



**Hewlett Packard  
Enterprise**

# **HPE ProLiant DL360 Gen10 Server User Guide**

## **Abstract**

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

Part Number: 869840-006  
Published: April 2019  
Edition: 6

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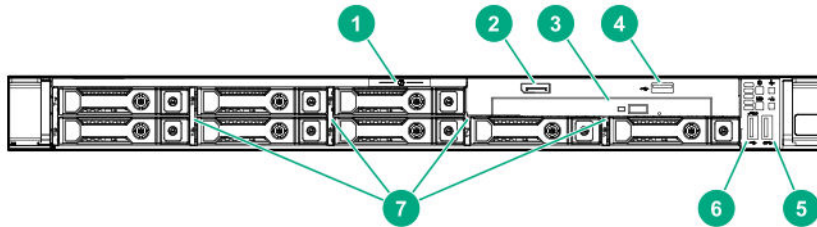
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# Component identification

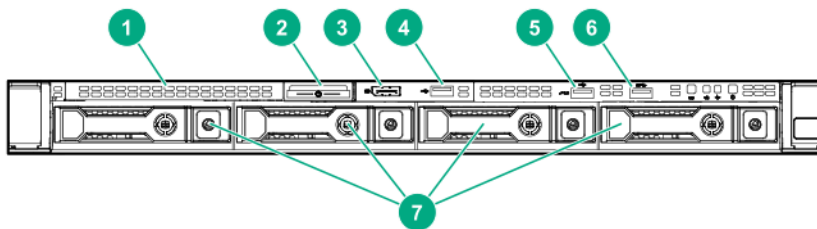
## Front panel components

### 8 SFF



Item	Description
1	Serial label pull tab
2	Display port (optional)
3	Optical drive (optional)
4	USB 2.0 port (optional)
5	USB 3.0 port
6	iLO Service Port The operating system does not recognize this port as a USB port.
7	SAS/SATA drive bays

### 4 LFF

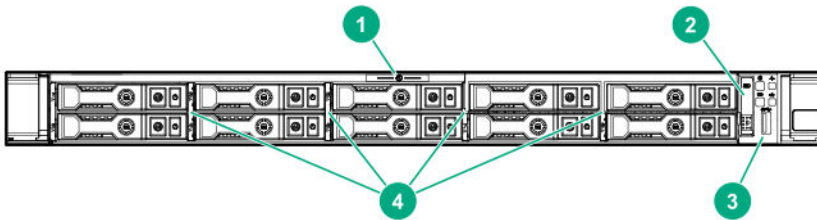


Item	Description
1	Optical drive blank (optional)
2	Serial label pull tab
3	Display port (optional)
4	USB 2.0 port (optional)

*Table Continued*

Item	Description
5	iLO Service Port The operating system does not recognize this port as a USB port.
6	USB 3.0 port
7	SAS/SATA drive bays

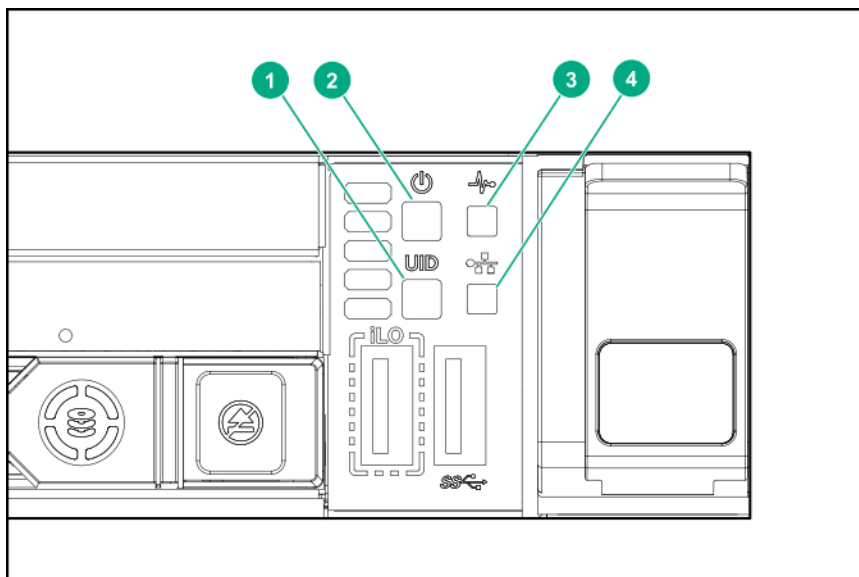
### 10 SFF NVMe/SAS Combo



Item	Description
1	Serial label pull tab
2	Systems Insight Display (optional)
3	USB 3.0 port
4	SAS/SATA/NVMe drive bays When the 10SFF NVMe/SAS backplane option is installed, NVMe drives must be installed in bays 9 and 10. The other bays support a mix of NVMe and SAS drives.

## Front panel LEDs and buttons

### 8SFF/10SFF





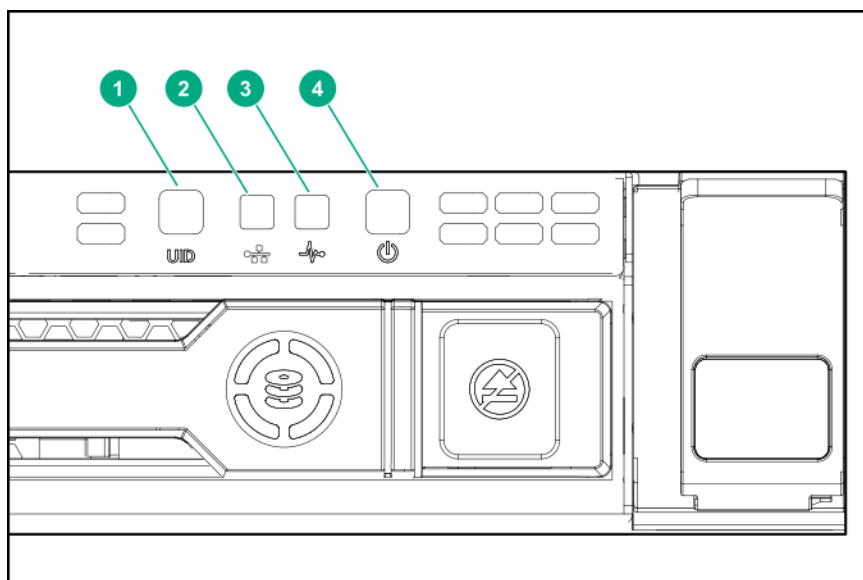
Item	Description	Status
1	UID button/LED*	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> <li>• 1 Hz = Remote management or firmware upgrade in progress</li> <li>• 4 Hz = iLO manual reboot sequence initiated</li> <li>• 8 Hz = iLO manual reboot sequence in progress</li> </ul> Off = Deactivated
2	Power On/Standby button and system power LED*	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present**
3	Health LED*	Solid green = Normal Flashing green = iLO is rebooting Flashing amber = System degraded Flashing red = System critical†
4	NIC status LED*	Solid green = Link to network Flashing green = Network active Off = No network activity

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

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

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

## 4LFF



Item	Description	Status
1	UID button/LED*	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> <li>• 1 Hz = Remote management or firmware upgrade in progress</li> <li>• 4 Hz = iLO manual reboot sequence initiated</li> <li>• 8 Hz = iLO manual reboot sequence in progress</li> <li>Off = Deactivated</li> </ul>
2	NIC status LED*	Solid green = Link to network Flashing green = Network active Off = No network activity
3	Health LED*	Solid green = Normal Flashing green = iLO is rebooting Flashing amber = System degraded Flashing red = System critical**
4	Power On/Standby button and system power LED*	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present†

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

\*\*To identify components in a degraded or critical state, see the Systems Insight Display LEDs, check iLO/BIOS logs, and reference the server troubleshooting guide.

†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.

## 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](#).

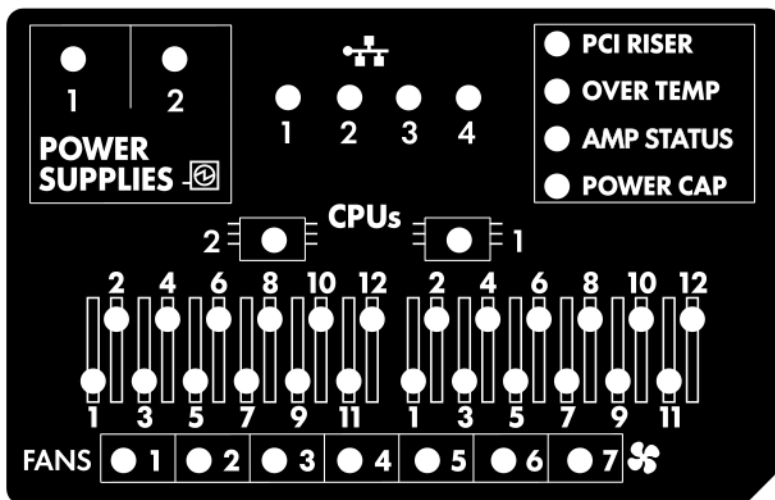
## Front panel LED power fault codes

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
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
NIC LEDs	Off = No link to network Solid green = Network link Flashing green = Network link with activity If power is off, the front panel LED is not active. For status, see <b>Rear panel LEDs</b> on page 15.
Power supply LEDs	Off = Normal Solid amber = Power subsystem degraded, power supply failure, or input power lost.
PCI riser LED	Off = Normal Amber = Incorrectly installed PCI riser cage
Over temp LED	Off = Normal Amber = High system temperature detected
Amp Status LED	Off = AMP modes disabled Solid green = AMP mode enabled Solid amber = Failover Flashing amber = Invalid configuration
Power cap LED	Off = System is in standby, or no cap is set. Solid green = Power cap applied

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 12).

## 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

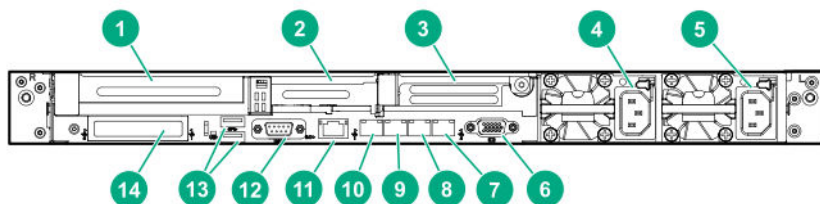
<b>Systems Insight Display LED and color</b>	<b>Health LED</b>	<b>System power LED</b>	<b>Status</b>
Processor (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> <li>• Processor in socket X has failed.</li> <li>• Processor X is not installed in the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

*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"> <li>Redundant power supply is installed and only one power supply is functional.</li> <li>AC power cord is not plugged into redundant power supply.</li> <li>Redundant power supply fault</li> <li>Power supply mismatch at POST or power supply mismatch through hot-plug addition</li> </ul>
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.

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

## Rear panel components

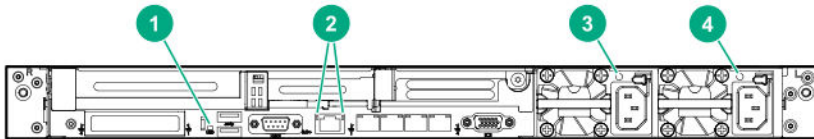


Item	Description
1	Slot 1 PCIe3
2	Slot 2 PCIe3
3	Slot 3 PCIe3 (optional - requires second processor)
4	Power supply 2 (PS2)
5	Power supply 1 (PS1)
6	Video port
7	NIC port 4

*Table Continued*

Item	Description
8	NIC port 3
9	NIC port 2
10	NIC port 1
11	iLO Management Port
12	Serial port (optional)
13	USB 3.0 ports
14	FlexibleLOM (optional)

## Rear panel LEDs

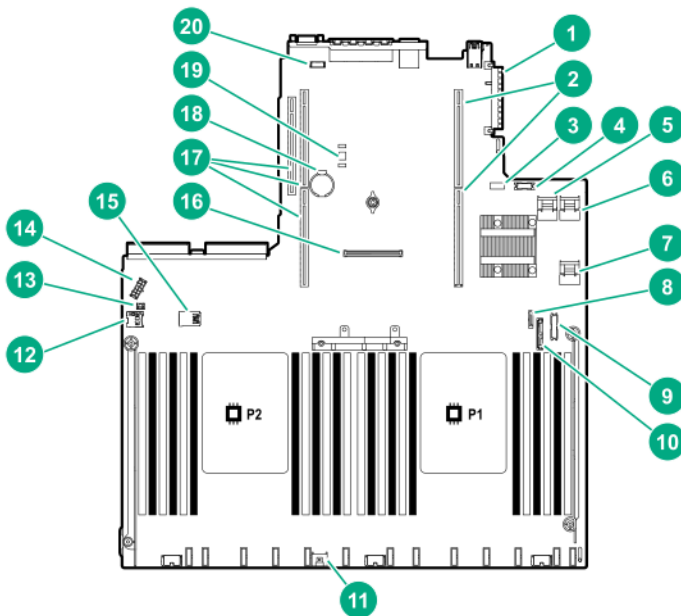


Item	Description	Status
1	UID LED	Solid blue = Identification is activated. Flashing blue = System is being managed remotely. Off = Identification is deactivated.
2R	iLO 5/standard NIC activity LED	Solid green = Activity exists. Flashing green = Activity exists. Off = No activity exists.
2L	iLO 5/standard NIC link LED	Solid green = Link exists. Off = No link exists.

*Table Continued*

Item	Description	Status
3	Power supply 2 LED	<p>Solid green = Normal</p> <p>Off = One or more of the following conditions exists:</p> <ul style="list-style-type: none"> <li>• AC power unavailable</li> <li>• Power supply failed</li> <li>• Power supply in standby mode</li> <li>• Power supply exceeded current limit.</li> </ul>
4	Power supply 1 LED	<p>Solid green = Normal</p> <p>Off = One or more of the following conditions exists:</p> <ul style="list-style-type: none"> <li>• AC power unavailable</li> <li>• Power supply failed</li> <li>• Power supply in standby mode</li> <li>• Power supply exceeded current limit.</li> </ul>

## System board components



Item	Description
1	FlexibleLOM connector
2	Primary (processor 1) PCIe riser connector

*Table Continued*



Item	Description
3	System maintenance switch
4	Front display port/USB 2.0 connector
5	x4 SATA port 1
6	x4 SATA port 2
7	x2 SATA port 3
8	x1 SATA port 4
9	Front power/USB 3.0 connector
10	Optical/SATA port 5
11	Energy pack connector
12	Micro SD card slot
13	Chassis Intrusion Detection connector
14	Drive backplane power connector
15	Dual internal USB 3.0 connector
16	Type-a SmartArray connector
17	Secondary (processor 2) PCIe riser connector
18	System battery
19	TPM connector (optional)
20	Serial port connector (optional)

## System maintenance switch descriptions

Position	Default	Function
S1 <sup>1</sup>	Off	Off = iLO security is enabled. On = iLO security is disabled.
S2	Off	Reserved
S3	Off	Reserved
S4	Off	Reserved
S5 <sup>1</sup>	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6 <sup>1, 2, 3</sup>	Off	Off = No function On = Restore default manufacturing settings
S7	Off	Reserved
S8	—	Reserved
S9	—	Reserved

*Table Continued*

Position	Default	Function
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

- <sup>1</sup> To access the redundant ROM, set S1, S5, and S6 to On.
- <sup>2</sup> 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.
- <sup>3</sup> 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 150.

## NMI functionality

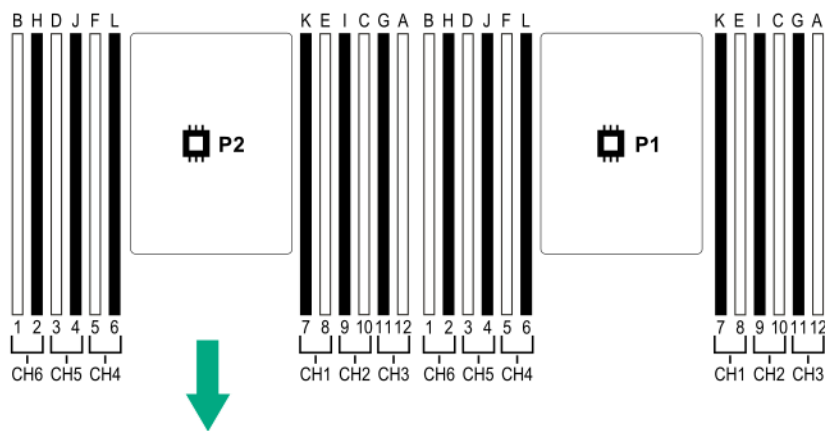
An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debugging methods.

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.

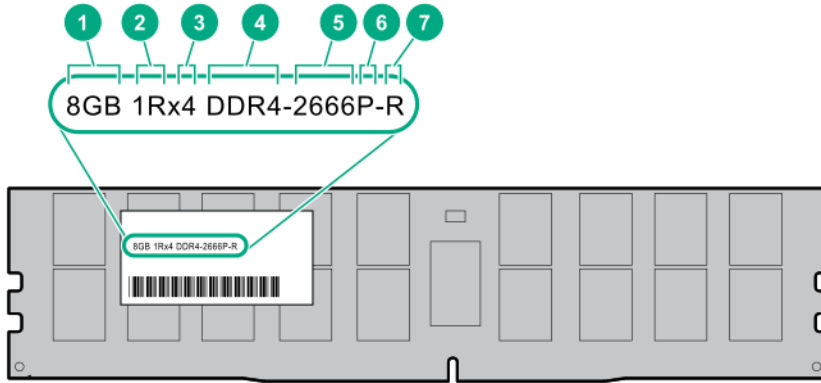
## DIMM slot locations

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



## 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*

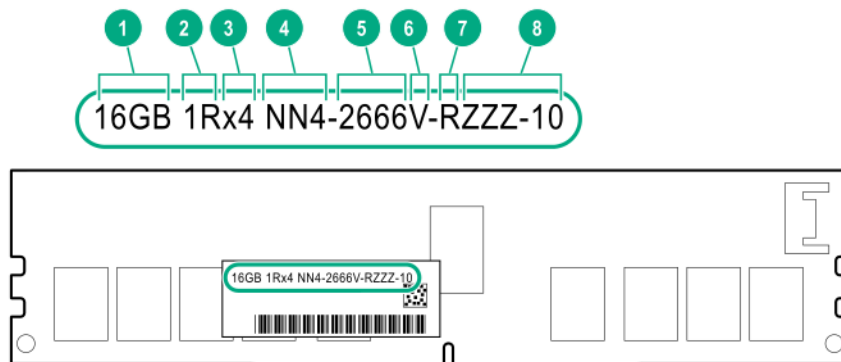
Item	Description	Example
6	CAS latency	P = CAS 15-15-15 T = CAS 17-17-17 U = CAS 20-18-18 V = CAS 19-19-19 (for RDIMM, LRDIMM) V = CAS 22-19-19 (for 3DS TSV LRDIMM) Y = CAS 21-21-21 (for RDIMM, LRDIMM) Y = CAS 24-21-21 (for 3DS TSV LRDIMM)
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)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

## NVDIMM identification

NVDIMM boards are blue instead of green. This change to the color makes it easier to distinguish NVDIMMs from DIMMs.

To determine NVDIMM characteristics, see the full product description as shown in the following example:

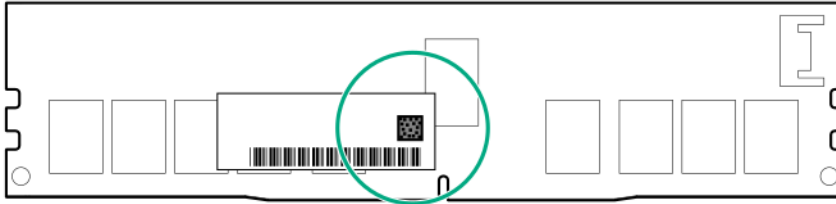


Item	Description	Definition
1	Capacity	16 GiB
2	Rank	1R (Single rank)
3	Data width per DRAM chip	x4 (4 bit)
4	Memory type	NN4=DDR4 NVDIMM-N
5	Maximum memory speed	2667 MT/s
6	Speed grade	V (latency 19-19-19)
7	DIMM type	RDIMM (registered)
8	Other	—

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

## NVDIMM 2D Data Matrix barcode

The 2D Data Matrix barcode is on the right side of the NVDIMM label and can be scanned by a cell phone or other device.

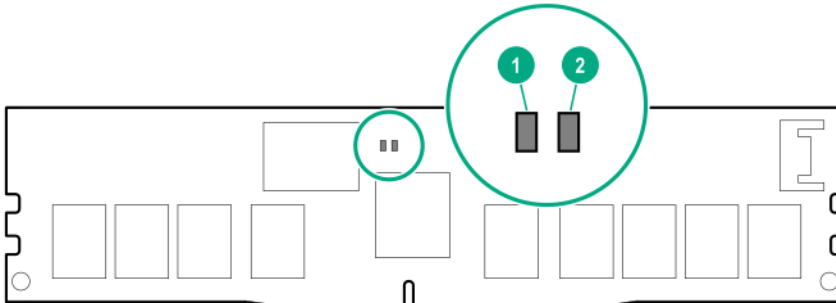


When scanned, the following information from the label can be copied to your cell phone or device:

- (P) is the module part number.
- (L) is the technical details shown on the label.
- (S) is the module serial number.

Example: (P)HMN82GR7AFR4N-VK (L)16GB 1Rx4 NN4-2666V-RZZZ-10(S)80AD-01-1742-11AED5C2

## NVDIMM LED identification



Item	LED description	LED color
1	Power LED	Green
2	Function LED	Blue

## NVDIMM-N LED combinations

State	Definition	NVDIMM-N Power LED (green)	NVDIMM-N Function LED (blue)
0	AC power is on (12V rail) but the NVM controller is not working or not ready.	On	Off
1	AC power is on (12V rail) and the NVM controller is ready.	On	On

*Table Continued*

State	Definition	NVDIMM-N Power LED (green)	NVDIMM-N Function LED (blue)
2	AC power is off or the battery is off (12V rail off).	Off	Off
3	AC power is on (12V rail) or the battery is on (12V rail) and the NVDIMM-N is active (backup and restore).	On	Flashing

## NVDIMM Function LED patterns

For the purpose of this table, the NVDIMM-N LED operates as follows:

- Solid indicates that the LED remains in the on state.
- Flashing indicates that the LED is on for 2 seconds and off for 1 second.
- Fast-flashing indicates that the LED is on for 300 ms and off for 300 ms.

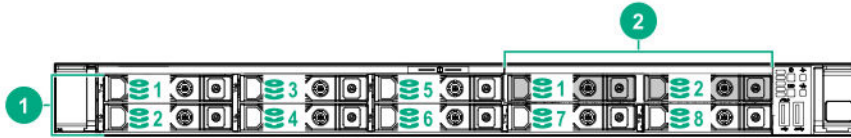
State	Definition	NVDIMM-N Function LED
0	The restore operation is in progress.	Flashing
1	The restore operation is successful.	Solid or On
2	Erase is in progress.	Flashing
3	The erase operation is successful.	Solid or On
4	The NVDIMM-N is armed, and the NVDIMM-N is in normal operation.	Solid or On
5	The save operation is in progress.	Flashing
6	The NVDIMM-N finished saving and battery is still turned on (12 V still powered).	Solid or On
7	The NVDIMM-N has an internal error or a firmware update is in progress. For more information about an NVDIMM-N internal error, see the IML.	Fast-flashing

## Device numbers

### 8SFF device bay numbering

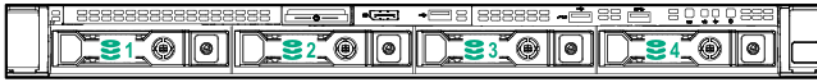


### 8SFF + 2 SFF device bay numbering



Item	Description
1	Box 1, bays 1-8
2	Box 2, bays 1 and 2

### 4LFF device bay numbering



### 10SFF NVMe/SAS backplane option device bay numbering

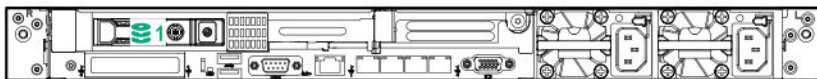
When the 10SFF NVMe/SAS backplane option is installed, NVMe drives must be installed in bays 9 and 10. The other bays support a mix of NVMe and SAS drives.



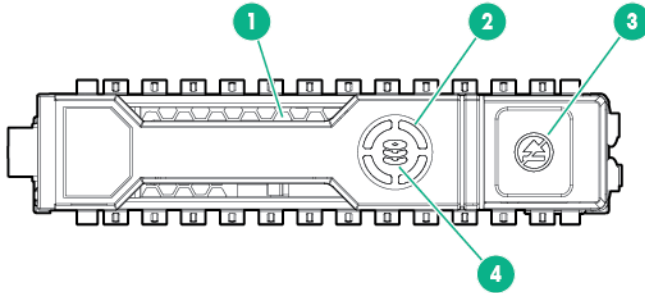
### Optional rear device bay numbering

The optional rear device bay supports either 1 SFF drive in a SmartDrive carrier, or 2 uFF M.2 drives in an HPE Smart Carrier M.2 (SCM).

When the HPE SFF Flash Adapter is installed, the uFF drives are recognized as 1 and 101.



# Hot-plug drive LED definitions



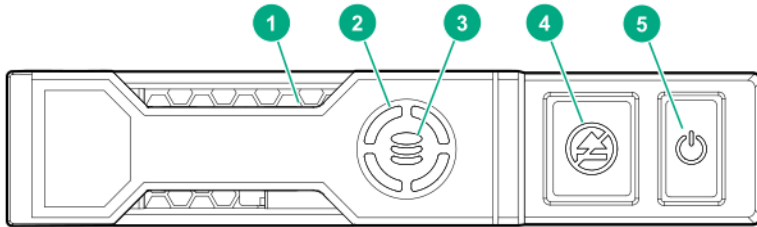
Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity.
		Off	No drive activity.
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is doing one of the following: <ul style="list-style-type: none"> <li>• Rebuilding</li> <li>• Performing a RAID migration</li> <li>• Performing a strip size migration</li> <li>• Performing a capacity expansion</li> <li>• Performing a logical drive extension</li> <li>• Erasing</li> <li>• Spare part activation</li> </ul>
		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 or a spare drive.



# 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.

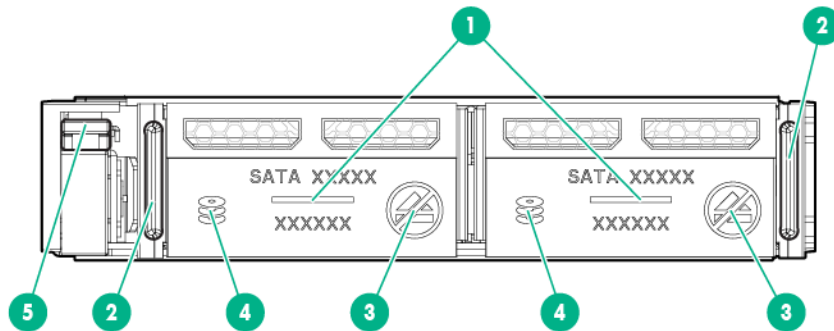


Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is doing one of the following: <ul style="list-style-type: none"> <li>Rebuilding</li> <li>Performing a RAID migration</li> <li>Performing a stripe size migration</li> <li>Performing a capacity expansion</li> <li>Performing a logical drive extension</li> <li>Erasing</li> </ul>
		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
Flashing white	The drive ejection request is pending.		

*Table Continued*

Item	LED	Status	Definition
		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.

## uFF drive components and LEDs



Item	Description	Status
1	Locate	<ul style="list-style-type: none"> <li>Off—Normal</li> <li>Solid blue—The drive is being identified by a host application</li> <li>Flashing blue—The drive firmware is being updated or requires an update</li> </ul>
2	uFF drive ejection latch	Removes the uFF drive when released
3	Do not remove LED	<ul style="list-style-type: none"> <li>Off—OK to remove the drive. Removing the drive does not cause a logical drive to fail.</li> <li>Solid white—Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</li> </ul>

*Table Continued*

Item	Description	Status
4	Drive status LED	<ul style="list-style-type: none"> <li>Off—The drive is not configured by a RAID controller</li> <li>Solid green—The drive is a member of one or more logical drives</li> <li>Flashing green (4 Hz)—The drive is operating normally and has activity</li> <li>Flashing green (1 Hz)—The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, logical drive extension, or is erasing</li> <li>Flashing amber/green (1 Hz)—The drive is a member of one or more logical drives that predicts the drive will fail</li> <li>Solid amber—The drive has failed</li> <li>Flashing amber (1 Hz)—The drive is not configured and predicts the drive will fail</li> </ul>
5	Adapter ejection release latch and handle	Removes the SFF flash adapter when released

## Hot-plug fans

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

**⚠ CAUTION:** To avoid damage to the equipment, do not operate the server for extended periods of time if the server does not have the optimal number of fans installed. Although the server might boot, Hewlett Packard Enterprise does not recommend operating the server without the required fans installed and operating.

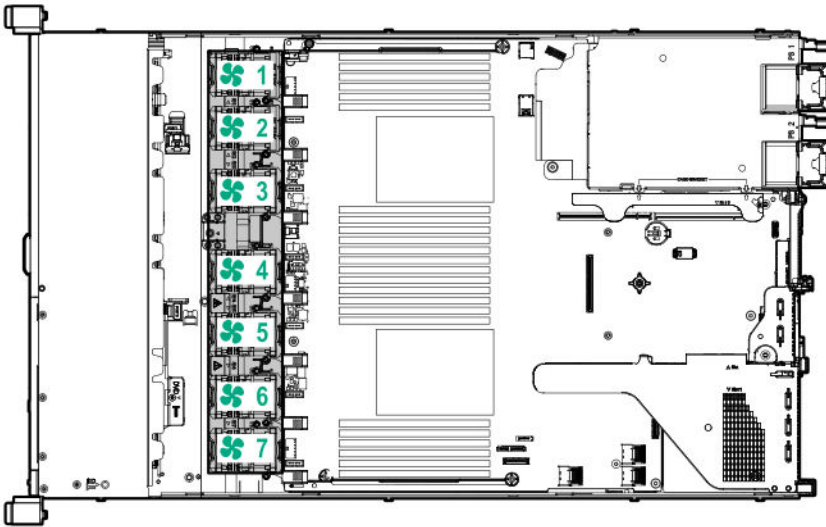
The valid fan configurations are listed in the following tables.

### One-processor configuration

Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6	Fan bay 7
Fan blank	Fan blank	Fan	Fan	Fan	Fan	Fan

### Two-processor configuration

Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6	Fan bay 7
Fan	Fan	Fan	Fan	Fan	Fan	Fan



The loss of a single fan rotor (one standard fan) causes loss of redundancy. The loss of two fan rotors (2 standard fans or 1 high-performance fan) causes the server to initiate a shut down.

The high-performance fans are used for 8-SFF +2SFF NVMe and 10 SFF drive configurations when NVMe drives are installed in the server. They are also required for ASHRAE compliant configurations. For more information on ASHRAE compliant configurations, see the [Hewlett Packard Enterprise website](#).

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

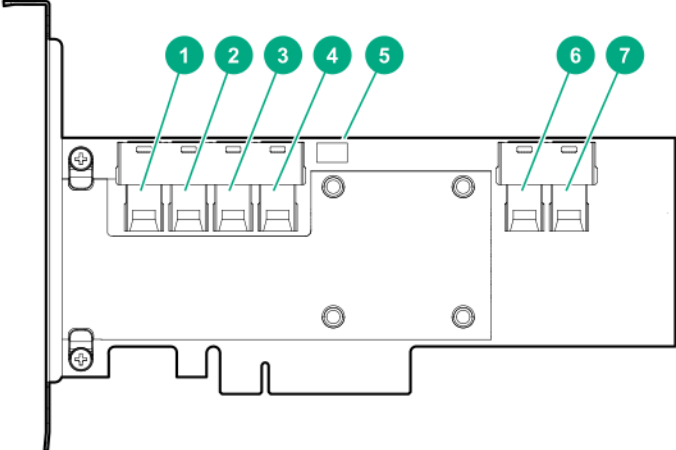
- At POST and in the OS, iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.
- When the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU), iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.

---

**⚠ CAUTION:** A thermal event can damage server components when the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU).

---

# HPE Smart Array P824i-p MR Gen10 Controller



## Components

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

# 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.

## Powering 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.

## Extend the server from the rack

---

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

---

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Disconnect all peripheral cables and power cords.
3. Loosen the front panel thumbscrews.
4. Extend the server on the rack rails until the server rail-release latches engage.

---

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

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

---

5. After performing the installation or maintenance procedure, slide the server into the rack:
  - a. Slide the server fully into the rack.
  - b. Secure the server by tightening the thumbscrews.
6. Connect the peripheral cables and power cords.

## Remove the server from the rack

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

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Extend the server from the rack (**Extend the server from the rack** on page 30).
3. Disconnect the cabling and remove the server from the rack. For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

## Remove the access panel

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

---

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

---

To remove the component:

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Extend the server from the rack (**Extend the server from the rack** on page 30).
3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

## 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 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, if needed.

## Remove the hot-plug fan

### Procedure

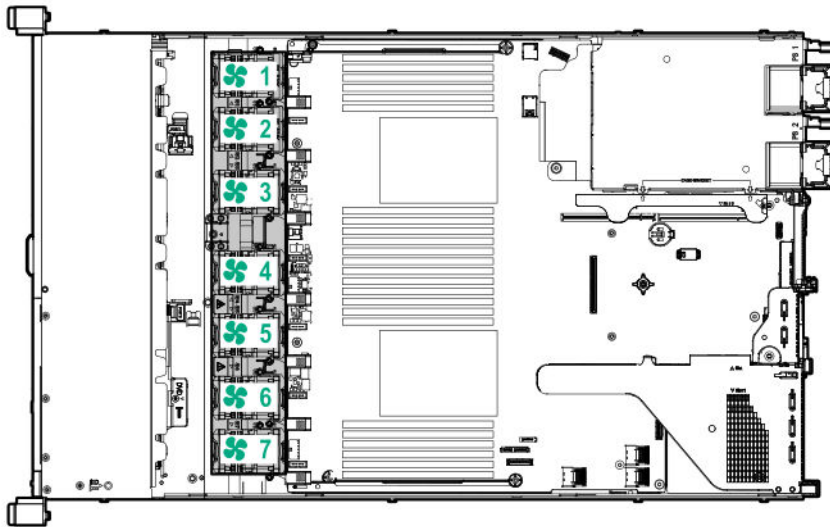
1. Observe the following alert:

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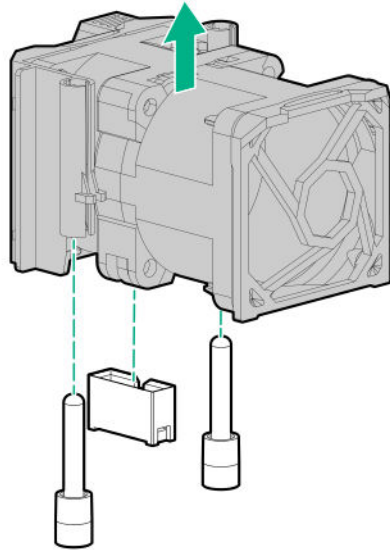
❗ **IMPORTANT:** After removing a high-performance (dual-rotor) fan, install or replace the fan within 60 seconds. Otherwise, the server will shut down gracefully.

---

2. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
3. Remove the access panel (**Remove the access panel** on page 31).
4. Remove the fan.







---

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

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**⚠ IMPORTANT:** For optimum cooling, install fans in all primary fan locations.

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To replace the component, reverse the removal procedure.

## Removing the primary PCI riser cage

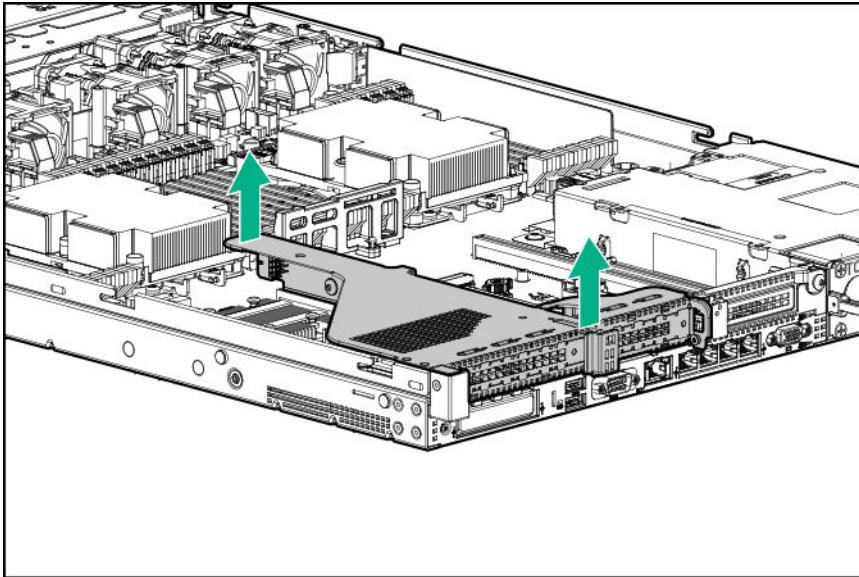
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**⚠ CAUTION:** To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

---

### Procedure

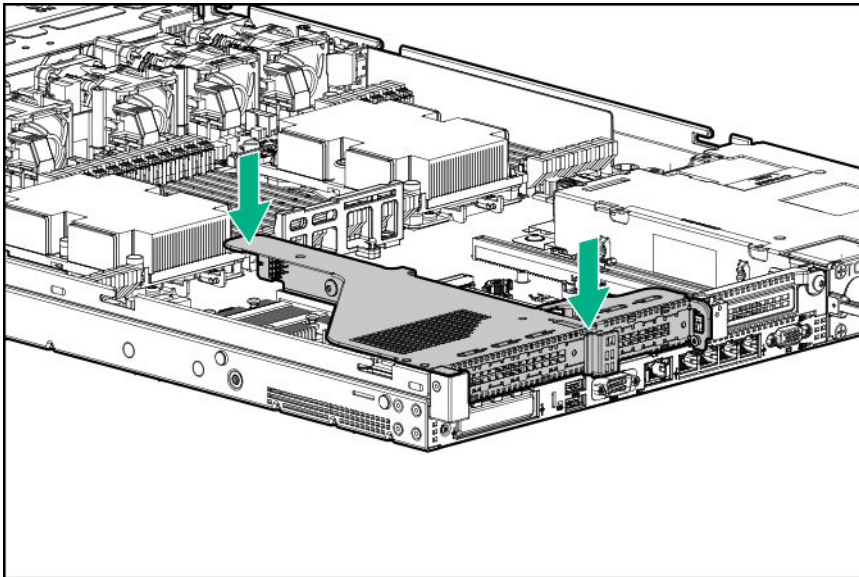
1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the PCI riser cage.



## Install the primary PCI riser cage

### Procedure

1. Install the PCI riser cage.



2. Install the access panel ([Installing the access panel](#) on page 31).
3. Install the server into the rack ([Installing the server into the rack](#) on page 43).
4. Connect each power cord to the server.
5. Connect each power cord to the power source.
6. Power up the server ([Power up the server](#) on page 30).

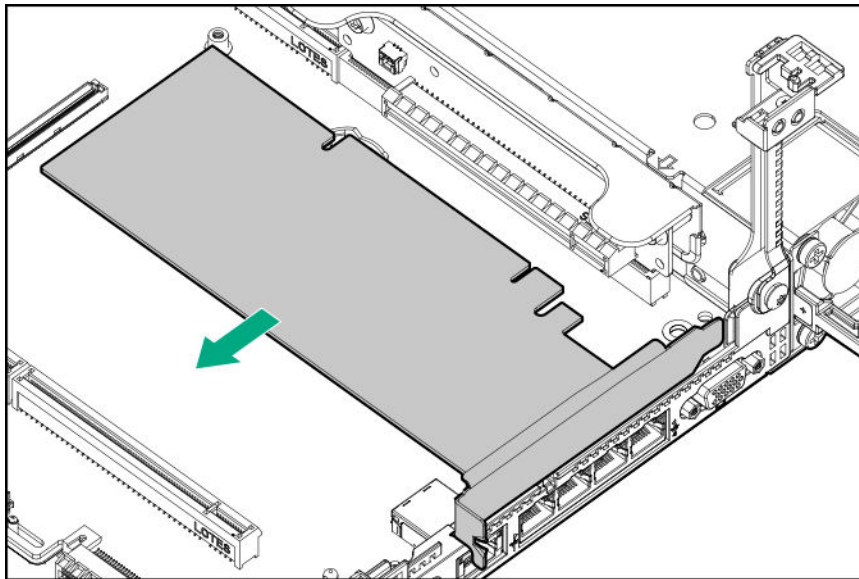
# Removing the secondary PCI riser cage

## Procedure

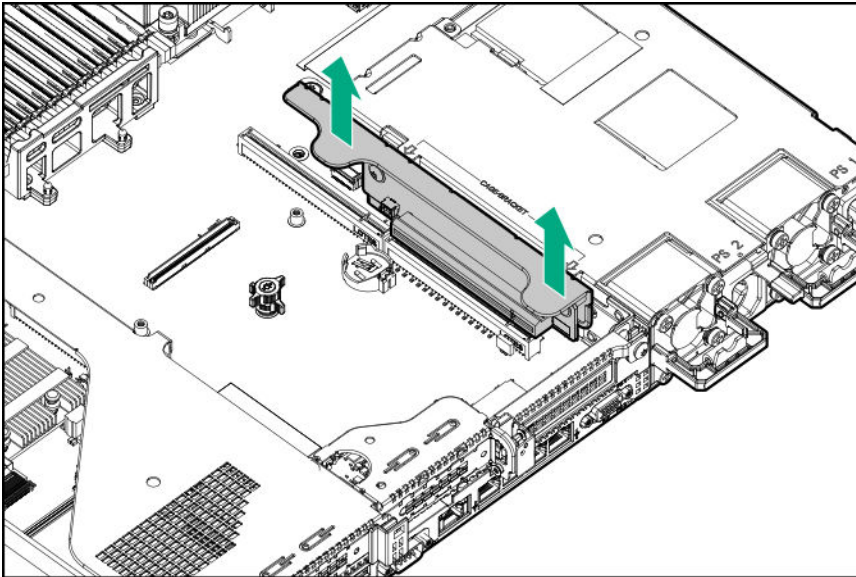
1. Observe the following alert:

**⚠ 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.

2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. If needed, remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
8. Disconnect any cables connected to the PCI riser cage.
9. Remove any expansion boards installed in the PCI riser cage.



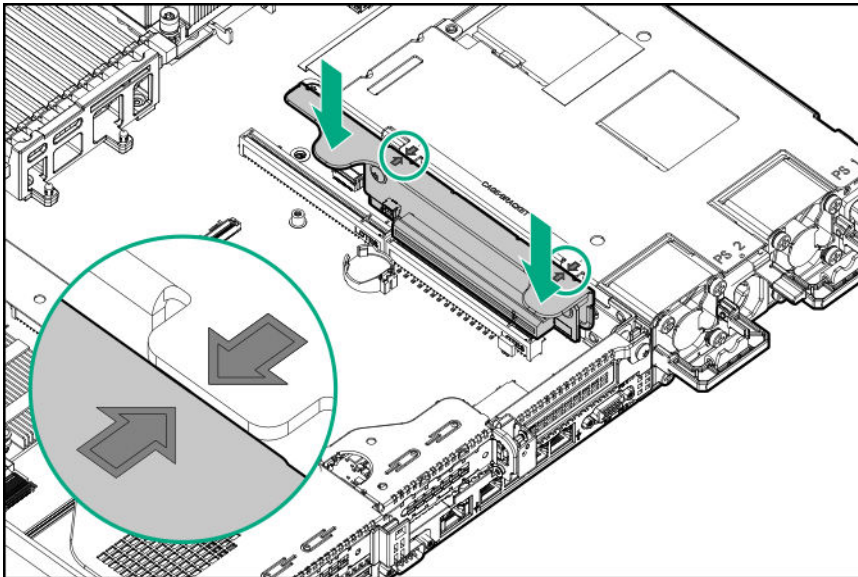
10. Remove the PCI riser cage.



## Install the secondary PCI riser cage

### Procedure

1. Install the PCI riser cage.

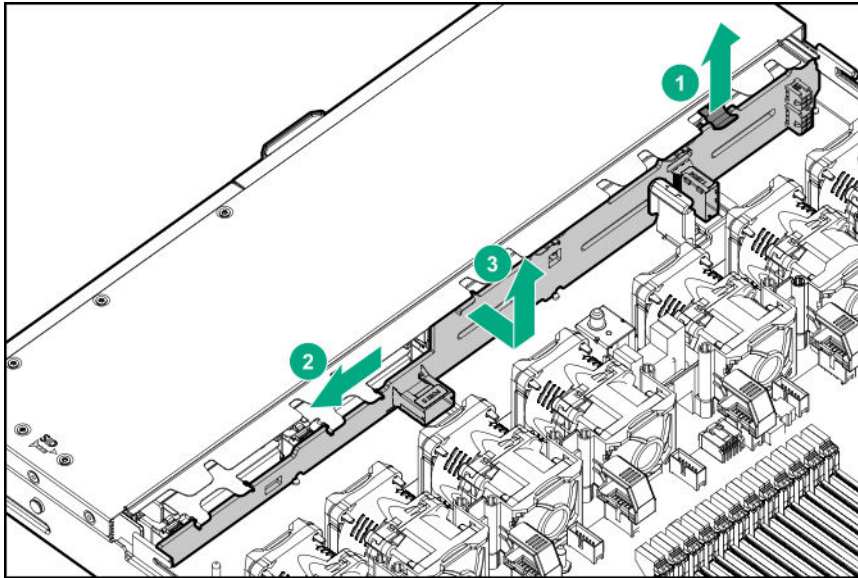


2. If needed, install expansion boards ([Installing an expansion board in the secondary riser cage](#) on page 91).
3. Install the access panel ([Installing the access panel](#) on page 31).
4. Install the server into the rack ([Installing the server into the rack](#) on page 43).
5. Connect each power cord to the server.
6. Connect each power cord to the power source.
7. Power up the server ([Power up the server](#) on page 30).

# Removing the 8 SFF drive backplane

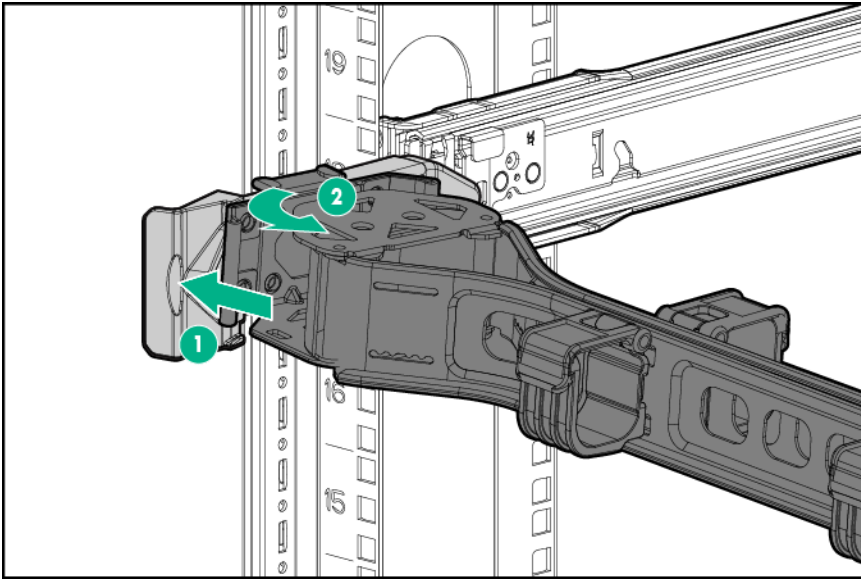
## Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove all drives (**Removing a hot-plug SAS or SATA hard drive** on page 58).
7. Disconnect and remove all cables connected to the drive backplane.
8. Remove the 8 SFF SAS/SATA drive backplane.



## Releasing the cable management arm

Release the cable management arm and then swing the arm away from the rack.



# Setup

## Optional service

Delivered by experienced, certified engineers, Hewlett Packard Enterprise support services help you keep your servers up and running with support packages tailored specifically for HPE ProLiant systems. Hewlett Packard Enterprise 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.

Hewlett Packard Enterprise 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 Hewlett Packard Enterprise support services for hardware, software or both are:

- Foundation Care – Keep systems running.
  - 6-Hour Call-to-Repair<sup>1</sup>
  - 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<sup>1</sup>
  - 4-Hour 24x7
  - Next Business Day
- Deployment service for both hardware and software
- Hewlett Packard Enterprise Education Services – Help train your IT staff.

<sup>1</sup>The time commitment for this repair service might vary depending on the geographical region of site. For more service information available in your site, contact your local **Hewlett Packard Enterprise support center**.

For more information on Hewlett Packard Enterprise support services, see the **Hewlett Packard Enterprise website**.

## Optimum environment

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

### Space and airflow requirements

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

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

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

enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

---

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

---

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

---

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

---

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

---

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

---

**⚠ CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
  - Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).
- 

## Temperature requirements

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

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

---

**⚠ CAUTION:** To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
  - Do not exceed the manufacturer's TMRA.
- 

## Power requirements

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



---

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

---

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

---

## Electrical grounding requirements

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

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

## Connecting a DC power cable to a DC power source

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

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

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

---

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

---

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

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

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

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

---

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

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

---

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

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

## 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.

---

## Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation and software products
- Rack-mounting hardware and documentation

In addition to the supplied items, you might need:

- Operating system or application software
- Hardware options
- Screwdriver

## Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "[Hardware options installation](#)."

## Installing the server into the rack

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



---

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

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



---

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

---

### Procedure

1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the selected rail system.
2. Connect peripheral devices to the server. For more information, see **Rear panel components** on page 14.
3. Connect the power cord to the rear of the server.
4. Use the hook-and-loop strap to secure the power cord.
5. Connect the power cord to the power source.

## Operating system

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

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

Failure to observe UEFI requirements for ProLiant Gen10 servers can result in errors installing the operating system, failure to recognize boot media, and other boot failures. For more information on these requirements, see the *HPE UEFI Requirements* on the **Hewlett Packard Enterprise website**.

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

- Intelligent Provisioning—For single-server deployment, updating, and provisioning capabilities. For more information, see **Installing the operating system with Intelligent Provisioning** on page 45.
- Insight Control server provisioning—For multiserver remote OS deployment, use Insight Control server provisioning for an automated solution. For more information, see the Insight Control documentation on the **Hewlett Packard Enterprise website**.

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

For more information, see **Keeping the system current** on page 153.

For more information on using these installation methods, see the **Hewlett Packard Enterprise website**.

# Installing the operating system with Intelligent Provisioning

## Procedure

1. Connect the Ethernet cable between the network connector on the server and a network jack.
2. Press the Power On/Standby button.
3. During server POST, press **F10**.
4. Complete the initial Preferences and Registration portion of [Intelligent Provisioning](#).
5. At the 1 Start screen, click **Configure and Install**.
6. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.

# Selecting boot options in UEFI Boot Mode

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

## Procedure

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

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

# Selecting boot options

This server supports both Legacy BIOS Boot Mode and UEFI Boot Mode. On servers operating in UEFI Boot Mode, the boot controller and boot order are set automatically.

## Procedure

1. Press the Power On/Standby button.
2. Do one of the following:
  - a. To enter the UEFI System Utilities screen and modify the server configuration ROM default settings, press the **F9** key on the ProLiant POST screen. Choose one of the following boot modes:
    - Legacy BIOS
    - UEFI (default)
  - b. If you do not need to modify the server configuration and are ready to install the system software, press the **F10** key to access Intelligent Provisioning.

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

## **Registering the server**

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

# Hardware options installation

## Hewlett Packard Enterprise 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>).

## Introduction


Install any hardware options before initializing the server. For options installation information, see the option documentation. For server-specific information, use the procedures in this section.

If multiple options are being installed, read the installation instructions for all the hardware options to identify similar steps and streamline the installation process.

---

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

---

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

---

## Installing a redundant hot-plug power supply

### Prerequisites


Before installing this option, be sure you have the following:

The components included with the hardware option kit


### Procedure

1. Observe the following alerts:

---

 **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 bays are populated with either a component or a blank.

---

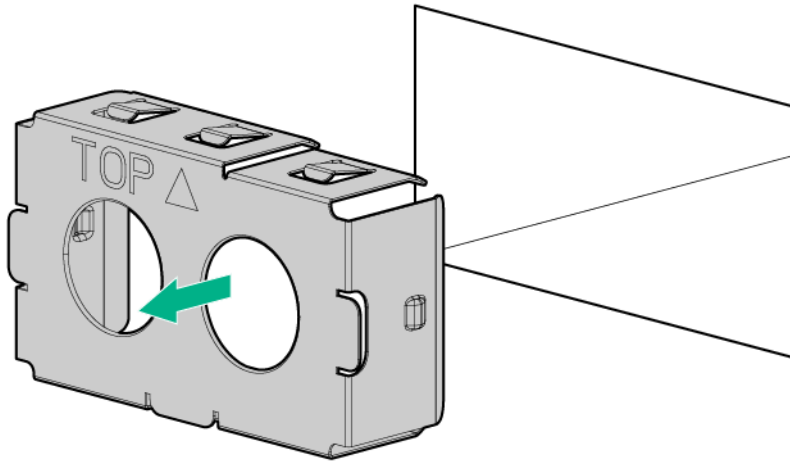
2. Access the product rear panel ([Releasing the cable management arm](#) on page 37).

3. Remove the blank.

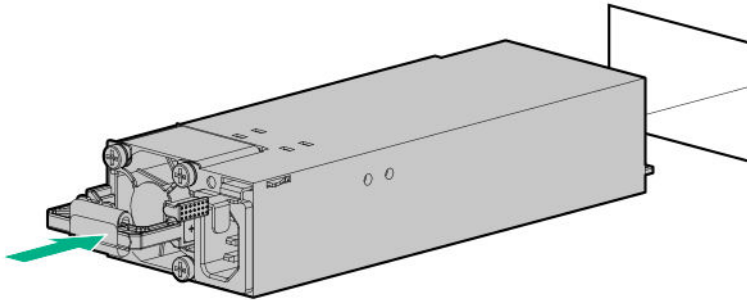
---

 **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.

---



4. Insert the power supply into the power supply bay until it clicks into place.



5. Connect the power cord to the power supply.
6. Route the power cord. Use best practices when routing power cords and other cables. A cable management arm is available to help with routing. To obtain a cable management arm, contact a Hewlett Packard Enterprise authorized reseller.
7. Connect the power cord to the AC power source.
8. Be sure that the power supply LED is green (**Rear panel LEDs** on page 15).

## 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 and NVDIMM population information

For specific DIMM and NVDIMM 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

The server supports up to 24 DIMMs.

### Prerequisites

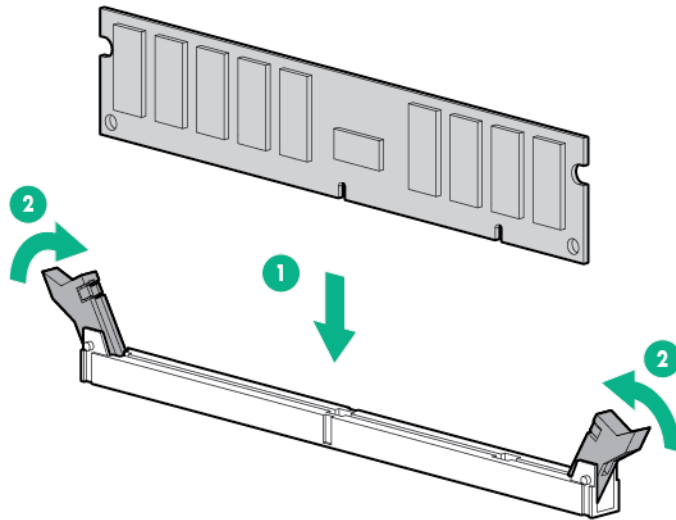
Before installing this option, be sure you have the following:

The components included with the hardware option kit

For more information on specific options, see the server QuickSpecs on the [Hewlett Packard Enterprise website](#).

### Procedure

1. Power down the server ([Powering down the server](#) on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack ([Extend the server from the rack](#) on page 30).
  - b. Remove the server from the rack ([Remove the server from the rack](#) on page 31).
4. Remove the access panel ([Remove the access panel](#) on page 31).
5. Open the DIMM slot latches.
6. Install the DIMM.



7. Install the access panel (**Installing the access panel** on page 31).
8. Install the server in the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (**Power up the server** on page 30).

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

For more information about LEDs and troubleshooting failed DIMMs, see **Systems Insight Display combined LED descriptions** on page 12.

## HPE 16GB NVDIMM option

HPE NVDIMMs are flash-backed NVDIMMs used as fast storage and are designed to eliminate smaller storage bottlenecks. The HPE 16GB NVDIMM for HPE ProLiant Gen10 servers is ideal for smaller database storage bottlenecks, write caching tiers, and any workload constrained by storage bottlenecks.

The HPE 16GB NVDIMM is supported on select HPE ProLiant Gen10 servers with first generation Intel Xeon Scalable processors. The server can support up to 12 NVDIMMs in 2 socket servers (up to 192GB) and up to 24 NVDIMMs in 4 socket servers (up to 384GB). The HPE Smart Storage Battery provides backup power to the memory slots allowing data to be moved from the DRAM portion of the NVDIMM to the Flash portion for persistence during a power down event.

For more information on HPE NVDIMMs, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/persistentmemory>).

## NVDIMM-processor compatibility

HPE 16GB NVDIMMs are only supported in servers with first generation Intel Xeon Scalable processors installed.

## Server requirements for NVDIMM support

Before installing an HPE 16GB NVDIMM in a server, make sure that the following components and software are available:

- A supported HPE server using Intel Xeon Scalable Processors: For more information, see the NVDIMM QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).
- An HPE Smart Storage Battery
- A minimum of one regular DIMM: The system cannot have only NVDIMM-Ns installed.
- A supported operating system with persistent memory/NVDIMM drivers. For the latest software information, see the Hewlett Packard Enterprise website (<http://persistentmemory.hpe.com>).
- For minimum firmware versions, see the HPE 16GB NVDIMM User Guide on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>).

To determine NVDIMM support for your server, see the server QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

## Installing an NVDIMM

- 
- ⚠ **CAUTION:** To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.
- 
- ⚠ **CAUTION:** To avoid damage to the hard drives, memory, and other system components, be sure to install the correct DIMM baffles for your server model.
- 
- ⚠ **CAUTION:** DIMMs are keyed for proper alignment. Align notches in the DIMM with the corresponding notches in the DIMM slot before inserting the DIMM. Do not force the DIMM into the slot. When installed properly, not all DIMMs will face in the same direction.
- 
- ⚠ **CAUTION:** Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure.
- 
- ⚠ **CAUTION:** Failure to properly handle DIMMs can damage the DIMM components and the system board connector. For more information, see the DIMM handling guidelines in the troubleshooting guide for your product on the Hewlett Packard Enterprise website:
    - HPE ProLiant Gen10 (<http://www.hpe.com/info/gen10-troubleshooting>)
    - HPE Synergy (<http://www.hpe.com/info/synergy-troubleshooting>)
- 
- ⚠ **CAUTION:** Unlike traditional storage devices, NVDIMMs are fully integrated in with the ProLiant server. Data loss can occur when system components, such as the processor or HPE Smart Storage Battery, fails. HPE Smart Storage battery is a critical component required to perform the backup functionality of NVDIMMs. It is important to act when HPE Smart Storage Battery related failures occur. Always follow best practices for ensuring data protection.
- 

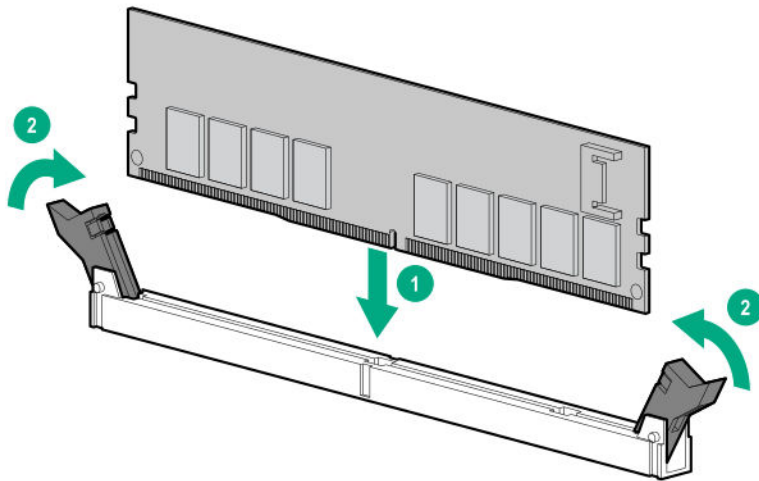
### Prerequisites

Before installing an NVDIMM, be sure the server meets the **Server requirements for NVDIMM support** on page 50.

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Locate any NVDIMMs already installed in the server.
6. Verify that all LEDs on any installed NVDIMMs are off.
7. Install the NVDIMM.



8. Install and connect the HPE Smart Storage Battery, if it is not already installed.
  - **Installing an energy pack in 8 SFF and 4 LFF configurations** on page 128
  - **Installing an energy pack in the 10 SFF SAS/SATA/NVMe Combo backplane configuration** on page 126
9. Install any components removed to access the DIMM slots and the HPE Smart Storage Battery.
10. Install the access panel.
11. Slide or install the server into the rack.
12. If removed, reconnect all power cables.
13. Power up the server.
14. If required, sanitize the NVDIMM-Ns. For more information, see **NVDIMM sanitization** on page 53.

## Configuring the server for NVDIMMs

After installing NVDIMMs, configure the server for NVDIMMs. For information on configuring settings for NVDIMMs, see the *HPE 16GB NVDIMM User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>).

The server can be configured for NVDIMMs using either of the following:

- UEFI System Utilities—Use System Utilities through the Remote Console to configure the server for NVDIMM memory options by pressing the **F9** key during POST. For more information about UEFI System Utilities, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).
- iLO RESTful API for HPE iLO 5—For more information about configuring the system for NVDIMMs, see <https://hewlettpackard.github.io/ilo-rest-api-docs/ilo5/>.

## NVDIMM sanitization

Media sanitization is defined by NIST SP800-88 Guidelines for Media Sanitization (Rev 1, Dec 2014) as "a general term referring to the actions taken to render data written on media unrecoverable by both ordinary and extraordinary means."

The specification defines the following levels:

- Clear: Overwrite user-addressable storage space using standard write commands; might not sanitize data in areas not currently user-addressable (such as bad blocks and overprovisioned areas)
- Purge: Overwrite or erase all storage space that might have been used to store data using dedicated device sanitize commands, such that data retrieval is "infeasible using state-of-the-art laboratory techniques"
- Destroy: Ensure that data retrieval is "infeasible using state-of-the-art laboratory techniques" and render the media unable to store data (such as disintegrate, pulverize, melt, incinerate, or shred)

The NVDIMM-N Sanitize options are intended to meet the Purge level.

For more information on sanitization for NVDIMMs, see the following sections in the *HPE 16GB NVDIMM User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>):

- NVDIMM sanitization policies
- NVDIMM sanitization guidelines
- Setting the NVDIMM-N Sanitize/Erase on the Next Reboot Policy

NIST SP800-88 *Guidelines for Media Sanitization* (Rev 1, Dec 2014) is available for download from the NIST website (<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-88r1.pdf>).

## NVDIMM relocation guidelines

### Requirements for relocating NVDIMMs or a set of NVDIMMs when the data must be preserved

- The destination server hardware must match the original server hardware configuration.
- All System Utilities settings in the destination server must match the original System Utilities settings in the original server.
- If NVDIMM-Ns are used with NVDIMM Interleaving ON mode in the original server, do the following:
  - Install the NVDIMMs in the same DIMM slots in the destination server.
  - Install the entire NVDIMM set (all the NVDIMM-Ns on the processor) on the destination server.

This guideline would apply when replacing a system board due to system failure.

If any of the requirements cannot be met during NVDIMM relocation, do the following:

- Manually back up the NVDIMM-N data before relocating NVDIMM-Ns to another server.
- Relocate the NVDIMM-Ns to another server.
- Sanitize all NVDIMM-Ns on the new server before using them.

### **Requirements for relocating NVDIMMs or a set of NVDIMMs when the data does not have to be preserved**

If data on the NVDIMM-N or set of NVDIMM-Ns does not have to be preserved, then

- Move the NVDIMM-Ns to the new location and sanitize all NVDIMM-Ns after installing them to the new location. For more information, see [NVDIMM sanitization](#) on page 53.
- Observe all DIMM and NVDIMM population guidelines. For more information, see [DIMM and NVDIMM population information](#) on page 48.
- Observe the process for removing an NVDIMM.
- Observe the process for installing an NVDIMM.
- Review and configure the system settings for NVDIMMs. For more information, see [Configuring the server for NVDIMMs](#) on page 52.

## **Installing a high-performance fan**

This kit is available to meet some extended ambient operating temperatures above 35 degrees Celsius. For more information about the qualifications for extended ambient configurations, see the [Hewlett Packard Enterprise website](#).

The high-performance fans are used for 8-SFF and 10 SFF drive configurations. They are also required for the 10 SFF SAS/SATA/NVMe Combo backplane option and for ASHRAE compliant configurations. For more information on ASHRAE compliant configurations, see the [Hewlett Packard Enterprise website](#).

### **Prerequisites**

Before installing this option, be sure you have the following:

The components included with the hardware option kit

### **Procedure**

1. Observe the following alert:

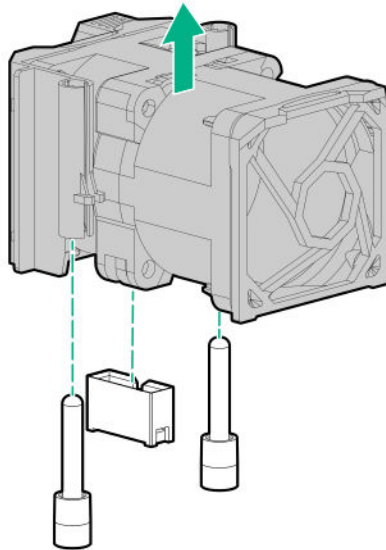
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**!** **IMPORTANT:** After removing a high-performance (dual-rotor) fan, install or replace the fan within 60 seconds. Otherwise, the server will shut down gracefully.

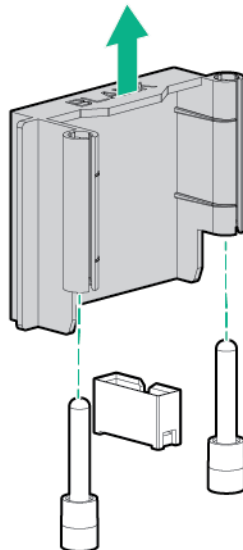
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2. Power down the server ([Powering down the server](#) on page 30).
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:

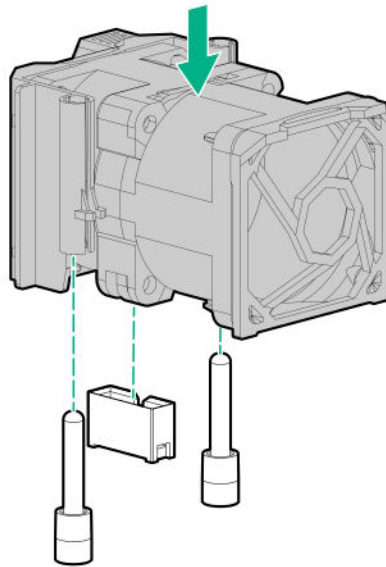
- a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
  6. Remove all standard fans from the fan bays.



7. Remove fan blanks from the fan bays, if installed.



8. Install high-performance fans in each of the seven fan bays.  
If needed, ensure each fan is securely installed by pressing the tab. Do not press on other areas of the fan.



9. Install the access panel ([Installing the access panel](#) on page 31).
10. Slide the server into the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ([Power up the server](#) on page 30).

## Drive options

Depending on the configuration, this server supports SAS, SATA, NVMe, and uFF M.2 drives. For more information on drive support, see [Device numbers](#) on page 22.

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

- The system automatically sets all device numbers.
- If only one hard drive is used, install it in the bay with the lowest device number.
- Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

## Hot-plug drive guidelines

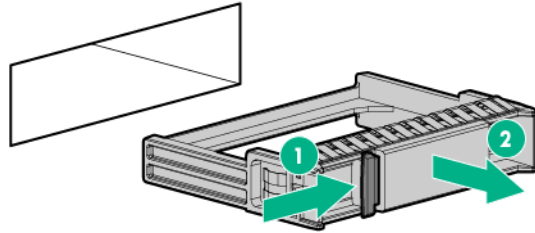
When adding drives to the server, observe the following general guidelines:

- The system automatically sets all device numbers.
- If only one drive is used, install it in the bay with the lowest device number.
- Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

## Removing the hard drive blank

Remove the component as indicated.





## Installing a hot-plug SAS or SATA drive

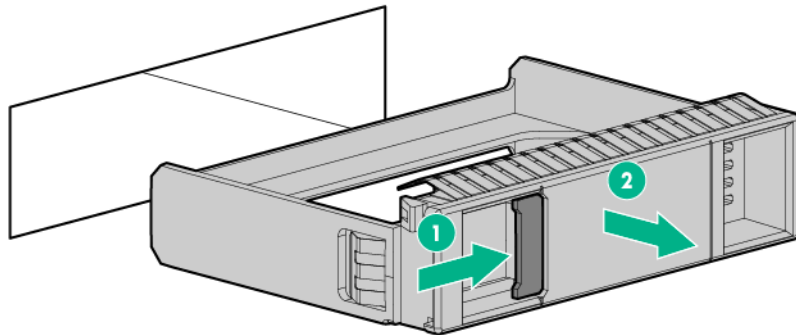
### Prerequisites

Before installing this option, be sure that you have the following:

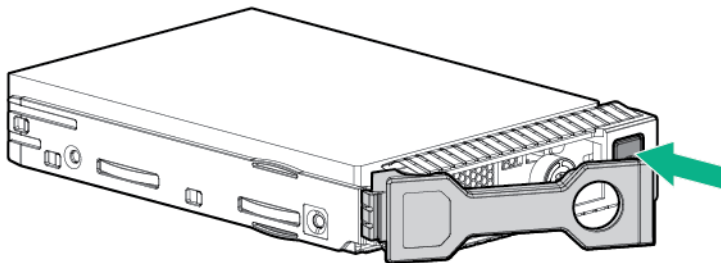
The components included with the hardware option kit

### Procedure

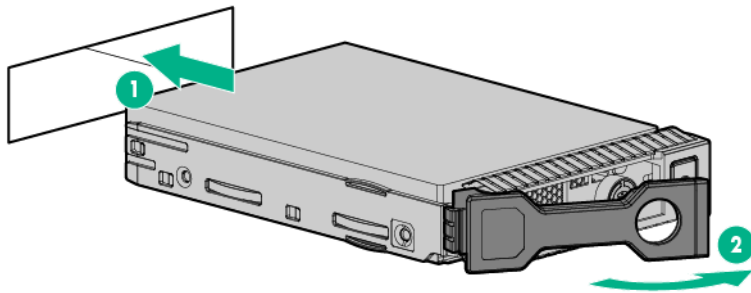
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.

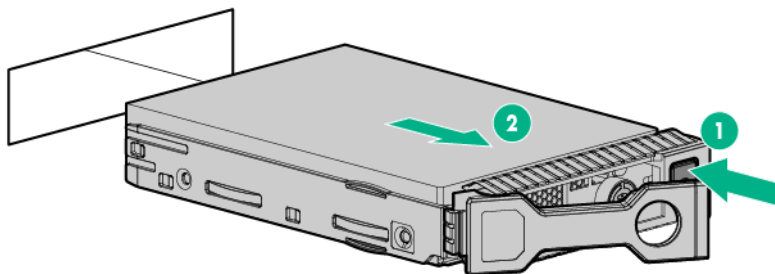


4. Determine the status of the drive from the drive LED definitions (**Hot-plug drive LED definitions** on page 24).

## Removing a hot-plug SAS or SATA hard drive

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

1. Determine the status of the drive from the **hot-plug drive LED definitions**.
2. Back up all server data on the drive.
3. Remove the drive.



## Installing the NVMe drives

NVMe drives are supported in 8 SFF and 10 SFF server configurations when the 10 SFF SAS/SATA/NVMe Combo backplane option or the 2 SFF NVMe backplane option is installed. When either backplane is installed, NVMe drives are required in bays 9 and 10. For more information, see **Device numbers** on page 22.

### Prerequisites

NVMe drives are supported in the 8SFF and 10 SFF server configurations.

Before installing this option, be sure you have the following:

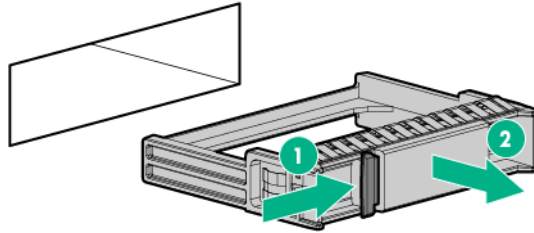
The components included with the hardware option kit

### Procedure

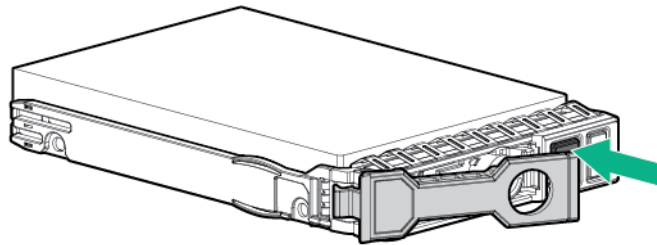
1. Observe the following alert:

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

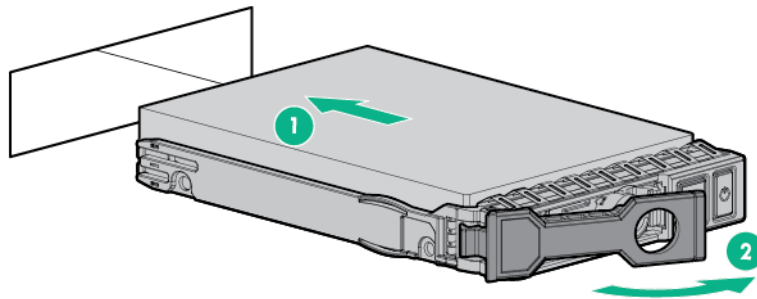
2. Remove the drive blank, if installed.



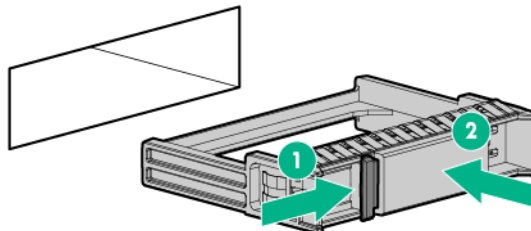
3. Press the Do Not Remove button to open the release handle.



4. Install the drives.



5. Install an SFF drive blank in any unused drive bays.

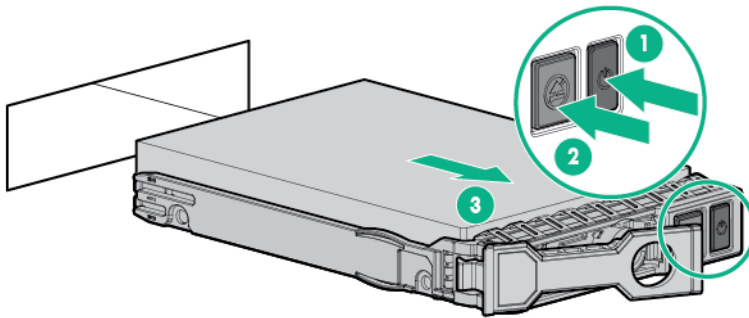


## Removing and replacing an NVMe drive

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

### Procedure

1. Back up all server data.
2. Observe the LED status of the drive and determine if it can be removed.
3. Remove the drive:
  - a. Push the Power button.  
The Do Not Remove button illuminates and flashes.
  - b. Wait until the flashing stops and the Do Not Remove button is no longer illuminated.
  - c. Push the Do Not Remove button and then remove the drive.

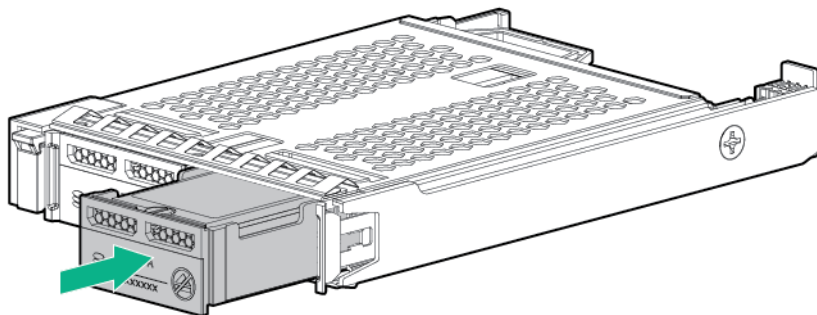


## Installing a uFF drive and SCM drive carrier

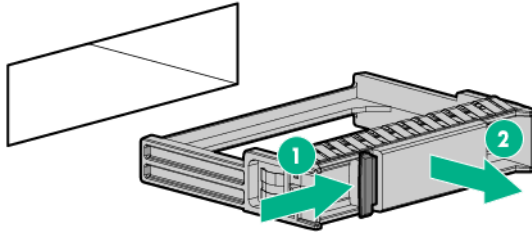
**!** **IMPORTANT:** Not all drive bays support the drive carrier. To find supported bays, see the server QuickSpecs.

### Procedure

1. If needed, install the uFF drive into the drive carrier.

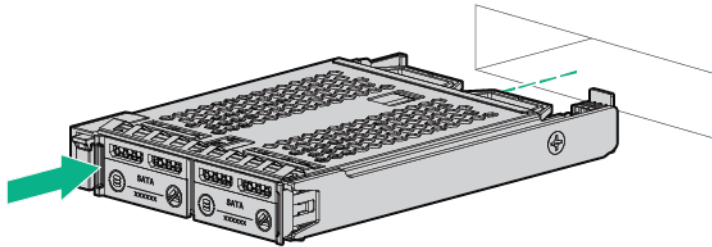


2. Remove the drive blank.



**3. Install the drives.**

Push firmly near the ejection handle until the latching spring engages with the drive bay.



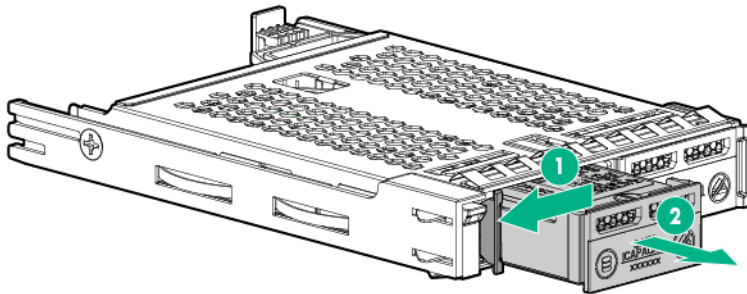
**4. Power on the server.**

To configure the drive, use **HPE Smart Storage Administrator**.

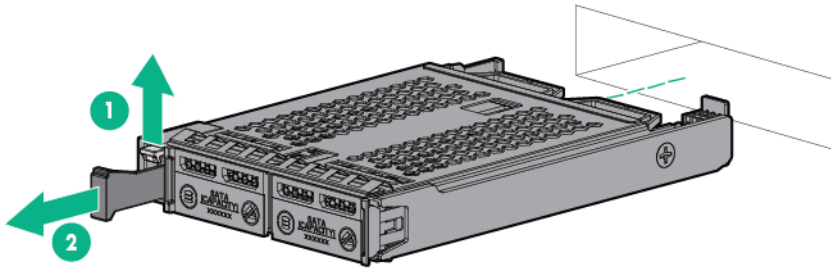
## Removing and replacing a uFF drive

### Procedure

1. Back up all server data.
2. Observe the LED status of the drive and determine if it can be removed.
3. Remove the drive.



To remove the drive carrier:



To replace the component, reverse the removal procedure.

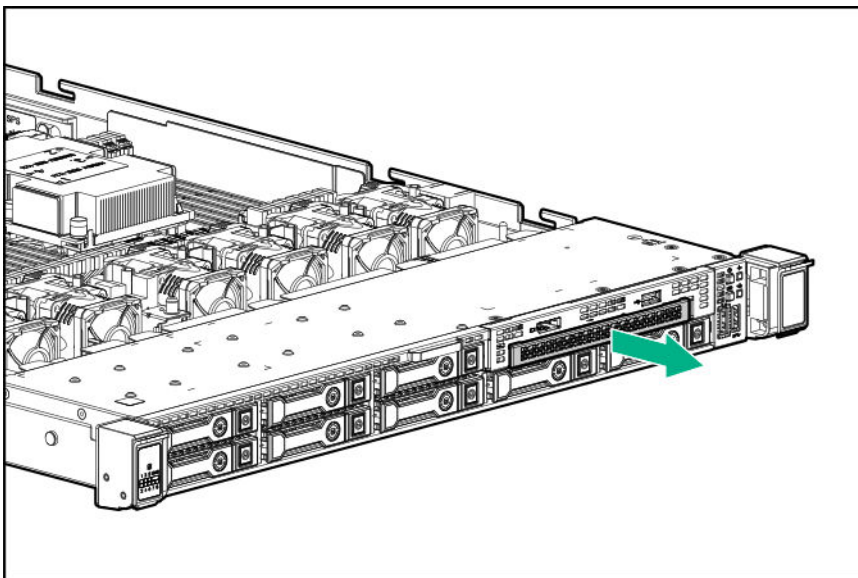
## Installing an 8 SFF optical drive

### Prerequisites

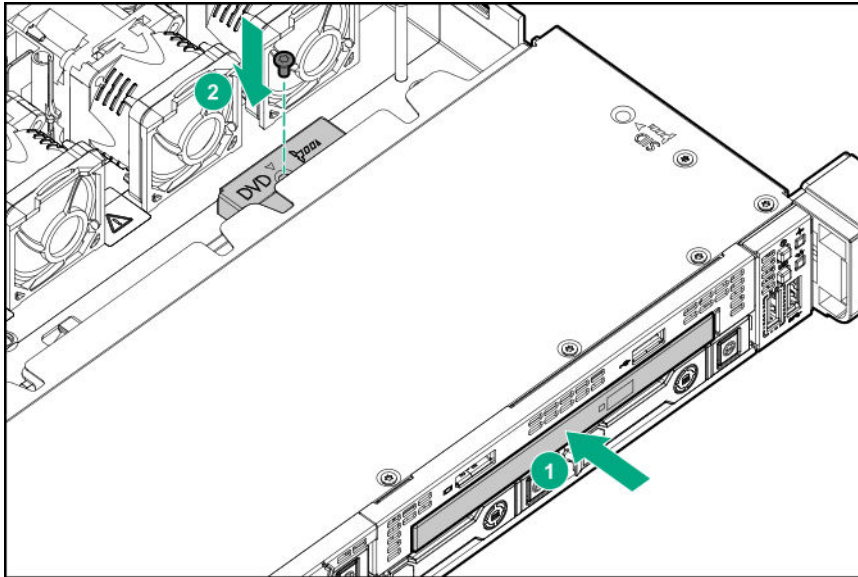
Before installing an optical drive, be sure the 8 SFF display port/USB/optical blank option is installed. For more information, see [Installing an 8 SFF display port/USB/optical blank option](#) on page 71.

### Procedure

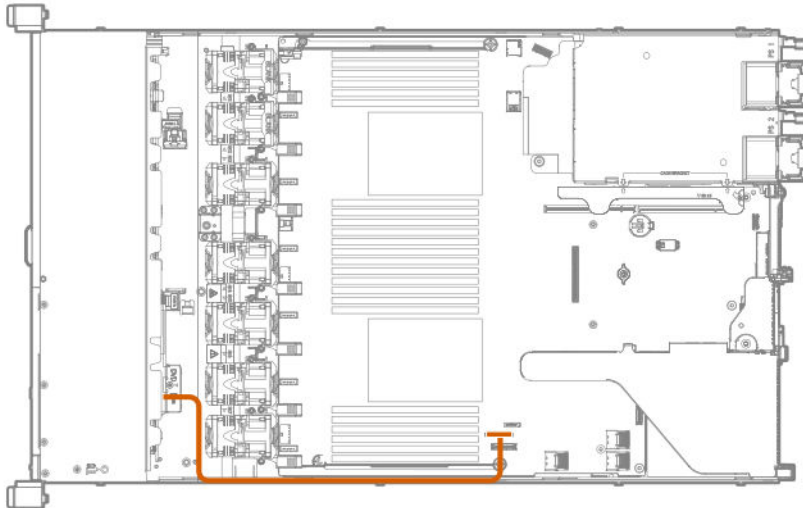
1. Remove the optical drive blank.



2. Install the optical drive.



3. Connect the optical drive cable.



## Universal media bay options

### Installing a 2 SFF SAS/SATA drive cage

#### Prerequisites

Universal media bay options are compatible only with the 8 SFF chassis.

Hewlett Packard Enterprise recommends installing the P816i-a controller to support 10 SAS/SATA drives. For more information, see **Installing an HPE Smart Array P816i-a SR Gen10 Controller option** on page 102.

Additional controller options are available. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

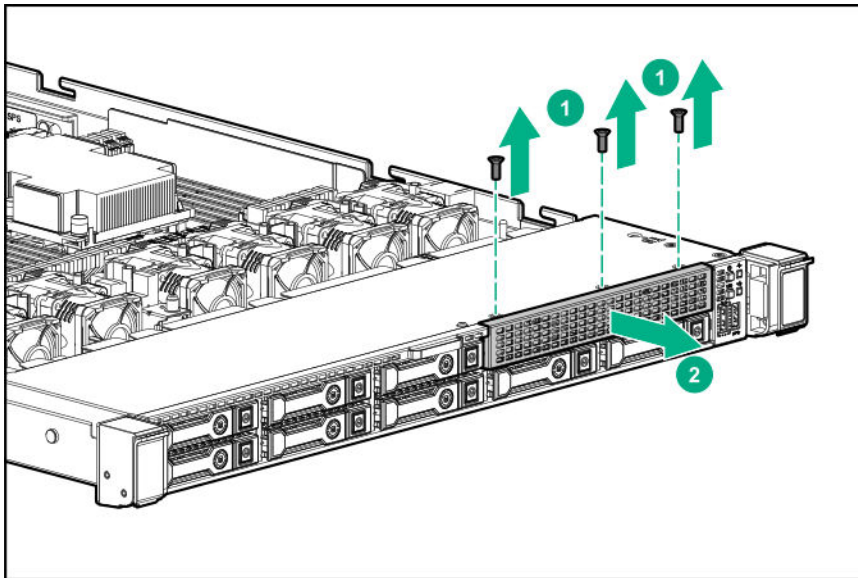
In addition, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- Additional cables, as needed. For more information, see **SFF cables** on page 136.
- 2 SFF SAS or SATA drives or blanks

For more information, contact a Hewlett Packard Enterprise authorized reseller.

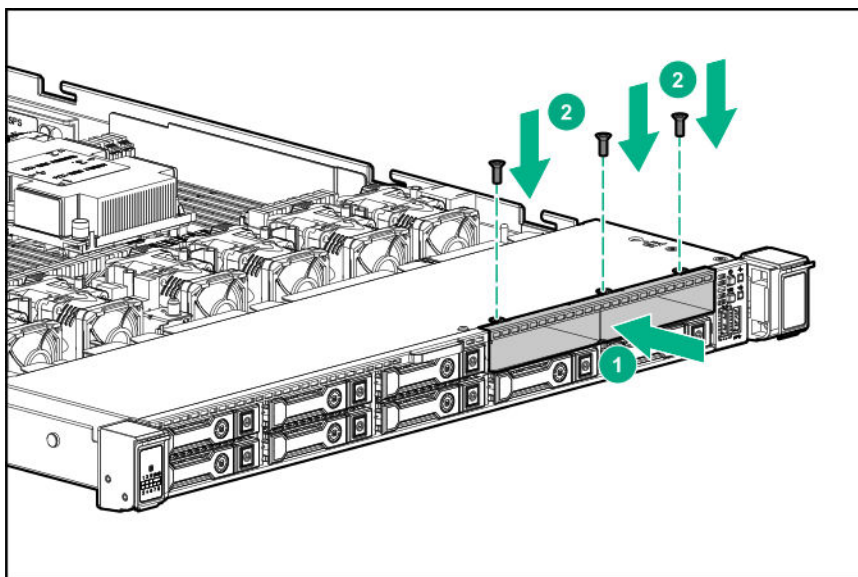
### Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the universal media bay blank.



7. Install the 2 SFF SAS/SATA drive cage.





8. Observe the following:

---

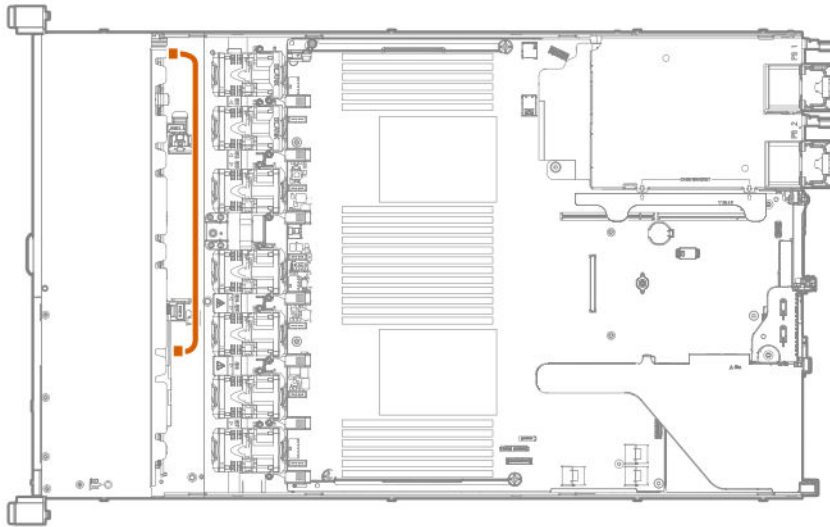
**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

---

9. Route and connect the data cable.



10. Route and connect the power cable.



11. Install the access panel (**Installing the access panel** on page 31).
12. Install the server in the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (**Power up the server** on page 30).
16. Install drives.

## Installing a 2 SFF NVMe drive cage option

### Prerequisites

Before installing this option, be sure that you have the following:

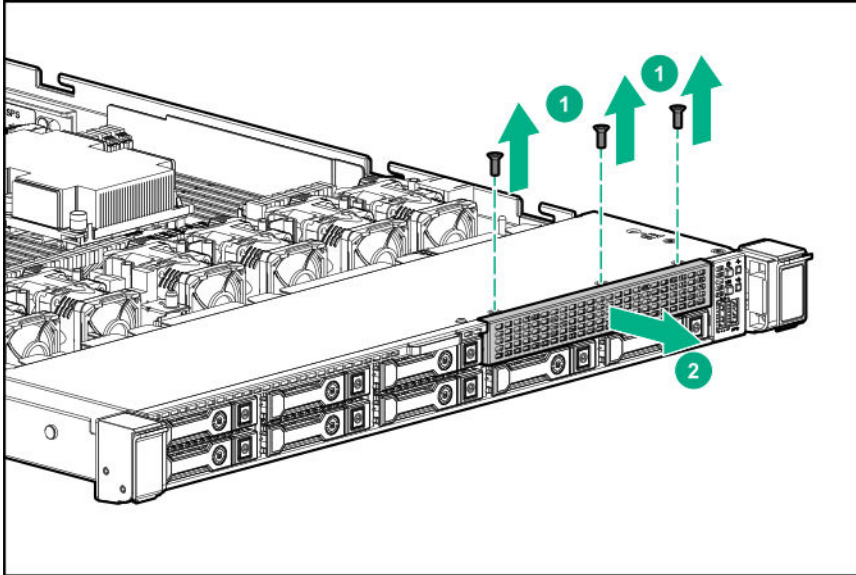
- The components included with the hardware option kit
- T-10 Torx screwdriver
- T-15 Torx screwdriver
- Additional cables, as needed. For more information, see **SFF cables** on page 136.
- NVMe drives

For more information, contact a Hewlett Packard Enterprise authorized reseller.

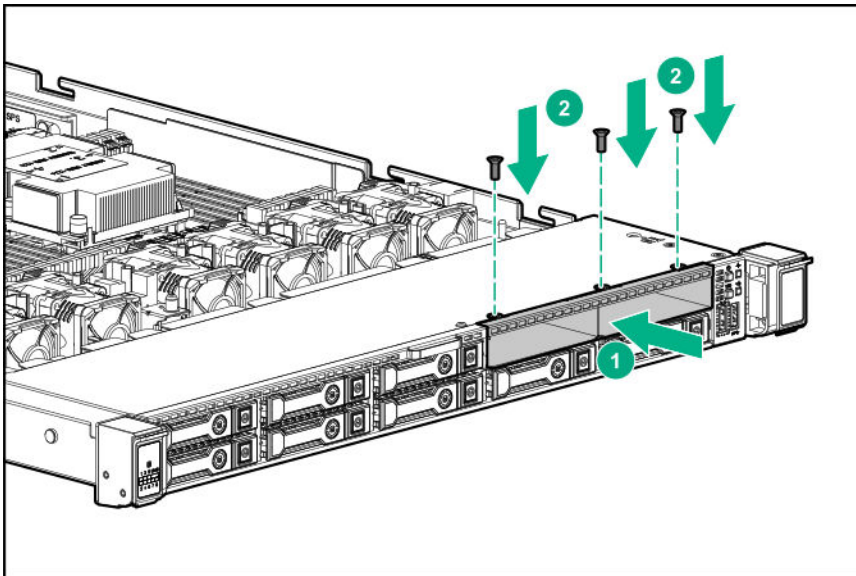
### Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.

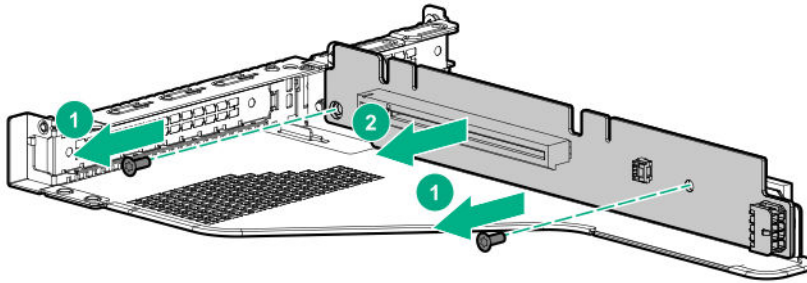
4. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Use a T-10 Torx screwdriver to remove the universal media bay blank.



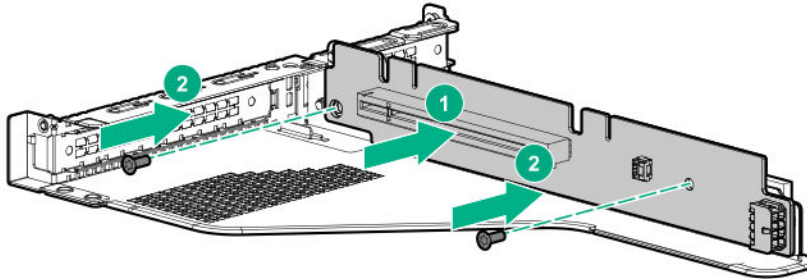
7. Use a T-10 Torx screwdriver to install the 2 SFF NVMe drive cage.



8. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
9. Use a T-15 Torx screwdriver to remove the existing riser board.



10. Use a T-15 Torx screwdriver to install the riser provided in the kit in the primary PCI riser cage.



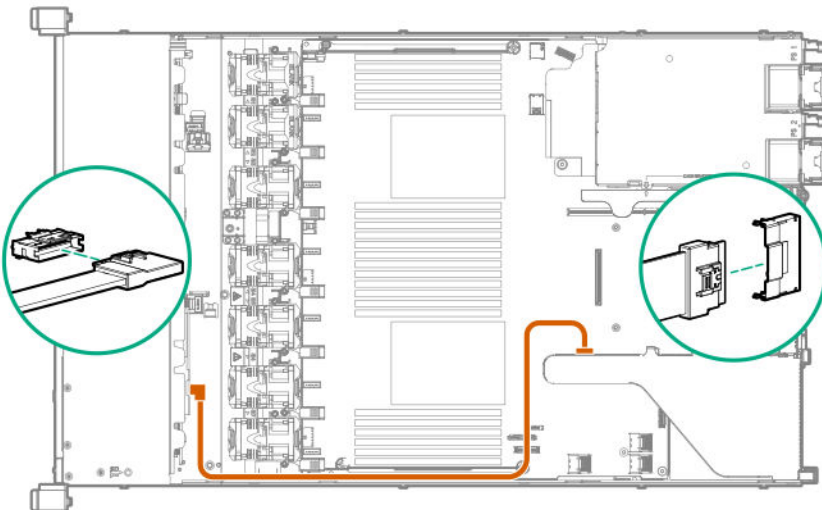
11. Observe the following:

---

**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

---

12. Route and connect the data cable.



13. Install the primary PCI riser cage.
14. Install the access panel (**Installing the access panel** on page 31).
15. Install the server in the rack.
16. Connect each power cord to the server.

17. Connect each power cord to the power source.
18. Power up the server (**Power up the server** on page 30).
19. Install drives.

## Installing a 2 SFF HPE Smart Carrier M.2 (SCM) drive cage

### Prerequisites

Hewlett Packard Enterprise recommends **installing the P816i-a controller** to support more than eight SAS/SATA drives. Additional controller options are available. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

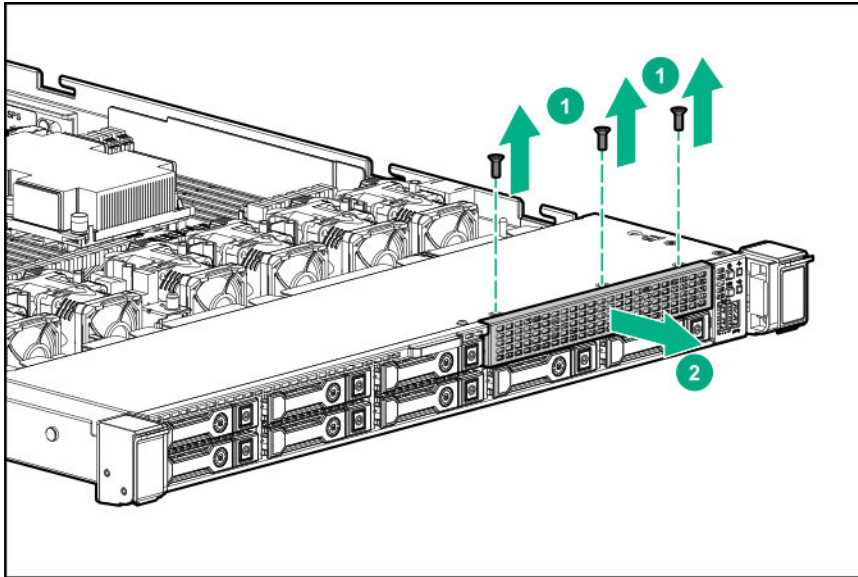
Before installing this option, be sure you that have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- Additional cables, as needed. For more information, see **SFF cables** on page 136.
- 2 SFF SAS/SATA drives, 4 uFF M.2 drives, or blanks

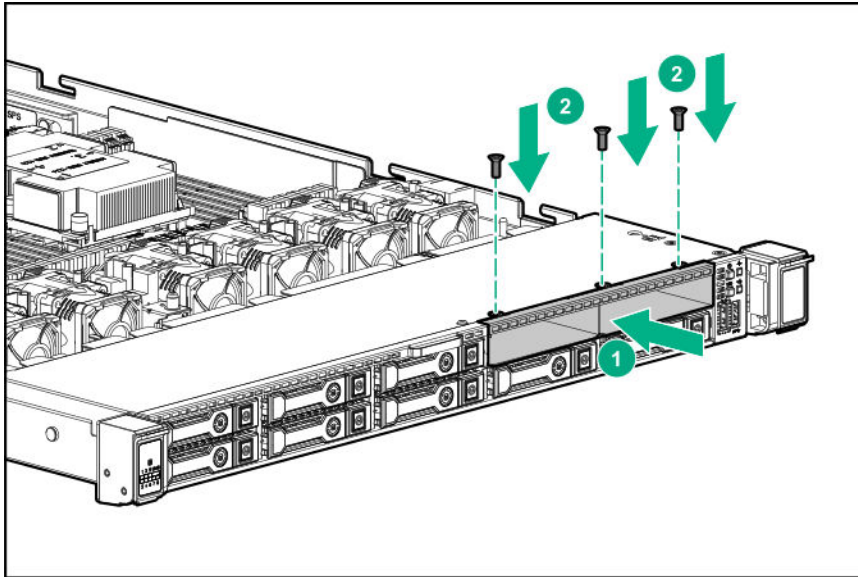
For more information, contact a Hewlett Packard Enterprise authorized reseller.

### Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the universal media bay blank.



7. Install the drive cage.



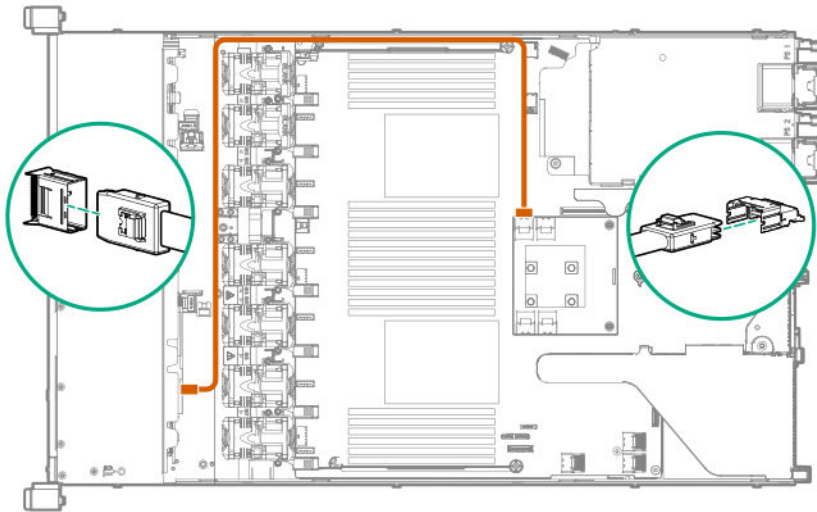
8. Observe the following:

---

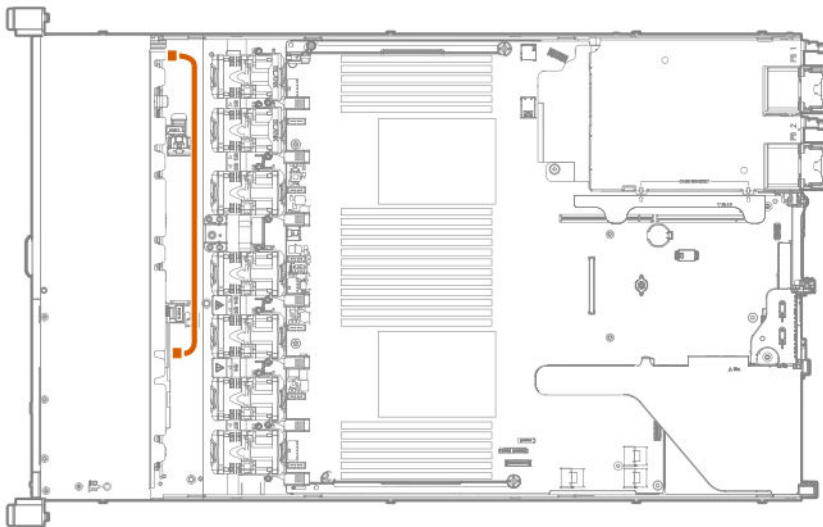
**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

---

9. Route and connect the data cable.



10. Route and connect the power cable.



11. Install the access panel (**Installing the access panel** on page 31).
12. Install the server in the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (**Power up the server** on page 30).
16. Install drives.

## Installing an 8 SFF display port/USB/optical blank option

### Prerequisites

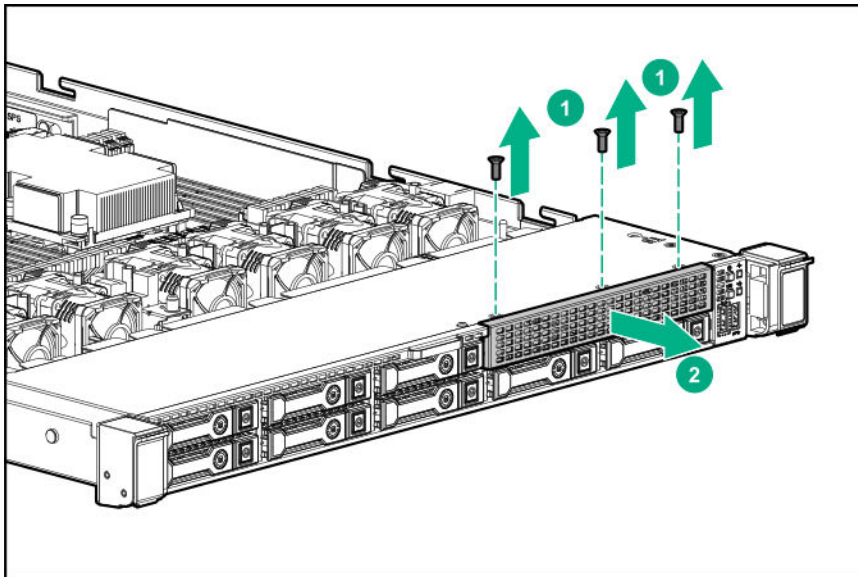
Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- An optical drive, if installing

For more information, contact a Hewlett Packard Enterprise authorized reseller.

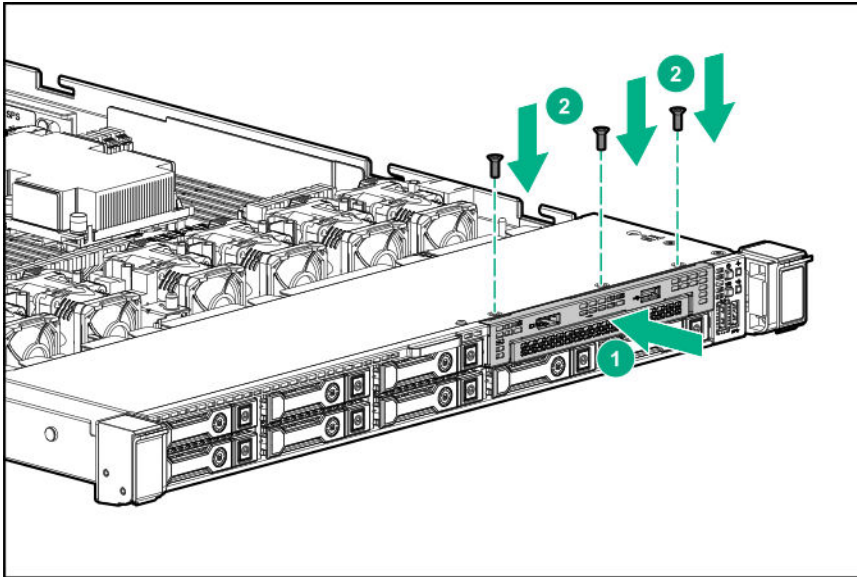
### Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the universal media bay blank.

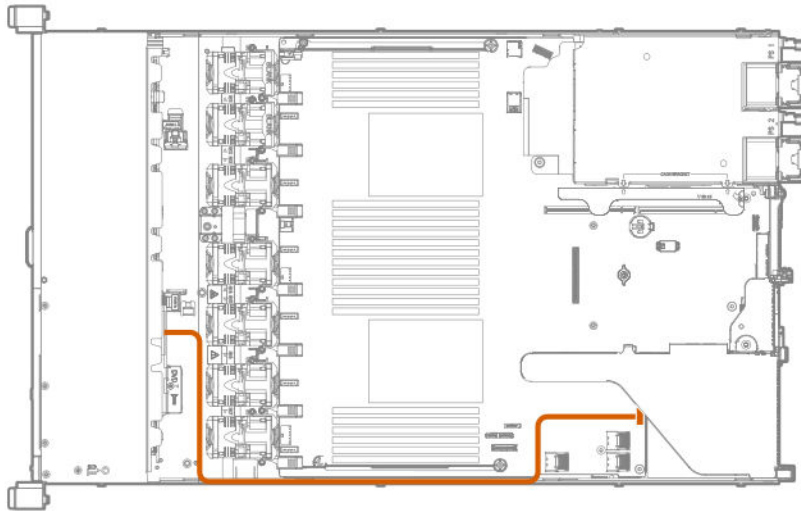


7. Install the 8 SFF display port/USB/optical blank option.





8. Route and connect the data cable.



9. If needed, install an optical drive ([Installing an 8 SFF optical drive](#) on page 62).
10. Install the access panel ([Installing the access panel](#) on page 31).
11. Install the server in the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server ([Power up the server](#) on page 30).

## Installing the 4 LFF optical drive option

### Prerequisites

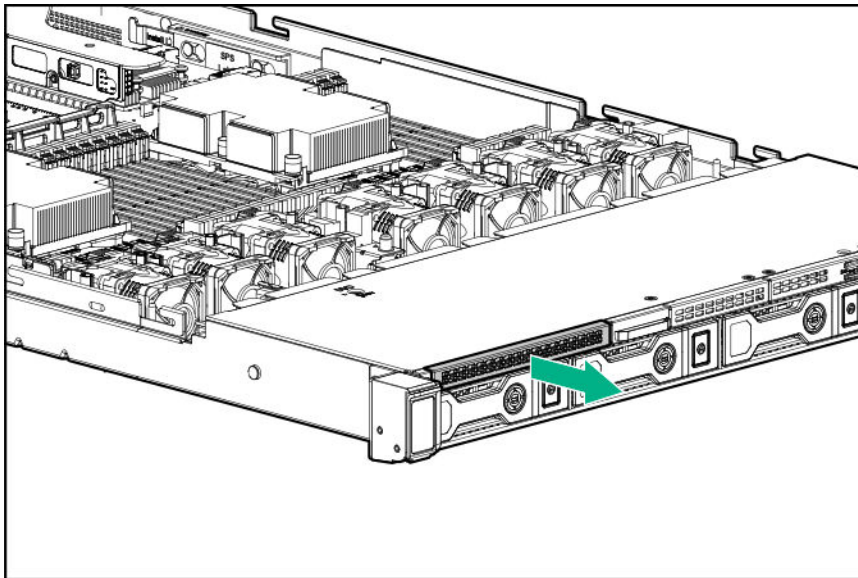
Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- LFF optical cable option kit
- An optical drive

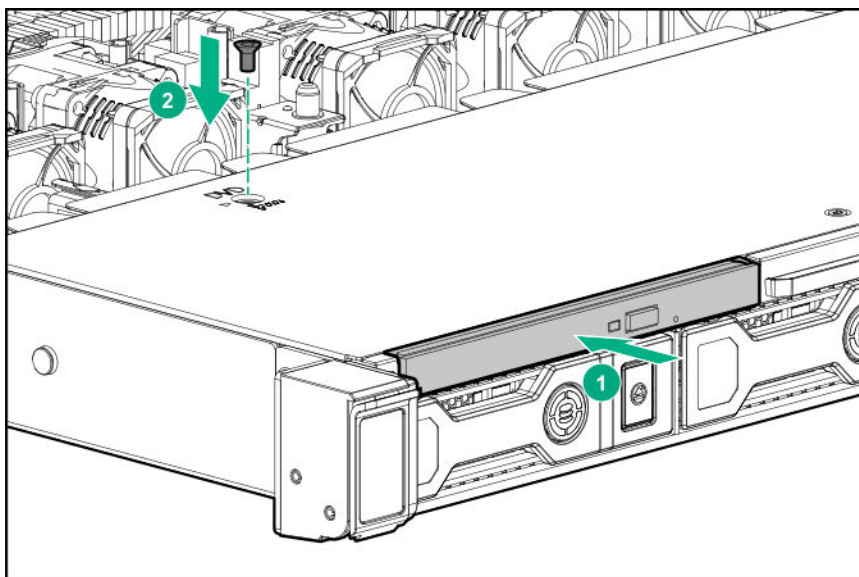
For more information, contact a Hewlett Packard Enterprise authorized reseller.

### Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the LFF optical drive bay blank.



7. Install the optical drive.



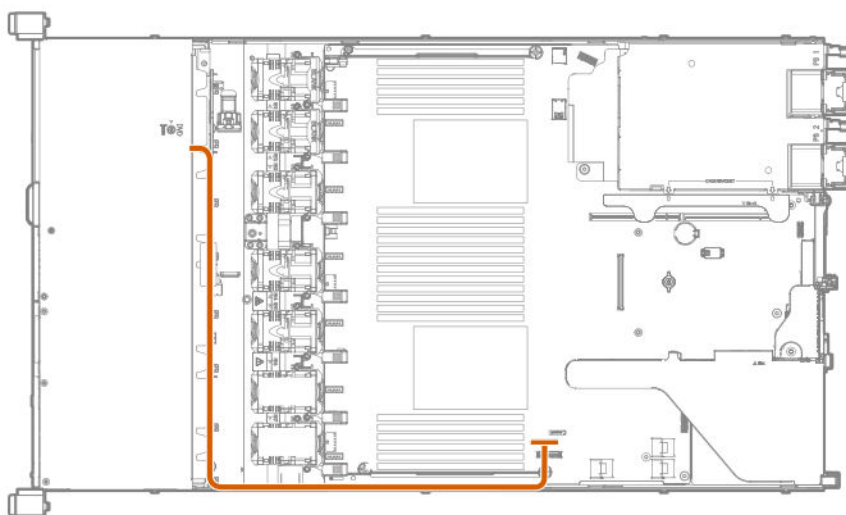
8. Observe the following:

---

**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

---

9. Connect the optical drive cable to the optical drive backplane and to the SATA optical/storage drive connector.



10. Install the access panel (**Installing the access panel** on page 31).
11. Install the server in the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server (**Power up the server** on page 30).

# Installing the rear drive riser cage option

The rear drive riser cage option supports low-profile PCI riser options in slot 2.

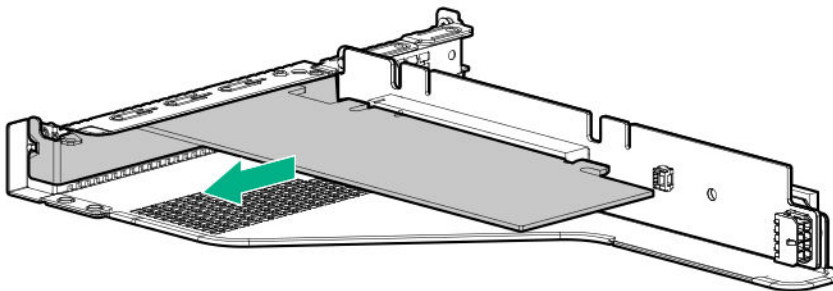
## Prerequisites

Before installing this option, be sure you have the following:

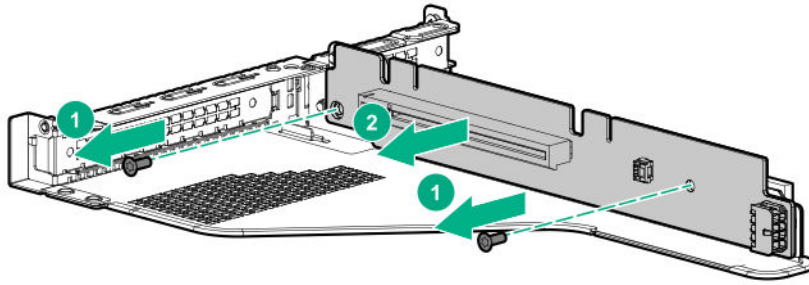
- The components included with the hardware option kit
- T-10 and T-15 Torx screwdriver
- 1 SFF drive, 2 uFF M.2 drives, or blanks

## Procedure

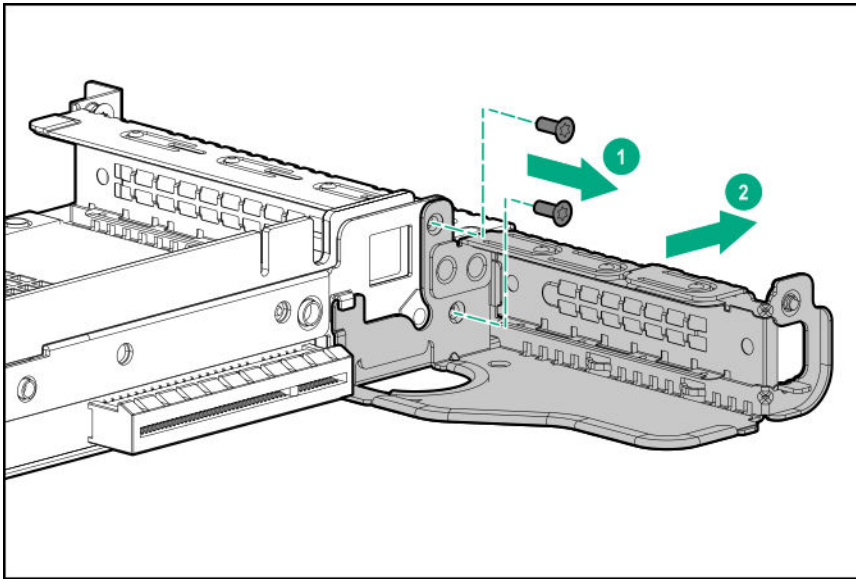
1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
6. If installed, remove any expansion boards installed in the riser board.



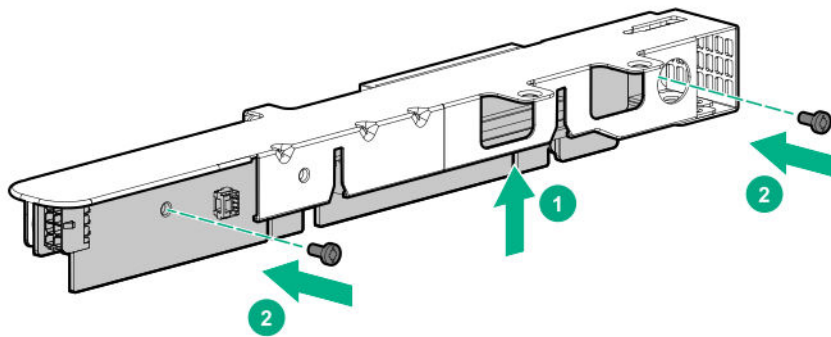
7. Remove the riser board. Set aside for later use.



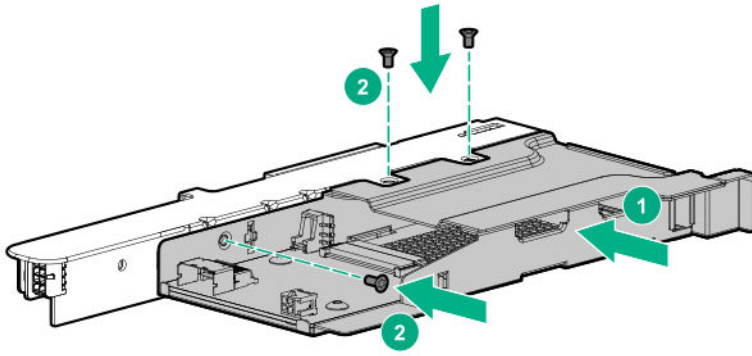
8. If installed, remove the slot 2 bracket from the primary riser cage.



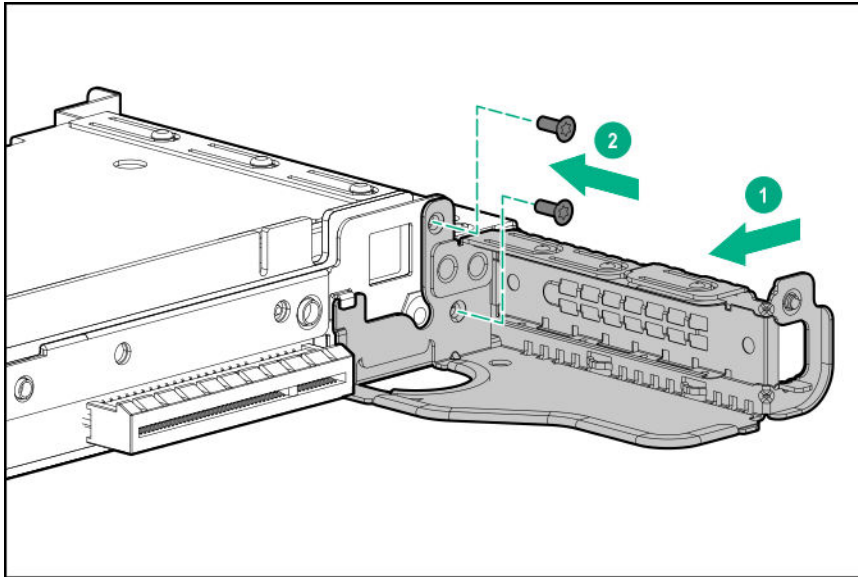
9. If needed, install the riser board removed in step 7 on the rear drive riser cage bracket.



10. Install the drive cage on the riser cage.

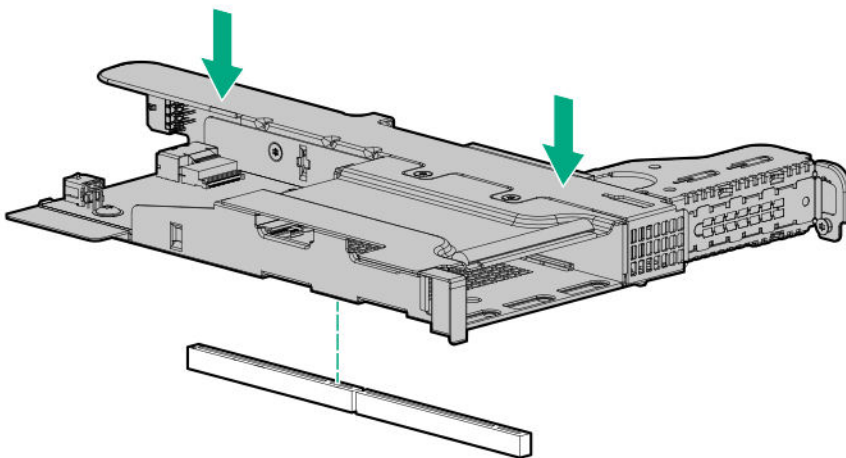


11. If needed, install the riser cage bracket on the rear drive riser cage.



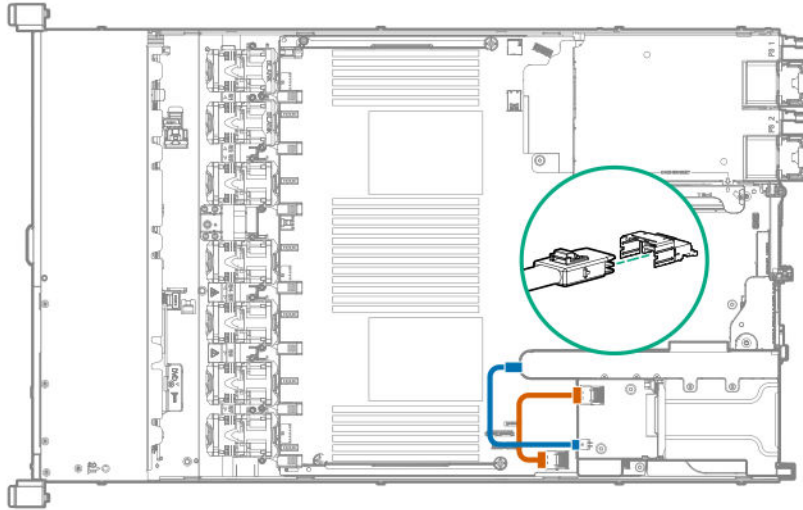
12. If needed, install an expansion board (**Installing an expansion board in the primary riser cage** on page 83).

13. Install the rear drive riser cage in the primary riser cage position.



14. Route and connect the data and power cables.

Hewlett Packard Enterprise recommends using embedded SATA solutions when connecting the cable. Other options exist. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).



15. Install drives or blanks (**Drive options** on page 56).
16. Install the access panel (**Installing the access panel** on page 31).
17. Install the server in the rack.
18. Power up the server (**Power up the server** on page 30).
19. Connect each power cord to the server.
20. Connect each power cord to the power source.

## Primary PCI riser cage options

The primary PCI riser cage supports the following:

- Slot 1: Full-height, 3/4-length expansion boards (up to 9.5")
- Slot 2:
  - Half-length, half-height expansion boards
  - 3/4-length expansion boards when either a low-profile type -a controller or no controller is installed.

## Installing an optional primary PCI riser board

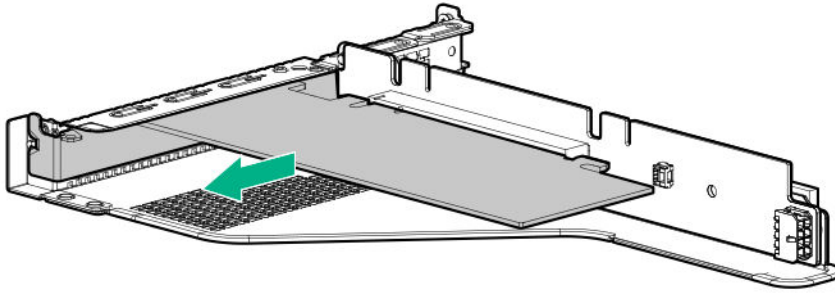
### Prerequisites

Before installing this option, be sure you have the following:

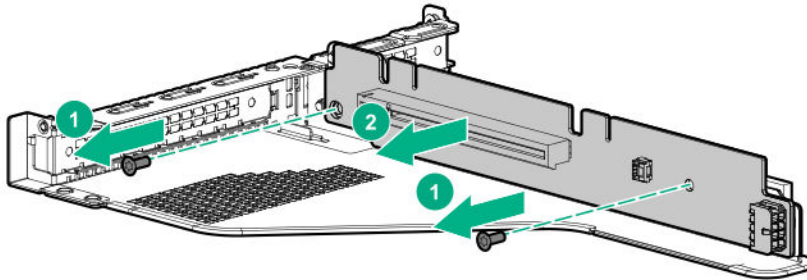
- The components included with the hardware option kit
- T-15 Torx screwdriver

## Procedure

1. Back up all server data.
2. Power down the server (**Powering down the server** on page 30).
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:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
7. If needed, remove any expansion boards installed in the riser cage.

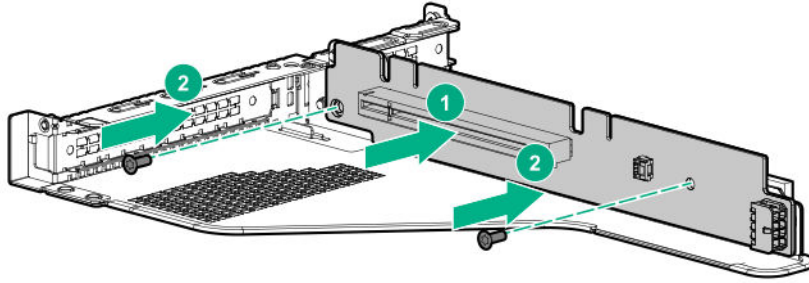


8. Remove the existing riser board from the PCI riser cage.



9. Install the optional riser board in the riser cage.





10. Install the following, as needed:
  - Expansion boards ([Installing an expansion board in the primary riser cage](#) on page 83)
  - GPU ([Installing an accelerator or GPU in the primary riser cage](#) on page 85)
  - Controllers ([Controller options](#) on page 96)
11. Install the riser cage ([Install the primary PCI riser cage](#) on page 34).
12. Install the access panel ([Installing the access panel](#) on page 31).
13. Install the server in the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ([Power up the server](#) on page 30).

## Installing the SATA M.2 2280 riser option

### Prerequisites

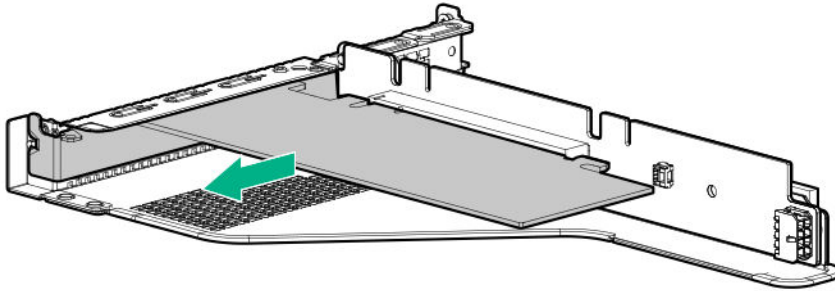
Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- Up to two 2280 form factor M.2 drives
- T-15 Torx screwdriver

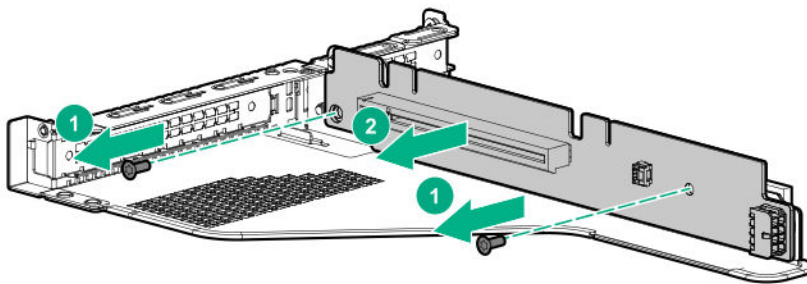
### Procedure

1. Power down the server ([Powering down the server](#) on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack ([Extend the server from the rack](#) on page 30).
  - b. Remove the server from the rack ([Remove the server from the rack](#) on page 31).

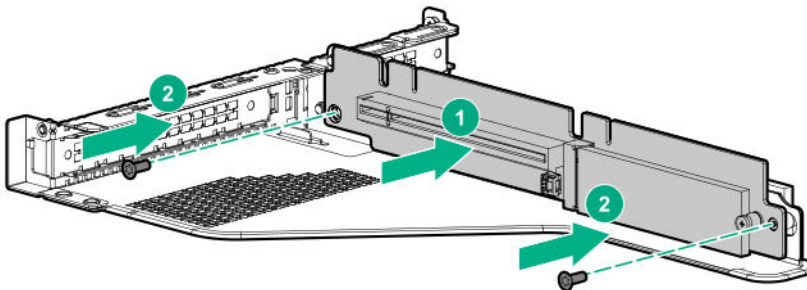
4. Remove the access panel (**Remove the access panel** on page 31).
5. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
6. If needed, remove any expansion boards installed in the riser cage.



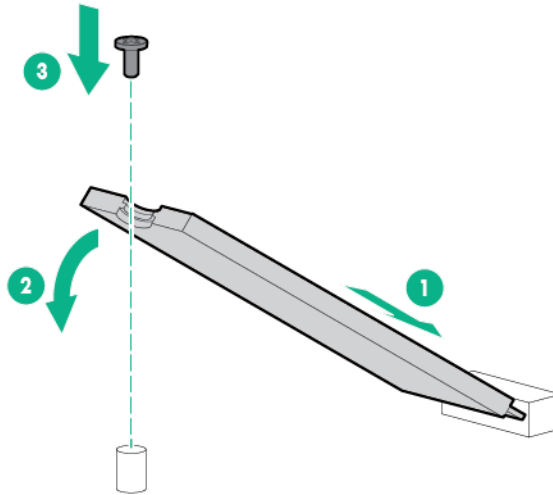
7. Remove the existing riser board from the riser cage.



8. Install the M.2 riser board.



9. Remove the screw securing the standoff on the riser.
10. Install the M.2 drives.



11. Install the following, as needed:
  - Expansion boards ([Installing an expansion board in the primary riser cage](#) on page 83)
  - Controllers ([Controller options](#) on page 96)
12. Install the primary PCI riser cage ([Install the primary PCI riser cage](#) on page 34).
13. Install the access panel ([Installing the access panel](#) on page 31).
14. Install the server in the rack.

## Installing an expansion board in the primary riser cage

### Prerequisites

Before installing this option, be sure you have the following:

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

### Procedure

1. Observe the following alerts:

---

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

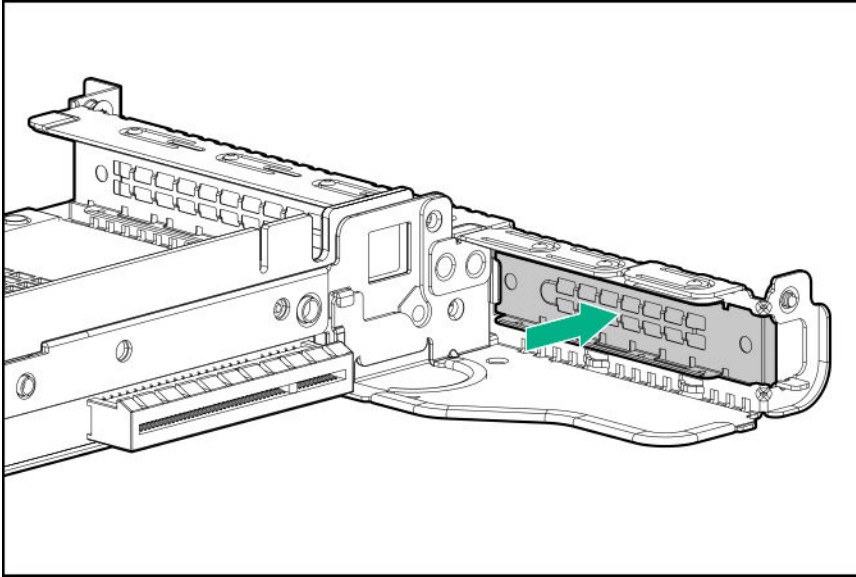
---

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

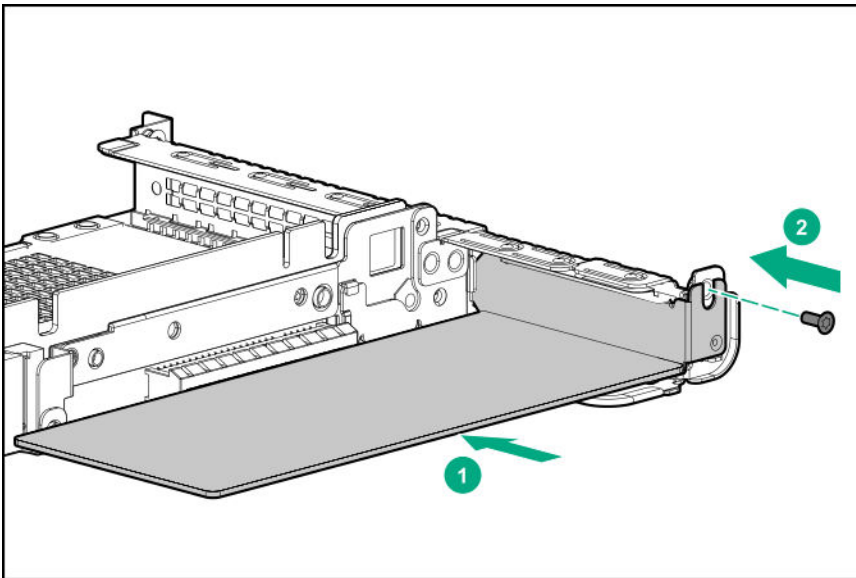
---

2. Back up all server data.
3. Power down the server ([Powering down the server](#) on page 30).
4. Remove all power:

- a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
- a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
8. Remove the expansion slot blank.



9. Use a T-10 Torx screwdriver to Install the expansion board.



10. Connect any required internal or external cables to the expansion board.
11. Install the primary PCI riser cage (**Install the primary PCI riser cage** on page 34).

12. Install the access panel ([Installing the access panel](#) on page 31).
13. Install the server in the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ([Power up the server](#) on page 30).

## Installing an accelerator or GPU in the primary riser cage

Use these instructions to install accelerator options, including GPUs, in the server.

### Prerequisites

This option requires the standard primary PCI riser cage.

Before installing this option, be sure that the power supplies support the installation of this option. For more information, see the [Hewlett Packard Enterprise Configurator website](#).

In addition, be sure that you have the following items:

- The components included with the hardware option kit
- HPE DL360 Gen10 CPU1 Cable Kit (If installing a high-powered GPU kit)

### Procedure

1. Observe the following alerts:



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

---

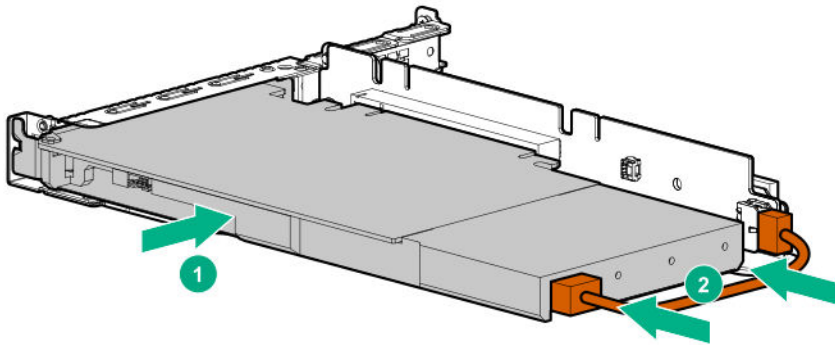


**CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

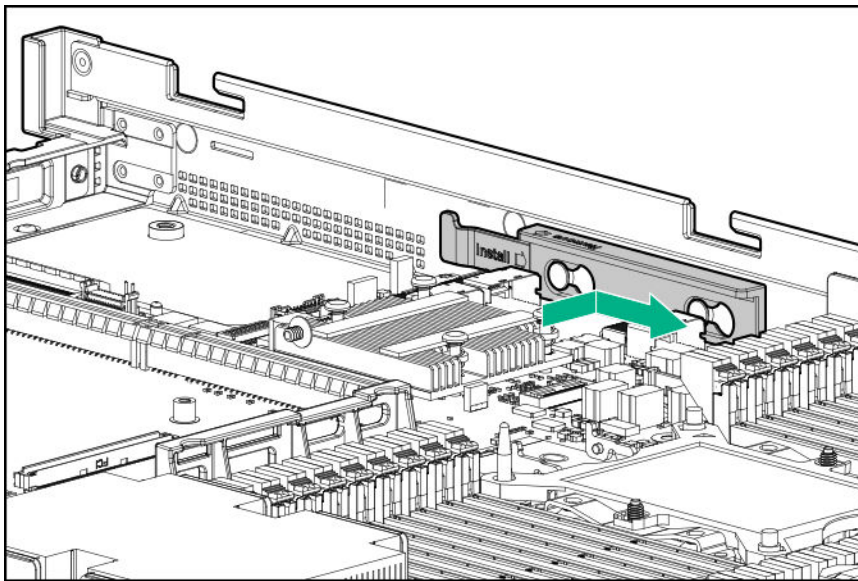
---

2. Back up all server data.
3. Power down the server ([Powering down the server](#) on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack ([Extend the server from the rack](#) on page 30).
  - b. Remove the server from the rack ([Remove the server from the rack](#) on page 31).
6. Remove the access panel ([Remove the access panel](#) on page 31).
7. Remove the primary PCI riser cage ([Removing the primary PCI riser cage](#) on page 33).
8. Install the card in the x16 slot in the primary PCI riser cage position.

9. If installing a GPU requiring greater than 75 W, connect the power cable to the primary riser power connector.



10. If the card requires rear support, install the GPU support bracket.



11. Install the riser cage ([Install the primary PCI riser cage](#) on page 34).
12. Install the access panel ([Installing the access panel](#) on page 31).
13. Install the server in the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ([Power up the server](#) on page 30).

## Secondary PCI riser options

### Installing a secondary full-height PCI riser cage option

When installed, this riser cage supports full-height, 3/4-length expansion boards up to 9.5". PCIe3 slot 2 is no longer available.

## Prerequisites

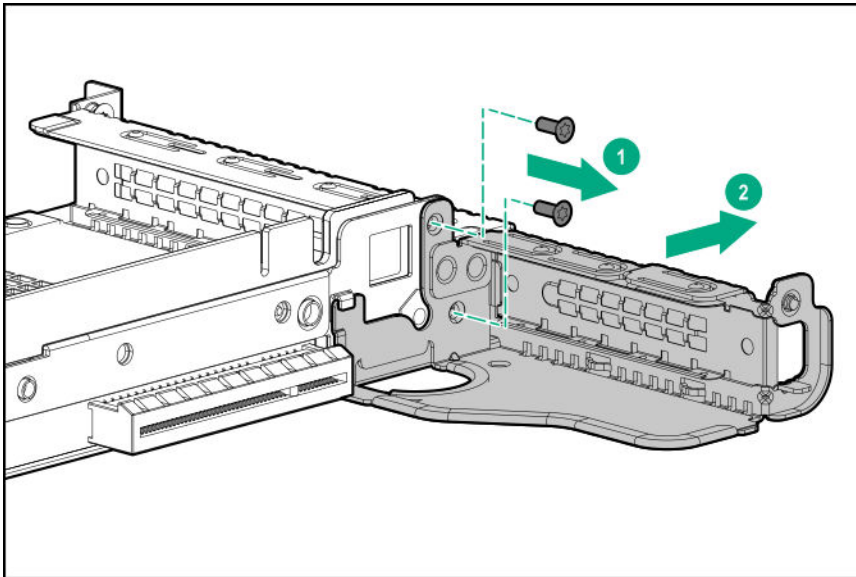
This option requires a dual processor configuration.

Before installing this option, be sure you have the following:

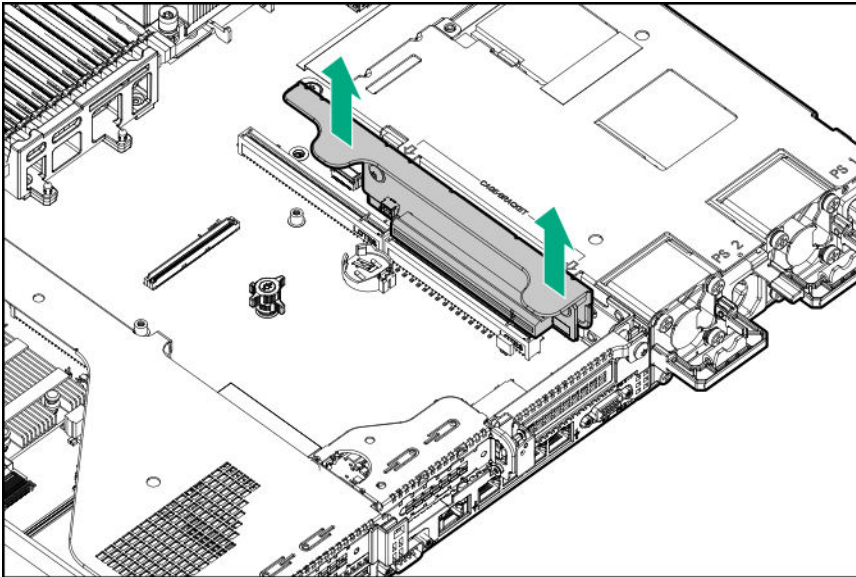
- The components included with the hardware option kit
- Any expansion boards or controllers you plan to install
- T-10 Torx screwdriver
- T-15 Torx screwdriver

## Procedure

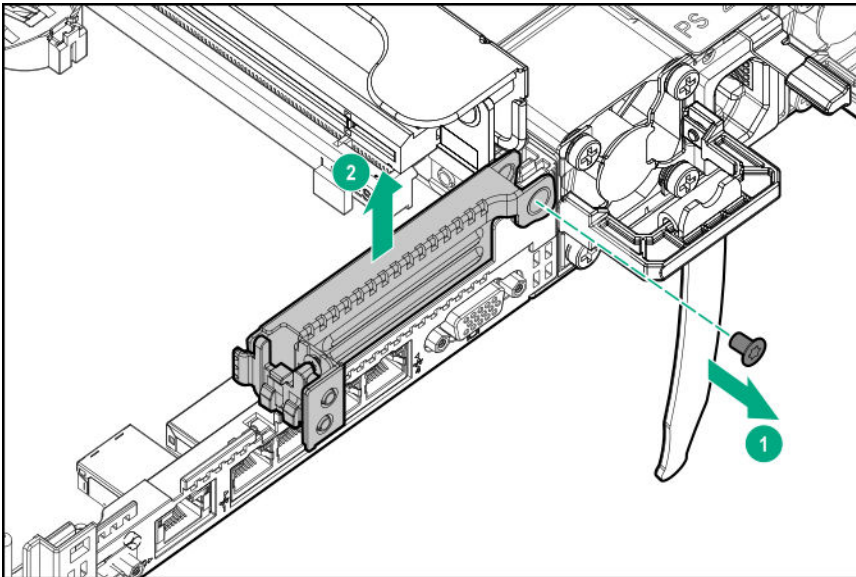
1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Remove the primary PCI riser cage (**Removing the primary PCI riser cage** on page 33).
6. Use a T-10 Torx screwdriver to remove the slot 2 bracket from the primary riser cage.



7. If installed, remove the low-profile riser cage.

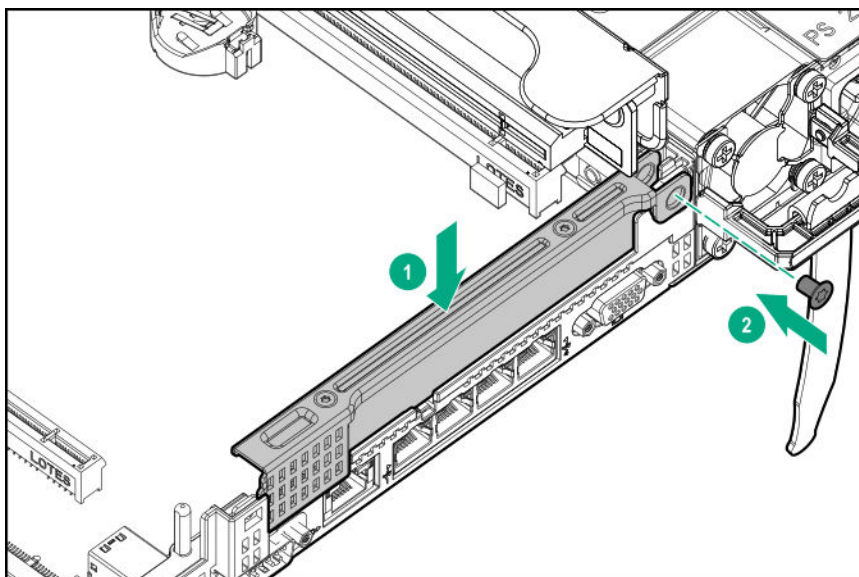


8. Lift and remove the secondary riser cage latch.  
Use a T-15 Torx screwdriver to remove the riser cage screw.

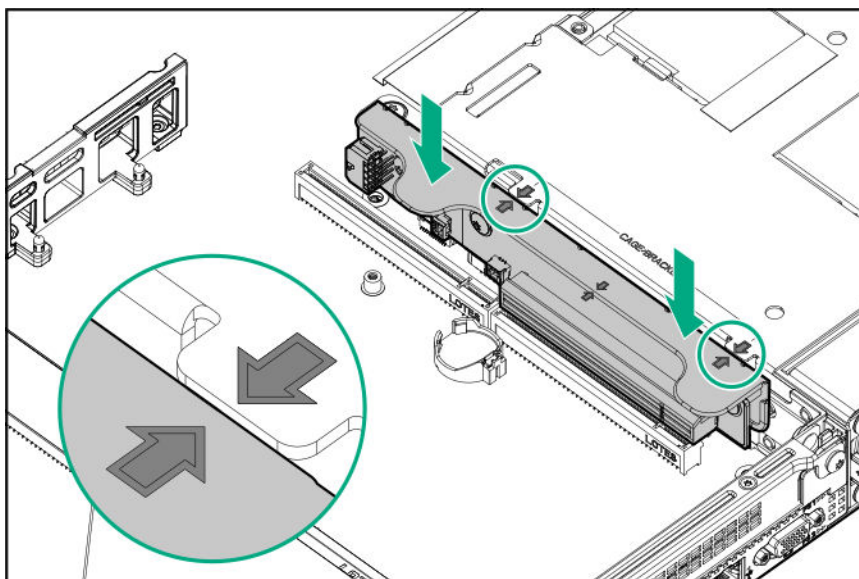


9. Install the full height PCIe x16 riser cage latch.  
Use a T-15 Torx screwdriver to remove the riser cage screw.





10. Install the riser cage.



11. Install one of the following, as needed:

- Expansion boards (**Installing an expansion board in the secondary riser cage** on page 91)
- GPU (**Installing an accelerator or GPU in the secondary riser cage** on page 94)
- Controllers (**Controller options** on page 96)

12. Install the access panel (**Installing the access panel** on page 31).

13. Install the server in the rack.

14. Connect each power cord to the server.

15. Connect each power cord to the power source.

16. Power up the server (**Power up the server** on page 30).

## Installing a secondary low-profile PCIe slot riser cage option

When installed, this riser cage provides an additional low profile slot and supports half-length/half-height expansion boards.

### Prerequisites

This option requires a dual processor configuration.

Before installing this option, be sure that you have the following:

The components included with the hardware option kit

### Procedure

1. Observe the following alerts:



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

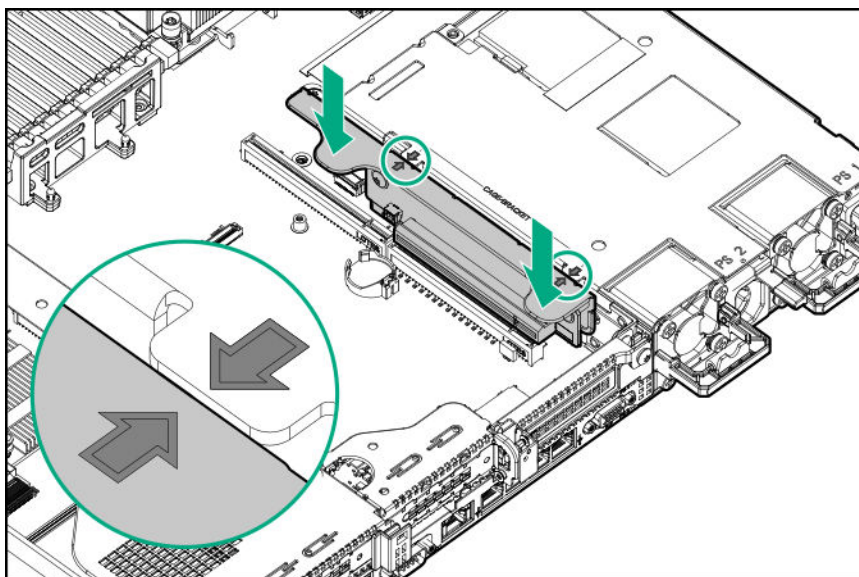
---



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

---

2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Install the secondary low-profile PCIe slot riser cage.



8. Install one of the following, as needed:
  - Expansion boards ([Installing an expansion board in the secondary riser cage](#) on page 91)
  - Controllers ([Controller options](#) on page 96)
9. Install the access panel ([Installing the access panel](#) on page 31).
10. Install the server into the rack ([Installing the server into the rack](#) on page 43).
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ([Power up the server](#) on page 30).

## Installing an expansion board in the secondary riser cage

### Prerequisites

Before installing this option, be sure that you have the following:

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

### Procedure

1. Observe the following alerts:

---

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

---

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

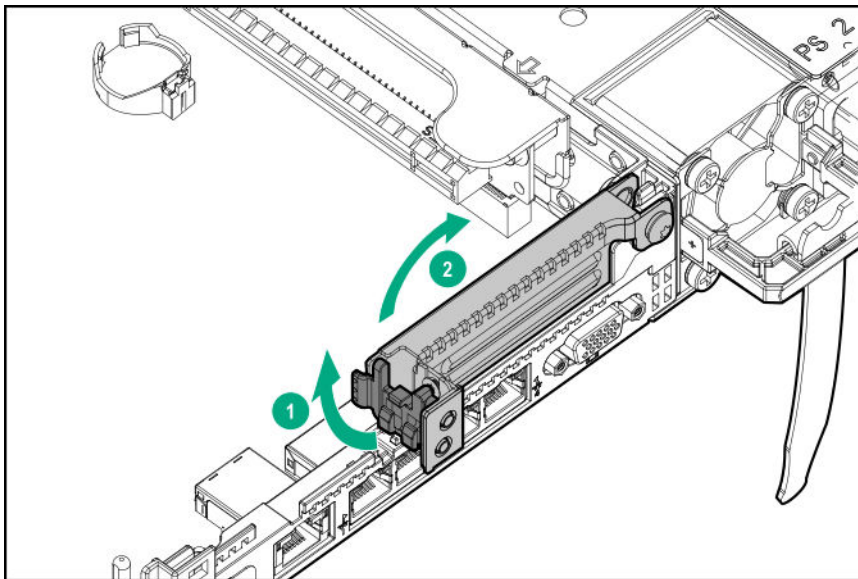
---

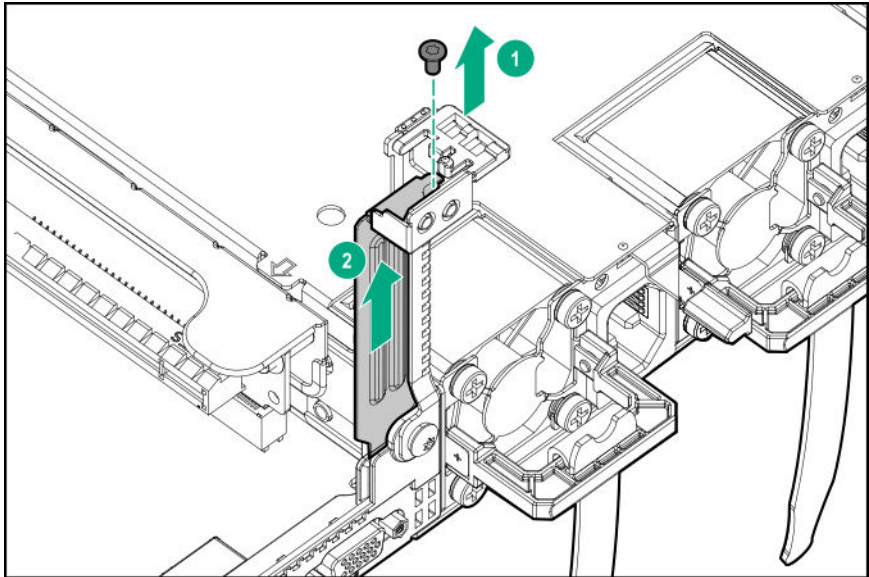
2. Back up all server data.

3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Install a secondary riser cage:
  - Low-profile (**Installing a secondary low-profile PCIe slot riser cage option** on page 90)
  - Full-height (**Installing a secondary full-height PCI riser cage option** on page 86)
8. Remove the expansion slot blank:

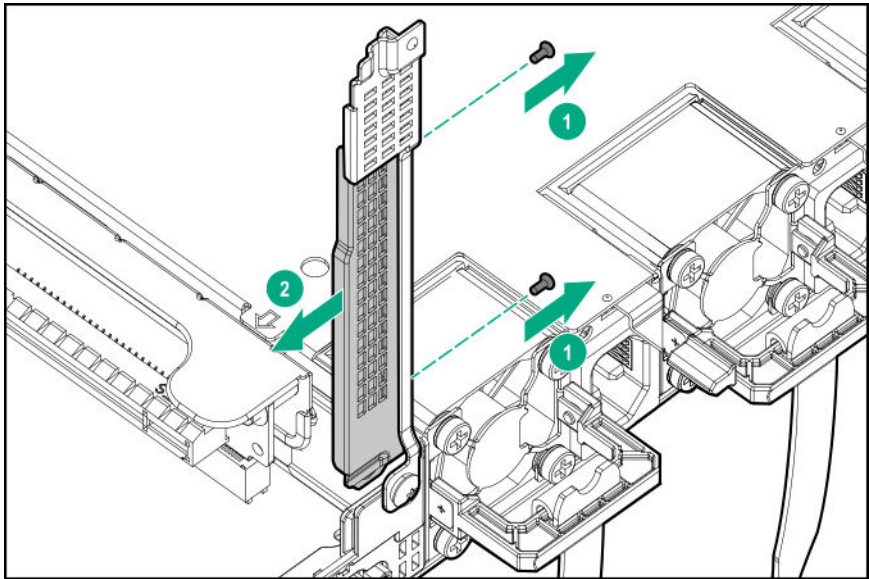
A T-10 Torx screwdriver is required to remove the expansion slot blank.

  - Half-length

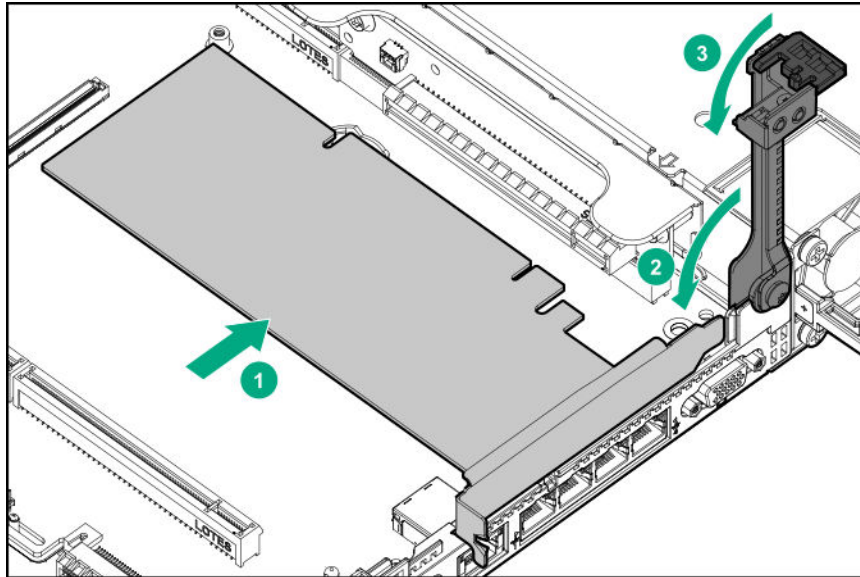




- Full-length



9. Install the expansion board.



10. Connect any required internal or external cables to the expansion board.
11. Install the access panel (**Installing the access panel** on page 31).
12. Install the server in the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server (**Power up the server** on page 30).

## Installing an accelerator or GPU in the secondary riser cage

Use these instructions to install accelerator options, including GPUs, in the server.

### Prerequisites

When installing a 3/4-length GPU, a low profile type -a controller must be installed.

Before installing this option, do the following:

- Be sure that the power supplies support the installation of this option. For more information, see the **Hewlett Packard Enterprise Configurator website**.
- Be sure that you have the following items:
  - The components included with the GPU enablement option kit
  - T-15 Torx screwdriver

### Procedure

1. Observe the following alerts:



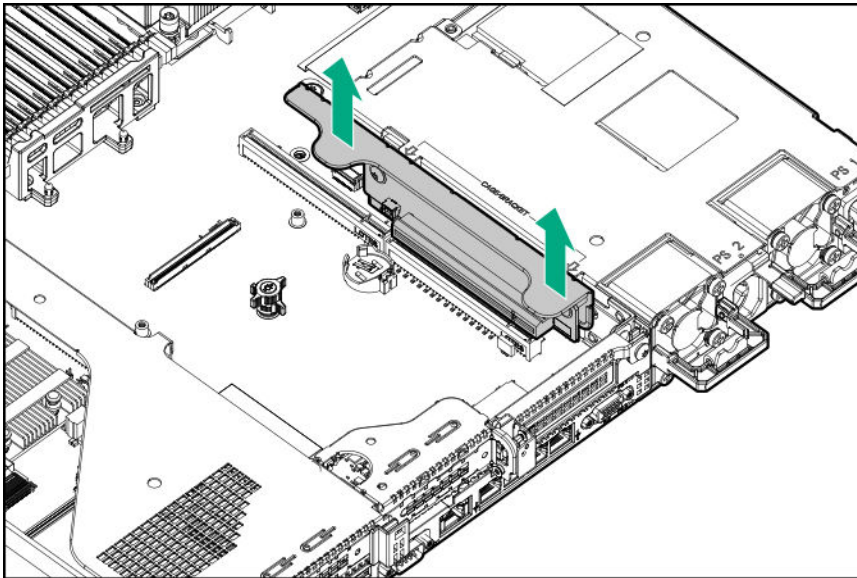
**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

---

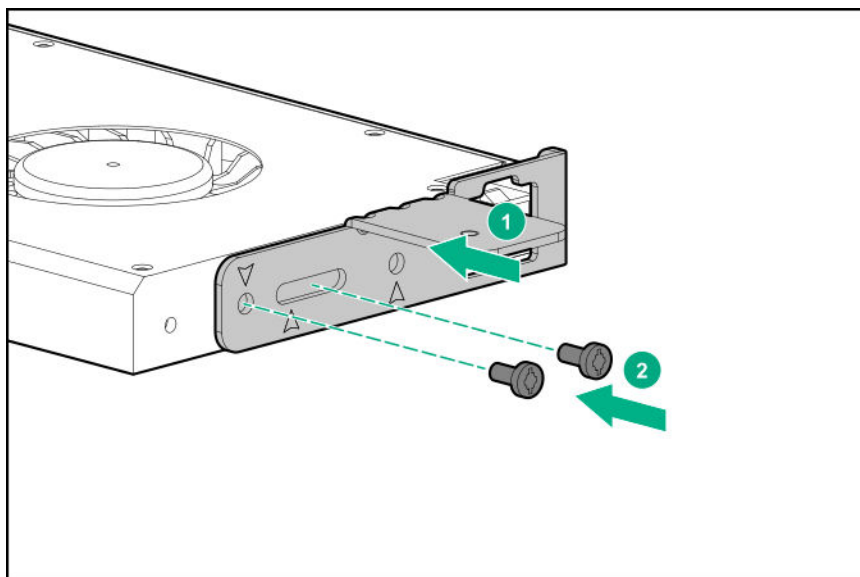
**⚠ CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

---

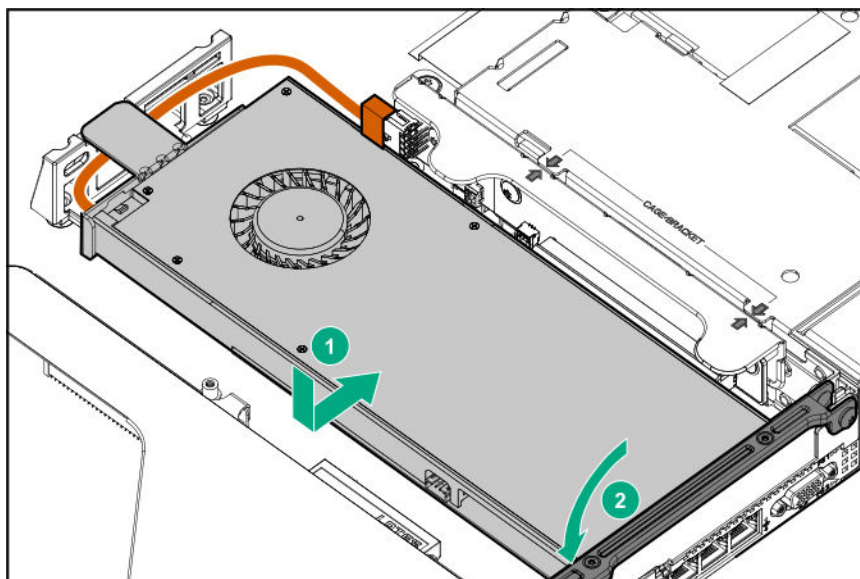
2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. If installed, remove the low profile riser cage.



8. Install the secondary full-height PCI riser cage (**Installing a secondary full-height PCI riser cage option** on page 86).
9. Remove the existing rear guide bracket from the card, if installed.
10. If installing a 3/4-length GPU, install the bracket supplied in the kit.  
A T-15 Torx screwdriver is required to install the bracket.



11. Install the card in the riser cage, and then connect any required cables, if applicable.
12. If installing a GPU requiring greater than 75 W, connect the power cable to the primary riser power connector.



13. Install the access panel (**Installing the access panel** on page 31).
14. Install the server in the rack.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server (**Power up the server** on page 30).

## Controller options

For more information on controllers, see the following information:



- The controller data sheet on the Hewlett Packard Enterprise website (<https://www.hpe.com/h20195/V2/Getdocument.aspx?docname=a00017196enw>)
- The controller QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

## Installing an HPE Smart Array P408i-a SR Gen10 Controller option

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-15 Torx screwdriver

### Procedure

1. Observe the following alerts:



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

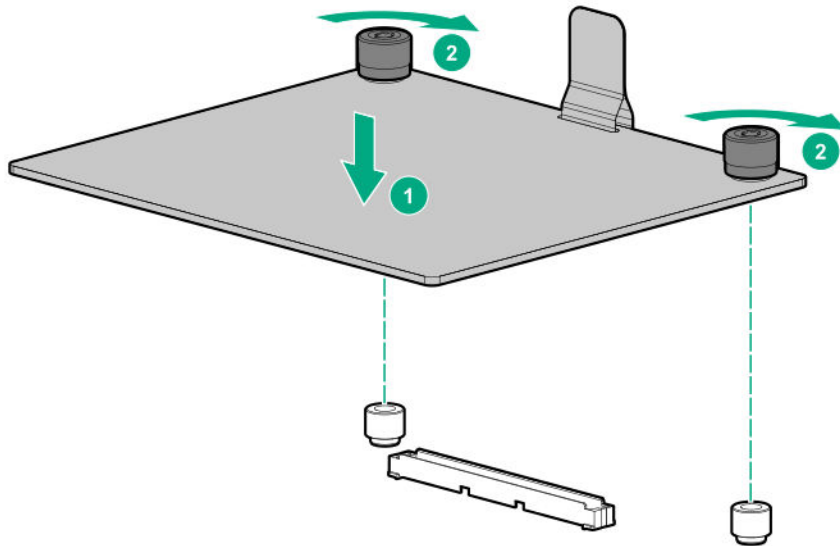
---



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

---

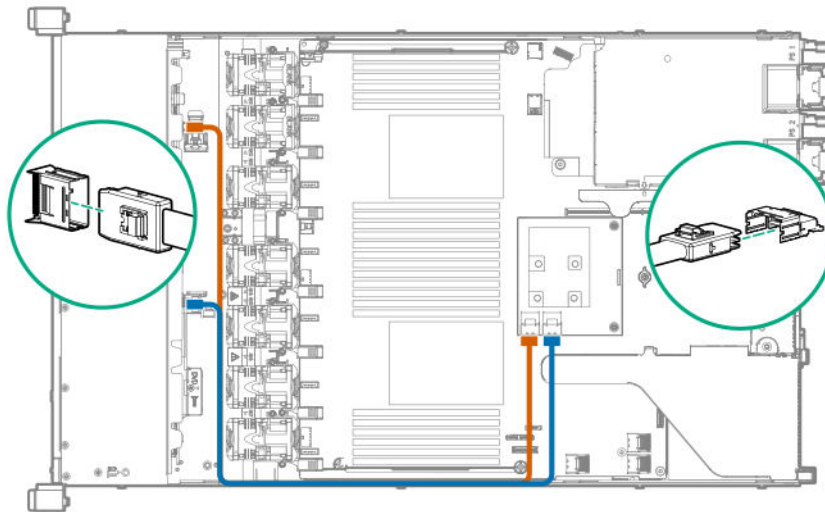
2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Install the controller.



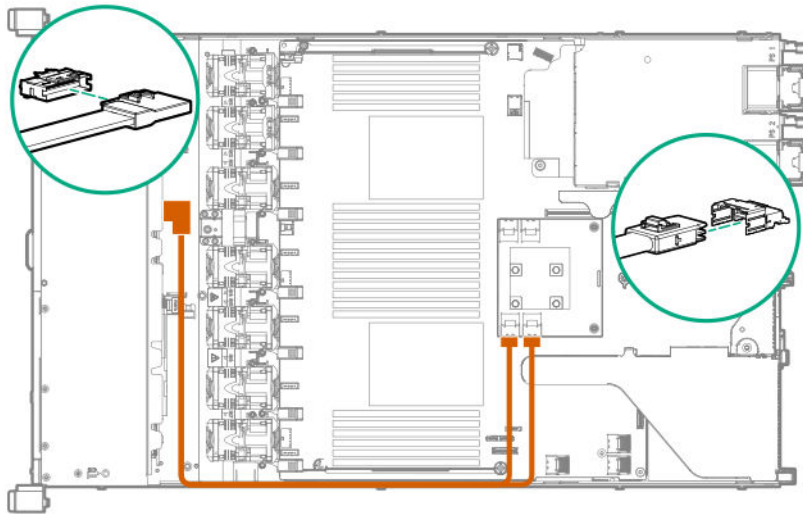
8. Connect the cables.

Additional cabling options are available. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

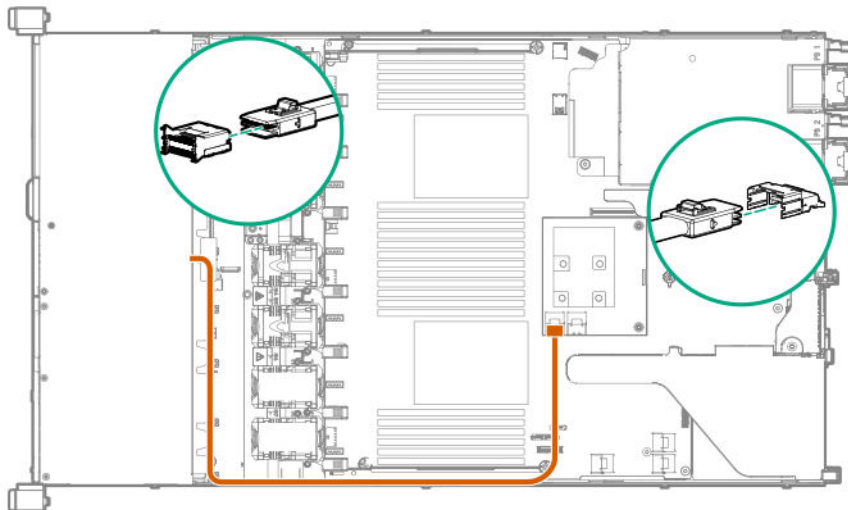
- 8 SFF



- 10 SFF SAS/SATA NVMe Combo



- 4 LFF



9. Install the access panel (**Installing the access panel** on page 31).
10. Install the server in the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (**Power up the server** on page 30).

## Installing an HPE Smart Array P408i-p SR Gen10 Controller option

### Prerequisites

Before installing this option, be sure you that have the following:

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

## Procedure

1. Observe the following alerts:

---

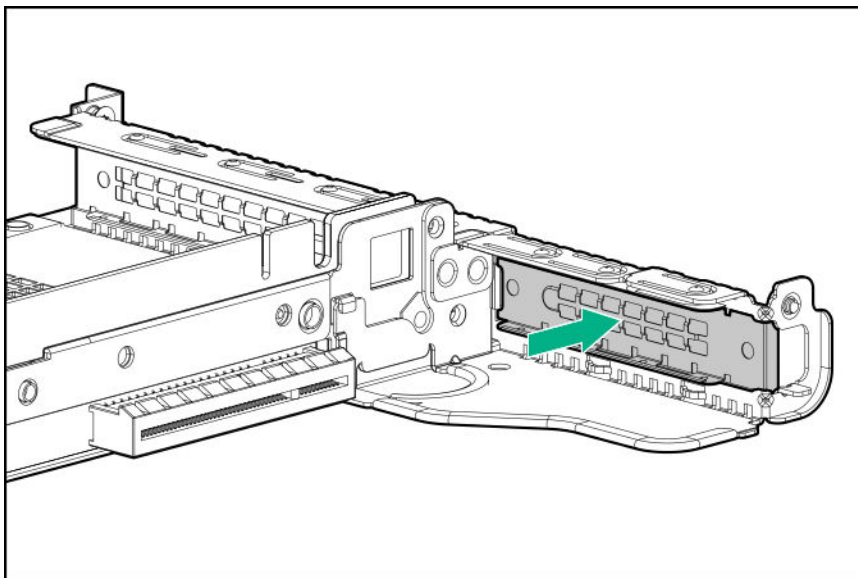
**⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

---

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

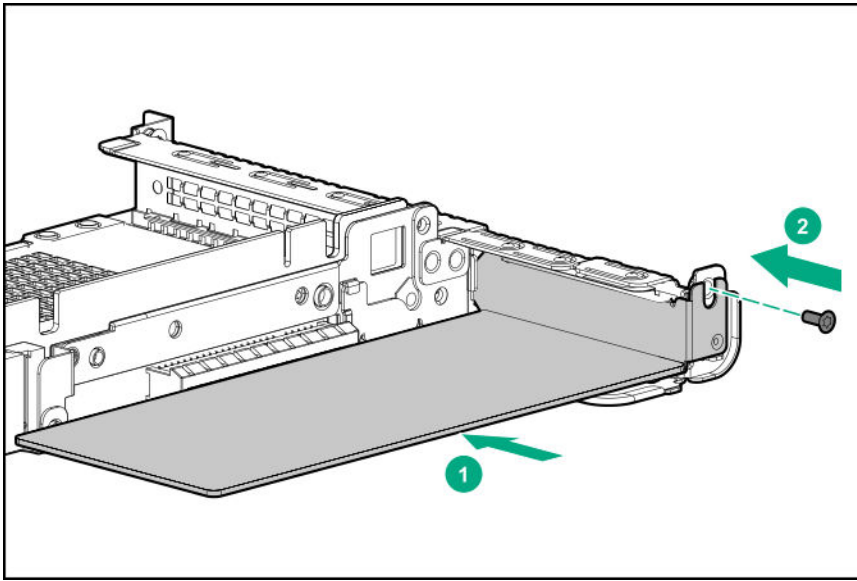
---

2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. **Remove the primary PCI riser cage.**
8. Remove the slot 2 expansion board blank.



9. Use a Torx T-10 screwdriver to install the controller.

The controller can also be installed in slot 1.

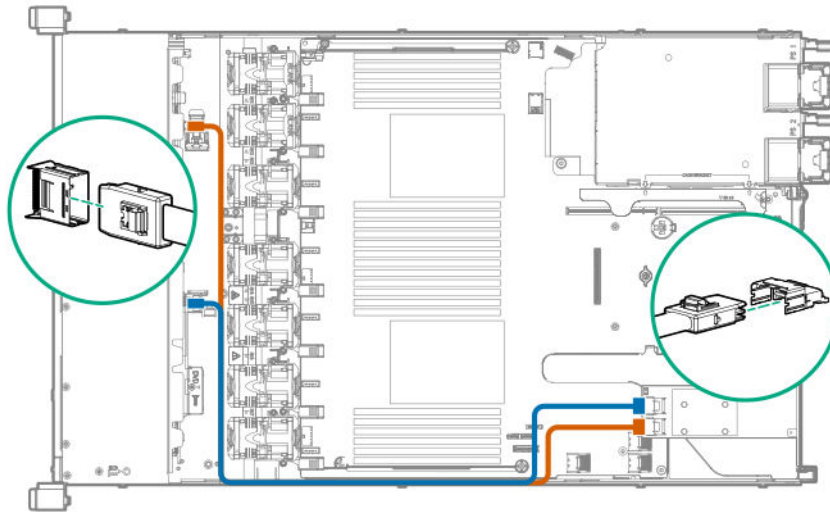


10. Install the primary PCI riser cage (**Install the primary PCI riser cage** on page 34).

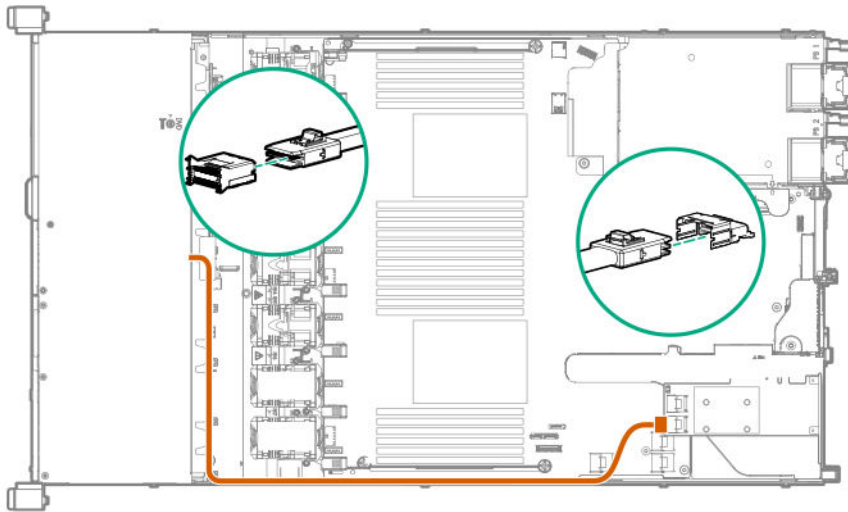
11. Connect the cables.

Additional cabling options are available. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

- 8 SFF



- 4 LFF



12. Install the access panel (**Installing the access panel** on page 31).
13. Install the server in the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (**Power up the server** on page 30).

## Installing an HPE Smart Array P816i-a SR Gen10 Controller option

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- Additional cables, as required. For more information, see **Cabling** on page 136
- T-15 Torx screwdriver

### Procedure

1. Observe the following alerts:

---

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

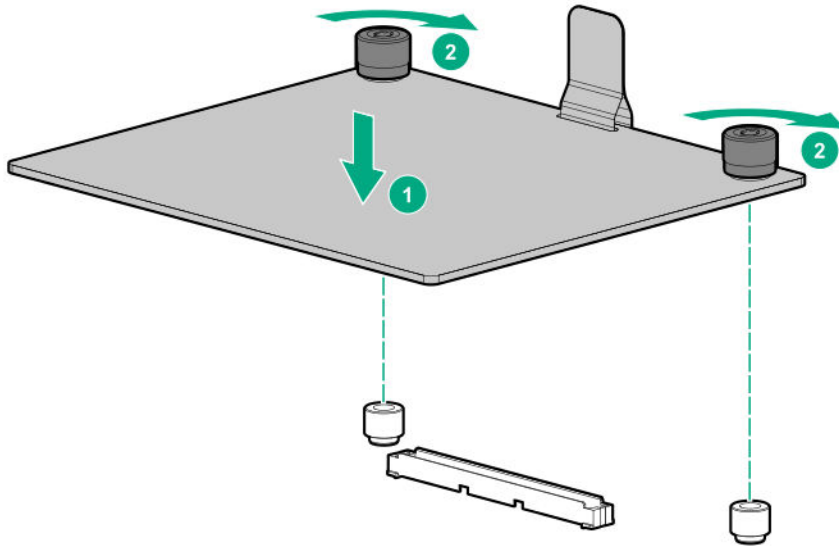
---

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

---

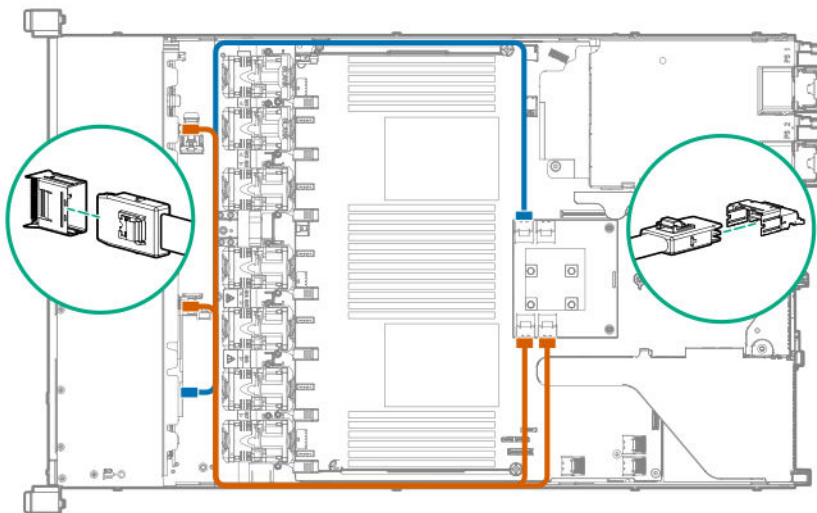
2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:

- a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
    - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
    - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
  6. Remove the access panel (**Remove the access panel** on page 31).
  7. Install the controller.



8. Connect the cables.

The following illustration shows the 8+2 SFF backplane configuration connected to the controller. Additional cabling options are available. For more information, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).



9. Install the access panel ([Installing the access panel](#) on page 31).
10. Install the server in the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ([Power up the server](#) on page 30).

## Installing an HPE Smart Array P824i-p MR Gen10 controller in a configured server

### Procedure


1. Back up data on the system.
2. Close all applications.
3. Update the server firmware if it is not the latest revision.
4. Do one of the following:
  - If the new Smart Array is the new boot device, install the device drivers.
  - If the new Smart Array is not the new boot device, go to the next step.

---

**NOTE:** If the logical drive is used in a Smart Array SR controller RAID array, you are not able to boot from that device if you are attached to a Smart Array MR controller.


---

5. Ensure that users are logged off and all tasks are completed on the server.
6. Power down the server.

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

---

7. Power down all peripheral devices that are attached to the server.
8. Disconnect the power cord from the power source.
9. Disconnect the power cord from the server.
10. Remove or open 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.

---

11. Remove the riser.
12. Select an available x8 or larger PCIe expansion slot.

A x8 physical size slot is required, even though the slot width may be electrically x4 or x1. Hewlett Packard Enterprise recommends using a slot that is electrically x8.
13. Remove the slot cover.

Save the retaining screw, if one is present.



14. Slide the controller along the slot alignment guide, if one is present, and then press the board firmly into the expansion slot so that the contacts on the board edge are seated properly in the slot.
15. Secure the controller in place with the retaining screw. If the slot alignment guide has a latch (near the rear of the board), close the latch.
16. Connect the controller backup power battery cable. To determine the location of the connector, see the server user guide.
17. Connect storage devices to the controller.  
For cabling information, see the server user guide.
18. Install the HPE Smart Storage Battery.
19. Reinstall the riser.
20. Connect the controller backup power cable.  
For cabling information, see the server user guide.
21. Connect peripheral devices to the server.
22. Connect the power cord to the server.
23. Connect the power cord to the power source.
24. Power up all peripheral devices.
25. Power up the server.

## Installing the operating system with the HPE Smart Array MR Gen10 P824i-p controller driver

### Prerequisites

Ensure that you have the HPE Smart Array MR Gen10 P824i-p controller driver available. Obtain it by extracting it from the SPP (<http://www.hpe.com/servers/spp>) or by downloading it from the Hewlett Packard Enterprise Support website <https://www.support.hpe.com>.

### Procedure

1. Power on the server.
2. If you are running the server in UEFI Boot Mode, select **F9 (System Utilities)**.
3. (Optional) If running the server in Legacy Boot Mode, set the controller as the boot controller.
4. (Optional) If running the server in Legacy Boot Mode, change the controller boot order.
5. Configure a logical drive or select physical drives for JBOD mode using the Smart Array configuration utility in UEFI System Utilities.
6. Launch the operating system installation and point to the controller driver when prompted.
7. If the operating system utility does not see the drive, repeat the step to configure the logical drive or select physical drives for JBOD and retry the installation.
8. After the installation is complete, use MR Storage Administrator, StorCLI, or the SPP to update the controller firmware if it is not the latest revision.

# Processor and heatsink options

## Installing a processor heatsink assembly

The server supports single-processor and dual processor operations.

---

❗ **IMPORTANT:** HPE ProLiant and HPE Synergy Gen10 server products do not support upgrading 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 before performing this procedure. See **Processor, heatsink, and socket components**.

### Prerequisites

Before installing this option, be sure that you have the following items:

- Processor or heatsink kit contents
- T-30 Torx screwdriver

### 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 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.

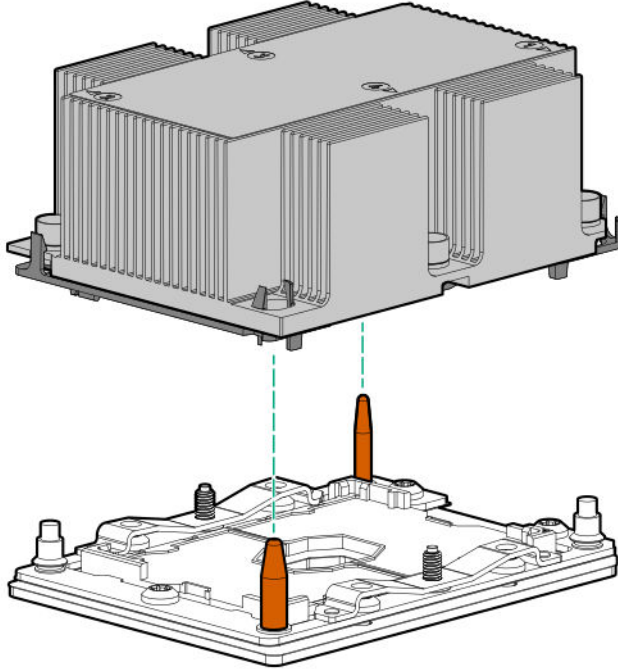
---

2. Power down the server (**Powering down the server** on page 30).
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Remove the server from the rack (**Remove the server from the rack** on page 31).
5. Remove the access panel (**Remove the access panel** on page 31).
6. Remove the dust cover from the processor socket you intend to upgrade.
7. Install the processor heatsink assembly:

- a. Locate and align the Pin 1 indicator on the processor carrier and the socket.
- b. Align the processor-heatsink module 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 will only install one way.

Your heatsink may look different than the one shown.

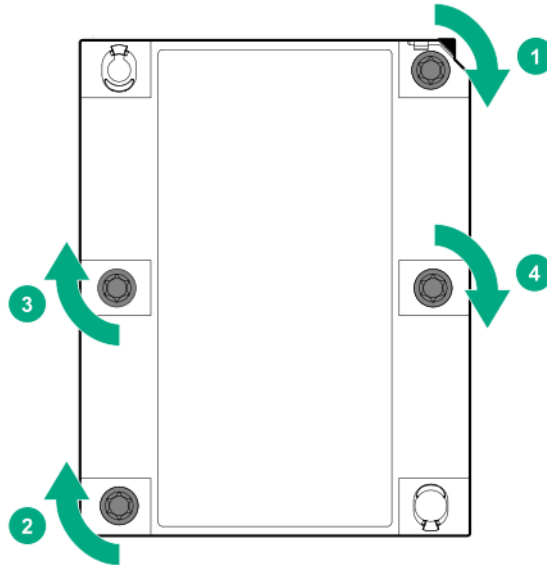


---

**⚠ 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 nut in the order indicated on the heatsink label (1 -2 -3 -4) until it no longer turns.



8. If installing a second processor, install high-performance fans in bays 7 and 8. These fans are provided with the processor option kit.
9. Install the access panel (**Installing the access panel** on page 31).
10. Install the server in the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (**Power up the server** on page 30).

## Installing a high-performance heatsink

### Prerequisites

**CAUTION:** Installing a high-performance heatsink requires the installation of a processor assembly onto the heatsink. To avoid damage to server or components, do not remove or install the processor assembly when installing or replacing other heatsinks.

To determine when a high-performance heatsink should be installed in the server, see the server QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
  - T-30 Torx screwdriver
  - 1/4" flat blade screwdriver or nonconductive tool
- Hewlett Packard Enterprise recommends using a nonconductive tool.

### Procedure

1. Observe the following alerts.

---

**⚠ CAUTION:** The processor assembly must be removed and replaced as a unit. Do not remove the processor from the carrier.

---

**⚠ 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: 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 (**Powering down the server** on page 30).

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:

a. Extend the server from the rack (**Extend the server from the rack** on page 30).

b. Remove the server from the rack (**Remove the server from the rack** on page 31).

5. Remove the access panel (**Remove the access panel** on page 31).

6. Observe the following cautions.

---

**⚠ CAUTION:** Be sure to loosen each heatsink nut in the order indicated. Otherwise, damage might occur to the heatsink or processor.

---

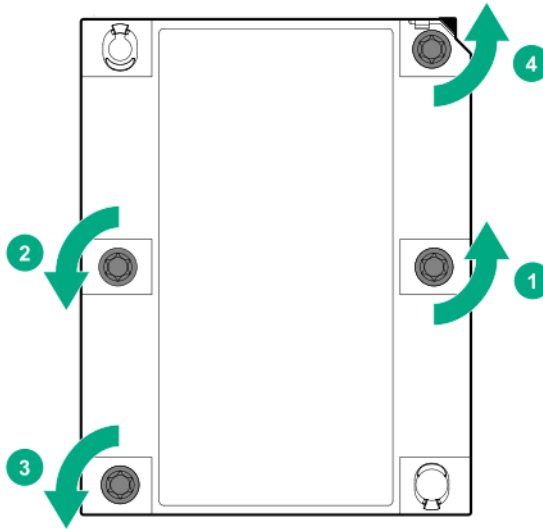
**⚠ CAUTION:** Install the processor heatsink assembly as soon as possible after removing it. Do not leave the processor socket unpopulated for extended periods of time.

---

7. Remove the existing processor heatsink assembly:

a. Allow the heatsink to cool.

b. Using a T-30 Torx screwdriver, loosen the heatsink nuts.



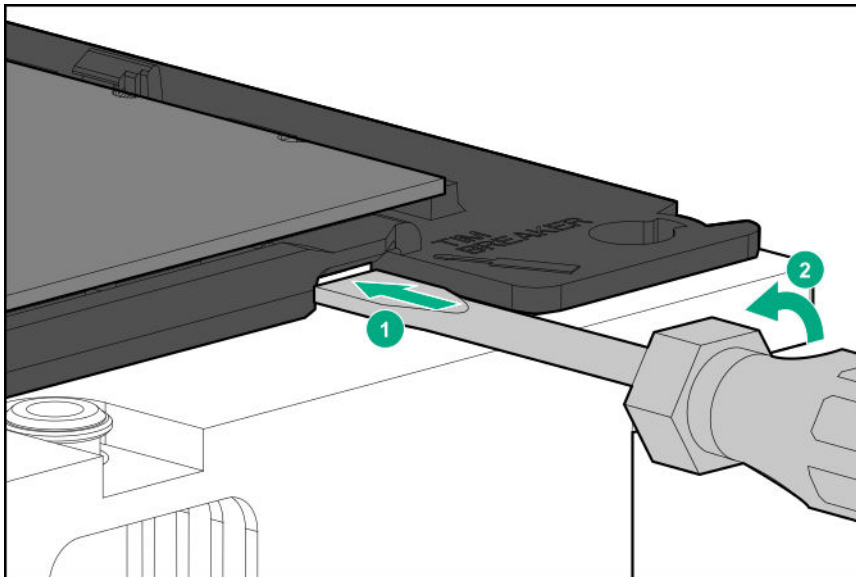
- c. Lift the processor heatsink assembly up and away from the system board.
  - d. Turn the processor heatsink assembly over and place it on a work surface with the processor assembly facing up.
8. Release the thermal grease adhesion between the processor assembly and heatsink:
- a. Locate the TIM (thermal interface media) breaker slot between the processor assembly and heatsink. The slot is across from the Pin 1 indicator, near the corner.
  - b. Insert a 1/4" flat blade screwdriver or nonconductive tool into the slot.

---

**⚠ CAUTION:** To avoid damage to the processor, insert the tool between the processor and the heatsink base. The opening in the carrier provides access to a gap between the processor heatsink spreader and the heatsink base.

---

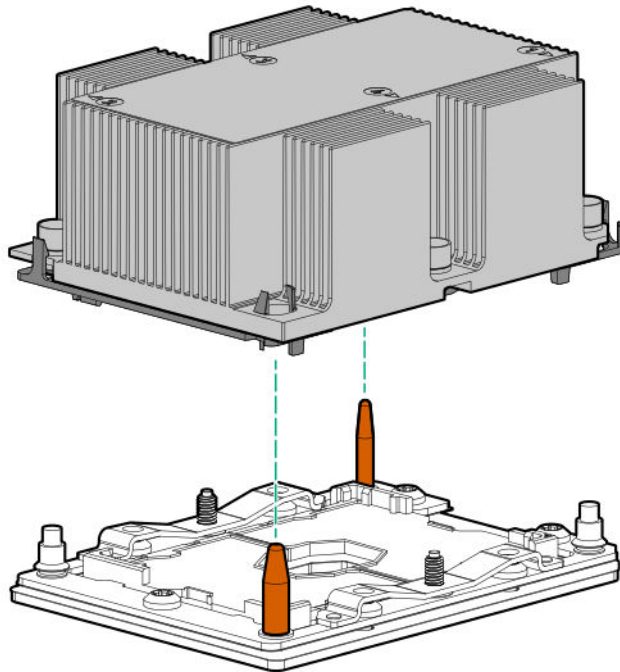
- c. To release the adhesion of the thermal grease, gently rotate the tool.



- d. Unlatch the remaining corners of the processor assembly.
  - e. Separate the processor assembly from the heatsink.  
The processor remains attached to the carrier.
9. Using an alcohol wipe, remove the existing thermal grease from the processor and heatsink. Allow the alcohol to evaporate before continuing.
  10. Remove the plastic cover over the thermal grease on the high-performance heatsink.
  11. Install the processor assembly on the heatsink.  
Align the Pin 1 indicator on the processor to the Pin 1 indicator on the heatsink, and then latch the processor assembly to the heatsink.

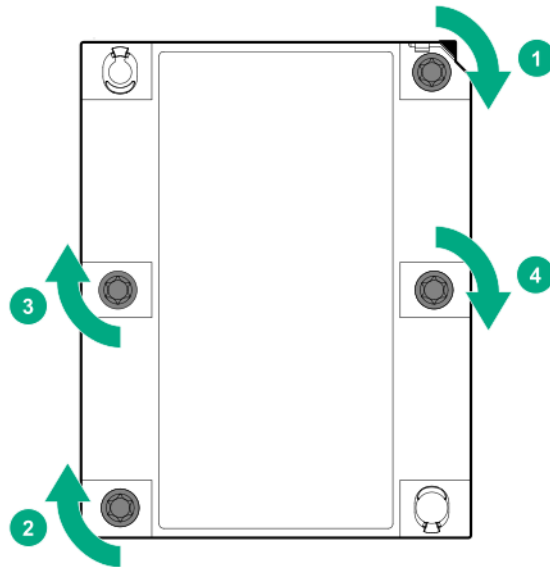
Your heatsink may look different than the one shown.

12. 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.

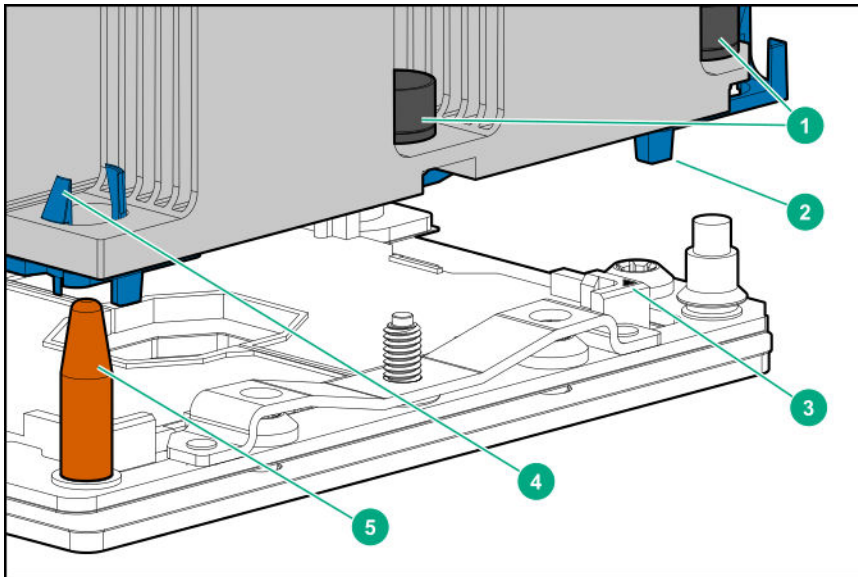


- c. **CAUTION:** Be sure to tighten each heatsink nut fully in the order indicated. Otherwise, boot failure or intermittent shutdowns might occur.

Using a T-30 Torx screwdriver, fully tighten each heatsink nut until it no longer turns.



## Processor, heatsink, and socket components



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

<sup>1</sup> Symbol also on the processor and frame.



# Installing the Systems Insight Display power module

## Prerequisites

Before installing this option, be sure you have the following:

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

## Procedure

1. Observe the following alerts:



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

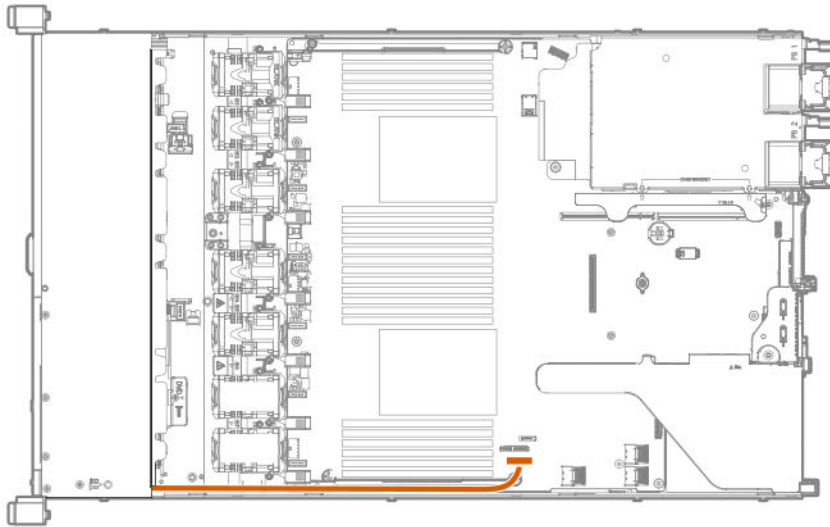
---



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

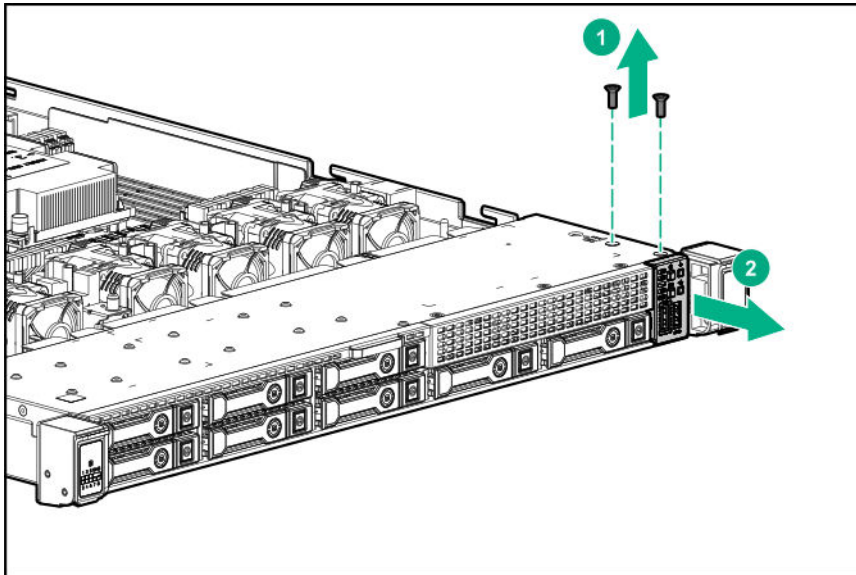
---

2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Disconnect the Power/UID/USB cable from the front power button/USB 3.0 on the system board.

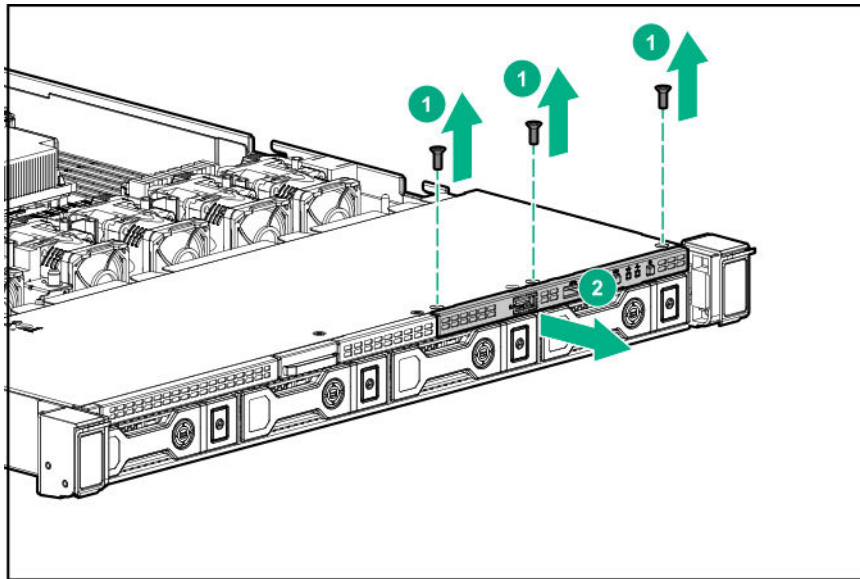


8. Using a Torx T-10 screwdriver, remove the Power/UID/USB assembly.

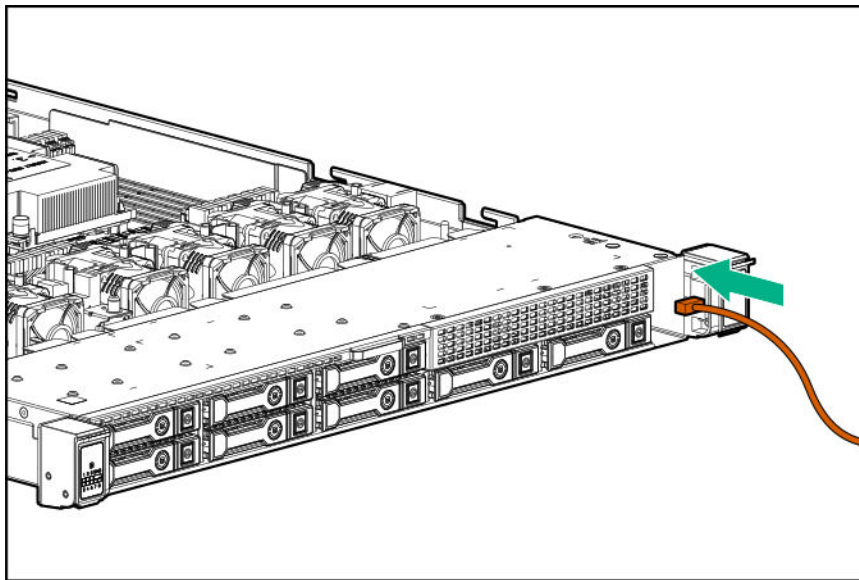
- 8 SFF



- 4 LFF

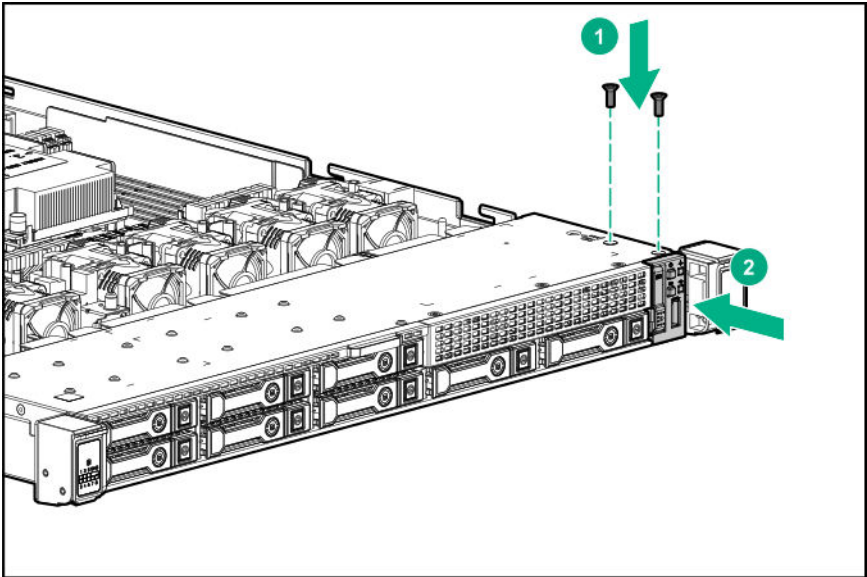


9. Guide the SID cable through the front of the server.

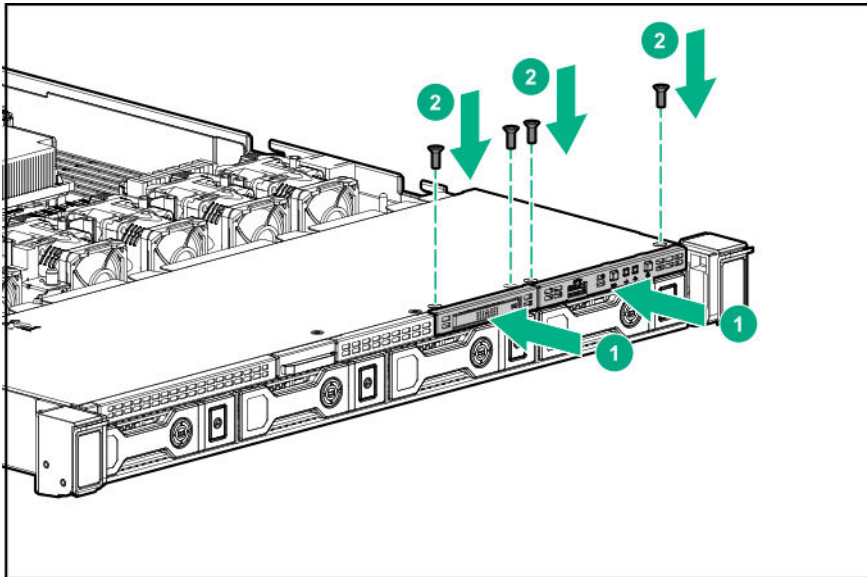


10. Install the SID module into the front panel. Using a T-10 Torx screwdriver, secure the module to the chassis with the screws from the kit.

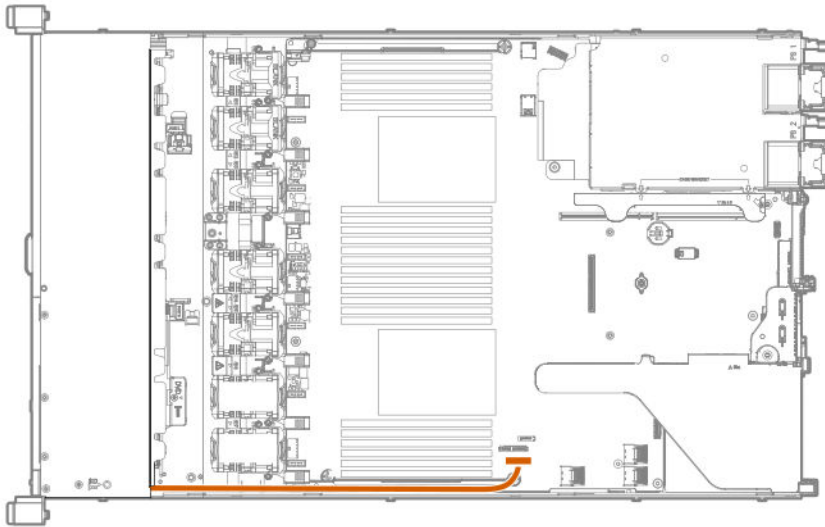
- 8 SFF



- 4 LFF



11. Connect the SID cables to the front power button/USB 3.0 connector on the system board.



## Installing the 4 LFF display port/USB module

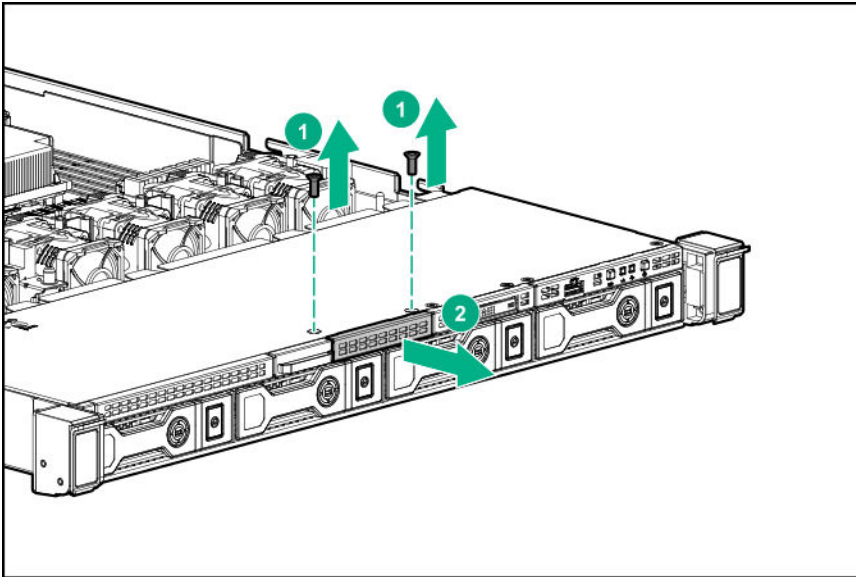
### Prerequisites

Before installing this option, be sure you have the following:

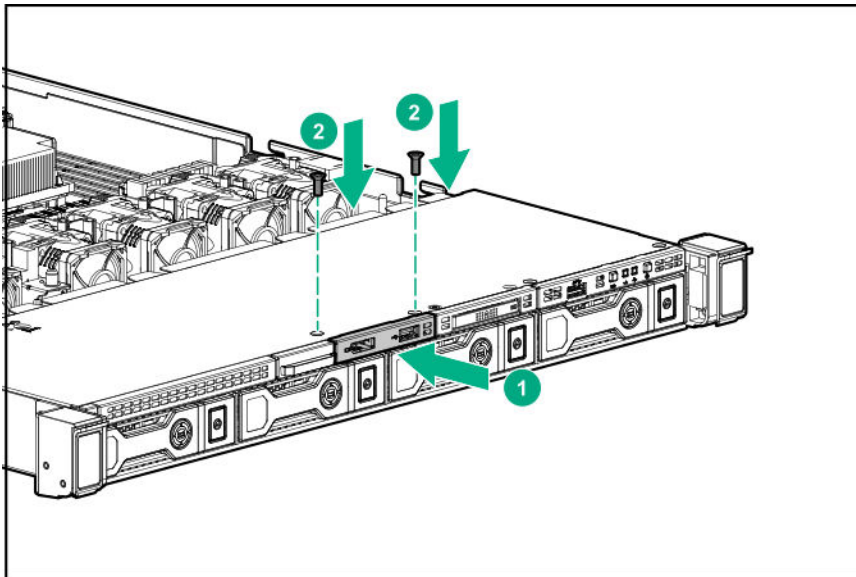
- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

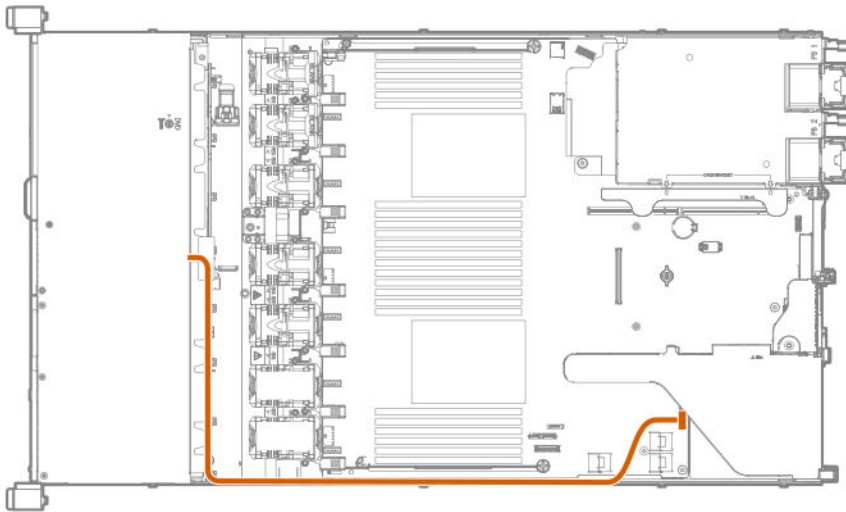
1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Using a Torx T-10 screwdriver, remove the 4 LFF display port/USB blank.



6. Install the 4 LFF display port/USB module.



7. Route and connect the cable.



8. Install the access panel (**Installing the access panel** on page 31).
9. Install the server in the rack.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (**Power up the server** on page 30).

## Installing the serial cable option

### Prerequisites

Before installing this option, be sure you have the following:

- The components included with the hardware option kit
- 5 mm socket

### Procedure

1. Observe the following alerts:



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

---

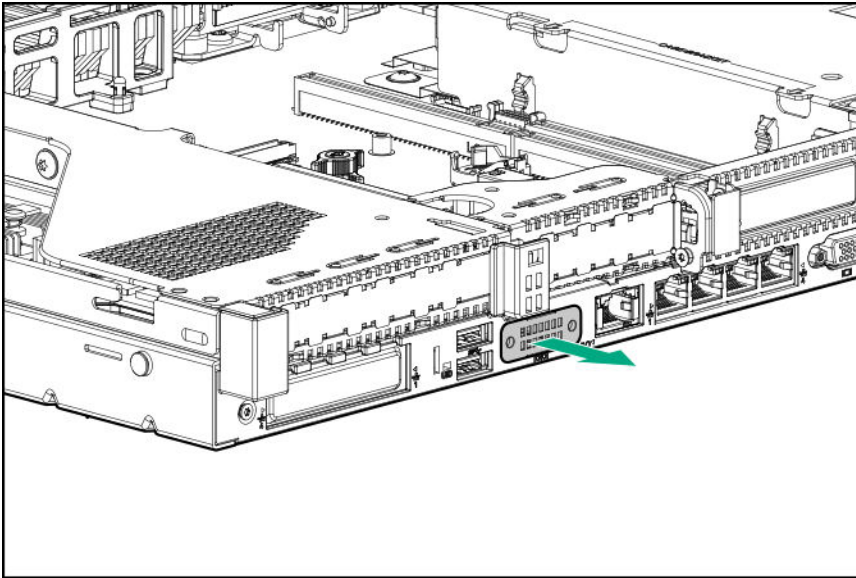


**CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

---

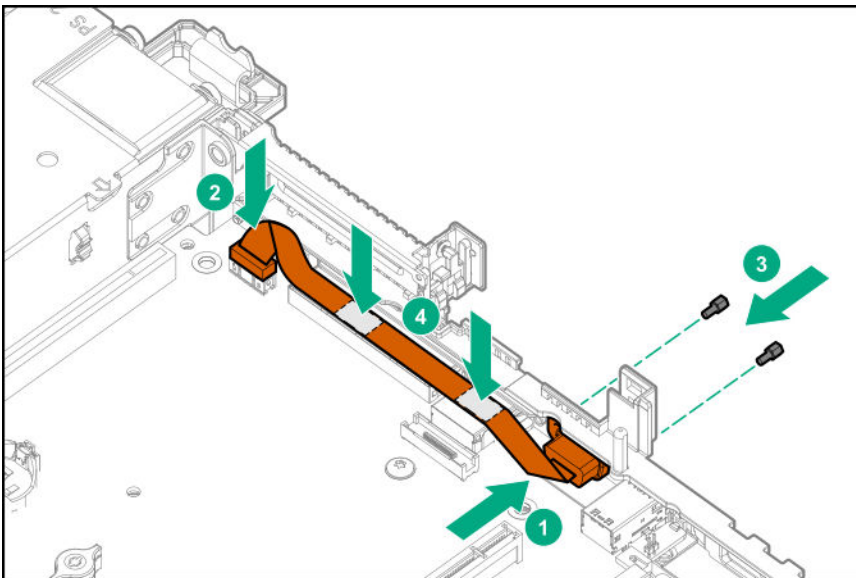
2. Back up all server data.
3. Power down the server (**Powering down the server** on page 30).
4. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.
5. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
6. Remove the access panel (**Remove the access panel** on page 31).
7. Remove the serial cable blank.



8. Connect the serial cable option, and then secure the cable with two T-10 screws. Then, remove the backing from the double-sided tape and press down where indicated.

A 5 mm socket is required for this step.



9. Install the access panel (**Installing the access panel** on page 31).



10. Install the server in the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (**Power up the server** on page 30).

## Installing the Chassis Intrusion Detection switch option

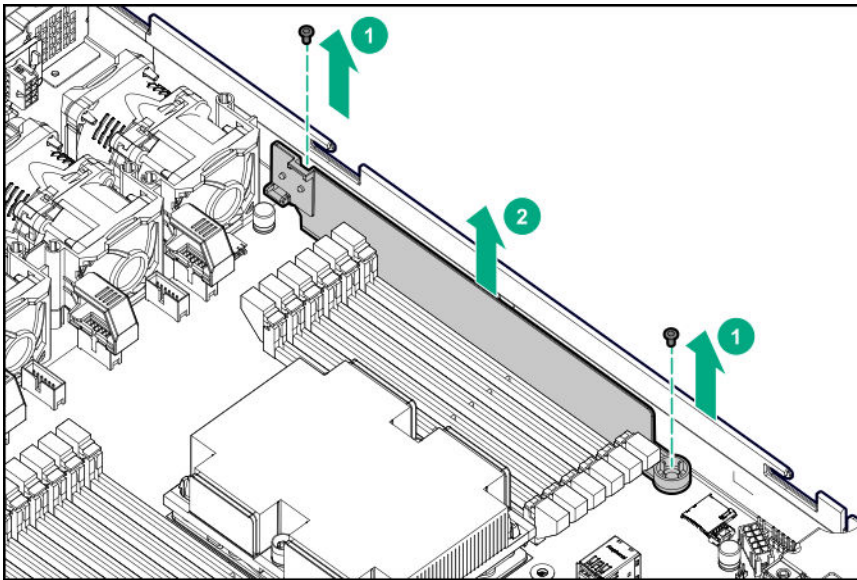
### Prerequisites

Before installing this option, be sure you have the following:

- The components included with the hardware option kit
- T-15 Torx screwdriver

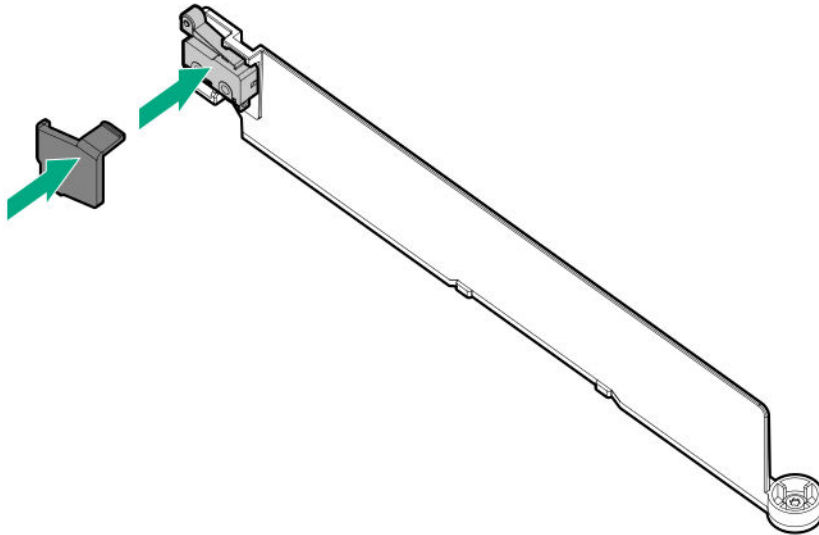
### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Use a T-15 Torx screwdriver to remove the left DIMM guard from the system board.

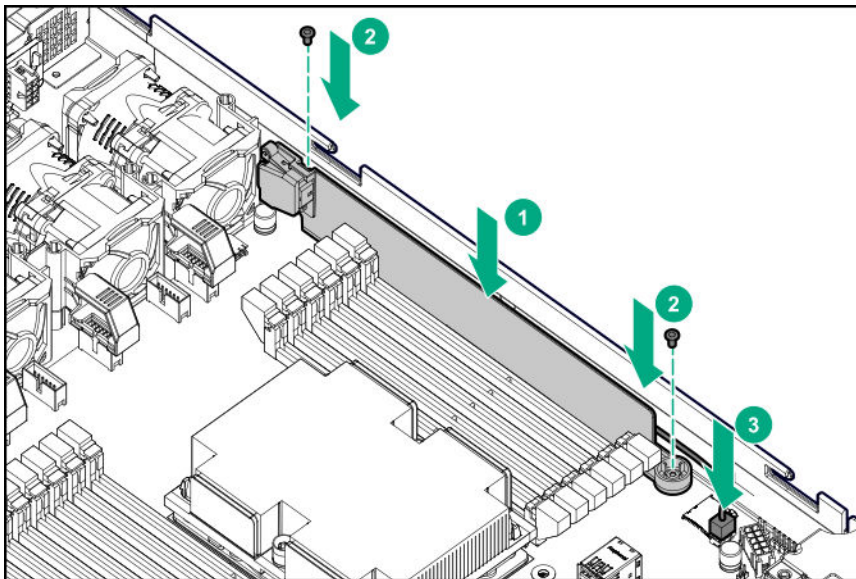


6. Assemble the connector/cable harness pin openings to the alignment pegs on the DIMM guard.

7. Install the plastic cover on the DIMM guard.



8. Use a T-15 Torx screwdriver to install the DIMM guard, and then connect the cable to the system board.



9. Install the access panel ([Installing the access panel](#) on page 31).
10. Install the server in the rack.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ([Power up the server](#) on page 30).

## Installing a FlexibleLOM option

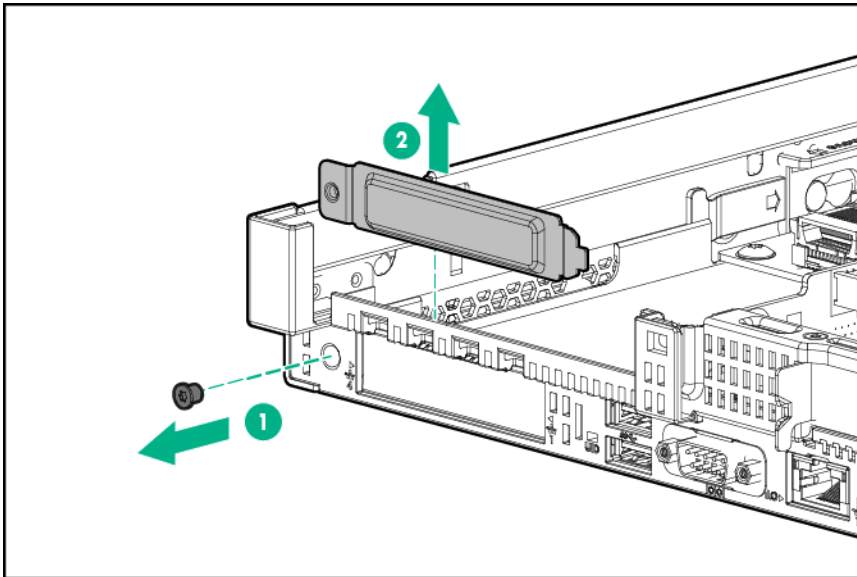
### Prerequisites

Before installing this option, be sure that you have the following:

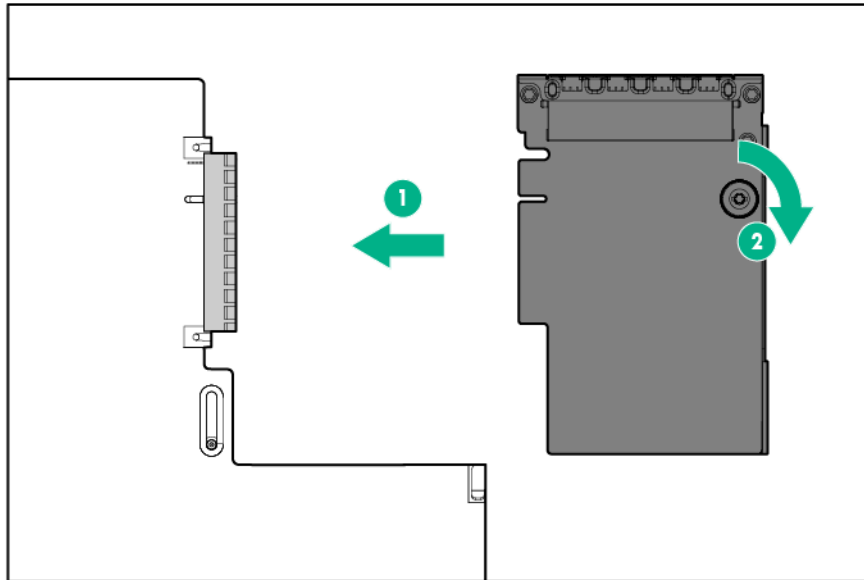
- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Use a T-10 Torx screwdriver to remove the FlexibleLOM PCIe blank.



6. Install the component:
  - a. Firmly seat the FlexibleLOM in the slot.
  - b. Tighten the thumbscrew.



7. Install the access panel (**Installing the access panel** on page 31).
8. Slide the server into the rack.
9. Connect the LAN segment cables.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (**Power up the server** on page 30).

## Energy pack options

Hewlett Packard Enterprise offers two centralized backup power source options to back up write cache content on P-class Smart Array controllers in case of an unplanned server power outage.

- **HPE Smart Storage Battery**
- **HPE Smart Storage Hybrid Capacitor**

---

ⓘ **IMPORTANT:** The HPE Smart Storage Hybrid Capacitor is only supported on Gen10 and later servers that support the 96W HPE Smart Storage Battery.

---

One energy pack option can support multiple devices. An energy pack option is required for P-class Smart Array controllers. Once installed, the status of the energy pack displays in HPE iLO. For more information, see the HPE iLO user guide on the Hewlett Packard Enterprise website (<http://www.hpe.com/support/iLO-docs>).

## HPE Smart Storage Battery

The HPE Smart Storage Battery supports the following devices:

- HPE Smart Storage SR controllers
- HPE Smart Storage MR controllers
- NVDIMMs

---

❗ **IMPORTANT:** To support NVDIMMs, the HPE Smart Storage Battery must be installed.

---

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.

## HPE Smart Storage Hybrid Capacitor

The HPE Smart Storage Hybrid Capacitor supports the following devices:

- HPE Smart Storage SR controllers
- HPE Smart Storage MR controllers

---

❗ **IMPORTANT:** NVDIMMs are only supported by the HPE Smart Storage Battery.

---

The capacitor pack can support up to three devices or 600 joules.

This server supports the HPE Smart Storage Hybrid Capacitor with the 145mm cable.

Before installing the HPE Smart Storage Hybrid Capacitor, verify that the system BIOS meets the minimum firmware requirements to support the capacitor pack.

---

❗ **IMPORTANT:** If the system BIOS or controller firmware is older than the minimum recommended firmware versions, the capacitor pack will only support one device.

---

The capacitor pack is fully charged after the system boots.

## Minimum firmware versions

Product	Minimum firmware version
HPE ProLiant DL360 Gen10 Server system ROM	2.00
HPE Smart Array SR controllers	1.90
HPE Smart Array MR controllers	24.23.0-0041

## Energy pack option configurations

In the HPE ProLiant DL360 Gen10 Server , an energy pack can be installed in two different orientations, depending on configuration:

- [Installing an energy pack in 8 SFF and 4 LFF configurations](#) on page 128
- [Installing an energy pack in the 10 SFF SAS/SATA/NVMe Combo backplane configuration](#) on page 126

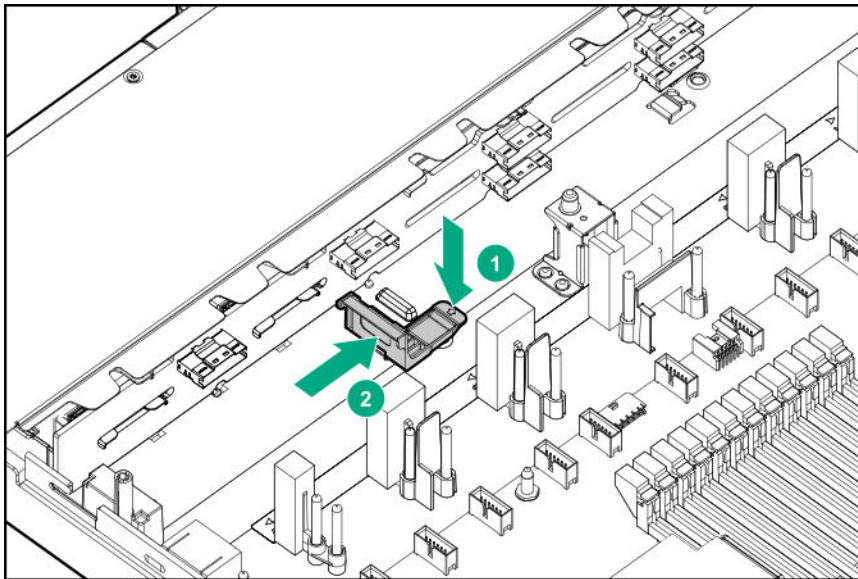
## Installing an energy pack in the 10 SFF SAS/SATA/NVMe Combo backplane configuration

### Prerequisites

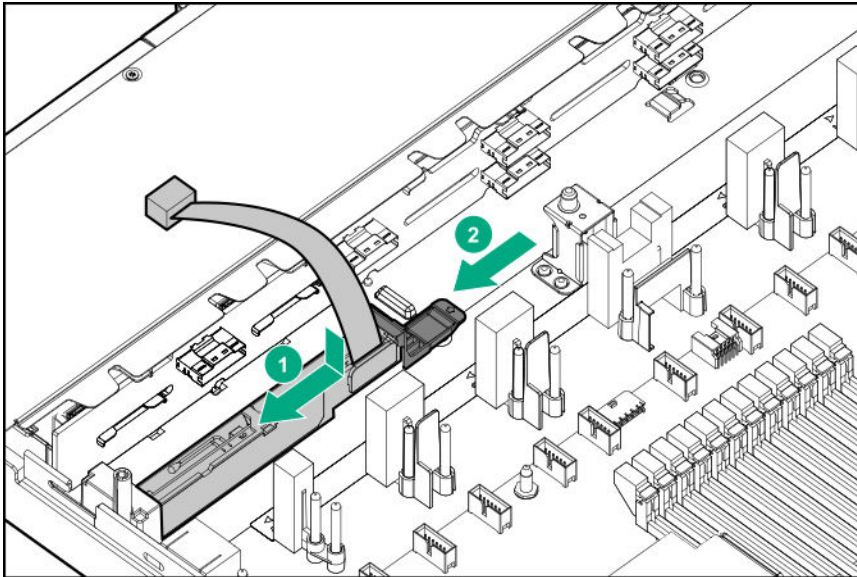
The energy pack must be installed in this orientation when the 10 SFF SAS/SATA/NVMe Combo backplane is installed.

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Remove the right retainer. Set aside.

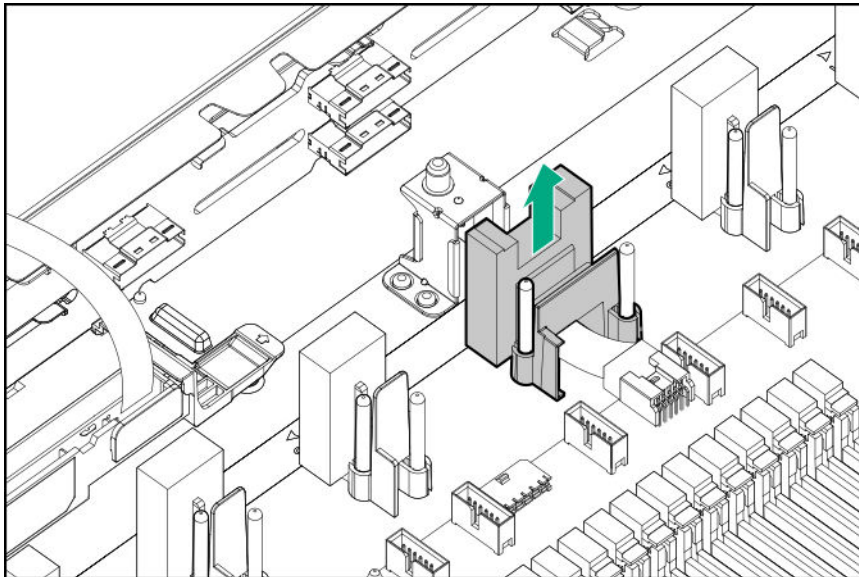


6. Slide the energy pack into the left retainer, and then install the right retainer.

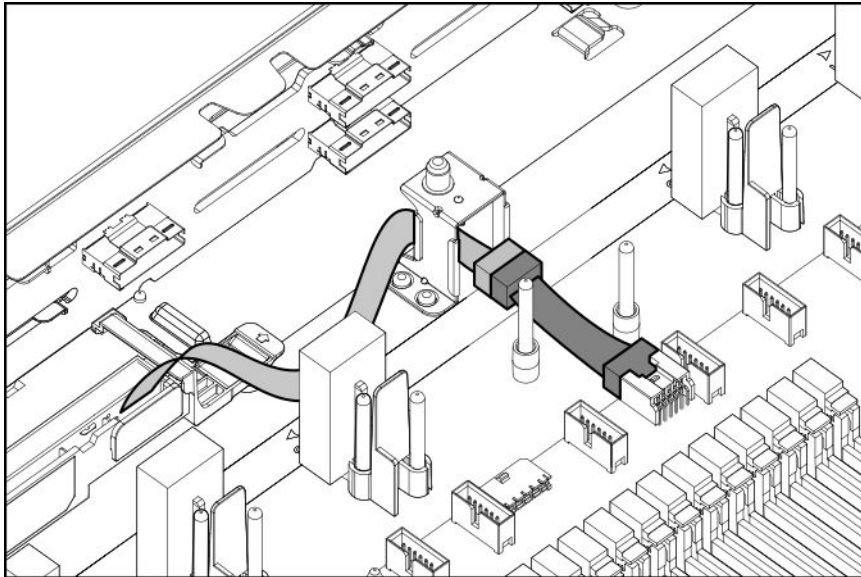


7. Connect the energy pack cable:

a. Remove the center fan baffle.



b. Connect the energy pack cable to the extender cable.



c. Install the center fan baffle.

8. Install the access panel (**Installing the access panel** on page 31).
9. Install the server in the rack.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (**Power up the server** on page 30).

## Installing an energy pack in 8 SFF and 4 LFF configurations

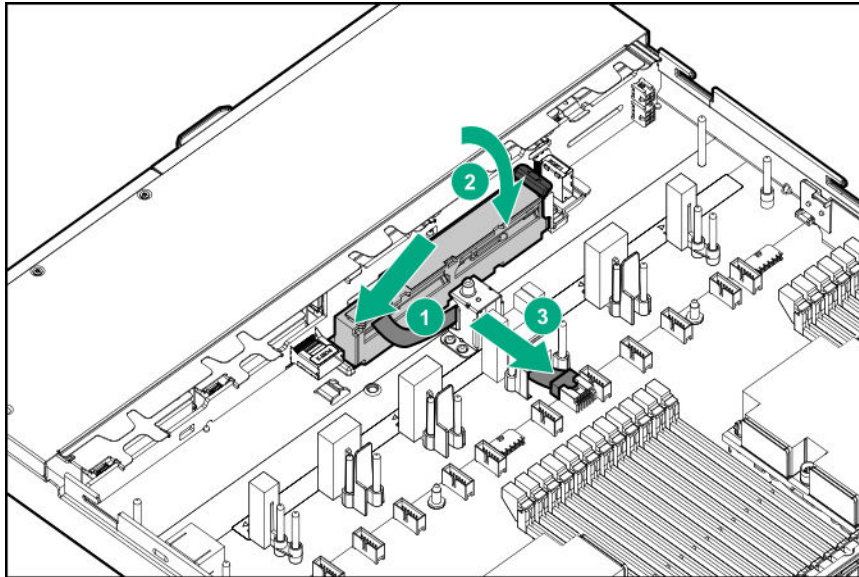
### Prerequisites

Before installing this option, be sure you that have the components included with the hardware option kit.

### Procedure

1. Power down the server (**Powering down the server** on page 30).
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Install the energy pack and connect the energy pack cable.





6. Install the access panel (**Installing the access panel** on page 31).
7. Install the server in the rack.
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. Power up the server (**Power up the server** on page 30).

## 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.

---

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM is bound to the system board. If an OS is configured to use the TPM and it is removed, the OS may go into recovery mode, data loss can occur, or both.
- 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 or system configuration.
- 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.

---

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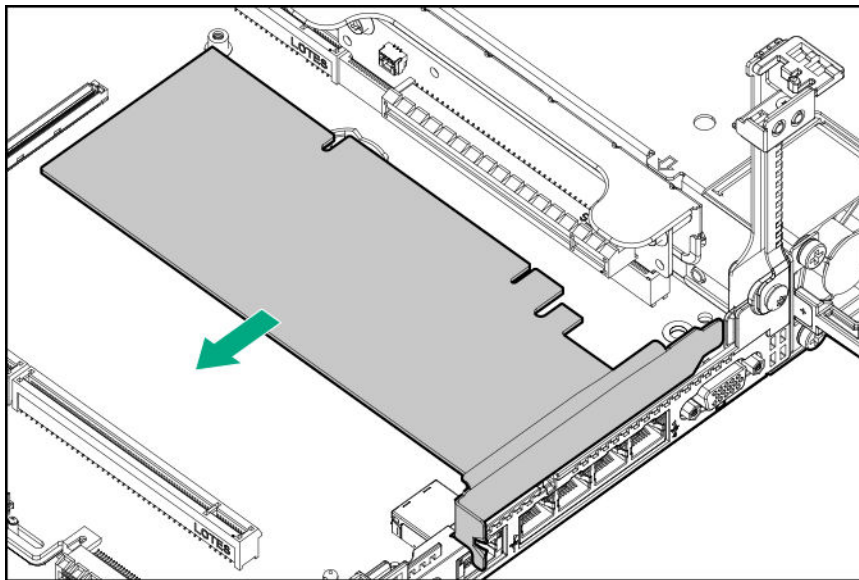
**⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

---

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. Power down the server ([Powering down the server](#) on page 30).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - Extend the server from the rack ([Extend the server from the rack](#) on page 30).
  - Remove the server from the rack ([Remove the server from the rack](#) on page 31).
6. Place the server on a flat, level work surface.
7. Remove the access panel ([Remove the access panel](#) on page 31).
8. If needed, remove any expansion boards installed in slot 3.



9. Remove the primary PCI riser cage ([Removing the primary PCI riser cage](#) on page 33).
10. Proceed to [Installing the TPM board and cover](#) on page 131.

## Installing the TPM board and cover

### Procedure

1. Observe the following alerts:

---

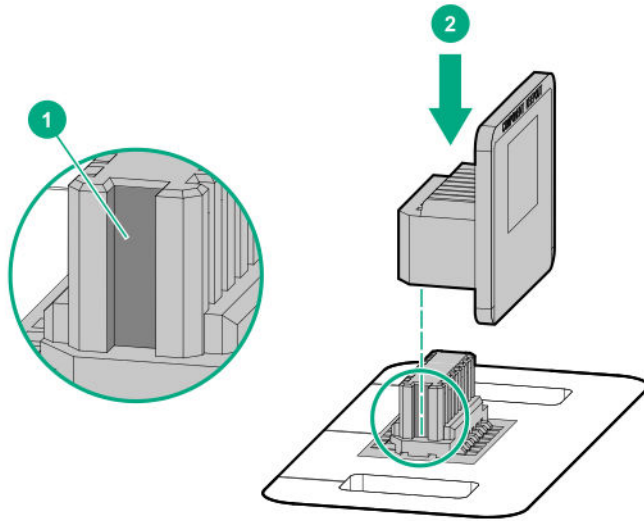
**CAUTION:** If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

---

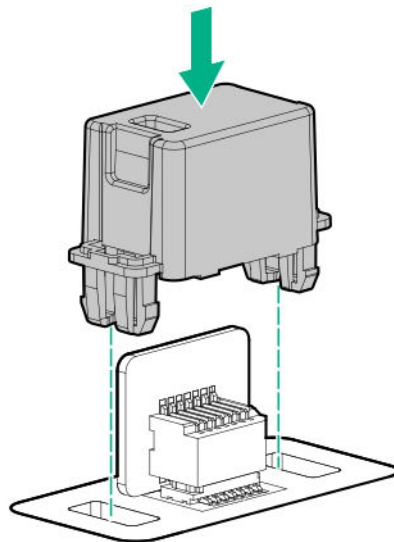
**CAUTION:** The TPM is keyed to install only in the orientation shown. Any attempt to install the TPM in a different orientation might result in damage to the TPM or system board.

---

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 133.

## 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

## Cabling overview

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

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

## SFF cables

Option kit	Cable part number	Connects from	Connects to
SFF P824i-p Cable Kit	876864-001	8SFF SAS/SATA Backplane	Port 1i/2i on the P824i-p Smart Array Controller
	876865-002	2 SFF SAS/SATA Backplane	Port 3i on the P824i-p Smart Array Controller
	876866-002	10 SFF SAS/SATA Backplane	Port 1i/2i on the P824i-p Smart Array Controller
SFF Internal Cables Kit	874618-001	2SFF SAS/SATA Backplane	Embedded SATA
	869662-001	8 SFF SAS/SATA Backplane	Embedded SATA Type -a Smart Array Controller
	876867-001	2 SFF SAS/SATA Backplane	Type -p Smart Array Controller (Slot #1)
2 SFF Backplane Option Kit	874615-001	8 SFF SAS/SATA Backplane	Type -p Smart Array Controller (Slot #2)
	876867-001	2 SFF SAS/SATA Backplane	Embedded SATA Type -p Smart Array Controller
	869669-001	2 SFF SAS/SATA Backplane	P816i-a Smart Array Controller
2 SFF SCM Backplane Option Kit	869668-001	2 SFF SCM Backplane	Embedded SATA
	869669-001	2 SFF SCM Backplane	P816i-a Smart Array Controller
		2 SFF SCM Backplane	Slot #1
1 SFF Rear Backplane Option Kit	869685-001	1 SFF Rear Backplane	Embedded SATA Type -p Smart Array Controller

*Table Continued*



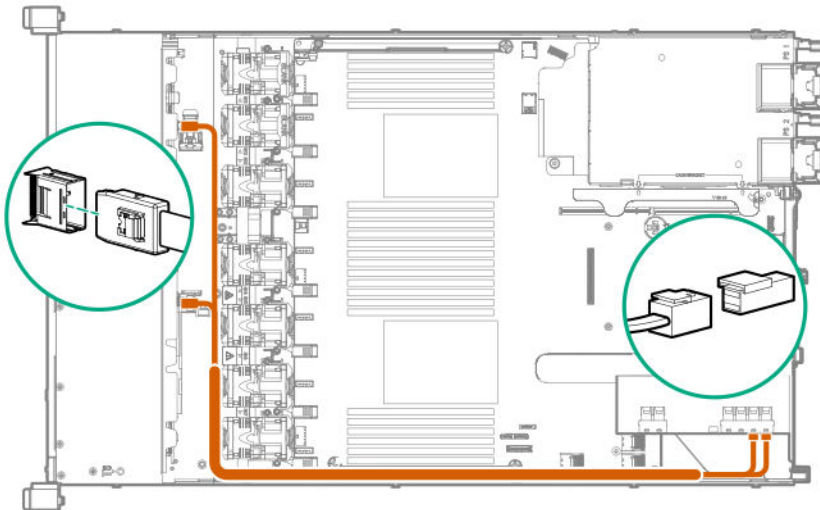
Option kit	Cable part number	Connects from	Connects to
	876868-001	1 SFF Rear Backplane	P816i-a Smart Array Controller
10 SFF SAS/SATA/NVMe Combo backplane	869675-001	10 SFF backplane, SAS port	P408i-a controller
	869676-001	10 SFF backplane, ports 1, 2, and 3	NVMe riser, ports 1, 2, and 3
	869681-001	10 SFF backplane, port 5	NVMe riser, port 5
	869680-001	10 SFF backplane, port 4	NVMe riser, port 4

## SFF configuration cable routing

**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

### SFF backplane to P824i-p controller

8SFF to ports 1i/2i in the primary



### 8SFF to ports 1i/2i + 2SFF to port 3i in the primary

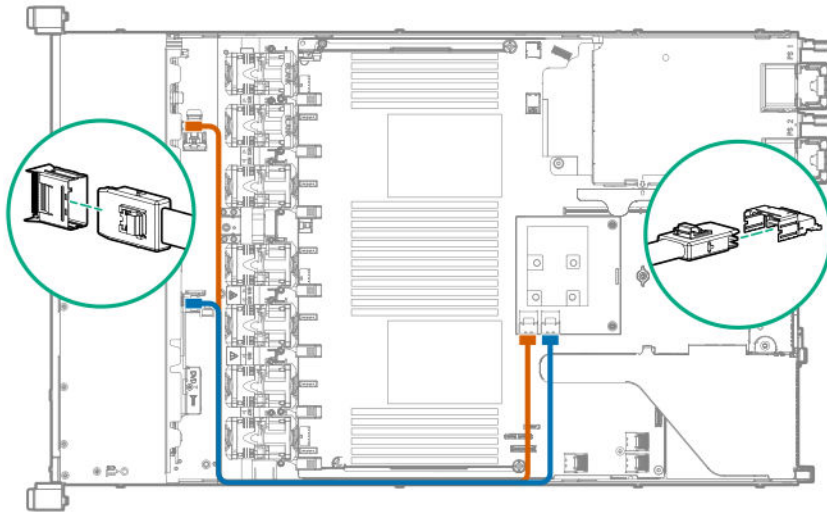


### 10SFF premium backplane to ports 1i/2i in the primary



### 8 SFF backplane to a P408i-a/P816i-a controller

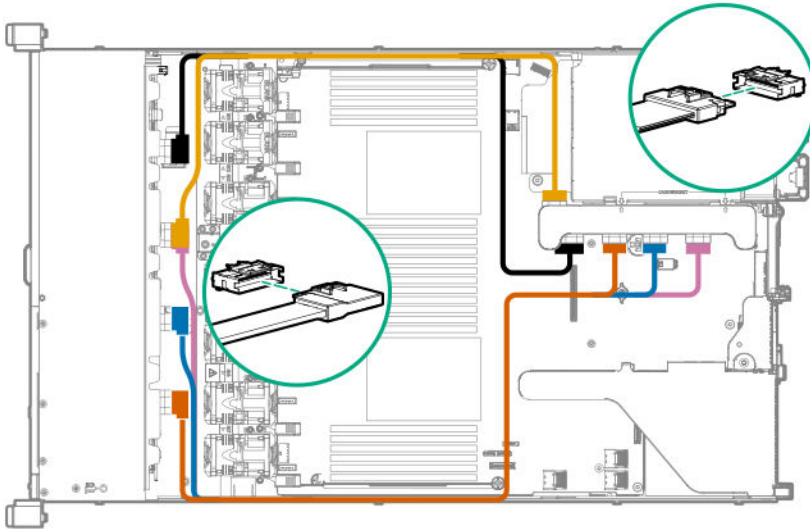
A P408i-a controller is shown, but the routing is the same for the P816i-a.



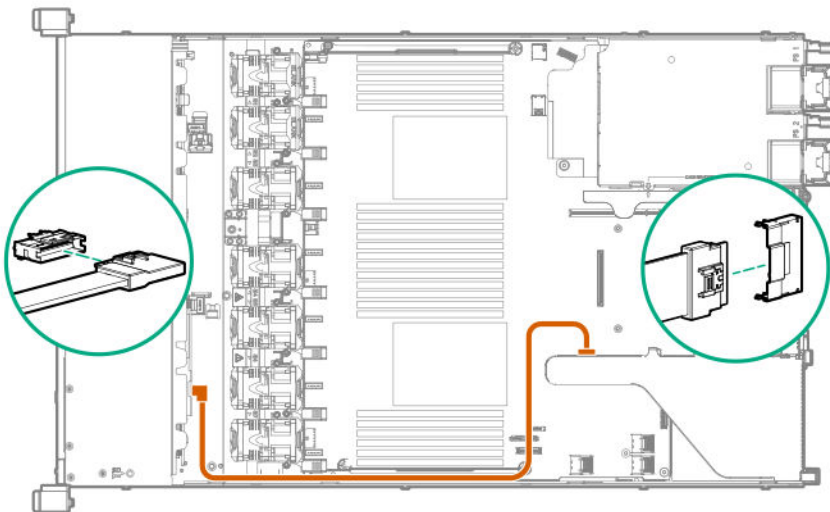
**2 SFF backplane to P816i-a controller**



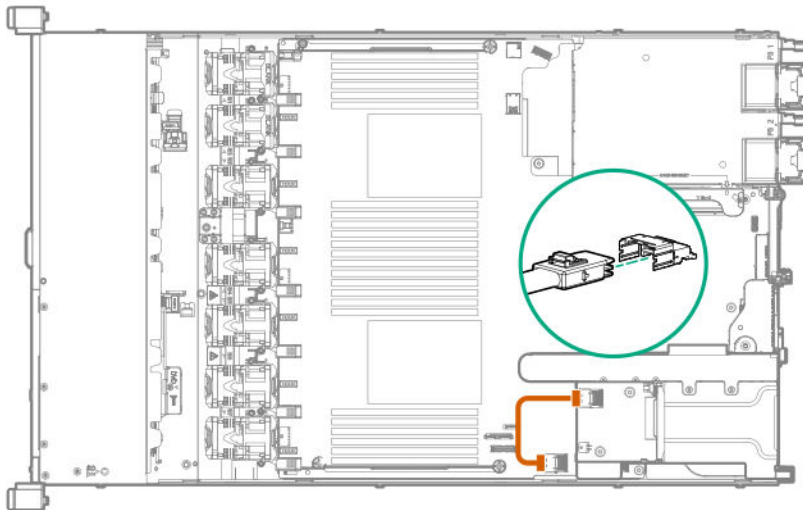
## 10 SFF NVMe backplane to NVMe riser



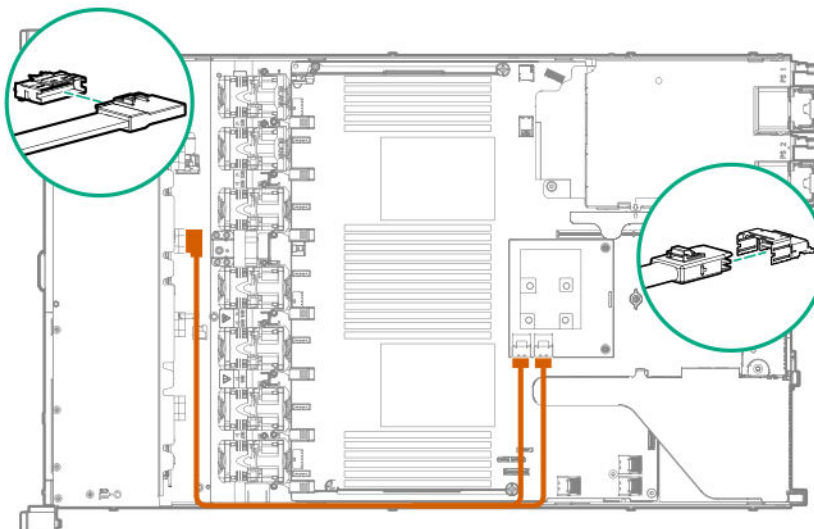
## 2 SFF NVMe backplane to primary riser



## 1 SFF rear backplane to system board SATA



## 10 SFF backplane to P408i-a controller



## Additional SFF cabling

For more information on the following cables and cabling configurations, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>):

- 8 SFF backplane to P408i-p controller
- 8 SFF backplane to system board SATA
- 8 SFF backplane power cable
- 2 SFF backplane to P408i-p controller
- 2 SFF backplane to system board SATA
- 2 SFF to 8 SFF power cable

- 1 SFF rear backplane to P816i-a controller
- SFF system power/USB cable

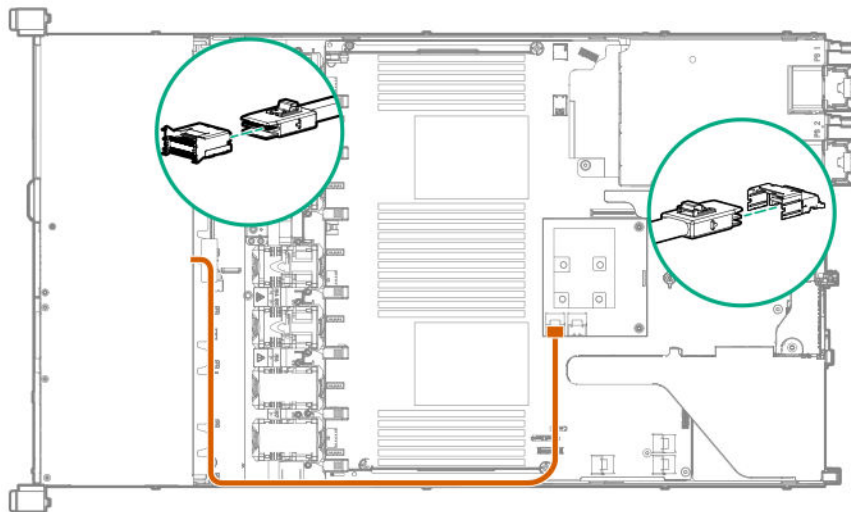
## LFF cables

Option kit	Cable part number	Connects from	Connects to
HPE DL360 Gen10 LFF Internal Cable Kit	869673-001	4 LFF backplane	Type -p Smart Array controller, slot 1 Type -a Smart Array controller Embedded SATA
	874616-001	4 LFF backplane	PCI controller, slot 2
HPE DL360 Gen9 LFF Optical Cable Kit	756914-001	LFF optical drive	System board SATA, port 5

## LFF configuration cable routing

**NOTE:** The following information describes the standard cable routing for this component. For more information on optional cable routing, see the HPE ProLiant DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>).

### 4 LFF backplane to P408i-a controller



## Additional LFF cabling

For more information on the following cables and cabling configurations, see the HPE DL360 Gen10 Server cabling matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/CablingMatrixGen10>):

- 4 LFF backplane to P408i-p controller
- 4 LFF backplane to system board SATA

# 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
<b>Active Health System</b> on page 144	Online and Offline
<b>HPE iLO 5</b> on page 144	Online and Offline
<b>HPE Smart Storage Administrator</b> on page 151	Online and Offline
<b>iLO RESTful API</b> on page 146	Online and Offline
<b>Intelligent Provisioning</b> on page 147	Online and Offline
<b>Scripting Toolkit for Windows and Linux</b> on page 148	Online
<b>Service Pack for ProLiant</b> on page 153	Online and Offline
<b>Smart Update Manager</b> on page 153	Online and Offline
<b>UEFI System Utilities</b> on page 149	Offline
<b>HPE MR Storage Administrator</b> on page 151	Offline
<b>StorCLI</b> on page 152	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.

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 ProLiant Gen10 servers and Synergy Gen10 compute modules.

To find out if your server model 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 SMB Setup. When you launch F10 mode from the POST screen, you are prompted to select whether you want to enter the Intelligent Provisioning or HPE SMB Setup mode.


---

**NOTE:** After you have selected a mode, you must re provision 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 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.

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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 SMB Setup.
- 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 and iLO Advanced Premium Security Edition licenses 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>.

For information about the iLO Advanced Premium Security Edition license, see <http://www.hpe.com/servers/ilopremium>.

## 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

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**!** **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.

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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>.

## 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.

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

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## 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.

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

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## Smart Update Tools

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

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**NOTE:** HPE OneView or iLO Amplifier Pack manage the iLO while iSUT runs on each server and deploys the updates. The same tool might not manage both applications. Create a process that notifies the administrators when updates are available.

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- **Smart Update Tools:** Polls iLO to check for requests from HPE OneView 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 Amplifier Pack:** Displays available updates for servers. Communicates with iSUT (or SUT 1.x) through iLO to perform updates.
- **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.

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**NOTE:** Do not manage the same nodes with iLO Amplifier Pack and HPE OneView at the same time.

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## 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

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

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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>).

# Removing and replacing the system battery

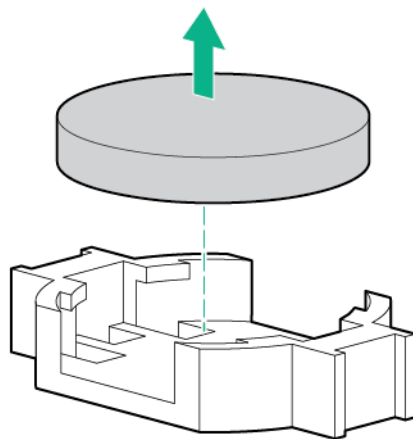
The system battery provides power to the real-time clock. If the server no longer automatically displays the correct date and time, you might need to replace the system battery.

**⚠ 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 (**Powering down the server** on page 30).
2. Remove all power:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - a. Extend the server from the rack (**Extend the server from the rack** on page 30).
  - b. Remove the server from the rack (**Remove the server from the rack** on page 31).
4. Remove the access panel (**Remove the access panel** on page 31).
5. Locate the battery (**System board components** on page 16).
6. Remove the battery.



7. 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
<b>Temperature range<sup>1</sup></b>	—
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
<b>Relative humidity (noncondensing)</b>	—
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature

<sup>1</sup> All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

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

- 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).
- 40°C to 45°C (104°F to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

The approved hardware configurations for this system are listed on the [Hewlett Packard Enterprise website](#).

## Server specifications

Specification	Value
Height	4.29 cm (1.69 in)
Depth (chassis with SFF drive cage)	70.7 cm (27.83 in)
Depth (chassis with LFF drive cage)	74.98 cm (29.50 in)
Width	43.46 cm (17.11 in)
<b>Weights</b>	

*Table Continued*



Specification	Value
SFF minimum (one drive, one processor, one power supply, two heatsinks, one Smart Array controller, five fans)	13.04 kg (28.74 lb)
SFF maximum (10 drives, two processors, two power supplies, two heatsinks, one Smart Array controller, seven fans)	16.27 kg (35.86 lb)
LFF minimum (one drive, one processor, one power supply, two heatsinks, one Smart Array controller, five fans)	13.77 kg (30.36 lb)
LFF maximum (Four drives, two processors, two power supplies, two heatsinks, one Smart Array controller, seven fans)	16.78 kg (37 lb)

## Power supply specifications

Depending on the installed options and the regional location where the server was purchased, the server can be configured with one of the following power supplies:

- **[HPE 500W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)** on page 161
- **[HPE 800W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)** on page 162
- **[HPE 800W Flex Slot Titanium Hot-plug Low Halogen Power Supply](#)** on page 163
- **[HPE 800W Flex Slot Universal Hot-plug Low Halogen Power Supply](#)** on page 164
- **[HPE 800W Flex Slot -48VDC Hot-plug Low Halogen Power Supply](#)** on page 164
- **[HPE 1600W Flex Slot Platinum Hot-plug Low Halogen Power Supply](#)** on page 166

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

### HPE 500W Flex Slot Platinum Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	100 VAC to 240 VAC 240 VDC for China only

*Table Continued*

<b>Specification</b>	<b>Value</b>
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	5.8 A at 100 VAC 2.8 A at 200 VAC 2.4 A at 240 VDC for China only
Maximum rated input power	557 W at 100 VAC 539 W at 200 VAC 537 W at 240 VDC for China only
BTUs per hour	1902 at 100 VAC 1840 at 200 VAC 1832 at 240 VDC for China only
<b>Power supply output</b>	—
Rated steady-state power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only
Maximum peak power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only

## **HPE 800W Flex Slot Platinum Hot-plug Low Halogen Power Supply**

<b>Specification</b>	<b>Value</b>
<b>Input requirements</b>	—
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

*Table Continued*

Specification	Value
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
<b>Power supply output</b>	—
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 Titanium Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	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	4.35 A at 200 VAC 3.62 A at 240 VAC 3.62 A at 240 VDC for China only
Maximum rated input power	851 W at 200 VAC 848 W at 240 VAC 848 W at 240 VDC for China only
BTUs per hour	2905 at 200 VAC 2893 at 240 VAC 2893 at 240 VDC for China only
<b>Power supply output</b>	—

*Table Continued*

Specification	Value
Rated steady-state power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only

## HPE 800W Flex Slot Universal Hot-plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	200 VAC to 277 VAC 380 VDC
Rated input frequency	50 Hz to 60 Hz
Rated input current	4.4 A at 200 VAC 3.1 A at 277 VAC 2.3 A at 380 VDC
Maximum rated input power	869 W at 200 VAC 865 W at 230 VAC 861 W at 277 VAC 863 W at 380 VDC
BTUs per hour	2964 at 200 VAC 2951 at 230 VAC 2936 at 277 VAC 2943 at 380 VDC
<b>Power supply output</b>	—
Rated steady-state power	800 W at 200 VAC to 277 VAC input
Maximum peak power	800 W at 200 VAC to 277 VAC input

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

Specification	Value
<b>Input requirements</b>	—
Rated input voltage	-40 VDC to -72 VDC -48 VDC nominal input

*Table Continued*

Specification	Value
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
<b>Power supply output</b>	—
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
<b>Input requirements</b>	
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
<b>Power supply output</b>	
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

## Hot-plug power supply calculations

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

# Websites

## General websites

Hewlett Packard Enterprise Information Library

[www.hpe.com/info/EIL](http://www.hpe.com/info/EIL)

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

[www.hpe.com/storage/spock](http://www.hpe.com/storage/spock)

Storage white papers and analyst reports

[www.hpe.com/storage/whitepapers](http://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](http://www.hpe.com/support/hpesc)  
**Hewlett Packard Enterprise Support Center: Software downloads**  
[www.hpe.com/support/downloads](http://www.hpe.com/support/downloads)  
**Software Depot**  
[www.hpe.com/support/softwaredepot](http://www.hpe.com/support/softwaredepot)
- To subscribe to eNewsletters and alerts:  
[www.hpe.com/support/e-updates](http://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](http://www.hpe.com/support/AccessToSupportMaterials)

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 **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.

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## 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](http://www.hpe.com/services/getconnected)

#### HPE Proactive Care services

[www.hpe.com/services/proactivecare](http://www.hpe.com/services/proactivecare)

#### HPE Proactive Care service: Supported products list

[www.hpe.com/services/proactivecaresupportedproducts](http://www.hpe.com/services/proactivecaresupportedproducts)

#### HPE Proactive Care advanced service: Supported products list

[www.hpe.com/services/proactivecareadvancedsupportedproducts](http://www.hpe.com/services/proactivecareadvancedsupportedproducts)

### Proactive Care customer information

#### Proactive Care central

[www.hpe.com/services/proactivecarecentral](http://www.hpe.com/services/proactivecarecentral)

#### Proactive Care service activation

[www.hpe.com/services/proactivecarecentralgetstarted](http://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](http://www.hpe.com/support/ProLiantServers-Warranties)

#### HPE Enterprise and Cloudline Servers

[www.hpe.com/support/EnterpriseServers-Warranties](http://www.hpe.com/support/EnterpriseServers-Warranties)

#### HPE Storage Products

[www.hpe.com/support/Storage-Warranties](http://www.hpe.com/support/Storage-Warranties)

#### HPE Networking Products

[www.hpe.com/support/Networking-Warranties](http://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](http://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](http://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](http://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](http://www.hpe.com/info/environment)**

## **Documentation feedback**

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# Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AMP

Advanced Memory Protection

API

application program interface

ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASR

Automatic Server Recovery

CAS

column address strobe

CSA

Canadian Standards Association

CSR

Customer Self Repair

FSBBU

Flex slot battery backup

GPU

graphics processing unit

HBA

host bus adapter

HP SUM

HP Software Update Manager

HPE SSA

HPE Smart Storage Administrator

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISO

International Organization for Standardization

JSON

JavaScript Object Notation

LFF

large form factor

LRDIMM

load reduced dual in-line memory module

NAND

Not AND

NMI

nonmaskable interrupt

NVRAM

nonvolatile memory

PCIe

Peripheral Component Interconnect Express

PDU

power distribution unit

POST

Power-On Self-Test

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

REST

representational state transfer

RoHS

Restriction of Hazardous Substances

RSOC

relative state of charge

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SFF

small form factor

SID

Systems Insight Display  
SIM  
Systems Insight Manager  
SPP  
Service Pack for ProLiant  
TMRA  
recommended ambient operating temperature  
TPM  
Trusted Platform Module  
UDIMM  
unregistered dual in-line memory module  
UEFI  
Unified Extensible Firmware Interface  
UID  
unit identification  
USB  
universal serial bus  
VC  
Virtual Connect  
VCA  
Version Control Agent  
VCRM  
Version Control Repository Manager  
VDC  
voltage direct-current