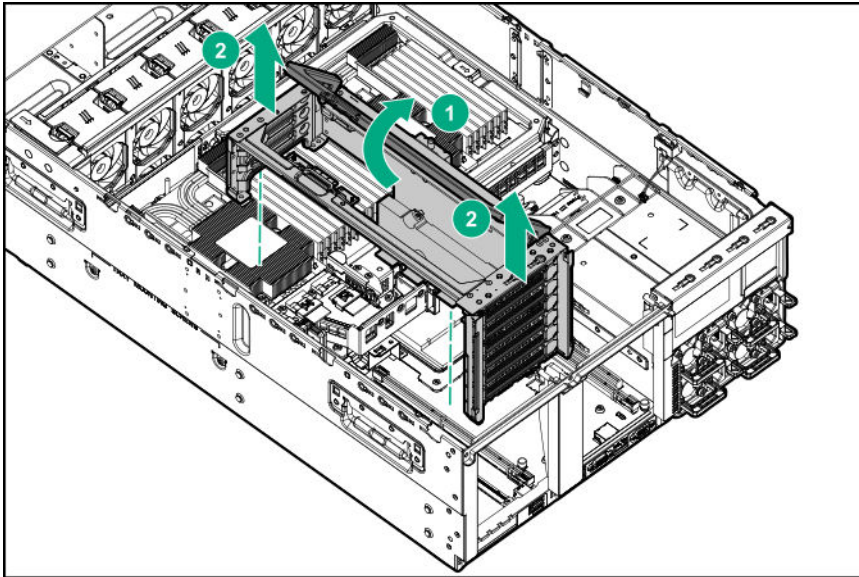
4. Remove the access panel (**Removing the access panel** on page 40).

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

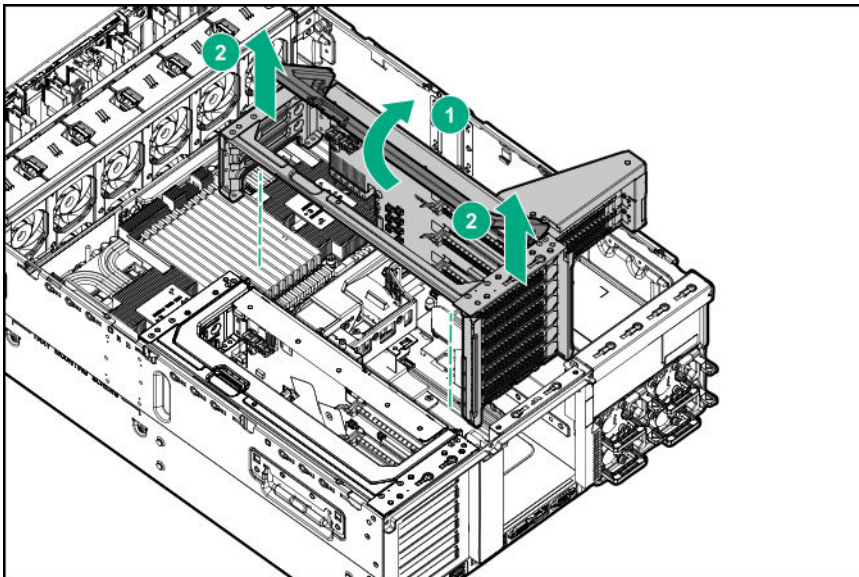
5. Disconnect all cables attached to the expansion boards in the PCIe riser cage.

6. Remove the riser cage:

- Primary riser cage



- Butterfly riser cage



Removing the air baffle

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

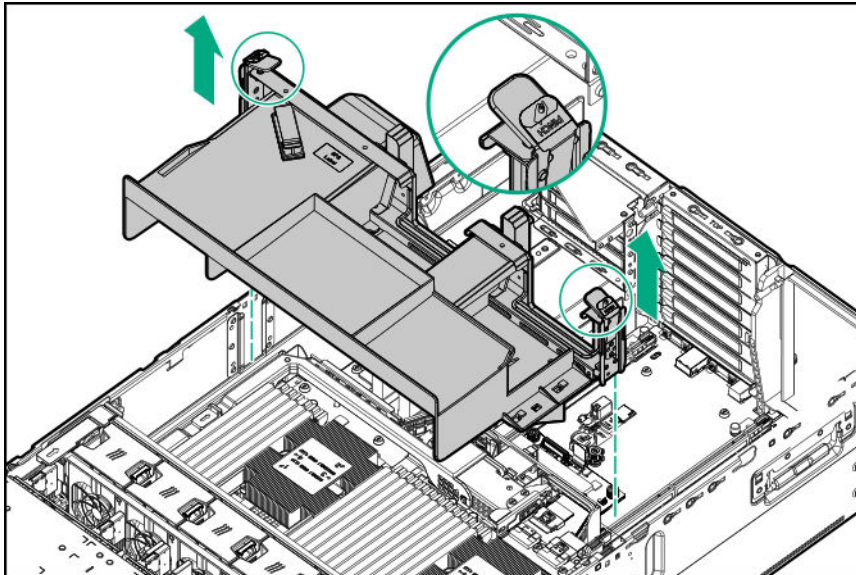
Procedure

1. **Power down the server** on page 37.
2. Remove all power:

- a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
- Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle.



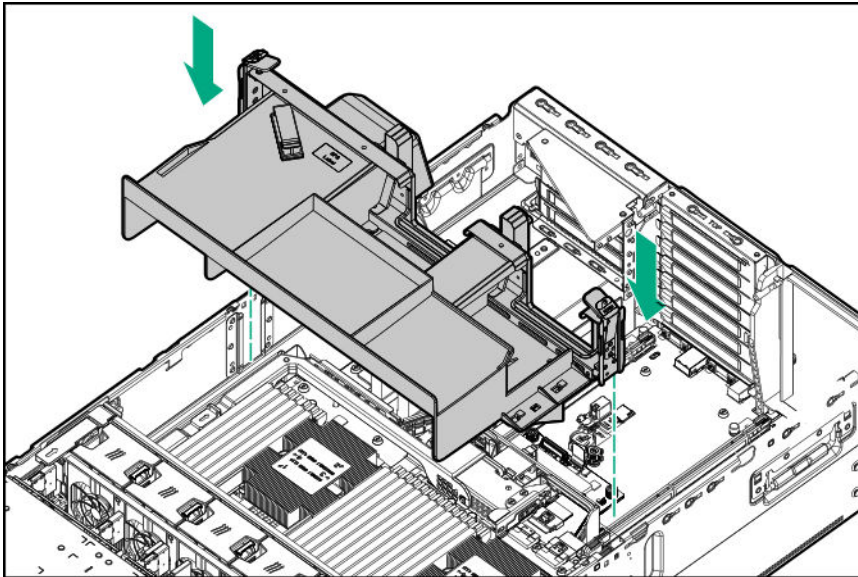
Installing the air baffle

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

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

Procedure

1. Install the air baffle.



2. Install the primary PCIe riser cage ([Installing the primary PCIe riser cage](#) on page 42).
3. Install the butterfly PCIe riser cage ([Installing a butterfly PCIe riser cage](#) on page 86).
4. Install the access panel ([Installing the access panel](#) on page 41).
5. Install the server into the rack ([Installing the server into the rack](#) on page 59).
6. Connect each power cord to the server.
7. Connect each power cord to the power source.
8. **Power up the server** on page 37.

Removing the fan cage

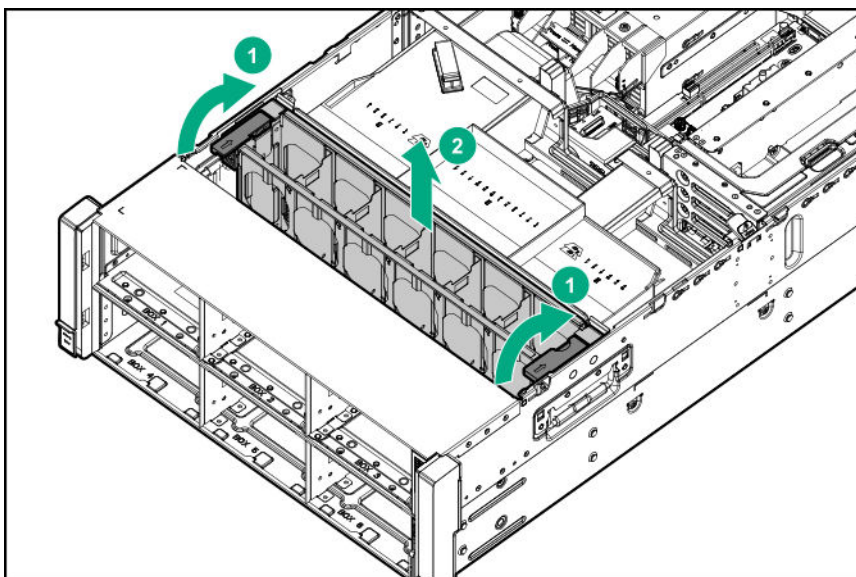
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
4. Remove the access panel ([Removing the access panel](#) on page 40).



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

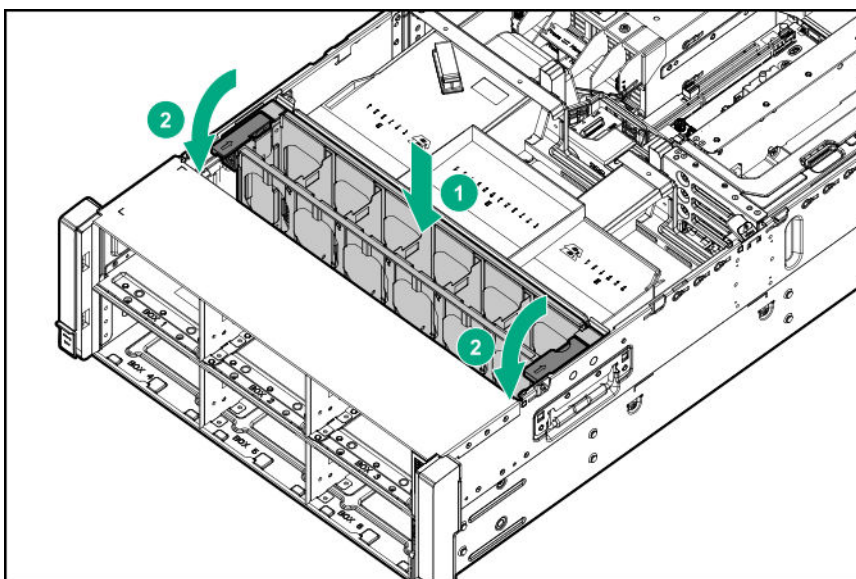
5. Remove the fan cage.



Installing the fan cage

Procedure

1. Install the fan cage.



2. Install the access panel ([Installing the access panel](#) on page 41).
3. Install the server into the rack ([Installing the server into the rack](#) on page 59).
4. Connect each power cord to the server.
5. Connect each power cord to the power source.
6. **Power up the server** on page 37.

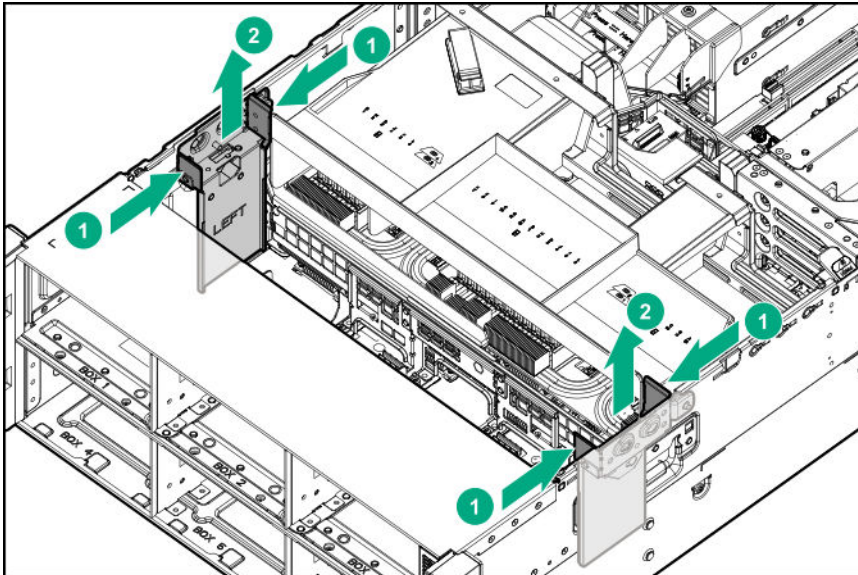
Removing the fan cage holders

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

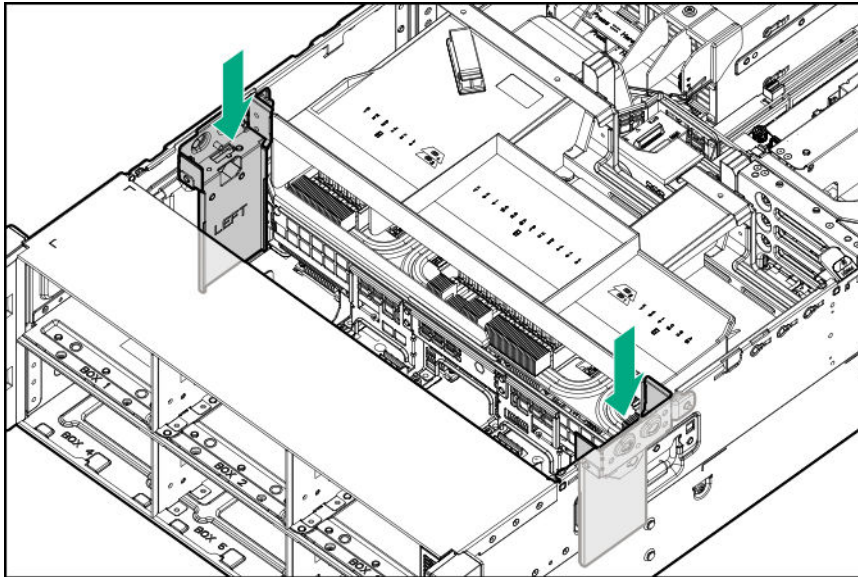
5. Remove the fan cage (**Removing the fan cage** on page 46).
6. Remove the fan cage holders.



Installing fan cage holders

Procedure

1. Install the fan cage holders.



2. Install the fan cage (**Installing the fan cage** on page 47).
3. If removed, do the following:
 - Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
 - Install the CPU Mezzanine UPI performance kit (**Installing the CPU Mezzanine UPI performance kit** on page 122).
4. Install the access panel (**Installing the access panel** on page 41).
5. Install the server into the rack (**Installing the server into the rack** on page 59).
6. Connect each power cord to the server.
7. Connect each power cord to the power source.
8. **Power up the server** on page 37.

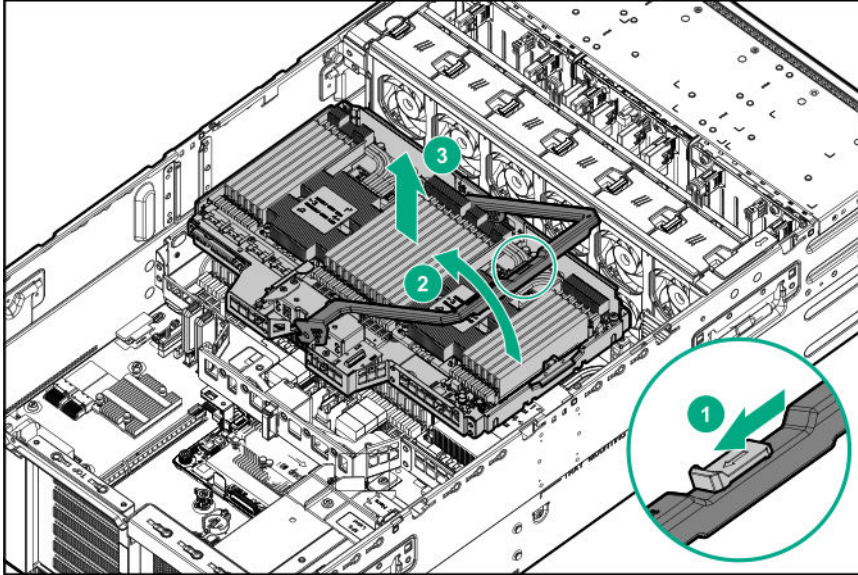
Removing the processor mezzanine tray

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. Remove the processor mezzanine tray.



Removing the CPU Mezzanine UPI performance kit

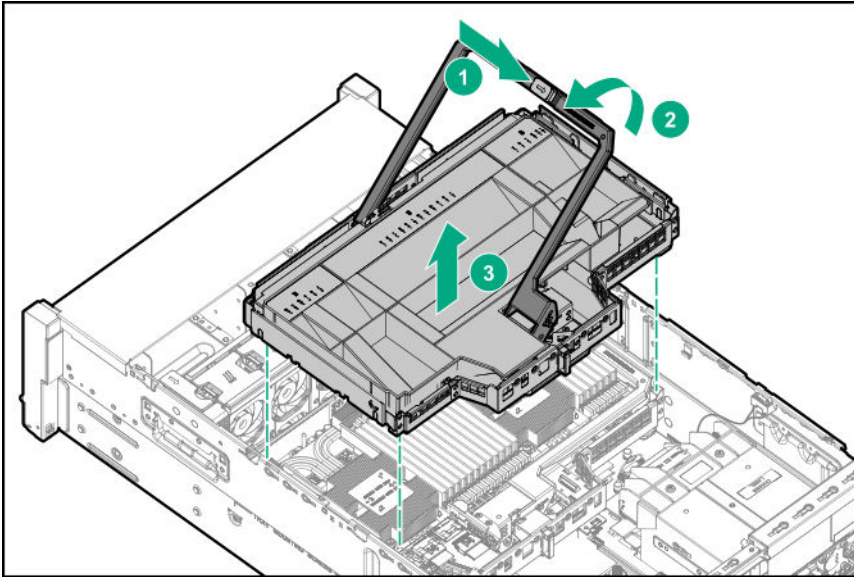
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).

6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. Remove the CPU Mezzanine UPI performance kit.



Setup

HPE support services

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

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

- Foundation Care – Keep systems running.
 - 6-Hour Call-to-Repair
 - 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-Repair
 - 4-Hour 24x7
 - Next Business Day
- Startup and implementation services for both hardware and software
- HPE Education Services – Help train your IT staff.

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

Setup overview

Prerequisites

Before setting up the server:

- Download the latest SPP:
<http://www.hpe.com/servers/spp/download>
Support validation required
- Verify that your OS or virtualization software is supported:
<http://www.hpe.com/info/ossupport>
- Read the operational requirements for the server:
[Operational requirements](#) on page 55
- Read the safety and compliance information on the Hewlett Packard Enterprise website:
<http://www.hpe.com/support/safety-compliance-enterpriseproducts>
- Obtain the storage driver if needed:

- Download it from the Hewlett Packard Enterprise support center website.
- Extract it from the SPP.

Procedure

1. Unbox the server and verify the contents:

- A server
- A power cord
- Rack-mounting hardware
- Documentation

2. (Optional) Install hardware options.

For installation instructions, see **Hardware options installation**.

3. **Install the server in a rack.**

4. Decide how to manage the server:

- Locally: use a KVM switch or a connect a keyboard, monitor, and mouse.
- Remotely: connect to the iLO web interface and run a remote console:

a. Verify the following:

- iLO is licensed to use the remote console feature.
If iLO is not licensed, visit **<http://www.hpe.com/info/ilo>**.
- The iLO management port is connected to a secure network.

b. Using a browser, navigate to the iLO web interface, and then log in.

`https://<iLO hostname or IP address>`

Note the following:

- The hostname is on the serial pull tab.
- If a DHCP server assigns the IP address, the IP address appears on the boot screen.
- If a static IP address is assigned, use that IP address.
- The default login credentials are on the serial label pull tab.

c. In the side navigation, click the **Remote Console & Media** link, and then launch a remote console.

5. Press the Power On/Standby button.

For remote management, use the iLO virtual power button.

6. Using the SPP, **update the following**:

- System ROM
- Storage controller

- Network adapters
- Intelligent Provisioning

7. Do one of the following:

- To configure the server to boot from a SAN, see the following guide:

<https://www.hpe.com/info/boot-from-san-config-guide>

- If a Smart Array controller is installed:

- For Smart Array SR controllers, use HPE Smart Storage Administrator to create arrays:

- From the boot screen, press **F10** to run Intelligent Provisioning.
- From Intelligent Provisioning, run **HPE Smart Storage Administrator**.

- For Smart Array MR controllers, use the UEFI System Configuration to create arrays.

For procedures on creating arrays with MR controllers, see the following guide in the **information library**:

HPE Smart Array P824i-p MR Gen10 User Guide

! **IMPORTANT:** Smart array MR controllers are not supported by Intelligent Provisioning or Smart Storage Administrator.

! **IMPORTANT:** Before you install an OS on drives connected to the HPE Smart Array P824i-p MR Gen10 Controller, configure the drives using **UEFI System Utilities (F9)**. If the drives are not configured, the OS will not detect the drives during installation. For more information, see *HPE Smart Array P824i-p MR Gen10 User Guide* at the Hewlett Packard Enterprise website <http://www.hpe.com/info/P824i-p-docs>.

- If no controller is installed, do one of the following:

- AHCI is enabled by default. You can deploy an OS or virtualization software.

- Disable AHCI, enable software RAID, and then create an array:

- From the boot screen, press **F9** to run UEFI System Utilities.
- From the UEFI System Utilities screen, select **System Configurations > BIOS/Platform Configuration (RBSU) > Storage Options > SATA Controller Options > Embedded SATA configuration > Smart Array SW RAID Support**.
- Enable SW RAID.
- Save the configuration and reboot the server.
- Create an array:
 - From the boot screen, press **F9** to run UEFI System Utilities.
 - From the UEFI System Utilities screen, select **System Configuration > Embedded Storage: HPE Smart Storage S100i SR Gen10 > Array Configuration > Create Array**.


8. Set the server **power supply requirements**.

Deploy an OS or virtualization software

9. Do one of the following:

- To deploy an OS, run Intelligent Provisioning.

Press **F10** at the boot screen.

 **IMPORTANT:** Smart array MR controllers are not supported by Intelligent Provisioning or Smart Storage Administrator.

- Manually deploy an OS.

- a. Insert the installation media.

For remote management, click **Virtual Drives** in the iLO remote console to mount images, drivers, or files to a virtual folder. If a storage driver is required to install the OS, use the virtual folder to store the driver.

- b. To select the boot device, press **F11** at the boot screen.

- c. After the OS is installed, update the drivers.

10. Register the server (<http://www.hpe.com/info/register>).


Operational requirements

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.


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.

Server warnings and cautions


-
- ⚠ WARNING:** This server is heavy. To reduce the risk of personal injury or damage to the equipment:
- Observe local occupational health and safety requirements and guidelines for manual material handling.
 - Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. Hewlett Packard Enterprise recommends that a minimum of two people are required for all rack server installations. If the server is installed higher than chest level, a third person may be required to help align the server.
 - Use caution when installing the server in 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 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/DC power is removed.
-
- ⚠ WARNING:** To reduce the risk of fire or burns after removing the energy pack:
- Do not disassemble, crush, or puncture the energy pack.
 - Do not short external contacts.
 - Do not dispose of the energy pack in fire or water.
- After power is disconnected, battery voltage might still be present for 1s to 160s.
- AVERTISSEMENT:** Pour réduire les risques d'incendie ou de brûlures après le retrait du module batterie :
- N'essayez pas de démonter, d'écraser ou de percer le module batterie.
 - Ne court-circuitiez pas ses contacts externes.
 - Ne jetez pas le module batterie dans le feu ou dans l'eau.
- Après avoir déconnecté l'alimentation, une tension peut subsister dans la batterie durant 1 à 160 secondes.
-
- ⚠ 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.
-

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


Rack warnings


-
-  **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.
-

Electrostatic discharge

Be aware of the precautions you must follow when setting up the system or handling components. 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 system or component.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

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

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

Server box contents

The server shipping box contains the following contents:

- A server
- A power cord
- Rack-mounting hardware
- Documentation

Installing the server into the rack

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

⚠ CAUTION: To prevent damage to the rails, be sure to align and fully insert the server side rails into the rack rails when installing the server in the rack.

Procedure

1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the rack.
2. Connect peripheral devices to the server.

For information on identifying connectors, see **Rear panel components** on page 21.

⚠ 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.

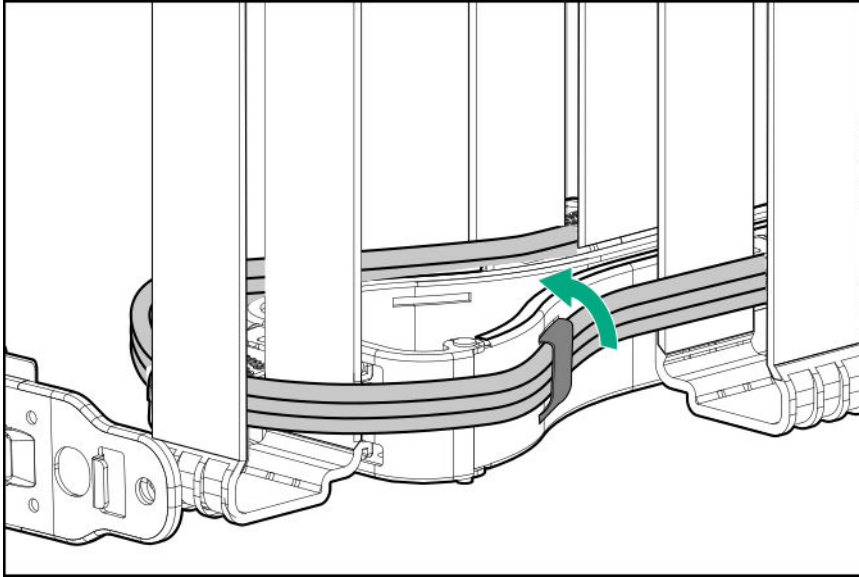
3. Connect the power cord to the rear of the server.

⚠ CAUTION: Connect the power cords using only a supported configuration. Using an unsupported power supply or cabling configuration can result in an unexpected loss of system power.

For information on cabling the power supplies for redundancy, see **Installing a hot-plug power supply** on page 128.

4. Secure the cables to the cable management arm.

-
- ❗ **IMPORTANT:** When using cable management arm components, be sure to leave enough slack in each of the cables to prevent damage to the cables when the server is extended from the rack.
-



5. Connect the power cord to the AC 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 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 server.

Setting the server power supply requirements

The server supports four power supply redundancy modes in UEFI System Utilities. To determine if your current server hardware configuration can support a specific redundancy setting, use the HPE Power Advisor on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/poweradvisor/online>).

- **1 + 1 Redundancy**—In a two-power supply configuration, the server will continue to operate if one power supply fails. This mode is not applicable in a four-power supply configuration.
- **2 + 2 Redundancy**—In a four-power supply configuration, the server will continue to operate if two power supplies fail or if one AC feed loses power.
- **3 + 1 Redundancy**—In a four-power supply configuration, the server will continue to operate if a single power supply fails. The server will initiate operating system shutdown if two power supplies fail. No AC power redundancy is possible.
- **4 + 0 Redundancy**—In a four-power supply configuration, there is no power supply redundancy. The server consumes more power than what redundancy can supply, and will initiate operating system shutdown if one or more power supplies fail.

By default, the server is configured for 2 + 2 power redundancy.

To verify that the server is cabled properly for AC power redundancy, see **Power supply options** on page 128.

Procedure

1. Use the HPE Power Advisor (<http://www.hpe.com/info/poweradvisor/online>) to determine the power draw of the system and verify that the server will continue to operate redundantly in the default configuration.

To change the redundancy setting in the UEFI System Utilities, proceed with the following steps.

2. To access the UEFI System Utilities, press **F9** during POST.
3. From the **System Utilities** screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Advanced Options**.
4. Select the appropriate redundancy configuration from the **Power Supply Requirements** menu, and then press **Enter**.
5. Press **F10** to Save or **F12** to Save and Exit.

Installing or deploying an operating system

Before installing an operating system, observe the following:

- Be sure to read the HPE UEFI requirements for ProLiant servers on the **Hewlett Packard Enterprise website**. If UEFI requirements are not met, you might experience boot failures or other errors when installing the operating system.
- Update firmware before using the server for the first time, unless software or components require an older version. For more information, see "**Keeping the system current**" on page 173."
- For the latest information on supported operating systems, see the **Hewlett Packard Enterprise website**.
- The server does not ship with OS media. All system software and firmware is preloaded on the server.

Registering the server

To experience quicker service and more efficient support, register the product at the **Hewlett Packard Enterprise Product Registration website**.

Hardware options installation

Product QuickSpecs

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

Installing a Systems Insight Display

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

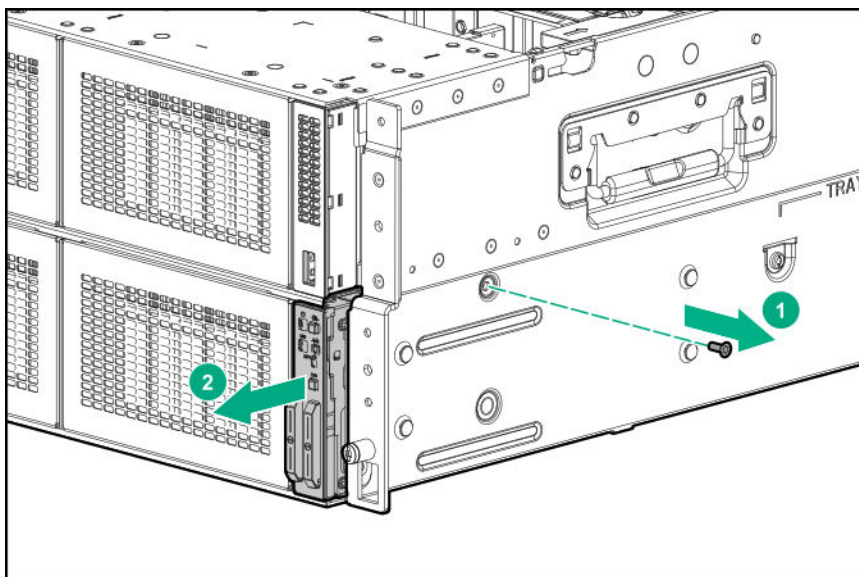
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).



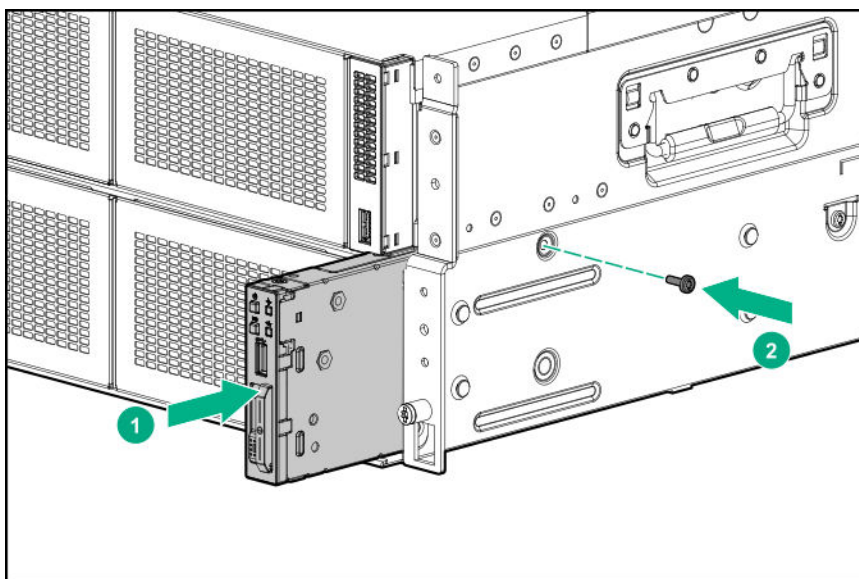
CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. Remove the fan cage (**Removing the fan cage** on page 46).
9. If installed, remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
10. Remove the cabled power switch module. Retain the T-10 screw for later use.

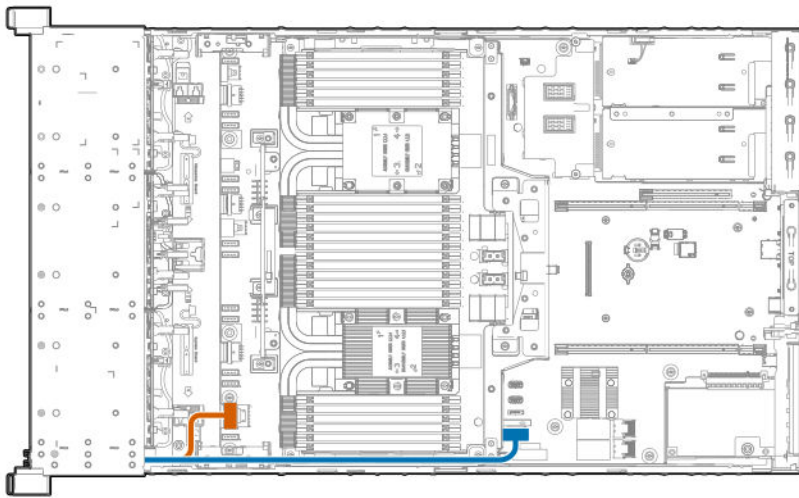


11. Route the cable through the opening in the front of the server, and then install the SID power switch module. Secure the module using the existing screw.

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



12. Cable the SID module to the system board.



13. Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
14. Install the air baffle (**Installing the air baffle** on page 45).

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

15. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
16. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
17. Install the fan cage (**Installing the fan cage** on page 47).
18. Install the access panel (**Installing the access panel** on page 41).
19. Install the server into the rack (**Installing the server into the rack** on page 59).
20. Connect each power cord to the server.
21. Connect each power cord to the power source.
22. **Power up the server** on page 37.

Installing an eight-bay SFF HDD/SSD drive cage

The eight-bay SFF HDD/SSD drive cage can be installed in any drive box in the server. For more information, see **Front panel components** on page 7.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

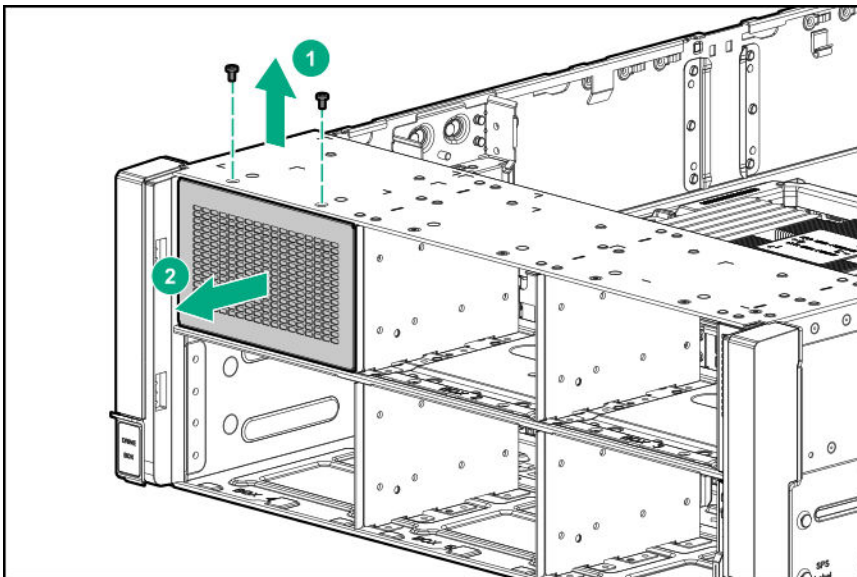
- T-10 Torx screwdriver
- The components included with the hardware option kit

Procedure

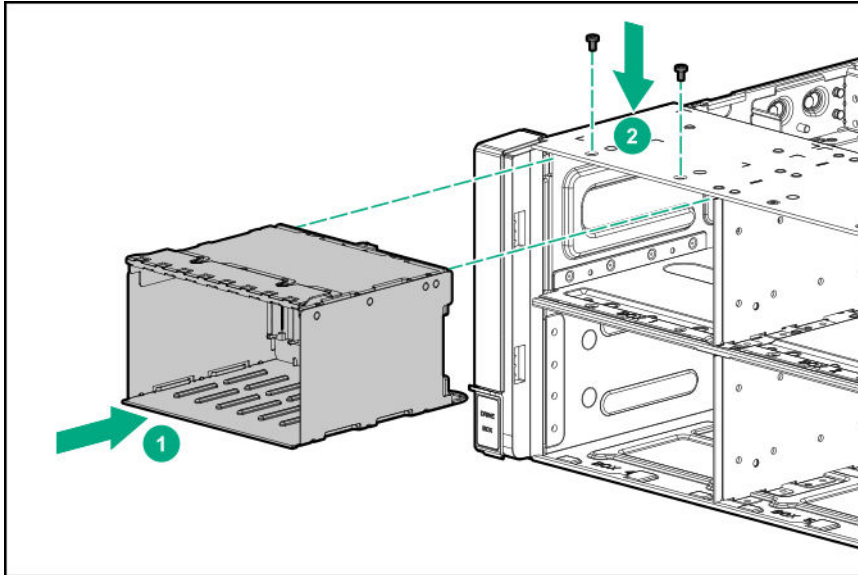
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

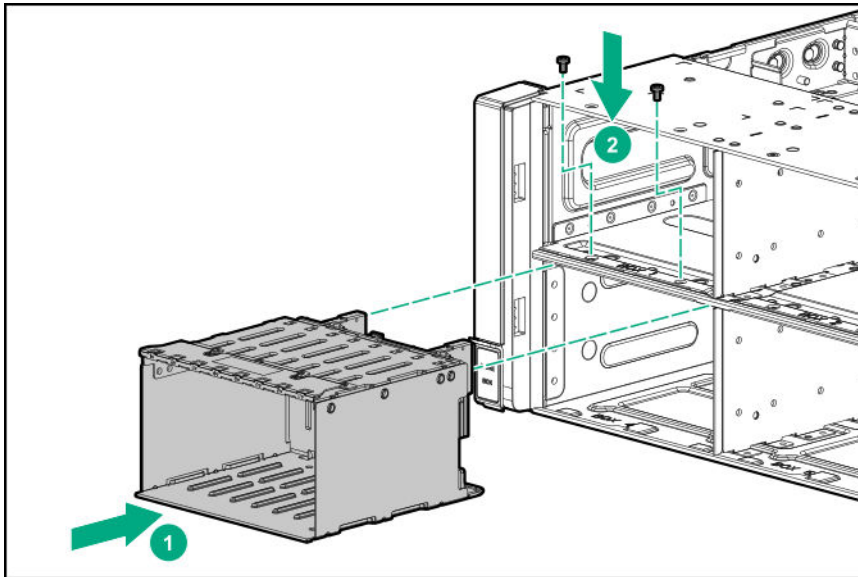
5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. If installed, do one of the following:
 - Remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
 - Remove the CPU Mezzanine UPI performance kit (**Removing the CPU Mezzanine UPI performance kit** on page 50).
9. Remove the fan cage (**Removing the fan cage** on page 46).
10. Remove the fan cage holders (**Removing the fan cage holders** on page 48).
11. Remove the drive bay blank.



12. If drive blanks are installed in the drive cage assembly, remove the drive blanks. Retain the drive blanks for use in empty drive bays.
13. Install the drive cage.
 - Drive boxes 1–3 (box 1 shown)



- Drive boxes 4–6 (box 4 shown)



14. Connect the power cable to the **drive backplane power connector**.
15. Route and connect the data cables depending on the server configuration. For more information, see **Cabling** on page 137.

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

16. Install the fan cage holders (**Installing fan cage holders** on page 48).
17. Install the fan cage (**Installing the fan cage** on page 47).

18. If removed, do one of the following:

- Install the processor mezzanine tray ([Installing a processor mezzanine tray](#) on page 115).
- Install the CPU Mezzanine UPI performance kit ([Installing the CPU Mezzanine UPI performance kit](#) on page 122).

19. Install the air baffle ([Installing the air baffle](#) on page 45).

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

20. Install the primary PCIe riser cage ([Installing the primary PCIe riser cage](#) on page 42).

21. Install the butterfly PCIe riser cage ([Installing a butterfly PCIe riser cage](#) on page 86).

22. Install the access panel ([Installing the access panel](#) on page 41).

23. Install the server into the rack ([Installing the server into the rack](#) on page 59).

24. Connect each power cord to the server.

25. Connect each power cord to the power source.

26. **Power up the server** on page 37.

Installing an eight-bay NVMe SSD drive cage

The eight-bay NVMe SSD drive cage can be installed in drive boxes 1–3.

- A minimum of four NVMe drives can be installed in the drive cage.
- When installed in drive box 1, only four NVMe drives can be installed in the drive cage.

For more information on valid NVMe drive configurations and cabling, see [NVMe drive cable matrix](#) on page 139.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

Procedure

1. **Power down the server** on page 37.

2. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

3. Do one of the following:

- Extend the server from the rack (**Extending the server from the rack** on page 37).
- Remove the server from the rack (**Removing the server from the rack** on page 38).

4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).

6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).

7. Remove the air baffle (**Removing the air baffle** on page 44).

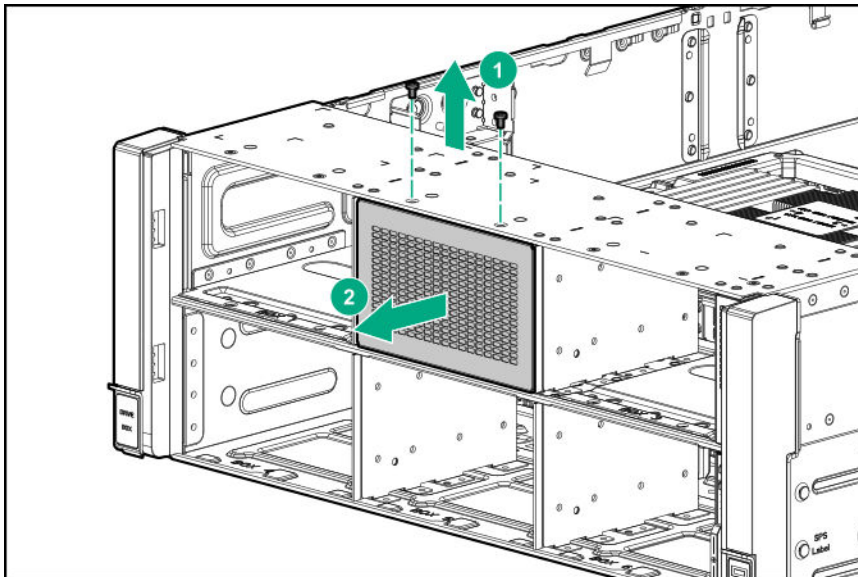
8. If installed, do one of the following:

- Remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
- Remove the CPU Mezzanine UPI performance kit (**Removing the CPU Mezzanine UPI performance kit** on page 50).

9. Remove the fan cage (**Removing the fan cage** on page 46).

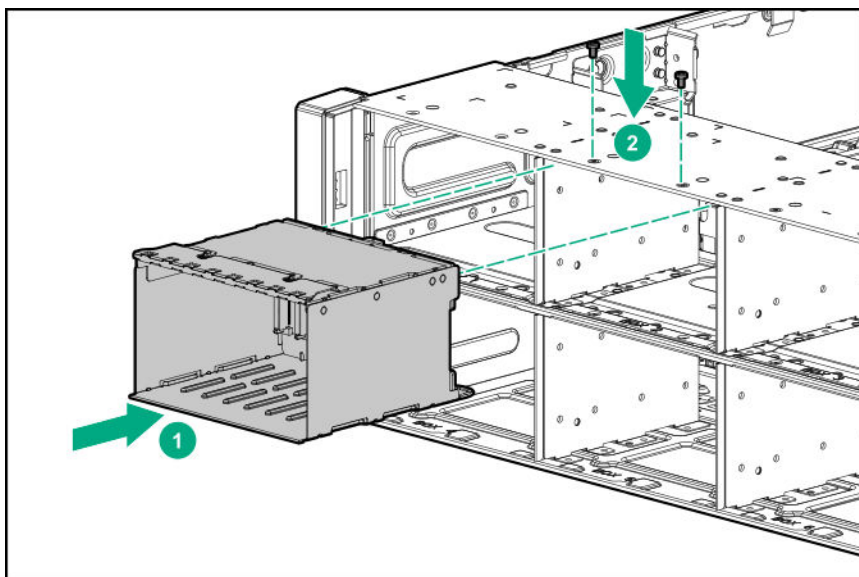
10. Remove the fan cage holders (**Removing the fan cage holders** on page 48).

11. Remove the drive bay blank.



12. If drive blanks are installed in the drive cage assembly, remove the drive blanks. Retain the drive blanks for use in empty drive bays.

13. Install the drive cage.



14. Connect the power cable to the **drive backplane power connector**.
15. Route and connect the data cables depending on the server configuration.

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

For more information, see **Cable matrix** on page 137 and **NVMe SSD drive cage cabling** on page 150.

16. Install the fan cage holders (**Installing fan cage holders** on page 48).
17. Install the fan cage (**Installing the fan cage** on page 47).
18. If removed, do one of the following:
 - Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
 - Install the CPU Mezzanine UPI performance kit (**Installing the CPU Mezzanine UPI performance kit** on page 122).
19. Install the air baffle (**Installing the air baffle** on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

20. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
21. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
22. Install the access panel (**Installing the access panel** on page 41).
23. Install the server into the rack (**Installing the server into the rack** on page 59).
24. Connect each power cord to the server.
25. Connect each power cord to the power source.
26. **Power up the server** on page 37.

Installing a six-bay SFF HDD/two-bay NVMe SSD (Premium) cage

The two-bay NVMe SSD/six-bay SFF HDD (Premium) drive cage can be installed in the following drive boxes in the server. For more information, see **Front panel components** on page 7.

- Drive box 1
- Drive box 2
- Drive box 3

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

Procedure

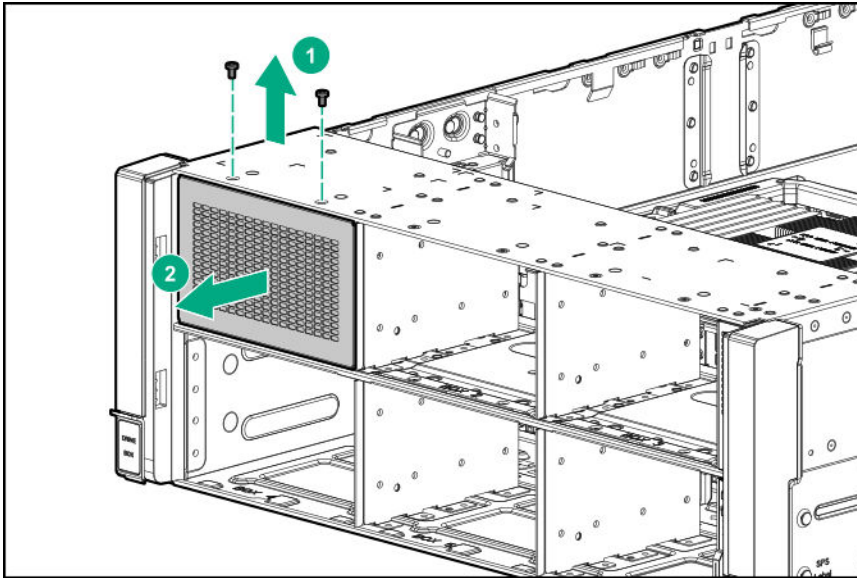
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. If installed, do one of the following:
 - Remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
 - Remove the CPU Mezzanine UPI performance kit (**Removing the CPU Mezzanine UPI performance kit** on page 50).
9. Remove the fan cage (**Removing the fan cage** on page 46).

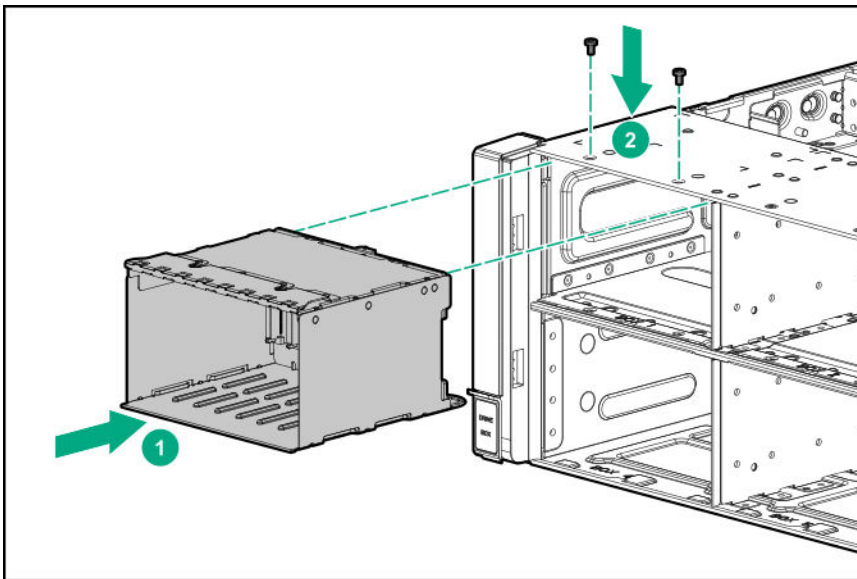
10. Remove the fan cage holders (**Removing the fan cage holders** on page 48).

11. Remove the drive bay blank.



12. If drive blanks are installed in the drive cage assembly, remove the drive blanks.
Retain the drive blanks for use in empty drive bays.

13. Install the drive cage.



14. Connect the power cable to the **drive backplane power connector**.

15. Route and connect the data cables depending on the server configuration.



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

For more information, see **Cabling** on page 137.

16. Install the fan cage holders (**Installing fan cage holders** on page 48).

17. Install the fan cage ([Installing the fan cage](#) on page 47).
 18. If removed, do one of the following:
 - Install the processor mezzanine tray ([Installing a processor mezzanine tray](#) on page 115).
 - Install the CPU Mezzanine UPI performance kit ([Installing the CPU Mezzanine UPI performance kit](#) on page 122).
 19. Install the air baffle ([Installing the air baffle](#) on page 45).
-
- ⚠ CAUTION:** To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.
-
20. Install the primary PCIe riser cage ([Installing the primary PCIe riser cage](#) on page 42).
 21. Install the butterfly PCIe riser cage ([Installing a butterfly PCIe riser cage](#) on page 86).
 22. Install the access panel ([Installing the access panel](#) on page 41).
 23. Install the server into the rack ([Installing the server into the rack](#) on page 59).
 24. Connect each power cord to the server.
 25. Connect each power cord to the power source.
 26. **Power up the server** on page 37.

Installing a universal media bay

The universal media bay can only be installed in drive box 4. For more information, see [Front panel components](#) on page 7.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

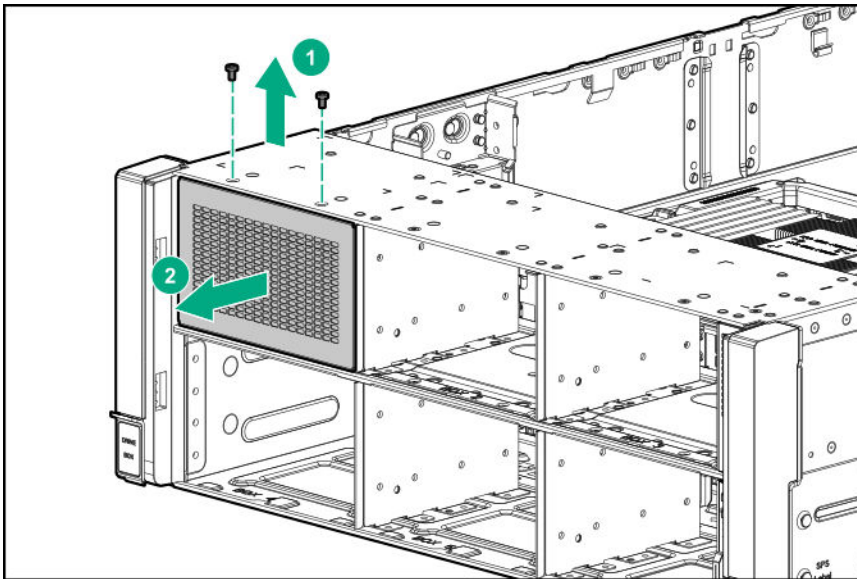
- The components included with the hardware option kit
- T-10 Torx screwdriver

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
4. Remove the access panel ([Removing the access panel](#) on page 40).

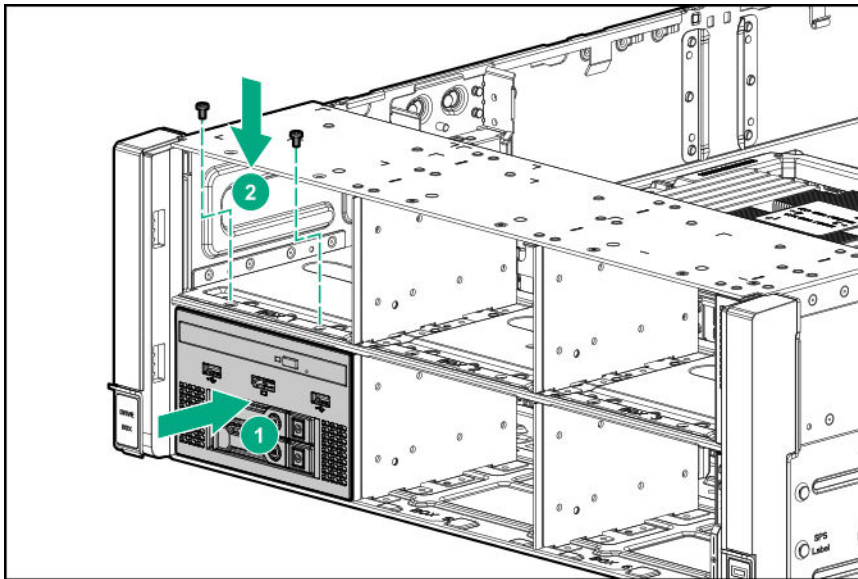
⚠ CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. If installed, do one of the following:
 - Remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
 - Remove the CPU Mezzanine UPI performance kit (**Removing the CPU Mezzanine UPI performance kit** on page 50).
9. Remove the fan cage (**Removing the fan cage** on page 46).
10. Remove the fan cage holders (**Removing the fan cage holders** on page 48).
11. Remove the drive bay blank from box 1.



12. If drive blanks are installed in the drive cage assembly, remove the drive blanks. Retain the drive blanks for use in empty drive bays.
13. Route the cables through the opening, and then install the universal media bay.

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



14. Connect the cables depending on the server configuration.

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

For more information, see **Cabling** on page 137.

15. Install the drive bay blank into box 1.
16. Install the fan cage holders (**Installing fan cage holders** on page 48).
17. Install the fan cage (**Installing the fan cage** on page 47).
18. If removed, do one of the following:
 - Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
 - Install the CPU Mezzanine UPI performance kit (**Installing the CPU Mezzanine UPI performance kit** on page 122).
19. Install the air baffle (**Installing the air baffle** on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

20. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
21. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
22. Install the access panel (**Installing the access panel** on page 41).
23. Install the server into the rack (**Installing the server into the rack** on page 59).
24. Connect each power cord to the server.
25. Connect each power cord to the power source.
26. **Power up the server** on page 37.

Installing a two-bay SFF (Premium) drive cage

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

The front bay installation requires a universal media bay to be installed ([Installing a universal media bay](#) on page 72).

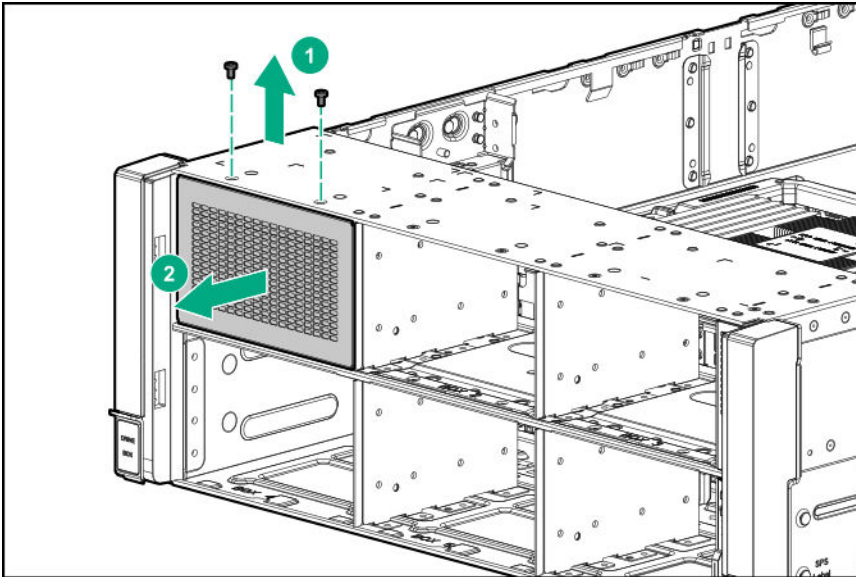
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
4. Remove the access panel ([Removing the access panel](#) on page 40).

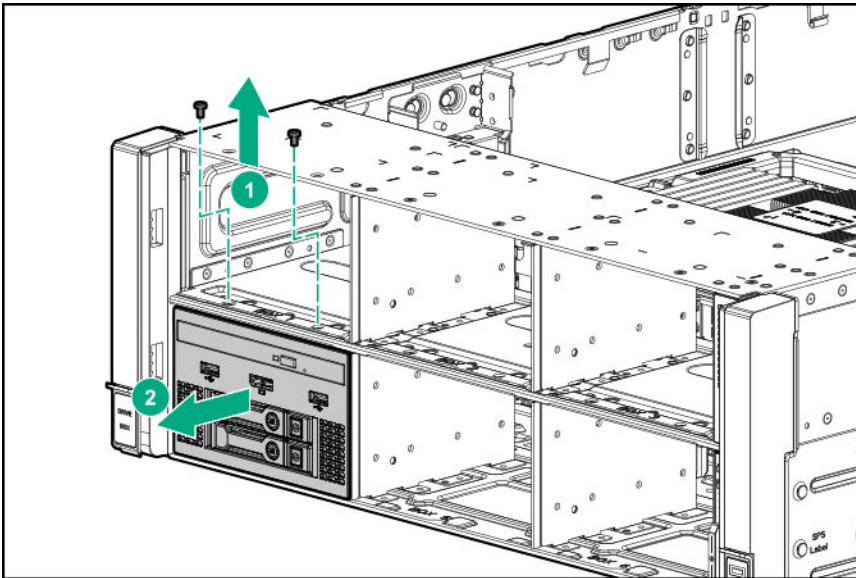


CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

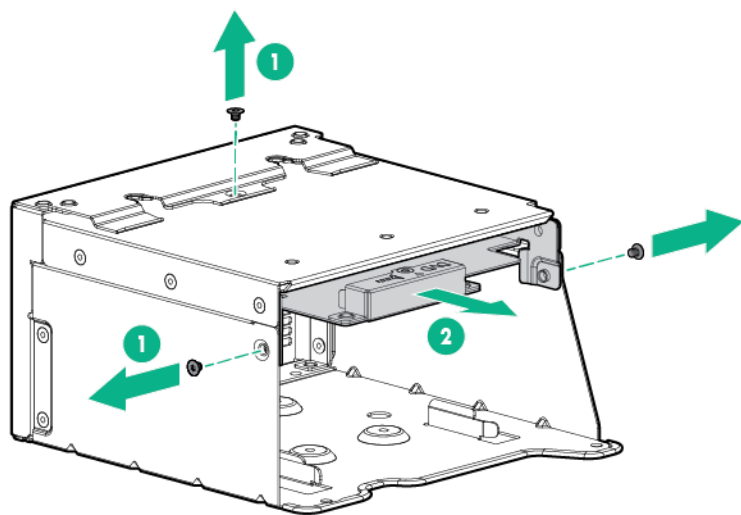
5. Remove the primary PCIe riser cage ([Removing a PCIe riser cage](#) on page 43).
6. If installed, remove the butterfly riser cage ([Removing a PCIe riser cage](#) on page 43).
7. Remove the air baffle ([Removing the air baffle](#) on page 44).
8. If installed, do one of the following:
 - Remove the processor mezzanine tray ([Removing the processor mezzanine tray](#) on page 49).
 - Remove the CPU Mezzanine UPI performance kit ([Removing the CPU Mezzanine UPI performance kit](#) on page 50).
9. Remove the fan cage ([Removing the fan cage](#) on page 46).
10. Remove the fan cage holders ([Removing the fan cage holders](#) on page 48).
11. Remove the drive bay blank from box 1.



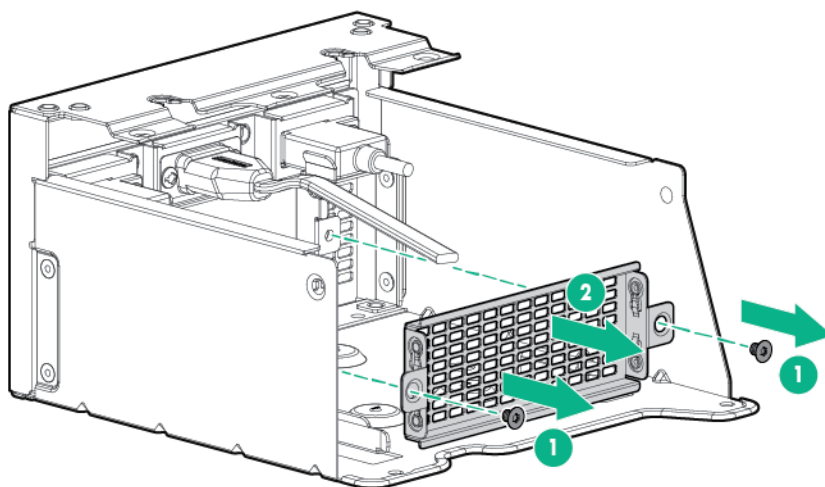
12. If installed in the server, remove the universal media bay.



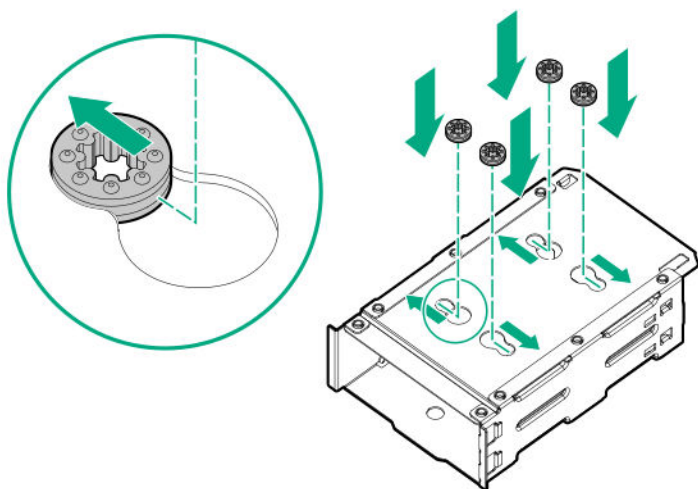
13. Remove the optical disk drive tray from the universal media bay.



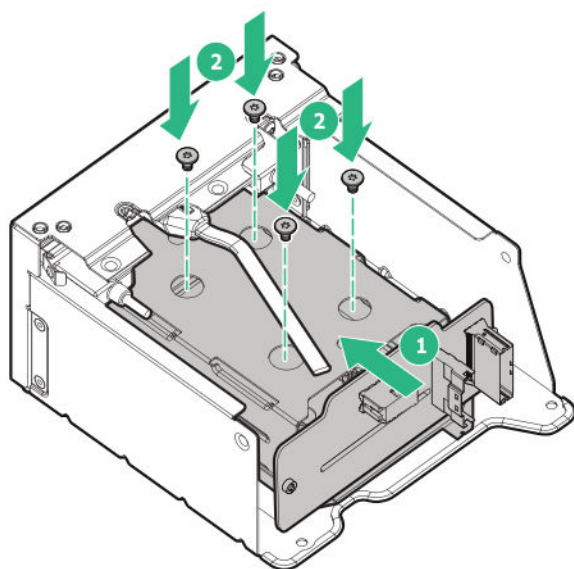
14. Remove the SFF drive blank from the universal media bay.



15. Install the grommets onto the underside of the drive cage.



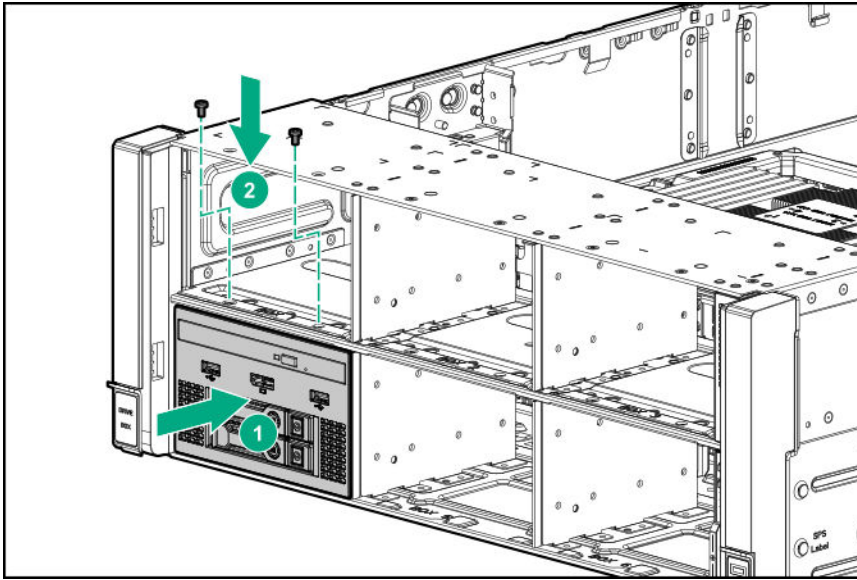
16. Install the drive cage into the universal media bay.



17. Route the cables through the opening, and then install the universal media bay.



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



18. Connect the cables depending on the server configuration.

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

For more information, see **Cabling** on page 137.

19. Install the drive bay blank into box 1.
20. Install the fan cage holders (**Installing fan cage holders** on page 48).
21. Install the fan cage (**Installing the fan cage** on page 47).
22. If removed, do one of the following:
- Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
 - Install the CPU Mezzanine UPI performance kit (**Installing the CPU Mezzanine UPI performance kit** on page 122).
23. Install the air baffle (**Installing the air baffle** on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

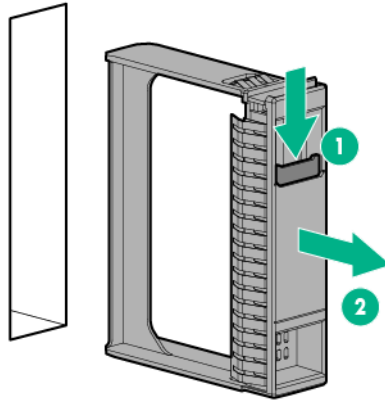
24. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
25. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
26. Install the access panel (**Installing the access panel** on page 41).
27. Install the server into the rack (**Installing the server into the rack** on page 59).
28. Connect each power cord to the server.
29. Connect each power cord to the power source.
30. **Power up the server** on page 37.

Installing a hot-plug SAS or SATA drive

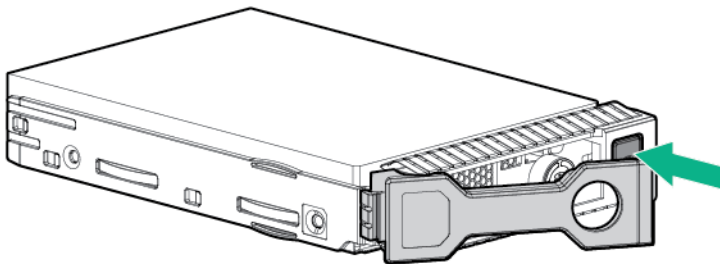
⚠ CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all device bays are populated with either a component or a blank.

Procedure

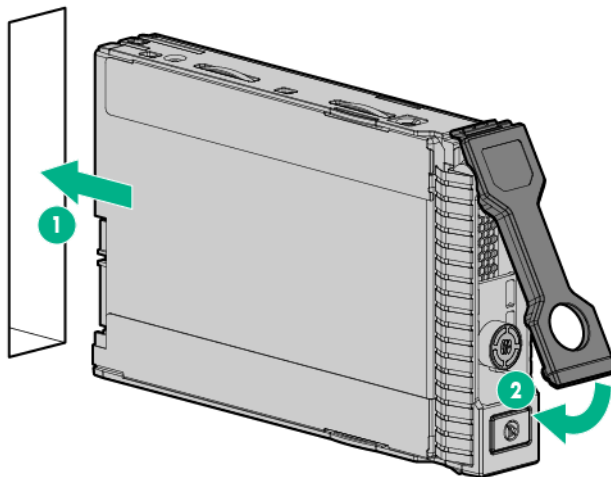
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



Installing an NVMe drive

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

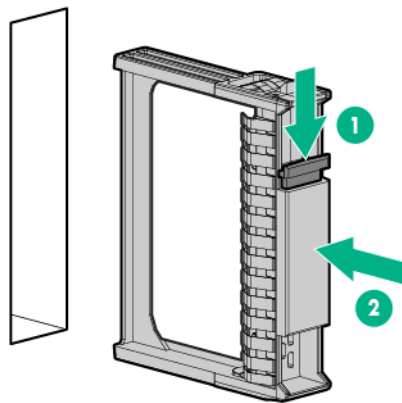
The server supports installation of up to 20 NVMe drives, depending on the drive cage configuration. Observe the following population guidelines:

- Install a minimum of four NVMe drives in the eight-bay NVMe drive cage.
- Two-drive configurations are supported in the following drive cages:
 - Six-bay HDD/two-bay NVMe (Premium) drive cage
 - Two-bay SFF (Premium) drive cage in the universal media bay

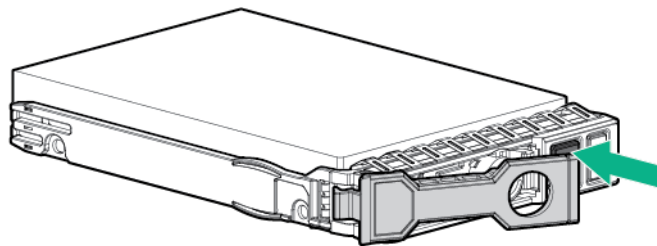
For more information on valid NVMe drive configurations and cabling, see **NVMe drive cable matrix** on page 139.

Procedure

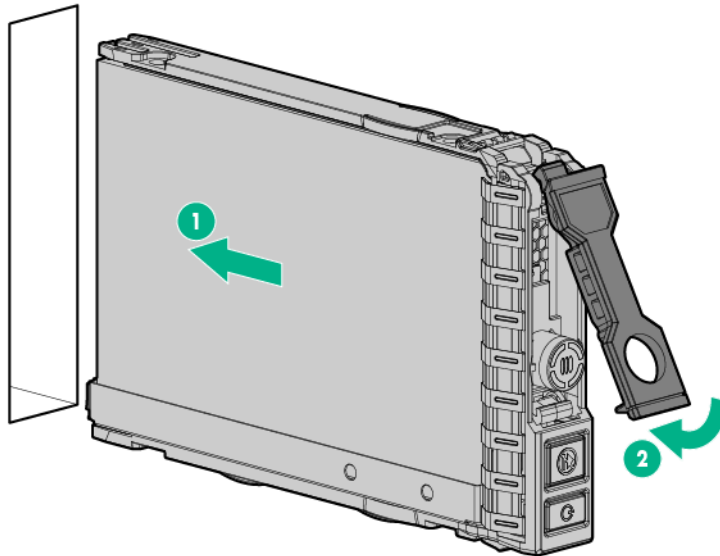
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



4. Observe the LED status of the drive.

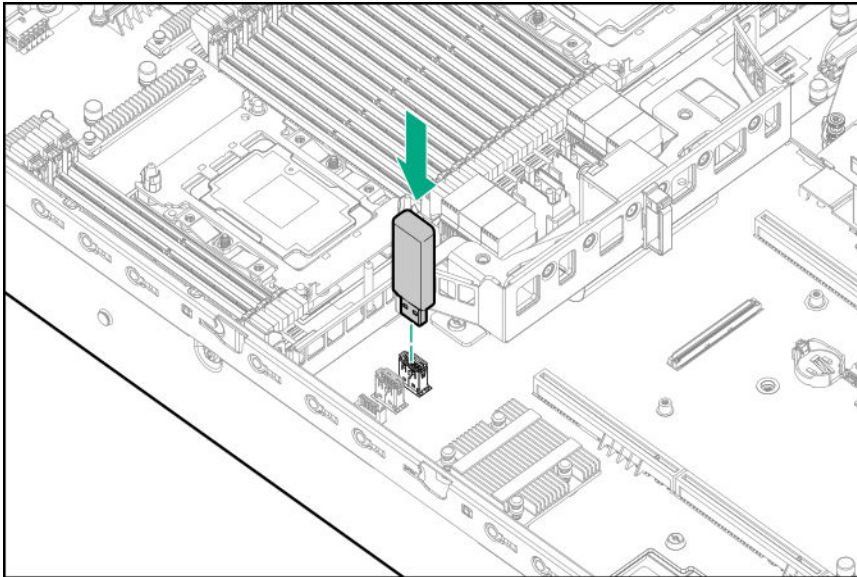
Installing an internal USB drive

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Locate the internal USB connectors on the system board (**System board components** on page 25).
6. Install the USB drive.



7. Install the access panel (**Installing the access panel** on page 41).
8. Install the server into the rack (**Installing the server into the rack** on page 59).
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. **Power up the server** on page 37.

Installing a 4 port NVMe mezzanine card

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.
- A primary riser PCIe riser cage with a 4 port NVMe riser card installed.

Procedure

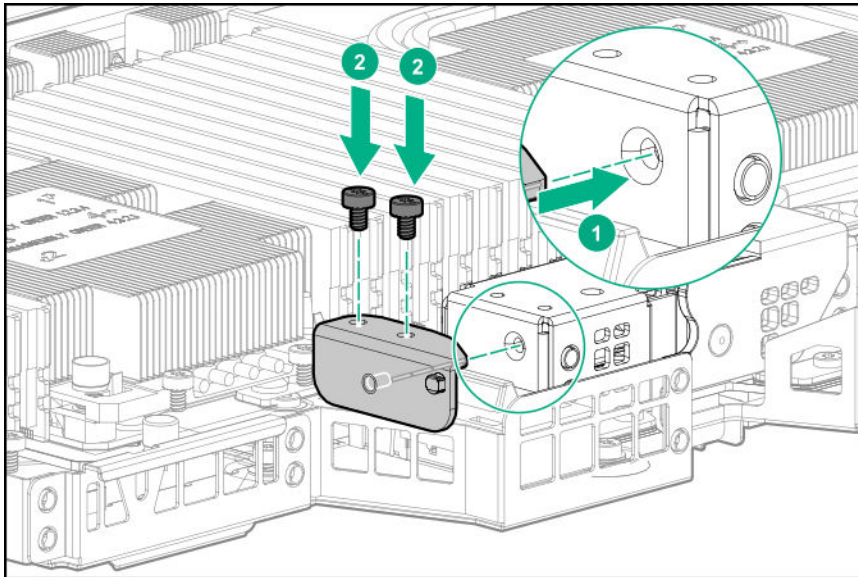
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

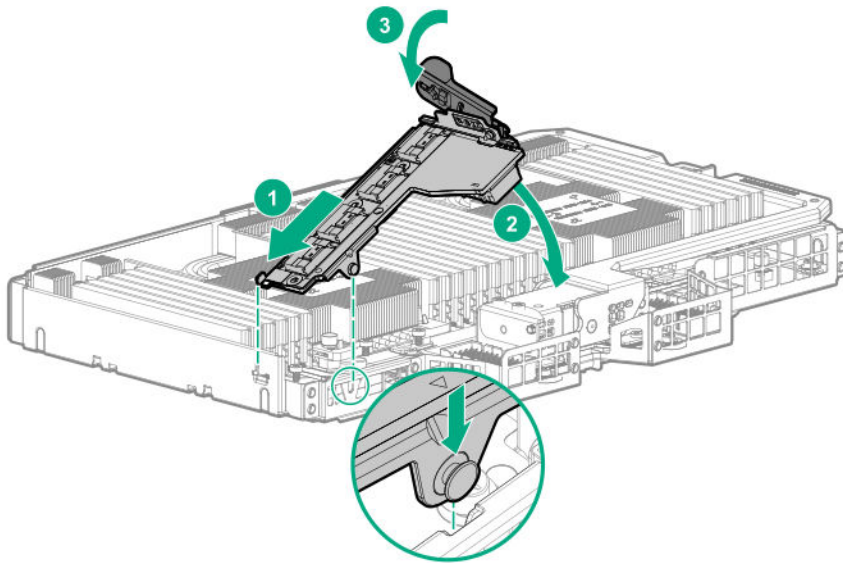
5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).

NOTE: If you are not installing a new primary PCIe riser cage that has a 4 port NVMe riser card installed, be sure to remove the riser card from the existing primary PCIe riser cage, and replace it with a 4 port NVMe riser card.

6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. If installed, remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
9. Remove the fan cage (**Removing the fan cage** on page 46).
10. Remove the fan cage holders (**Removing the fan cage holders** on page 48).
11. Install the bracket.



12. Install the mezzanine card. Listen for a click to indicate that the card is fully installed when the handle is closed.



13. Route the cables depending on the server configuration.

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

For more information, see **Cabling** on page 137.

14. Install the fan cage holders (**Installing fan cage holders** on page 48).
15. Install the fan cage (**Installing the fan cage** on page 47).
16. Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).
17. Connect the cables to the mezzanine card.
For more information, see **Cabling** on page 137.
18. Install the air baffle (**Installing the air baffle** on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

19. Install a primary PCIe riser cage with a 4 port NVMe riser card installed (**Installing the primary PCIe riser cage** on page 42).
20. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
21. Install the access panel (**Installing the access panel** on page 41).
22. Install the server into the rack (**Installing the server into the rack** on page 59).
23. Connect each power cord to the server.
24. Connect each power cord to the power source.
25. **Power up the server** on page 37.

Installing a butterfly PCIe riser cage

- ⚠ CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.
-

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

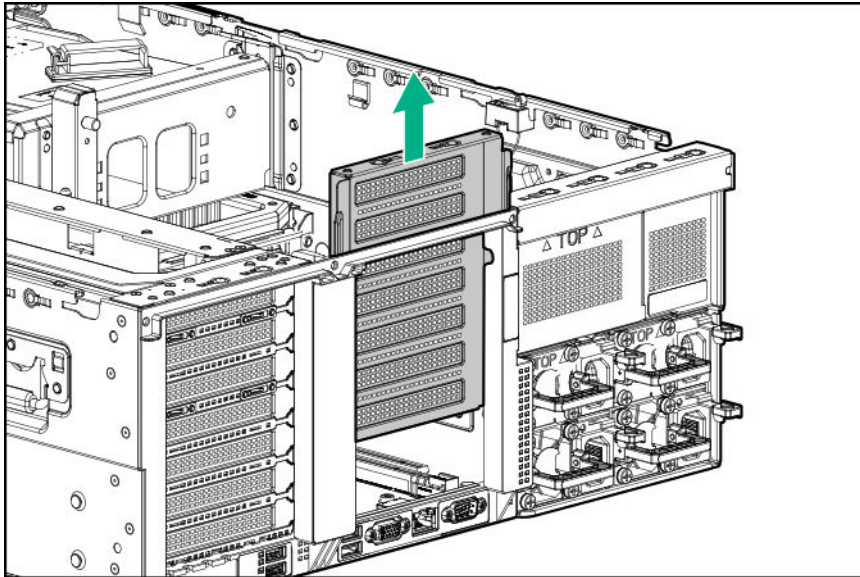
- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

Procedure

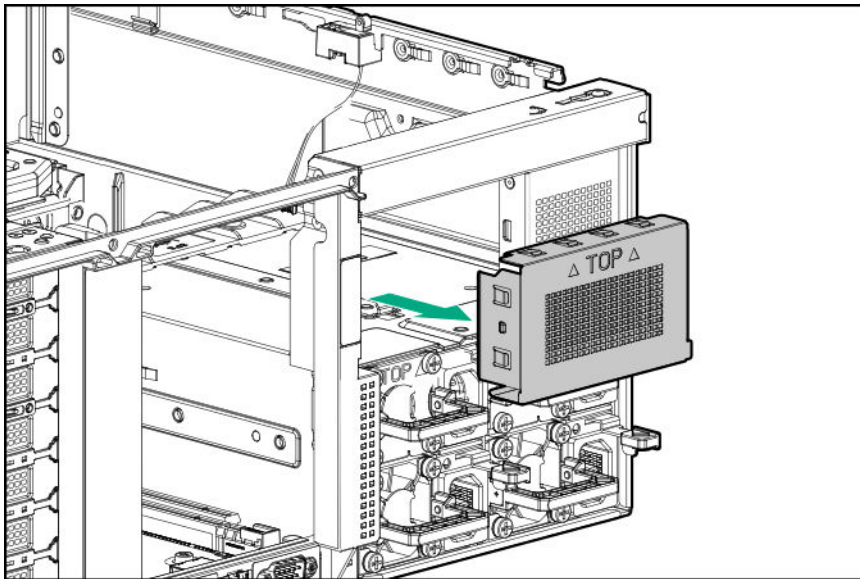
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the butterfly riser cage blanks.
 - a. Remove the secondary slot blank.

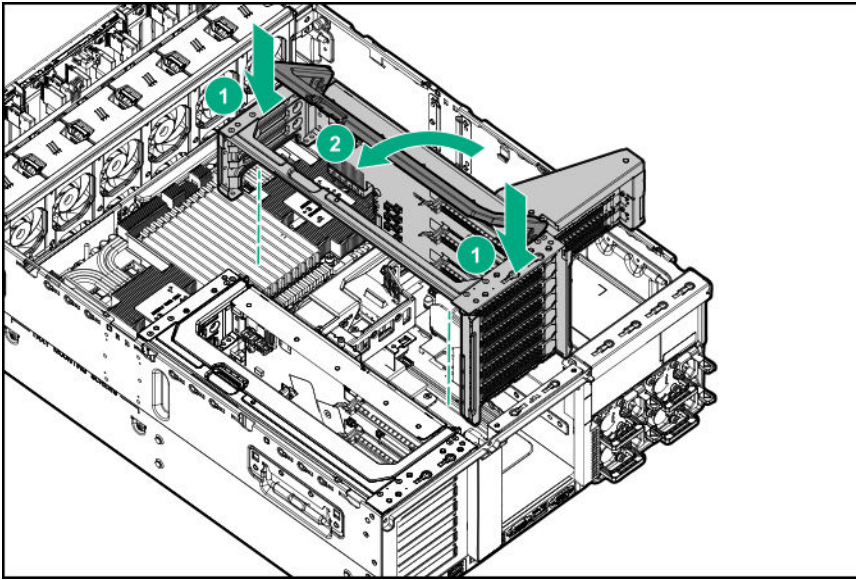


b. Remove the tertiary slot blank.



6. Install the riser cage.

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.



7. Install the access panel (**Installing the access panel** on page 41).
8. Install the server into the rack (**Installing the server into the rack** on page 59).
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. **Power up the server** on page 37.

Riser board options

The server supports two PCIe riser cages that can be configured with different riser boards.

Primary PCIe riser cage

The primary PCIe riser cage supports installation of the following riser boards:

- Six-slot riser board with four x8, two x16, and two x8 Slimline NVMe connections.
- Seven-slot riser board with four x8 and three x16 connections.
- Four-port riser board with four x8 Slimline NVMe connections.

Butterfly PCIe riser cage (Secondary PCIe slot)

The butterfly PCIe riser cage supports installation of the following riser boards in the secondary PCIe slot:

- Six-slot riser board with four x8, two x16, and two x8 Slimline NVMe connections.
- Seven-slot riser board with four x8 and three x16 connections.

Butterfly PCIe riser cage (Tertiary PCIe slot)

The butterfly PCIe riser cage supports installation of a two-slot riser board with two x8 connections in the tertiary PCIe slot.

Installing a riser board into the primary PCIe riser cage

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

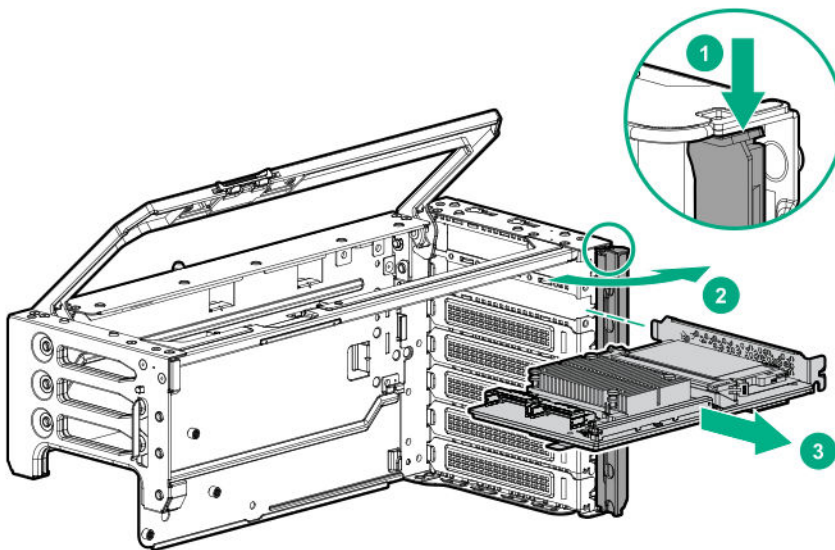
- T-10 Torx screwdriver
- The components included with the hardware option kit

Procedure

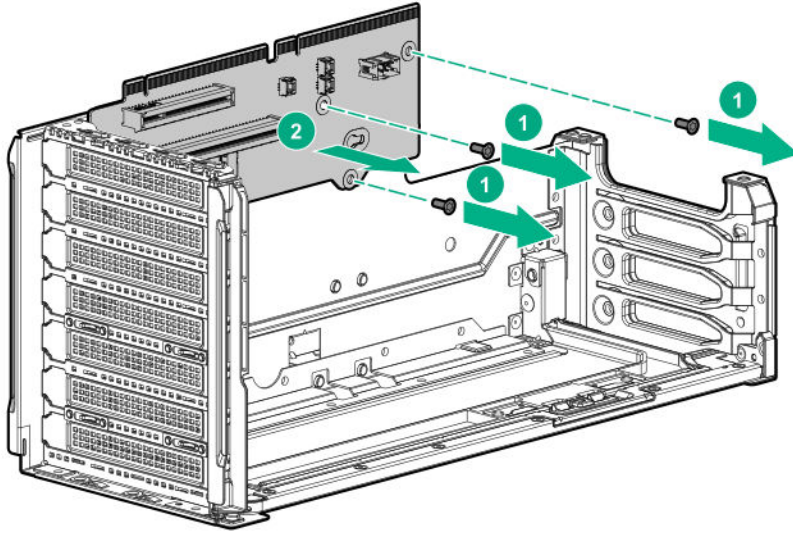
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Disconnect all cables attached to the expansion boards in the PCIe riser cage.
6. Remove the riser cage (**Removing a PCIe riser cage** on page 43).
7. If installed, remove any expansion boards installed on the riser board.

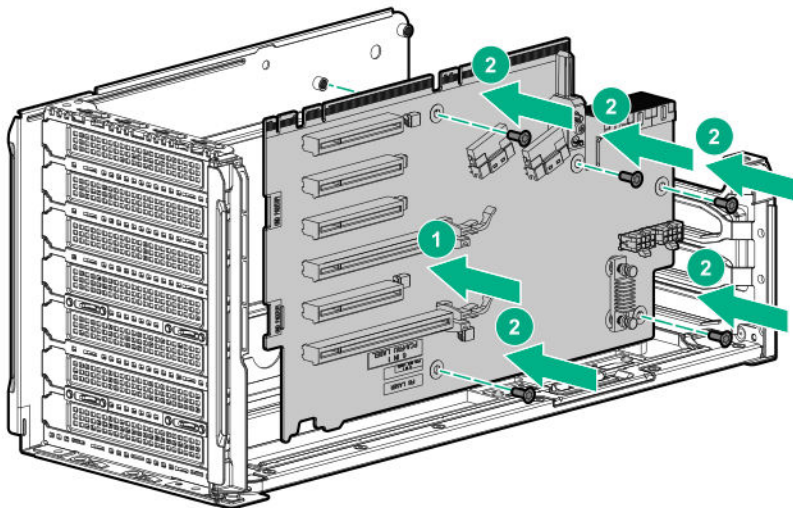


8. Remove the riser board installed in the riser cage.



9. Align the screw holes on the riser board with the holes on the riser cage, and then install the riser board.

NOTE: Your riser board might appear different.



10. Install the riser cage ([Installing the primary PCIe riser cage](#) on page 42).
11. Install the access panel ([Installing the access panel](#) on page 41).
12. Install the server into the rack ([Installing the server into the rack](#) on page 59).
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. **Power up the server** on page 37.

Installing a riser board into the butterfly PCIe riser cage

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

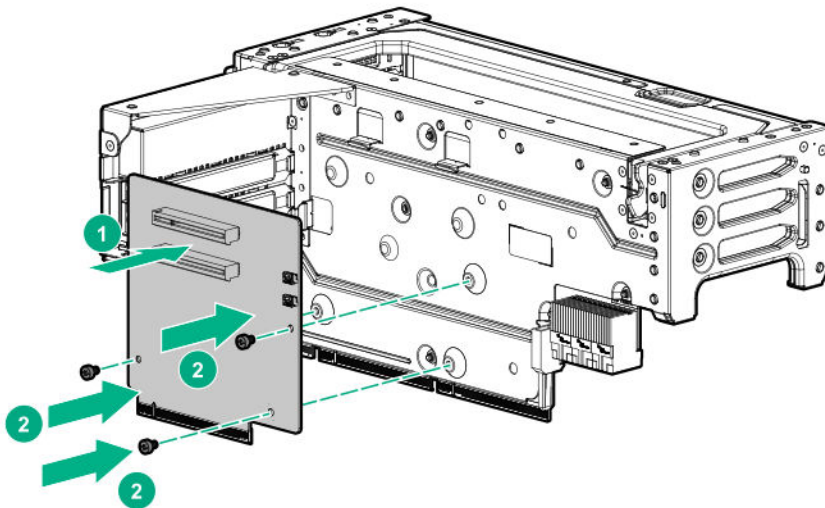
- A T-10 Torx screwdriver might be needed to unlock the access panel.
- The components included with the hardware option kit

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the riser cage (**Removing a PCIe riser cage** on page 43).
6. Install the riser board.



7. Install the riser cage (**Installing a butterfly PCIe riser cage** on page 86).
8. Install the access panel (**Installing the access panel** on page 41).

9. Install the server into the rack ([Installing the server into the rack](#) on page 59).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. [Power up the server](#) on page 37.

Expansion slot options

Processor-to-PCIe slot assignment

The PCIe slots are mapped to specific processors, as described in the following table.

Proc	Primary riser		Secondary riser		Tertiary riser	Primary 8x2 NVMe riser	
	7 slot PCIe	6 slot + NVMe	7 slot PCIe	6 slot + NVMe	2 slot PCIe	NVMe slim	NVMe Mezz
1	Slots 5, 6, 7	Slots 5, 6, 7 + 2 NVMe (J4)*	—	—	—	8 NVMe	—
2	—	—	Slots 12, 13, 14	Slots 12, 13, 14 + 2 NVMe (J3)*	Slots 15, 16	—	—
3	Slots 1, 2, 3, 4	Slots 2, 3, 4 + 2 NVMe (J3)*	—	—	—	—	8 NVMe
4	—	—	Slots 8, 9, 10, 11	Slots 9, 10, 11 + 2 NVMe (J4)*	—	—	—

* To locate the J3 and J4 ports, see [6 slot riser board](#) on page 33.

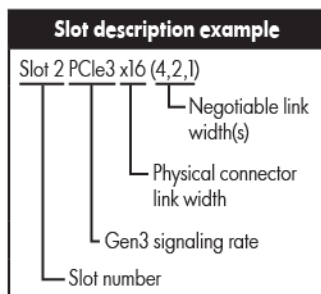
For example, PCIe slot 8 is operational when:

- The 7 slot PCIe riser board is installed in the butterfly riser cage.
- Processor 4 is installed.

Supported PCIe form factors

All slots support full-height expansion cards. Use the following information to find supported lengths for each slot.

Slot description example



6 slot riser

PCIe slot and card length	Description
Slot 1 - Full-length/Full-height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 2 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 3 - Full-length/Full-height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 4 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 5 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 6 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)

7 slot riser

PCIe slot and card length	Description
Slot 1 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 2 - Full-length/Full-height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 3 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 4 - Full-length/Full-height (FL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 5 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 6 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 7 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)

2 slot riser

PCIe slot and card length	Description
Slot 1 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)
Slot 2 - 3/4 length/Full-height (¾L/FH)	PCIe3 x8 (8, 4, 2, 1)

Installing an expansion board

Use these instructions to install expansion boards including PCIe accelerators and network cards into the server. For more information on installing controllers, SAS expanders, or GPU cards, see the related sections.



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



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

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

Procedure

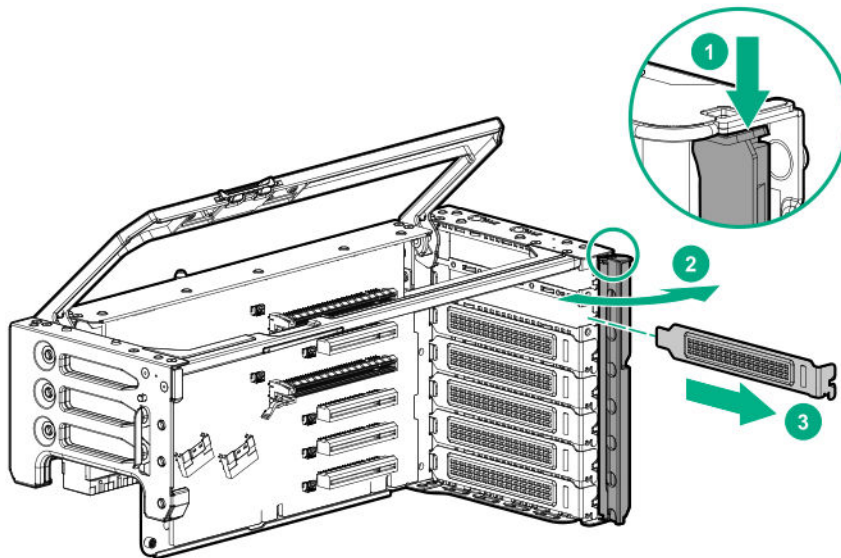
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).



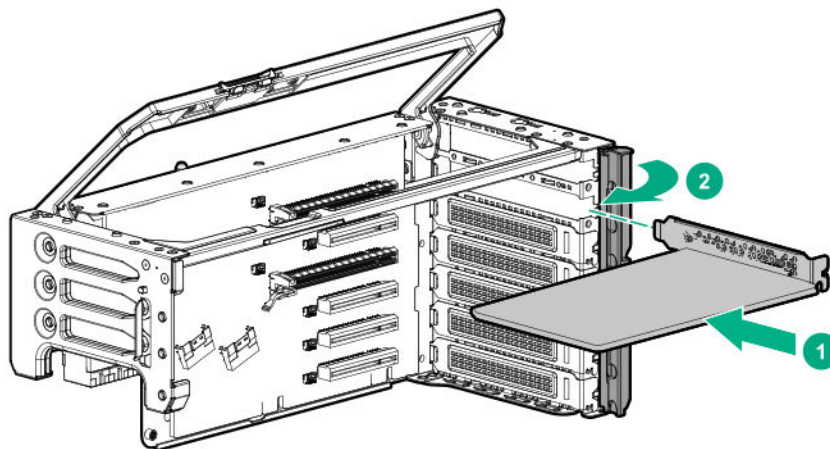
CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

5. Remove the riser cage (**Removing a PCIe riser cage** on page 43).
6. Remove the expansion slot blank from the riser cage.

The primary PCIe riser cage is shown.



7. Install the expansion board into the PCI riser cage.



8. Install the riser cage.
9. Connect any required internal or external cables to the expansion board.
See the documentation that ships with the expansion board.
10. Install the access panel ([Installing the access panel](#) on page 41).
11. Install the server into the rack ([Installing the server into the rack](#) on page 59).
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server** on page 37.

More information

[Installing the HPE 12G SAS Expander Card](#) on page 101


Installing an HPE InfiniBand HDR/Ethernet 940QSFP 56x16 adapter


The server supports installing two adapters in a four-processor configuration and one adapter in a two-processor configuration. Each adapter requires the installation of an auxiliary card in a supported slot.

Use the following table to determine the supported slot locations:

Processors	Adapter slot	Auxiliary card slot
2	6	13
4	2	9
	4	11

For more information on expansion slot numbering, see [Rear panel components](#) on page 21.

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

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

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- HPE InfiniBand HDR PCIe G3 Auxiliary card with 350mm cable kit
- 7 slot riser board installed in the primary and secondary riser cages

Procedure

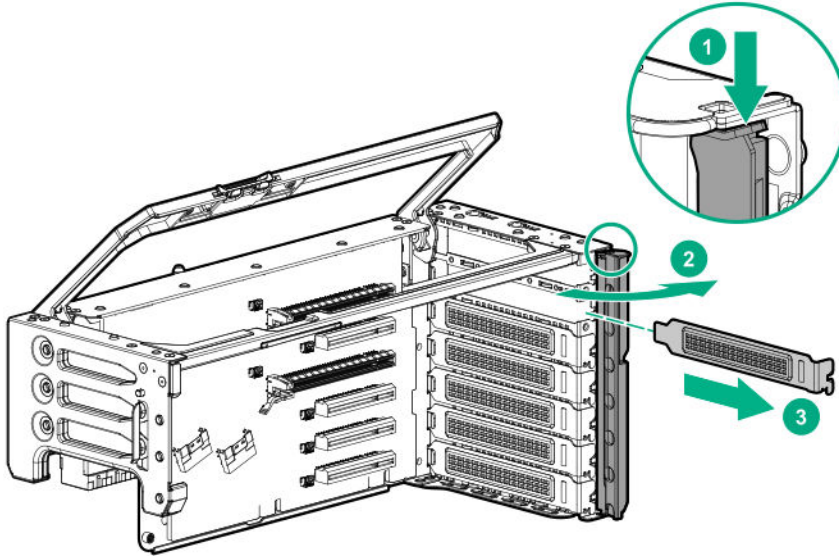
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
4. Remove the access panel ([Removing the access panel](#) on page 40).

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

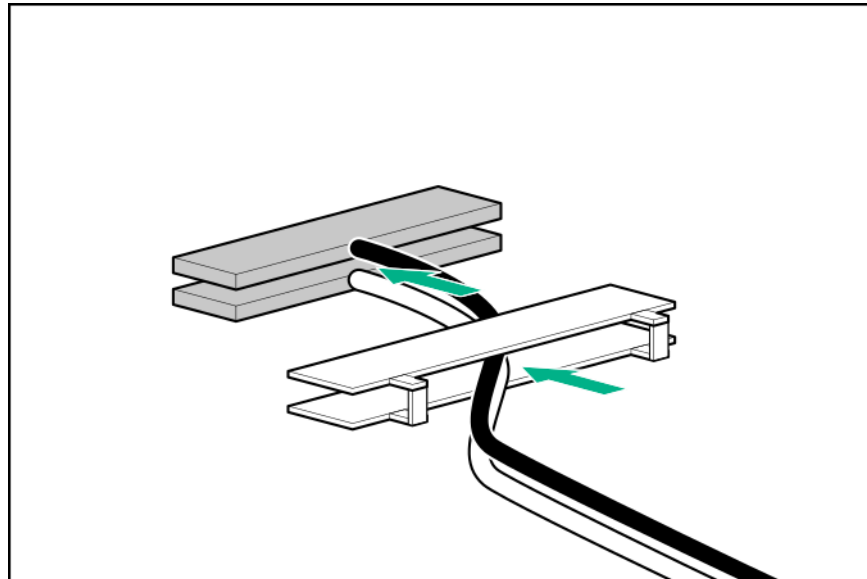
5. Depending on your configuration, remove the primary riser cage, secondary riser cage, or both (**Removing a PCIe riser cage** on page 43).

6. Remove the expansion slot blanks from the required slots.

The primary PCIe riser cage is shown.



7. Thread the adapter end of the auxiliary card cables through one of the retention clips provided with the installation kit.

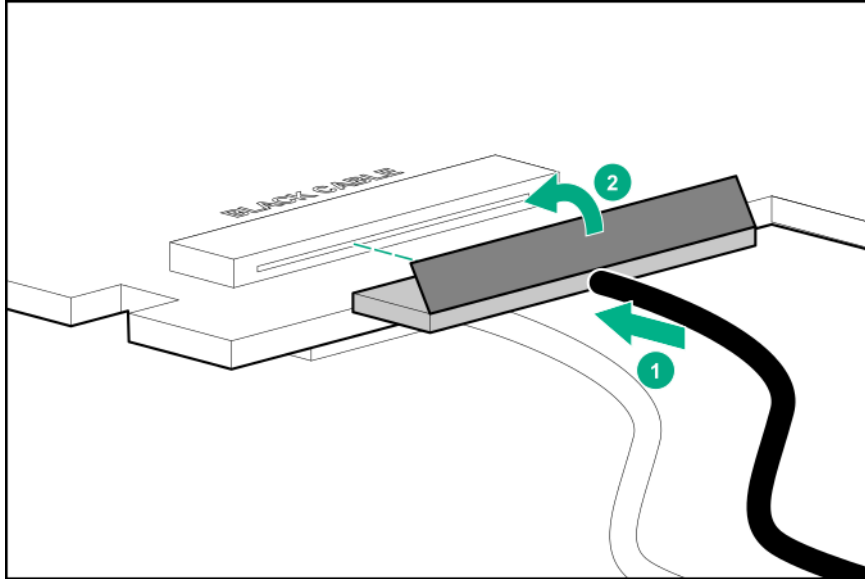


8. Open the cable latch door, connect the auxiliary card cables to the adapter ports so that the golden side of the cable connector is on the top, and then close the cable latch door.

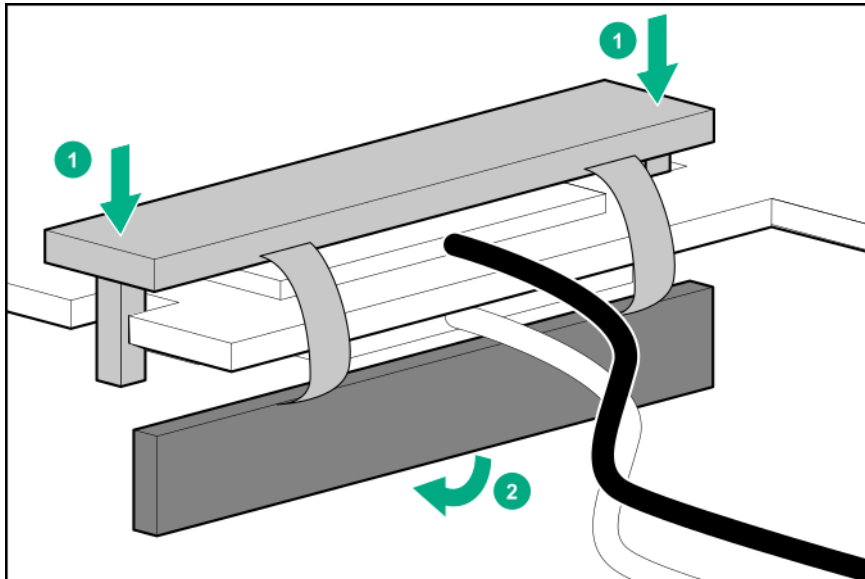
The white and black cables from the auxiliary card connect to the expansion board ports labeled WHITE CABLE and BLACK CABLE, respectively.

The cable latch door must be open when connecting the cables.

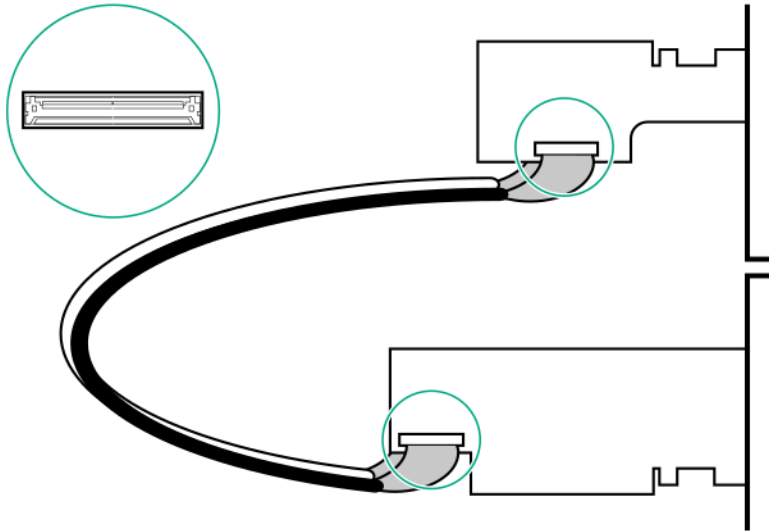
⚠ CAUTION: The connector pins are fragile and easily damaged. To avoid damaging the connector pins, do not use excessive force when connecting the cables.



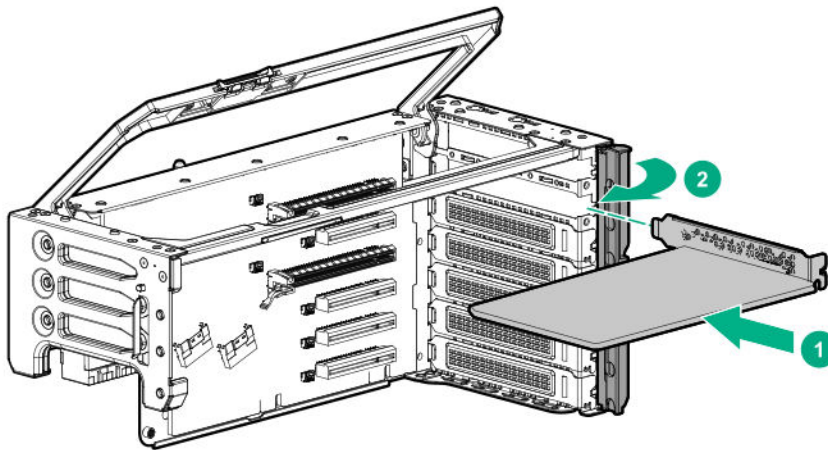
9. Install the retention clip.



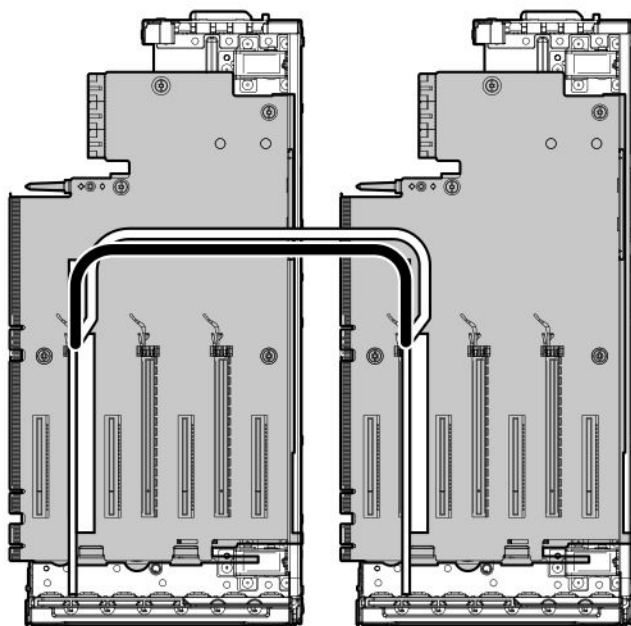
10. Thread the auxiliary cables through the second retention clip.
11. Connect the auxiliary cables to the auxiliary card.
12. Confirm that the orientation of the cables is correct.



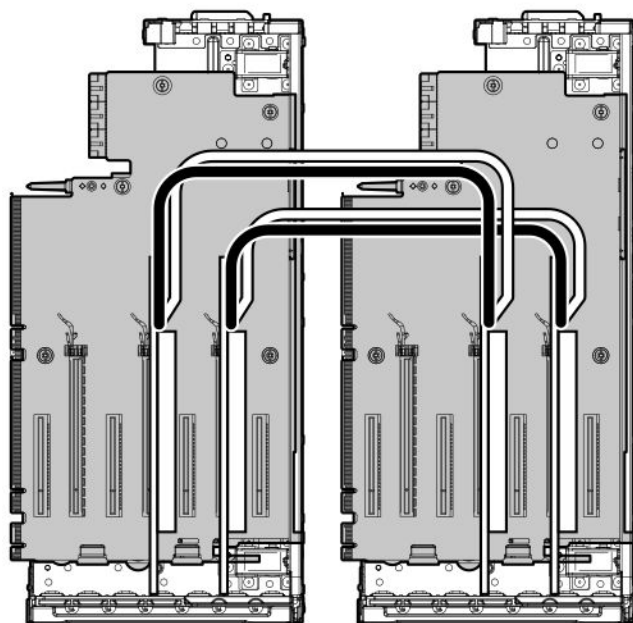
13. Install the adapter and auxiliary cards into supported slots.



Two-processor configuration



Four-processor configuration



14. Install the riser cages into the server.
15. Install the access panel (**Installing the access panel** on page 41).
16. Install the server into the rack (**Installing the server into the rack** on page 59).
17. Connect each power cord to the server.
18. Connect each power cord to the power source.
19. **Power up the server** on page 37.


Installing the HPE 12G SAS Expander Card


Hewlett Packard Enterprise recommends installing the SAS expander card in the following locations:

- 24-drive configuration—Install the expander card into slot 5 of the primary riser cage. A SAS controller must be installed in slot 6.
- 48-drive configuration—Install the expander cards into slot 5 of the primary riser cage, and into slot 15 of the butterfly riser cage. SAS controllers must be installed in slots 6 and 16.

To ensure that cables are connected correctly, observe the labels on the cable and component connectors.

Be sure that you have the latest firmware for the controllers and the expander card. To download the latest firmware, see the Hewlett Packard Enterprise website (<http://www.hpe.com/support/hpesc>).

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

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

Prerequisites

- The components included with the hardware option kit
- Cables for each drive box
- A SAS controller for each expander

Procedure

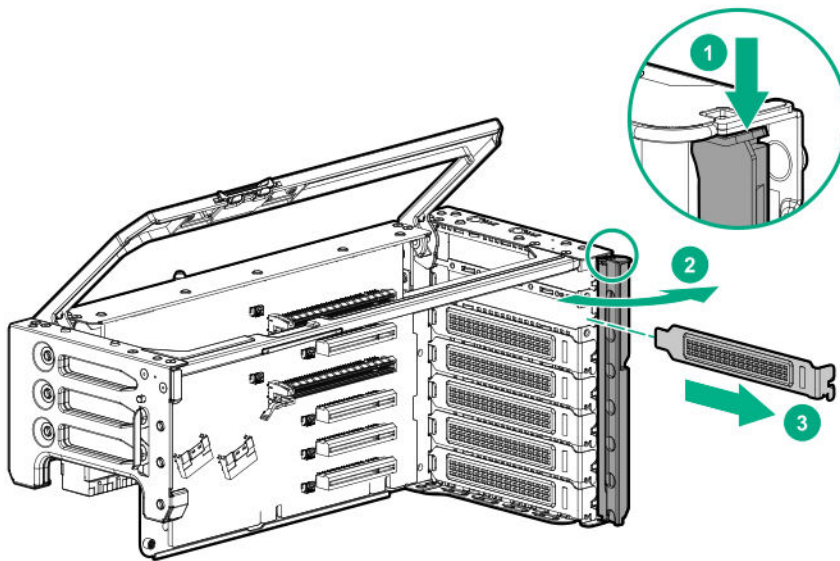
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:

- Extend the server from the rack ([Extending the server from the rack](#) on page 37).
- Remove the server from the rack ([Removing the server from the rack](#) on page 38).

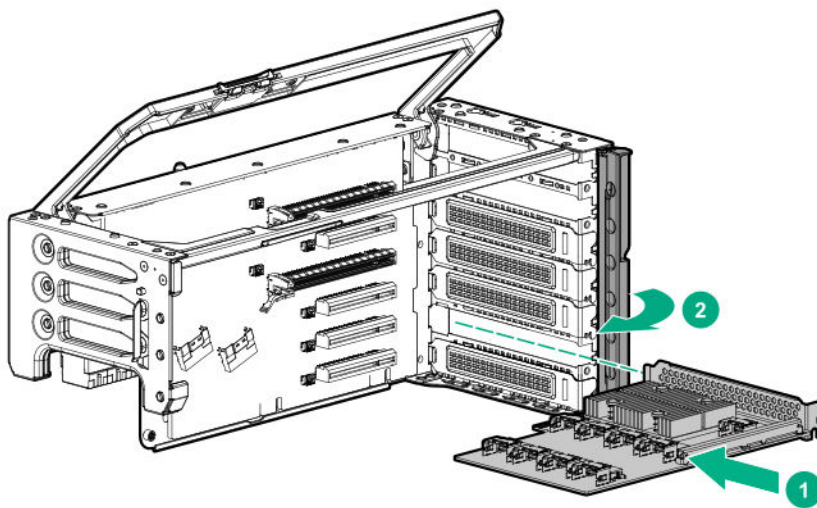
4. Remove the access panel ([Removing the access panel](#) on page 40).

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

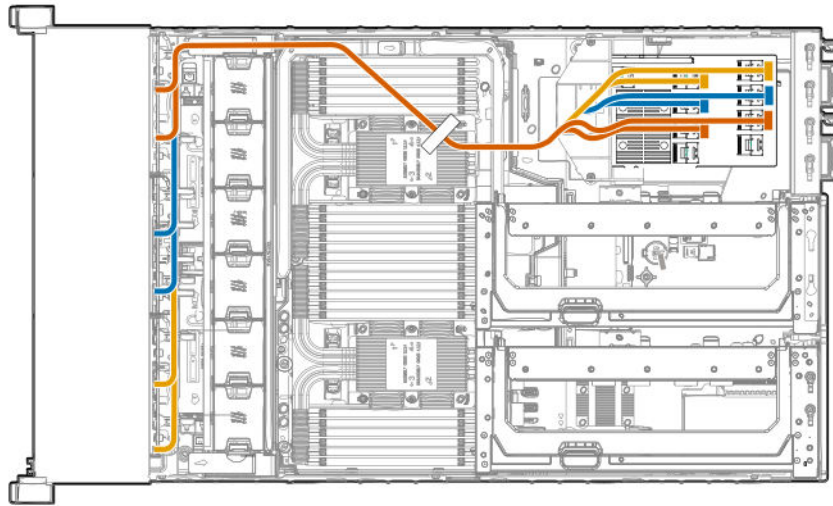
5. Remove the riser cage ([Removing a PCIe riser cage](#) on page 43).
6. Remove the expansion slot blank from slot 5 (primary riser cage) or slot 15 (butterfly riser cage).
The primary PCIe riser cage is shown.



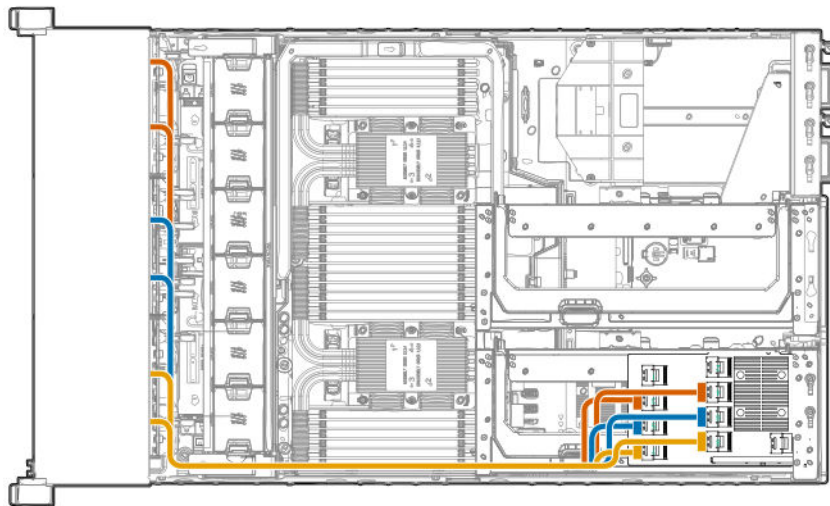
7. Using the labels on each cable, connect the cables to the SAS expander.
8. Install the 12G SAS expander card into expansion slot 5 or slot 15.



9. Install the riser cage.
10. Using the labels on the cables to determine the correct connections, connect the cables from ports 3 and 4 of the SAS expander card to the corresponding SAS controller in slot 6 or 16.
11. Connect the cables from the SAS expander card to the drive backplanes.
 - a. Route the cables from the upper drive box backplanes (boxes 1–3) to the SAS expander card in the butterfly riser cage.



- b. Route the cables from the lower drive box backplanes (boxes 4–6) to the SAS expander card in the primary riser cage.



12. Install the access panel (**Installing the access panel** on page 41).
13. Install the server into the rack (**Installing the server into the rack** on page 59).
14. Connect each power cord to the server.


15. Connect each power cord to the power source.


16. **Power up the server** on page 37.

Installing a GPU card

Up to four double wide GPU cards can be installed in the following locations:

- Primary riser cage, slots 2 and 4.
- Butterfly riser cage, slots 9 and 11.

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

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


Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware kit.
- T-30 Torx screwdriver.
- A T-10 Torx screwdriver might be needed to unlock the access panel.
- One cable kit supports up to three GPU cards. Install a second GPU cable kit if installing more than three GPU cards in the server.

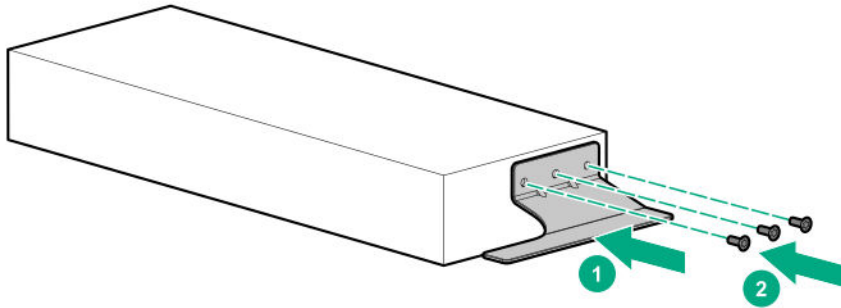
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

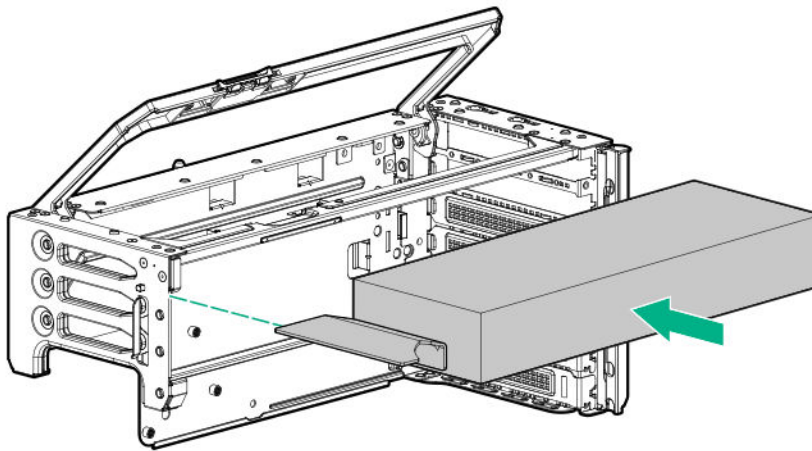
 **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

5. Remove the riser cage (**Removing a PCIe riser cage** on page 43).

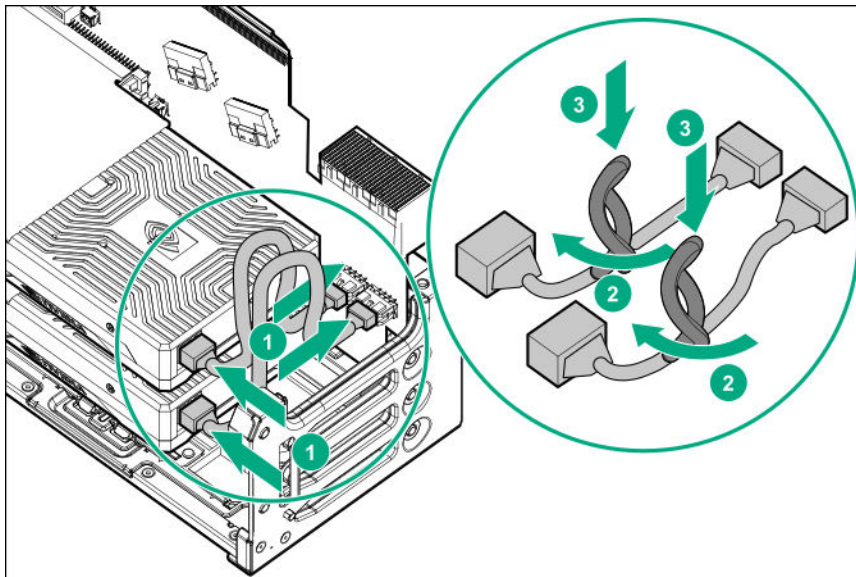
6. Install the extender bracket onto the GPU card.



7. Install the GPU card into the riser cage.

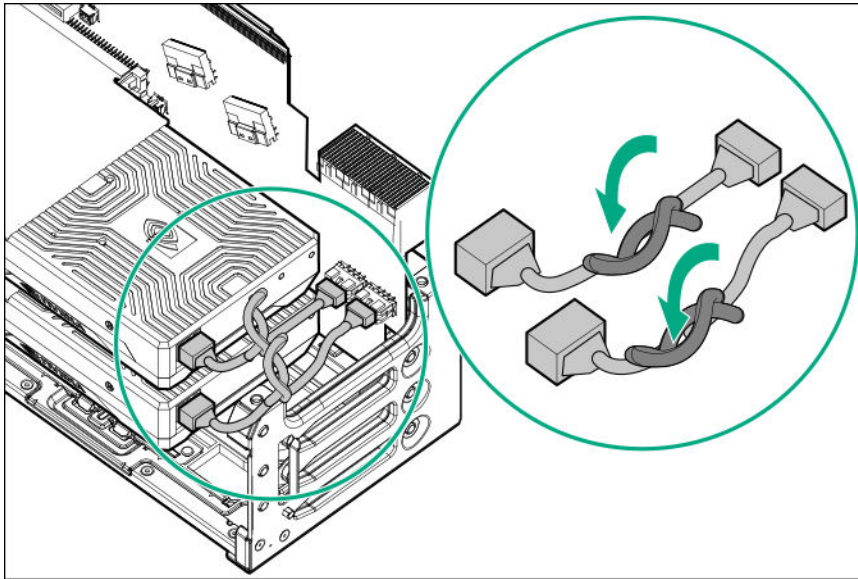


8. Connect the GPU power cables to the riser board, and loop the excess cable.



9. Tuck the looped cables between the GPU cards and the riser cage.

⚠ CAUTION: Before installing the riser cage into the server, be sure that the power cables are routed and secured between the GPU card and the riser cage. Improper routing can result in damage to the cables and connectors.



10. Install the riser cage.
11. Install the access panel (**Installing the access panel** on page 41).
12. Install the server into the rack (**Installing the server into the rack** on page 59).
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. **Power up the server** on page 37.

The installation is complete.

Controller options

The server supports the following storage controllers:

- Embedded controllers
Enabled through System Utilities and configured through HPE Smart Storage Administrator (Intelligent Provisioning)
- Type-p controllers
Type-p controllers install in a PCIe expansion slot

Installing a type-p controller

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

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

⚠ CAUTION: Hewlett Packard Enterprise recommends performing a backup of all server data before installing or removing a controller or adapter.

Population guidelines

- Up to four internal cabled controllers can be installed in the primary riser cage.
- The butterfly riser supports only two internal cabled controllers in slots 15 and 16.
- No internal cabled controllers are supported in slots 8 through 14.
- There are no limitations on the number of externally cabled controllers.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- T-10 Torx screwdriver

Before installing the controller, observe the following requirements:

- To ensure that cables are connected correctly, observe the labels on the cable and component connectors.
- Be sure that you have the latest firmware for the controllers, HBAs, and the expander card. To download the latest firmware, see the Hewlett Packard Enterprise website (<http://www.hpe.com/support/hpesc>).
- To enable SmartCache or CacheCade in the Smart Array controller, be sure that **an energy pack is installed**.

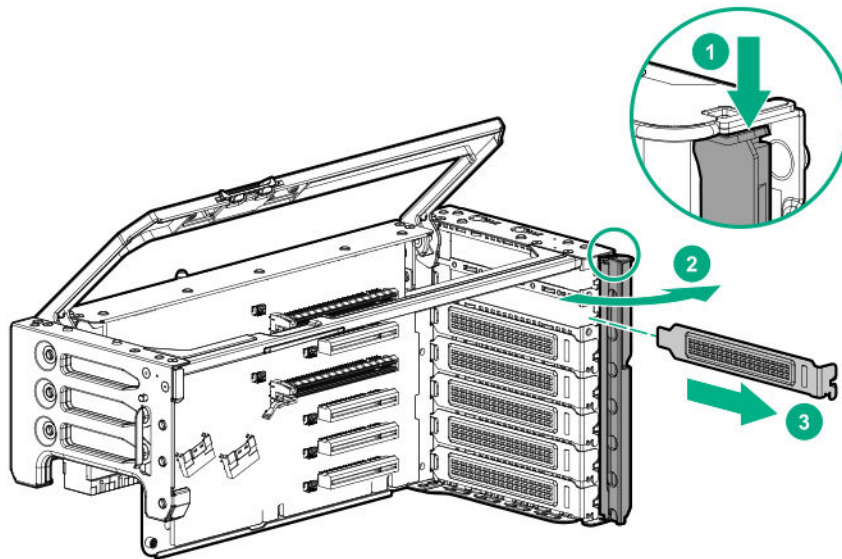
Procedure

1. Back up all server data.
2. **Power down the server** on page 37.
3. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
4. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
5. Remove the access panel (**Removing the access panel** on page 40).

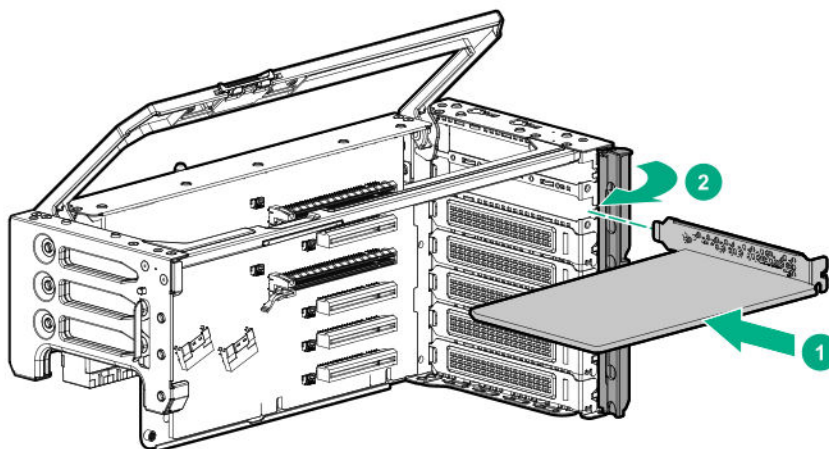
⚠ CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

6. Remove the fan cage (**Removing the fan cage** on page 46).
7. Remove the riser cage (**Removing a PCIe riser cage** on page 43).
8. Remove the expansion slot blank from the riser cage.

The primary PCIe riser cage is shown.



9. Install the controller into the PCI riser cage, depending on the server configuration.



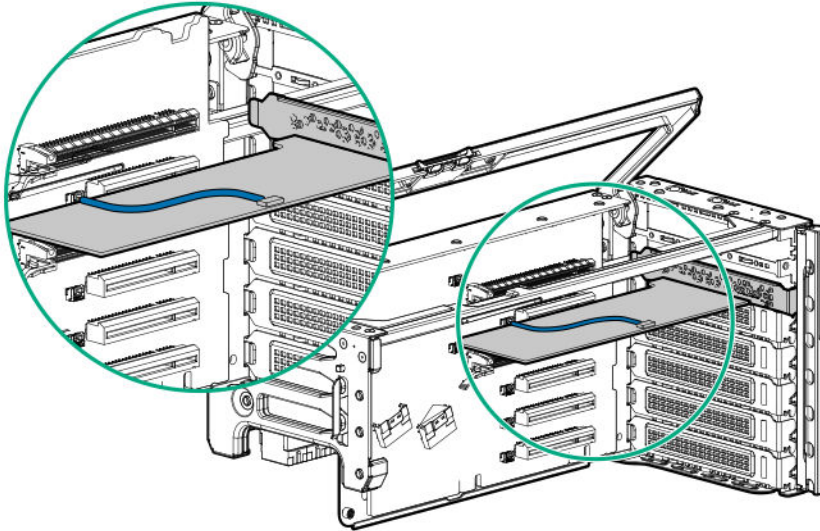
HPE Smart Array SR-series controllers

If your server configuration requires installation of a SAS expander, observe the following:

- 24 drive configuration—Install the SAS controller in slot 6. The SAS expander card must be installed into slot 5 of the primary riser cage.
- 48 drive configuration—Install the SAS controllers in slots 6 and 16. Install SAS expander cards into slot 5 of the primary riser cage, and into slot 15 of the butterfly riser cage.

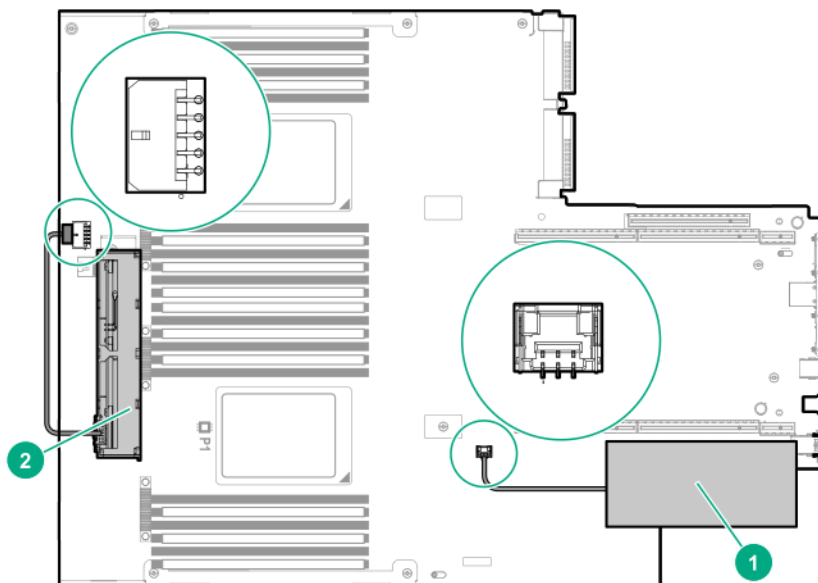
HPE Smart Array MR-series controllers

- 24 drive configuration—Install the controller in the primary cage.
 - 48 drive configuration—Install the controllers in the primary and butterfly riser cages.
10. Using the shorter of the two cables provided, connect the controller backup power cable to the controller backup power connector on the riser board (**Riser board components** on page 33).



❗ **IMPORTANT:** To enable SmartCache or CacheCade in a P-class type-p Smart Array controller, you must:

- Connect the controller backup power cable to the controller backup power connector on the system or riser board.
- Connect the energy pack cable to the energy pack connector on the system board.



Item	Description ¹
1	Type-p Smart Array controller connected to the controller backup power connector
2	Energy pack connected to the energy pack connector

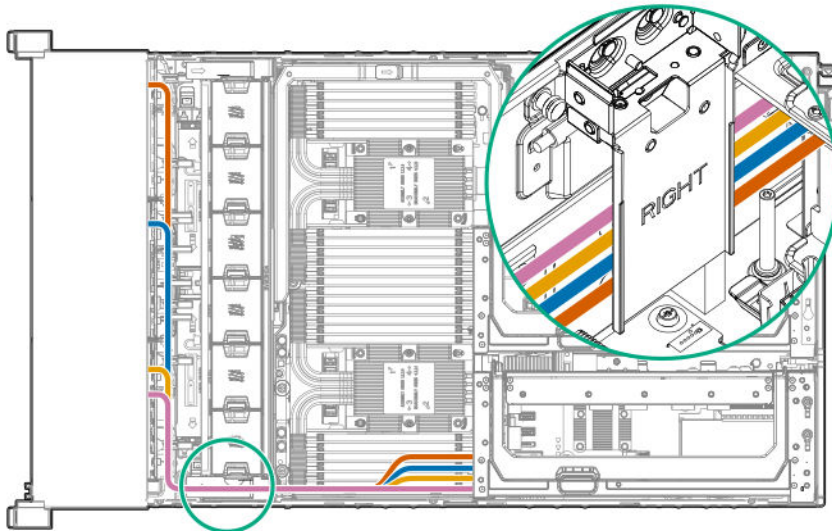
¹ Your server might appear different.

To locate these connectors, see **System board components** on page 25 and **Riser board components** on page 33.

11. Install the riser cage.
12. Route and connect the cables between the storage devices and the controller.

A maximum of four cables can be routed to each riser cage.

⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.



13. Install the access panel (**Installing the access panel** on page 41).
14. Install the server into the rack (**Installing the server into the rack** on page 59).
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. **Power up the server** on page 37.
18. To configure the controller, see the user guide for your controller series on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/smartstorage-docs>).

Installing a FlexibleLOM adapter

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

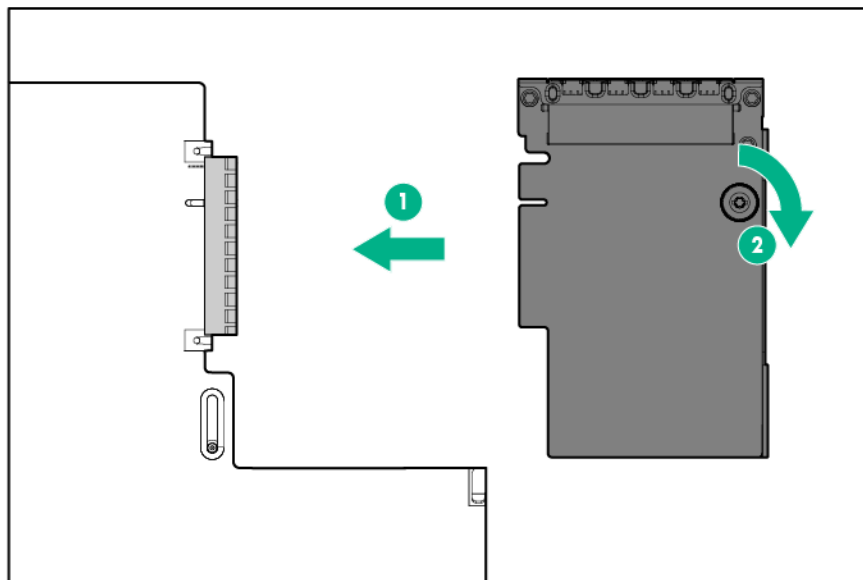
- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. Install the FlexibleLOM adapter.



7. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).

8. Install the access panel ([Installing the access panel](#) on page 41).
9. Install the server into the rack ([Installing the server into the rack](#) on page 59).
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. [Power up the server](#) on page 37.

Processor options

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 processor

The server supports installation of 1–4 processors. Single-processor configurations are supported in servers with only a six-slot riser installed in the primary riser cage.

-
- ❗ **IMPORTANT:** Existing HPE ProLiant and HPE Synergy Gen10 server products containing first-generation Intel Xeon Scalable processors may not be upgraded to second-generation Intel Xeon Scalable processors at this time.

For more information, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

Hewlett Packard Enterprise recommends identifying the processor heatsink module components (**[Processor, heatsink, and socket components](#)** on page 27) before performing this procedure.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware kit.
- T-30 Torx screwdriver.
- A T-10 Torx screwdriver might be needed to unlock the access panel.

Procedure

1. Observe the following alerts:

⚠ CAUTION: When handling the heatsink, always hold it along the top and bottom of the fins. Holding it from the sides can damage the fins.

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

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

⚠ CAUTION: If installing a processor with a faster speed, update the system ROM before installing the processor.

To download firmware and view installation instructions, see the **Hewlett Packard Enterprise Support Center website**.

⚠ CAUTION: THE CONTACTS ARE VERY FRAGILE AND EASILY DAMAGED. To avoid damage to the socket or processor, do not touch the contacts.

2. **Power down the server** on page 37.

3. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.

4. Do one of the following:

- Extend the server from the rack (**Extending the server from the rack** on page 37).
- Remove the server from the rack (**Removing the server from the rack** on page 38).

5. Remove the access panel (**Removing the access panel** on page 40).

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

6. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).

7. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).

8. Remove the air baffle (**Removing the air baffle** on page 44).

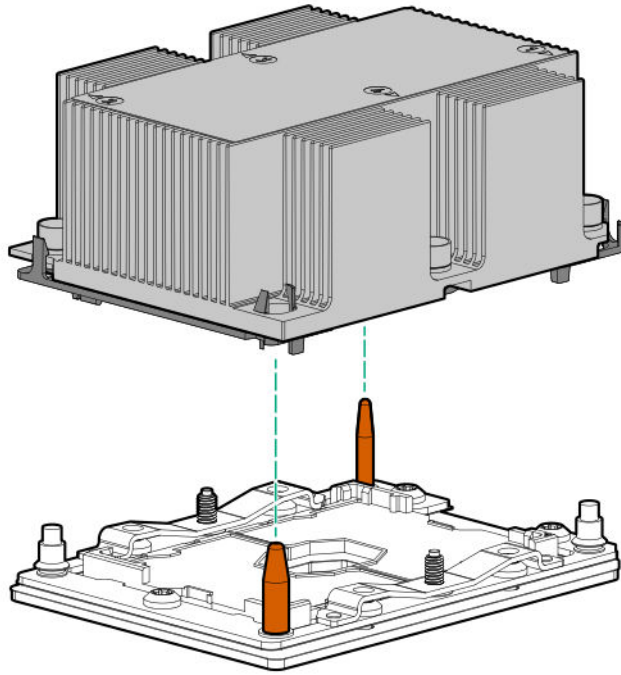
9. If installed, remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).

10. Install the processor heatsink assembly:

- a. Locate the Pin 1 indicator on the processor carrier and the socket.
- b. Align the processor heatsink assembly with the heatsink alignment pins and gently lower it down until it sits evenly on the socket.

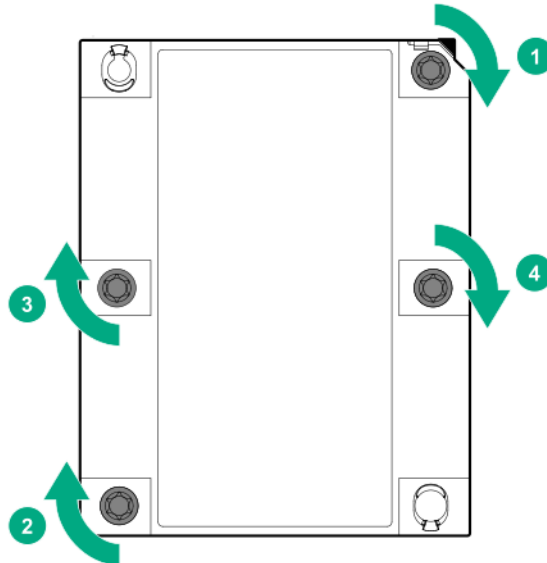
The heatsink alignment pins are keyed. The processor heatsink assembly will only install one way.

Your heatsink may look different than the one shown.



⚠ CAUTION: Be sure to tighten each heatsink nut fully in the order indicated. Otherwise, boot failure or intermittent shutdowns might occur.

- c. Using a T-30 Torx screwdriver, fully tighten each heatsink nuts in the order indicated on the heatsink label (1 -2 -3 -4) until it no longer turns.



11. Install the processor mezzanine tray (**Installing a processor mezzanine tray** on page 115).

12. Install the air baffle (**Installing the air baffle** on page 45).



CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

13. Install the fan cage ([Installing the fan cage](#) on page 47).
14. Install the primary PCIe riser cage ([Installing the primary PCIe riser cage](#) on page 42).
15. Install the butterfly PCIe riser cage ([Installing a butterfly PCIe riser cage](#) on page 86).
16. Install the access panel ([Installing the access panel](#) on page 41).
17. Install the server into the rack ([Installing the server into the rack](#) on page 59).
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. [Power up the server](#) on page 37.

Installing a processor mezzanine tray

Install the processor mezzanine tray to support four processors in the server.

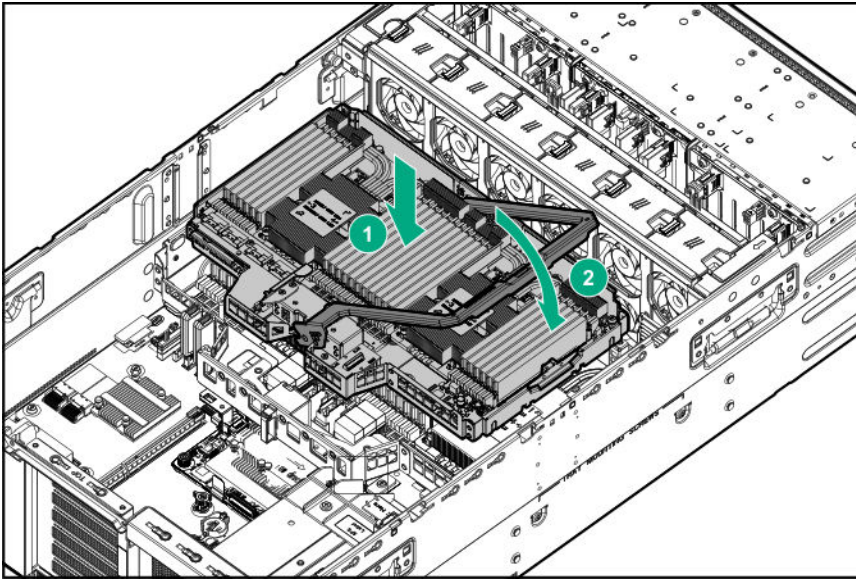
Procedure

1. [Power down the server](#) on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
4. Remove the access panel ([Removing the access panel](#) on page 40).



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

5. Remove the primary PCIe riser cage ([Removing a PCIe riser cage](#) on page 43).
6. If installed, remove the butterfly riser cage ([Removing a PCIe riser cage](#) on page 43).
7. Remove the air baffle ([Removing the air baffle](#) on page 44).
8. Install the processors onto the processor mezzanine tray sockets ([Installing a processor](#) on page 112).
9. Install the DIMMs onto the processor mezzanine tray DIMM slots ([Installing a DIMM](#) on page 117).
10. Install the processor mezzanine tray.



11. Install the air baffle (**Installing the air baffle** on page 45).

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

12. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
13. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
14. Install the access panel (**Installing the access panel** on page 41).
15. Install the server into the rack (**Installing the server into the rack** on page 59).
16. Connect each power cord to the server.
17. Connect each power cord to the power source.
18. **Power up the server** on page 37.

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. All memory installed in the server must be of the same type.
-

DIMM population information

For specific DIMM population information, see the DIMM population guidelines on the Hewlett Packard Enterprise website (<http://www.hpe.com/docs/memory-population-rules>).

DIMM-processor compatibility

The installed processor determines the type of DIMM that is supported in the server:

- First-generation Intel Xeon Scalable processors support DDR4-2666 DIMMs.
- Second-generation Intel Xeon Scalable processors support DDR4-2933 DIMMs.

Mixing DIMM types is not supported. Install only the supported DDR4-2666 or DDR4-2933 DIMMs in the server.

HPE SmartMemory speed information

For more information about memory speed information, see the Hewlett Packard Enterprise website (<https://www.hpe.com/docs/memory-speed-table>).

Installing a DIMM

For information about memory support, configurations, or population guidelines, see **Memory options** on page 116.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

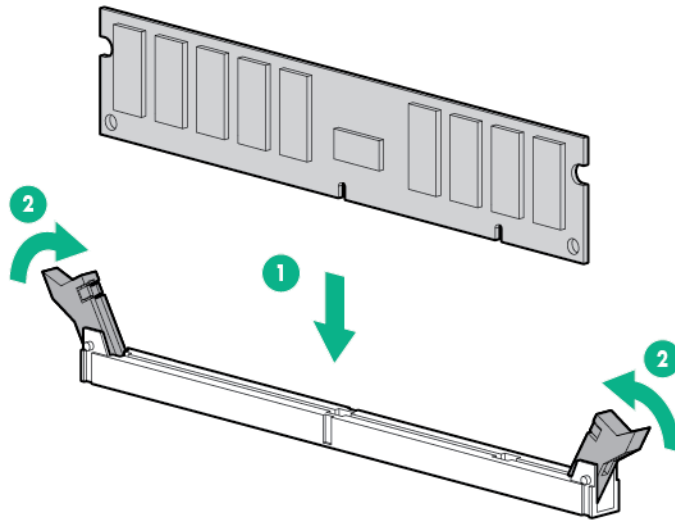
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).



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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. To access the DIMM slots for processors 1 and 2, remove the processor mezzanine tray (**Removing the processor mezzanine tray** on page 49).
9. Open the DIMM slot latches.
10. Install the DIMM.



11. Install the processor mezzanine tray ([Installing a processor mezzanine tray](#) on page 115).
12. Install the air baffle ([Installing the air baffle](#) on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

13. Install the primary PCIe riser cage ([Installing the primary PCIe riser cage](#) on page 42).
14. Install the butterfly PCIe riser cage ([Installing a butterfly PCIe riser cage](#) on page 86).
15. Install the access panel ([Installing the access panel](#) on page 41).
16. Install the server into the rack ([Installing the server into the rack](#) on page 59).
17. Connect each power cord to the server.
18. Connect each power cord to the power source.
19. **Power up the server** on page 37.

To configure the memory mode, use the BIOS/Platform Configuration (RBSU) in the System Utilities.

If a DIMM failure has occurred, see [Systems Insight Display combined LED descriptions](#) on page 16.

HPE Persistent Memory option

HPE Persistent Memory, which offers the flexibility to deploy as dense memory or fast storage and features Intel Optane DC Persistent Memory, enables per-socket memory capacity of up to 3.0 TB. HPE Persistent Memory, together with traditional volatile DRAM DIMMs, provide fast, high-capacity, cost-effective memory and storage to transform big data workloads and analytics by enabling data to be stored, moved, and processed quickly.

HPE Persistent Memory modules use the standard DIMM form factor and are installed alongside DIMMs in a server memory slot. HPE Persistent Memory modules are designed for use only with second-generation Intel Xeon Scalable processors, and are available in the following capacities:

- 128 GB
- 256 GB
- 512 GB

HPE Persistent Memory module-processor compatibility

HPE Persistent Memory modules are supported only in servers with second-generation Intel Xeon Scalable processors installed.

HPE Persistent Memory population information

For specific population and configuration information, see the memory population guidelines on the Hewlett Packard Enterprise website (<http://www.hpe.com/docs/memory-population-rules>).

System requirements for HPE Persistent Memory module support

-
- !** **IMPORTANT:** Hewlett Packard Enterprise recommends that you implement best practice configurations for high availability (HA) such as clustered configurations.
-

Before installing HPE Persistent Memory modules, make sure that the following components and software are available:

- A supported HPE ProLiant Gen10 server or Synergy compute module using second-generation Intel Xeon Scalable processors. For more information, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/support/persistentmemoryQS>).
- HPE DDR4 Standard Memory RDIMMs or LRDIMMs (the number will vary based on your chosen configuration).
- Supported firmware and drives:
 - System ROM version 2.10 or later
 - Server Platform Services (SPS) Firmware version 04.01.04.296
 - HPE iLO 5 Firmware version 1.43
 - HPE Innovation Engine Firmware version 2.1.x or later

Download the required firmware and drivers from the Hewlett Packard Enterprise website (<http://www.hpe.com/info/persistentmemory>).
- A supported operating system:
 - Windows Server 2012 R2 with persistent memory drivers from Hewlett Packard Enterprise
 - Windows Server 2016 with persistent memory drivers from Hewlett Packard Enterprise
 - Windows Server 2019
 - Red Hat Enterprise Linux 7.6
 - Red Hat Enterprise Linux 8.0
 - SUSE Linux Enterprise Server 12 SP4
 - SUSE Linux Enterprise Server 15 with SUSE-SU-2019:0224-1 kernel update
 - SUSE Linux Enterprise Server 15 SP1 with SUSE-SU-2019:1550-1 kernel update

- VMware vSphere 6.7 U2 + Express Patch 10 (ESXi670-201906002) or later (supports App Direct and Memory modes)
- VMware vSphere 6.5 U3 or later (supports Memory mode)
- Hardware and licensing requirements for optional encryption of the HPE Persistent Memory modules:
 - HPE TPM 2.0 (local key encryption)
 - HPE iLO Advanced License (remote key encryption)
 - Key management server (remote key encryption)

For more information, see the *HPE Persistent Memory User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/persistentmemory-docs>).

Installing HPE Persistent Memory modules

Use this procedure only for new HPE Persistent Memory module installations. If you are migrating this HPE Persistent Memory module from another server, see the *HPE Persistent Memory User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/persistentmemory-docs>).

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- The components included with the hardware option kit.
- A T-10 Torx screwdriver that might be needed to unlock the access panel.

Procedure

1. Observe the following alerts:

⚠ CAUTION: DIMMs and HPE Persistent Memory modules are keyed for proper alignment. Align notches on the DIMM or HPE Persistent Memory module with the corresponding notches in the slot before installing the component. Do not force the DIMM or HPE Persistent Memory module into the slot. When installed properly, not all DIMMs or HPE Persistent Memory modules will face in the same direction.

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

⚠ CAUTION: Failure to properly handle HPE Persistent Memory modules can damage the component and the system board connector.

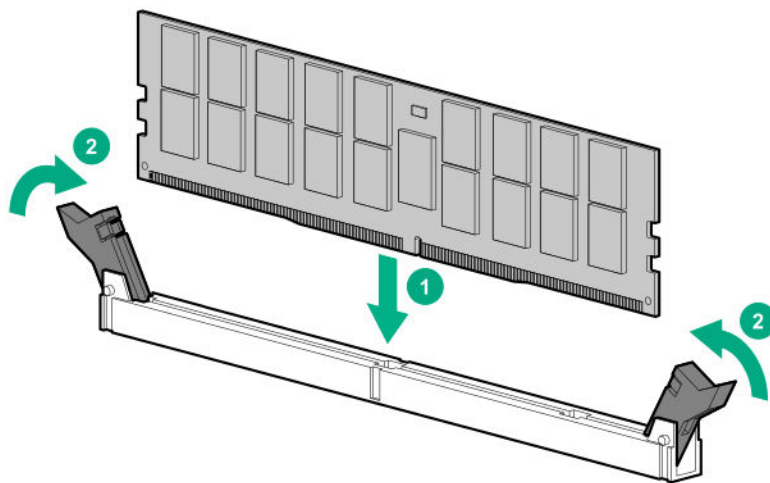
❗ IMPORTANT: Hewlett Packard Enterprise recommends that you implement best practice configurations for high availability (HA) such as clustered configurations.

2. **Power down the server** on page 37.
3. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.

4. Do one of the following:
 - Extend the server from the rack ([Extending the server from the rack](#) on page 37).
 - Remove the server from the rack ([Removing the server from the rack](#) on page 38).
5. Place the server on a flat, level work surface.
6. Remove the access panel ([Removing the access panel](#) on page 40).

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

7. Remove the primary PCIe riser cage ([Removing a PCIe riser cage](#) on page 43).
8. If installed, remove the butterfly riser cage ([Removing a PCIe riser cage](#) on page 43).
9. Remove the air baffle ([Removing the air baffle](#) on page 44).
10. To access the DIMM slots for processors 1 and 2, remove the processor mezzanine tray ([Removing the processor mezzanine tray](#) on page 49).
11. Install the HPE Persistent Memory module.



12. Install any components removed to access the DIMM slots.
13. Install the access panel.
14. Slide or install the server into the rack.
15. If removed, reconnect all power cables.
16. Power up the server.
17. Configure the server for HPE Persistent Memory.

For more information, see [Configuring the server for HPE Persistent Memory](#) on page 121.

Configuring the server for HPE Persistent Memory

After installing HPE Persistent Memory modules, configure the server for HPE Persistent Memory.

-
- !** **IMPORTANT:** Always follow recommendations from your software application provider for high-availability best practices to ensure maximum uptime and data protection.
-

A number of configuration tools are available, including:

- **UEFI System Utilities**—Access System Utilities through the Remote Console to configure the server by pressing the **F9** key during POST.
- **iLO RESTful API**—Use the iLO RESTful API through tools such as the RESTful Interface Tool (ilorest) or other third-party tools.
- **HPE Persistent Memory Management Utility**—The HPE Persistent Memory Management Utility is a desktop application used to configure the server for HPE Persistent Memory, as well as evaluate and monitor the server memory configuration layout.

For more information, see the *HPE Persistent Memory User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/persistentmemory-docs>).

Installing the CPU Mezzanine UPI performance kit

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

Procedure

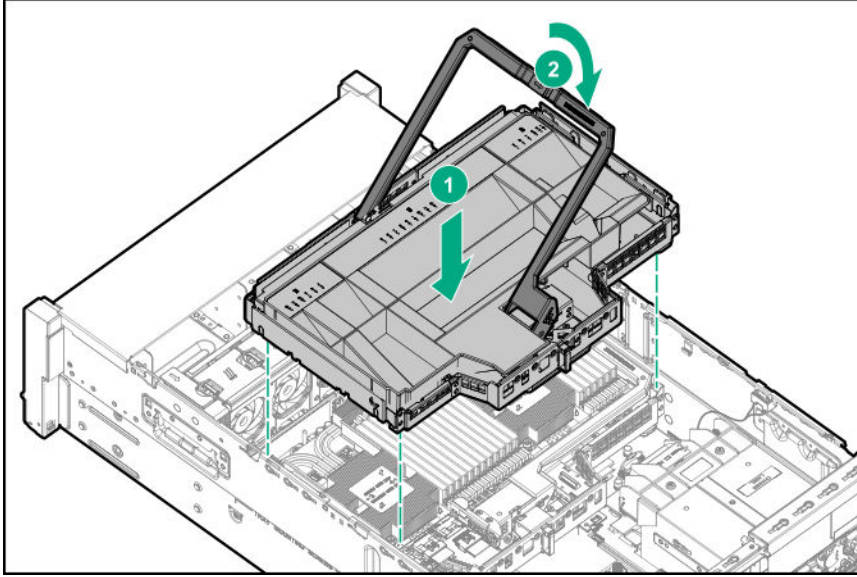
1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. Remove the covers protecting the upper processor mezzanine power and signal connectors.

To locate these connectors, see **System board components** on page 25.

9. Install the CPU Mezzanine UPI performance kit.



10. Install the air baffle (**Installing the air baffle** on page 45).

CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

11. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
12. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
13. Install the access panel (**Installing the access panel** on page 41).
14. Install the server into the rack (**Installing the server into the rack** on page 59).
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. **Power up the server** on page 37.

HPE Smart Storage Battery

The HPE Smart Storage Battery supports the following devices:

- HPE Smart Array SR controllers
- HPE Smart Array MR controllers

A single 96W battery can support up to 24 devices.

After the battery is installed, it might take up to two hours to charge. Controller features requiring backup power are not re-enabled until the battery is capable of supporting the backup power.

This server supports the 96W HPE Smart Storage Battery with the 145mm cable.

Installing a Smart Storage Battery

NOTE: System ROM and firmware messages might display "energy pack" in place of "Smart Storage Battery." Energy pack refers to both HPE Smart Storage batteries and HPE Smart Storage Hybrid capacitors.

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

- T-10 Torx screwdriver
- The components included with the hardware option kit

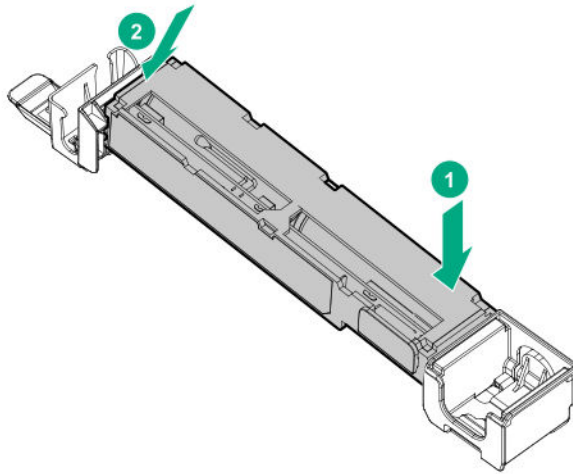
Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).



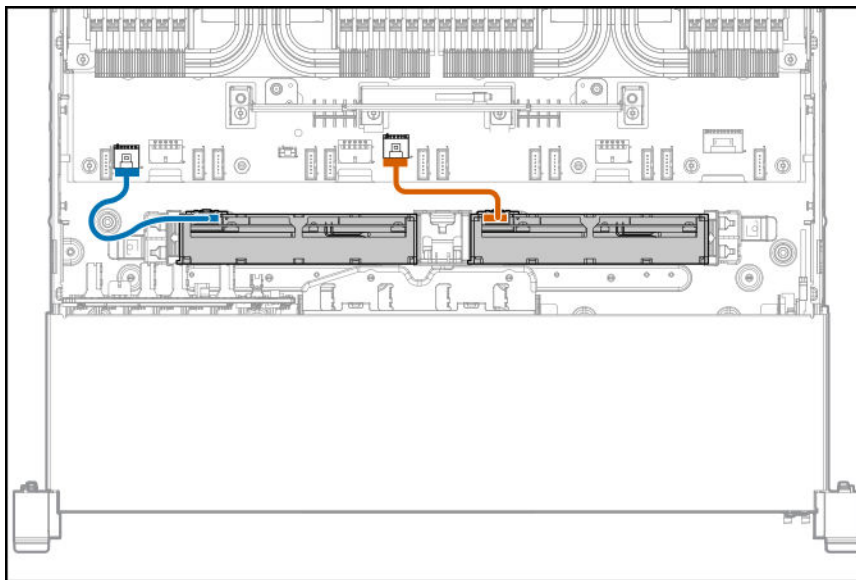
CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

5. Remove the primary PCIe riser cage (**Removing a PCIe riser cage** on page 43).
6. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
7. Remove the air baffle (**Removing the air baffle** on page 44).
8. Remove the fan cage (**Removing the fan cage** on page 46).
9. Install up to two HPE Smart Storage batteries.



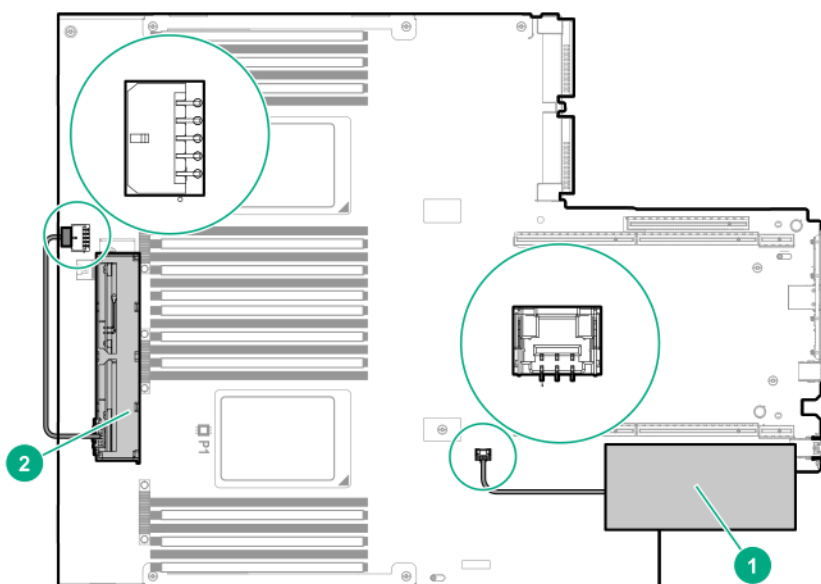
10. Route and connect the energy pack cable:

- To provide backup power to the DIMM slots and controllers installed on the system board, connect the energy pack cable to connector 1 (orange).
- To provide backup power to the DIMM slots on the processor mezzanine tray, connect the energy pack cable to connector 2 (blue).



! **IMPORTANT:** To enable SmartCache or CacheCade in a P-class type-p Smart Array controller, you must:

- Connect the controller backup power cable to the controller backup power connector on the system or riser board.
 - Connect the energy pack cable to the energy pack connector on the system board.
-



Item	Description ¹
1	Type-p Smart Array controller connected to the controller backup power connector
2	Energy pack connected to the energy pack connector

¹ Your server might appear different.

To locate these connectors, see **System board components** on page 25 and **Riser board components** on page 33.

11. Install the air baffle (**Installing the air baffle** on page 45).

⚠ CAUTION: To avoid damaging the connectors, always install the air baffle into the server before installing the riser cages.

12. Install the fan cage (**Installing the fan cage** on page 47).
13. Install the primary PCIe riser cage (**Installing the primary PCIe riser cage** on page 42).
14. Install the butterfly PCIe riser cage (**Installing a butterfly PCIe riser cage** on page 86).
15. Install the access panel (**Installing the access panel** on page 41).
16. Install the server into the rack (**Installing the server into the rack** on page 59).
17. Connect each power cord to the server.
18. Connect each power cord to the power source.
19. **Power up the server** on page 37.

Installing an intrusion detection switch

Prerequisites

Before you perform this procedure, make sure that you have the following items available:

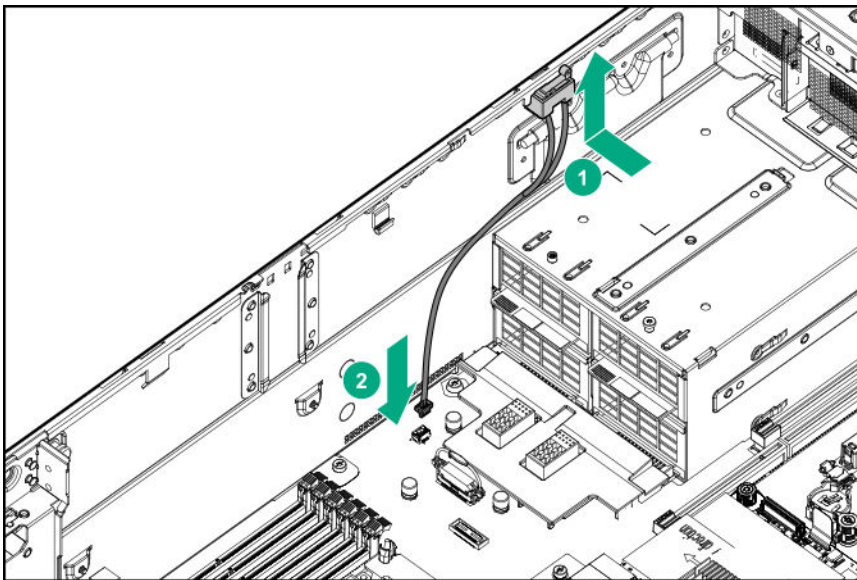
The components included with the hardware option kit

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. Install the intrusion detection switch.



6. Install the access panel (**Installing the access panel** on page 41).
7. Install the server into the rack (**Installing the server into the rack** on page 59).
8. Connect each power cord to the server.

9. Connect each power cord to the power source.

10. **Power up the server** on page 37.

Power supply options

Power supply redundancy

By default, the server is configured for 2 + 2 power redundancy. To review or update this setting in UEFI System Utilities, see **Setting the server power supply requirements** on page 60.

Population rules

The server supports installation of two or four power supplies. The power supplies are supported horizontally for redundancy. Observe the following when installing power supplies:

Two power supply configuration

- Install 1600 W power supplies into power supply bays 1 and 2. Bays 3 and 4 are not supported in this configuration.
- For 1 + 1 power redundancy, connect the power supplies in bays 1 and 2 to separate AC circuits.

For information on cabling the power supplies for redundancy, see **Installing a hot-plug power supply** on page 128.

Four power supply configuration

- Install power supplies into power supply bays 1—4.
- For redundancy, connect AC power from one power circuit to power supplies 1 and 2, and then connect power supplies 3 and 4 to a separate AC power circuit.

For information on cabling the power supplies for redundancy, see **Installing a hot-plug power supply** on page 128.

Installing a hot-plug power supply

⚠ CAUTION: All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and may shut down when it detects mismatched power supplies.

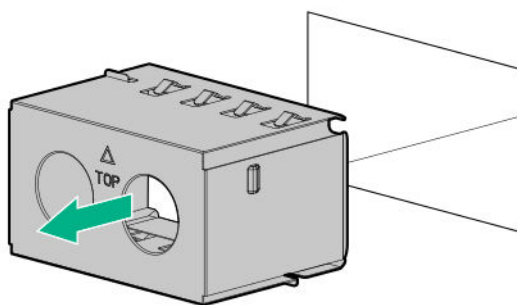
⚠ CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all device bays are populated with either a component or a blank.

❗ IMPORTANT: HPE ProLiant Gen9 power supplies are **not** supported in HPE ProLiant Gen10 servers.

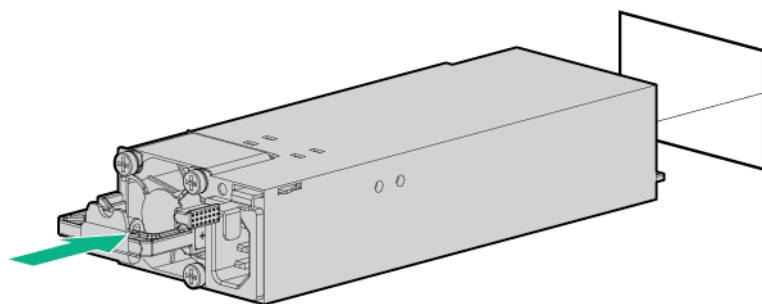
Procedure

1. Remove the blank.

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



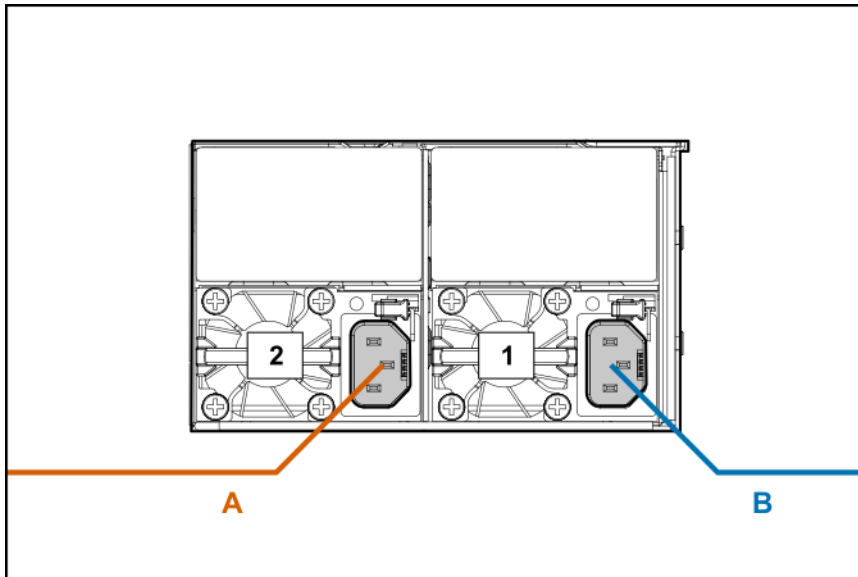
2. Install the power supply until it clicks into place.



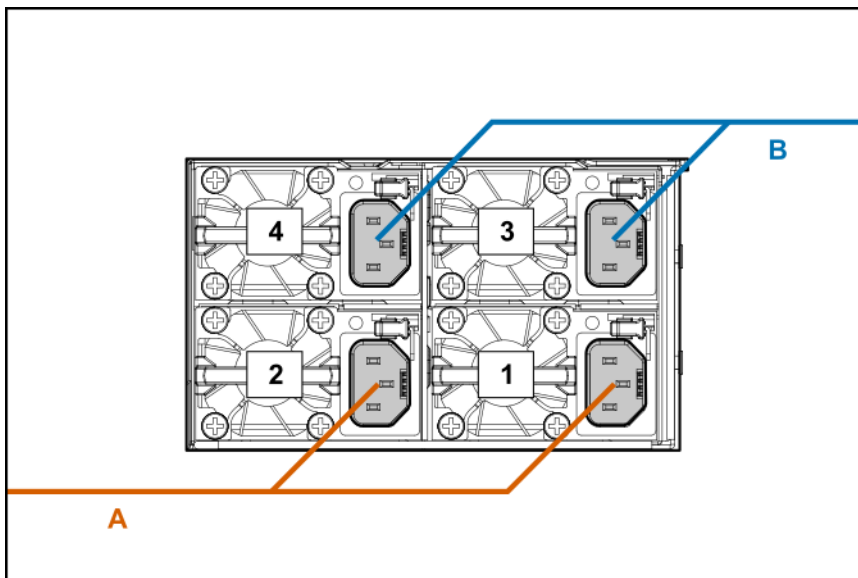
3. Connect the power cord to the power supply.

⚠ CAUTION: Connect the power cords using only the following supported configurations. Using an unsupported power supply or cabling configuration can result in an unexpected loss of system power.

- Two power supply configuration—For redundancy, connect power supplies 1 and 2 to separate AC power circuits.



- Four power supply configuration—For redundancy, connect power supplies 1 and 2 to power circuit A, and then connect power supplies 3 and 4 to power circuit B.



4. Route the power cord.
Use the cable management arm when routing cords and cables.
5. Connect the power cord to the power source.
6. Observe the power supply LED.

HPE Trusted Platform Module 2.0 Gen10 option

Overview

Use these instructions to install and enable an HPE TPM 2.0 Gen10 Kit in a supported server. This option is not supported on Gen9 and earlier servers.

This procedure includes three sections:

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

HPE TPM 2.0 installation is supported with specific operating system support such as Microsoft® Windows Server® 2012 R2 and later. For more information about operating system support, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>). For more information about Microsoft® Windows® BitLocker Drive Encryption feature, see the Microsoft website (<http://www.microsoft.com>).

⚠ CAUTION: If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

❗ IMPORTANT: In UEFI Boot Mode, the HPE TPM 2.0 Gen10 Kit can be configured to operate as TPM 2.0 (default) or TPM 1.2 on a supported server. In Legacy Boot Mode, the configuration can be changed between TPM 1.2 and TPM 2.0, but only TPM 1.2 operation is supported.

HPE Trusted Platform Module 2.0 Guidelines

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

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 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.

慧与特别提醒：在您启用系统中的TPM功能前，请务必确认您对TPM的使用遵守当地相关法律、法规及政策，并已事先获得所需的一切批准及许可（如适用），因您未获得相应的操作/使用许可而导致的违规问题，皆由您自行承担全部责任，与慧与无涉。

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, Hewlett Packard Enterprise Service provides a TPM with the spare system board.
- Any attempt to remove the cover of an installed TPM from the system board can damage the TPM cover, the TPM, and the system board.
- If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to complete Recovery Mode after BitLocker detects a possible compromise of system integrity.
- Hewlett Packard Enterprise is not liable for blocked data access caused by improper TPM use. For operating instructions, see the TPM documentation or the encryption technology feature documentation provided by the operating system.

Installing and enabling the HPE TPM 2.0 Gen10 Kit

Installing the Trusted Platform Module board

Preparing the server for installation

Procedure

1. Observe the following warnings:



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

To reduce the risk of personal injury, electric shock, or damage to the equipment, remove power from the server:

For rack and tower servers, remove the power cord.

For server blades and compute modules, remove the server blade or compute module from the enclosure.



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

2. Update the system ROM.

Locate and download the latest ROM version from the **Hewlett Packard Enterprise Support Center website**. Follow the instructions on the website to update the system ROM.

3. Update the system ROM.

Locate and download the latest ROM version from the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>). To update the system ROM, follow the instructions on the website.

4. Power down the server.

- a. Shut down the OS as directed by the OS documentation.
- b. To place the server in standby mode, press the Power On/Standby button. When the server enters standby power mode, the system power LED changes to amber.
- c. Disconnect the power cords (rack and tower servers).

5. Do one of the following:

- Remove the server from the rack, if necessary.
 - Remove the server or server blade from the server.
6. Place the server on a flat, level work surface.
 7. Remove the access panel.
 8. Remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
 9. Proceed to **Installing the TPM board and cover** on page 133.

Installing the TPM board and cover

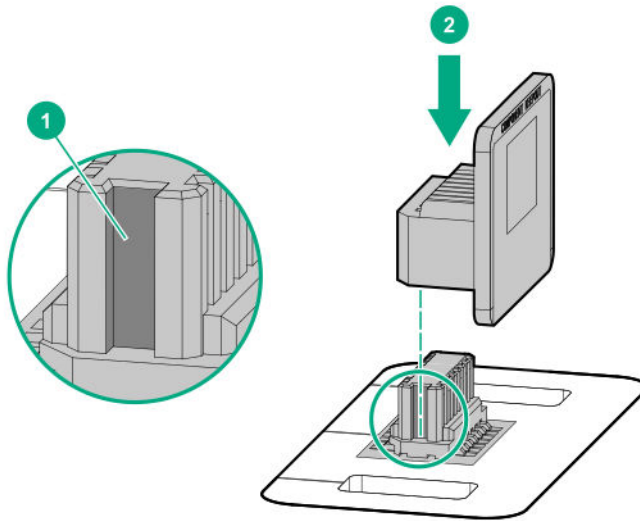
Procedure

1. Observe the following alerts:

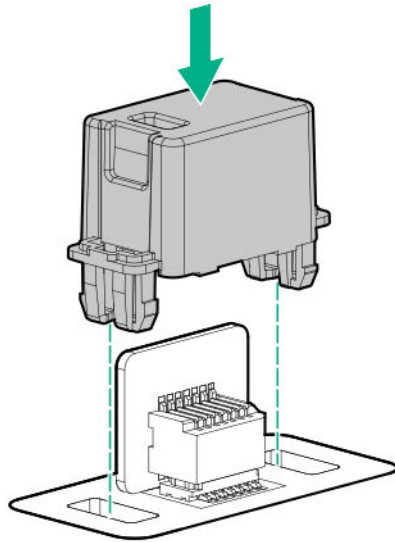
⚠ CAUTION: If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

⚠ CAUTION: The TPM is keyed to install only in the orientation shown. Any attempt to install the TPM in a different orientation might result in damage to the TPM or system board.

2. Align the TPM board with the key on the connector, and then install the TPM board. To seat the board, press the TPM board firmly into the connector. To locate the TPM connector on the system board, see the server label on the access panel.



3. Install the TPM cover:
 - a. Line up the tabs on the cover with the openings on either side of the TPM connector.
 - b. To snap the cover into place, firmly press straight down on the middle of the cover.



4. Proceed to **Preparing the server for operation** on page 134.

Preparing the server for operation

Procedure

1. Install any options or cables previously removed to access the TPM connector.
2. Install the access panel.
3. Do one of the following:
 - a. Install the server in the rack, if necessary.
 - b. Install the server in the enclosure.
4. Power up the server.
 - a. Connect the power cords (rack and tower servers).
 - b. Press the Power On/Standby button.

Enabling the Trusted Platform Module

When enabling the Trusted Platform module, observe the following guidelines:

- By default, the Trusted Platform Module is enabled as TPM 2.0 when the server is powered on after installing it.
- In UEFI Boot Mode, the Trusted Platform Module can be configured to operate as TPM 2.0 or TPM 1.2.
- In Legacy Boot Mode, the Trusted Platform Module configuration can be changed between TPM 1.2 and TPM 2.0, but only TPM 1.2 operation is supported.

Enabling the Trusted Platform Module as TPM 2.0

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 > Trusted Platform Module options**.
3. Verify the following:
 - "Current TPM Type" is set to **TPM 2.0**.
 - "Current TPM State" is set to **Present and Enabled**.
 - "TPM Visibility" is set to **Visible**.
4. If changes were made in the previous step, press the **F10** key to save your selection.
5. If F10 was pressed in the previous step, do one of the following:
 - If in graphical mode, click **Yes**.
 - If in text mode, press the **Y** key.
6. Press the **ESC** key to exit System Utilities.
7. If changes were made and saved, the server prompts for reboot request. Press the **Enter** key to confirm reboot.

If the following actions were performed, the server reboots a second time without user input. During this reboot, the TPM setting becomes effective.

 - Changing from TPM 1.2 and TPM 2.0
 - Changing TPM bus from FIFO to CRB
 - Enabling or disabling TPM
 - Clearing the TPM
8. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.

For more information, see the [Microsoft website](#).

Enabling the Trusted Platform Module as TPM 1.2

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 > Trusted Platform Module options**.
3. Change the "TPM Mode Switch Operation" to **TPM 1.2**.
4. Verify "TPM Visibility" is **Visible**.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, do one of the following:

- If in graphical mode, click **Yes**.
- If in text mode, press the **Y** key.

7. Press the **ESC key to exit System Utilities.**

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

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

For more information, see the [**Microsoft website**](#).

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.

Cabling

Storage Cabling Guidelines

When installing cables, observe the following:

- All ports are labeled:
 - System board ports
 - Controller ports
 - 12G SAS Expander ports
- Most data cables have labels near each connector with destination port information.
- Some data cables are pre-bent. Do not unbend or manipulate the cables.
- Before connecting a cable to a port, lay the cable in place to verify the length of the cable.
- When routing cables from the front to the rear of the server, use the cable channels on either side of the chassis.
- A maximum of four cables can be routed to the riser cages.

Cable matrix

Use the following tables to find cabling information and part numbers.

SAS/SATA kits

Option kit	Cable part number*	From	To	Power cable part number
2SFF SAS/SATA drive cage	869952-001 ¹	Drive backplane	System board	870479-001 ²
8SFF SAS/SATA drive cage	870480-001 ³	Drive backplane (drive boxes 1, 3, 4, and 6)	Primary riser cage Tertiary riser cage	870479-001 ²
8SFF SAS/SATA drive cage	870483-001 ³	Drive backplane (drive boxes 1–6)	Primary riser cage Tertiary riser cage	870479-001 ²
8SFF SAS/SATA drive cage (mini SAS)	870492-001 ⁴	Drive backplane (drive boxes 1, 3, 4, and 6)	Primary riser cage Tertiary riser cage	870479-001 ²

Table Continued

Option kit	Cable part number*	From	To	Power cable part number
8SFF SAS/SATA drive cage (mini SAS)	870489-001 ⁴	Drive backplane (drive boxes 1–6)	Primary riser cage Tertiary riser cage	870479-001 ²
12G SAS Expander	870499-001 ⁵	2SFF SAS port	12G SAS Expander	—
HPE Smart Array p824i-p MR Gen 10 controller	—	Controller	Riser	830824-B21 ⁶
	P00511-001 ⁷	Drive backplane (drive box 4)	Primary riser cage, controller ports 5 and 6	—
	P00509-001 ⁷	Drive backplane (drive box 5)	Primary riser cage, controller ports 3 and 4	—
	P00510-001 ⁷	Drive backplane (drive box 6)	Primary riser cage, controller ports 1 and 2	—
	P00510-001 ⁷	Drive backplane (drive box 1)	Tertiary riser cage, controller ports 1 and 2	—
	P00509-001 ⁷	Drive backplane (drive box 2)	Tertiary riser cage, controller ports 3 and 4	—
	P00511-001 ⁷	Drive backplane (drive box 3)	Tertiary riser cage, controller ports 5 and 6	—

* To order spare cables, use the following kits and spare part numbers.

¹ 2SFF cable kit (877963-001)

² USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

³ M.SAS/SATA 1041mm+900mm cable kit (881700-001)

⁴ M.SAS 970mm+820mm cable kit (881701-001)

⁵ M.SAS/SATA 1x4-1x4 cable kit (881702-001)

⁶ 28 AWG, 3 Pin, PCI to Controller power cable, short (878645-001)

⁷ MiniSAS to MiniSAS HD, 12G cable kit (P03215-001)

Data kits

Option kit	Cable part number*	From	To
Front USB/display port (universal media bay)	Included with component	Component	System board
Front USB 3.0 port	870476-001 ¹	Component	System board
Optical disk drive	869949-001 ²	Component	System board
Systems Insight Display	Included with component	Component	System board

* To order spare cables, use the following kits and spare part numbers.

¹ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

² Optical drive cable (784623-001)

GPU kits

Option kit	Cable part number*	From	To
HPE GPU 8p Keyed GPU Cable Kit	869820-001 ¹	GPU	Riser
HPE GPU 8p Cable Kit	869821-001 ¹	GPU	Riser

* To order spare cables, use the following kits and spare part numbers.

¹ GPU cables kit (875097-001)

NVMe drive cable matrix

Use the following tables to find supported NVMe drive configurations, cabling information, and part numbers.

NVMe drives are supported in servers with the following riser configurations:

- **6 slot primary**
- **6 slot primary + 8 slot butterfly** *
- **6 slot primary + 9 slot butterfly** **
- **7 slot primary + 8 slot butterfly**
- **4 port slimline primary + 8 slot butterfly + 4 port mezzanine card**
- **4 port slimline primary + 9 slot butterfly + 4 port mezzanine card**

* The 8 slot butterfly riser contains a 6 slot riser in the secondary PCIe slot, and a 2 slot riser in the tertiary PCIe slot.

** The 9 slot butterfly riser contains a 7 slot riser in the secondary PCIe slot, and a 2 slot riser in the tertiary PCIe slot.

Server riser configuration: 6 slot riser installed in the primary riser cage

# of NVMe drives supported	Processor quantity	Cable part number *	From	To	Power cable part number *
2	1	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
2	1	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	870479-001 ³
2	2	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
2	2	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	870479-001 ³
2	3	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	870479-001 ³
4	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
4	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	
4 **	3	870508-001 ²	Drive box 2, 8-NVMe drive cage	Primary 6 slot riser	870479-001 ³
2	4	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	870479-001 ³
4	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
4	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	

* To order spare cables, use the following kits and spare part numbers.

- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

** Partial configuration, see **(6-drive or fewer) configuration**.

Server riser configuration:

- **Primary riser cage—6 slot riser installed**
- **Butterfly riser cage—6 slot and 2 slot risers installed**

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
4	2	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	
4	2	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
6	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
			Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	
6	3	869957-001 ¹	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
6 **	3	870508-001 ²	Drive box 2, 8-NVMe drive cage	Primary 6 slot riser Butterfly 6 slot riser	870479-001 ³

Table Continued

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
6	4	869957-001 ¹	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
8	4	870508-001 ²	Drive box 2, 8-NVMe drive cage	Primary 6 slot riser Butterfly 6 slot riser	870479-001 ³
8	4	869957-001 ¹	Drive box 1, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
			Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	

* To order spare cables, use the following kits and spare part numbers.

- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

** Partial configuration, see **(6-drive or fewer) configuration**.

Server riser configuration:

- **Primary riser cage—6 slot riser installed**
- **Butterfly riser cage—7 slot and 2 slot risers installed**

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
2	2	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
2	2	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	870479-001 ³
4	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
4	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	
4	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 3, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	
4	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Primary 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Primary 6 slot riser	

* To order spare cables, use the following kits and spare part numbers.

- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

Server riser configuration:

- **Primary riser cage—7 slot riser installed**
- **Butterfly riser cage—6 slot and 2 slot risers installed**

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
2	2	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
2	2	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	870479-001 ³
2	3	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
2	3	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	870479-001 ³
2	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
2	4	869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	870479-001 ³
4	4	869957-001 ¹	Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	
4	4	869957-001 ¹	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	

* To order spare cables, use the following kits and spare part numbers.

- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

Server riser configuration:

- **Primary riser cage—4 port slimline riser installed**
- **Butterfly riser cage—6 slot and 2 slot risers installed**
- **4 port NVMe mezzanine card installed**

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
16	3	870508-001 ²	Drive box 2, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
18	3	870508-001 ²	Drive box 2, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
		869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	
18	4	870508-001 ²	Drive box 1, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 2, 8-NVMe drive cage	4 port mezzanine card	
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
		869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	
18	3	870508-001 ²	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8-NVMe drive cage	4 port mezzanine card	
		869957-001 ¹	Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
18	4	870508-001 ²	Drive box 2, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
		869957-001 ¹	Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	

Table Continued

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
18	4	870508-001 ²	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8-NVMe drive cage	4 port mezzanine card	
		869957-001 ¹	Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
20 **	4	870508-001 ²	Drive box 1, 8SFF (6+2) Premium drive cage	Butterfly 6 slot riser	870479-001 ³
			Drive box 2, 8-NVMe drive cage	4 port mezzanine card	
		869957-001 ¹	Drive box 3, 8-NVMe drive cage	Primary 4 port riser	
			Drive box 4, 2SFF Premium drive cage	Butterfly 6 slot riser	

* To order spare cables, use the following kits and spare part numbers.

- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

** Partial configuration, see [20-drive configuration](#) on page 155.

Server riser configuration:

- **Primary riser cage—4 port slimline riser installed**
- **Butterfly riser cage—7 slot and 2 slot risers installed**
- **4 port NVMe mezzanine card installed**

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
16	3	870508-001 ²	Drive box 2, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	

Table Continued

# of NVMe drives supported	Processor quantity	Cable part number	From	To	Power cable part number
16	4	870508-001 ²	Drive box 2, 8-NVMe drive cage	4 port mezzanine card	870479-001 ³
			Drive box 3, 8-NVMe drive cage	Primary 4 port riser	

* To order spare cables, use the following kits and spare part numbers.

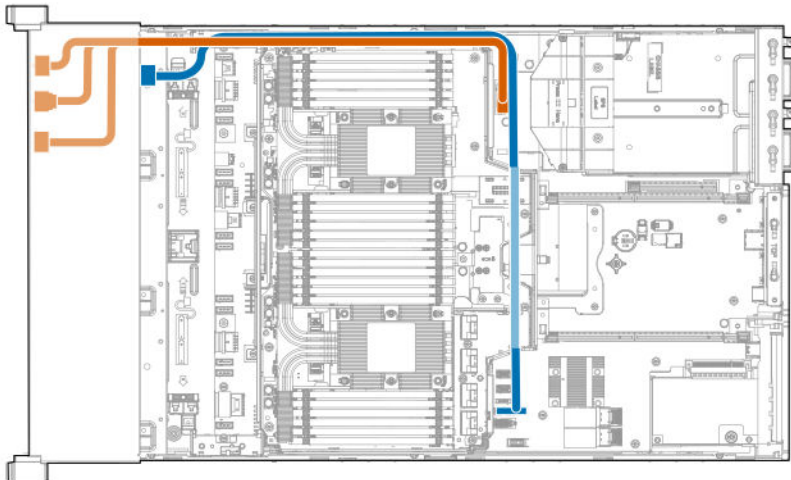
- ¹ NVMe cable kit (877983-001)
- ² NVMe cable kit (881703-001)
- ³ USB 3.0 Ext. 600mm+SASPWR BP cable kit (881699-001)

More information

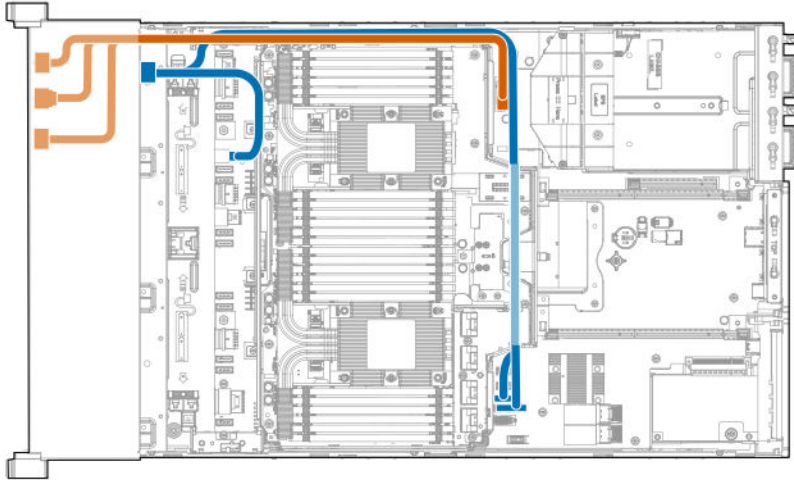
[NVMe SSD drive cage cabling](#) on page 150

Universal media bay cabling

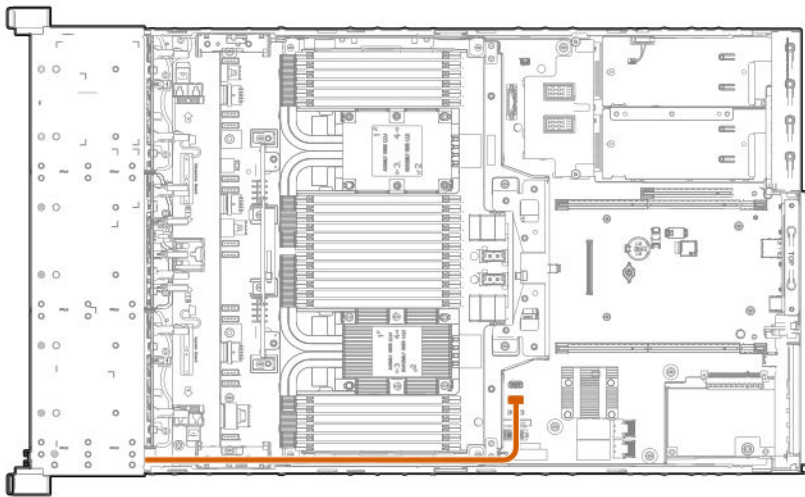
With optional optical disk drive



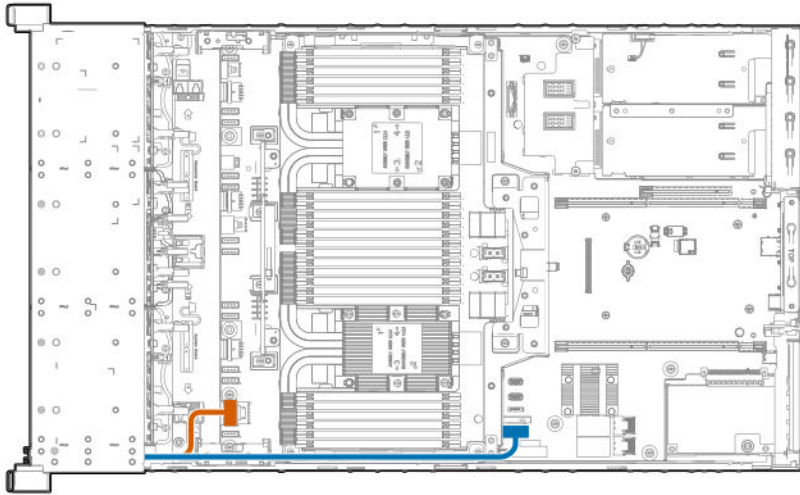
With optional 2SFF drive cage



Front panel USB port cabling



Power switch module/Systems Insight Display module cabling

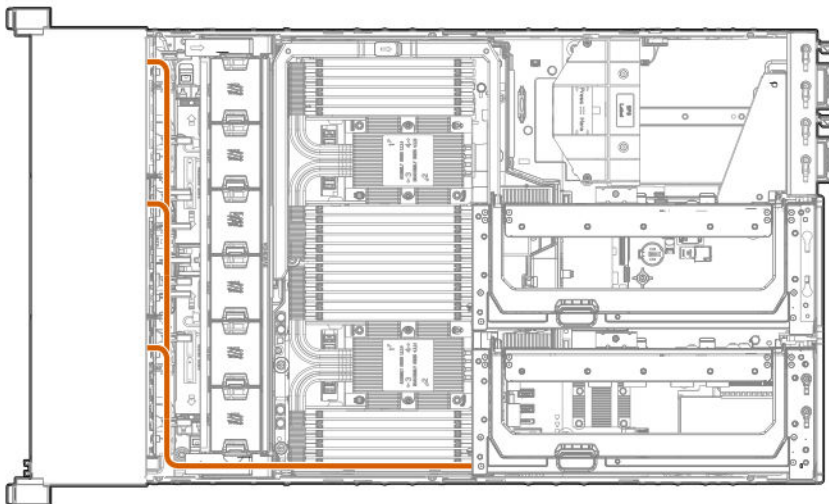


SFF HDD drive cage cabling

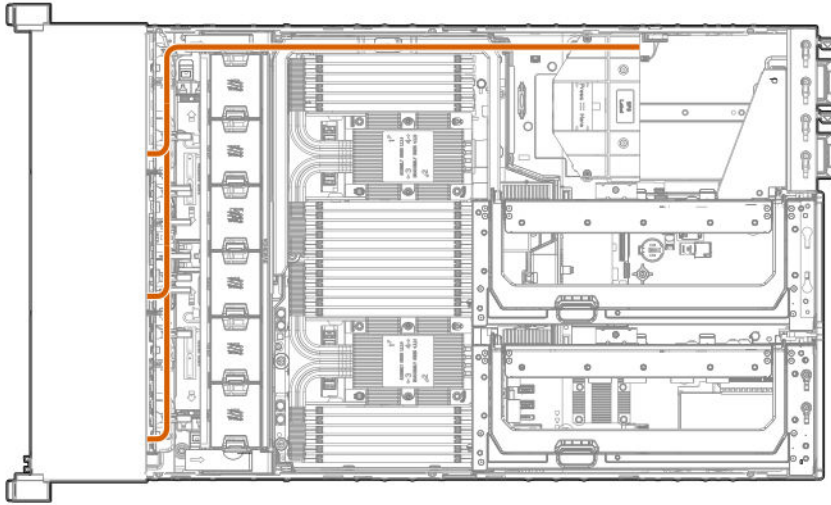
⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

The following images define supported cable routing pathways between the eight-bay SFF HDD drive cage backplane and the riser cages. For more information, see the **Cable matrix** on page 137.

Drive cages to primary PCIe riser



Drive cages to tertiary riser slot



NVMe SSD drive cage cabling

- CAUTION:** To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

The following images define supported cable routing for supported NVMe drive cage configurations:

- **NVMe drive cable matrix** on page 139
- **Eight-bay NVMe SSD drive cage cabling** on page 150
- **Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage cabling** on page 155
- **Two-bay SFF (Premium) drive cage** on page 157

More information

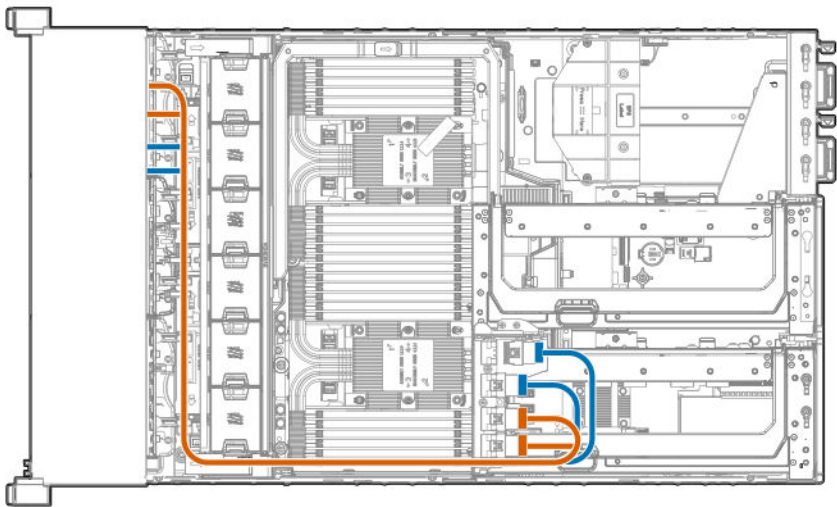
NVMe drive cable matrix on page 139

Eight-bay NVMe SSD drive cage cabling

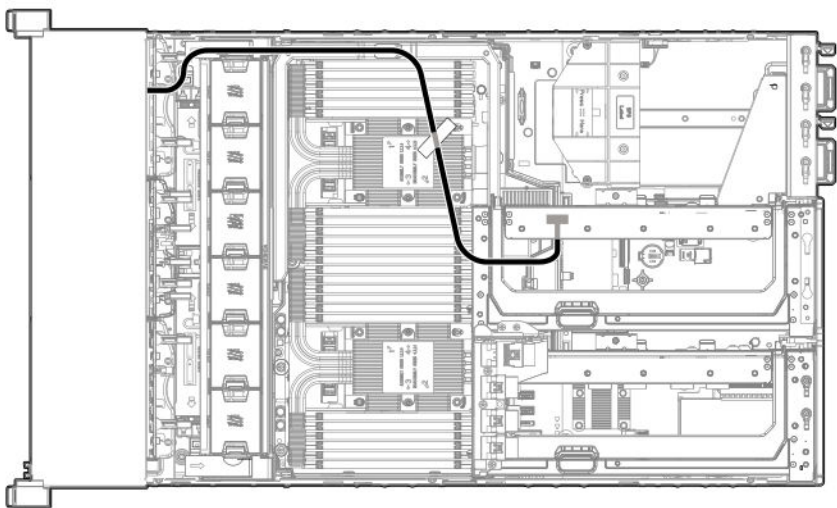
- CAUTION:** To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

The following images define supported cable routing pathways between the Eight-bay NVMe SSD drive cage backplane and the riser cages. For more information on the supported configurations, see the **NVMe drive cable matrix** on page 139.

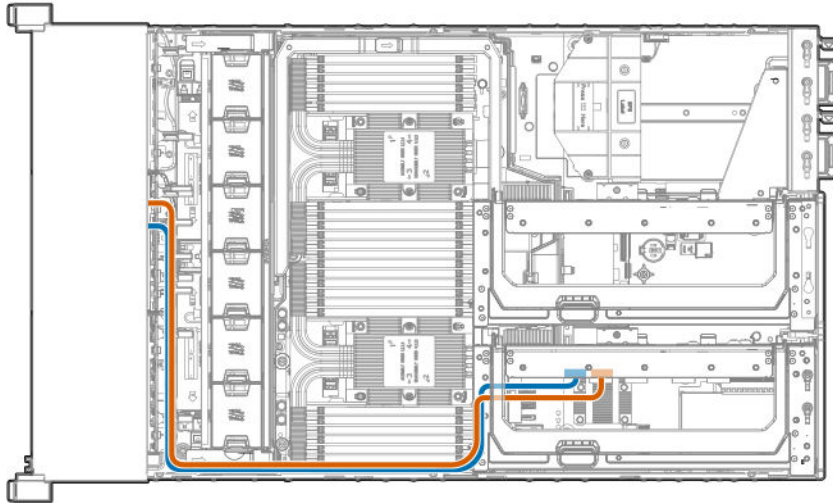
Drive box 1 to 4 port mezzanine card



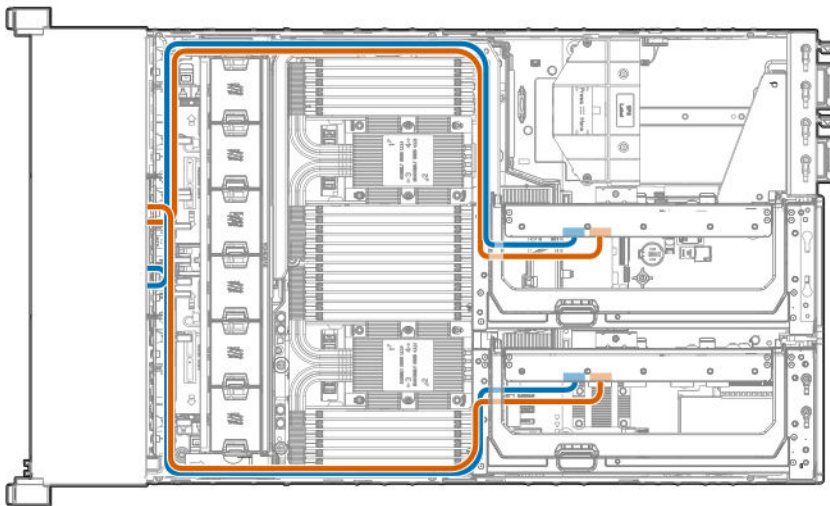
Drive box 1 to butterfly riser cage



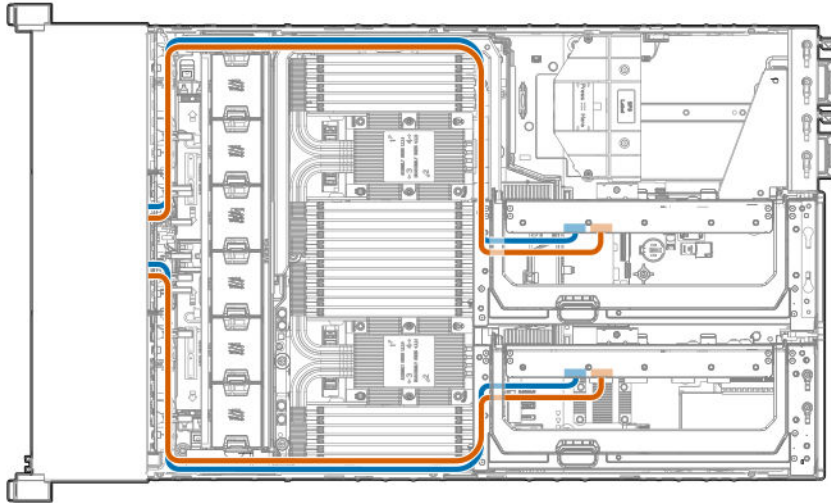
Drive box 2 to primary riser cage (4-drive configuration)



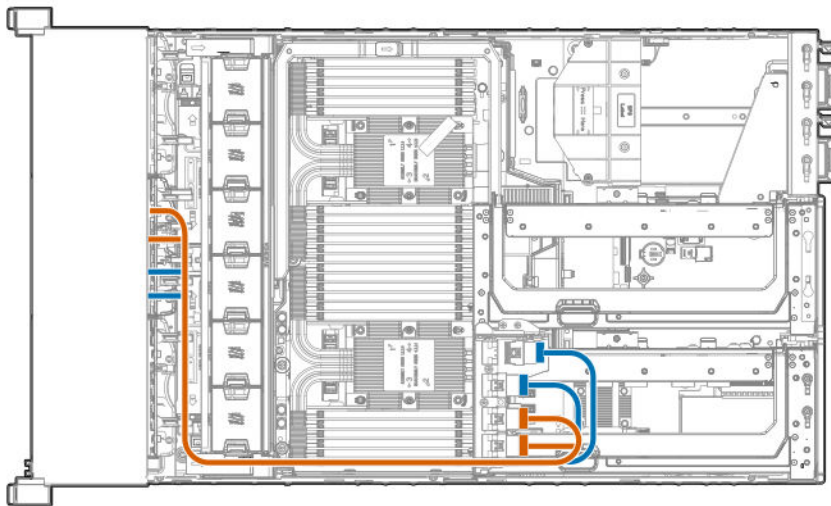
Drive box 2 to primary and butterfly riser cages (6-drives or fewer configuration)



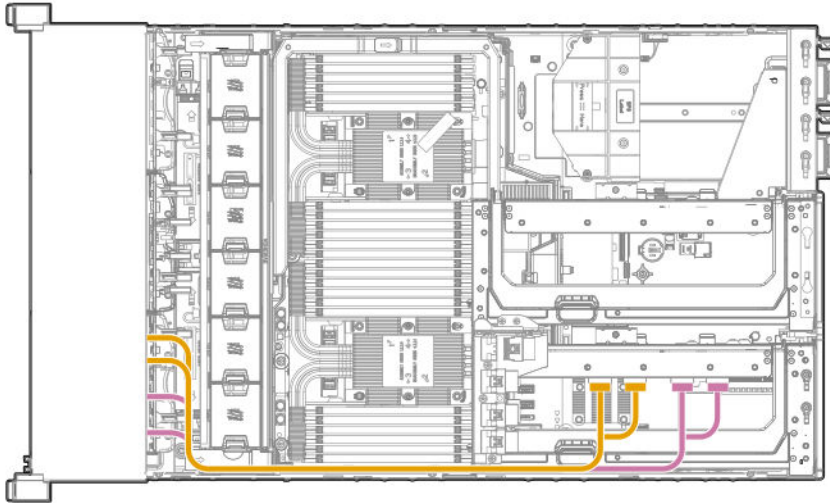
Drive box 2 to primary and butterfly riser cages (8-drive configuration)



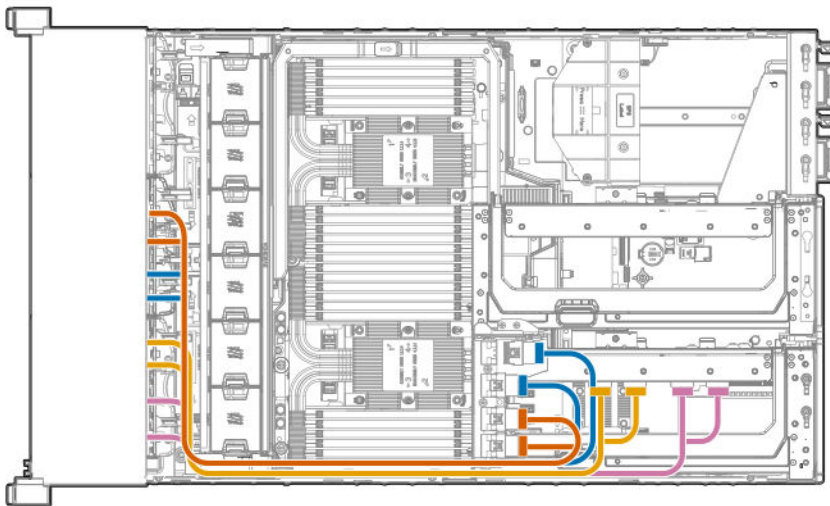
Drive box 2 to 4 port mezzanine card



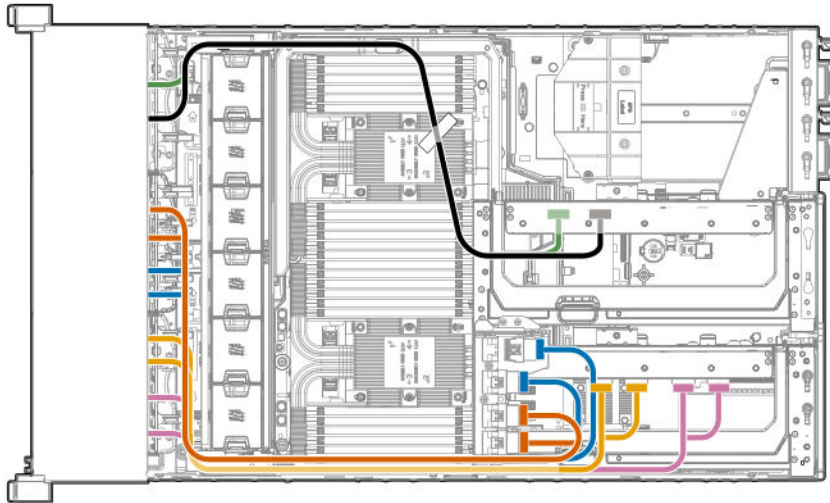
Drive box 3 to primary 4 port riser



Drive box 2 to 4 port mezzanine card, Drive box 3 to primary 4 port riser (16-drive configuration)



20-drive configuration



16-drive configuration, plus the following:

- Drive box 1 (six-bay HDD/two-bay NVMe Premium drive cage), connected to the 6 slot riser installed in the butterfly riser cage.
- Drive box 4 (universal media bay with two-bay SFF Premium drive cage), connected to the 6 slot riser installed in the butterfly riser cage.

Or:

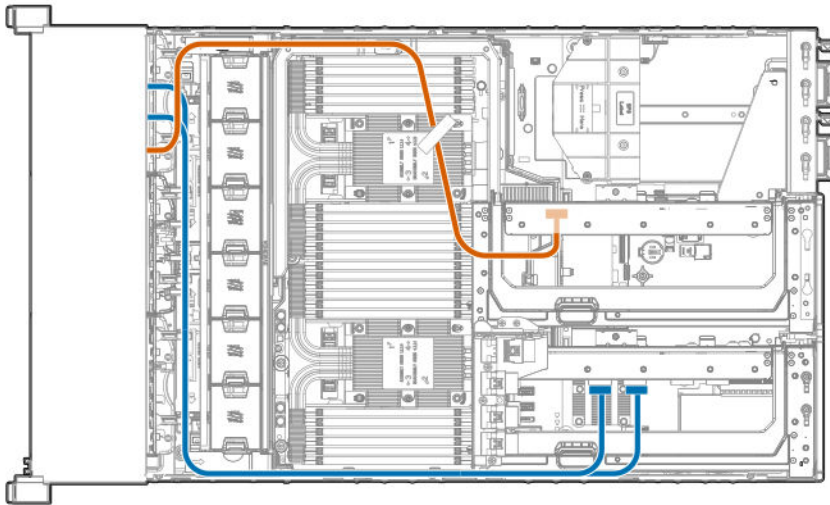
Drive box 1 (eight-bay NVMe SSD drive cage, with four NVMe drives installed), connected to the 6 slot riser installed in the butterfly riser cage.

Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage cabling

⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

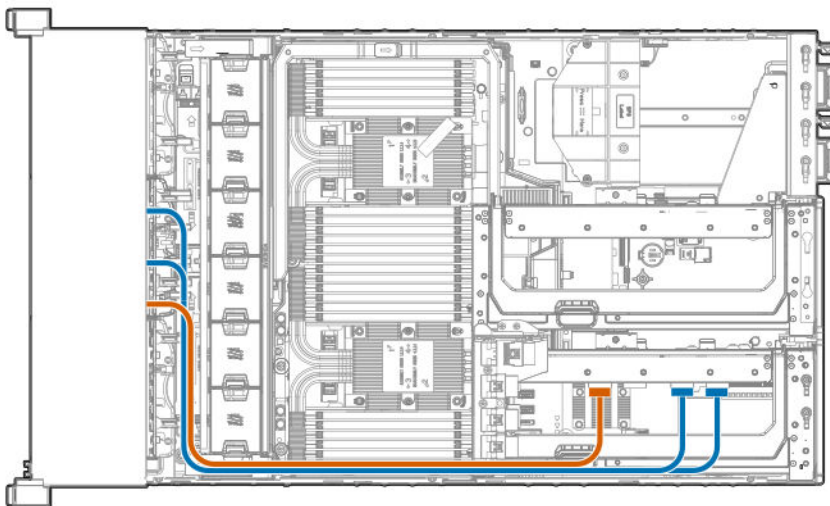
The following images define supported cable routing pathways between the Six-bay SFF HDD/Two-bay NVMe SSD (Premium) drive cage backplane and the riser cages. For more information on the supported configurations, see the **NVMe drive cable matrix** on page 139.

Drive box 1



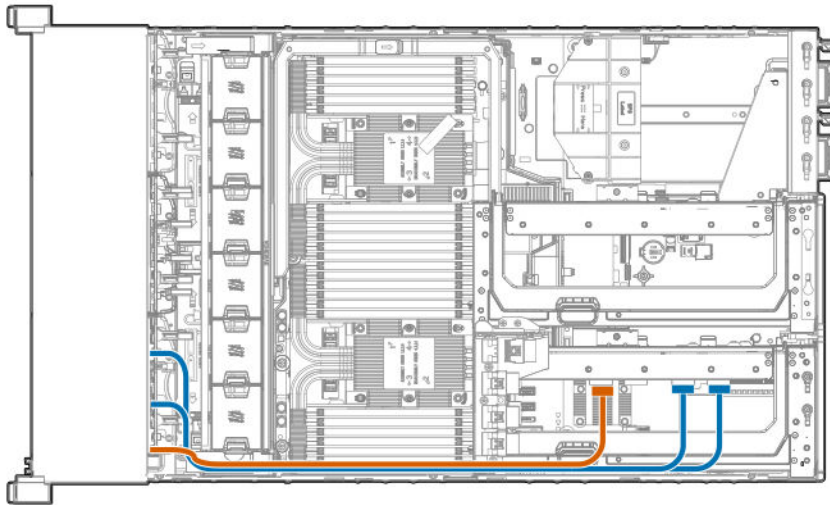
- NVMe drives cabled to the secondary riser cage
- SAS/SATA drives cabled to the primary riser cage

Drive box 2 or 5



- NVMe drives cabled to the primary riser cage
- SAS/SATA drives cabled to the primary riser cage

Drive box 3 or 6



- NVMe drives cabled to the primary riser cage
- SAS/SATA drives cabled to the primary riser cage

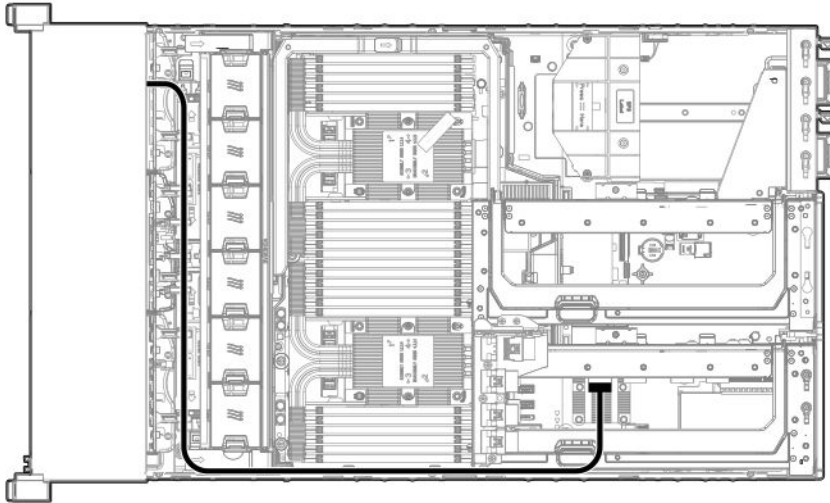
Two-bay SFF (Premium) drive cage

⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

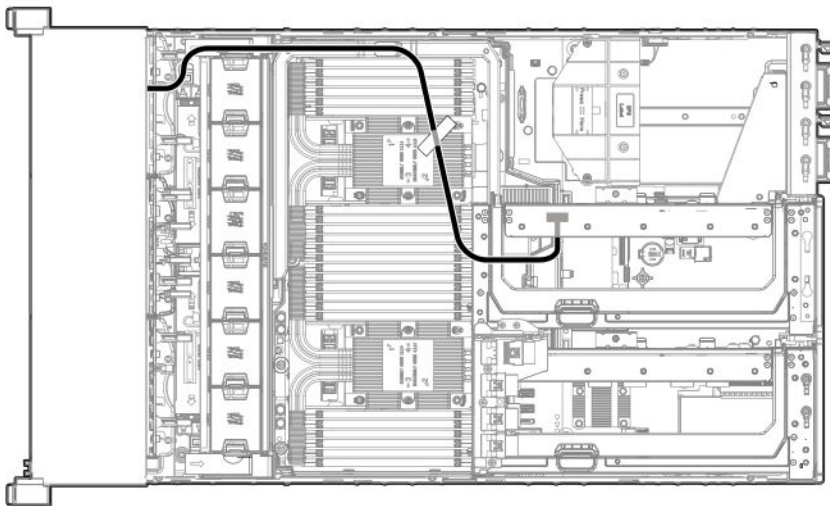
The following images define supported cable routing pathways between the two-bay SFF (premium) drive cage backplane and the riser cages. For more information on the supported configurations, see one of the following:

- **Cable matrix** on page 137
- **NVMe drive cable matrix** on page 139

From drive box 4, to the primary riser cage



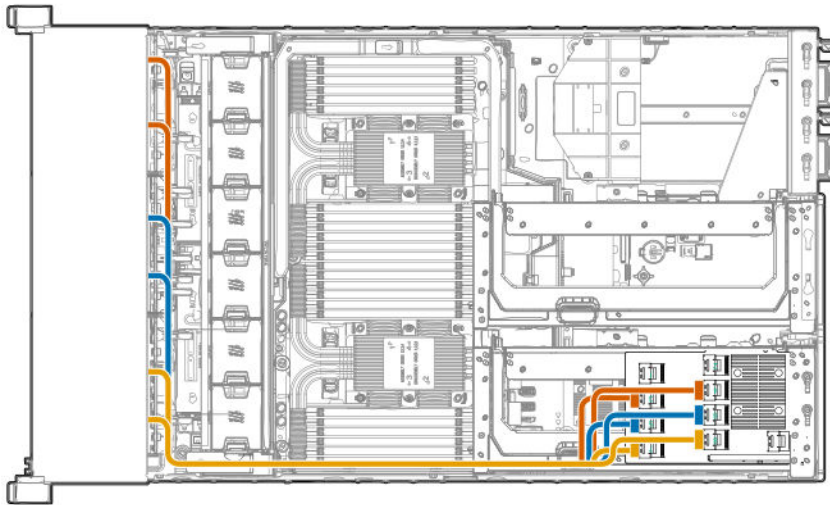
From drive box 4, to the butterfly riser cage



12G SAS expander cabling

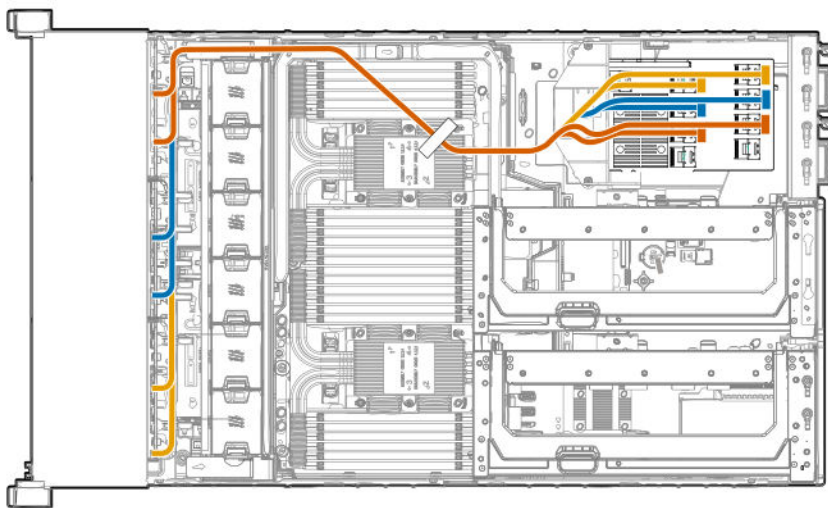
⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

24-drive configuration



Cables from the lower drive box backplanes (boxes 4–6) are routed to the SAS expander card installed in the primary riser cage.

48-drive configuration

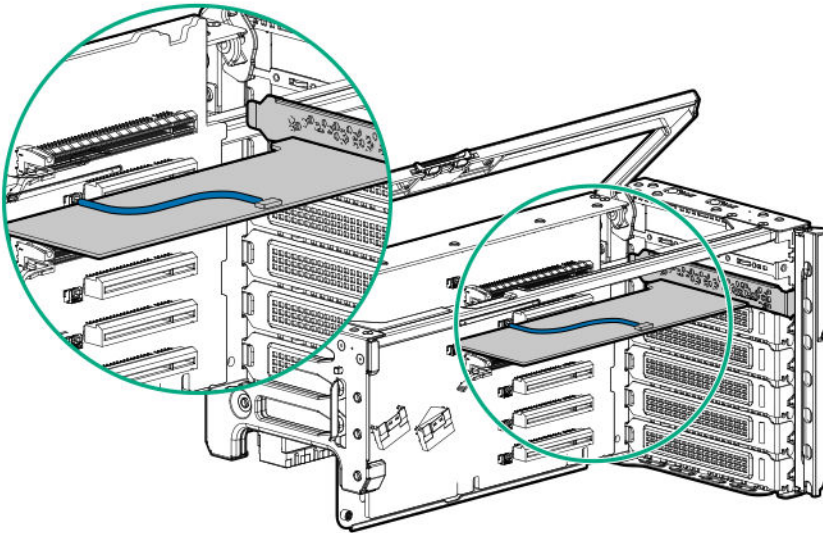


- Cables from the lower drive box backplanes are routed as shown in the 24-drive configuration.
- Cables from the upper drive box backplanes (boxes 1–3) are routed to the SAS expander card installed in the butterfly riser cage.

HPE Smart Array MR Gen10 controller cabling

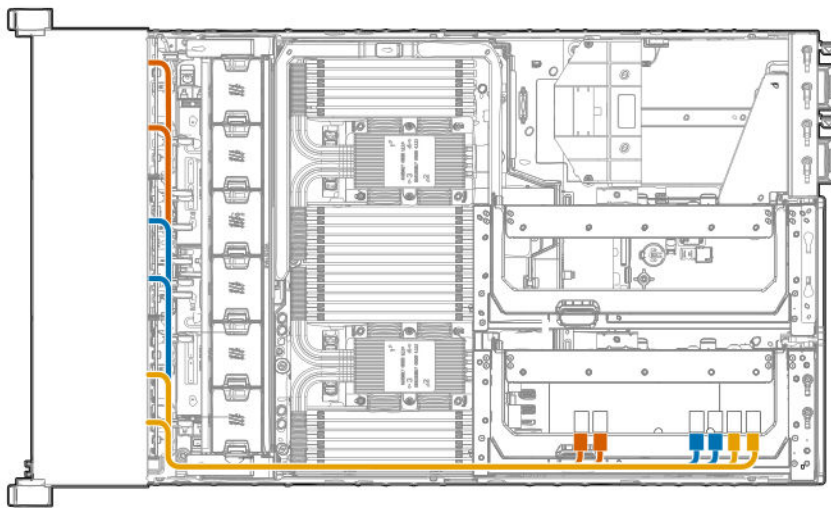
⚠ CAUTION: To avoid damage to the cables and server components, always route cables flat against the server walls, and separate the cables as they enter the primary riser cage. Bundled cables can be pinched or damaged when installing the fan cage or primary riser cage.

Controller backup power cable



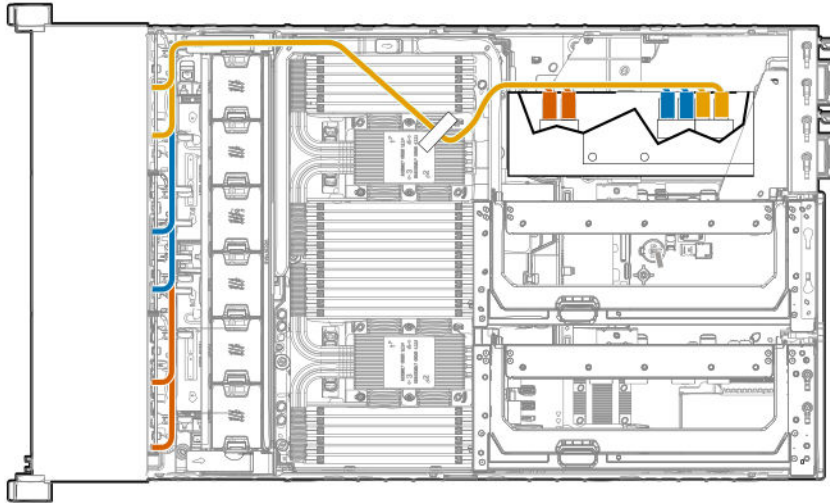
Using the shorter of the two cables provided, connect the controller backup power cable to the controller backup power connector on the riser board.

24-drive configuration



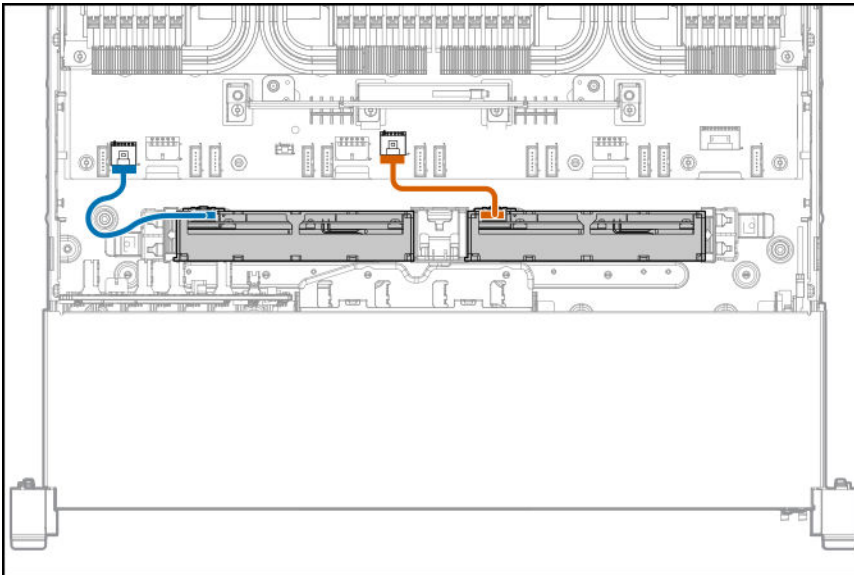
Cables from the lower drive box backplanes (boxes 4–6) are routed to the controller installed in the primary riser cage.

48-drive configuration



- Cables from the lower drive box backplanes are routed as shown in the 24-drive configuration.
- Cables from the upper drive box backplanes (boxes 1–3) are routed to the controller installed in the butterfly riser cage.

HPE Smart Storage Battery cabling



Cable	Description
Processor mezzanine tray energy pack cable ¹	Blue
System board energy pack cable ²	Orange

¹ This energy pack provides backup power to the NVDIMMs on processors 3 and 4.

² This energy pack provides backup power to the NVDIMMs (processors 1 and 2) and the controllers installed on the system board.

NOTE: This server supports only the HPE Smart Storage Battery.

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>Active Health System</u> on page 164	Online and Offline
<u>HPE iLO 5</u> on page 165	Online and Offline
<u>HPE Smart Storage Administrator</u> on page 171	Online and Offline
<u>iLO RESTful API</u> on page 166	Online and Offline
<u>Intelligent Provisioning</u> on page 167	Online and Offline
<u>Scripting Toolkit for Windows and Linux</u> on page 168	Online
<u>Service Pack for ProLiant</u> on page 173	Online and Offline
<u>Smart Update Manager</u> on page 173	Online and Offline
<u>UEFI System Utilities</u> on page 169	Offline
<u>HPE MR Storage Administrator</u> on page 171	Offline
<u>StorCLI</u> on page 172	Offline

Product QuickSpecs

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

Active Health System Viewer

Active Health System Viewer (AHSV) is an online tool used to read, diagnose, and resolve server issues quickly using AHS uploaded data. AHSV provides Hewlett Packard Enterprise recommended repair actions based on experience and best practices. AHSV provides the ability to:

- Read server configuration information
- View Driver/Firmware inventory
- Review Event Logs

- Respond to Fault Detection Analytics alerts
- Open new and update existing support cases

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

For more information about the Active Health System, see the iLO user guide at the following website: <http://www.hpe.com/support/ilo-docs>.

Active Health System data collection

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

Examples of information that is collected:

- Server model and serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS and driver versions and settings

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

Active Health System Log

The data collected by the Active Health System is stored in the Active Health System Log. The data is logged securely, isolated from the operating system, and separate from customer data. Host resources are not consumed in the collection and logging of Active Health System data.

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

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

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

You can also upload the log to the Active Health System Viewer. For more information, see the Active Health System Viewer documentation at the following website: <http://www.hpe.com/support/ahsv-docs>.

HPE iLO 5

iLO 5 is a remote server management processor embedded on the system boards of HPE ProLiant servers and Synergy compute modules. iLO enables the monitoring and controlling of servers from remote locations. iLO management is a powerful tool that provides multiple ways to configure, update, monitor, and repair servers remotely. iLO (Standard) comes preconfigured on Hewlett Packard Enterprise servers without an additional cost or license.

Features that enhance server administrator productivity and additional new security features are licensed. For more information, see the iLO licensing guide at the following website: <http://www.hpe.com/support/ilo-docs>.

For more information about iLO, see the iLO user guide at the following website: <http://www.hpe.com/support/ilo-docs>.

iLO Federation

iLO Federation enables you to manage multiple servers from one system using the iLO web interface.

When configured for iLO Federation, iLO uses multicast discovery and peer-to-peer communication to enable communication between the systems in iLO Federation groups.

When you navigate to one of the iLO Federation pages, a data request is sent from the iLO system running the web interface to its peers, and from those peers to other peers until all data for the selected iLO Federation group is retrieved.

iLO supports the following features:

- Group health status—View server health and model information.
- Group virtual media—Connect URL-based media for access by a group of servers.
- Group power control—Manage the power status of a group of servers.
- Group power capping—Set dynamic power caps for a group of servers.
- Group firmware update—Update the firmware of a group of servers.
- Group license installation—Enter a license key to activate iLO licensed features on a group of servers.
- Group configuration—Add iLO Federation group memberships for multiple iLO systems.

Any user can view information on iLO Federation pages, but a license is required for using the following features: Group virtual media, Group power control, Group power capping, Group configuration, and Group firmware update.

For more information about iLO Federation, see the iLO user guide at the following website: <http://www.hpe.com/support/ilo-docs>.

iLO Service Port

The Service Port is a USB port with the label **iLO** on supported servers and compute modules.

To find out if your server or compute module supports this feature, see the server specifications document at the following website: <http://www.hpe.com/info/qs>.

When you have physical access to a server, you can use the Service Port to do the following:

- Download the Active Health System Log to a supported USB flash drive.

When you use this feature, the connected USB flash drive is not accessible by the host operating system.

- Connect a client (such as a laptop) with a supported USB to Ethernet adapter to access the iLO web interface, remote console, CLI, iLO RESTful API, or scripts.

Hewlett Packard Enterprise recommends the HPE USB to Ethernet Adapter (part number Q7Y55A).

Some servers, such as the XL170r, require an adapter to connect a USB to Ethernet adapter to the iLO Service Port.

Hewlett Packard Enterprise recommends the HPE Micro USB to USB Adapter (part number 789904-B21).

When you use the iLO Service Port:

- Actions are logged in the iLO event log.
- The server UID flashes to indicate the Service Port status.

You can also retrieve the Service Port status by using a REST client and the iLO RESTful API.

- You cannot use the Service Port to boot any device within the server, or the server itself.
- You cannot access the server by connecting to the Service Port.
- You cannot access the connected device from the server.

For more information about the iLO Service Port, see the iLO user guide at the following website: <http://www.hpe.com/support/ilo-docs>.

iLO RESTful API

iLO includes the iLO RESTful API, which is Redfish API conformant. The iLO RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring tasks by sending basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to the iLO web server.

To learn more about the iLO RESTful API, see the Hewlett Packard Enterprise website (<http://www.hpe.com/support/restfulinterface/docs>).

For specific information about automating tasks using the iLO RESTful API, see libraries and sample code at <http://www.hpe.com/info/redfish>.

❏ For more information, watch the [Redfish & How it works with HPE Server Management](#) video.

RESTful Interface Tool

The RESTful Interface Tool (iLOREST) is a scripting tool that allows you to automate HPE server management tasks. It provides a set of simplified commands that take advantage of the iLO RESTful API. You can install the tool on your computer for remote use or install it locally on a server with a Windows or Linux Operating System. The RESTful Interface Tool offers an interactive mode, a scriptable mode, and a file-based mode similar to CONREP to help decrease automation times.

For more information, see the following website: <http://www.hpe.com/info/resttool>.

iLO Amplifier Pack

The iLO Amplifier Pack is an advanced server inventory, firmware and driver update solution that enables rapid discovery, detailed inventory reporting, firmware, and driver updates by leveraging iLO advanced functionality. The iLO Amplifier Pack performs rapid server discovery and inventory for thousands of supported servers for the purpose of updating firmware and drivers at scale.

For more information about iLO Amplifier Pack, see the *iLO Amplifier Pack User Guide* at the following website: <http://www.hpe.com/support/ilo-ap-ug-en>.

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 the iLO web interface

Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in ProLiant servers and HPE Synergy compute modules. Intelligent Provisioning simplifies server setup, providing a reliable and consistent way to deploy servers.

Intelligent Provisioning 3.30 and later includes HPE Rapid Setup Software. When you launch F10 mode from the POST screen, you are prompted to select whether you want to enter the Intelligent Provisioning or HPE Rapid Setup Software mode.

NOTE: After you have selected a mode, you must reprovision the server to change the mode that launches when you boot to F10.

Intelligent Provisioning prepares the system for installing original, licensed vendor media and Hewlett Packard Enterprise-branded versions of OS software. Intelligent Provisioning also prepares the system to integrate optimized server support software from the Service Pack for ProLiant (SPP). SPP is a comprehensive systems software and firmware solution for ProLiant servers, server blades, their enclosures, and HPE Synergy compute modules. These components are preloaded with a basic set of firmware and OS components that are installed along with Intelligent Provisioning.

❗ **IMPORTANT:** HPE ProLiant DX/XL servers do not support operating system installation with Intelligent Provisioning, but they do support the maintenance features. For more information, see "Performing Maintenance" in the Intelligent Provisioning user guide and online help.

After the server is running, you can update the firmware to install additional components. You can also update any components that have been outdated since the server was manufactured.

To access Intelligent Provisioning:

- Press **F10** from the POST screen and enter either Intelligent Provisioning or HPE Rapid Setup Software.
- From the iLO web interface using **Always On**. **Always On** allows you to access Intelligent Provisioning without rebooting your server.

Intelligent Provisioning operation

Intelligent Provisioning includes the following components:

- Critical boot drivers
- Active Health System (AHS)

- Erase Utility
- Deployment Settings

! **IMPORTANT:**

- Although your server is preloaded with firmware and drivers, Hewlett Packard Enterprise recommends updating the firmware upon initial setup. Also, downloading and updating the latest version of Intelligent Provisioning ensures the latest supported features are available.
- For ProLiant servers, firmware is updated using the Intelligent Provisioning Firmware Update utility.
- Do not update firmware if the version you are currently running is required for compatibility.

NOTE: Intelligent Provisioning does not function within multihomed configurations. A multihomed host is one that is connected to two or more networks or has two or more IP addresses.

Intelligent Provisioning provides installation help for the following operating systems:

- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi/vSphere Custom Image
- ClearOS

Not all versions of an OS are supported. For information about specific versions of a supported operating system, see the OS Support Matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ossupport>).

Management Security

HPE ProLiant Gen10 servers are built with some of the industry's most advanced security capabilities, out of the box, with a foundation of secure embedded management applications and firmware. The management security provided by HPE embedded management products enables secure support of modern workloads, protecting your components from unauthorized access and unapproved use. The range of embedded management and optional software and firmware available with the iLO Advanced license provides security features that help ensure protection, detection, and recovery from advanced cyber-attacks. For more information, see the *HPE Gen10 Server Security Reference Guide* on the Hewlett Packard Enterprise Information Library at <http://www.hpe.com/support/gen10-security-ref-en>.

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. Its features 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 or partition.
- Configuring memory options.
- Launching other preboot environments.

HPE servers with UEFI can provide:

- Support for boot partitions larger than 2.2 TB. Such configurations could previously only be used for boot drives when using RAID solutions.
- Secure Boot that enables the system firmware, option card firmware, operating systems, and software collaborate to enhance platform security.
- UEFI Graphical User Interface (GUI)
- An Embedded UEFI Shell that provides a preboot environment for running scripts and tools.
- Boot support for option cards that only support a UEFI option ROM.

Selecting the boot mode

This server provides two **Boot Mode** configurations: UEFI Mode and Legacy BIOS Mode. Certain boot options require that you select a specific boot mode. By default, the boot mode is set to **UEFI Mode**. The system must boot in **UEFI Mode** to use certain options, including:

- Secure Boot, UEFI Optimized Boot, Generic USB Boot, IPv6 PXE Boot, iSCSI Boot, and Boot from URL
- Fibre Channel/FCoE Scan Policy

NOTE: The boot mode you use must match the operating system installation. If not, changing the boot mode can impact the ability of the server to boot to the installed operating system.

Prerequisite

When booting to **UEFI Mode**, leave **UEFI Optimized Boot** enabled.

Procedure

1. From the **System Utilities** screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > Boot Mode**.
2. Select a setting.
 - **UEFI Mode** (default)—Configures the system to boot to a UEFI compatible operating system.
 - **Legacy BIOS Mode**—Configures the system to boot to a traditional operating system in Legacy BIOS compatibility mode.

3. Save your setting.
4. Reboot the server.

Secure Boot

Secure Boot is a server security feature that 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 and 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 Secure Boot is enabled:

- Firmware components and operating systems with boot loaders must have an appropriate digital signature to execute during the boot process.
- Operating systems must support Secure Boot and have an EFI boot loader signed with one of the authorized keys to boot. For more information about supported operating systems, see <http://www.hpe.com/servers/ossupport>.

You can customize the certificates embedded in the UEFI BIOS by adding or removing your own certificates, either from a management console directly attached to the server, or by remotely connecting to the server using the iLO Remote Console.

You can configure Secure Boot:

- Using the **System Utilities** options described in the following sections.
- Using the iLO RESTful API to clear and restore certificates. For more information, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/redfish>).
- Using the `secboot` command in the Embedded UEFI Shell to display Secure Boot databases, keys, and security reports.

Launching the Embedded UEFI Shell

Use the **Embedded UEFI Shell** option to launch the Embedded UEFI Shell. The Embedded UEFI Shell is a preboot command-line environment for scripting and running UEFI applications, including UEFI boot loaders. The Shell also provides CLI-based commands you can use to obtain system information, and to configure and update the system BIOS.

Prerequisites

Embedded UEFI Shell is set to **Enabled**.

Procedure

1. From the **System Utilities** screen, select **Embedded Applications > Embedded UEFI Shell**.

The **Embedded UEFI Shell** screen appears.

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

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

3. If an administrator password is set, enter it at the prompt and press **Enter**.

The `Shell>` prompt appears.

4. Enter the commands required to complete your task.
5. Enter the `exit` command to exit the Shell.

HPE Smart Storage Administrator

HPE SSA is the main tool for configuring arrays on HPE Smart Array SR controllers. It exists in three interface formats: the HPE SSA GUI, the HPE SSA CLI, and HPE SSA Scripting. All formats provide support for configuration tasks. Some of the advanced tasks are available in only one format.

The diagnostic features in HPE SSA are also available in the standalone software HPE Smart Storage Administrator Diagnostics Utility CLI.

During the initial provisioning of the server or compute module, an array is required to be configured before the operating system can be installed. You can configure the array using SSA.

HPE SSA is accessible both offline (either through HPE Intelligent Provisioning or as a standalone bootable ISO image) and online:

- Accessing HPE SSA in the offline environment

! **IMPORTANT:** If you are updating an existing server in an offline environment, obtain the latest version of HPE SSA through Service Pack for ProLiant before performing configuration procedures.

Using one of multiple methods, you can run HPE SSA before launching the host operating system. In offline mode, users can configure or maintain detected and supported devices, such as optional Smart Array controllers and integrated Smart Array controllers. Some HPE SSA features are only available in the offline environment, such as setting the boot controller and boot volume.

- Accessing HPE SSA in the online environment

This method requires an administrator to download the HPE SSA executables and install them. You can run HPE SSA online after launching the host operating system.

For more information, see *HPE Smart Array SR Gen10 Configuration Guide* at the **Hewlett Packard Enterprise website**.

HPE MR Storage Administrator

HPE MR Storage Administrator is a web-based application that enables you to monitor, maintain, troubleshoot, and configure the HPE Smart Array MR controller. MR Storage Administrator helps you to view, create, and manage storage configurations.

- **Monitoring and Configuring:** MR Storage Administrator enables you to monitor the controllers and configure the drives on the controller. It displays the status of the controller cards, logical drives, and drives on the controller. The device status icons notify you if there are drive failures and other events that require your immediate attention. Email notifications about the status of the server are sent based on your alert

settings. The system errors and events are recorded and displayed in an event log file. You can also import or clear foreign configurations.

- **Maintaining:** Using MR Storage Administrator, you can perform system maintenance tasks, such as updating the controller firmware.
- **Troubleshooting:** MR Storage Administrator displays information related to drive failures, device failures, and other issues. It also provides recommendations and displays contextual links, helping you to locate the drives/devices that have issues and troubleshoot them. You can also download a report of the devices and their configurations, properties, and settings and send it to Hewlett Packard Enterprise Support for further troubleshooting.

Obtain MR Storage Administrator installation files through the Service Pack for ProLiant, or SPP, which you can download from <http://www.hpe.com/servers/spp/download>. Be sure to use the latest SPP version for the server.

For more information about the MR Storage Administrator, see *MR Storage Administrator User Guide* on the Hewlett Packard Enterprise website <http://www.hpe.com/info/P824i-pdocs>.

HPE InfoSight for servers

The HPE InfoSight portal is a secure web interface hosted by HPE that allows you to monitor supported devices through a graphical interface.

HPE InfoSight for servers:

- Combines the machine learning and predictive analytics of HPE InfoSight with the health and performance monitoring of Active Health System (AHS) and HPE iLO to optimize performance and predict and prevent problems
- Provides automatic collection and analysis of the sensor and telemetry data from AHS to derive insights from the behaviors of the install base to provide recommendations to resolve problems and improve performance

For more information on getting started and using HPE InfoSight for servers, go to: <http://www.hpe.com/info/infosight-servers-docs>.

StorCLI

The Storage Command Line Interface (StorCLI) tool is the command line management software designed for the HPE Smart Array MR controller. StorCLI is a command line interface that is designed to be easy to use, consistent, and easy to script.

Obtain StorCLI through the Service Pack for ProLiant, or SPP, which you can download from <http://www.hpe.com/servers/spp/download>. Be sure to use the latest SPP version for the server.

For more information about StorCLI, see *StorCLI User Guide* on the Hewlett Packard Enterprise website <http://www.hpe.com/info/P824i-pdocs>.

USB support

Hewlett Packard Enterprise Gen10 servers support all USB operating speeds depending on the device that is connected to the server.

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

To update firmware or system ROM, use one of the following methods:

- The **Firmware Update** option in the System Utilities.
- The `fwupdate` command in the **Embedded UEFI Shell**.
- Service Pack for ProLiant (SPP)
- HPE online flash components
- Moonshot Component Pack

Service Pack for ProLiant

SPP is a systems software and firmware solution delivered as a single ISO file download. This solution uses SUM as the deployment tool and is tested and supports HPE ProLiant, HPE BladeSystem, HPE Synergy, and HPE Apollo servers and infrastructure.

SPP, along with SUM and iSUT, provides Smart Update system maintenance tools that systematically update HPE ProLiant, HPE BladeSystem, HPE Synergy, and HPE Apollo servers and infrastructure.

SPP can be used in an online mode on a server running Windows, Linux, or VMware vSphere ESXi, or in an offline mode where the server is booted to an operating system included in the ISO file.

The preferred method for downloading an SPP is using the SPP Custom Download at <https://www.hpe.com/servers/spp/custom>.

The SPP is also available for download from the SPP download page at <https://www.hpe.com/servers/spp/download>.

Smart Update Manager

SUM is an innovative tool for maintaining and updating the firmware, drivers, and system software of HPE ProLiant, HPE BladeSystem, HPE Synergy, and HPE Apollo servers, infrastructure, and associated options.

SUM identifies associated nodes you can update at the same time to avoid interdependency issues.

Key features of SUM include:

- Discovery engine that finds installed versions of hardware, firmware, and software on nodes.
- SUM deploys updates in the correct order and ensures that all dependencies are met before deploying an update.
- Interdependency checking.
- Automatic and step-by-step Localhost Guided Update process.
- Web browser-based user interface.
- Ability to create custom baselines and ISOs.
- Support for iLO Repository (Gen10 iLO 5 nodes only).
- Simultaneous firmware and software deployment for multiple remote nodes.
- Local offline firmware deployments with SPP deliverables.
- Extensive logging in all modes.

NOTE: SUM does not support third-party controllers, including flashing hard drives behind the controllers.

Integrated Smart Update Tools

Integrated Smart Update Tools (iSUT) is a software utility used with iLO 4, iLO 5, iLO Amplifier Pack, HPE OneView, Service Pack for ProLiant (SPP), and Smart Update Manager (SUM) to stage, install, and activate firmware and driver updates.

- **iSUT:** Polls iLO to check for requests from HPE OneView, SUM, or iLO Amplifier Pack for updates through the management network and orchestrates staging, deploying, and activating updates. You can adjust the polling interval by issuing the appropriate command-line option provided by iSUT. Performs inventory on target servers, stages deployment, deploys updates, and then reboots the servers.
- **iLO 5 with integrated Smart Update** (Gen10 servers only): Performs iLO Repository-based updates by downloading the components from iLO Repository when iLO Installation Queue has the components which can be updated by iSUT.
- **iLO Amplifier Pack:** Displays available updates for servers. Communicates with iSUT (or SUT 1.x) to initiate updates using the iLO Redfish interface. iSUT reports the status of updates to iLO Amplifier Pack via iLO Restful Interface.
- **HPE OneView:** Displays available updates for servers. Communicates with iSUT (or SUT 1.x) to initiate updates, reports the status on the **Firmware** section of the **Server Profile** page of HPE OneView. HPE OneView provides automated compliance reporting in the dashboard.
- **SPP:** A comprehensive systems software and firmware update solution, which is delivered as a single ISO image.
- **SUM:** A tool for firmware and driver maintenance for HPE ProLiant servers and associated options.

NOTE: SUM, iLO Amplifier Pack, and HPE OneView should not manage the same nodes.

Updating firmware from the System Utilities

Use the **Firmware Updates** option to update firmware components in the system, including the system BIOS, NICs, and storage cards.

Procedure

1. Access the System ROM Flash Binary component for your server from the Hewlett Packard Enterprise Support Center.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.

4. Launch the **System Utilities**, and select **Embedded Applications > Firmware Update**.

5. Select a device.

The **Firmware Updates** screen lists details about your selected device, including the current firmware version in use.

6. Select **Select Firmware File**.

7. Select the flash file in the **File Explorer** list.

The firmware file is loaded and the **Firmware Updates** screen lists details of the file in the **Selected firmware file** field.

8. Select **Image Description**, and then select a firmware image.

A device can have multiple firmware images.

9. Select **Start firmware update**.

Updating the firmware from the UEFI Embedded Shell

Procedure

1. Access the System ROM Flash Binary component for your server from the Hewlett Packard Enterprise Support Center (<http://www.hpe.com/support/hpesc>).
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Boot to the UEFI Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `map -r`.
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 **Enter**.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Flash the system ROM by entering `fwupdate -d BIOS -f filename`.
9. Reboot the server. A reboot is required after the firmware update in order 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.

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

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

To locate the drivers for a server, go to the **Hewlett Packard Enterprise Support Center website**, and then search for the product name/number.

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 (<http://www.hpe.com/servers/spp/download>).
- Download individual drivers, firmware, or other system software components from the server product page in the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>).

Operating system version support

For information about specific versions of a supported operating system, refer to the **operating system support matrix**.

HPE Pointnext Portfolio

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

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

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

Utilize the Advisory and Transformation Services in the following areas:

- Private or hybrid cloud computing
- Big data and mobility requirements
- Improving data center infrastructure
- Better use of server, storage, and networking technology

For more information, see the Hewlett Packard Enterprise website:

<http://www.hpe.com/services/consulting>

Proactive notifications

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

- Hardware, firmware, and software changes
- Bulletins
- Patches
- Security alerts

You can subscribe to proactive notifications on the **Hewlett Packard Enterprise website**.

Troubleshooting

Troubleshooting resources

Troubleshooting resources are available for HPE Gen10 server products in the following documents:

- *Troubleshooting Guide for HPE ProLiant Gen10 servers* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance.
- *Error Message Guide for HPE ProLiant Gen10 servers and HPE Synergy* provides a list of error messages and information to assist with interpreting and resolving error messages.
- *Integrated Management Log Messages and Troubleshooting Guide for HPE ProLiant Gen10 and HPE Synergy* provides IML messages and associated troubleshooting information to resolve critical and cautionary IML events.

To access the troubleshooting resources, see the Hewlett Packard Enterprise Information Library (<http://www.hpe.com/info/gen10-troubleshooting>).

NMI functionality

An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debugging methods.

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

To force the OS to invoke the NMI handler and generate a crash dump log, the administrator can use the iLO Virtual NMI feature.

Replacing the system battery

The system battery provides power to the internal clock. If the server no longer automatically displays the correct date and time, you might need to replace the system battery.

⚠ WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

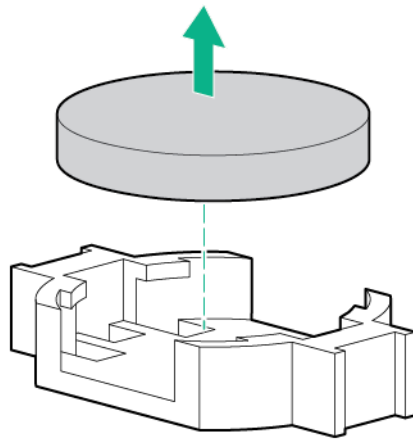
- Do not attempt to recharge the battery.
 - Do not expose the battery to temperatures higher than 60°C (140°F).
 - Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
 - Replace only with the spare designated for this product.
-

Procedure

1. **Power down the server** on page 37.
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Do one of the following:
 - Extend the server from the rack (**Extending the server from the rack** on page 37).
 - Remove the server from the rack (**Removing the server from the rack** on page 38).
4. Remove the access panel (**Removing the access panel** on page 40).

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

5. If installed, remove the butterfly riser cage (**Removing a PCIe riser cage** on page 43).
6. Locate the battery (**System board components** on page 25).
7. Remove the battery.



To replace the component, reverse the removal procedure.

8. Properly dispose of the old battery.

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

Specifications

Environmental specifications

Specification	Value
System Inlet Temperature, Standard Operating Support ¹	—
Operating	10°C to 35°C (50°F to 95°F)
Non-operating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (non-condensing)	—
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
Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
Altitude	—
Operating	3050 m (10,000 ft) This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
Non-operating	9144 m (30,000 ft) Maximum allowable altitude change rate is 457 m/min (1500 ft/min).

¹ All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 305.0 m (1.8°F per 1000 ft) to 3050 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. System performance during standard operating support may be reduced if operating with a fan fault or above 30°C (86°F).

The approved hardware configurations for this system are listed on the [**Hewlett Packard Enterprise website**](#).

System Inlet Temperature, Extended Ambient Operating Support

Specification	Value
System Inlet Temperature, Extended Ambient Operating Support	—
—	<p>For approved hardware configurations, the supported system inlet range is extended to be 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F)</p> <p>All temperature ratings shown are for 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 3050 m (10,000 ft). ¹</p>
—	<p>For approved hardware configurations, the supported system inlet range is extended to be 40°C to 45°C (104°F to 113°F)</p> <p>All temperature ratings shown are for 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 3050 m (10,000 ft). ¹</p>

¹ System performance may be reduced if operating in the extended ambient operating range or with a fan fault.

The approved hardware configurations for this system are listed on the [Hewlett Packard Enterprise website](#).

Mechanical specifications

Specification	Value
Height	17.48 cm (6.88 in)
Depth	75.18 cm (29.60 in)
Width	44.55 cm (17.54 in)
Weight (maximum)	51.71 kg (114 lbs)
Weight (minimum)	28.12 kg (62 lbs)

Power supply specifications

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

- [HPE 800W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#) on page 183
- [HPE 800W Flex Slot -48VDC Hot-plug Low Halogen Power Supply](#) on page 184
- [HPE 1600W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#) on page 185

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

HPE 800W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
Input requirements	—
Rated input voltage	100 VAC to 127 VAC 200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	9.1 A at 100 VAC 4.4 A at 200 VAC 3.6 A at 240 VDC for China only
Maximum rated input power	899 W at 100 VAC 867 W at 200 VAC 864 W at 240 VDC for China only
BTUs per hour	3067 at 100 VAC 2958 at 200 VAC 2949 at 240 VAC for China only
Power supply output	—
Rated steady-state power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only

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

Specification	Value
Input requirements	—
Rated input voltage	-40 VDC to -72 VDC -48 VDC nominal input
Rated input current	22.1 A at -40 VDC input 18.2 A at -48 VDC input, nominal input 12.0 A at -72 VDC input
Rated input power (W)	874 W at -40 VDC input 865 W at -48 VDC input, nominal input 854 W at -72 VDC input
Rated input power (BTUs per hour)	2983 at -40 VDC input 2951 at -48 VDC input, nominal input 2912 at -72 VDC input
Power supply output	—
Rated steady-state power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power	800 W at -40 VDC to -72 VDC input



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

- This equipment must be installed by trained service personnel.
- Connect the equipment to a reliably grounded secondary circuit source. A secondary circuit has no direct connection to a primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
- The branch circuit overcurrent protection must be rated 27 A.

⚠ CAUTION: This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment.

If this connection is made, all of the following must be met:

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

HPE 1600W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
Input requirements	
Rated input voltage	200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.7 A at 200 VAC 7.2 A at 240 VAC
Maximum rated input power	1734 W at 200 VAC 1725 W at 240 VAC
BTUs per hour	5918 at 200 VAC 5884 at 240 VAC
Power supply output	
Rated steady-state power	1600 W at 200 VAC to 240 VAC input 1600 W at 240 VDC input
Maximum peak power	2200 W for 1 ms (turbo mode) at 200 VAC to 240 VAC input

Websites

General websites

Hewlett Packard Enterprise Information Library

www.hpe.com/info/EIL

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

www.hpe.com/storage/spock

Storage white papers and analyst reports

www.hpe.com/storage/whitepapers

For additional websites, see **[Support and other resources](#)**.

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/info/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:

<http://www.hpe.com/support/selfrepair>

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

Warranty information

To view the warranty information for your product, see the links provided below:

HPE ProLiant and IA-32 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise and Cloudline Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

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.