



**Hewlett Packard
Enterprise**

HPE Apollo 2000 System User Guide

Abstract

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

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HPE Apollo 2000 System

Introduction

The HPE Apollo 2000 System consists of a chassis and nodes. There are three chassis options with different storage configurations. The four server tray slots on the chassis must be populated with server nodes or node blanks.

Chassis

- HPE Apollo r2200 Chassis (12 low-profile LFF model)
- HPE Apollo r2600 Chassis (24 SFF model)
- HPE Apollo r2800 Chassis (24 SFF model with storage expander backplane)

Nodes

- HPE ProLiant XL170r Gen9 Server Node (1U)
- HPE ProLiant XL190r Gen9 Server Node (2U)

The chassis supports the combination of 1U and 2U nodes. One chassis can support a maximum of the following:

- Four 1U nodes
- Two 1U nodes and one 2U node
- Two 2U nodes

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

Planning the installation

Safety and regulatory compliance

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the [Hewlett Packard Enterprise website](#).

Product QuickSpecs

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

Determine power and cooling configurations

Validate power and cooling requirements based on location and installed components.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of IT 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 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 UPS. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the server in operation during a power failure.

HPE Apollo Platform Manager

HPE Apollo Platform Manager, formerly named HPE Advanced Power Manager, is a point of contact for system administration.

To install, configure, and access HPE APM, see the *HPE Apollo Platform Manager User Guide* on the [Hewlett Packard Enterprise website](#).

Hot-plug power supply calculations

For more information on the hot-plug power supply and calculators to determine server power consumption in various system configurations, see the [Hewlett Packard Enterprise Power Advisor website](#).

Server warnings and cautions

**WARNING:**

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

- Observe local occupational health and safety requirements and guidelines for manual 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 or removing the server from the rack; it is unstable when not fastened to the rails.
-

**WARNING:**

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

**WARNING:**

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

**CAUTION:**

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

**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.

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 nodes 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 rack in a well-ventilated, climate-controlled environment.

The operating temperature inside the rack is always higher than the room temperature and is dependent on the configuration of equipment in the rack. Check the TMRA for each piece of equipment before installation.

-
- ⚠ 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 chassis or to increase the internal rack temperature beyond the maximum allowable limits.
 - Do not exceed the manufacturer's TMRA.
-

Grounding requirements

- The building installation must provide a means of connection to protective earth.
- The equipment must be connected to that means of connection.
- A service person must check whether the socket-outlet from which the equipment is to be powered provides a connection to the building protective earth. If the outlet does not provide a connection, the service person must arrange for the installation of a protective earthing conductor from the separate protective earthing terminal to the protective earth wire in the building.

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.

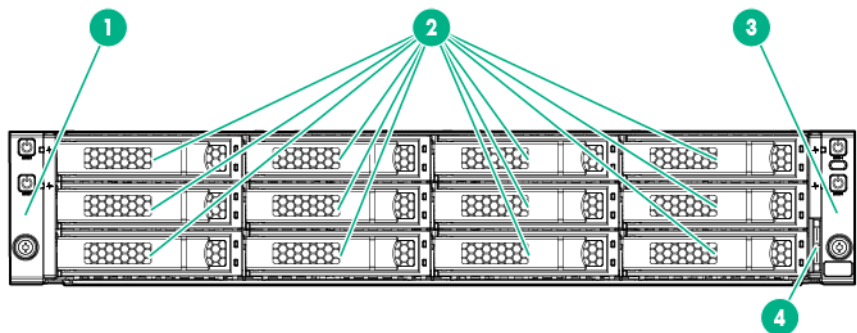
**WARNING:**

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.

Component identification

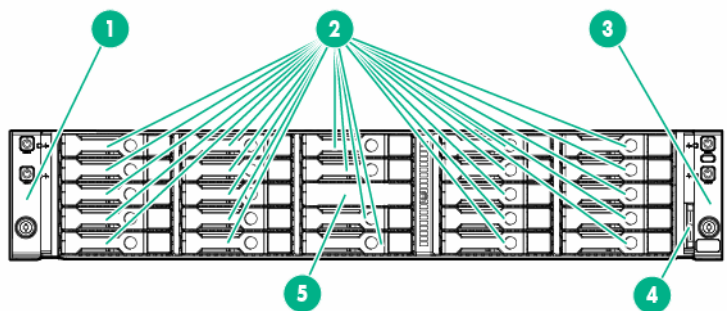
Chassis front panel components

- HPE Apollo r2200 Chassis



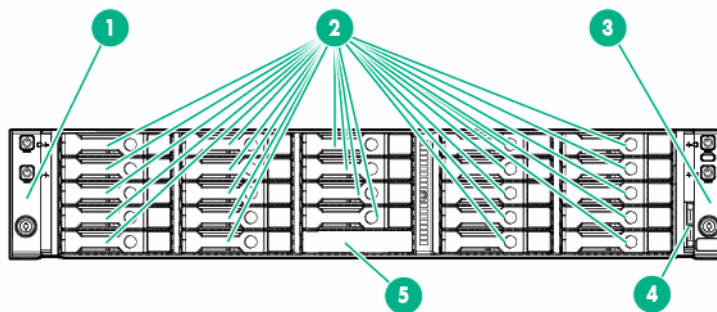
Item	Description
1	Left bezel ear
2	Low-profile LFF hot-plug drives
3	Right bezel ear
4	Chassis serial label pull tab

- HPE Apollo r2600 Chassis



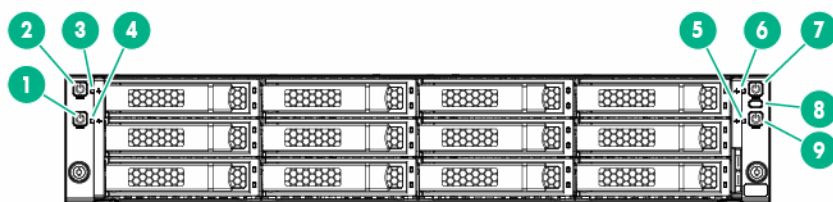
Item	Description
1	Left bezel ear
2	SFF SmartDrives
3	Right bezel ear
4	Chassis serial label pull tab
5	Non-removable bezel blank

- HPE Apollo r2800 Chassis



Item	Description
1	Left bezel ear
2	SFF SmartDrives
3	Right bezel ear
4	Chassis serial label pull tab
5	Non-removable bezel blank

Chassis front panel LEDs and buttons



Item	Description	Status
1	Power On/Standby button and system power LED (Node 1) ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²
2	Power On/Standby button and system power LED (Node 2) ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²

Table Continued

Item	Description	Status
3	Health LED (Node 2) ¹	Solid green = Normal Flashing amber = System degraded Flashing red = System critical ³
4	Health LED (Node 1) ¹	Solid green = Normal Flashing amber = System degraded Flashing red = System critical ³
5	Health LED (Node 3) ¹	Solid green = Normal Flashing amber = System degraded Flashing red = System critical ³
6	Health LED (Node 4) ¹	Solid green = Normal Flashing amber = System degraded Flashing red = System critical ³
7	Power On/Standby button and system power LED (Node 4) ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²
8	UID button/LED ¹	Solid blue = Activated Flashing blue: • 1 flash per second = Remote management or firmware upgrade in progress • 4 flashes per second = iLO manual soft reboot sequence initiated • 8 flashes per second = iLO manual hard reboot sequence in progress Off = Deactivated
9	Power On/Standby button and system power LED (Node 3) ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²

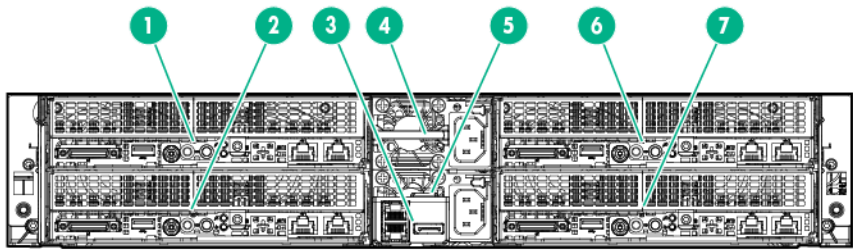
¹ When the LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see **Power Fault LEDs**.

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

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

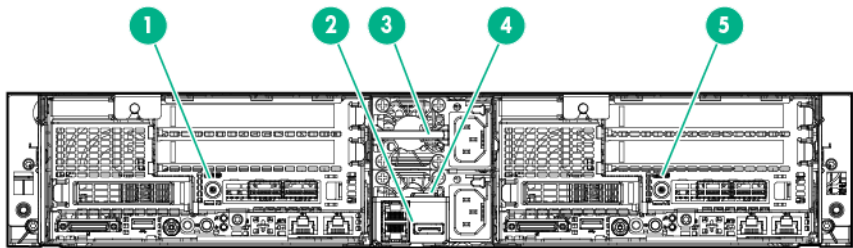
Chassis rear panel components

Four 1U nodes



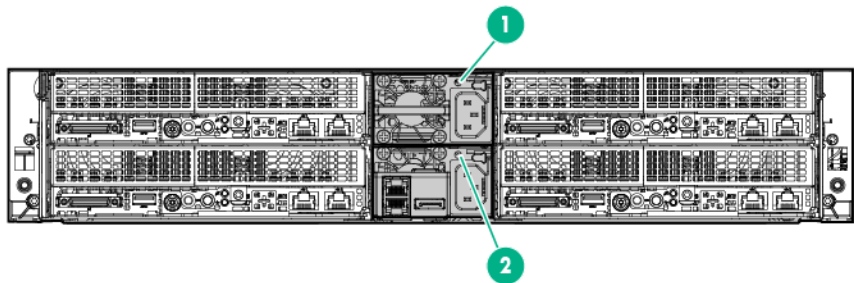
Item	Description
1	Node 4
2	Node 3
3	RCM module (optional)
4	Power supply 2
5	Power supply 1
6	Node 2
7	Node 1

Two 2U nodes



Item	Description
1	Node 3
2	RCM module (optional)
3	Power supply 2
4	Power supply 1
5	Node 1

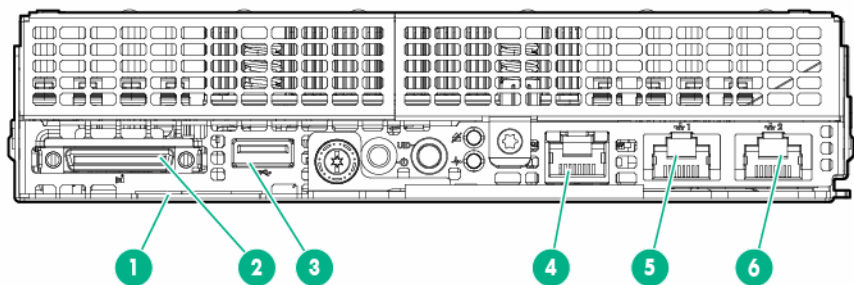
Chassis rear panel LEDs



Item	Description	Status
1	Power supply 2 LED	Solid green = Normal Off = One or more of the following conditions exists: • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply error
2	Power supply 1 LED	Solid green = Normal Off = One or more of the following conditions exists: • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply error

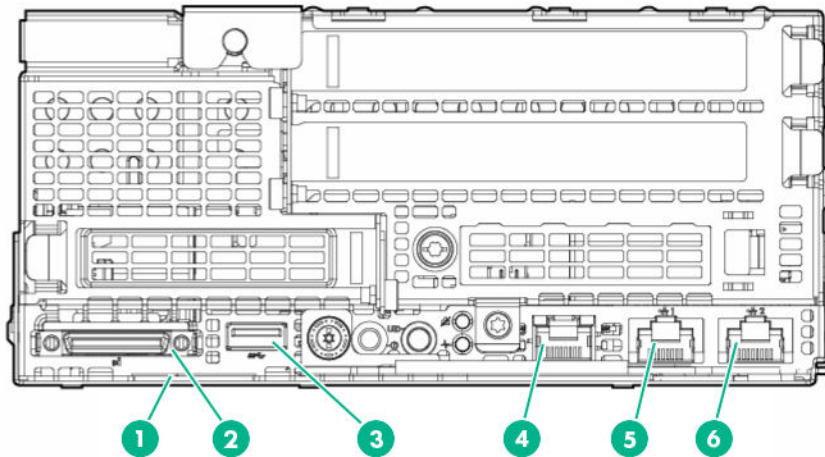
Node rear panel components

1U node rear panel components



Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2

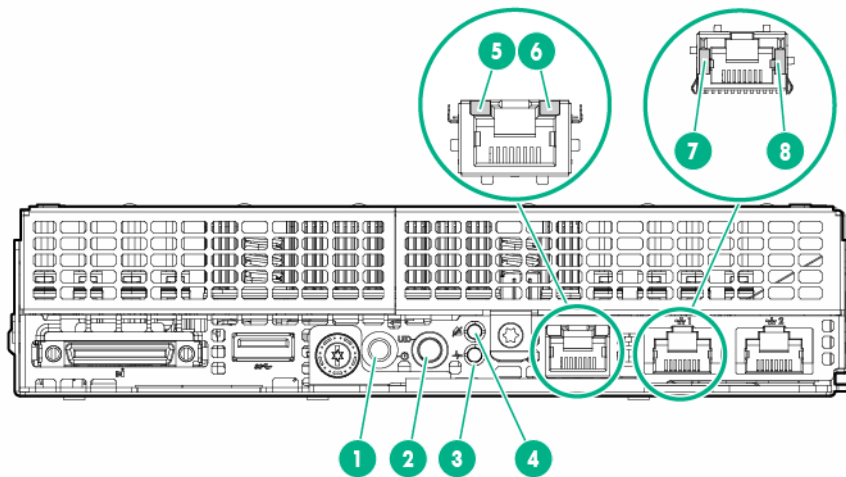
2U node rear panel components



Item	Description
1	Node serial number and iLO label pull tab
2	SUV connector
3	USB 3.0 connector
4	Dedicated iLO port (optional)
5	NIC connector 1
6	NIC connector 2

Node rear panel LEDs and buttons

- 1U node



Item	Description	Status
1	Power button/LED ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²
2	UID button/LED ¹	Solid blue = Activated ◦ 1 flash per second = Remote management or firmware upgrade in progress ◦ 4 flashes per second = iLO manual soft reboot sequence initiated ◦ 8 flashes per second = iLO manual hard reboot sequence in progress Off = Deactivated
3	Health LED ¹	Solid green = Normal Flashing green = iLO rebooting Flashing amber = System degraded Flashing red = System critical ³
4	Do not remove LED	Flashing white = Do not remove the node. Removing the node may terminate the current operation and cause data loss. Off = The node can be removed.
5	iLO activity LED	Green or flashing green = Network activity Off = No network activity

Table Continued

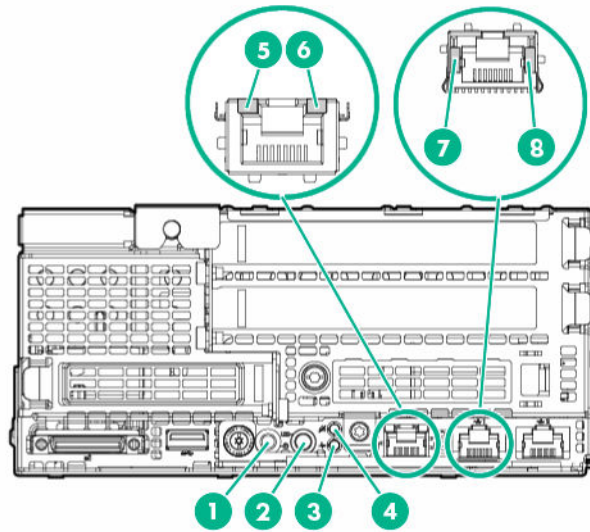
Item	Description	Status
6	iLO link LED	Green = Linked to network Off = No network connection
7	NIC link LED ¹	Green = Linked to network Off = No network connection
8	NIC activity LED ¹	Green or flashing green = Network activity Off = No network activity

¹ When the LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see **"Power fault LEDs."**

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

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

- **2U node**



Item	Description	Status
1	Power button/LED ¹	Solid green = System on Flashing green = Performing power on sequence Solid amber = System in standby Off = No power present ²
2	UID button/LED ¹	Solid blue = Activated ◦ 1 flash per second = Remote management or firmware upgrade in progress ◦ 4 flashes per second = iLO manual soft reboot sequence initiated ◦ 8 flashes per second = iLO manual hard reboot sequence in progress Off = Deactivated
3	Health LED ¹	Solid green = Normal Flashing amber = System degraded Flashing red = System critical ³
4	Do not remove LED	Flashing white = Do not remove the node. Removing the node may terminate the current operation and cause data loss. Off = The node can be removed.
5	iLO activity LED	Green or flashing green = Network activity Off = No network activity
6	iLO link LED	Green = Linked to network Off = No network connection
7	NIC link LED ¹	Green = Linked to network Off = No network connection
8	NIC activity LED ¹	Green or flashing green = Network activity Off = No network activity

¹ When the LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "**Power Fault LEDs.**"

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

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

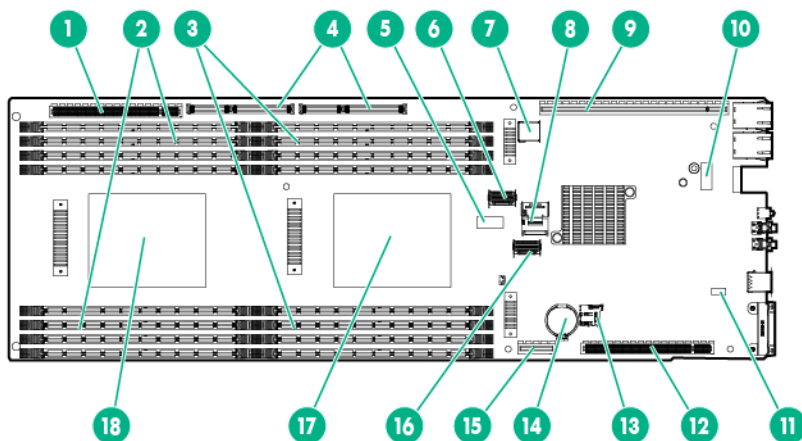
Power fault LEDs

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

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

System board components

NOTE: HPE ProLiant XL170r and XL190r Gen9 Server Nodes share the same system board.



Item	Description
1	Bayonet board slot
2	DIMMs for processor 2
3	DIMMs for processor 1
4	PCIe x40 riser board connector*
5	System maintenance switch
6	Mini-SAS connector 1 (SATA x4)
7	Internal USB 3.0 connector
8	Mini-SAS connector 2 (SATA x4)
9	PCIe x24 riser board connector*

Table Continued

Item	Description
10	Dedicated iLO port connector
11	NMI header
12	PCIe x16 riser board connector*
13	microSD slot
14	System battery
15	M.2 SSD riser connector
16	TPM connector
17	Processor 1
18	Processor 2

For more information on the riser board slots supported by the onboard PCI riser connectors, see [PCIe riser board slot definitions](#).

System maintenance switch

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

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

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

**CAUTION:**

Clearing CMOS, NVRAM, or both deletes configuration information. Be sure to configure the node properly to prevent data loss.

**IMPORTANT:**

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

NMI functionality

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

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

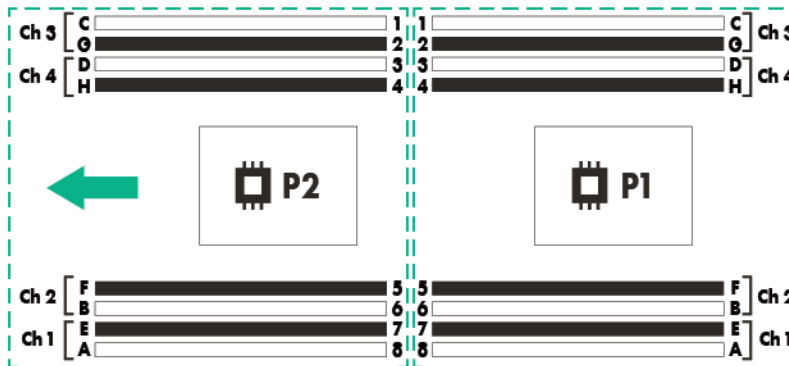
To force the system to invoke the NMI handler and generate a crash dump log, do one of the following:

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

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

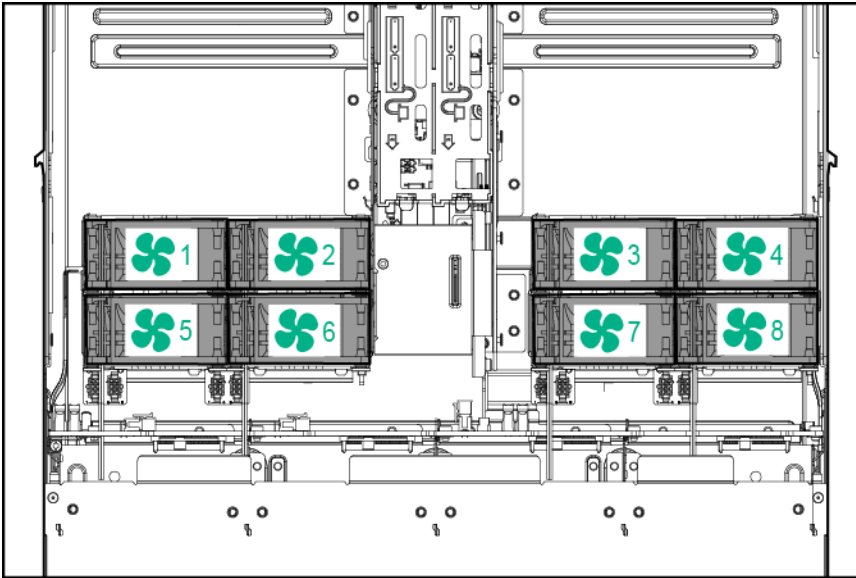
DIMM slot locations

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



NOTE: The arrow indicates the front of the chassis.

Fan locations



Drive bay numbering



CAUTION:

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

NOTE: A SATA or mini-SAS cable must be installed in a node for the node to correspond to drives in the chassis.

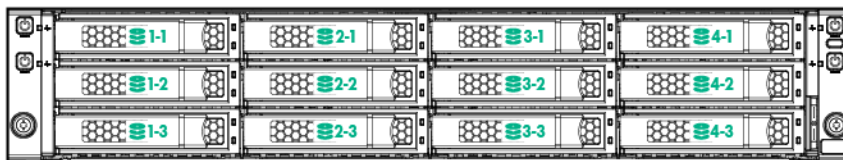
HPE Apollo r2200 Chassis drive bay numbering

One 1U node corresponds to a maximum of three low-profile LFF hot-plug drives.

- Node 1 corresponds to drive bays 1-1 through 1-3.
- Node 2 corresponds to drive bays 2-1 through 2-3.
- Node 3 corresponds to drive bays 3-1 through 3-3.
- Node 4 corresponds to drive bays 4-1 through 4-3.

One 2U node corresponds to a maximum of six low-profile LFF hot-plug drives.

- Node 1 corresponds to drive bays 1-1 through 2-3.
- Node 3 corresponds to drive bays 3-1 through 4-3.



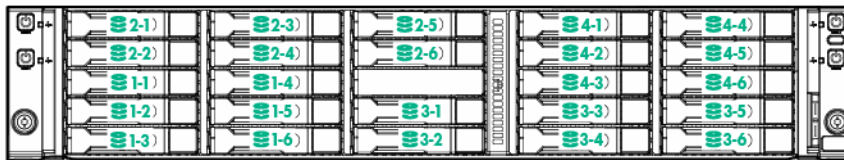
HPE Apollo r2600 Chassis drive bay numbering

One 1U node corresponds to a maximum of six SFF SmartDrives.

- Node 1 corresponds to drive bays 1-1 through 1-6.
- Node 2 corresponds to drive bays 2-1 through 2-6.
- Node 3 corresponds to drive bays 3-1 through 3-6.
- Node 4 corresponds to drive bays 4-1 through 4-6.

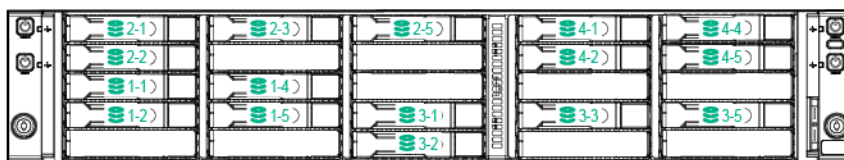
If a P840 Smart Array controller is installed, one 2U node corresponds to a maximum of twelve SFF SmartDrives.

- Node 1 corresponds to drive bays 1-1 through 2-6.
- Node 3 corresponds to drive bays 3-1 through 4-6.



If using the Dynamic Smart Array B140i Controller, HPE H240 Host Bus Adapter, or HPE P440 Smart Array Controller: one 2U node corresponds to a maximum of eight SFF SmartDrives. The remaining drives bays must be populated with drive blanks.

- Node 1 corresponds to drive bays 1-1, 1-2, 1-4, 1-5, 2-1, 2-2, 2-3 and 2-5.
- Node 3 corresponds to drive bays 3-1, 3-2, 3-3, 3-5, 4-1, 4-2, 4-4 and 4-5.



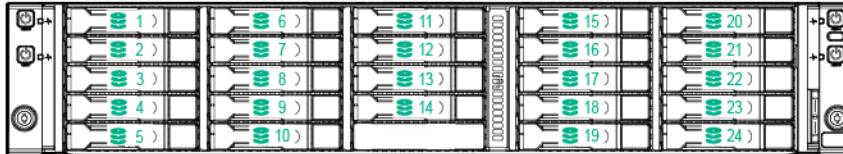
For more information on installing a storage controller, see "[Controller options](#)."

HPE Apollo r2800 Chassis drive bay numbering



IMPORTANT:

The HPE Apollo r2800 Chassis does not support nodes using the HPE Dynamic Smart Array B140i Controller or the HPE P840 Smart Array Controller. Hewlett Packard Enterprise recommends installing an HPE H240 Host Bus Adapter or HPE P440 Smart Array Controller.

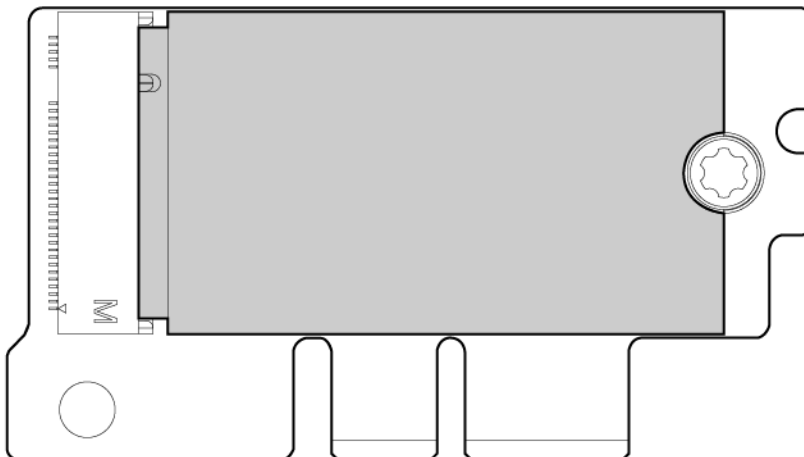


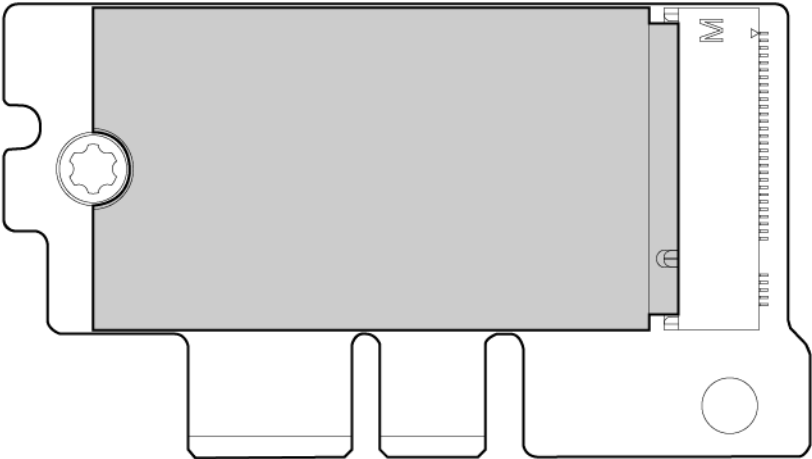
For information on drive bay mapping in the HPE Apollo r2800 Chassis and the factory default configuration, see "[Drive bay mapping for the HPE Apollo r2800 Chassis.](#)"

For more information on installing a storage controller, see "[Controller options.](#)"

M.2 SATA SSD bay numbering

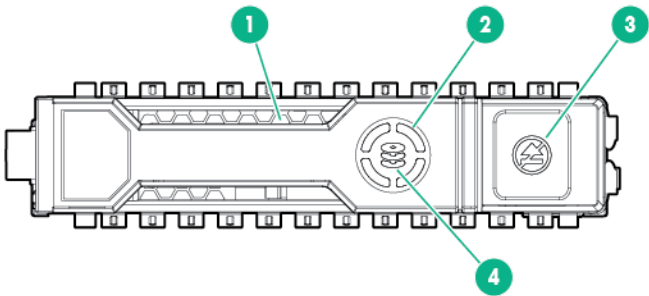
Bay 9





Hot-plug drive LED definitions

SmartDrive hot-plug drive 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.

Table Continued

Item	LED	Status	Definition
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

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

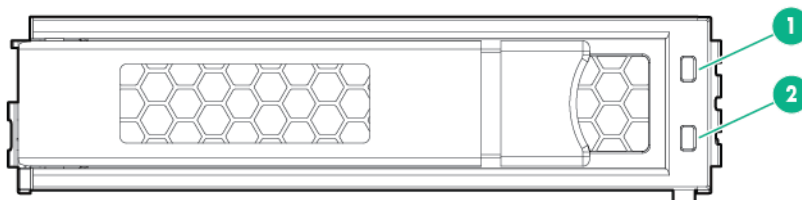
❗ IMPORTANT:

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

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

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

Low-profile LFF hot-plug drive LED definitions



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

LED Activity

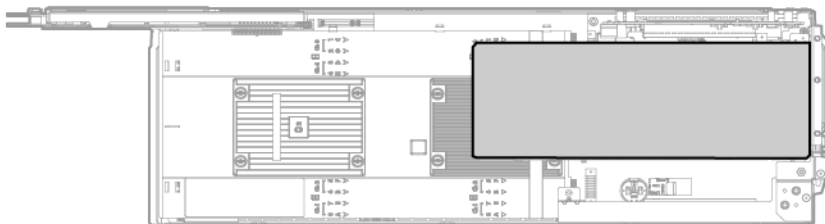
Online/Activity LED (green)	Fault/UID LED (amber/blue)	Definition
On, off, or flashing	Alternating amber and blue	One or more of the following conditions exist: • The drive has failed. • A predictive failure alert has been received for this drive. • The drive has been selected by a management application.
On, off, or flashing	Solid blue	One or both of the following conditions exist: • The drive is operating normally. • The drive has been selected by a management application.
On	Flashing amber	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online but is not currently active.
1 flash per second	Flashing amber	Do not remove the drive. Removing the drive might terminate the current operation and cause data loss. The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not remove the drive until the expansion or migration is complete.
1 flash per second	Off	Do not remove the drive. Removing the drive might terminate the current operation and cause data loss. The drive is rebuilding, erasing, or is part of an array that is undergoing capacity expansion or stripe migration.
4 flashes per second	Flashing amber	The drive is active but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
4 flashes per second	Off	The drive is active and is operating normally.

Table Continued

Online/Activity LED (green)	Fault/UID LED (amber/blue)	Definition
Off	Solid amber	A critical fault condition has been identified for this drive and the controller has placed it offline. Replace the drive as soon as possible.
Off	Flashing amber	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

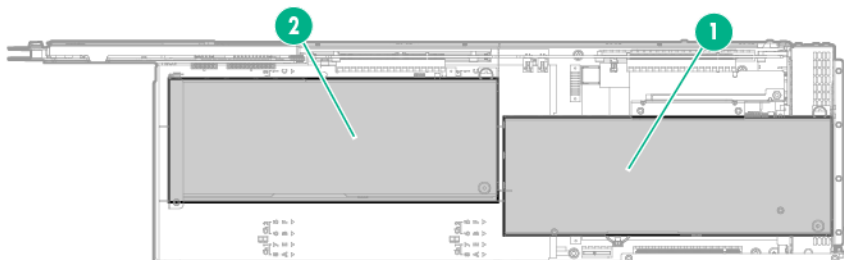
Accelerator numbering

One accelerator in a FlexibleLOM 2U node riser cage assembly



Item	Description
1	Accelerator 1

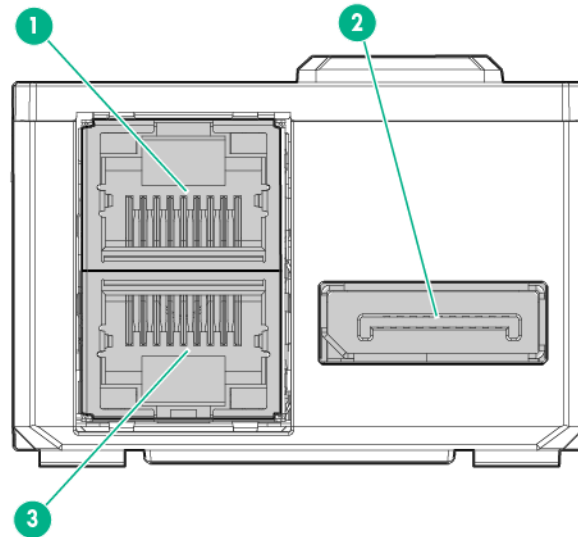
Two accelerators in a three-slot riser cage assembly



Item	Description
1	Accelerator 1
2	Accelerator 2

For more information, see "[Accelerator options.](#)"

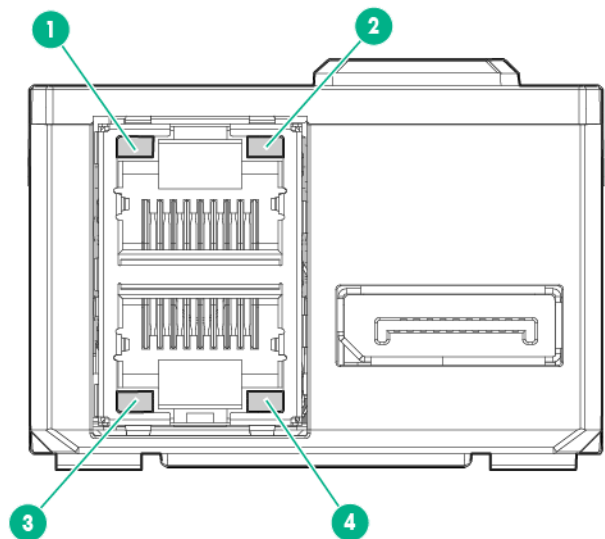
RCM module components



Item	Description
1	iLO connector
2	HPE APM 2.0 connector
3	iLO connector

For more information, see "[Installing the RCM module option.](#)"

RCM module LEDs

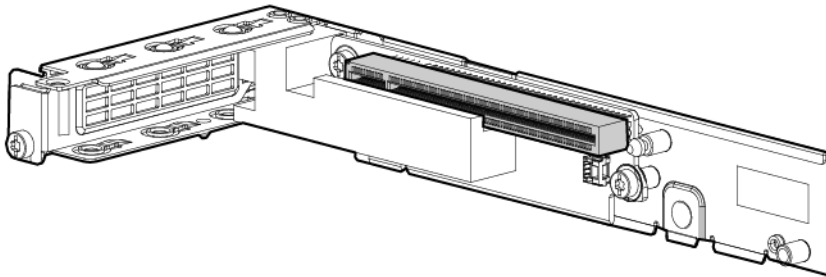


Item	Description
1	iLO activity LED Green or flashing green = Network activity Off = No network activity
2	iLO link LED Green = Linked to network Off = No network connection
3	iLO link LED Green = Linked to network Off = No network connection
4	iLO activity LED Green or flashing green = Network activity Off = No network activity

For more information, see "[Installing the RCM module option.](#)"

PCIe riser board slot definitions

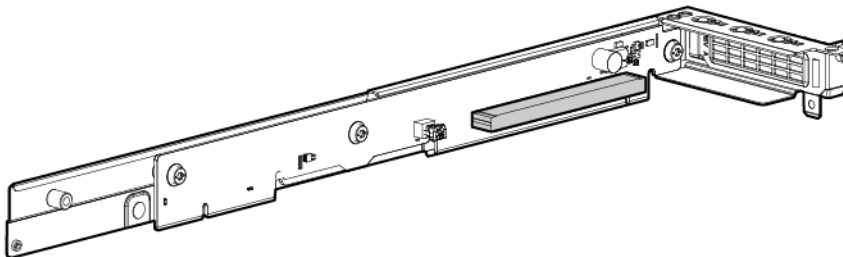
- Single-slot left PCI riser cage assembly (PN 798178-B21)



Form factor	Slot number	Slot description
Storage controller or low-profile PCIe NIC card	1	PCIe3 x16 (16, 8, 4, 1) for Processor 1

For more information on installing a storage controller, see "[Controller options](#)."

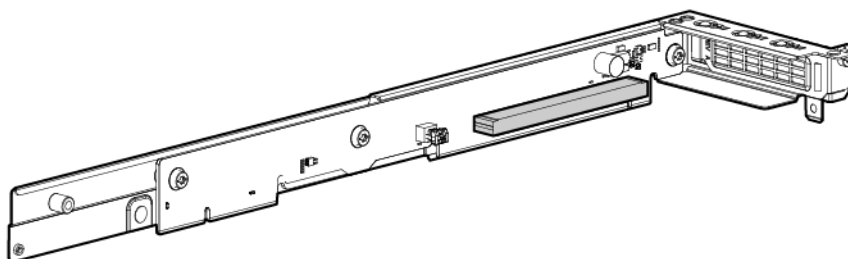
- Single-slot 1U right PCI riser cage assembly for Processor 2 (PN 798182-B21)



Form factor	Slot number	Slot description
Storage controller or low-profile PCIe NIC card	2	PCIe3 x16 (16, 8, 4, 1) for Processor 2

For more information on installing a storage controller, see "[Controller options](#)."

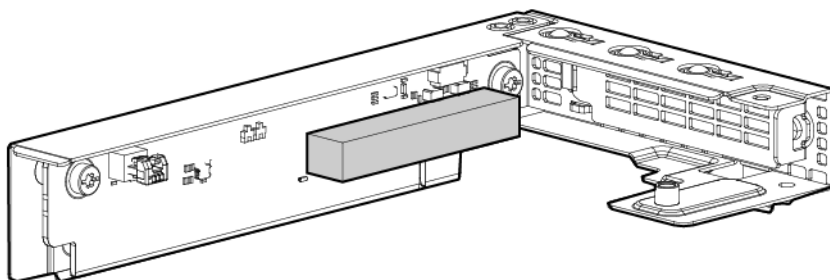
- Single-slot 1U right PCI riser cage assembly for Processor 1 (PN 819939-B21)



Form factor	Slot number	Slot description
Storage controller or low-profile PCIe NIC card	2	PCIe3 x16 (16, 8, 4, 1) for Processor 1

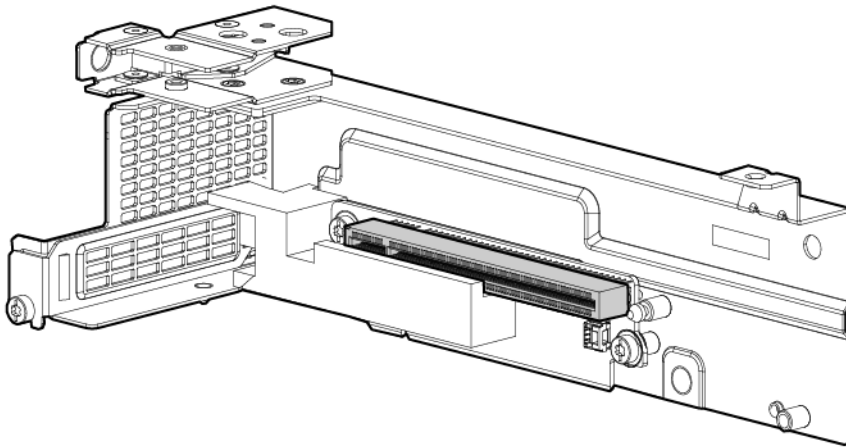
For more information on installing a storage controller, see "[Controller options](#)."

- FlexibleLOM 1U node riser cage assembly (PN 798180-B21)



Form factor	Slot number	Slot description
FlexibleLOM	FlexibleLOM slot	PCIe3 x8 for Processor 1

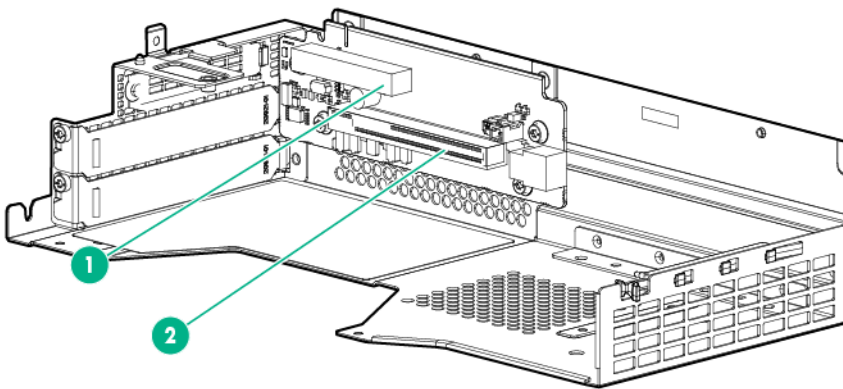
- Single-slot 2U node PCI riser cage assembly (PN 800293-B21)



Form factor	Slot number	Slot description
Storage controller or low-profile PCIe NIC card	1	PCIe3x16 (16, 8, 4, 1) for Processor 1

For more information on installing a storage controller, see "[Controller options](#)."

- FlexibleLOM 2U node riser cage assembly (PN 798184-B21)

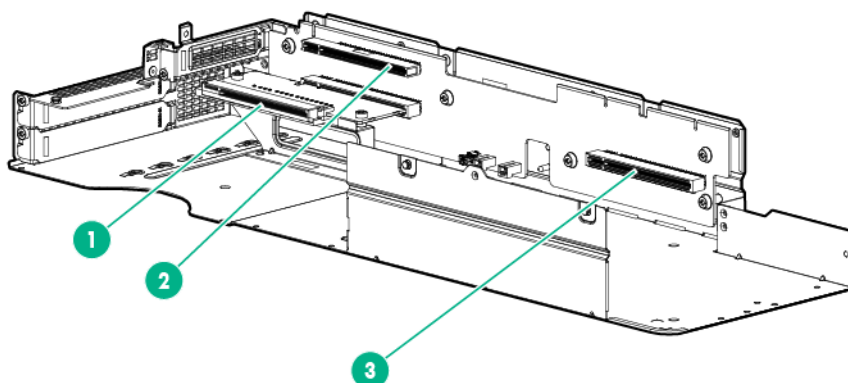


Item	Form factor	Slot number	Slot description
1	FlexibleLOM	FlexibleLOM slot	PCIe3 x8 for Processor 1
2	Storage controller or accelerator card	2	PCIe3 x16 (16, 8, 4, 1) for Processor 1

For more information on installing a storage controller, see "[Controller options](#)."

For more information on installing an accelerator, see "[Accelerator options.](#)"

- Three-slot 110S PCI riser cage assembly (PN 798186-B21)

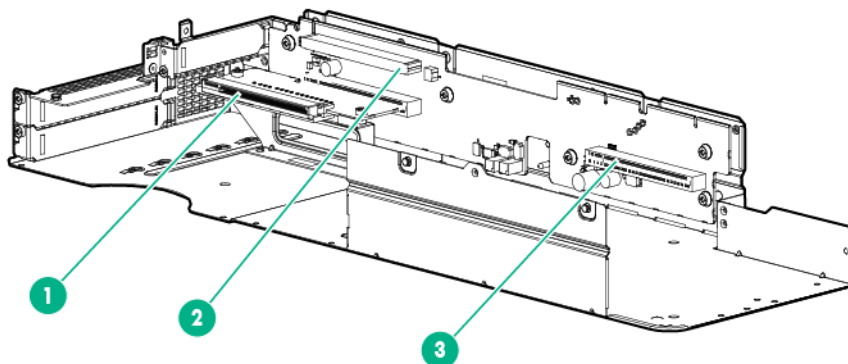


Item	Form factor	Slot number	Slot description
1	Accelerator card	3	PCIe3 x16 (16, 8, 4, 1) for Processor 1
2	Storage controller or low-profile PCIe NIC card	2	PCIe3 x16 (16, 8, 4, 1) for Processor 2
3	Accelerator card	4	PCIe3 x16 (16, 8, 4, 1) for Processor 2

For more information on installing a storage controller, see "[Controller options.](#)"

For more information on installing an accelerator, see "[Accelerator options.](#)"

- Three-slot GPU-direct PCI riser cage assembly (PN 798188-B21)

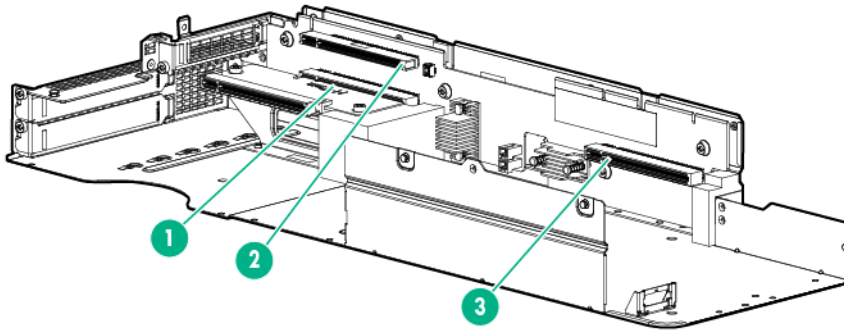


Item	Form factor	Slot number	Slot description
1	Accelerator card	3	PCIe3 x16 (16, 8, 4, 1) for Processor 2
2	Storage controller or low-profile PCIe NIC card	2	PCIe3 x16 (8, 4, 1) for Processor 2
3	Accelerator card	4	PCIe3 x16 (16, 8, 4, 1) for Processor 2

For more information on installing a storage controller, see "**Controller options.**"

For more information on installing an accelerator, see "**Accelerator options.**"

- Three-slot GPU-direct with re-timer PCI riser cage assembly (PN 827353-B21)



Item	Form factor	Slot number	Slot description
1	Accelerator card	3	PCIe3 x16 (16, 8, 4, 1) for Processor 2
2	Storage controller or low-profile PCIe NIC card	2	PCIe3 x16 (8, 4, 1) for Processor 2
3	Accelerator card	4	PCIe3 x16 (16, 8, 4, 1) for Processor 2

For more information on installing a storage controller, see "**Controller options.**"

For more information on installing an accelerator, see "**Accelerator options.**"

Operations

Power up the nodes

The SL/XL Chassis Firmware initiates an automatic power-up sequence when the nodes are installed. If the default setting is changed, use one of the following methods to power up each node:

- Use a virtual power button selection through iLO.
- Press and release the Power On/Standby button.

When the node goes from the standby mode to the full power mode, the node power LED changes from amber to green.

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

Power down the node

⚠ CAUTION:
Before powering down the node, perform a backup of critical server data and programs. Removing the node while the Do not remove LED is on may result in data loss or corruption. The node can be safely removed from the chassis only after the **Do not remove LED is off**.

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

To power down the node , 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 node enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the node to enter standby mode.
This method forces the node 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 node enters standby mode.

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

Remove the node from the chassis

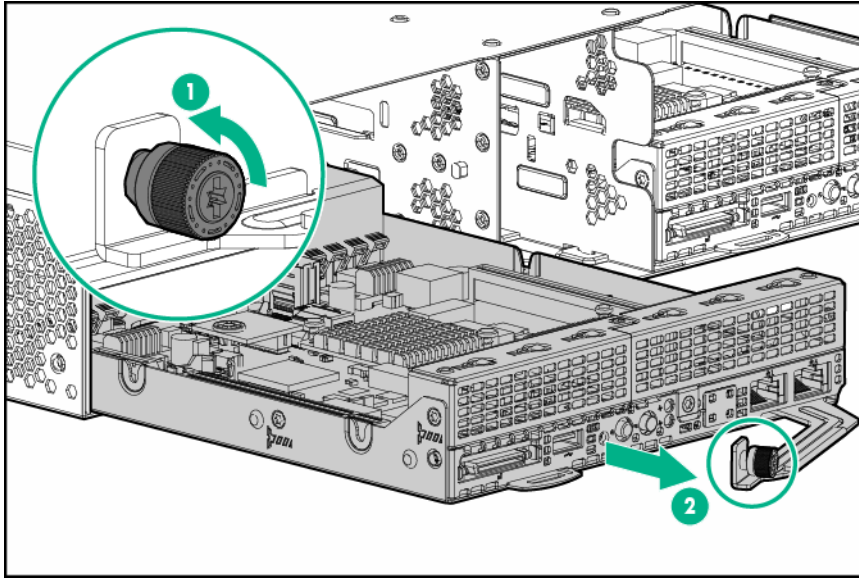
⚠ CAUTION:
Before powering down the node, perform a backup of critical server data and programs. Removing the node while the Do not remove LED is on may result in data loss or corruption. The node can be safely removed from the chassis only after the **Do not remove LED is off**.

⚠ CAUTION:
To avoid damage to the node , always support the bottom of the node when removing it from the chassis .

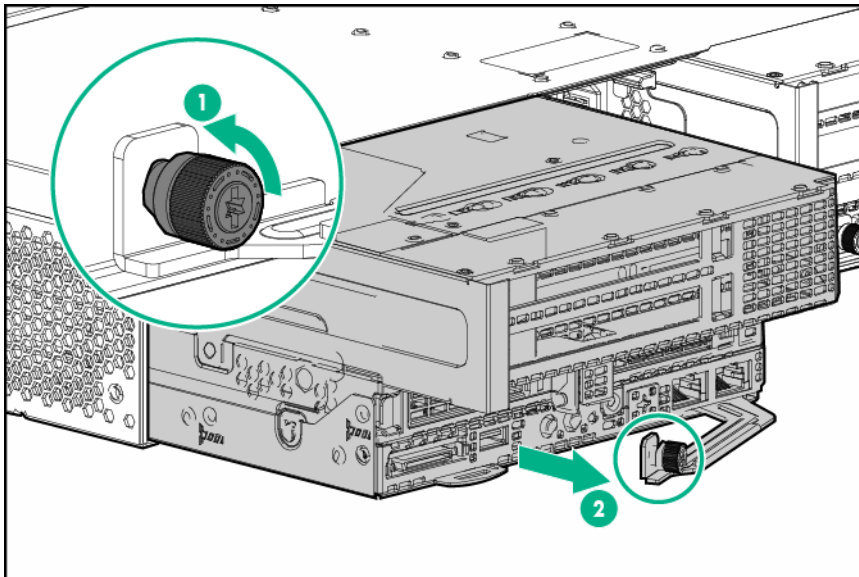
Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. Remove the node from the chassis:
 - a. Loosen the thumbscrew.
Loosen the thumbscrew.
 - b. Pull back the handle and remove the node.
Pull back the handle and remove the node.

- 1U node



- 2U node



CAUTION:

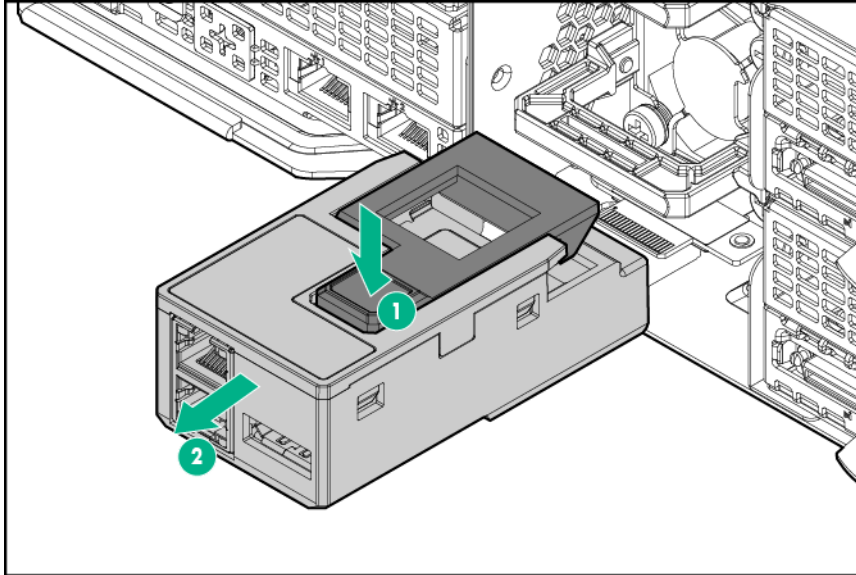
To avoid damage to the device, do not use the removal handle to carry it.

4. Place the node on a flat, level surface.

Remove the RCM module

Procedure

1. **Power down all nodes.**
2. Access the product rear panel.
3. Disconnect all cables from the RCM module.
4. Remove the RCM module.



Remove the power supply

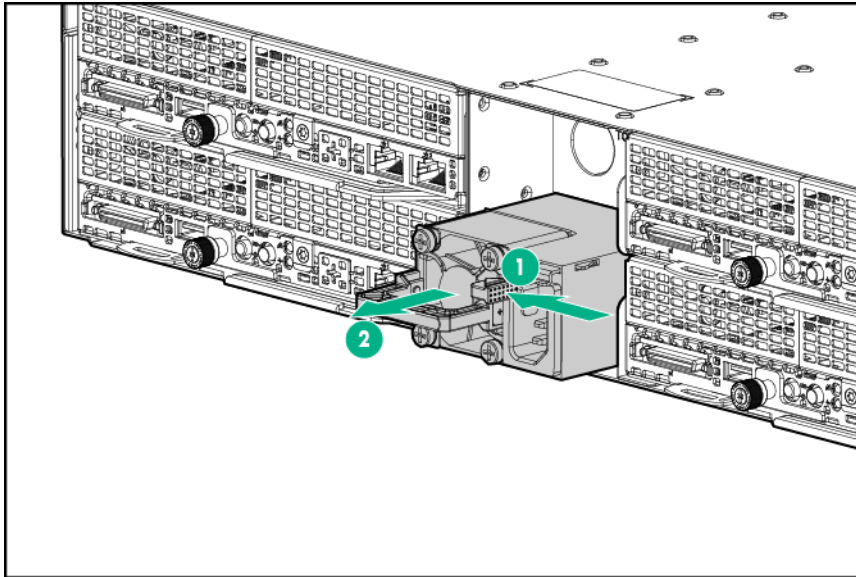
Prerequisites

Before removing the power supply, note the configuration and possible impact to the system.

- If two power supplies are installed, removal or failure of one of the power supplies might result in throttling or shut down of the server nodes. For more information, see "**Power capping modes.**"
- The bottom power is power supply 1, and the top power supply is power supply 2. For power supply numbering, see "**Chassis rear panel components.**"
- Power supply 2 is hot-swappable only if power supply 1 is installed.
- If a RCM module is installed, power down all nodes before removing the RCM module and power supply 1.
- Power supply 1 is hot-swappable only if:
 - A RCM module is not installed.
 - Power supply 2 is installed.

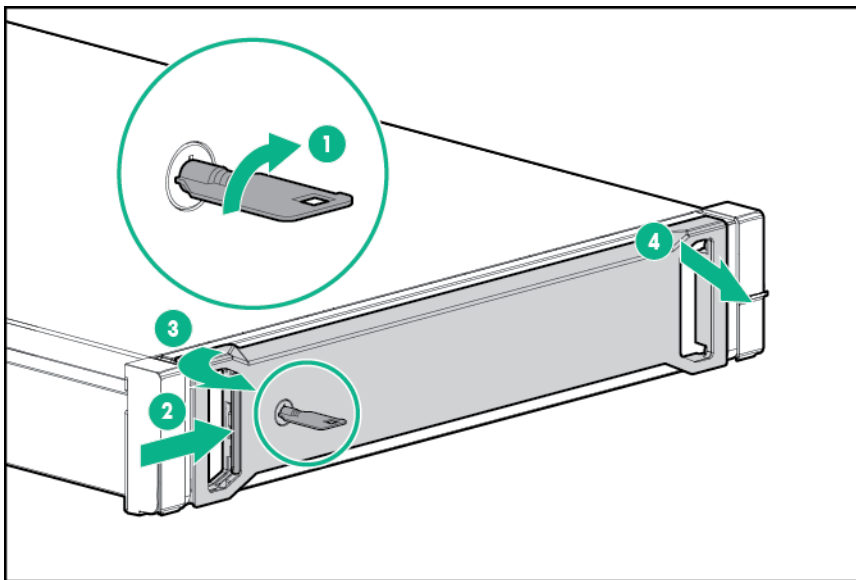
Procedure

1. **Power down all nodes.**
2. Access the product rear panel.
3. If installed, **remove the RCM module.**
4. Release the power cord from the strain relief strap.
5. Remove all power:
 - a. Disconnect the power cord from the power source.
 - b. Disconnect the power cord from the chassis.
6. Remove the power supply.



Remove the security bezel

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



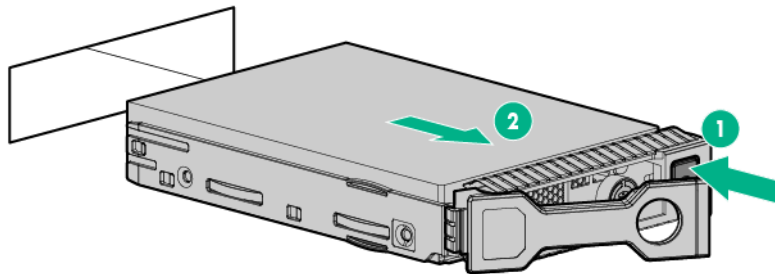
Removing the drive

⚠ CAUTION:

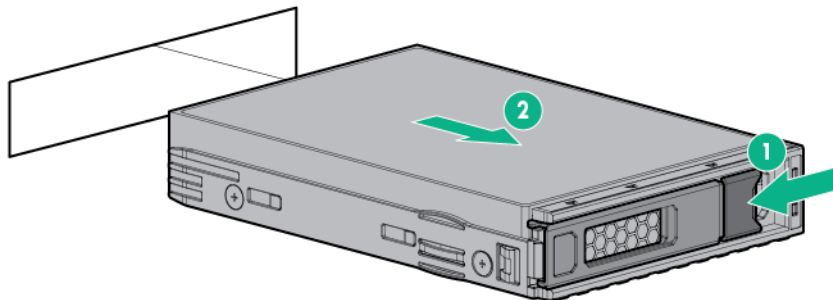
For proper cooling, do not operate the node without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

Procedure

1. If installed, **remove the security bezel**.
2. Remove the drive:
 - SFF SmartDrive



- Low-profile LFF hot-plug drive



Remove the chassis access panel

Procedure

1. **Power down all nodes.**
2. Disconnect all peripheral cables from the nodes and chassis.



WARNING:

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

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed components from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.

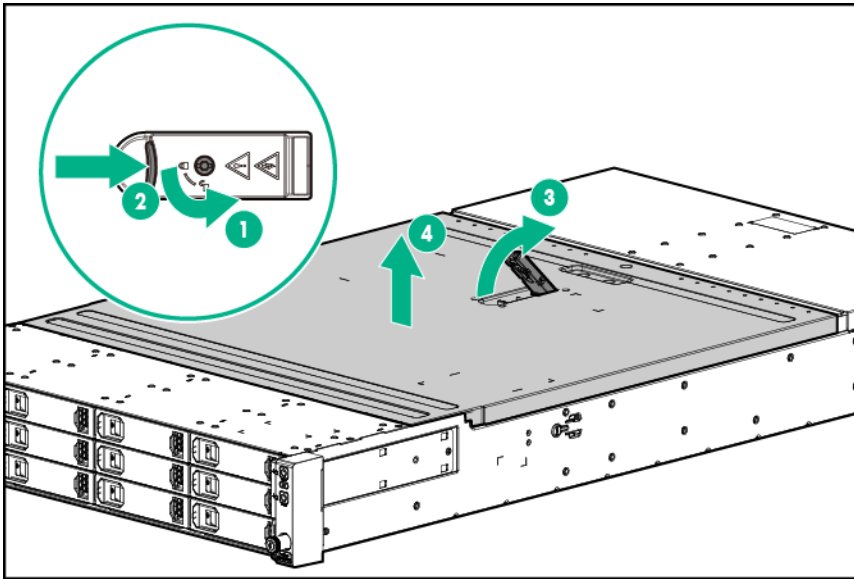


CAUTION:

Before installing the chassis into the rack or removing the chassis from the rack, Hewlett Packard Enterprise recommends removing the nodes, the drives, and the power supplies. Because a fully populated chassis is heavy, removing these components facilitates moving the chassis.

3. **Remove all nodes from the chassis.**
4. If installed, **remove the security bezel.**
5. **Remove all drives.**
6. If installed, **remove the RCM module.**
7. **Remove all power supplies.**
8. **Remove the chassis from the rack.**
9. Unlock the access panel latch using the T-15 Torx screwdriver and release the access panel latch.

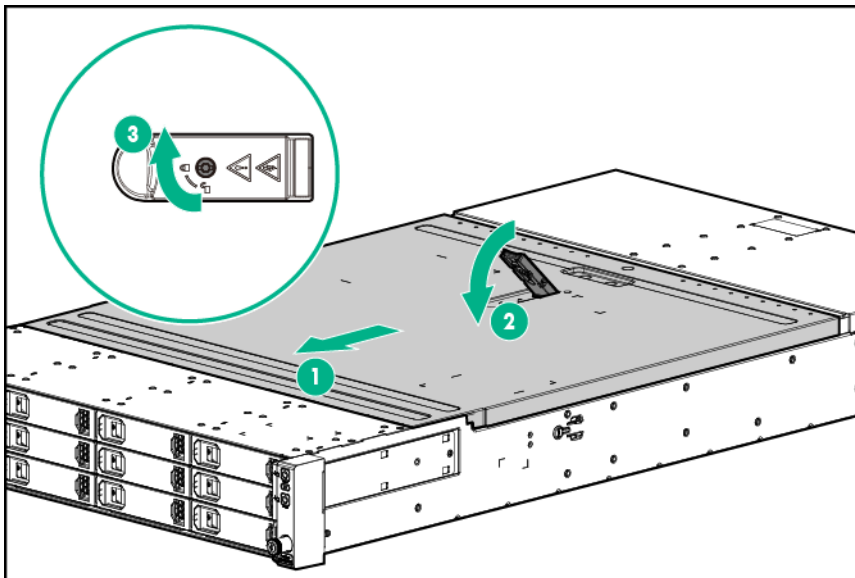
10. Slide the access panel back about 1.5 cm (0.5 in).
11. Lift and remove the access panel.



Install the chassis access panel

Procedure

1. Install the chassis access panel.
 - a. Place the access panel and align the pin on the chassis, and slide it towards the front of the server.
 - b. Lock the access panel latch using the T-15 Torx screwdriver.



2. **Install the chassis into the rack.**
3. **Install all nodes, drives and power supplies.**
4. If removed, **install the security bezel.**
5. If removed, **install the RCM module.**
6. Connect all peripheral cables to the nodes and chassis.
7. **Power up the nodes.**

Remove the chassis from the rack



WARNING:

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

- Observe local occupational health and safety requirements and guidelines for manual material handling.
 - Remove all installed components from the chassis before installing or moving the chassis.
 - Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.
-



WARNING:

To reduce the risk of personal injury or damage to the equipment, you must adequately support the chassis during installation and removal.



WARNING:

Always use at least two people to lift the chassis into the rack. If the chassis is being loaded into the rack above chest level, a third person must assist with aligning the chassis with the rails while the other two people support the weight of the chassis.



CAUTION:

Before installing the chassis into the rack or removing the chassis from the rack, Hewlett Packard Enterprise recommends removing the nodes, the drives, and the power supplies. Because a fully populated chassis is heavy, removing these components facilitates moving the chassis.

Procedure

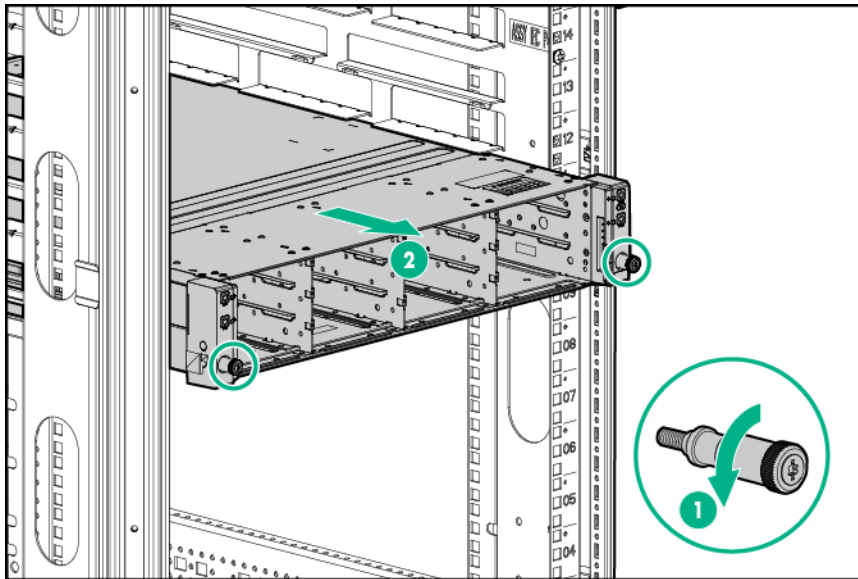
1. **Power down all nodes.**
 2. Disconnect all peripheral cables from the nodes and chassis.
-



IMPORTANT:

Label the drives before removing them. The drives must be returned to their original locations.

3. **Remove all nodes from the chassis.**
4. If installed, **remove the security bezel.**
5. **Remove all drives.**
6. If installed, **remove the RCM module.**
7. **Remove all power supplies.**
8. Loosen the thumbscrews and extend the chassis from the rack.



9. Remove the chassis from the rack.

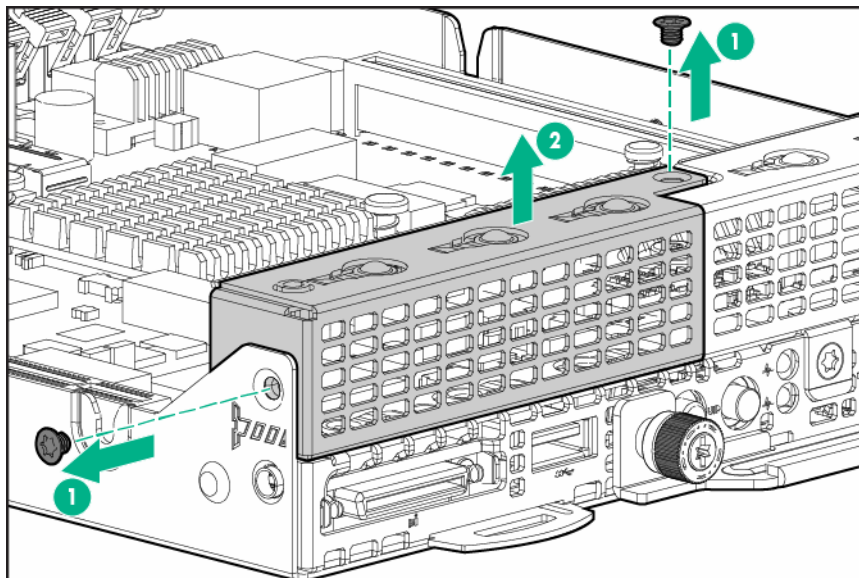
For more information, see the documentation that ships with the rack mounting option.

10. Place the chassis on a flat surface.

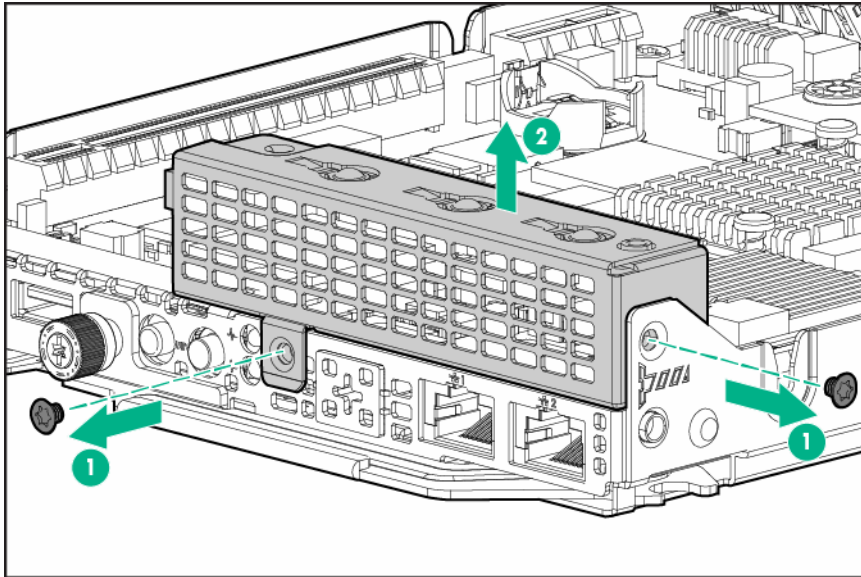
Remove the rear I/O blank

Procedure

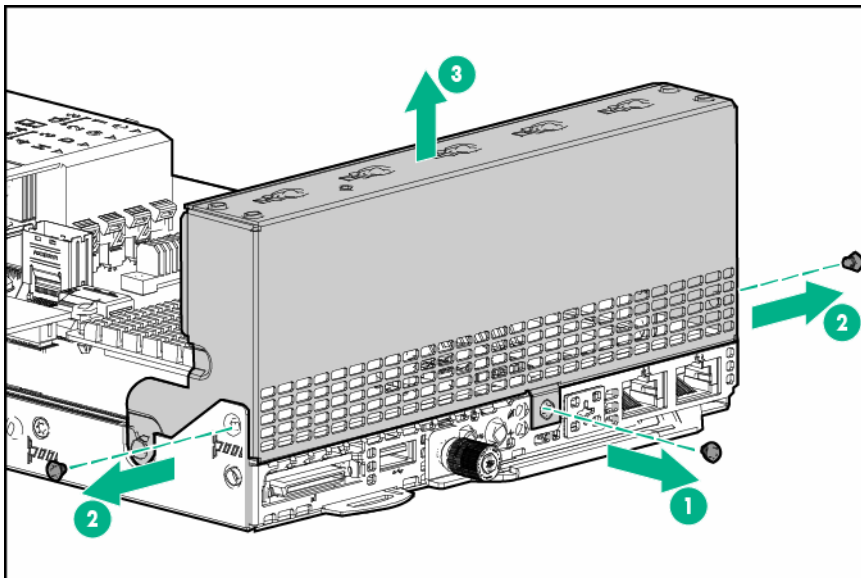
1. **Power down the node** .
2. Disconnect all peripheral cables from the node .
3. **Remove all nodes from the chassis**.
4. Place the node on a flat, level surface.
5. Remove the rear I/O blanks:
 - 1U left rear I/O blank



- 1U right rear I/O blank



- 2U rear I/O blank

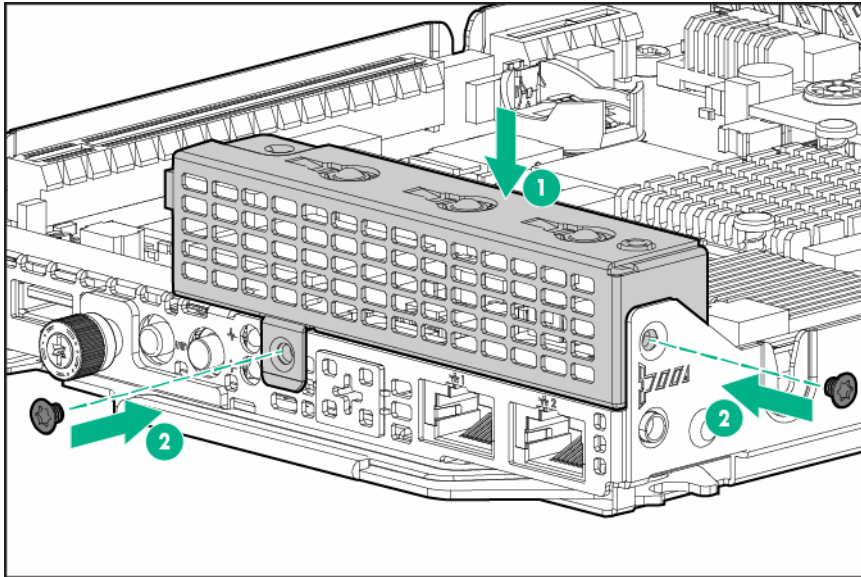


⚠ CAUTION:
To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

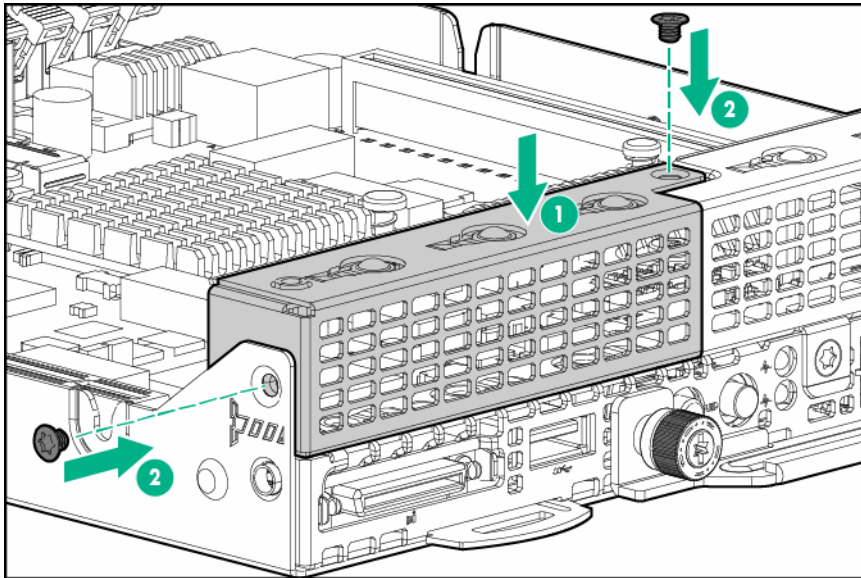
Install the rear I/O blank

Procedure

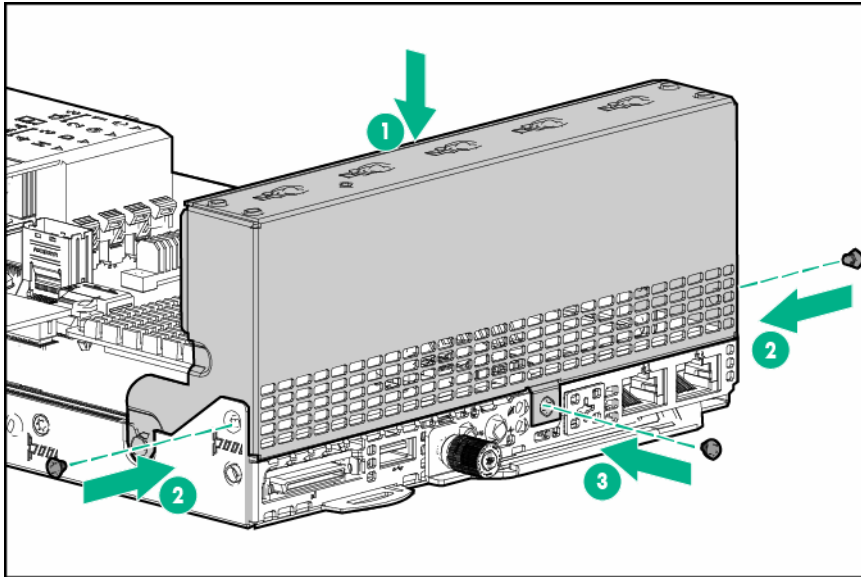
1. Install the rear I/O blanks:
 - 1U right rear I/O blank



- 1U left rear I/O blank



- 2U rear I/O blank

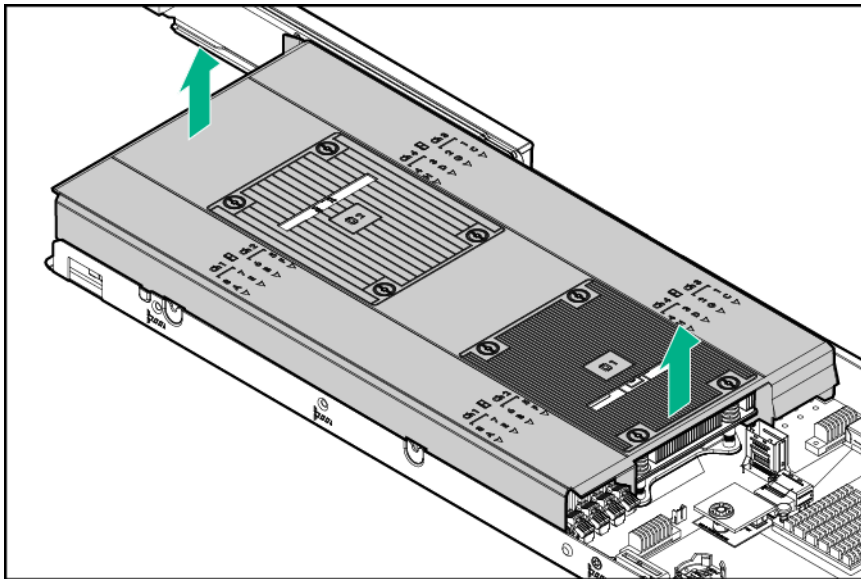


2. **Install the node into the chassis.**
3. Connect all peripheral cable to the node.
4. **Power up the nodes.**

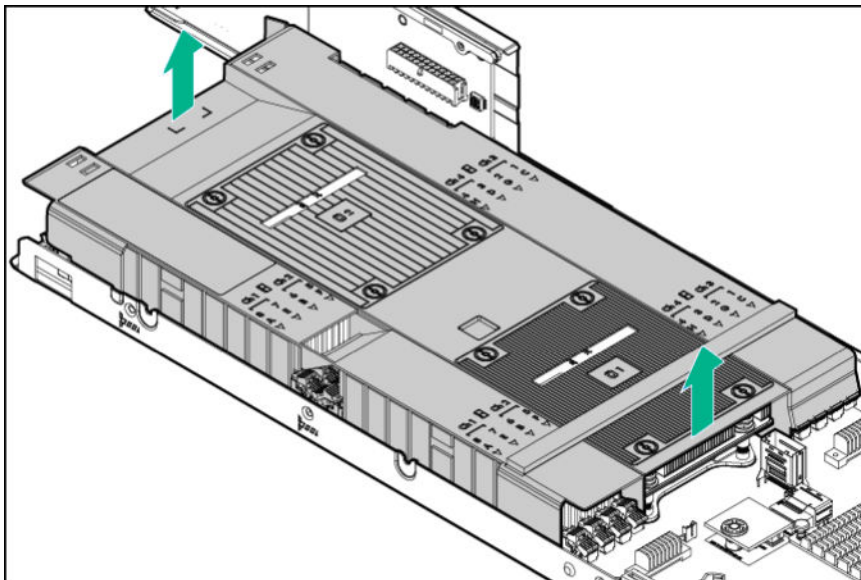
Remove the air baffle

Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove all nodes from the chassis.**
4. Place the node on a flat, level surface.
5. If installed in a 2U node, **remove the FlexibleLOM 2U node riser cage assembly.**
6. If installed in a 2U node, **remove the three-slot riser cage assembly.**
7. Remove the air baffle:
 - 1U air baffle



- 2U air baffle

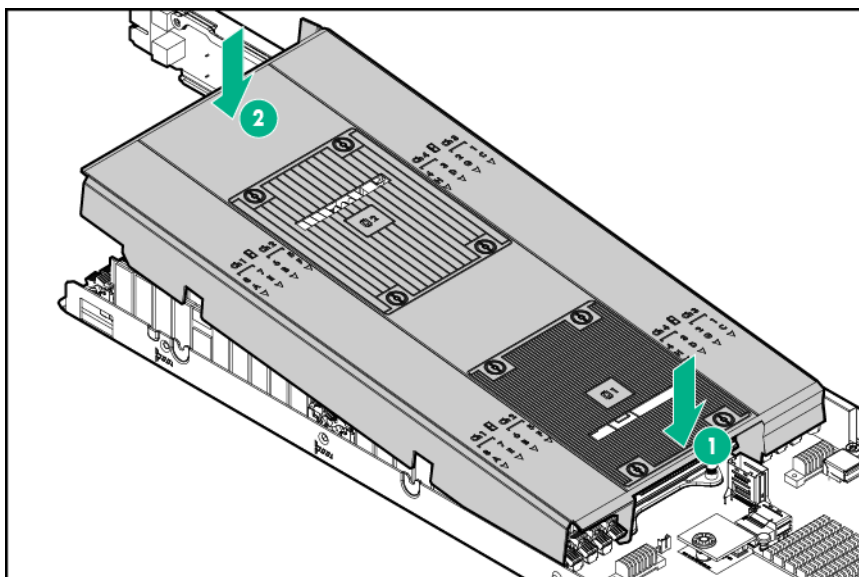


Install the air baffle

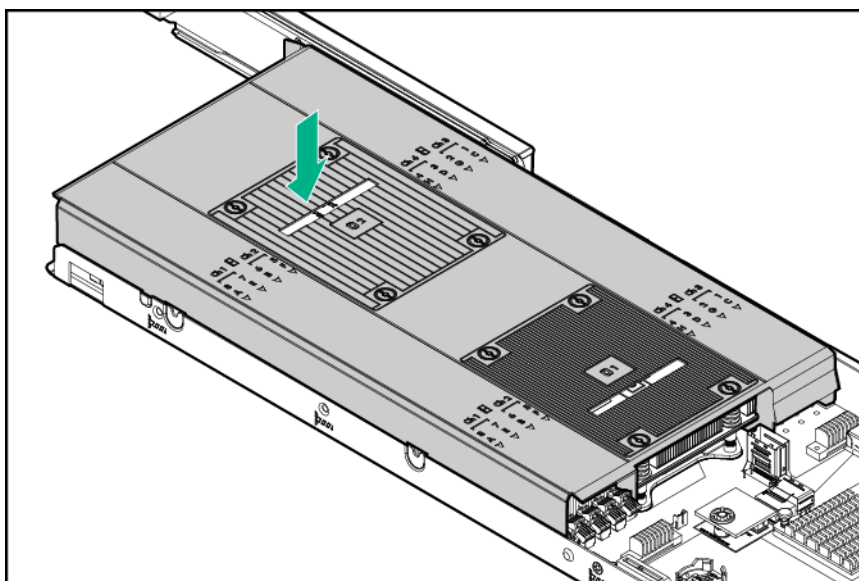
- ⚠ CAUTION:**
To prevent damage to the server, ensure that all DIMM latches are in closed and locked position before installing the air baffle.

Procedure

1. Install the air baffle:
 - a. Align the air baffle over the DIMM slot latches and lower the air baffle.



2. If a second processor and heatsink are installed, press down on the rear of the air baffle until it snaps into place on the heatsink.



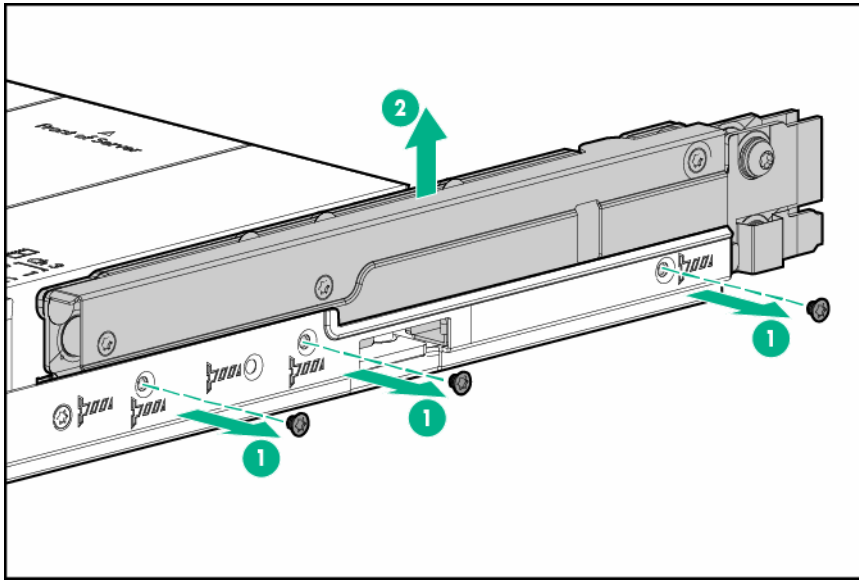
3. Install any removed PCI riser cage assemblies.
4. Install the node into the chassis.
5. Connect all peripheral cables to the node.
6. Power up the nodes.

Remove the bayonet board assembly

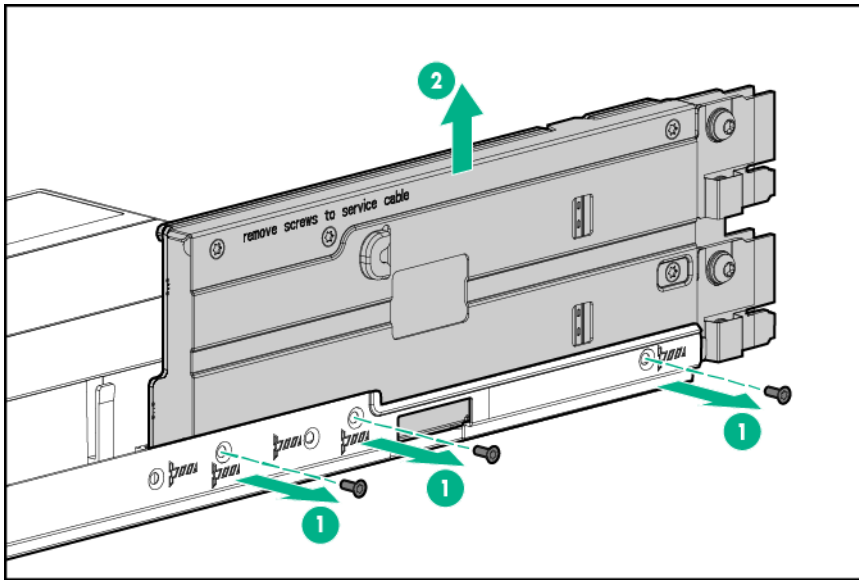
Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove all nodes from the chassis.**
4. Place the node on a flat, level surface.
5. If installed in a 2U node, remove the FlexibleLOM 2U node riser cage assembly.
6. If installed in a 2U node, remove the three-slot riser cage assembly.
7. If an accelerator power cable is installed, disconnect it from the bayonet board.

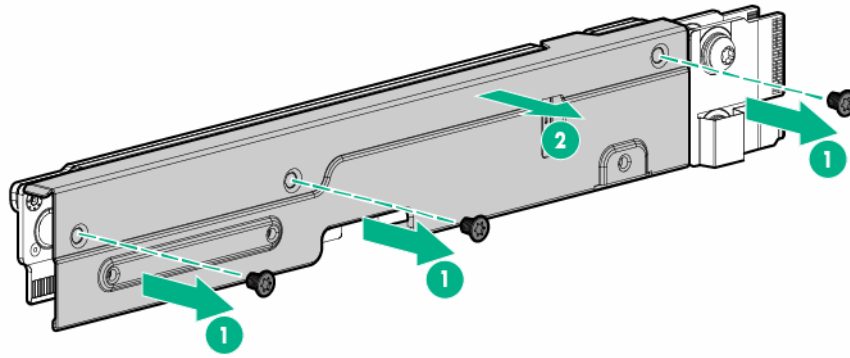
8. If a B140i SATA cable is installed, disconnect it from the system board.
9. Remove the bayonet board assembly from the node.
 - 1U bayonet board assembly



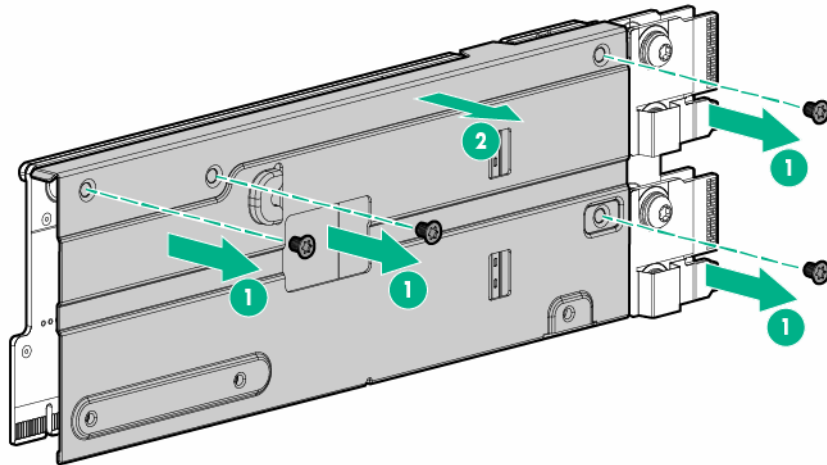
- 2U bayonet board assembly



10. If installing a SATA or mini-SAS cable, remove the bayonet board bracket from the bayonet board.
 - 1U bayonet board bracket



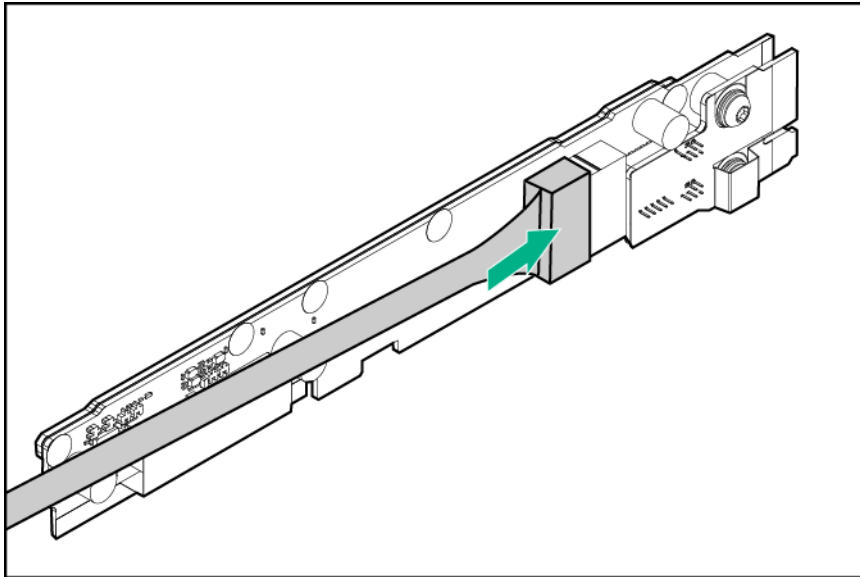
- 2U bayonet board bracket



Install the bayonet board assembly

Procedure

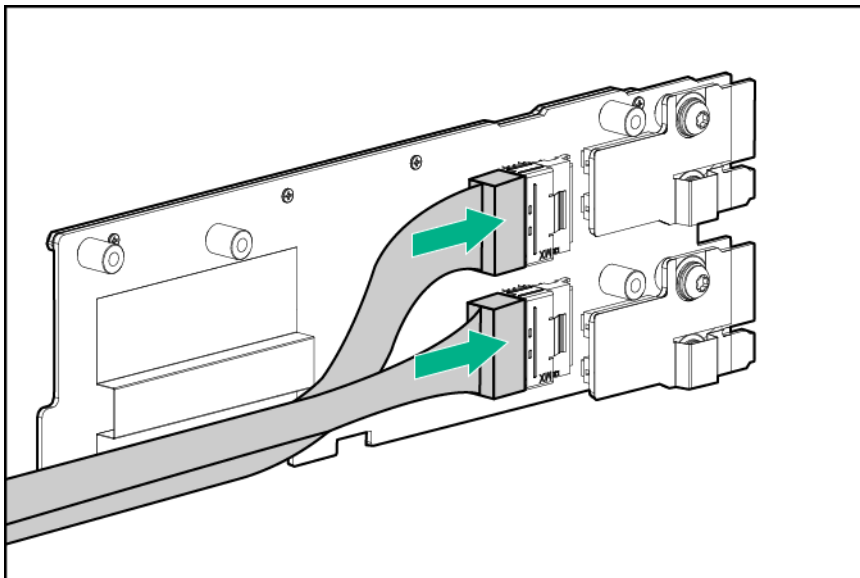
1. Connect the SATA or mini-SAS cable to the bayonet board.
 - 1U bayonet board



IMPORTANT:

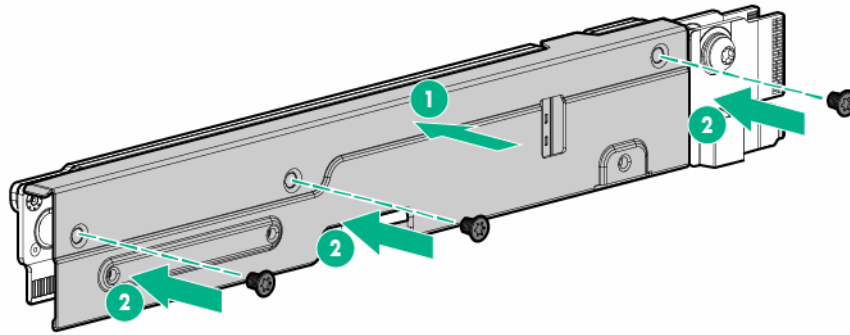
If connecting a SATA or Mini-SAS cable to the 2U bayonet board, route the cable under the padding before installing the 2U bayonet board bracket.

- 2U bayonet board

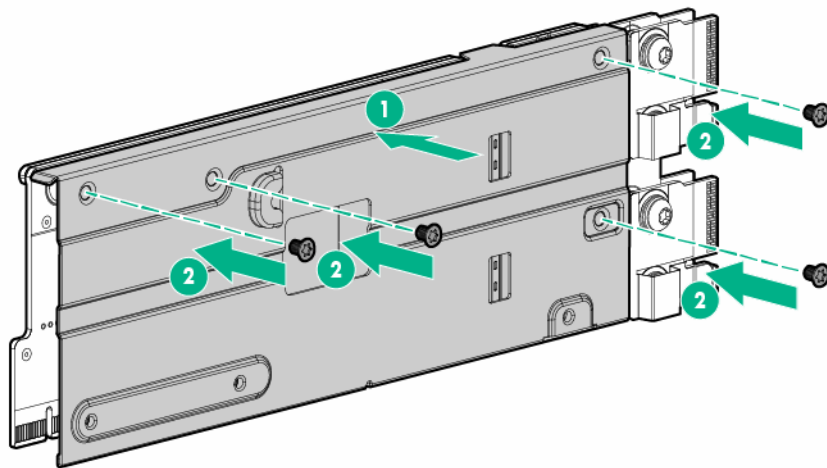


2. Install the bayonet board bracket onto the bayonet board.

- 1U bayonet board bracket

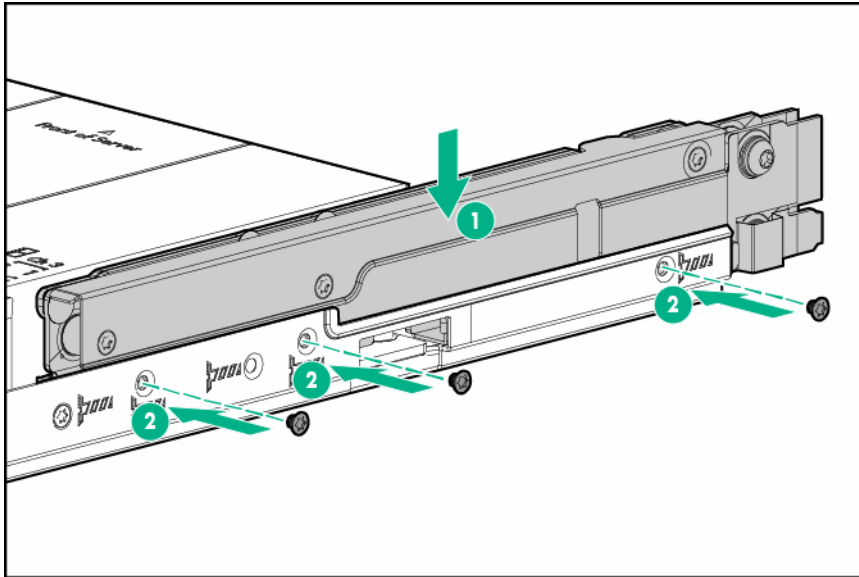


- 2U bayonet board bracket

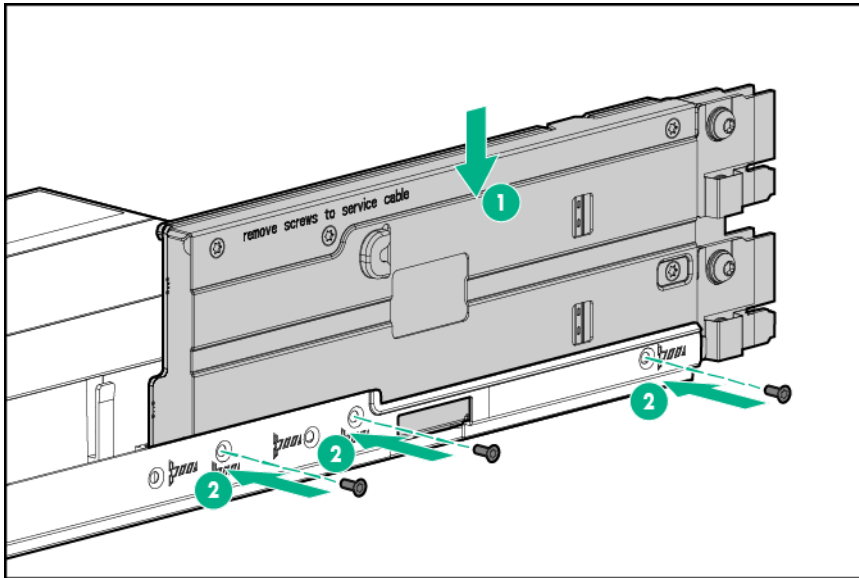


3. Install the bayonet board assembly into the node:

- 1U bayonet board assembly



- 2U bayonet board assembly



4. If any SATA or mini-SAS cables are installed, secure the cables under the thin plastic cover along the side of the node tray.
5. If removed, **connect the B140i SATA cable to the system board.**
6. **If an accelerator power cable was removed, connect it to the bayonet board.**
7. **Install any removed PCI riser cage assemblies.**
8. **Install the node into the chassis.**
9. Connect all peripheral cables to the node.
10. **Power up the node.**

Remove the PCI riser cage assembly



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:**

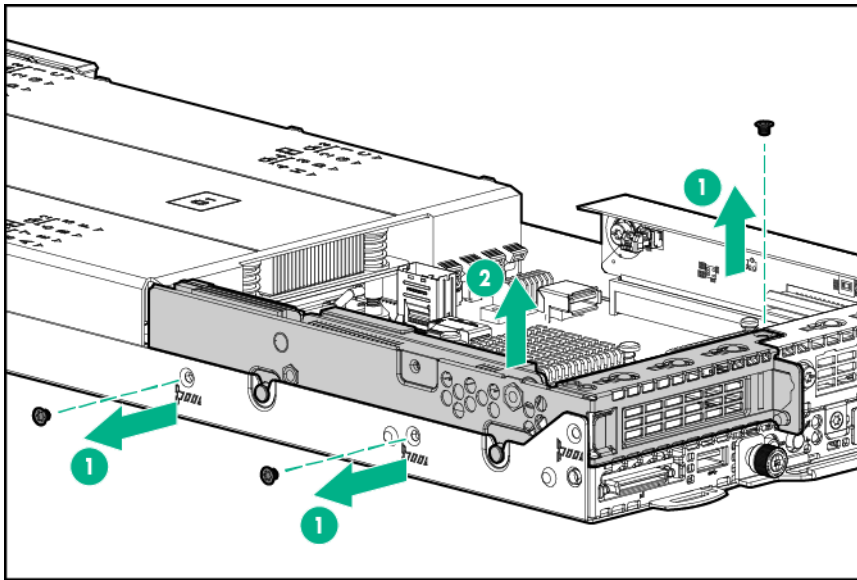
To prevent damage to the server or expansion boards, power down the server, and disconnect all power cords before removing or installing the PCI riser cage.

Single-slot left PCI riser cage assembly

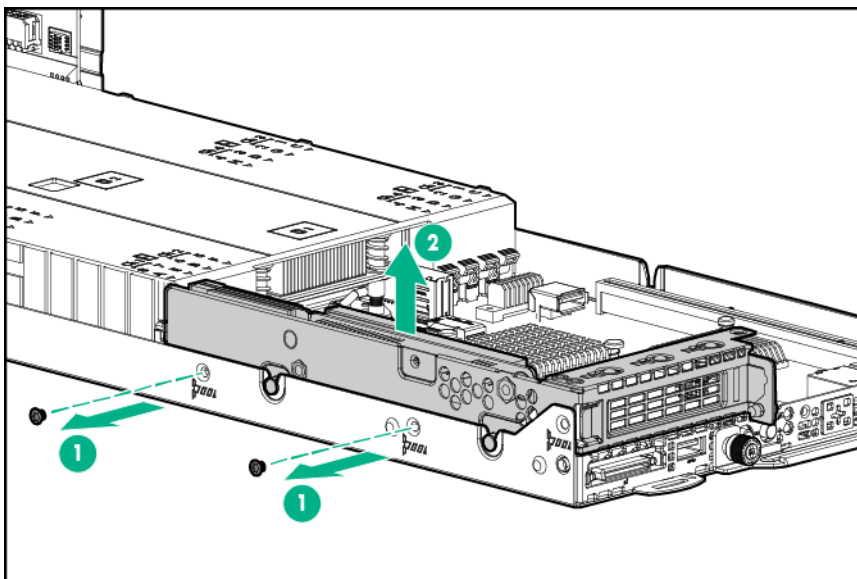
Procedure

1. **Power down the node**.
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis**.
4. Place the node on a flat, level surface.
5. In a 2U node, **remove the three-slot riser cage assembly**.
6. Remove the single-slot left PCI riser cage assembly:

- 1U node



- 2U node



⚠ CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

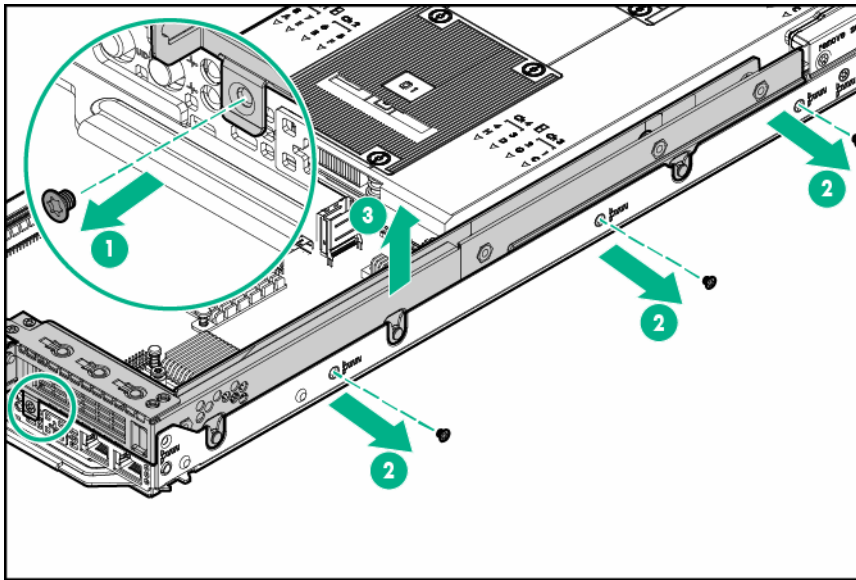
Single-slot 1U node right PCI riser cage assemblies

NOTE:

Single-slot 1U node right PCI riser cage assemblies feature different riser boards. For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Do one of the following:
 - Remove the 1U left **rear I/O blank**.
 - Remove the **single-slot left PCI riser cage assembly**.
5. Remove the single-slot 1U node right PCI riser cage assembly.



⚠ CAUTION:

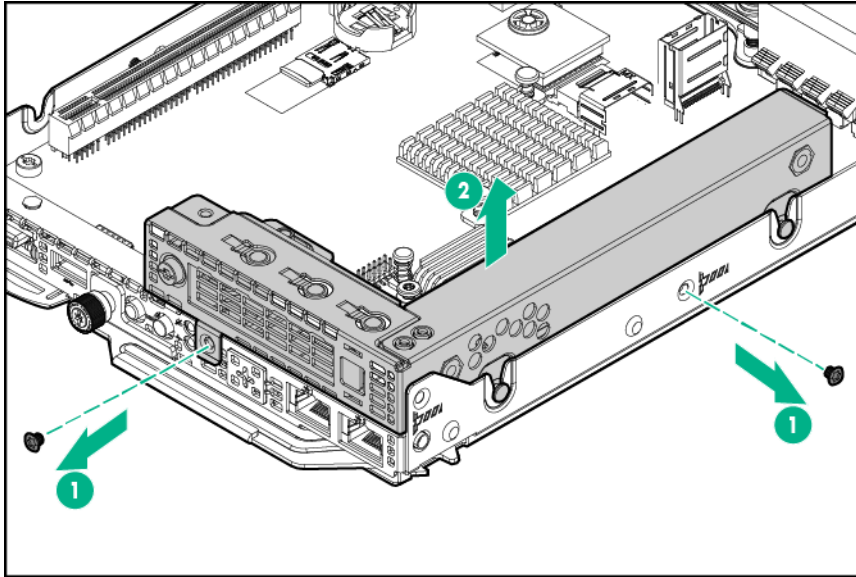
To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

FlexibleLOM 1U node riser cage assembly

Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove the node from the chassis .**

4. Do one of the following:
 - **Remove the 1U left rear I/O blank.**
 - **Remove the single-slot left PCI riser cage assembly.**
5. Remove the FlexibleLOM 1U node riser cage assembly.



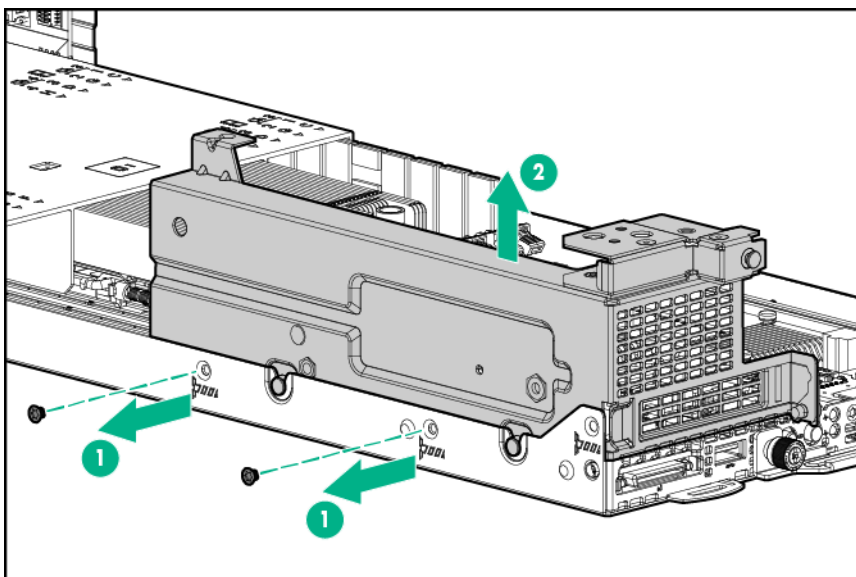
CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

Single-slot 2U node PCI riser cage assembly

Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. Remove the **FlexibleLOM 2U node riser cage assembly.**
6. Remove the single-slot 2U node PCI riser cage assembly.

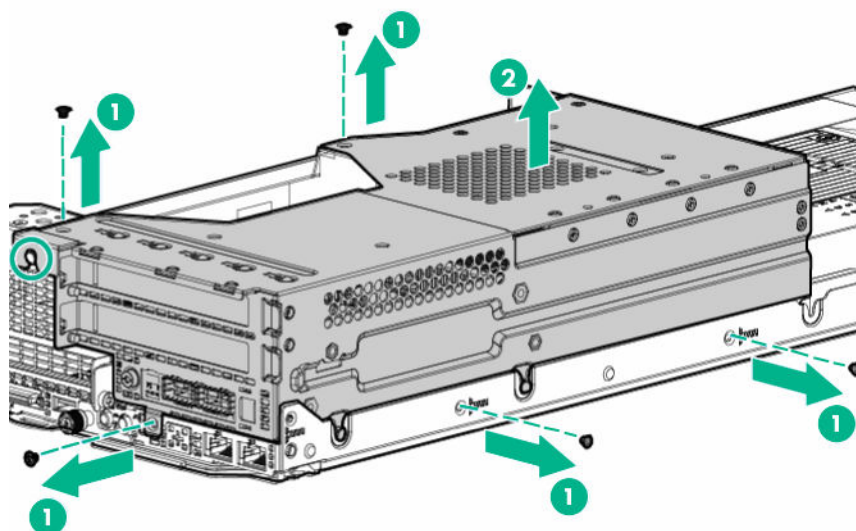


⚠ CAUTION:
To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

FlexibleLOM 2U node riser cage assembly

Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove the node from the chassis .**
4. Place the node on a flat, level surface.
5. Remove the FlexibleLOM 2U node riser cage assembly.

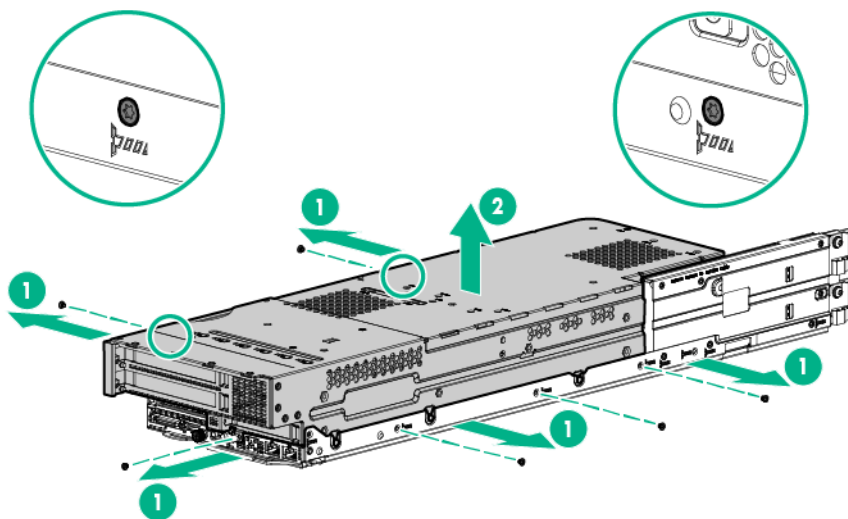


Three-slot riser cage assemblies

NOTE: Three-slot riser cage assemblies feature different riser boards. For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

Procedure

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. Remove the three-slot riser cage assembly.



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

Setup

Optional services

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

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

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

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

Unpacking the system

Unpack the following hardware and prepare for installation:

- HPE Apollo 2000 System
- Power cord
- Rack mounting hardware kit
- Rack rail strain relief strap
- Printed setup documentation

In addition to the supplied items, you might need:

- T-25 Torx screwdriver (to secure the chassis in the rack)
- T-10/T-15 Torx screwdriver (to install hardware options)
- Flathead screwdriver (to remove the knockout on the dedicated iLO connector opening)
- Hardware options

Installation overview

To set up and install the HPE Apollo 2000 System:

Procedure

1. Set up and install the rack. For more information, see the documentation that ships with the rack.
2. Prepare the chassis:
 - a. **Remove the power supply.**
 - b. **Remove the nodes.**
 - c. **Remove all drives.**

NOTE:

If planning to install the HPE Smart Storage Battery or redundant fan option, install these options into the chassis before installing the chassis into the rack.

NOTE:

Install the chassis into the rack before installing drives, power supplies, the RCM module, or nodes.

3. **Install any hardware options into the chassis and nodes.**
4. **Install the chassis into the rack.**
5. **Install all nodes, drives, and power supplies.**
6. If planning to install an RCM module, **install it now.**
7. **Power up the chassis.**
8. **Install an operating system.**
9. **Install the system software.**
10. **Configure a power cap.**
11. **If the HPE Apollo r2800 Chassis is installed, configure the drive bay mapping.**
12. **Register the server.**

Installing hardware options

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

Installing the chassis into the rack

Before installing the chassis into the rack, you must remove the nodes, the drives, and the power supplies. Because a fully populated chassis is heavy, removing these components facilitates moving and installing the chassis.

1. Prepare the chassis:
 - a. **Remove the power supply.**
 - b. **Remove the nodes.**
 - c. **Remove all drives.**
2. If planning to install the Smart Storage Battery or redundant fan option, **remove the chassis access panel.**
 - **HPE Smart Storage Battery**
 - **Redundant fan option**
3. **Install the chassis access panel.**

**WARNING:**

Always use at least two people to lift the chassis into the rack. If the chassis is being loaded into the rack above chest level, a third person must assist with aligning the chassis with the rails while the other two people support the weight of the chassis.

**WARNING:**

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

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed components from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.

**WARNING:**

To avoid risk of personal injury or damage to the equipment, do not stack anything on top of rail-mounted equipment or use it as a work surface when extended from the rack.

**CAUTION:**

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

The chassis requires installation in a rack. To install the rack rails, see the Quick Deploy Rail System Installation Instructions that ship with the rack hardware kit.

You can install up to twenty-one chassis in a 42U, 1200 mm deep rack. If you are installing more than one chassis, install the first chassis in the bottom of the rack, and then install additional chassis by moving up the rack with each subsequent chassis. Plan the rack installation carefully, because changing the location of installed components might be difficult.

**WARNING:**

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

- The rack is bolted to the floor using the concrete anchor kit.
 - The leveling feet extend to the floor.
 - The full weight of the rack rests on the leveling feet.
 - The racks are coupled together in multiple rack installations.
 - Only one component is extended at a time. If more than one component is extended, a rack might become unstable.
-

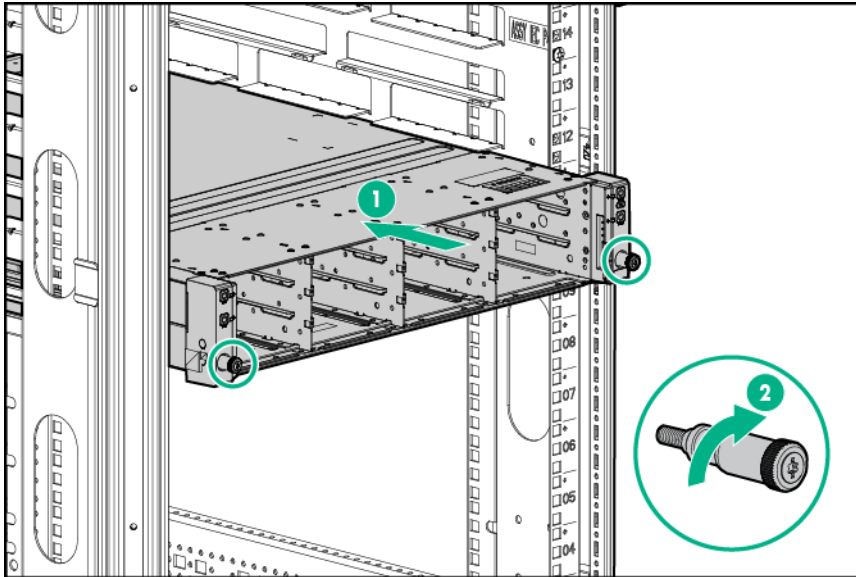
**WARNING:**

To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before installing the chassis.

**CAUTION:**

Be sure to keep the product parallel to the floor when installing the chassis. Tilting the product up or down could result in damage to the slides.

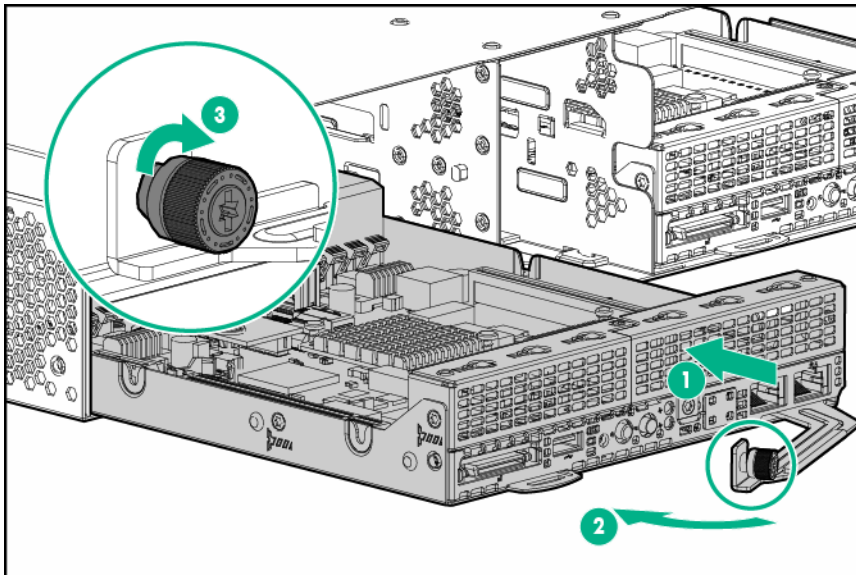
4. Install the chassis into the rack and tighten the thumbscrews.



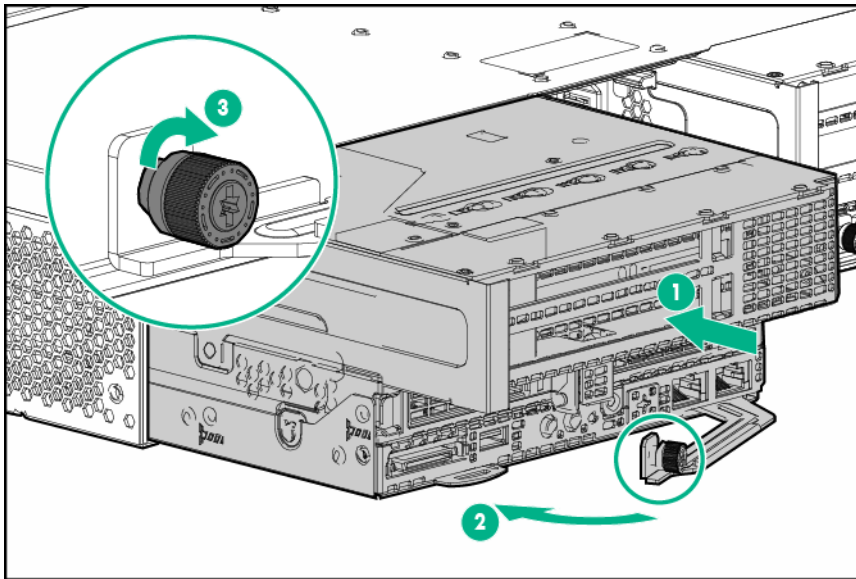
Chassis component installation

Installing a node into the chassis

- 1U node



- 2U node



Installing a drive

1. Remove the drive blank.
2. Install the drives.

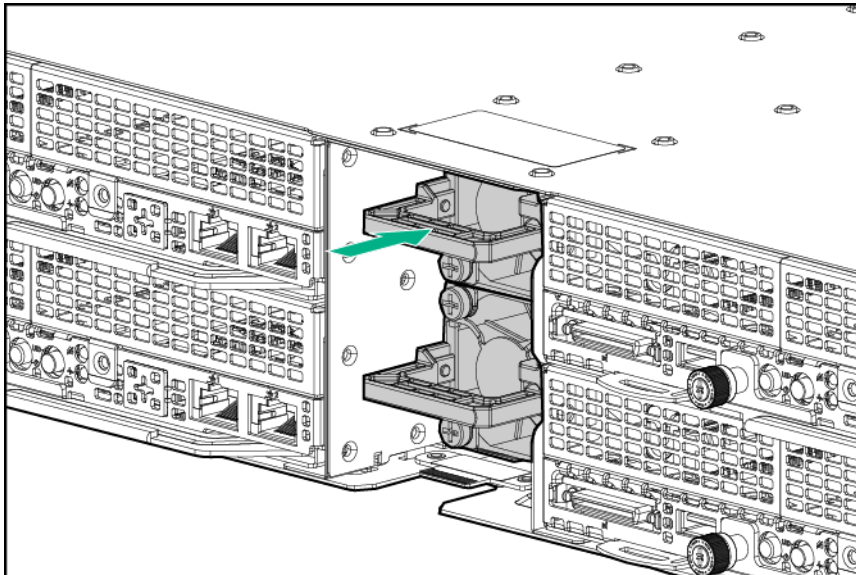
Installing the power supplies



CAUTION:

Do not mix power supplies with different efficiency and wattage in the chassis. Install only one type of power supply in a single chassis.

1. If installing a second power supply, remove the power supply blank.
2. Slide the power supplies into the power supply bays until they click into place.



3. If planning to install a **RCM module**, install it now.
4. Connect all power cords and secure them with the strain relief strap.

Powering up the chassis

Connect the AC or DC power cables, depending on the power configuration.

When the circuit breakers are powered, the chassis and Advanced Power Manager have power. By default, each installed component also powers up. Examine the Advanced Power Manager for any errors which may prevent installed components from powering up.

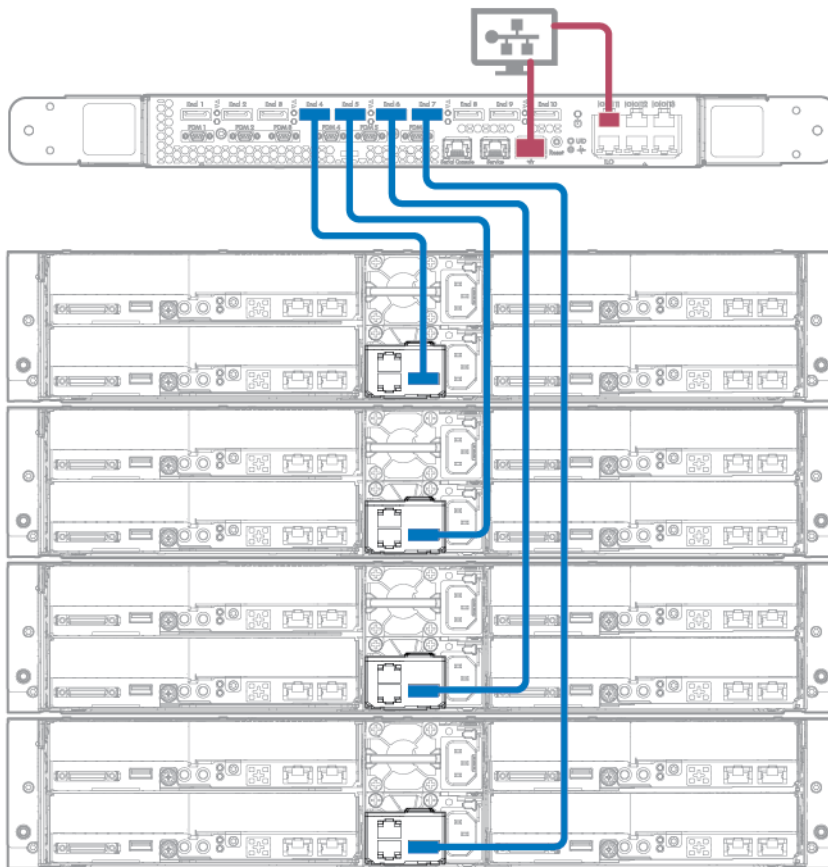
HPE Apollo Platform Manager (optional)

HPE Apollo Platform Manager (formerly named HPE Advanced Power Manager) is a point of contact for system administration.

To install, configure, and access APM, see the *HPE Apollo Platform Manager User Guide* on the [**Hewlett Packard Enterprise website**](#).

Connecting the optional HPE APM module

1. Connect the APM to the network (shown in red).
2. Connect the APM to the RCM modules (shown in blue).



Powering on and selecting boot options in UEFI Boot Mode

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

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](#).

Installing the operating system

To operate properly, the node must have a supported operating system installed. For the latest information on operating system support, see the [Hewlett Packard Enterprise website](#).

ⓘ IMPORTANT:
HPE ProLiant XL servers do not support operating system installation with Intelligent Provisioning, but do support the maintenance features. For more information, see the Performing Maintenance section of the HPE Intelligent Provisioning User Guide and online help.

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

- Manual installation—Insert the operating system CD into the USB-attached DVD-ROM drive (user provided) and reboot the node. You must download the Service Pack for ProLiant from the [SPP download site](#) and create SPP media so that you can install the drivers.
- Remote deployment installation—Use Insight Control server provisioning for an automated solution to remotely deploy an operating system.

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

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

Installing the system software

To access and configure Intelligent Provisioning on a single node:

1. Access Intelligent Provisioning by rebooting the server and pressing **F10**.
2. The first time you log into Intelligent Provisioning, follow the steps to set preferences and activate Intelligent Provisioning.
3. From the Home screen, click **Perform Maintenance**, and then click **Firmware Update**.
4. Ensure the latest drivers are available for installation. Select **Intelligent Provisioning Software** from the list of firmware, and click **Update**. If the check box is not selected, the latest drivers are already installed.

Power capping

The HPE ProLiant XL family of products provides a power capping feature that operates at the server enclosure level. The capping feature can be activated with PPIC.EXE, a stand-alone utility that runs in the environment of one of the resident servers in the chassis to be power capped. After a power cap is set for the enclosure, all the resident servers in the enclosure will have the same uniform power cap applied to them until the cap is either modified or canceled.

With APM, the enclosure-level power capping feature can be expanded without the need to use the PPIC.EXE utility. A global power cap can be applied to all enclosures with one APM command, or different caps can be applied to user-defined groups by using flexible zones within the same rack.

Power capping modes

The following Power Management modes are standard and are configurable in the power management controller:

- Mode 0: No Redundancy

All power-capping is disabled. This mode can be used to minimize any possible performance impact of power-capping logic.

- Mode 1: Max Performance with Redundancy

This is the default power capping mode. This mode allows the maximum number of nodes to run by engaging power-capping if the power draw from the chassis attempts to exceed the load supported by the active power supplies. In this mode, the system is expected to survive (with degraded performance) an unexpected power loss to one or more of the power supplies.

- Mode 2: Full AC/DC Redundancy Mode

Power-capping is enforced such that system has N+1 power redundancy. In this mode, the system will throttle the nodes allowing for one of the available power supplies to be held in reserve. If only one power supply is available, the system will throttle the nodes as to allow the full use of that power supply's capacity.

- Mode 3: User Configurable Mode

The user can specify a valid power cap value from a pre-defined range. A cap cannot be set below a minimum or above a maximum. The cap includes all server nodes, fans, and drives. User configurable mode requires an iLO Scale Out or iLO Advanced license.

- Mode 4: Rack Level Dynamic Power Capping Mode

In conjunction with APM, the user can specify a maximum power capacity for the entire rack. The APM dynamically allocates power to the applicable chassis within the rack to maximize performance given the available power. For more information, see the *HPE Apollo Platform Manager User Guide* on the [Hewlett Packard Enterprise website](#).

- Mode 5: Power Feed Redundancy Mode

When used with an A+B power feed configuration, Power Feed Redundancy Mode throttles the system 100%, bringing the nodes to a complete stop if a power feed loss is deduced. Full throttling continues until the power feed is brought back online. In this mode, the system is expected to survive an unexpected loss of an entire power feed to half of the power supplies.

Configuring a power cap

To configure power capping, you can use the following utilities:

- HPE ProLiant Power Interface Control Utility

PPIC is a standalone utility that runs on a single server within the enclosure. For more information, see the *ProLiant Power Interface Control (PPIC) Utility User Guide* on the [Hewlett Packard Enterprise website](#).

- Apollo Platform Manager

APM is a rack level device that can control power caps for all enclosures in the rack. For more information, see the *HPE Apollo Platform Manager User Guide* on the [Hewlett Packard Enterprise website](#).

Setting the chassis power cap mode with the PPIC utility

1. Download and install the ProLiant Power Interface Control Utility from the [Hewlett Packard Enterprise website](#).
2. Log in to the node , and then run the PPIC utility.
3. To set the power capacity mode, perform one of the following steps:

- To set mode 0, 1, and 2, enter the following command at the prompt:

```
-s -mmode
```

The following example sets the power capacity to mode 0:

```
-s -m0
```

- To set mode 3, enter the following command at the prompt:

```
-s -mmode -lpower
```

The following example sets the power capacity to mode 3 with a 1500W maximum power limit:

```
-s -m3 -l1500
```

Power capping modes show the valid values for `mode`. `Power` is required when setting Power Control Configuration to User Configurable.

For more information, see the *ProLiant Power Interface Control (PPIC) Utility User Guide* on the [Hewlett Packard Enterprise website](#).

Setting the chassis power cap mode with HPE APM

1. Log in to APM:
 - a. When the system boots, a Login prompt appears.
 - b. At the prompt, enter `Administrator`.
2. Before setting the power cap, enter the following command to review the power baseline:>`show power baseline`

The information displayed provides the minimum cap value, the maximum cap value, and the chassis that meet the requirements for power capping.

3. To set the power cap for eligible chassis connected to the APM, enter the following command at the prompt:>`SET POWER CAP<wattage>|NONE[zone_name]`

The wattage value, if provided, represents the total wattage to be allocated among all the chassis that are part of the baseline or partial baseline of a zone, if specified. This value is divided by the total maximum wattage established by the baseline to calculate a percentage cap value. This percentage is then multiplied against each chassis maximum wattage value to arrive at an appropriate cap value for that individual chassis.

If `NONE` is specified instead of a cap wattage value, then APM removes all (or the specified zone) of the power caps.

To remove baseline data from the EEPROM and to remove the power cap setting, enter the following command:

```
>SET POWER BASELINE NONE
```

After this command is issued, the only way to re-establish a power baseline is to issue the `SET POWER BASELINE` command. The system returns to the default power cap mode (mode 1).

Drive bay mapping for the HPE Apollo r2800 Chassis

The HPE Apollo r2800 Chassis, featuring the storage expander backplane, supports the flexibility to assign drive bays to specific server nodes. System administrators with the Integrated Lights Out (iLO)

administrator login credentials may provide and execute iLO XML commands or scripts to change the association of drive bays to server node numbers.

Drive bay mapping configuration changes may be made from any server node and take effect after all server nodes in the HPE Apollo r2800 Chassis are turned off and the Chassis firmware is able to reset the storage expander backplane. All nodes must remain powered off for at least 5 seconds after executing the configuration changes. The server nodes may be remotely restarted through the iLO remote interface, or may be locally restarted by pressing the power button for each node.

This feature requires the following minimum firmware versions:

- Apollo 2000 System Chassis firmware version 1.4.0 or later
- Storage Expander firmware version 1.0 or later
- iLO firmware version 2.10 or later

Factory default configuration

The factory default configuration evenly distributes the 24 SFF drive bays in the HPE Apollo r2800 Chassis.

Six drive bays are allocated to each 1U node.

- Node 1: drive bays 1 through 6
- Node 2: drive bays 7 through 12
- Node 3: drive bays 13 through 18
- Node 4: drive bays 19 through 24

Twelve drive bays are allocated to each 2U node.

- Node 1: drive bays 1 through 12
- Node 3: drive bays 13 through 24

For node numbering, see "[Chassis rear panel components](#)."

For drive bay numbering, see "[HPE Apollo r2800 Chassis drive bay numbering](#)."

Mapping drive bays

⚠ CAUTION:
Before mapping any drive bays, note the current configuration. Any changes to the drive bay mapping configuration where there are any drives set up in a Smart Array RAID configuration could cause data loss.

❗ IMPORTANT:
The HPE Apollo r2800 Chassis does not support nodes using the HPE Dynamic Smart Array B140i Controller or the HPE P840 Smart Array Controller. Hewlett Packard Enterprise recommends installing an HPE H240 Host Bus Adapter or HPE P440 Smart Array Controller.

For detailed information and examples on drive bay mapping configuration changes in the HPE Apollo r2800 Chassis, see the HPE iLO 4 Scripting and Command Line Guide on the [Hewlett Packard Enterprise website](#).

To map drives in the HPE Apollo r2800 Chassis:

1. Determine which drive bays to map to each node.
2. Using Integrated Lights Out (iLO) administrator login credentials, use a script that includes the `READ_BACKPLANE_INFO` command to get the current mapping information from the HPE Apollo r2800 Chassis.
3. Build an XML script to map the drive bays.

4. Using a script that includes the READ_ZONE_TABLE command, verify the changes to the zone table. The drives can also be labeled to clearly show the drive bay mapping configuration.

5. **Power down the nodes.**



IMPORTANT:

All nodes must remain powered off for at least 5 seconds after executing the configuration changes.

6. **Power up the nodes.**

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

Introduction

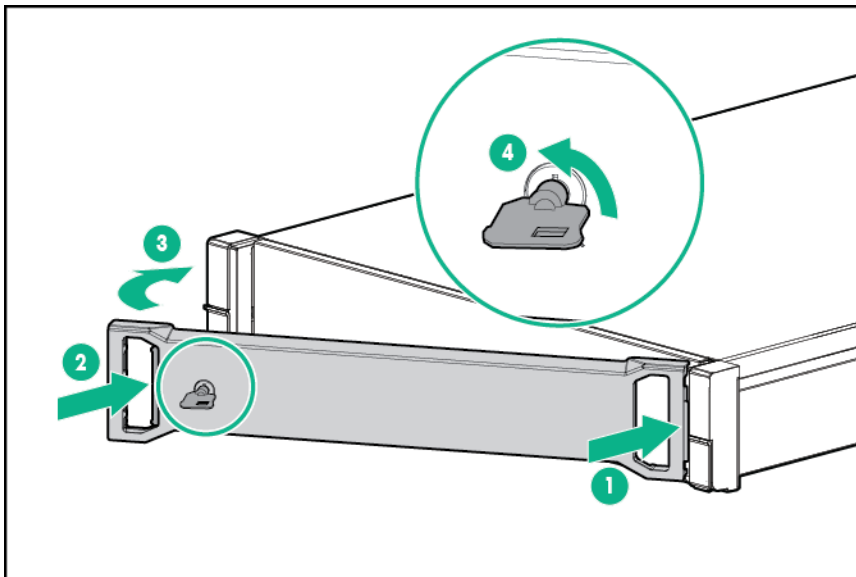
If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

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

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

Installing the security bezel option

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



Drive options

The embedded Dynamic Smart Array B140i Controller only supports SATA devices. For SAS drive installation, install a **Host Bus Adapter or a Smart Array Controller board option**.

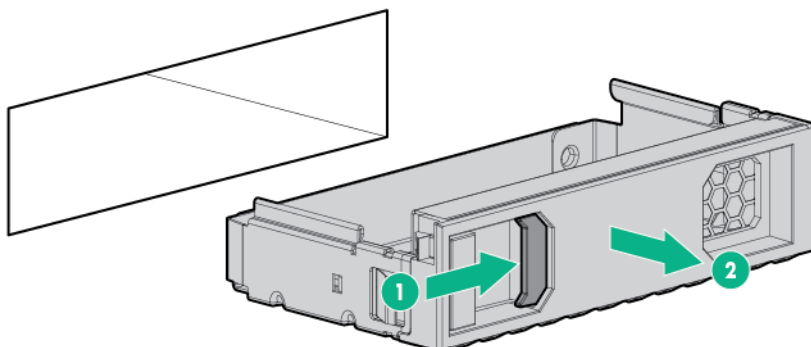
This hardware option might require a power supply with a higher wattage rating. To accurately estimate the power consumption of your server and select the appropriate power supply and other system components, see the **Hewlett Packard Enterprise Power Advisor website**.

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

Removing a drive blank

Procedure

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



Installing a hot-plug drive

The chassis can support up to 12 drives in an LFF configuration and up to 24 drives in an SFF configuration.

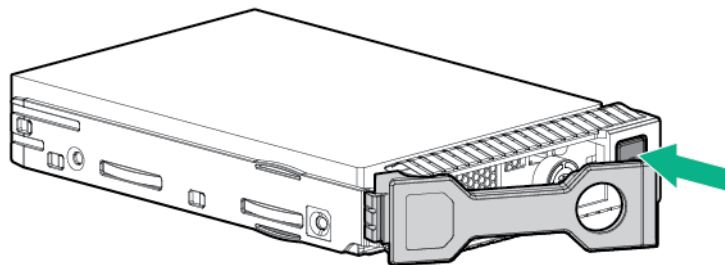


WARNING:

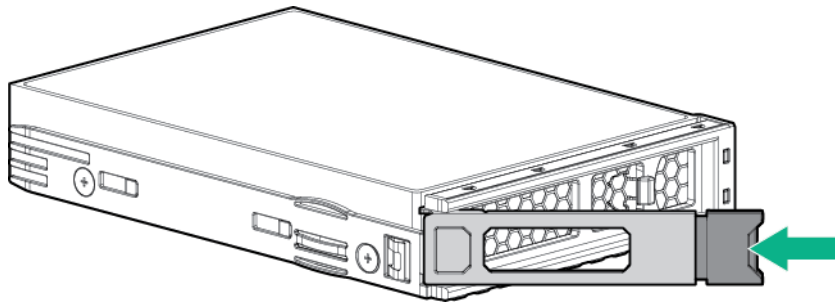
To reduce the risk of injury from electric shock, do not install more than one drive carrier at a time.

Procedure

1. If installed, **remove the security bezel.**
2. **Remove the drive blank.**
3. Prepare the drive.
 - SFF SmartDrive

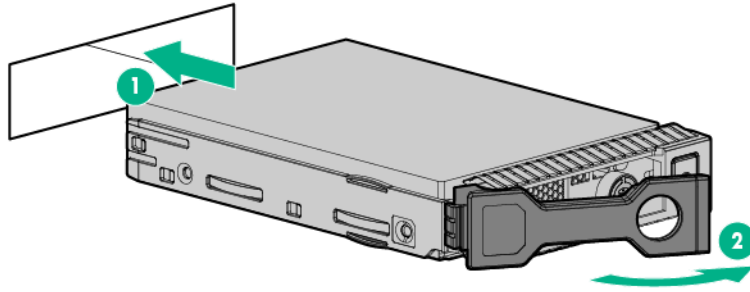


- Low-profile LFF hot-plug drive

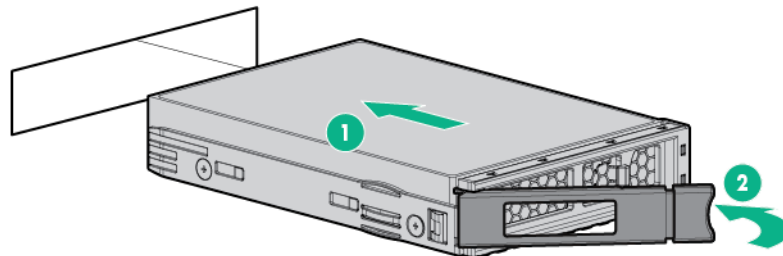


4. Install the drive:

- SFF SmartDrive



- Low-profile LFF hot-plug drive



5. Determine the status of the drive from the [drive LED definitions](#).

6. If removed, [install the security bezel](#).

For information on drive bay mapping in the HPE Apollo r2800 Chassis and the factory default configuration, see "[Drive bay mapping for the HPE Apollo r2800 Chassis](#)."

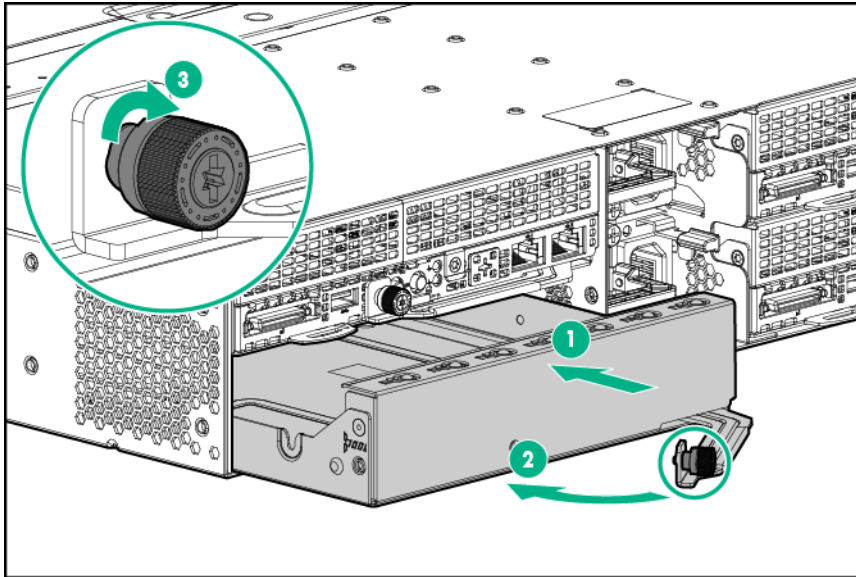
To configure arrays, see the *HPE Smart Storage Administrator User Guide* on the [Hewlett Packard Enterprise website](#).

Installing the node blank

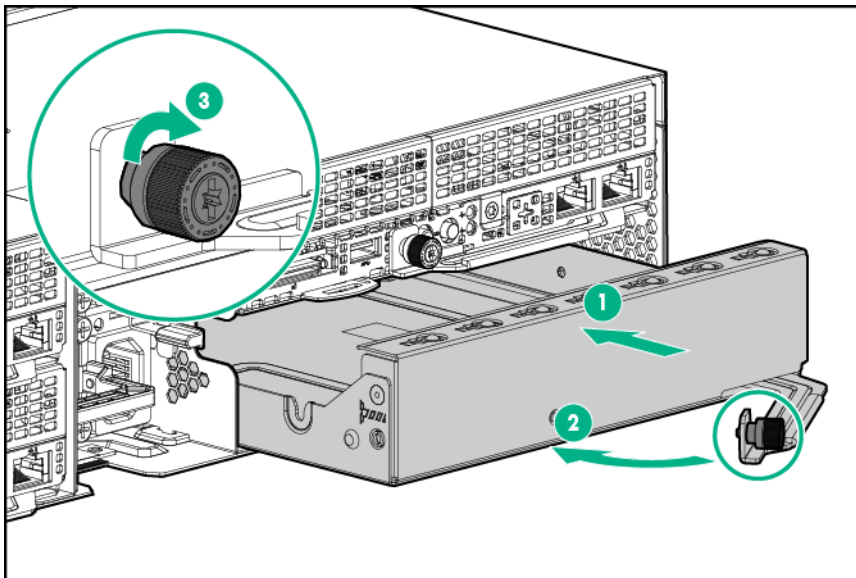
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Procedure

1. Install the node blank into the left side of the server chassis.



2. Install the node blank into the right side of the server chassis.



Installing the RCM module option

Prerequisites

Observe the following rules and limitations when installing an RCM module:

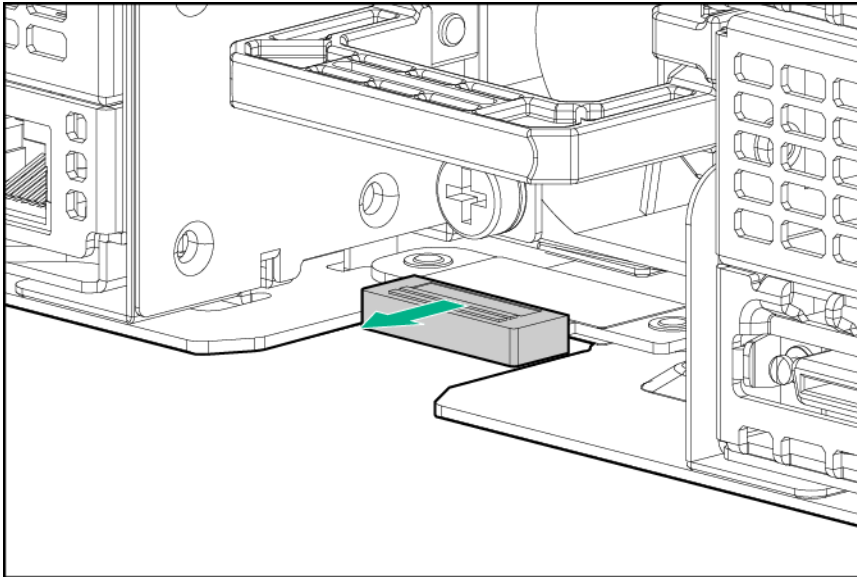
- If a dedicated iLO management port module is installed in a node, the node cannot be accessed through the RCM module.
- If a dedicated iLO management port module is installed in a node, the node can only connect to a network through the **dedicated iLO management port module**.
- If using the RCM module iLO ports or the dedicated iLO management port module to connect to a network, the network must operate at a speed of 1 Gb/s. The server cannot connect to the network if the network is operating at a speed of 10/100 Mb/s or 10 Gb/s.

- Use either the APM port or an iLO port to connect to a network. Having both ports connected at the same time results in a loopback condition.
- Do not connect both iLO ports to the network at the same time. Only one iLO port can be connected to the network, while the other iLO port can be used only as a connection to a second enclosure. Having both ports connected at the same time results in a loopback condition.

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

Procedure

1. **Power down all nodes.**
2. Disconnect each power cord from the power source.
3. Remove the cover from the RCM cable connector.



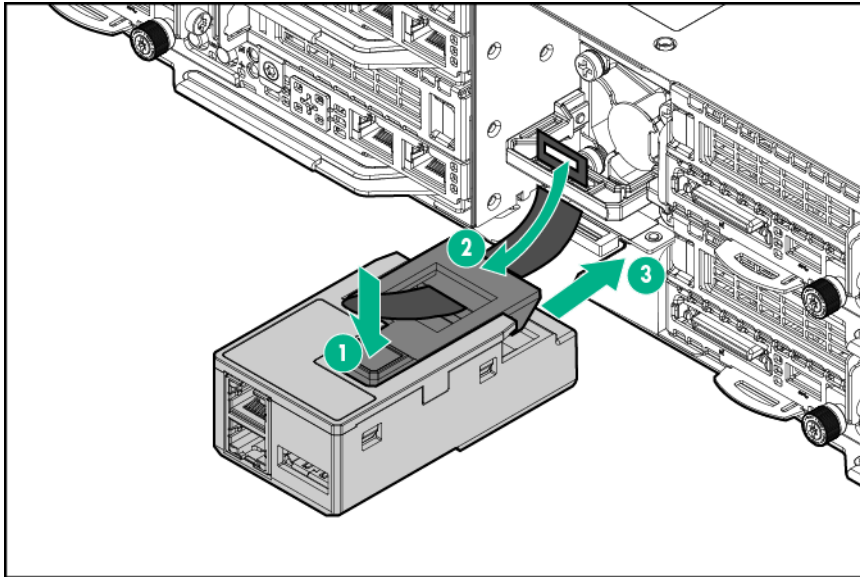
4. Remove the strain relief strap from the bottom power supply handle.



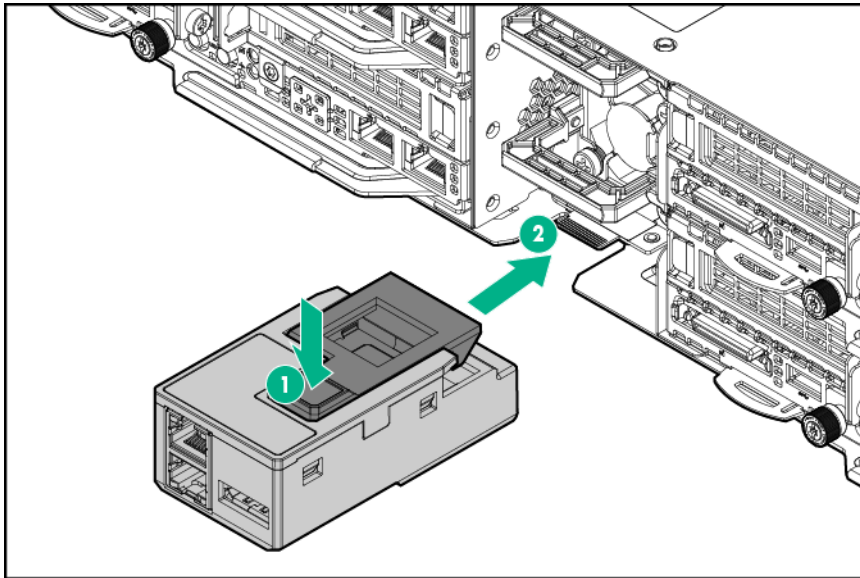
CAUTION:

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

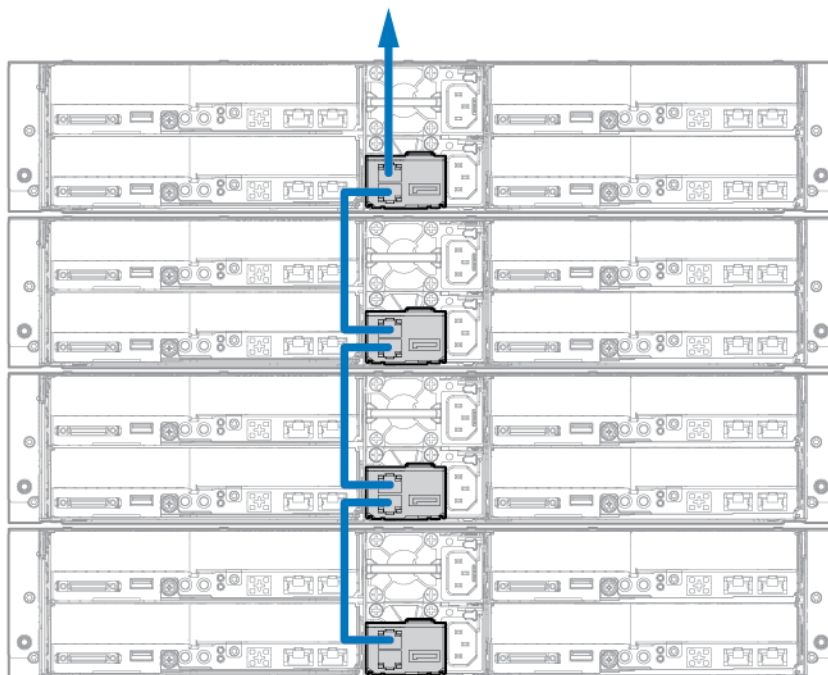
5. If only one power supply is installed, do the following:
 - a. Route the strain relief strap through the RCM module and around the handle of the bottom power supply.
 - b. Install the RCM module onto the bottom power supply.
 - c. Secure the power cord in the strain relief strap.



6. If two power supplies are installed, do the following:
 - a. Install the RCM module onto the bottom power supply.



- b. Release the strain relief strap on the top power supply handle.
 - c. Secure both power cords in the strain relief strap on the top power supply handle.
7. If using the RCM module iLO ports to connect the chassis to a network, connect all cables to the RCM module and the network.
Multiple chassis can be connected to the same network.



NOTE: Arrow indicates connection to the network.

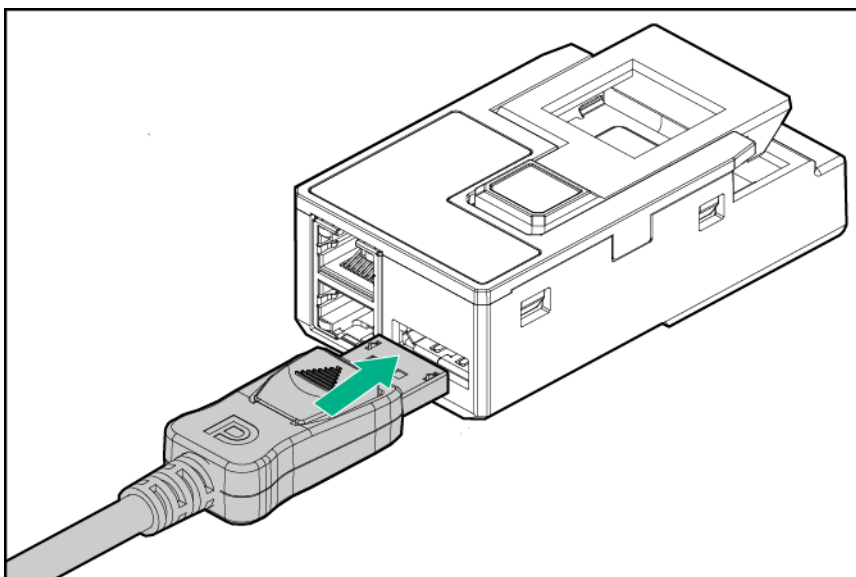
8. **If an HPE APM is installed, connect the cables to the RCM module, the APM, and the network.**
9. Reconnect all power:
 - a. Connect each power cord to the power source.
 - b. Connect the power cord to the chassis.
10. **Power up the nodes.**

Installing the RCM 2.0 to 1.0 adapter cable

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

Procedure

1. **Power down all nodes.**
2. Disconnect each power cord from the power source.
3. **Install the RCM module.**
4. Connect the RCM 2.0 to 1.0 adapter cable to the RCM module.

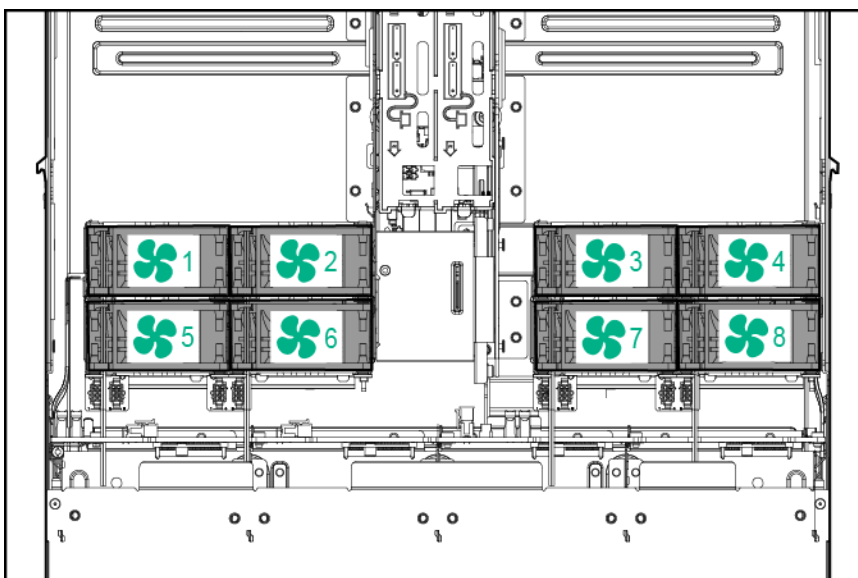


5. **Connect the cables to the RCM module, the APM, and the network.**
6. **Reconnect all power:**
 - a. Connect each power cord to the power source.
 - b. Connect the power cord to the chassis.
7. **Power up the nodes.**

Redundant fan option

Fan population guidelines

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



Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6	Fan bay 7	Fan bay 8
Non-redundant	Fan	Fan	Fan	Fan	Empty	Empty	Empty	Empty
Redundant	Fan	Fan	Fan	Fan	Fan	Fan	Fan	Fan

- In a redundant fan mode:
 - If one fan fails, the system continues to operate without redundancy. This condition is indicated by a flashing amber Health LED.
 - If two fans fail, the system shuts down.
- The minimum fan requirement for this server to power on is four fans (fans 1, 2, 3, and 4).

Installing the fan option

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

Procedure

1. **Power down all nodes.**
2. Disconnect all peripheral cables from the nodes and chassis.



WARNING:

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

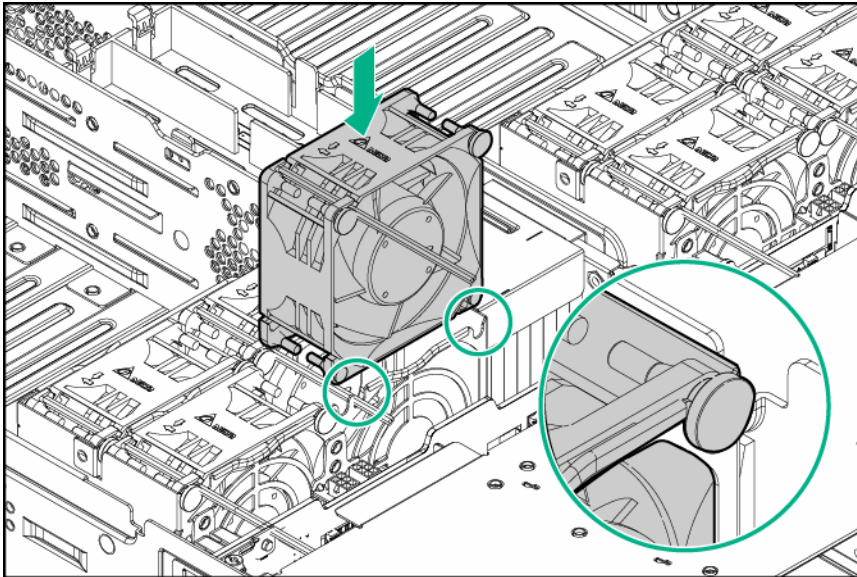
- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed components from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.



CAUTION:

Before installing the chassis into the rack or removing the chassis from the rack, Hewlett Packard Enterprise recommends removing the nodes, the drives, and the power supplies. Because a fully populated chassis is heavy, removing these components facilitates moving the chassis.

3. **Remove all nodes from the chassis.**
4. If installed, **remove the security bezel.**
5. **Remove all drives.**
6. If installed, **remove the RCM module.**
7. **Remove all power supplies.**
8. **Remove the chassis from the rack.**
9. **Remove the access panel.**
10. Install the redundant fans in the left and right fan cages.



11. Connect the fan cables to the power connectors.



12. **Install the access panel.**
13. **Install the chassis into the rack.**
14. If removed, **install the security bezel.**
15. **Install all nodes, drives and power supplies.**
16. If removed, **install the RCM module.**
17. Reconnect all power:
 - a. Connect each power cord to the power source.
 - b. Connect the power cord to the chassis.
18. Connect all peripheral cables to the nodes.
19. **Power up the nodes.**

Memory options



IMPORTANT:

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

The memory subsystem in this node can support LRDIMMs and RDIMMs:

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

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

Memory and processor information

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

DIMM type

- Intel Xeon E5-2600 v3 processors are optimized for:
 - Single-rank and dual-rank PC4-2133 (DDR4-2133) RDIMMs operating at up to 2133 MT/s
 - Dual-rank and quad-rank PC4-2133 (DDR4-2133) LRDIMMs operating at up to 2133 MT/s
- Intel Xeon E5-2600 v4 processors are optimized for:
 - Single-rank and dual-rank PC4-2400T (DDR4-2400) RDIMMs operating at up to 2400 MT/s
 - Dual-rank, quad-rank, and octal-rank PC4-2400T (DDR4-2400) LRDIMMs operating at up to 2400 MT/s

DIMM specifications

DIMM specifications - Intel Xeon E5-2600 v3 processor installed

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

DIMM specifications - Intel Xeon E5-2600 v4 processor installed

Type	Rank	Capacity (GB)	Native speed (MT/s)	Voltage
RDIMM	Single	8	2400	STD
RDIMM	Single	16	2400	STD
RDIMM	Dual	16	2400	STD
RDIMM	Dual	32	2400	STD
LRDIMM	Dual	32	2400	STD
LRDIMM	Quad	64	2400	STD
LRDIMM	Octal	128	2400	STD

Populated DIMM speed (MT/s)

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

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

Type	Rank	1 DIMM per channel (MT/s)	2 DIMMs per channel (MT/s)
RDIMM	Single	2133	2133
RDIMM	Dual	2133	2133
LRDIMM	Dual	2133	2133
LRDIMM	Quad	2133	2133

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

Type	Rank	1 DIMM per channel (MT/s)	2 DIMMs per channel (MT/s)
RDIMM	Single	2400	2133
RDIMM	Dual	2400	2133
LRDIMM	Dual	2400	2400
LRDIMM	Quad	2400	2400
LRDIMM	Octal	2400	2400

Maximum memory capacity

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

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

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

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

DIMM type	DIMM rank	Capacity (GB)	Maximum capacity for one processor (GB)	Maximum capacity for two processors (GB)
RDIMM	Single-rank	8	64	128
RDIMM	Single-rank	16	128	256
RDIMM	Dual-rank	16	128	256
RDIMM	Dual-rank	32	256	512
LRDIMM	Dual-rank	32	256	512
LRDIMM	Quad-rank	64	512	1024
LRDIMM	Octal-rank	128	1024	2048

SmartMemory

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

Memory subsystem architecture

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

Channel	Population order	Slot number
1	A E	8 7
2	B F	6 5
3	C G	1 2
4	D H	3 4

For the location of the slot numbers, see "[DIMM slot locations](#)."

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

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

Single-, dual-, and quad-rank DIMMs

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

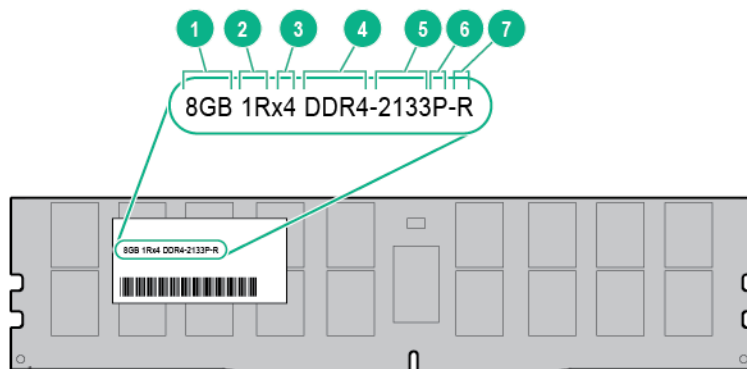
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module.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

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

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

DIMM identification

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



Item	Description	Definition
1	Capacity	4 GB 8 GB 16 GB 32 GB
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4
5	Maximum memory speed	2133 MT/s

Table Continued

Item	Description	Definition
6	CAS latency	P=15
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

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

Memory configurations

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

- Advanced ECC—Provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this node.
- Online spare memory—Provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

Advanced Memory Protection options are configured in the BIOS/Platform Configuration (RBSU). If the requested AMP mode is not supported by the installed DIMM configuration, the node boots in Advanced ECC mode. For more information, see the *HPE UEFI System Utilities User Guide for ProLiant Gen9 Servers* on the [Hewlett Packard Enterprise website](#).

Advanced ECC memory configuration

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

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

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

Online Spare memory configuration

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

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

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- When two processors are installed, balance the DIMMs across the two processors.
- White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D)
- Do not mix RDIMMs and LRDIMMs.

- When one processor is installed, install DIMMs in sequential alphabetic order: A, B, C, D, E, F, and so forth.
- When two processors are installed, install the DIMMs in sequential alphabetic order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth.
- When single-rank, dual-rank, and quad-rank DIMMs are populated for two DIMMs per channel or three DIMMs per channel, always populate the higher number rank DIMM first (starting from the farthest slot). For example, first quad-rank DIMM, then dual-rank DIMM, and then lastly single-rank DIMM.
- DIMMs should be populated starting farthest from the processor on each channel.
- For DIMM spare replacement, install the DIMMs per slot number as instructed by the system software.

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

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the **general DIMM slot population guidelines**.
- DIMMs may be installed individually.

Online spare population guidelines

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

- Observe the **general DIMM slot population guidelines**.
- Each channel must have a valid online spare configuration.
- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank. A single dual-rank DIMM is not a valid configuration.

Population order

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

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

Identifying the processor type

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

Procedure

1. Reboot the server.

The server restarts and the POST screen appears.

2. Press **F9**.

The System Utilities screen appears.

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

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

4. Press **Esc** until the main menu is displayed.
5. Select **Reboot the System** to exit the utility and resume the boot process.

Installing a DIMM

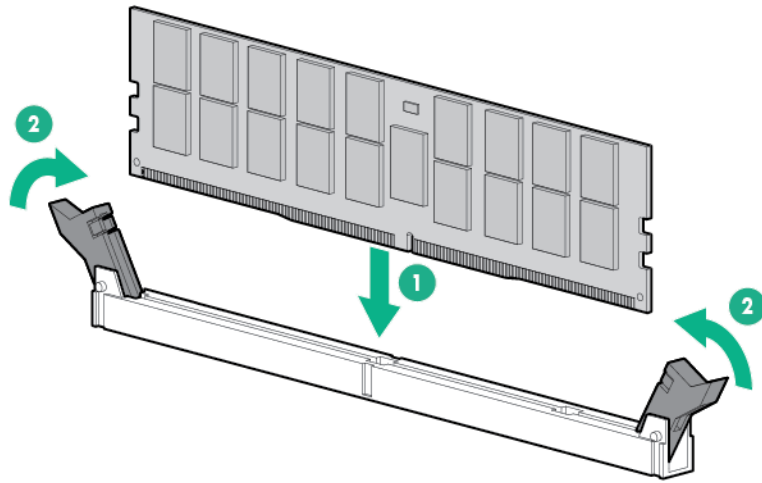
Prerequisites

Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations](#)."

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

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. If installed in a 2U node, **remove the FlexibleLOM 2U node riser cage assembly.**
6. If installed in a 2U node, **remove the three-slot riser cage assembly.**
7. **Remove the air baffle.**
8. Open the DIMM slot latches.
9. Install the DIMM.



CAUTION:

To prevent damage to the server, ensure that all DIMM latches are in closed and locked position before installing the air baffle.

10. **Install the air baffle.**
11. **Install any removed PCI riser cage assemblies.**
12. **Install the node into the chassis.**
13. Connect all peripheral cables to the nodes.
14. **Power up the nodes.**

Installing SATA and Mini-SAS cable options

Prerequisites



IMPORTANT:

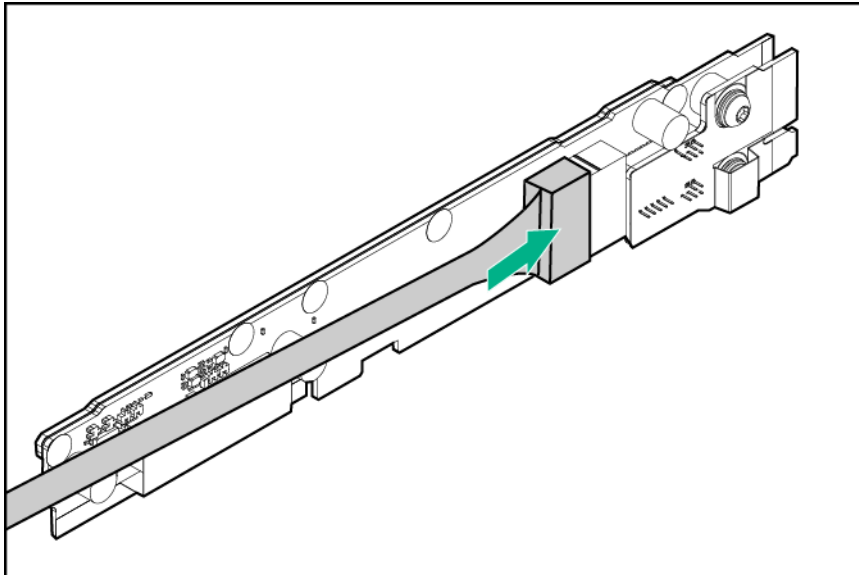
The HPE Apollo r2800 Chassis does not support nodes using the HPE Dynamic Smart Array B140i Controller or the HPE P840 Smart Array Controller. Hewlett Packard Enterprise recommends installing an HPE H240 Host Bus Adapter or HPE P440 Smart Array Controller.

- If using the Dynamic Smart Array B140i Controller, the B140i 1U node SATA cable (PN 800060-B21) or B140i 2U node SATA cable (PN 800061-B21) must be installed.
- To install a P840 Smart Array controller in a 2U node, two P440/P840 Mini-SAS cable options (PN 798205-B21) are required.
- For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

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

Procedure

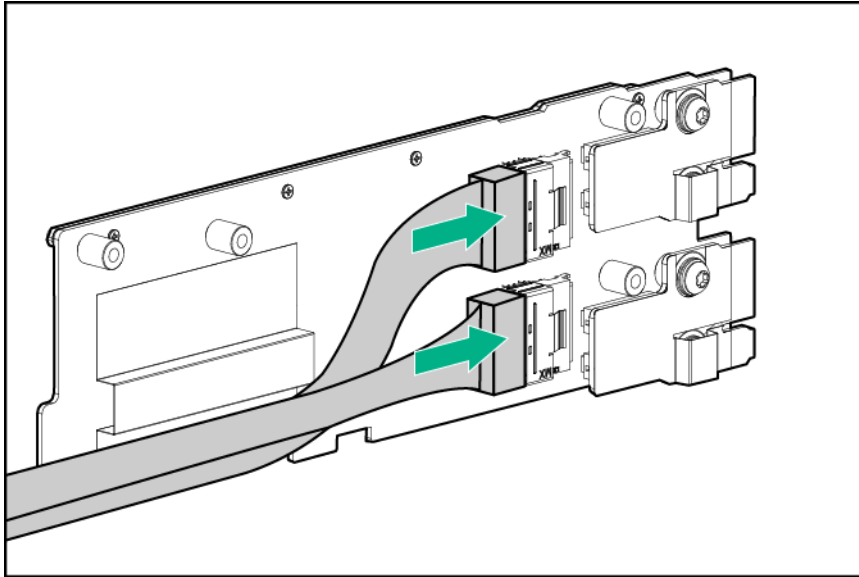
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. If installed, **remove the rear I/O blanks.**
6. **Remove any installed PCI riser cage assemblies.**
7. **Remove the bayonet board assembly and bayonet bracket.**
8. Connect the SATA or Mini-SAS cable to the bayonet board.
 - 1U bayonet board



**IMPORTANT:**

If connecting a SATA or Mini-SAS cable to the 2U bayonet board, route the cable under the padding before installing the 2U bayonet board bracket.

- 2U bayonet board



9. **Install the bayonet board bracket and bayonet board assembly.**
 10. **If installing a host bus adapter or Smart Array controller, install it into the riser cage.**
 11. Do one of the following:
 - Connect the B140i SATA cable to the system board.
 - Connect all necessary internal cables to the storage controller.
- For internal cabling information, see "**SATA and Mini-SAS cabling.**"
12. Route and secure the cables under the thin plastic cover along the side of the node tray.
 13. **Install any removed PCI riser cage assemblies.**
 14. **Install the node into the chassis.**
 15. Connect all peripheral cables to the nodes.
 16. **Power up the nodes.**

PCI riser cage assembly options

For more information on the riser board slot specifications, see "**PCIe riser board slot definitions.**"

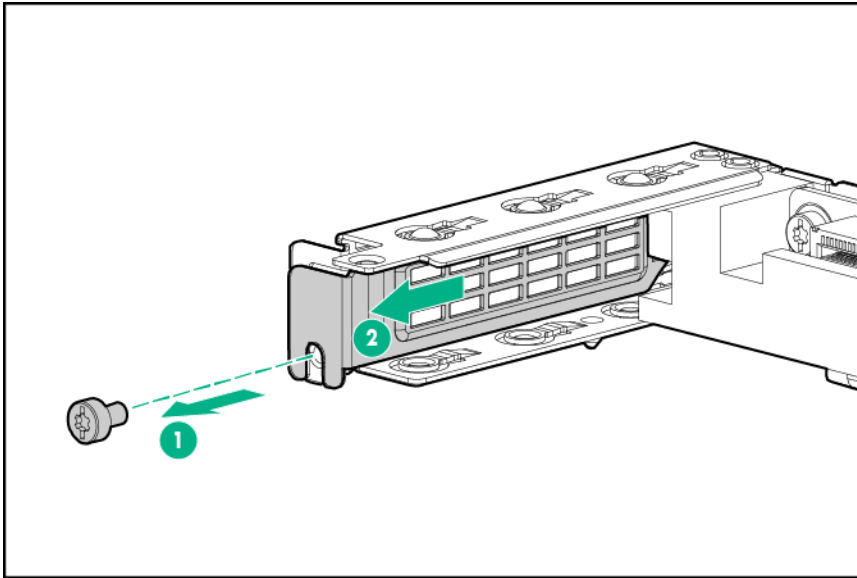
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the **Hewlett Packard Enterprise website.**

Single-slot left PCI riser cage assembly option

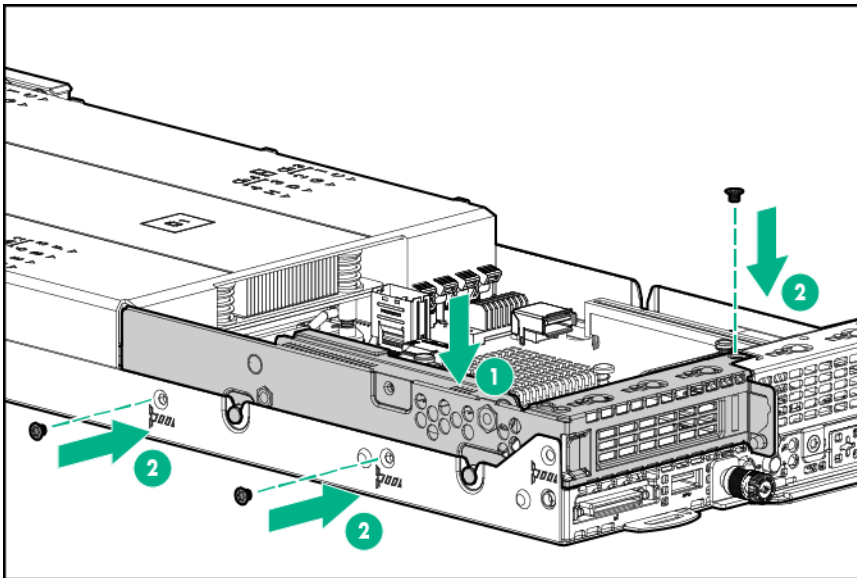
Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the rear I/O blanks.**

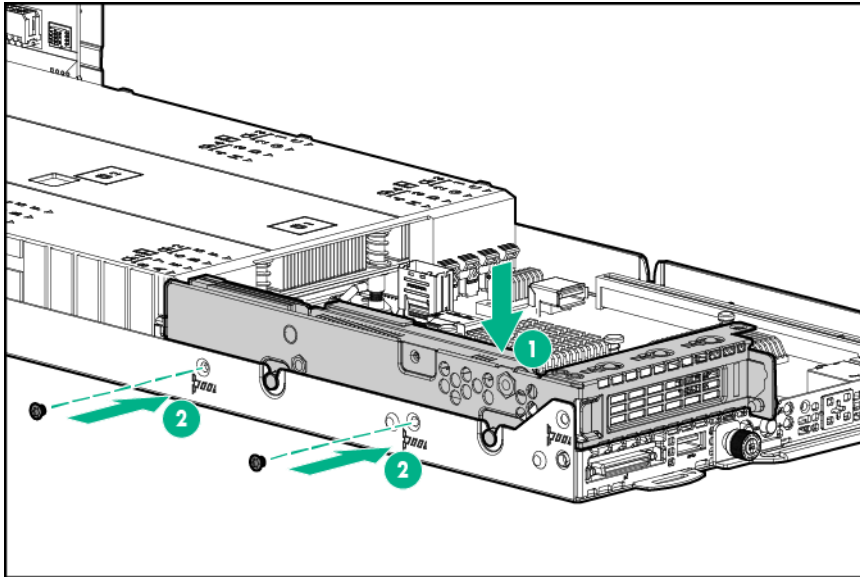
6. If you are installing an expansion board, remove the PCI blank.



7. **Install any expansion board options.**
8. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with that option.
9. In a 1U node, install the single-slot left PCI riser cage assembly and then secure it with three T-10 screws.



10. In a 2U node, do the following:
- a. Install a single-slot left PCI riser cage assembly and then secure it with two T10 screws.



- b. **Install the three-slot riser cage assembly and then secure it with six T-10 screws.**



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.



IMPORTANT:

If the PCIe riser cage assembly is not seated properly, then the server does not power up.

11. **Install the node into the chassis.**
12. Connect all peripheral cables to the nodes.
13. **Power up the nodes.**

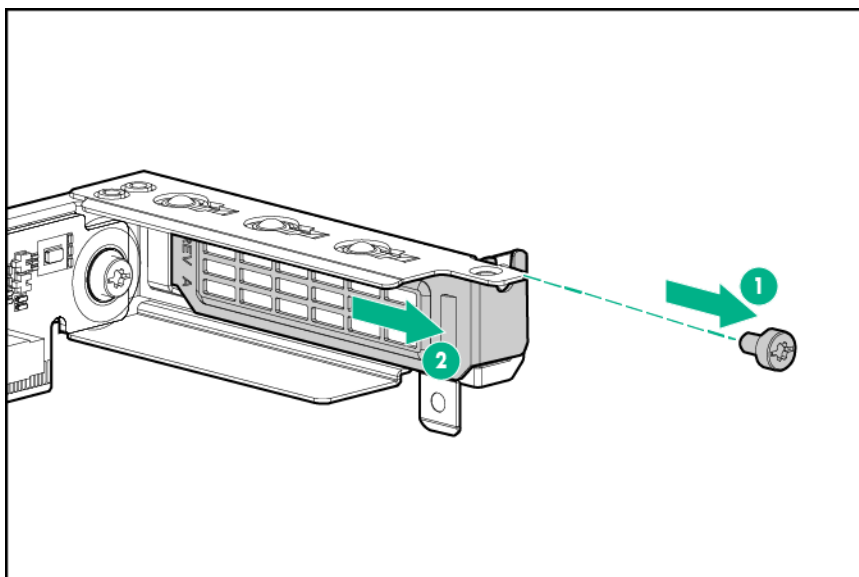
Single-slot 1U node right PCI riser cage assembly options

NOTE: If installing the Single-slot 1U right PCI riser cage assembly for Processor 2 (PN 798182-B21), a second processor is required.

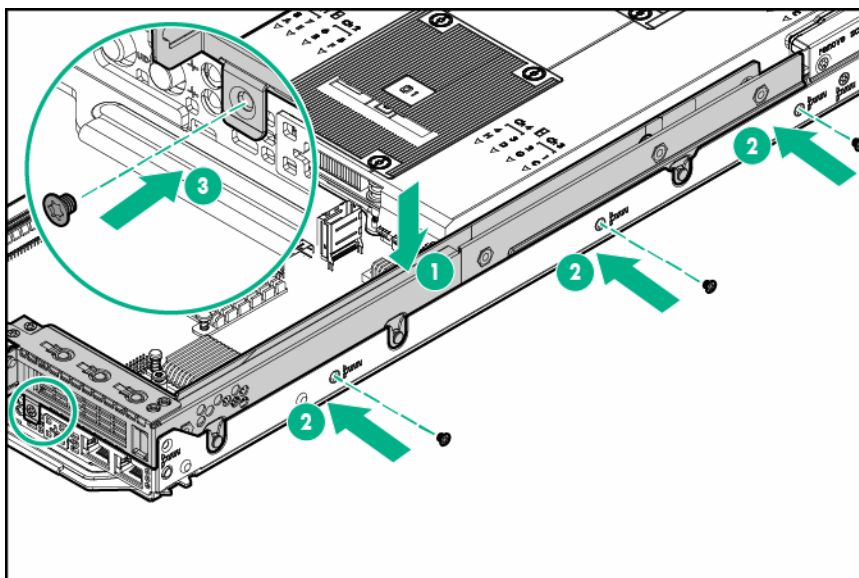
NOTE: Single-slot 1U node right PCI riser cage assemblies feature different riser boards. For more information on the riser board slot specifications, see "**PCIe riser board slot definitions.**"

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. If installed, **remove the single-slot left PCI riser cage assembly.**
6. **Remove the rear I/O blanks.**
7. If you are installing an expansion board, remove the PCI blank.



8. **Install any expansion board options.**
9. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
10. Install the single-slot 1U node right PCI riser cage assembly and then secure it with four T-10 screws.



11. Do one of the following:
 - **Install the 1U left rear I/O blank.**
 - **Install the single-slot left PCI riser cage assembly.**



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.



IMPORTANT:

If the PCIe riser cage assembly is not seated properly, then the server does not power up.

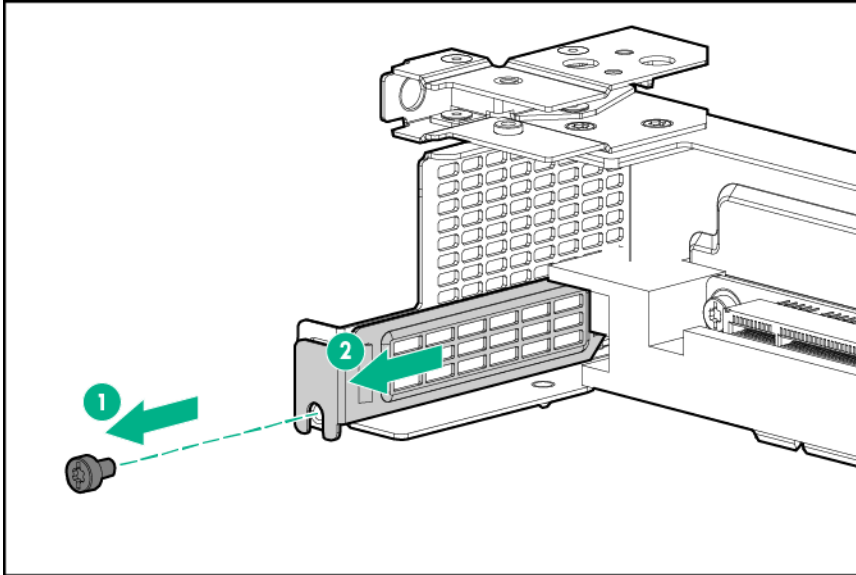
12. **Install the node into the chassis.**

13. Connect all peripheral cables to the nodes.
14. **Power up the nodes.**

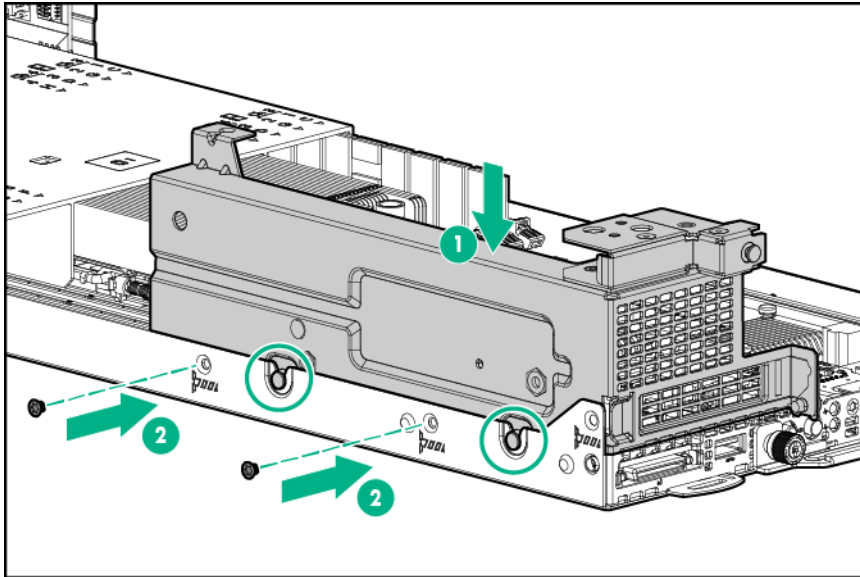
Single-slot 2U node PCI riser cage assembly option

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the 2U rear I/O blank.**
6. If you are installing an expansion board, remove the PCI blank.



7. **Install any expansion board options.**
8. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
9. Do the following:
 - a. Install the single-slot 2U node PCI riser cage assembly and secure it with two T-10 screws.



- b. **Install the FlexibleLOM 2U node riser cage assembly and secure it with five T-10 screws.**



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.



IMPORTANT:

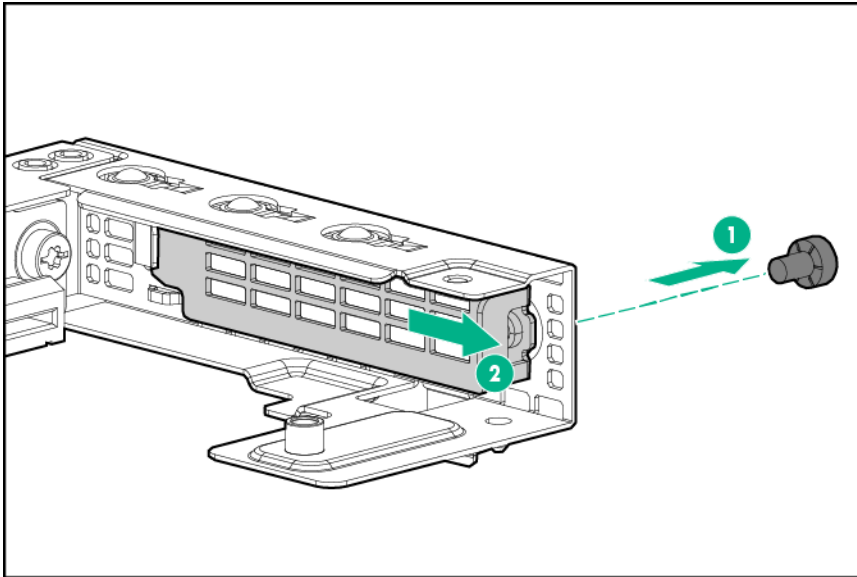
If the PCIe riser cage assembly is not seated properly, then the server does not power up.

10. **Install the node into the chassis.**
11. Connect all peripheral cables to the nodes.
12. **Power up the node.**

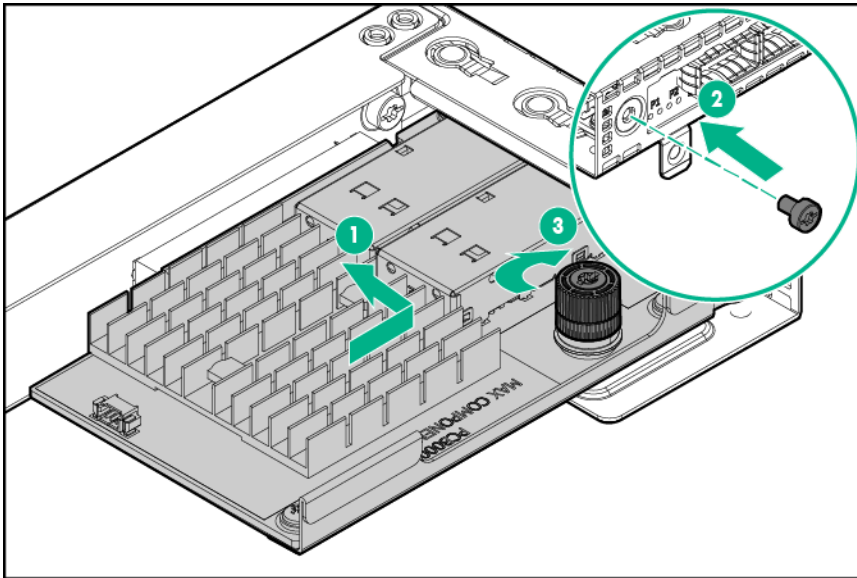
FlexibleLOM 1U node riser cage assembly option

Procedure

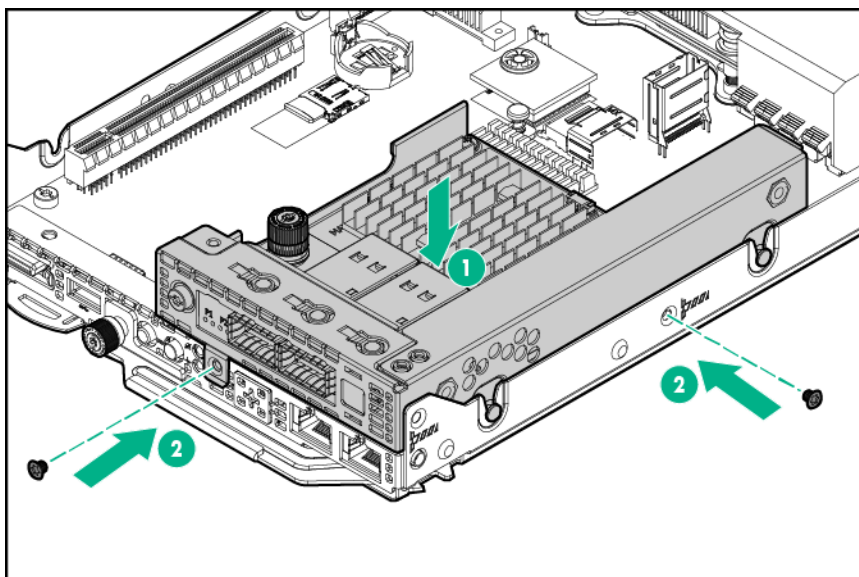
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. If installed, **remove the single-slot left PCI riser cage assembly.**
6. **Remove the rear I/O blanks.**
7. Remove the PCI blank.



8. Install the FlexibleLOM adapter.



9. Install the FlexibleLOM riser cage assembly.



10. Do one of the following:

- **Install the 1U left rear I/O blank.**
- **Install the single-slot left PCI riser cage assembly.**



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.



IMPORTANT:

If the PCIe riser cage assembly is not seated properly, then the server does not power up.

11. **Install the node into the chassis.**

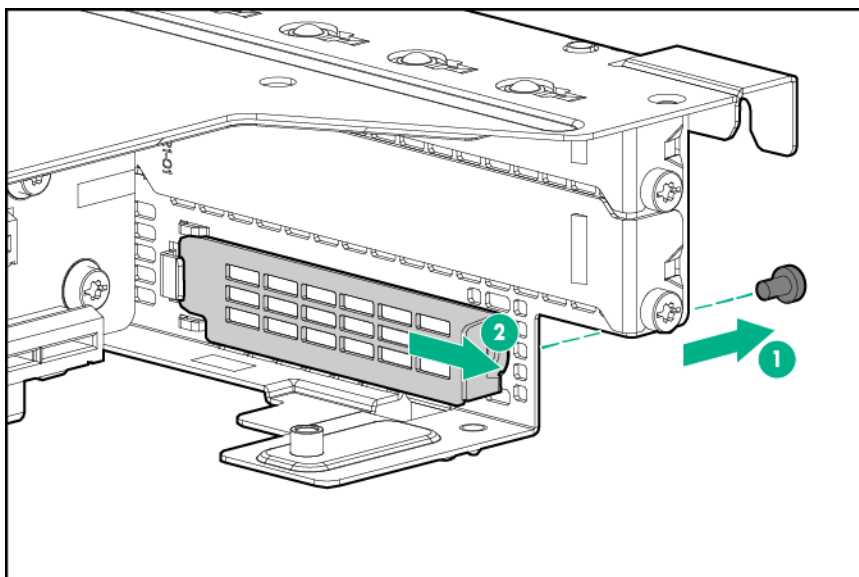
12. Connect all peripheral cables to the nodes.

13. **Power up the node.**

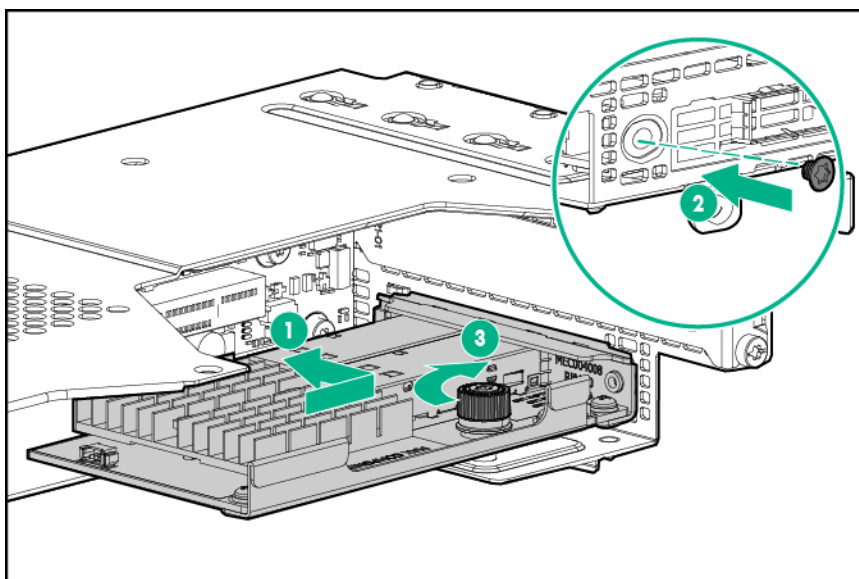
FlexibleLOM 2U node riser cage assembly option

Procedure

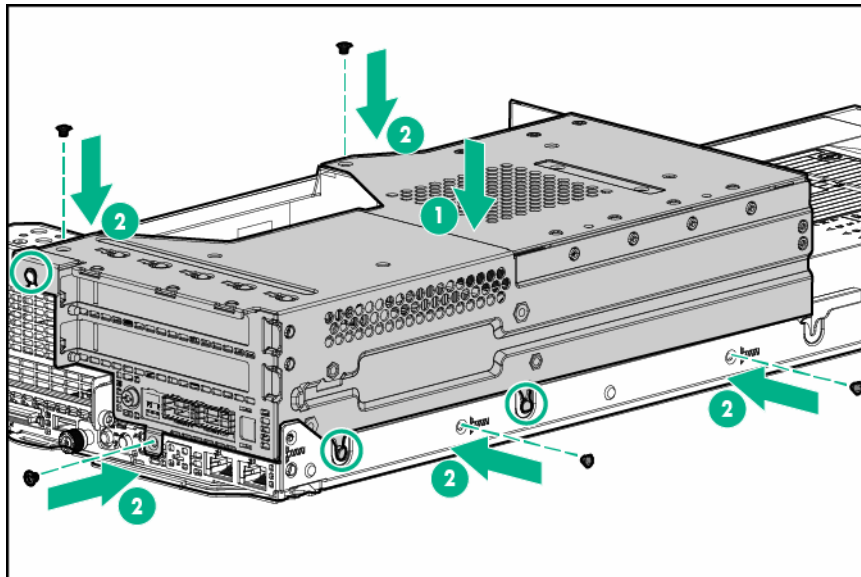
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the 2U rear I/O blank.**
6. Remove the PCI blank.



7. Install the FlexibleLOM adapter.



8. Do the following:
 - a. **Install the single-slot 2U node PCI riser cage assembly and secure it with two T-10 screws.**
 - b. Install the FlexibleLOM 2U node riser cage assembly and secure it with five T-10 screws.



CAUTION:
To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.

IMPORTANT:
If the PCIe riser cage assembly is not seated properly, then the server does not power up.

9. **Install the node into the chassis.**
10. Connect all peripheral cables to the nodes.
11. **Power up the node.**

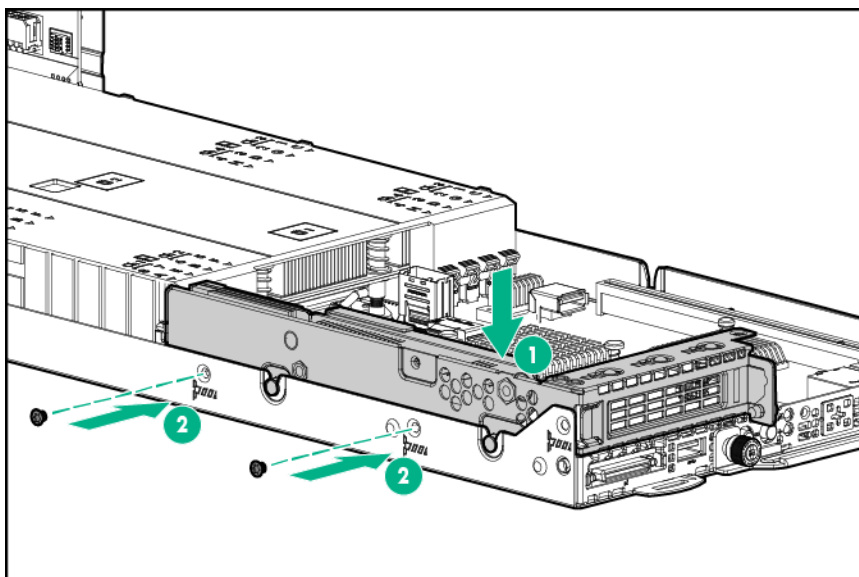
Three-slot riser cage assembly options

NOTE: A second processor is required to install a three-slot riser cage assembly.

NOTE: Three-slot riser cage assemblies feature different riser boards. For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

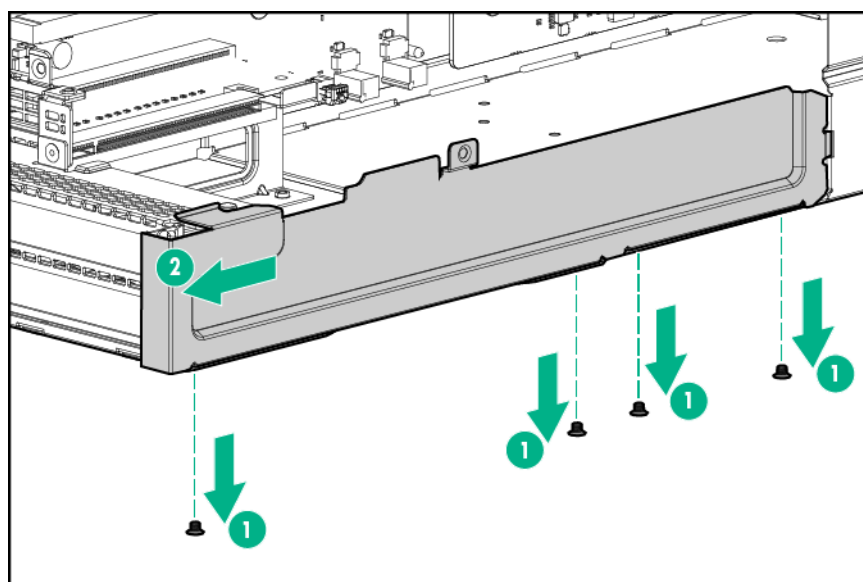
Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the 2U rear I/O blank.**
6. Install the single-slot left PCI riser cage assembly and then secure it with two T-10 screws.

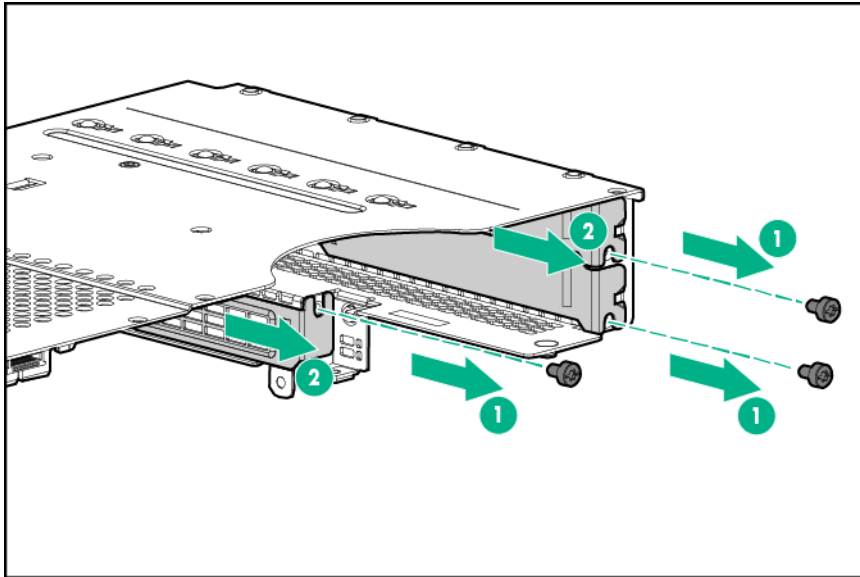


7. If installing an expansion board, do the following:

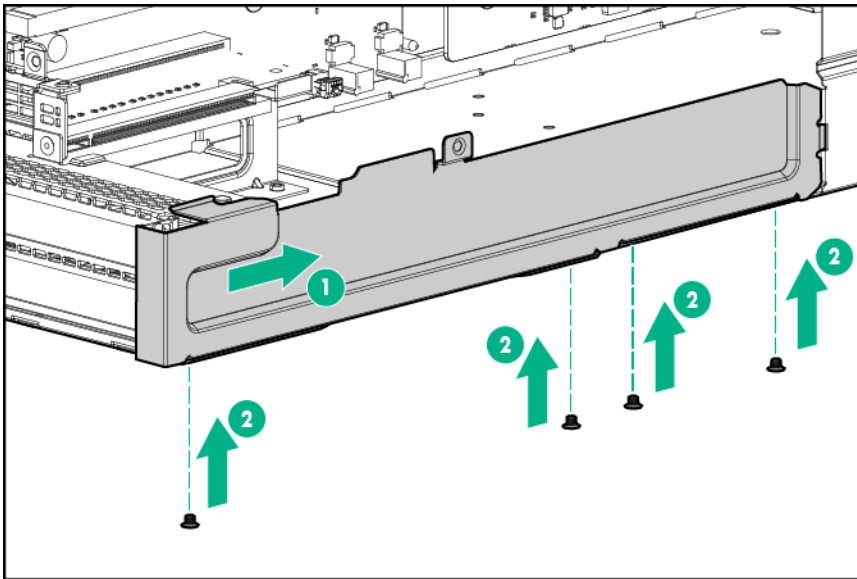
a. Remove the riser cage bracket.



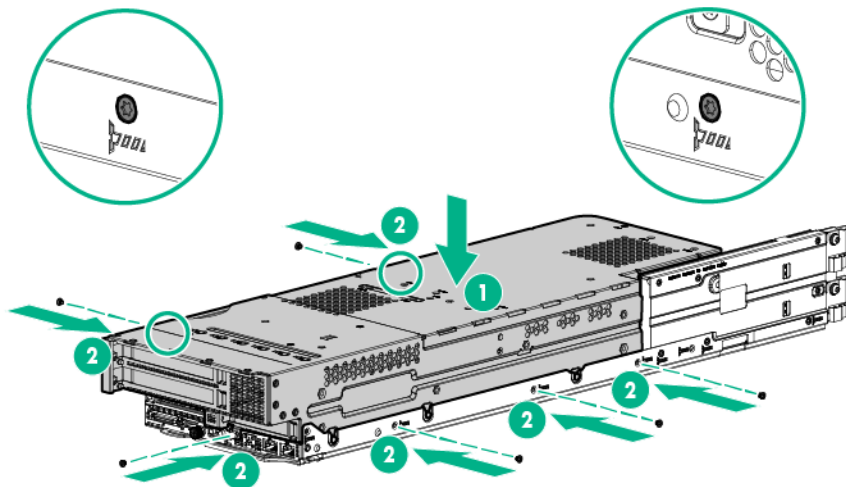
b. Select the appropriate PCIe slot and remove any PCI blanks.



8. **Install any expansion board options.**
9. Connect all necessary internal cables to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
10. Install the riser cage bracket.



11. Install the three-slot riser cage assembly and then secure it with six T-10 screws.



CAUTION:

To prevent improper cooling and thermal damage, do not operate the node unless all PCI riser cages or rear I/O blanks are installed, and do not operate the node unless all PCI slots have either an expansion slot cover or an expansion board installed.



IMPORTANT:

If the PCIe riser cage assembly is not seated properly, then the server does not power up.

12. **Install the node into the chassis.**
13. Connect all peripheral cables to the nodes.
14. **Power up the node.**

Expansion board options

This section provides instructions for installing an expansion board option into the server.

Expansion board installation guidelines

The server nodes support low-profile PCIe NIC cards, storage controllers, and accelerator options. Installation guidelines vary depending on the type of riser cage assemblies installed, other installed components, and thermal limitations.

- Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations](#)."
- Install low-profile storage controllers or PCIe NIC cards into slot 1 and 2. For more information on installing a storage controller, see "[Controller options](#)."
- Install GPU accelerator options into slot 2 of the FlexibleLOM 2U riser cage assembly, and slot 3 and 4 of a three-slot riser cage assembly. For more information, see "[Accelerator options](#)."

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

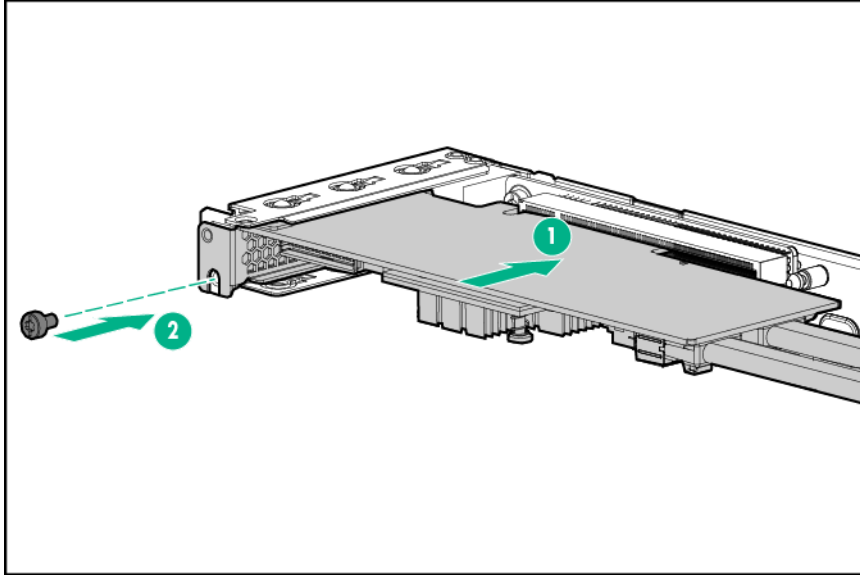
Installing the expansion board

Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations](#)."

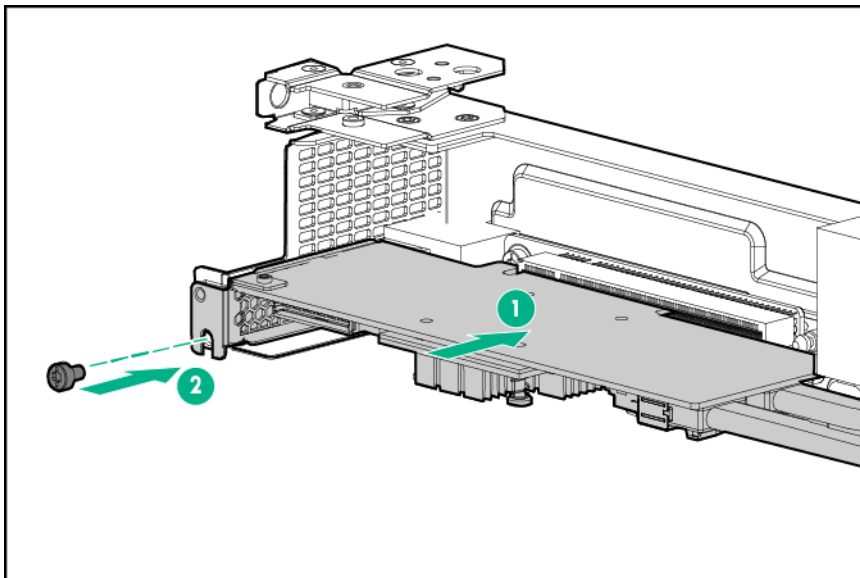
To install the component:

Procedure

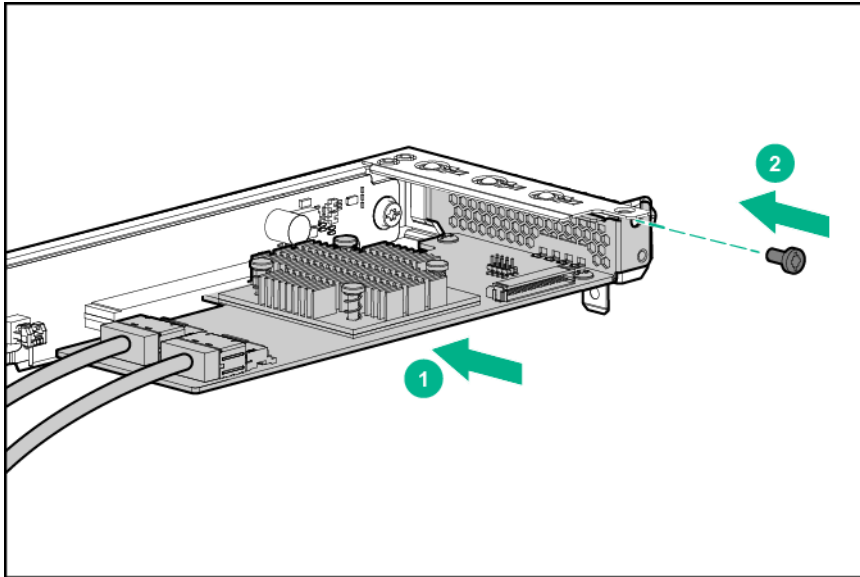
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the PCI riser cage.**
6. Identify the PCIe slot compatible with the new option, and then remove the PCI blank opposite that slot.
7. Connect any required cables to the expansion board.
8. Install the expansion board into the riser cage assembly and secure it to the riser cage with one T-15 screw.
 - Slot 1 of the single-slot left PCI riser cage assembly



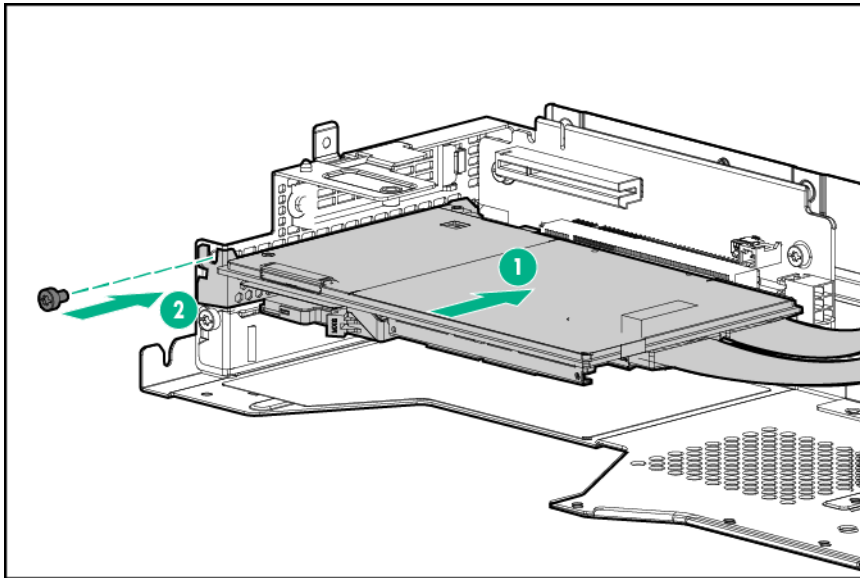
- Slot 1 of the single-slot 2U node PCI riser cage assembly



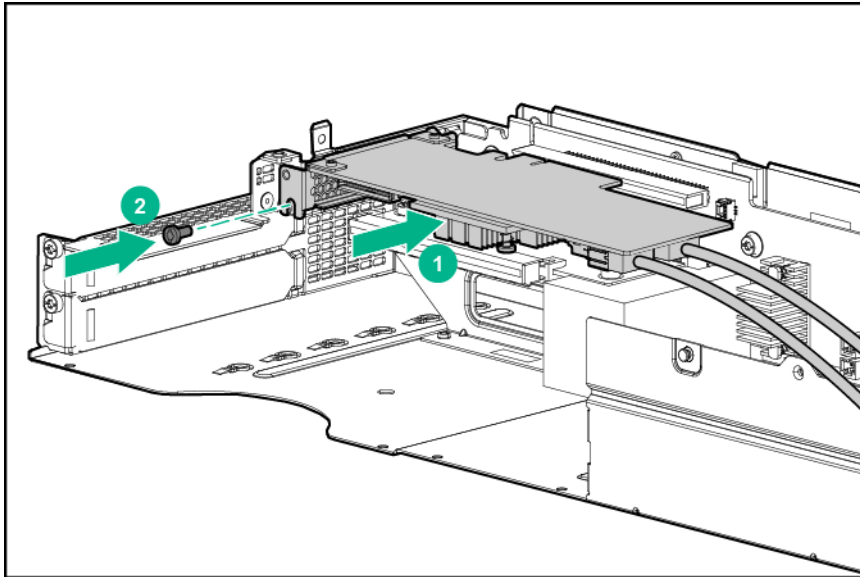
- Slot 2 of a single-slot 1U right PCI riser cage assembly



- Slot 2 of the FlexibleLOM 2U riser cage assembly



- Slot 2 of a three-slot riser cage assembly



9. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
10. **Install any removed PCI riser cage assemblies.**
11. **Install the node into the chassis.**
12. Connect all peripheral cables to the nodes.
13. **Power up the node.**

Controller options

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

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

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

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

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

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

**CAUTION:**

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

Storage controller installation guidelines

To maintain optimal thermal conditions and efficiency, Hewlett Packard Enterprise recommends the following guidelines:

- Install one storage controller per node.
- The HPE H240/H241 host bus adapter or HPE P440/P441 Smart Array controller can be installed in slot 1 or slot 2.

**IMPORTANT:**

The HPE Apollo r2800 Chassis does not support nodes using the HPE Dynamic Smart Array B140i Controller or the HPE P840 Smart Array Controller. Hewlett Packard Enterprise recommends installing an HPE H240 Host Bus Adapter or HPE P440 Smart Array Controller.

- The HPE P840 Smart Array controller can only be installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21)

Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations](#)."

For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

For information on drive bay mapping in the HPE Apollo r2800 Chassis and the factory default configuration, see "[Drive bay mapping for the HPE Apollo r2800 Chassis](#)."

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

Installing the HPE Smart Storage Battery

Procedure

1. **Power down all nodes.**
2. Disconnect all peripheral cables from the nodes and chassis.

**WARNING:**

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

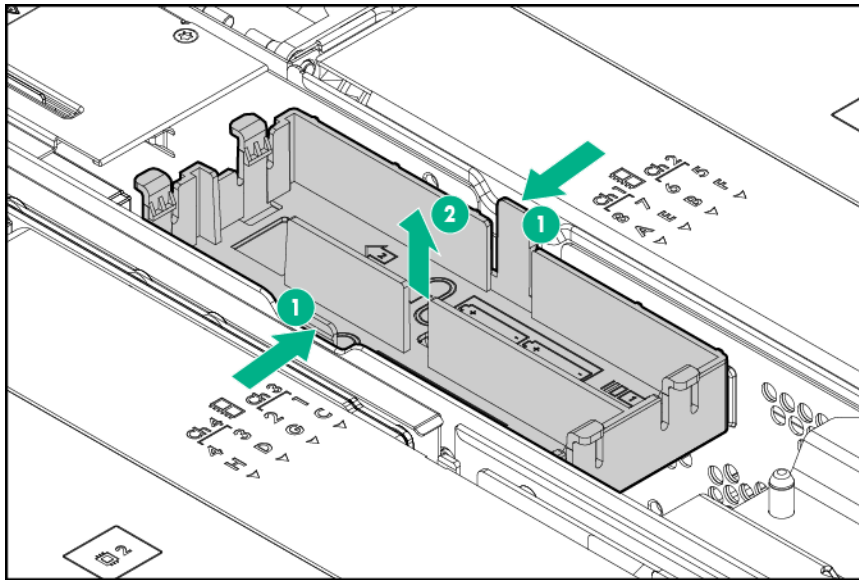
- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed components from the chassis before installing or moving the chassis.
- Use caution and get help to lift and stabilize the chassis during installation or removal, especially when the chassis is not fastened to the rack.

**CAUTION:**

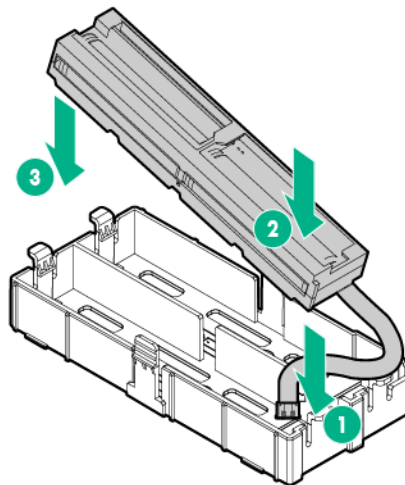
Before installing the chassis into the rack or removing the chassis from the rack, Hewlett Packard Enterprise recommends removing the nodes, the drives, and the power supplies. Because a fully populated chassis is heavy, removing these components facilitates moving the chassis.

3. **Remove all nodes from the chassis.**
4. If installed, **remove the security bezel.**

5. **Remove all drives.**
6. If installed, **remove the RCM module.**
7. **Remove all power supplies.**
8. **Remove the chassis from the rack.**
9. **Remove the access panel.**
10. Remove the Smart Storage Battery holder.



11. Route the cable through the holder and install the Smart Storage Battery.

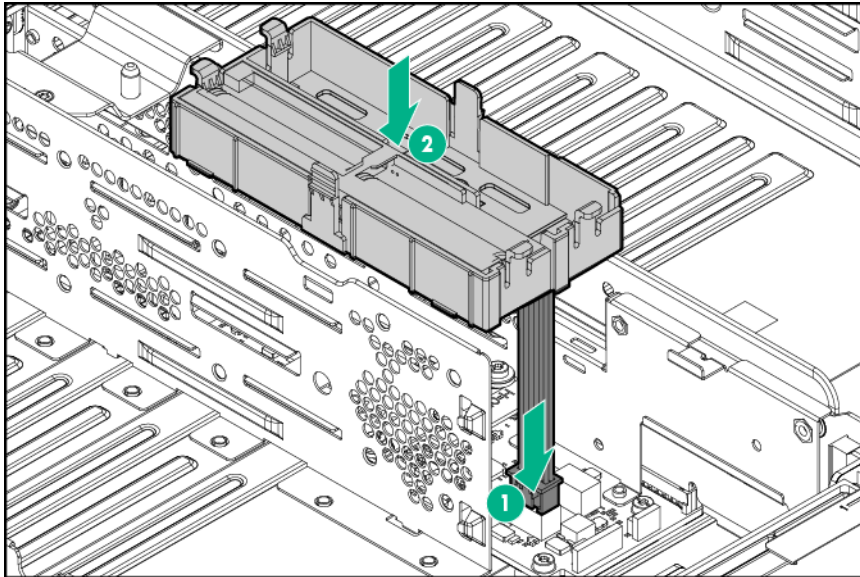


12. Do the following:
 - a. Connect the Smart Storage Battery cable to the power distribution board.
 - b. Install the Smart Storage Battery holder into the chassis.



IMPORTANT:

Ensure that the battery cable is connected to the correct connector. For detailed cabling information, see "**HPE Smart Storage Battery cabling.**"



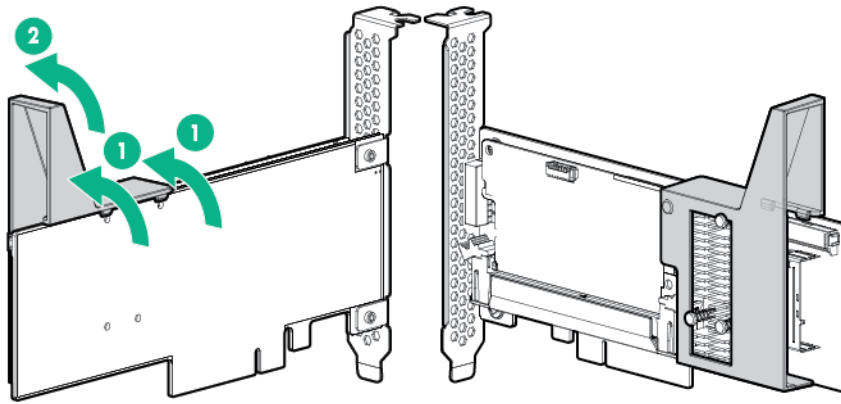
13. **Install the access panel.**
14. **Install the chassis into the rack.**
15. **Install the storage controller and FBWC module options in the node.**
16. **Install all nodes, drives and power supplies.**
17. If removed, **install the security bezel.**
18. If removed, **install the RCM module.**
19. Connect all peripheral cables to the nodes and chassis.
20. **Power up the nodes.**

Installing the storage controller and FBWC module options

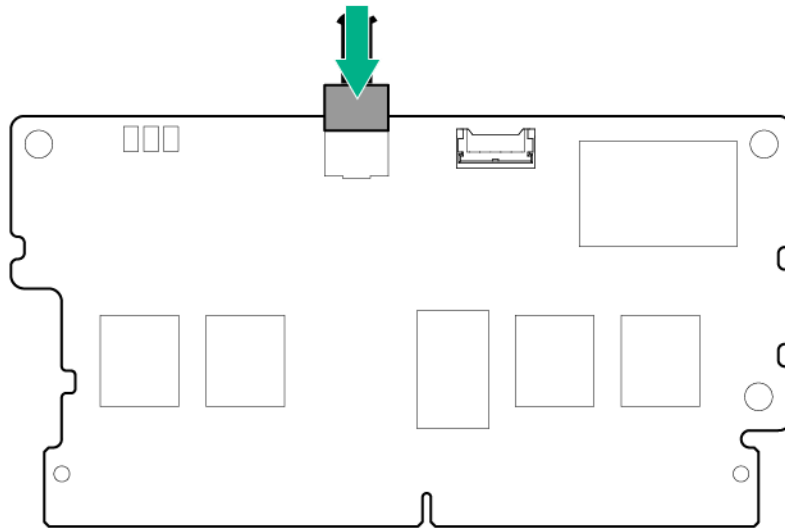
- ❗ **IMPORTANT:**
If planning to install a Smart Storage Battery, **install it in the chassis before installing the storage controller and FBWC module in the node.**

Procedure

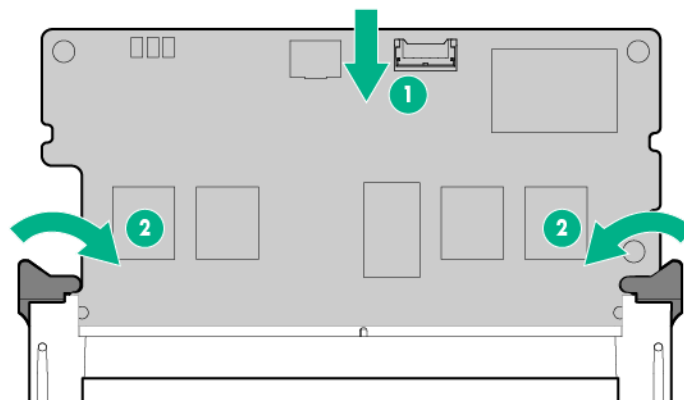
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the PCI riser cage.**
6. Identify the PCIe slot compatible with the new option, and then remove the PCI blank opposite that slot.
7. **Remove the bayonet board assembly and bayonet bracket.**
8. If you intend to use an FBWC module, install the module on the storage controller. Depending on the controller model, the cable connector on the cache module might be facing up or down when the module is installed on the controller board.
9. If installed, remove the air scoop from the controller.



10. Open the latch on the controller.
11. Connect the cache module backup power cable to the module.



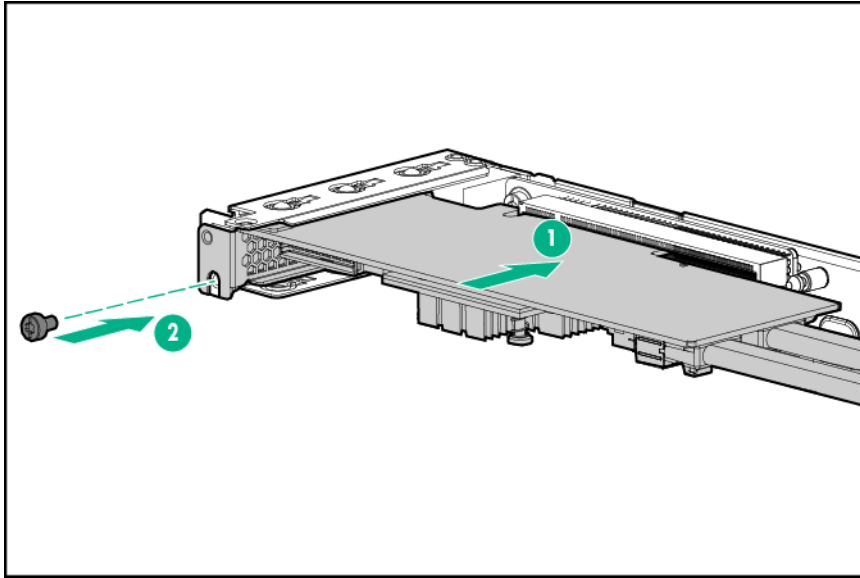
12. Install the cache module on the storage controller.



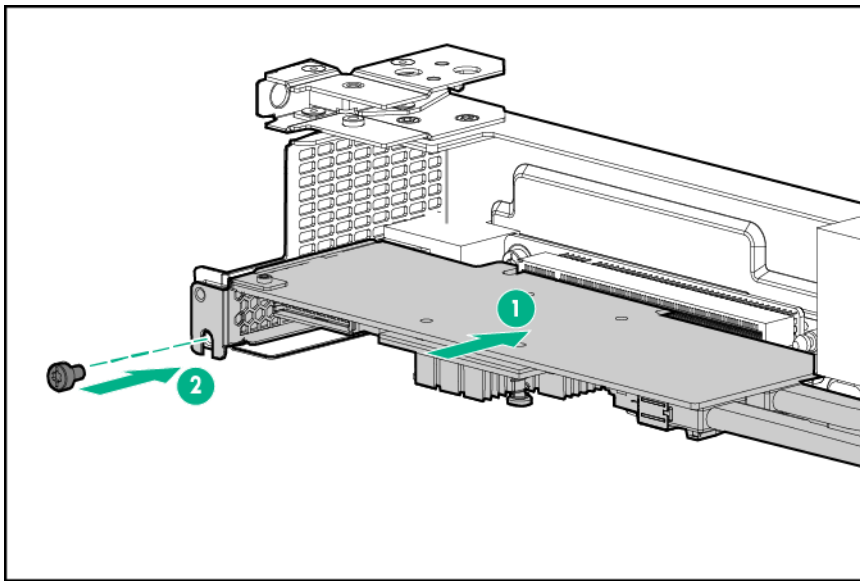
13. If you installed a cache module on the storage controller, connect the **cache module backup power cable to the riser board**.
14. Connect all necessary internal cables to the storage controller. For internal cabling information, see "**SATA and Mini-SAS cabling**."

15. Install the storage controller into the riser cage assembly and secure it to the riser cage with one T-15 screw.

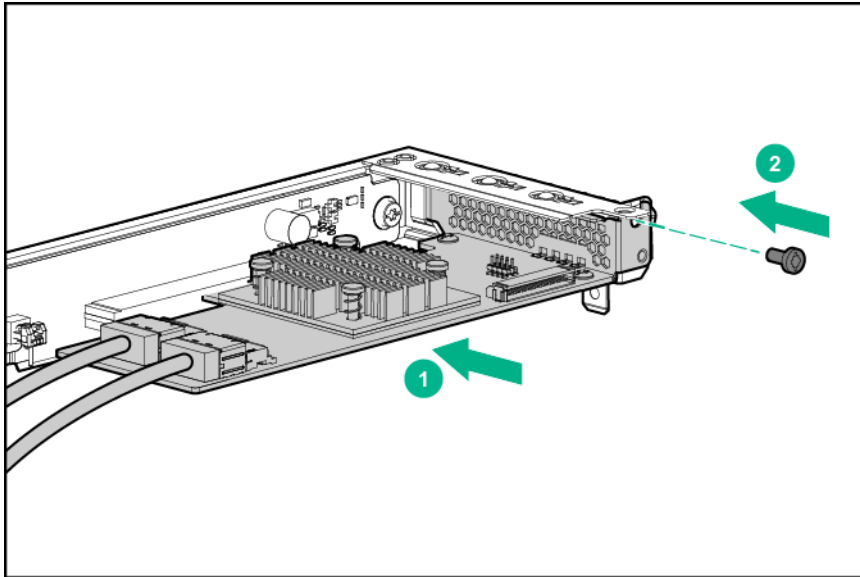
- Slot 1 of the single-slot left PCI riser cage assembly



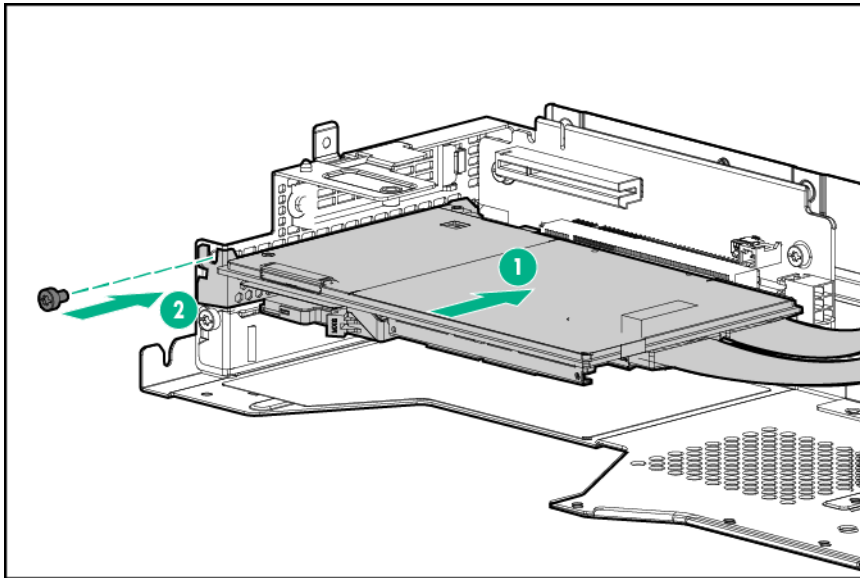
- Slot 1 of the single-slot 2U node PCI riser cage assembly



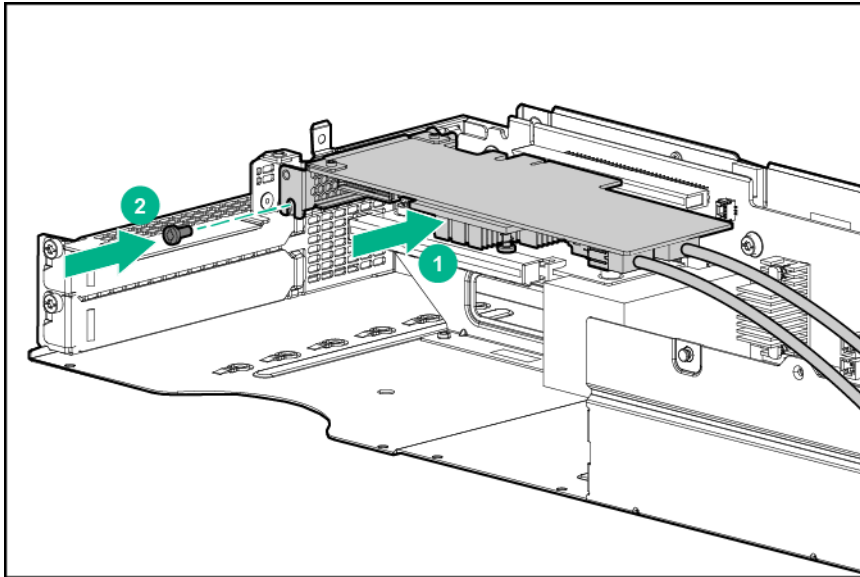
- Slot 2 of single-slot 1U right PCI riser cage assembly



- Slot 2 of the FlexibleLOM 2U riser cage assembly

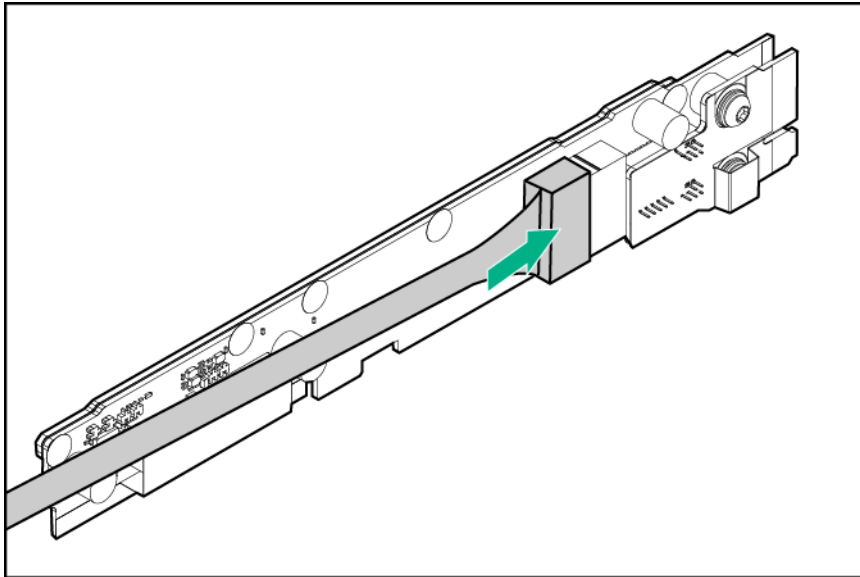


- Slot 2 of a three-slot riser cage assembly



16. Connect the SATA or mini-SAS cable to the bayonet board.

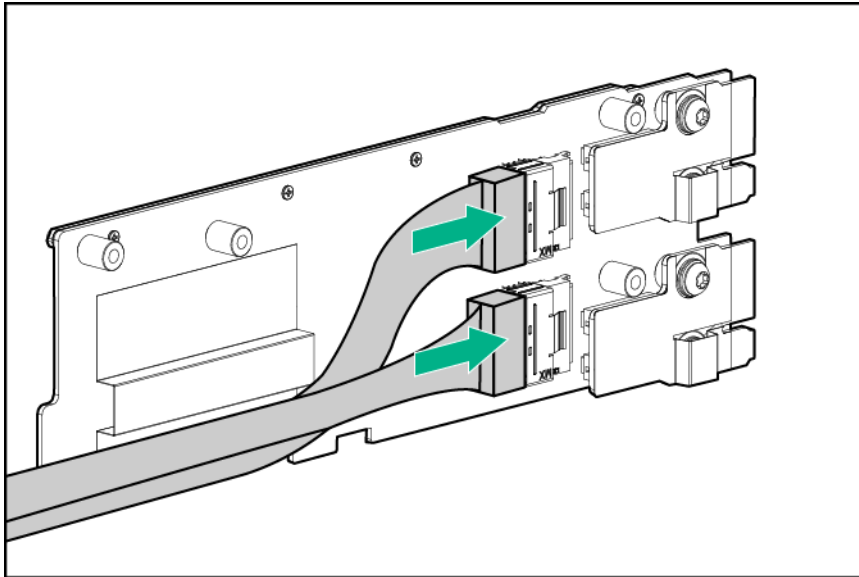
- 1U bayonet board



IMPORTANT:

If connecting a SATA or Mini-SAS cable to the 2U bayonet board, route the cable under the padding before installing the 2U bayonet board bracket.

- 2U bayonet board



17. **Install the bayonet board bracket and bayonet board assembly.**
18. Route and secure the cable under the thin plastic cover.
19. **Install any removed PCI riser cage assemblies..**
20. **Install the node into the chassis.**
21. Connect all peripheral cables to the nodes.
22. **Power up the nodes.**

For more information about the integrated storage controller and its features, select the relevant user documentation on the [Hewlett Packard Enterprise website](#).

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

Accelerator options

This hardware option might require a power supply with a higher wattage rating. To accurately estimate the power consumption of your server and select the appropriate power supply and other system components, see the [Hewlett Packard Enterprise Power Advisor website](#).

Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations](#)."

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

Accelerator population rules

Observe the following population rules when installing an accelerator in the node:

- The FlexibleLOM 2U node riser cage assembly supports one accelerator option. Install the accelerator into slot 2.
- A three-slot riser cage assembly supports a maximum of two accelerators.
 - If installing a single NVIDIA GRID K2 RAF GPU, NVIDIA Tesla K80 GPU, NVIDIA Tesla M60 GPU, NVIDIA Tesla M40 GPU, or NVIDIA Tesla P100 GPU, install it into slot 3 and leave slot 4 empty.
 - For all other accelerator models, and to ensure proper thermal cooling, populate both slot 3 and slot 4 with accelerators.
 - The mixing of different accelerator models is not supported.
- If installing an NVIDIA Tesla P100 GPU, note the following guidelines and limitations:

- The HPE Apollo r2800 Chassis does not support server nodes installed with NVIDIA Tesla P100 GPUs.
- If NVIDIA Tesla P100 GPUs are installed in the server node, and the server node is installed in the HPE Apollo r2200 Chassis, the inlet ambient temperature must be maintained at or below 24°C (75.2°F).
- If NVIDIA Tesla P100 GPUs are installed in the server node, and the server node is installed in the HPE Apollo r2600 Chassis, the inlet ambient temperature must be maintained at or below 20°C (68°F).
- To ensure proper thermal cooling when NVIDIA Tesla P100 GPUs are installed in the server node, bezel blanks must be installed in specific drive bays. For more information on supported drive configurations, see "[Bezel blank installation guidelines for the HPE Apollo r2200 Chassis and HPE Apollo r2600 Chassis](#)."

For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

Supported riser cage assemblies and accelerator power cables

FlexibleLOM 2U node riser cage assembly (PN 798184-B21)

Single accelerator options	Power cable	2-pin adapter cable
• Intel Xeon Phi Coprocessor 5110P • AMD FirePro S9150 GPU • NVIDIA Quadro M4000 GPU • NVIDIA Quadro K4200 GPU Accelerator • NVIDIA Tesla K40 GPU Accelerator	800288-001	Not supported

Three-slot 110S PCI riser cage assembly (PN 798186-B21)

Dual accelerator options	Power cable	2-pin adapter cables
• Intel Xeon Phi Coprocessor 5110P • AMD FirePro S9150 GPU • NVIDIA Tesla K40 GPU Accelerator	Both 825634-001 and 825635-001 are required	Not supported
• NVIDIA Tesla M40 GPU Accelerator¹ • NVIDIA Tesla P100 GPU Accelerator¹	Both 825636-001 and 825637-001 are required	Not supported
• NVIDIA GRID K2 Reverse Air Flow GPU Accelerator¹	Both 825634-001 and 825635-001 are required	805206-001 required for each accelerator

¹ Both single and dual accelerator configurations are supported.

Three-slot GPU-direct PCI riser cage assembly (PN 798188-B21)

Dual accelerator options	Power cable	2-pin adapter cables
- Intel Xeon Phi Coprocessor 5110P - AMD FirePro S9150 GPU - NVIDIA Tesla K40 GPU Accelerator	Both 825634-001 and 825635-001 are required	Not supported
NVIDIA GRID K2 Reverse Air Flow GPU Accelerator ¹	Both 825634-001 and 825635-001 are required	805206-001 required for each accelerator

¹ Both single and dual accelerator configurations are supported.

Three-slot GPU-direct with re-timer PCI riser cage assembly (PN 827353-B21)

Dual accelerator options	Power cable	2-pin adapter cables
AMD FirePro S7150 GPU	Both 825634-001 and 825635-001 are required	Not supported
- NVIDIA Tesla K80 GPU Accelerator ¹ - NVIDIA Tesla M60 GPU Accelerator ¹ - NVIDIA Tesla M40 GPU Accelerator ¹ - NVIDIA Tesla P100 GPU Accelerator ¹	Both 825636-001 and 825637-001 are required	Not supported

¹ Both single and dual accelerator configurations are supported.

For more information, see "[Accelerator cabling](#)."

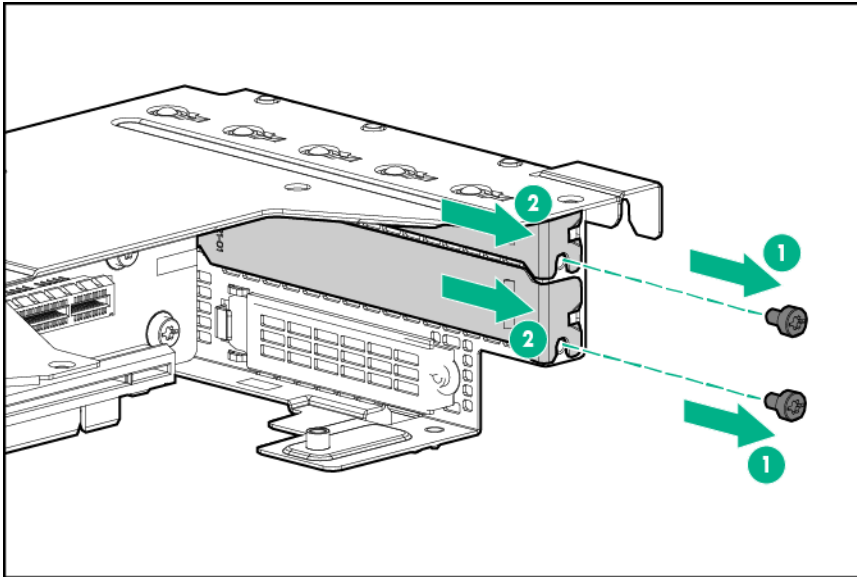
Installing one accelerator in a FlexibleLOM 2U node riser cage assembly

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

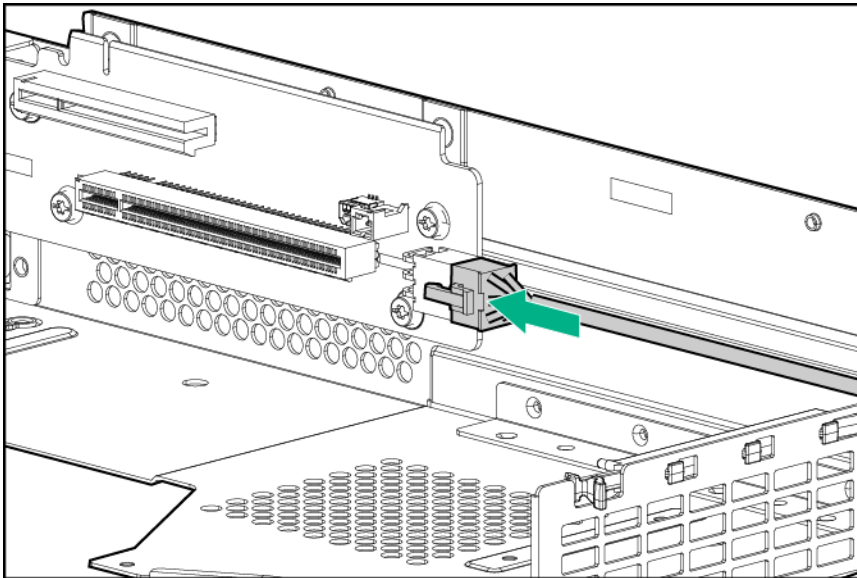
To install the component:

Procedure

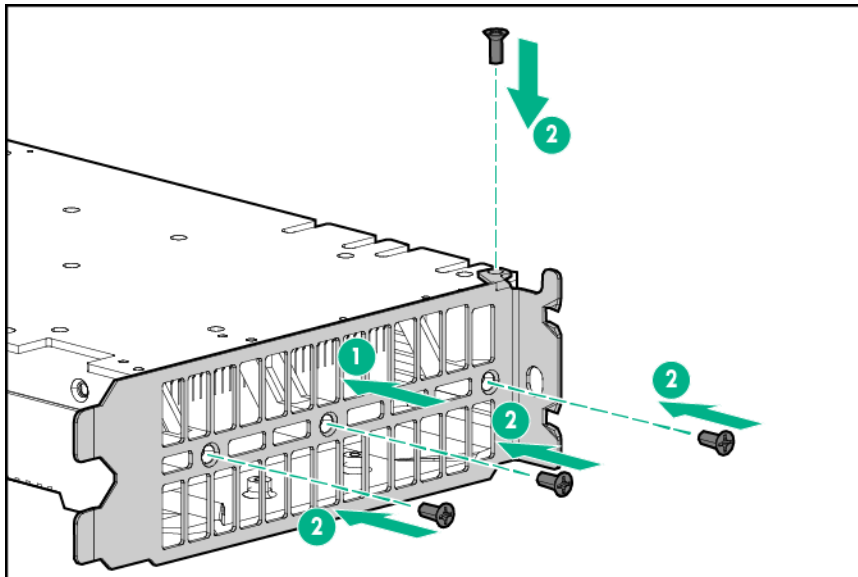
- 1. Power down the node.**
- Disconnect all peripheral cables from the node.
- 3. Remove the node from the chassis.**
- Place the node on a flat, level surface.
- 5. Remove the FlexibleLOM 2U node riser cage assembly.**
- If installing a half-height accelerator, remove the middle PCI blank only.
- If installing a full-height accelerator, remove the middle and the top PCI blanks.



8. Connect the single accelerator power cable to the connector on the riser board.

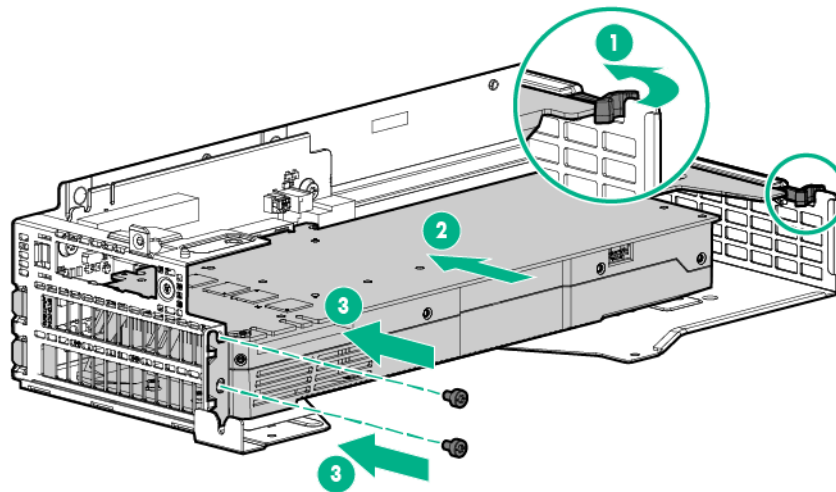


9. If installing a NVIDIA Tesla K40 GPU, install the front support bracket for Accelerator 1 with four M2.5 screws.

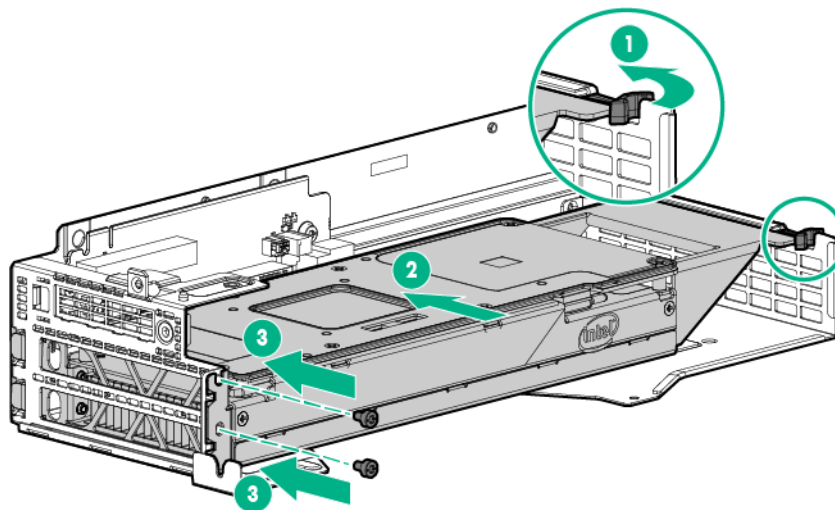


10. Install the accelerator into the PCI riser cage assembly.

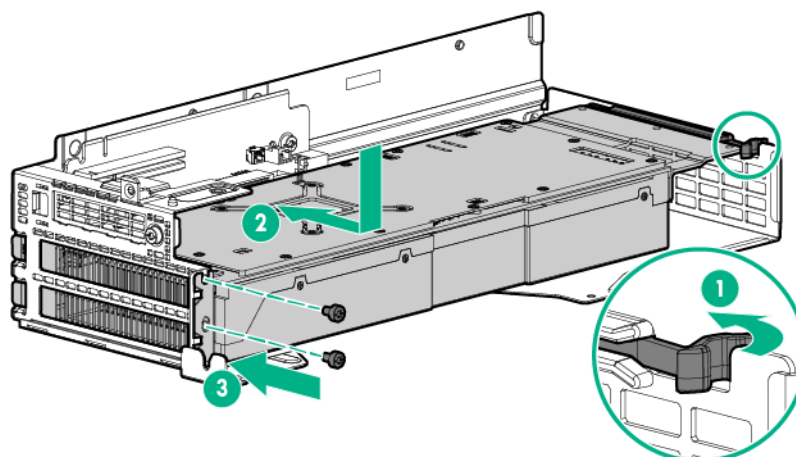
- NVIDIA Tesla K40 GPU



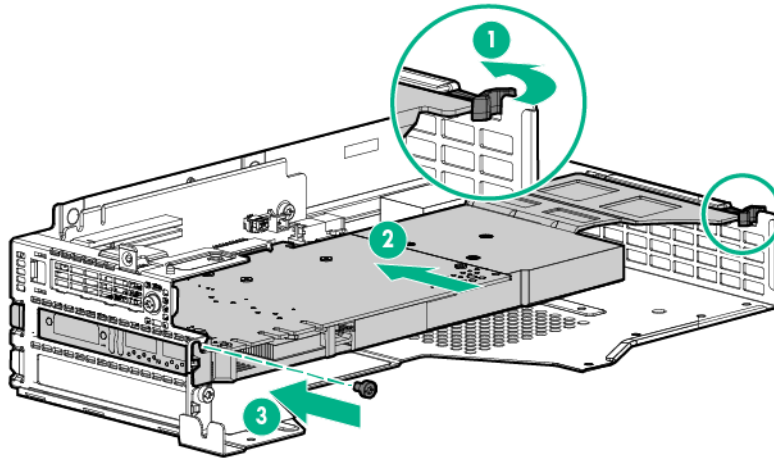
- Intel Xeon Phi Coprocessor 5110P



- AMD FirePro S9150 GPU



- NVIDIA Quadro K4200 GPU or NVIDIA Quadro M4000 GPU



IMPORTANT:

If installing an Intel Xeon Phi Coprocessor 5110P, connect the power cable to the 2x4 connector only. Do not connect the power cable to the 2x3 connector.

11. Connect the power cable to the accelerator.
"Connect the power cable to the accelerator. For more information, see "[Accelerator cabling](#)."
12. **Install the FlexibleLOM 2U node riser cage assembly.**
13. Connect the power cable to the bayonet board.
14. **Install the node into the chassis.**
15. Connect all peripheral cables to the nodes.
16. **Power up the node.**

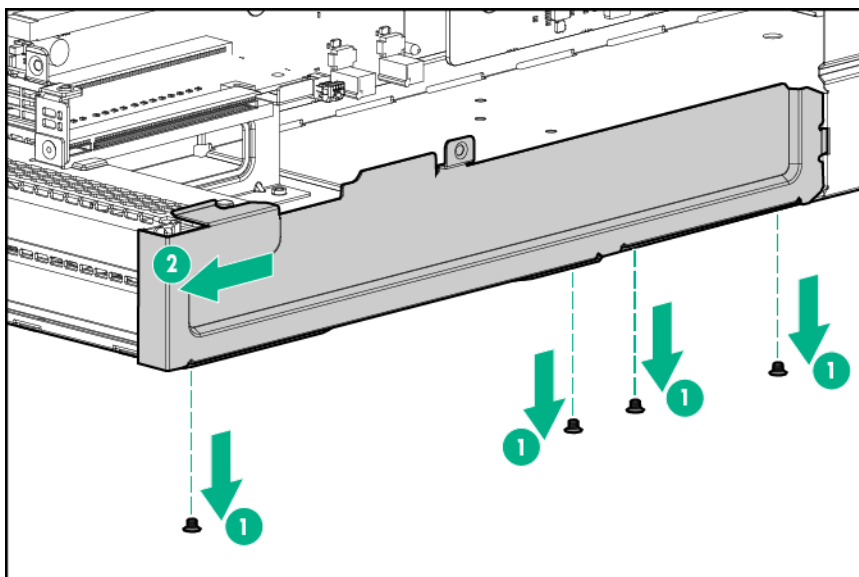
Installing NVIDIA GRID K2 RAF GPUs in a three-slot riser cage assembly

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

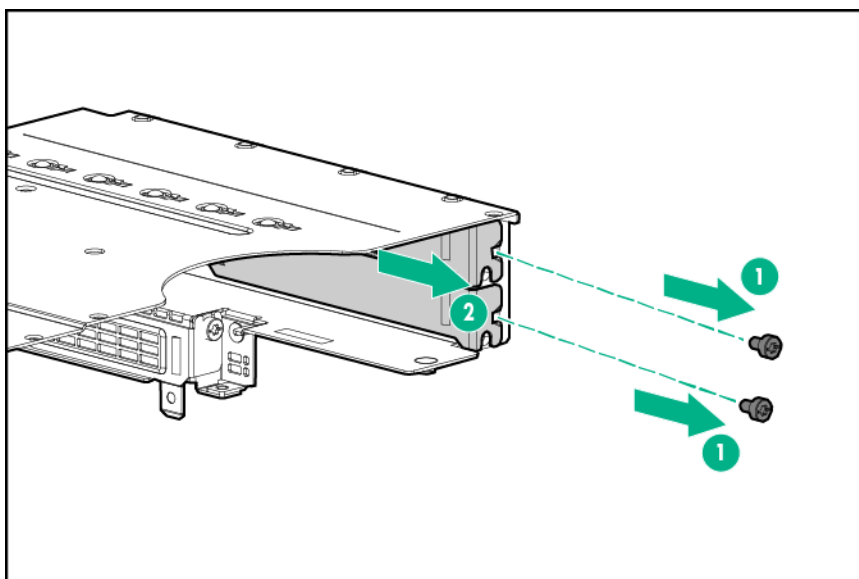
To install the component:

Procedure

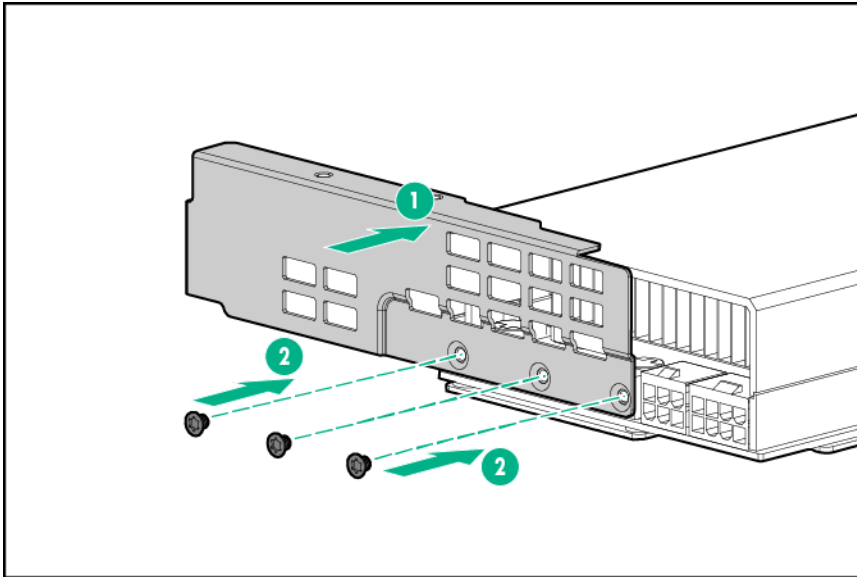
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the three-slot riser cage assembly.**
6. Remove the riser cage bracket.



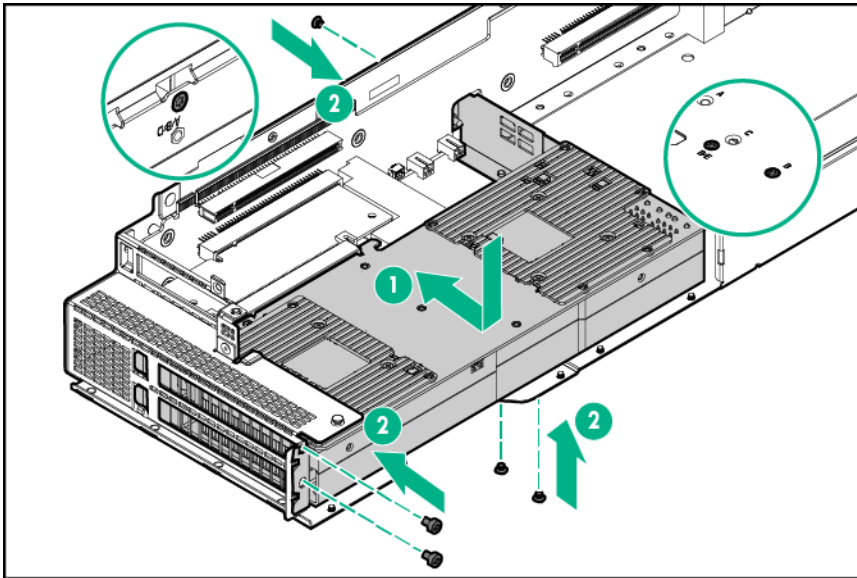
7. Remove the two top PCI blanks from the riser cage assembly.



8. Turn the riser cage assembly over and lay it along the bayonet board side of the node.
9. Remove the existing rear support bracket from Accelerator 1.
10. Install the rear support bracket for Accelerator 1.



11. Install Accelerator 1 into slot 3.

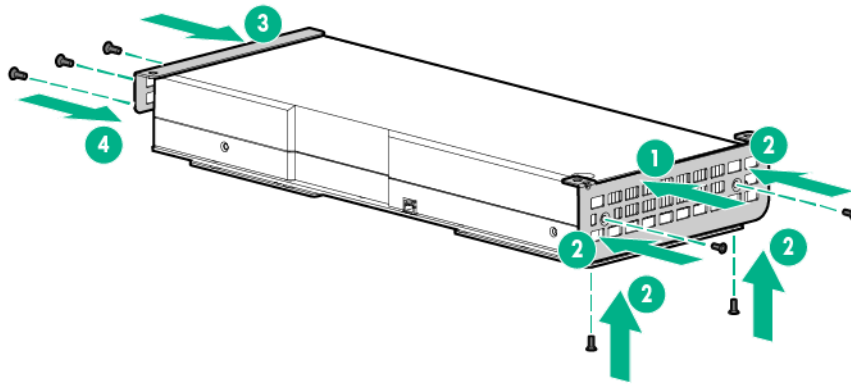


12. Connect the Accelerator 1 power cable to Accelerator 1. For more information, see "[Accelerator cabling](#)."

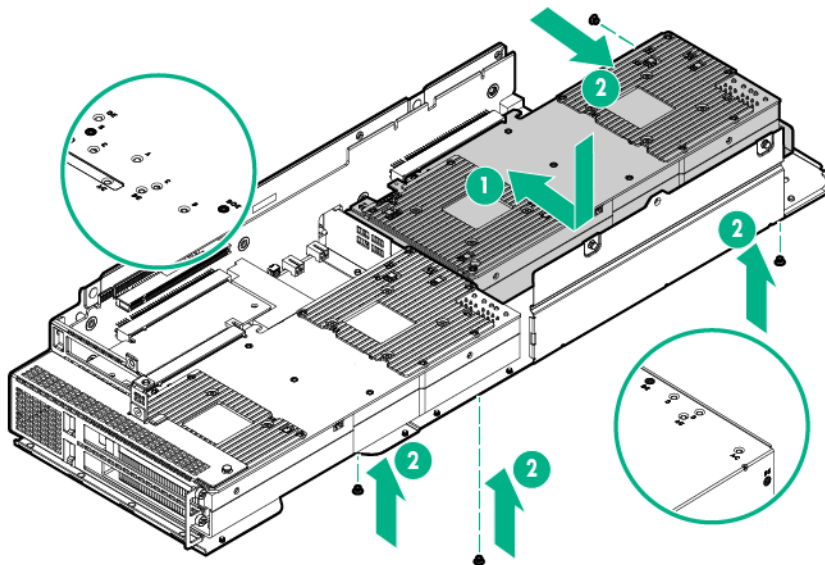
NOTE:

If installing a single NVIDIA GRID K2 RAF GPU, skip to step 18.

13. Remove the existing front and rear support brackets from Accelerator 2.
14. Install the rear and front support brackets onto Accelerator 2.
 - a. Secure the front support bracket for Accelerator 2 with four M2.5 screws.
 - b. Secure the rear support bracket for Accelerator 2 with three T-10 screws.



15. Install Accelerator 2 into slot 4.



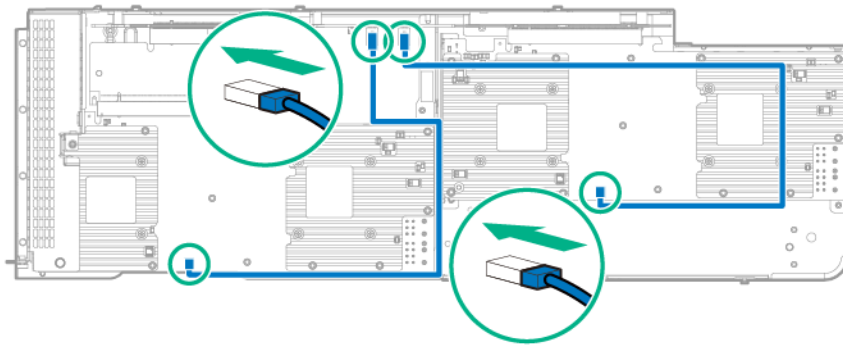
16. Connect the Accelerator 2 power cable to Accelerator 2.
17. Connect the Accelerator 1 power cable to the Accelerator 2 power cable.



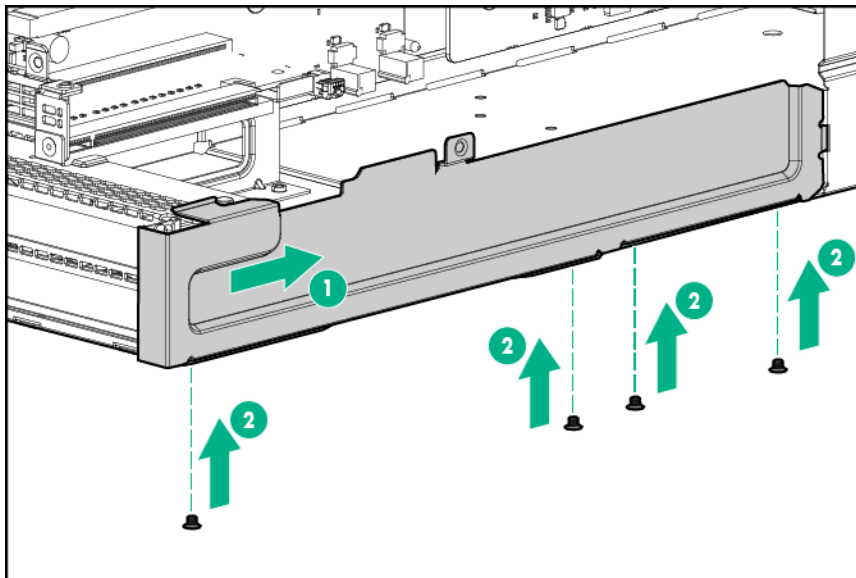
IMPORTANT:

Each NVIDIA GRID K2 RAF GPU requires a 2-pin adapter cable.

18. Connect the 2-pin adapter cables to the accelerators and the riser board.



19. Install the riser cage bracket.



20. Connect the power cable to the bayonet board. For more information, see "[Accelerator cabling](#)."
21. Install the node into the chassis. For more information, see "[Installing a node into the chassis](#)."
22. **Install the node into the chassis.**
23. Connect all peripheral cables to the nodes.
24. **Power up the node.**

Installing AMD FirePro S7150 and S9150 GPUs in a three-slot riser cage assembly

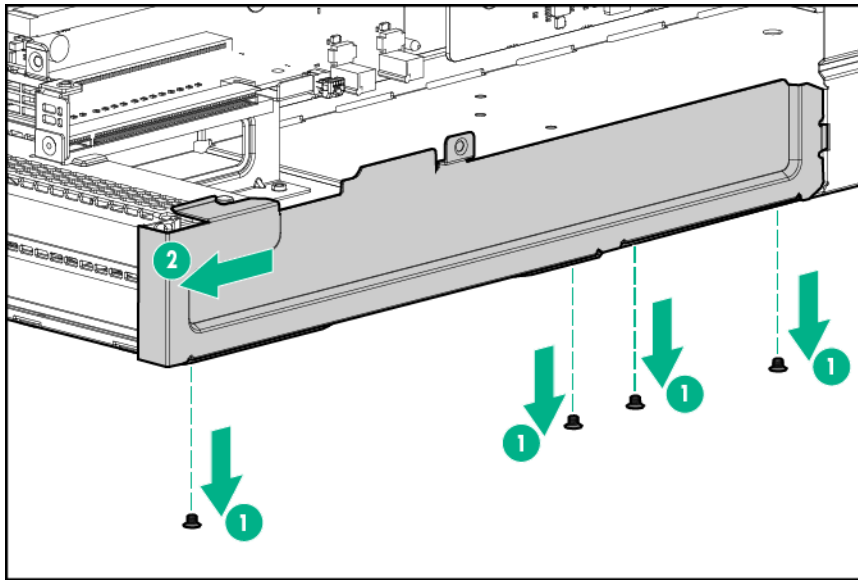
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

To install the component:

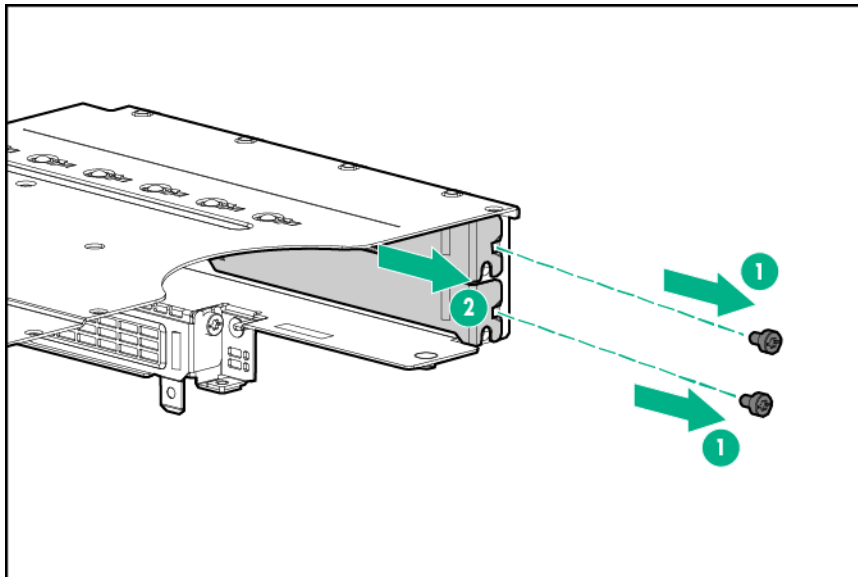
Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.

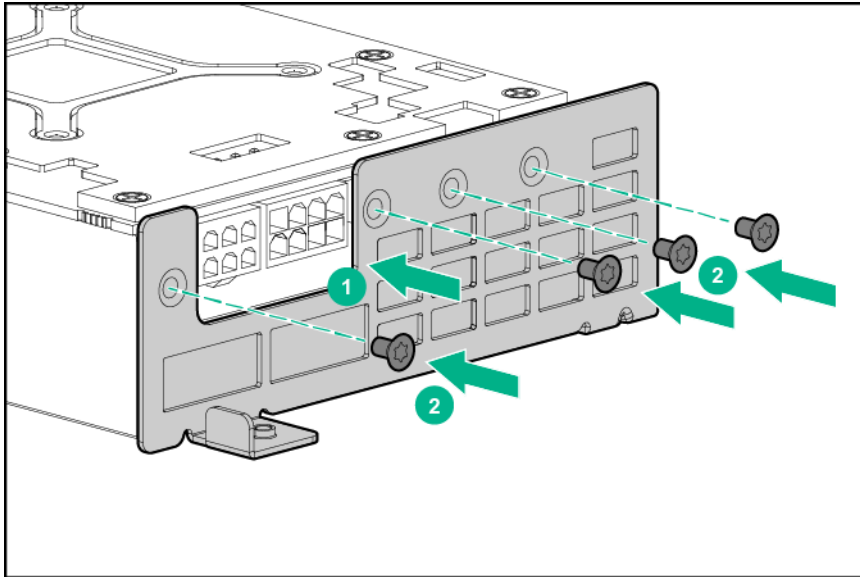
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the three-slot riser cage assembly.**
6. Remove the riser cage bracket.



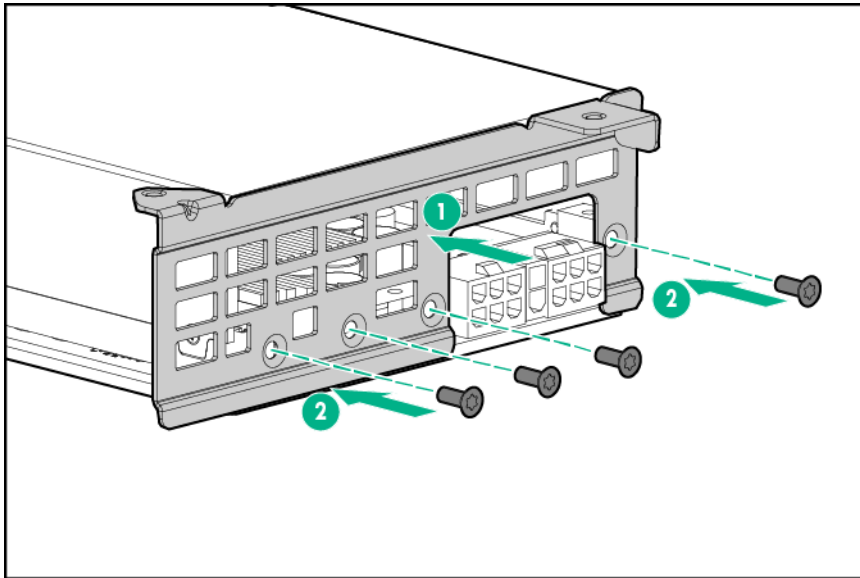
7. Remove the two top PCI blanks from the riser cage assembly.



8. Turn the riser cage assembly over and lay it along the bayonet board side of the node.
9. Remove the existing rear support bracket from Accelerator 1.
10. Install the rear support bracket for Accelerator 1.
 - AMD FirePro S7150 GPU

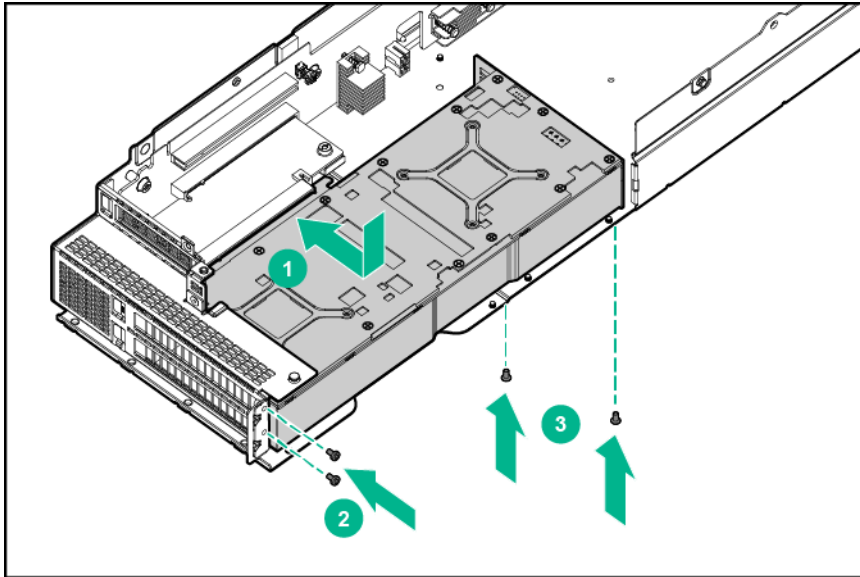


- AMD FirePro S9150 GPU

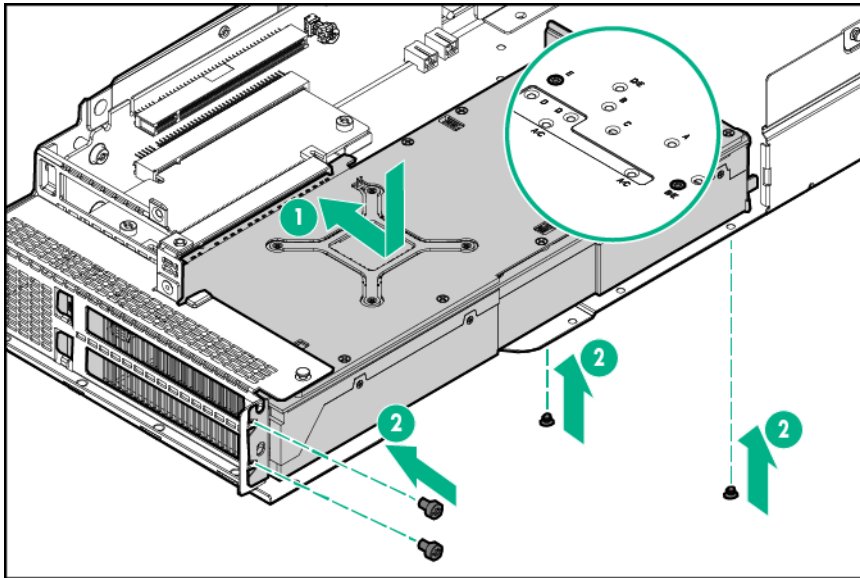


11. Install Accelerator 1 into slot 3.

- AMD FirePro S7150 GPU

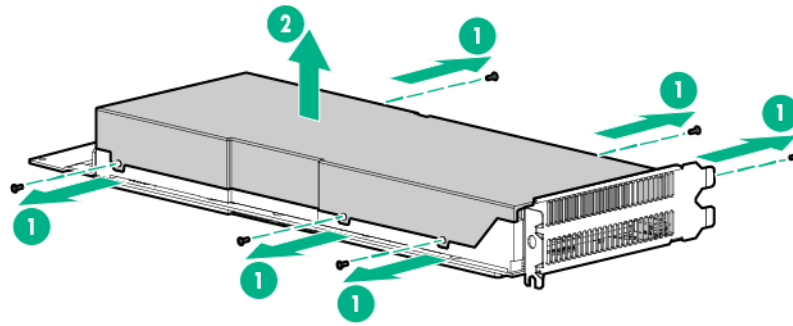


- AMD FirePro S9150 GPU

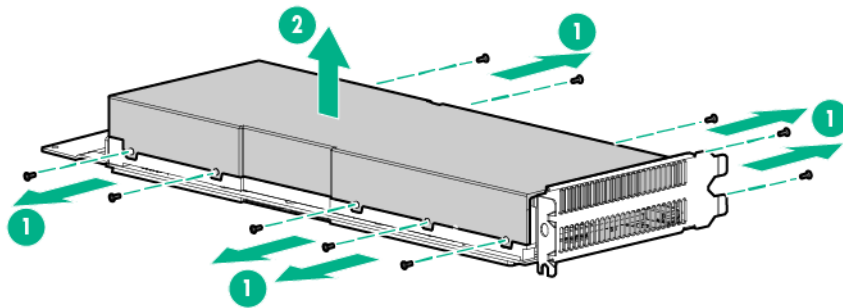


12. Connect the Accelerator 1 power cable to Accelerator 1. For more information, see "[Accelerator cabling](#)."
13. Remove the existing rear support bracket from Accelerator 2.
14. Remove the cover from Accelerator 2.

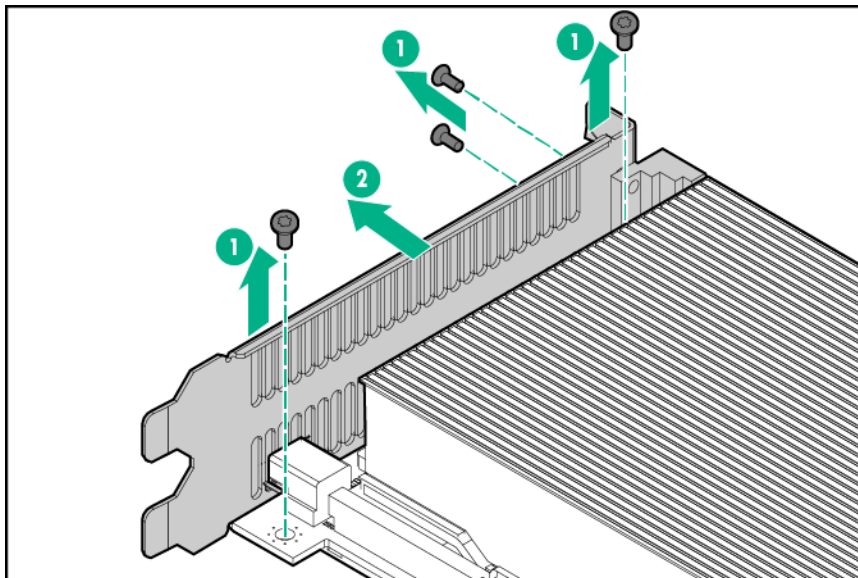
- AMD FirePro S9150 GPU



- AMD FirePro S7150 GPU

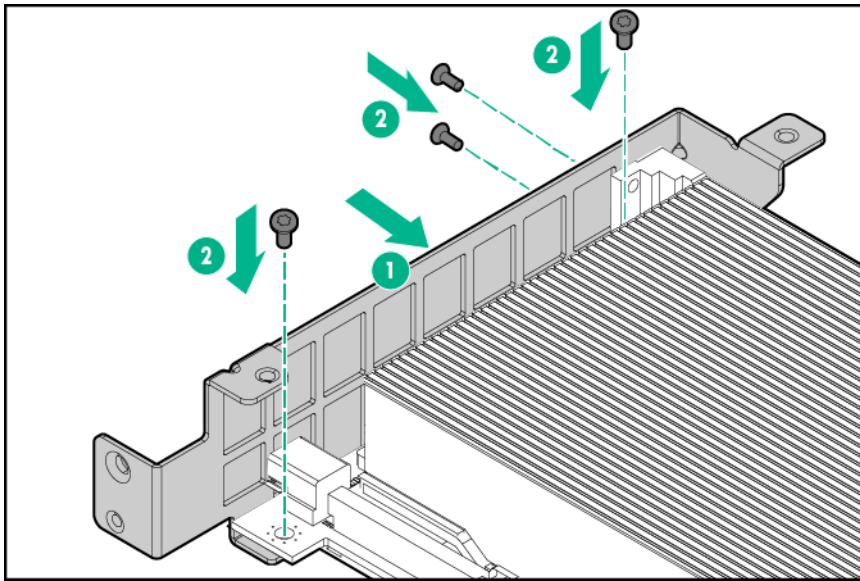


15. If installed, remove the existing front support bracket from Accelerator 2.

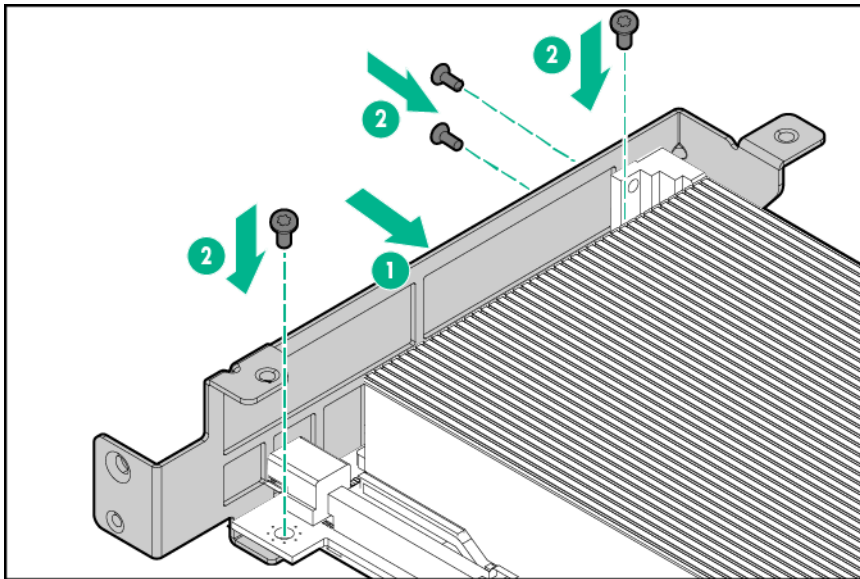


16. Install the front support bracket onto Accelerator 2.

- AMD FirePro S7150 GPU



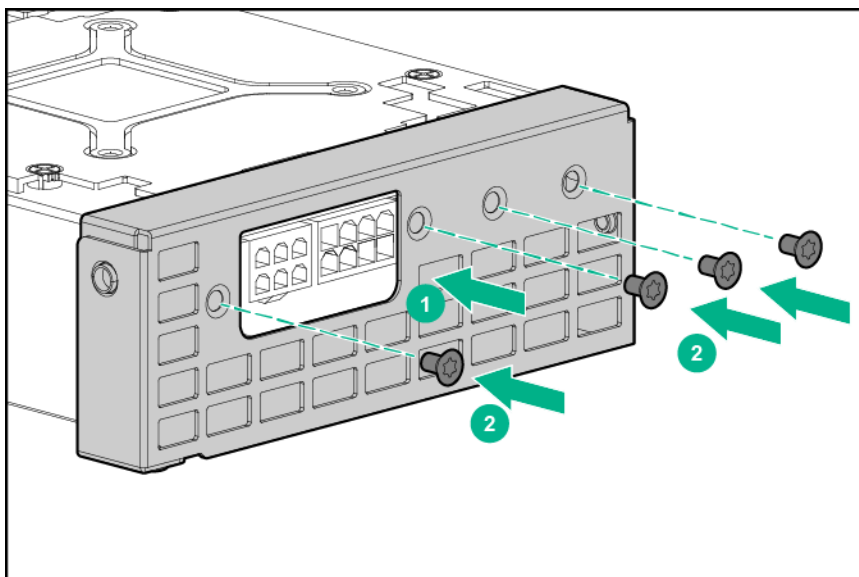
- AMD FirePro S9150



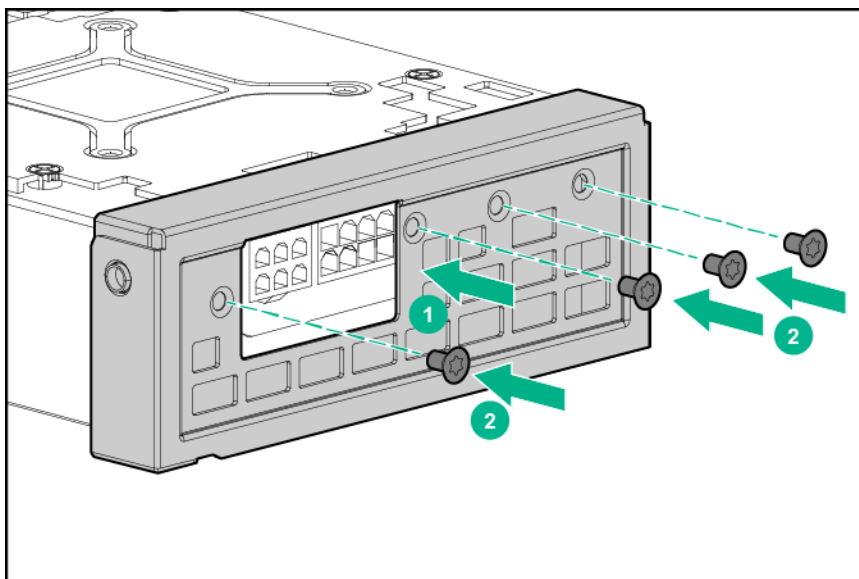
17. Reinstall the accelerator cover.

18. Install the rear support bracket.

AMD FirePro S7150

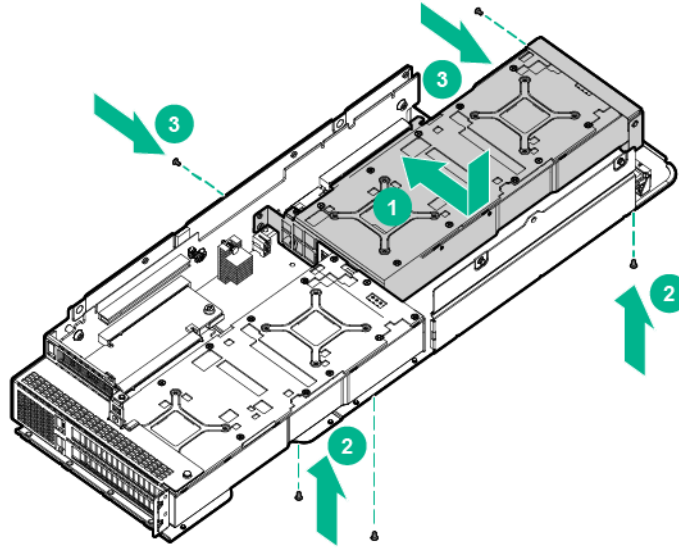


AMD FirePro S9150

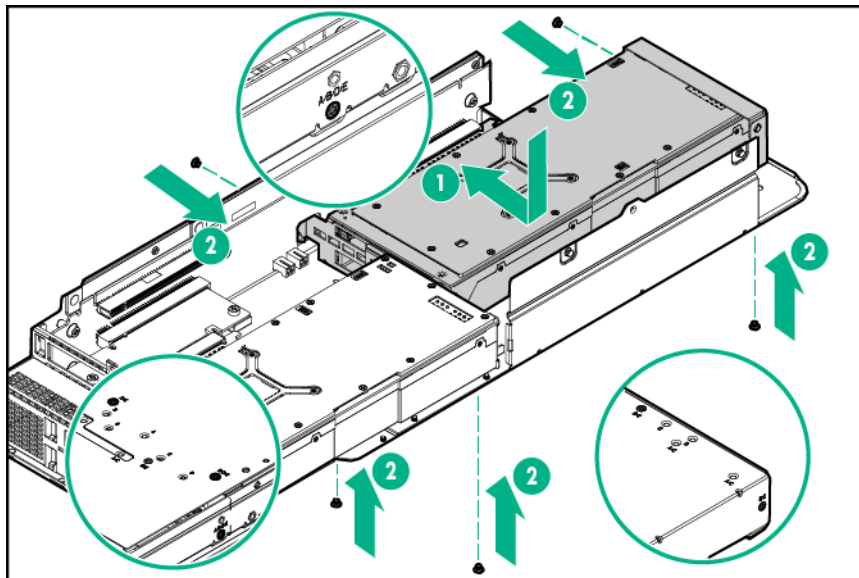


19. Install Accelerator 2 into slot 4.

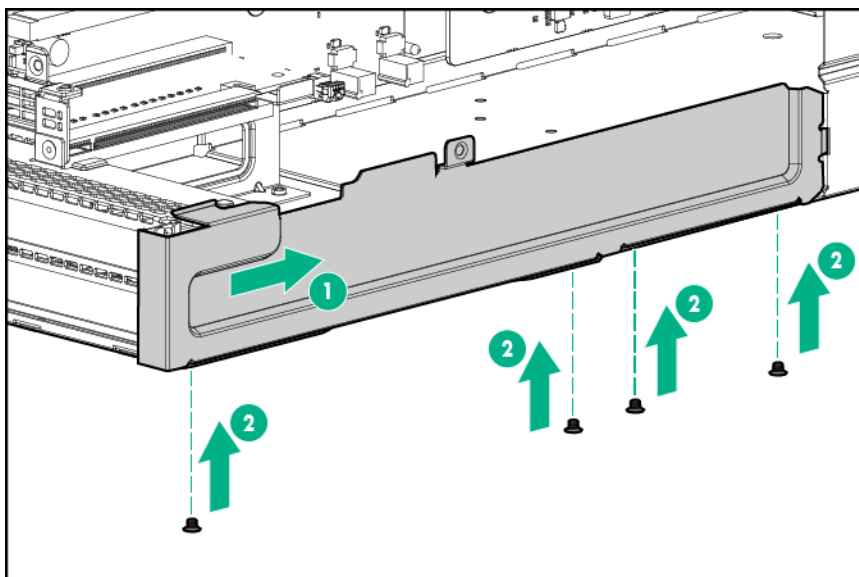
- AMD FirePro S7150 GPU



- AMD FirePro S9150 GPU



20. Connect the Accelerator 2 power cable to Accelerator 2.
21. Connect the Accelerator 1 power cable to the Accelerator 2 power cable.
22. Install the riser cage bracket.



23. Connect the power cable to the bayonet board. For more information, see "[Accelerator cabling](#)."
24. **Install the three-slot riser cage assembly.**
25. **Install the node into the chassis.**
26. Connect all peripheral cables to the nodes.
27. **Power up the node.**

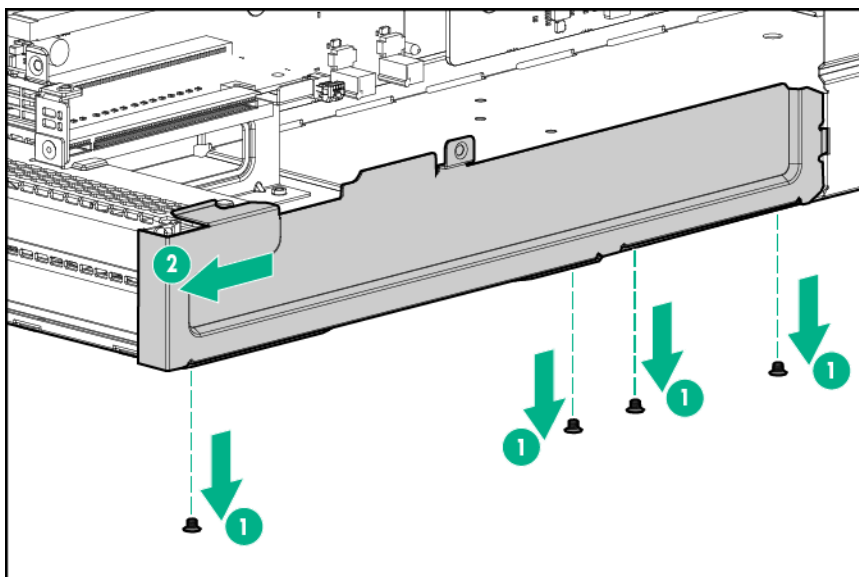
Installing Intel Xeon Phi 5110P Coprocessors in a three-slot riser cage assembly

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

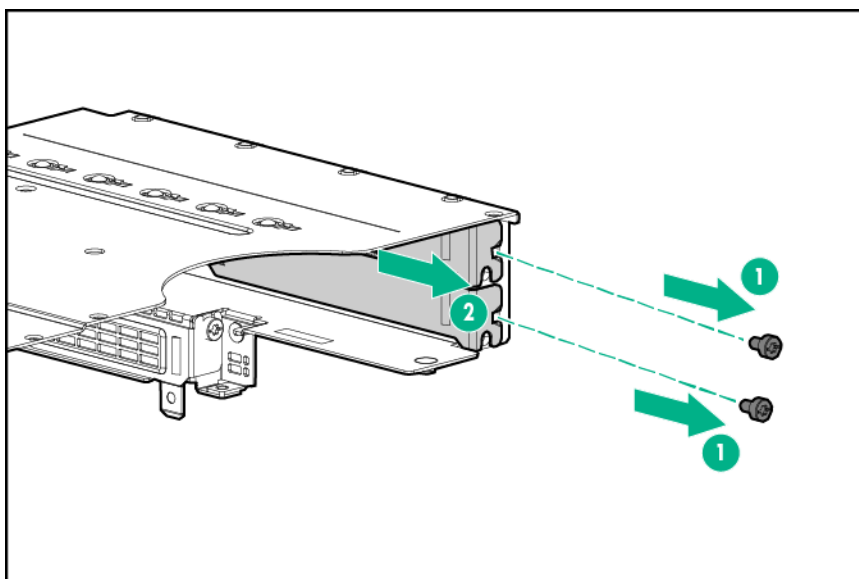
To install the component:

Procedure

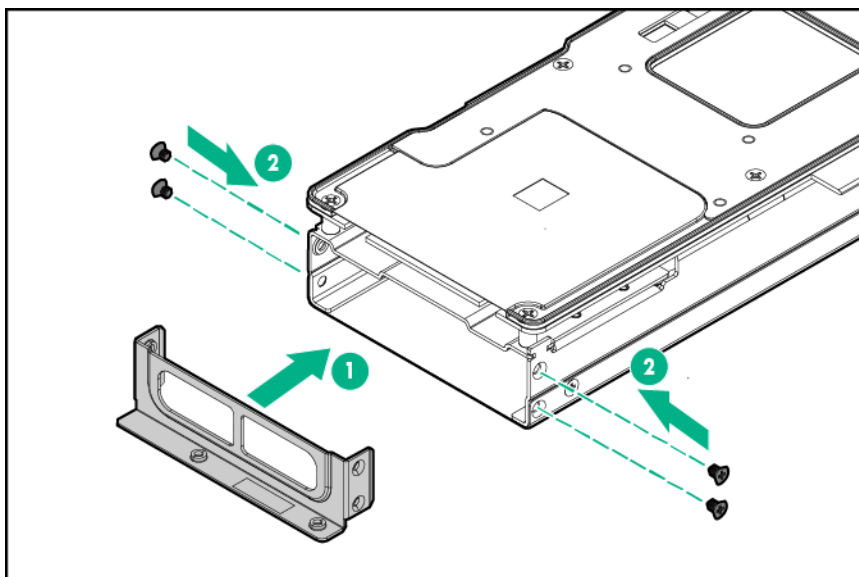
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the three-slot riser cage assembly.**
6. Remove the riser cage bracket.



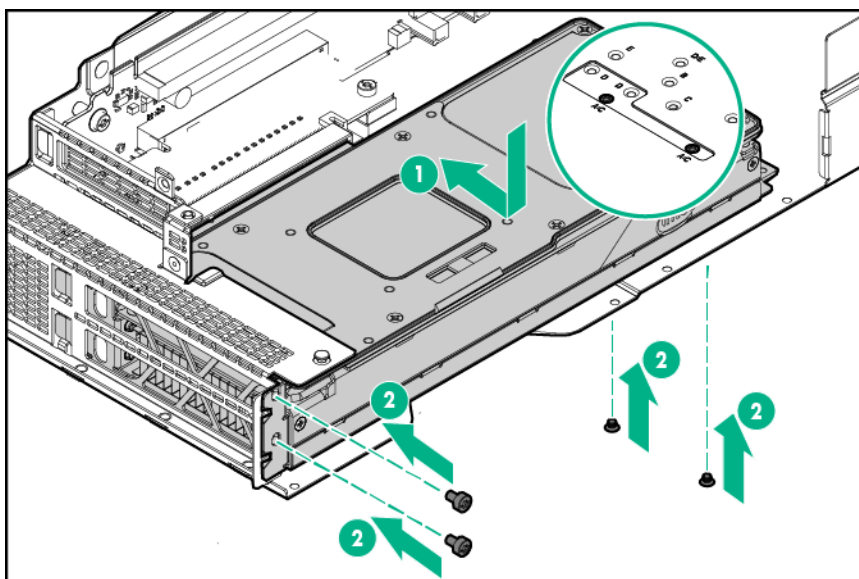
7. Remove the two top PCI blanks from the riser cage assembly.



8. Turn the riser cage assembly over and lay it along the bayonet board side of the node.
9. Remove the existing rear support bracket from Accelerator 1.
10. Install the rear support bracket for Accelerator 1.

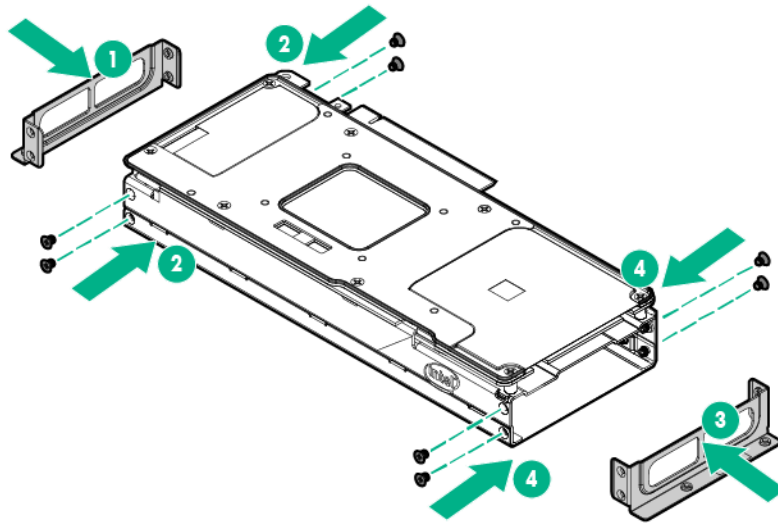


11. Install Accelerator 1 into slot 3.

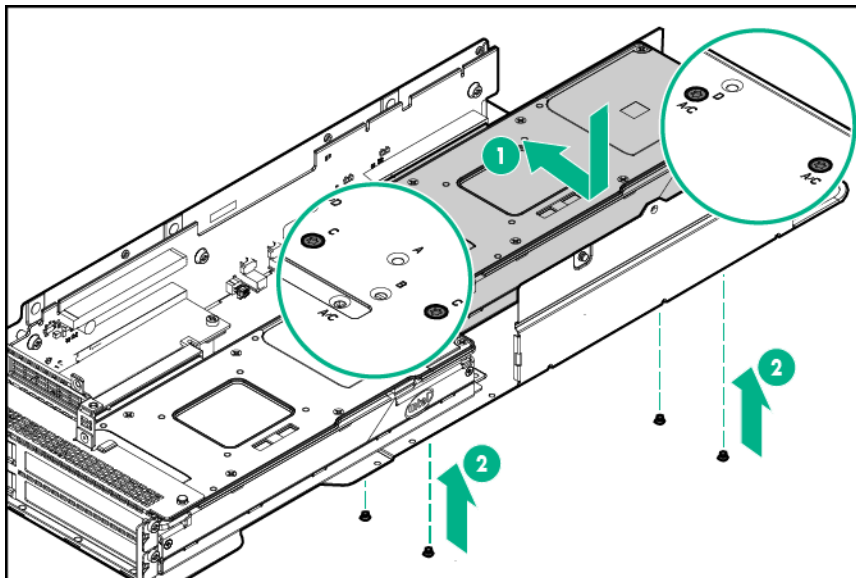


-
- ⚠ **IMPORTANT:**
If installing an Intel Xeon Phi Coprocessor 5110P, Connect the power cable to the 2x4 connector only. Do not connect the power cable to the 2x3 connector.
-

12. Connect the Accelerator 1 power cable to Accelerator 1. For more information, see "[Accelerator cabling](#)."
13. Remove the existing front and rear support brackets from Accelerator 2.
14. Install the rear and front support brackets onto Accelerator 2.



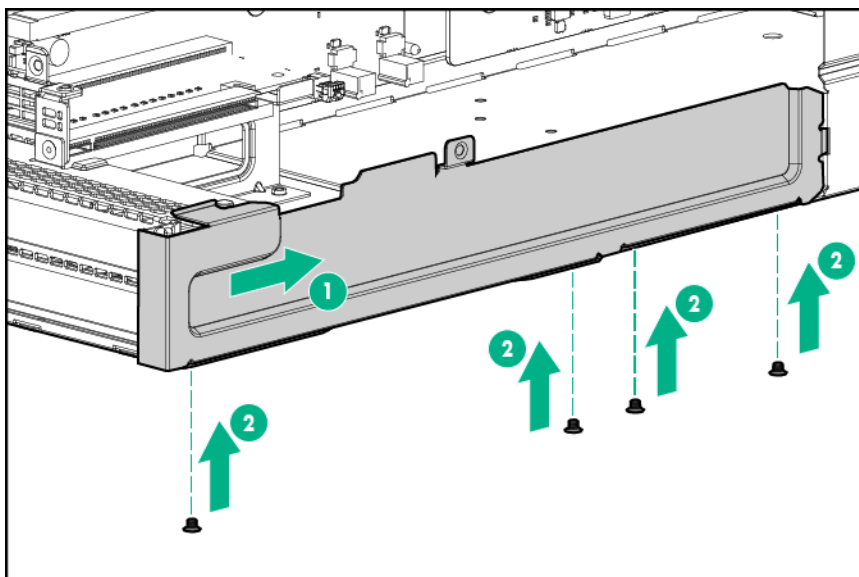
15. Install Accelerator 2 into slot 4.



! IMPORTANT:

If installing an Intel Xeon Phi Coprocessor 5110P, connect the power cable to the 2x4 connector only. Do not connect the power cable to the 2x3 connector.

16. Connect the Accelerator 2 power cable to Accelerator 2.
17. Connect the Accelerator 1 power cable to the Accelerator 2 power cable.
18. Install the riser cage bracket.



19. Connect the power cable to the bayonet board. For more information, see "[Accelerator cabling](#)."
20. **Install the three-slot riser cage assembly.**
21. **Install the node into the chassis.**
22. Connect all peripheral cables to the nodes.
23. **Power up the node.**

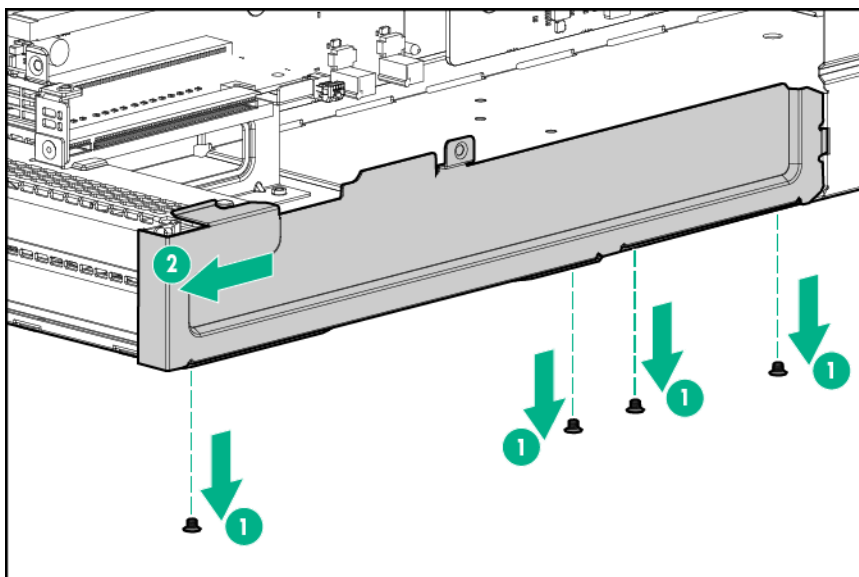
Installing NVIDIA Tesla K80, K40, M60, and M40 GPUs in a three-slot riser cage assembly

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

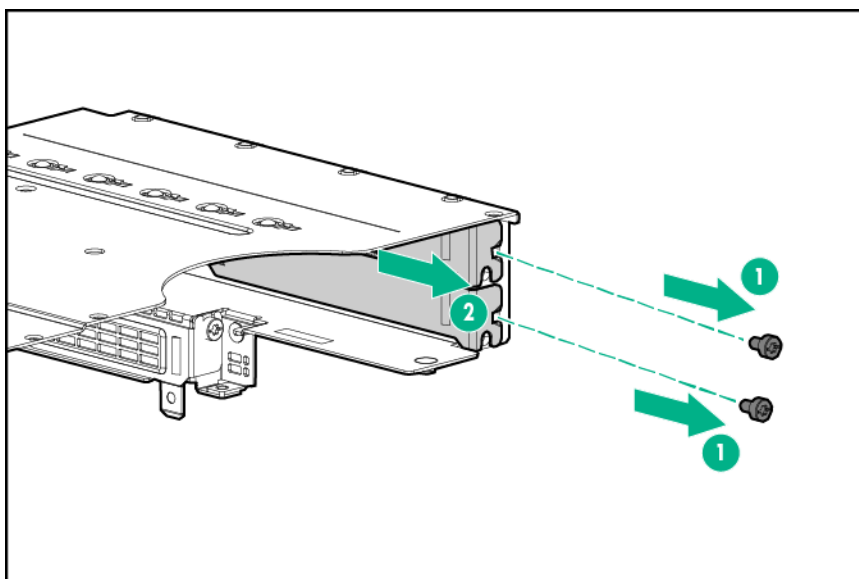
To install the component:

Procedure

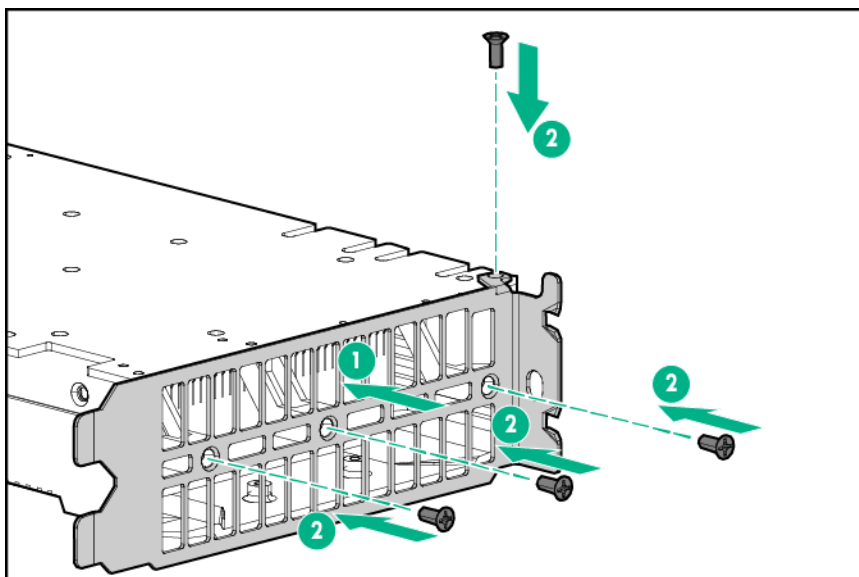
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove the three-slot riser cage assembly.**
6. Remove the riser cage bracket.



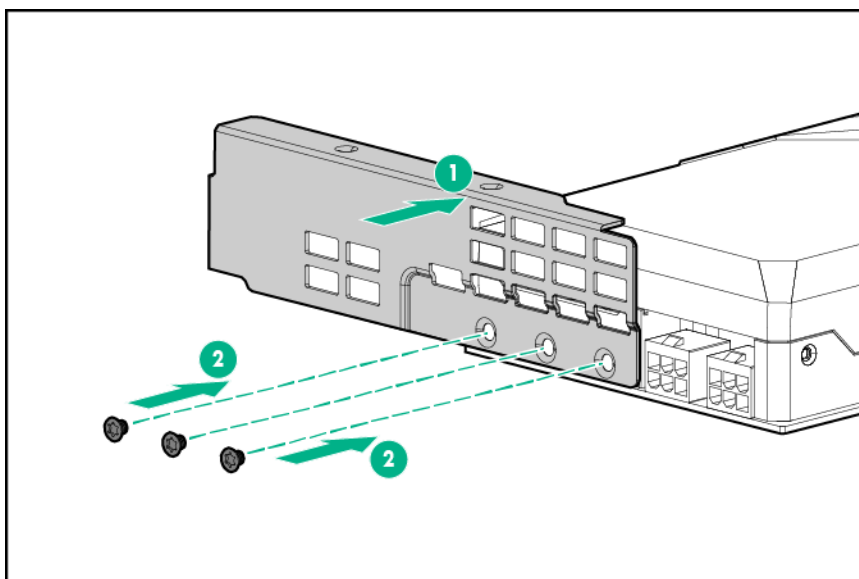
7. Remove the two top PCI blanks from the riser cage assembly.



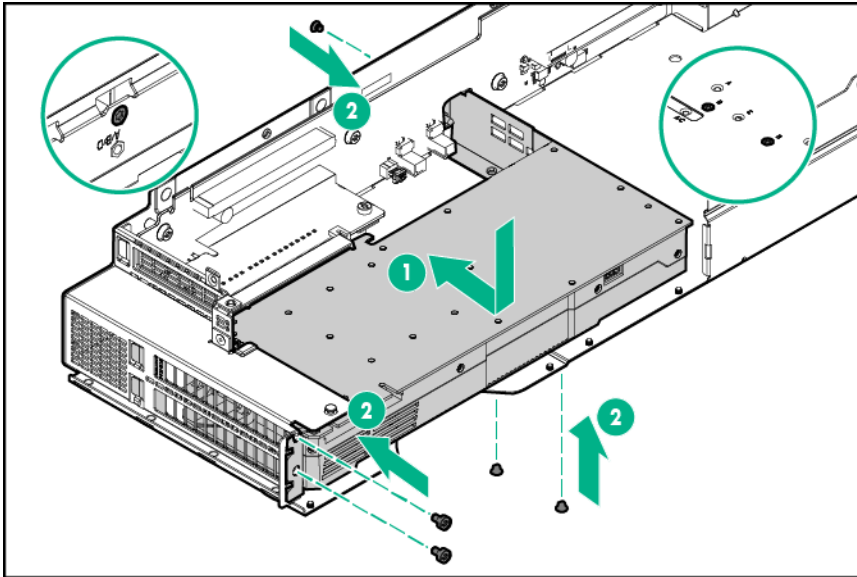
8. Turn the riser cage assembly over and lay it along the bayonet board side of the node.
9. Remove the existing rear support bracket from Accelerator 1.
10. If installing a NVIDIA Tesla K40 GPU, install the front support bracket for Accelerator 1 with four M2.5 screws.



11. Install the rear support bracket for Accelerator 1.



12. Install Accelerator 1 into slot 3.



13. Connect the Accelerator 1 power cable to Accelerator 1. For more information, see "[Accelerator cabling](#)."

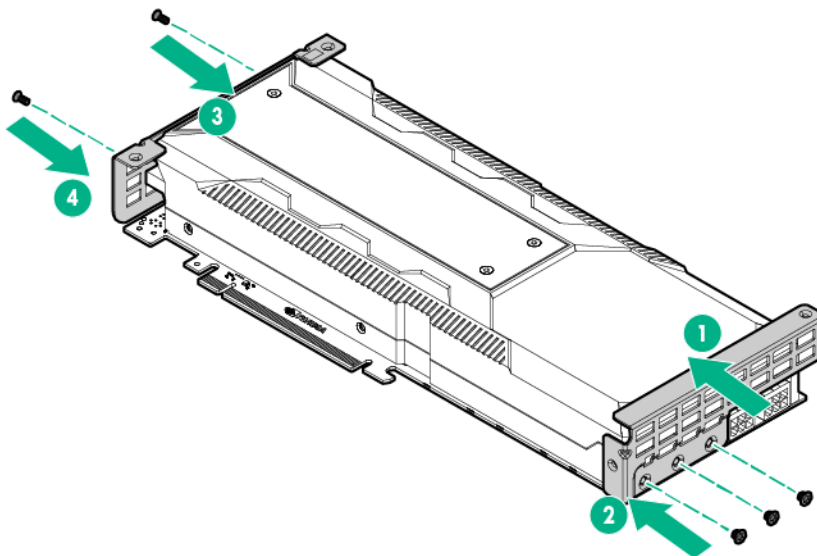
NOTE:

If installing a single NVIDIA Tesla K80, M60, or M40 GPU, skip to step 19.

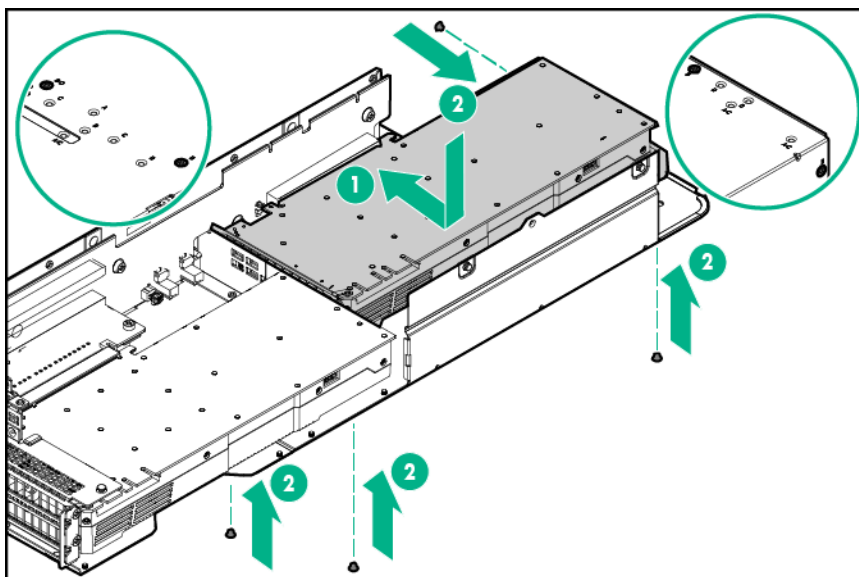
NOTE:

Single NVIDIA Tesla K40 GPUs are not supported in a three-slot riser cage assembly.

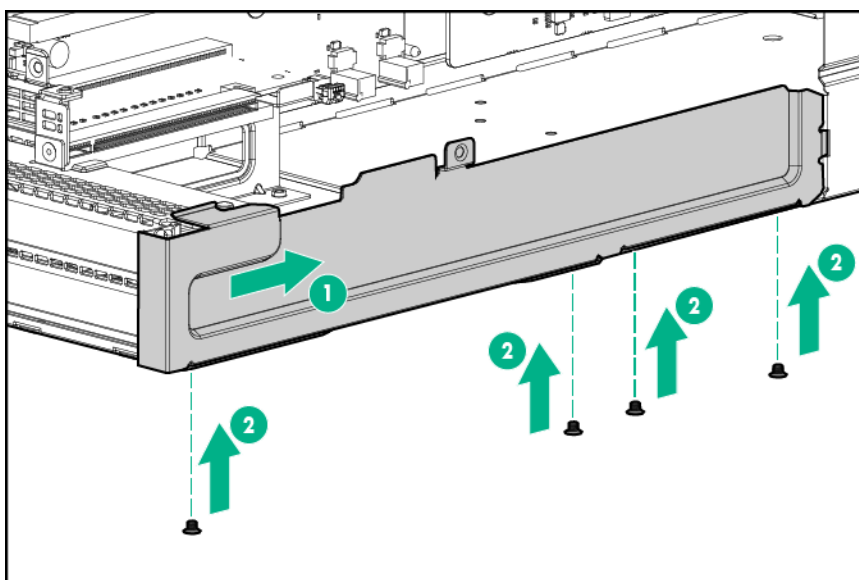
14. Remove the existing front and rear support brackets from Accelerator 2.
15. Install the rear and front support brackets onto Accelerator 2.
 - a. Secure the rear support bracket for Accelerator 2 with three T-10 screws.
 - b. Secure the front support bracket for Accelerator 2 with two M2.5 screws.



16. Install Accelerator 2 into slot 4.



17. Connect the Accelerator 2 power cable to Accelerator 2.
18. Connect the Accelerator 1 power cable to the Accelerator 2 power cable.
19. Install the riser cage bracket.



20. Connect the power cable to the bayonet board. For more information, see "[Accelerator cabling](#)."
21. **Install the three-slot riser cage assembly.**
22. **Install the node into the chassis.**
23. Connect all peripheral cables to the nodes.
24. **Power up the node.**

Installing NVIDIA Tesla P100 GPUs and bezel blanks



CAUTION:

If NVIDIA Tesla P100 GPUs are installed in the server node, and the server node is installed in the HPE Apollo r2200 Chassis, the inlet ambient temperature must be maintained at or below 24°C (75.2°F).

⚠ CAUTION:

If NVIDIA Tesla P100 GPUs are installed in the server node, and the server node is installed in the HPE Apollo r2600 Chassis, the inlet ambient temperature must be maintained at or below 20°C (68°F).

⚠ CAUTION:

If NVIDIA Tesla P100 GPUs are installed in the server node, bezel blanks must be installed in specific drive bays to ensure proper thermal cooling. For more information on supported drive configurations, see "**Bezel blank installation guidelines for the HPE Apollo r2200 Chassis and HPE Apollo r2600 Chassis.**"

❗ IMPORTANT:

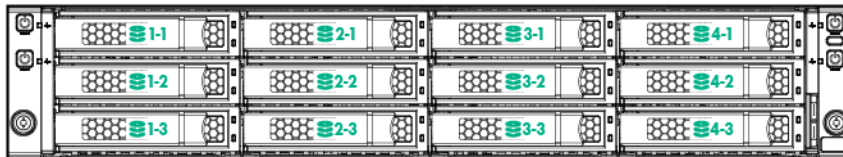
The Apollo r2800 Chassis does not support nodes installed with NVIDIA Tesla P100 GPUs.

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

Bezel blank installation guidelines for the HPE Apollo r2200 Chassis and HPE Apollo r2600 Chassis

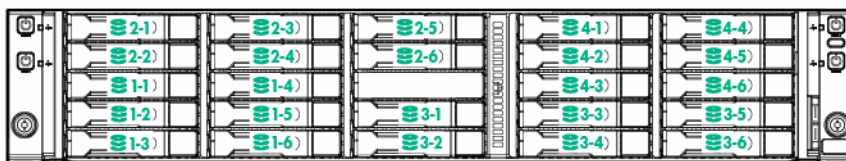
HPE Apollo r2200 Chassis

- If an NVIDIA Tesla P100 GPU is installed in Node 1, low-profile LFF bezel blanks must be installed in drive bays, 2-1, 2-2, and 2-3.
- If an NVIDIA Tesla P100 GPU is installed in Node 3, low-profile LFF bezel blanks must be installed in drive bays 4-1, 4-2, and 4-3.



HPE Apollo r2600 Chassis

- If an NVIDIA Tesla P100 GPU is installed in Node 1, SFF bezel blanks must be installed in drive bays 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6.
- If an NVIDIA Tesla P100 GPU is installed in Node 3, SFF bezel blanks must be installed in drive bays 4-1, 4-2, 4-3, 4-4, 4-5, and 4-6.



Installing a bezel blank

To install the component:

Procedure

1. If installed, **remove the security bezel**.
2. If installing an NVIDIA Tesla P100 GPU in Node 1:
 - a. In the HPE Apollo r2200 Chassis, remove all drives and drive blanks from bays 2-1, 2-2, and 2-3.
 - b. In the HPE Apollo r2600 Chassis, remove all drives and drive blanks from bays 2-1, 2-2, 2-3, 2-4, 2-5, and 2-6.
3. If installing an NVIDIA Tesla P100 GPU in Node 3:
 - a. In the HPE Apollo r2200 Chassis, remove all drives and drive blanks from bays 4-1, 4-2, and 4-3.
 - b. In the HPE Apollo r2600 Chassis, remove all drives and drive blanks from bays 4-1, 4-2, 4-3, 4-4, 4-5, and 4-6.

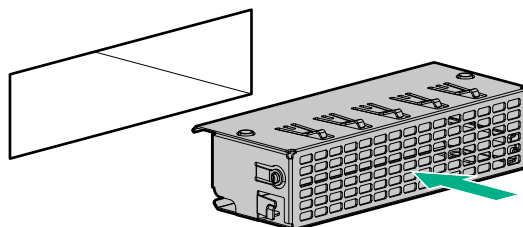


CAUTION:

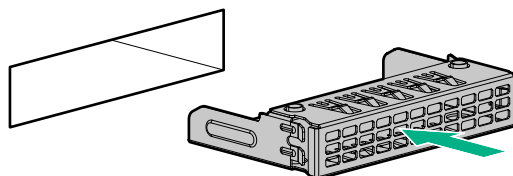
To prevent damage to the server, do not remove the bezel blank after it is installed. The bezel blank cannot be removed without damaging the component or the chassis.

4. Install the bezel blanks:

- Low-profile LFF bezel blank

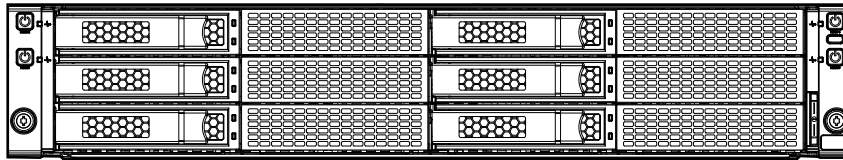


- SFF bezel blank

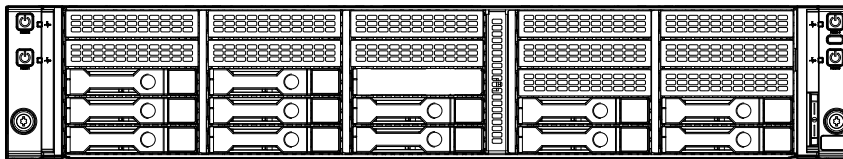


5. The images below show drive configuration examples with NVIDIA Tesla P100 GPUs installed in both Node 1 and Node 3.

- HPE Apollo r2200 Chassis



- HPE Apollo r2600 Chassis

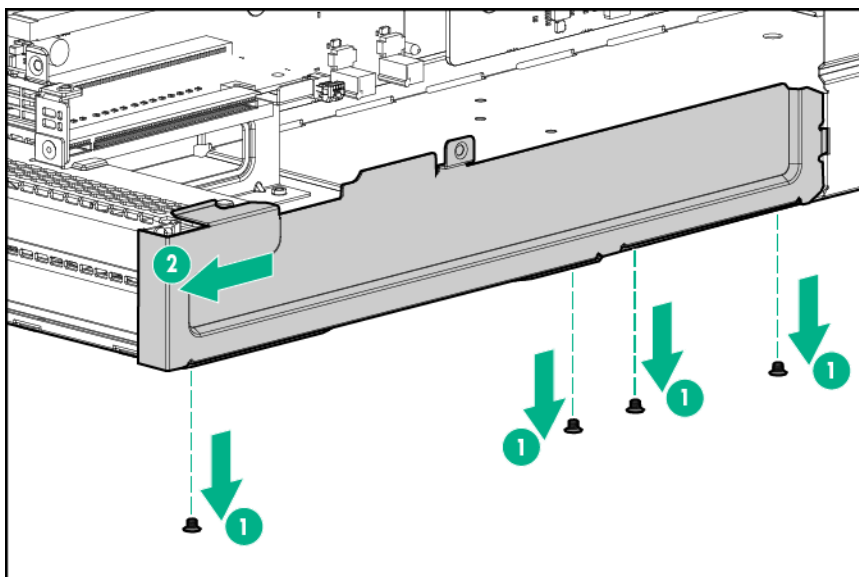


Installing NVIDIA Tesla P100 GPUs in a three-slot riser cage assembly

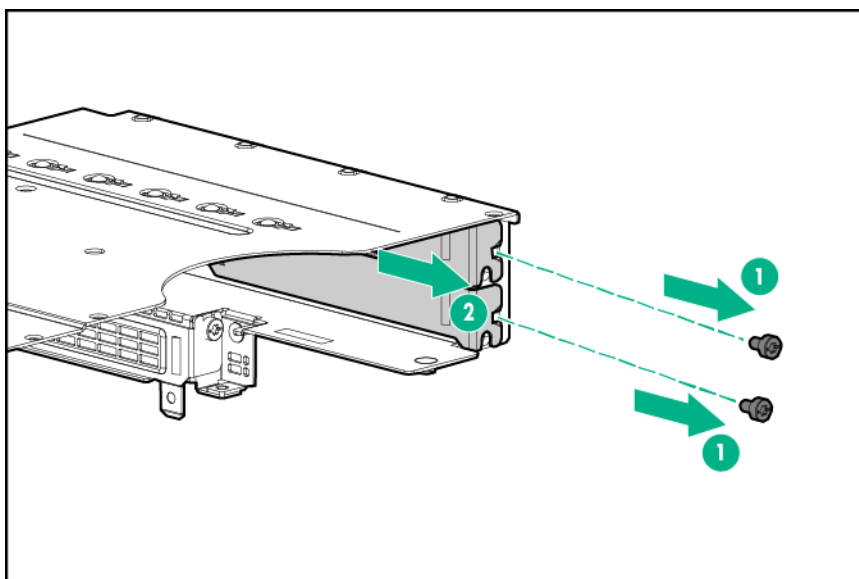
To install the component:

Procedure

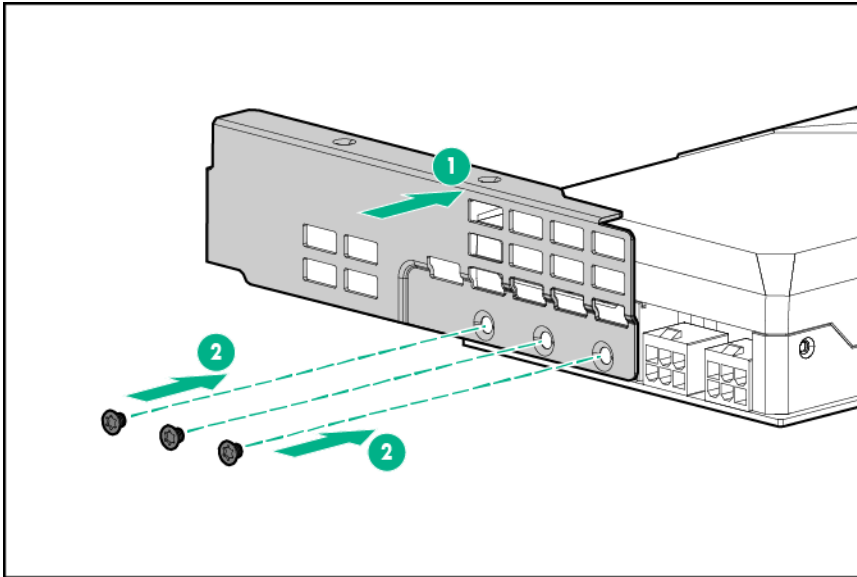
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. Install the bezel blanks into the chassis. See "**Bezel blank installation guidelines for the HPE Apollo r2200 Chassis and HPE Apollo r2600 Chassis.**"
6. **Remove the three-slot riser cage assembly.**
7. Remove the riser cage bracket.



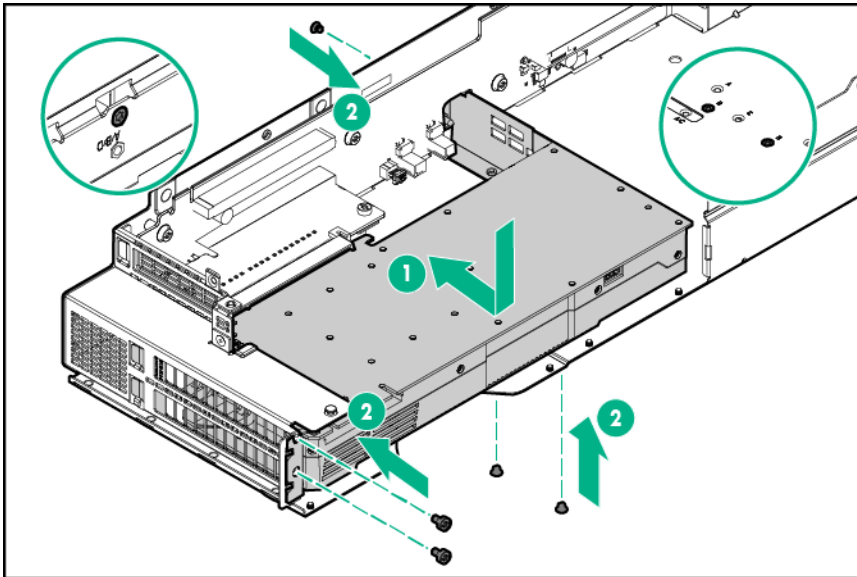
8. Remove the two top PCI blanks from the riser cage assembly.



9. Turn the riser cage assembly over and lay it along the bayonet board side of the node.
10. Remove the existing rear support bracket from Accelerator 1.
11. Install the rear support bracket for Accelerator 1.



12. Install Accelerator 1 into slot 3.

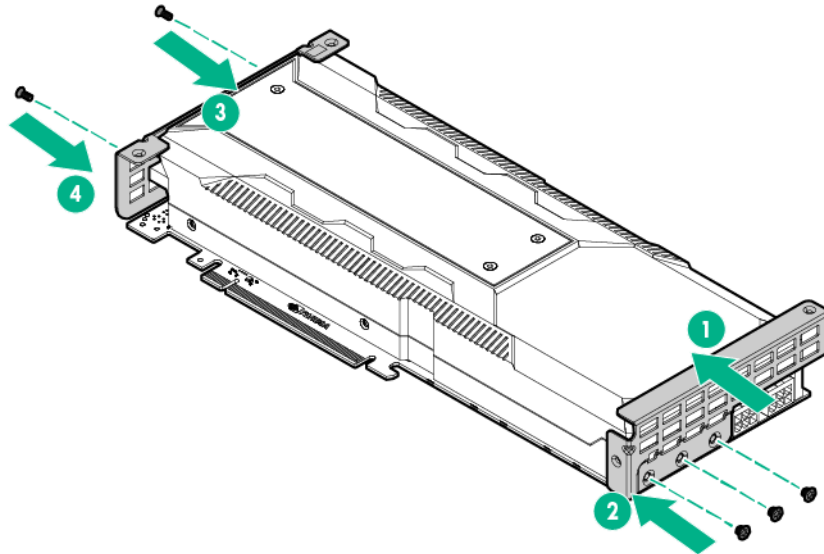


13. Connect the Accelerator 1 power cable to Accelerator 1. For more information, see "[Accelerator cabling](#)."

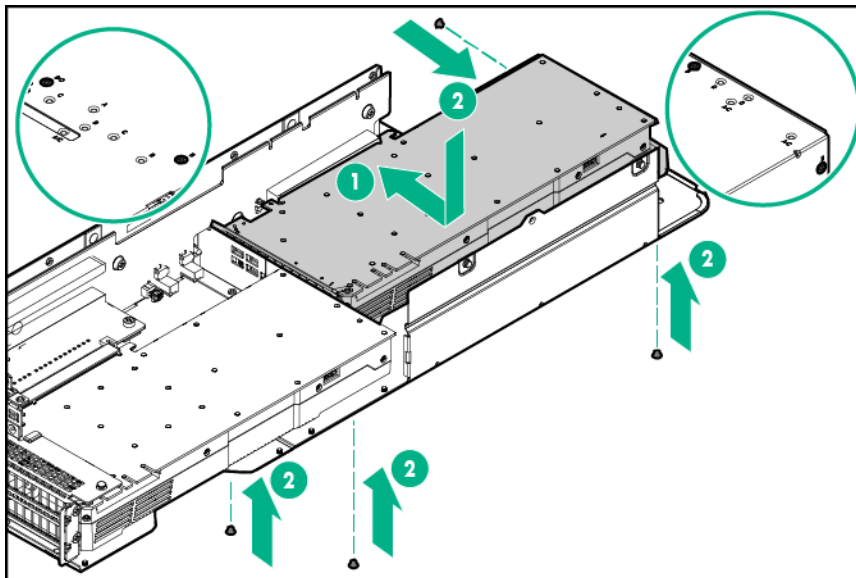
NOTE:

If installing a single NVIDIA Tesla P100 GPU, skip to step 19.

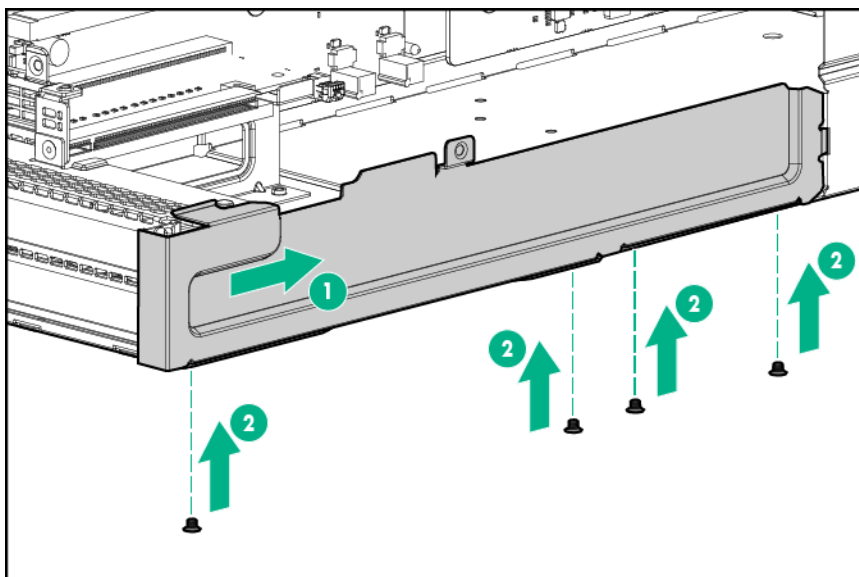
14. Remove the existing rear support bracket from Accelerator 2.
15. Install the rear and front support brackets onto Accelerator 2.
 - a. Secure the rear support bracket for Accelerator 2 with three T-10 screws.
 - b. Secure the front support bracket for Accelerator 2 with two M2.5 screws.



16. Install Accelerator 2 into slot 4.



17. Connect the Accelerator 2 power cable to Accelerator 2.
18. Connect the Accelerator 1 power cable to the Accelerator 2 power cable.
19. Install the riser cage bracket.



20. Connect the power cable to the bayonet board. For more information, see "[Accelerator cabling](#)."
21. **Install the three-slot riser cage assembly.**
22. **Install the node into the chassis.**
23. Connect all peripheral cables to the nodes.
24. **Power up the node.**

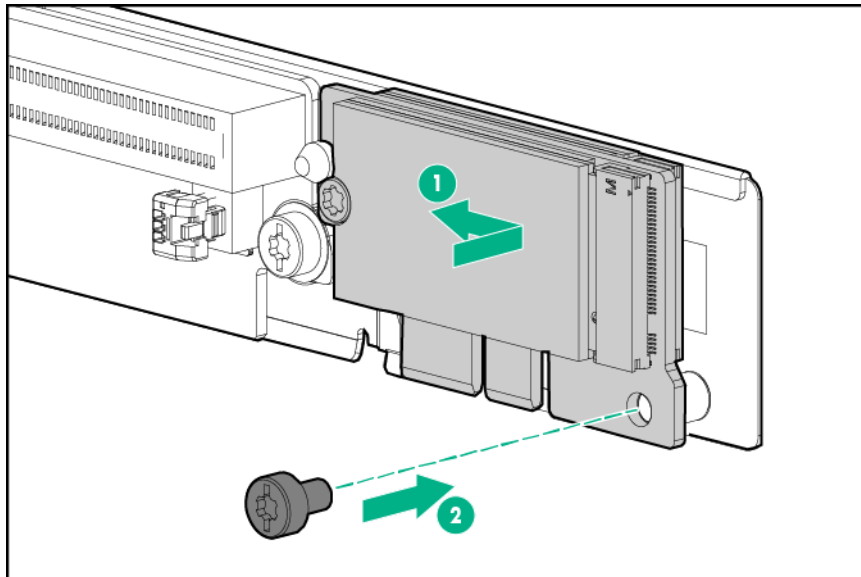
Installing the M.2 SATA SSD enablement board option

The M.2 SATA SSD enablement board can only be installed on the single-slot left PCI riser cage assembly (PN 798178-B21) or the single-slot 2U node PCI riser cage assembly (PN 800293-B21).

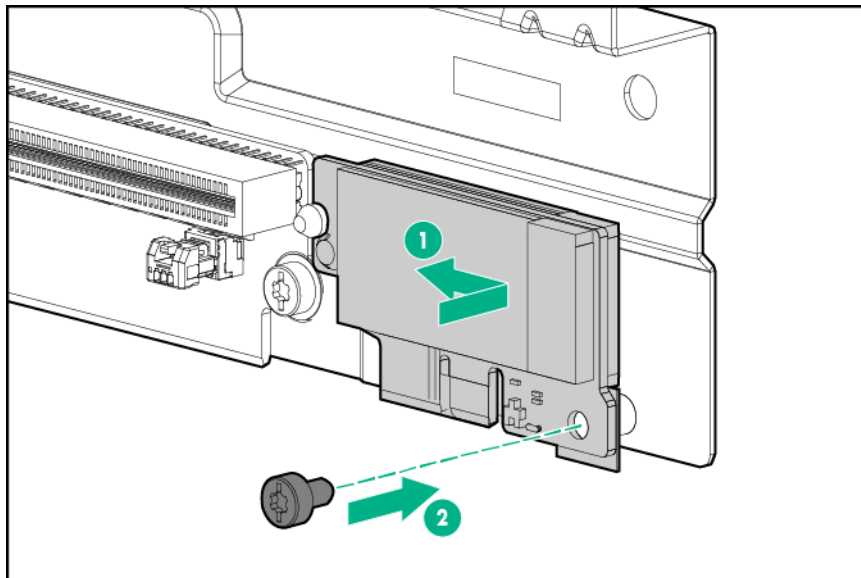
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. Do one of the following:
 - a. **Remove the single-slot left PCI riser cage assembly.**
 - b. **Remove the single-slot 2U node PCI riser cage assembly.**
6. If installed, remove the storage controller.
7. Install the enablement board on the PCI riser cage assembly, and then secure it with a T-15 screw.
 - Single-slot left PCI riser cage assembly



- Single-slot 2U node PCI riser cage assembly



8. If removed, **install the storage controller.**
9. **Install any removed PCI riser cage assemblies.**
10. **Install the node into the chassis.**
11. Connect all peripheral cables to the nodes.
12. **Power up the node.**

Installing the processor and heatsink options

Prerequisites

Determine if there are thermal requirements for the option. For a list of options that have thermal limitations, see "[Thermal limitations.](#)"

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

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.

**WARNING:**

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

**WARNING:**

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

**CAUTION:**

To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this node.

**CAUTION:**

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

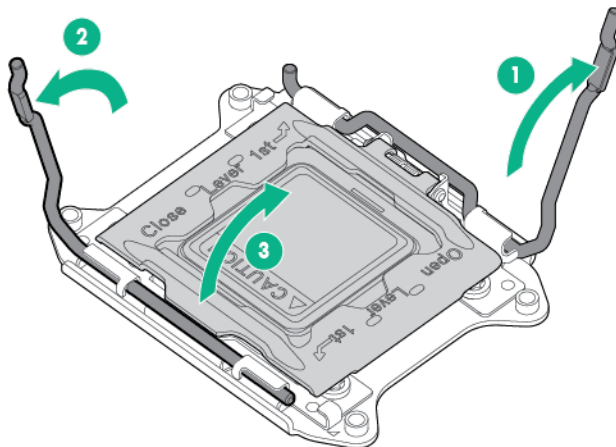
**CAUTION:**

The heatsink thermal interface media is not reusable and must be replaced if the heatsink is removed from the processor after it has been installed.

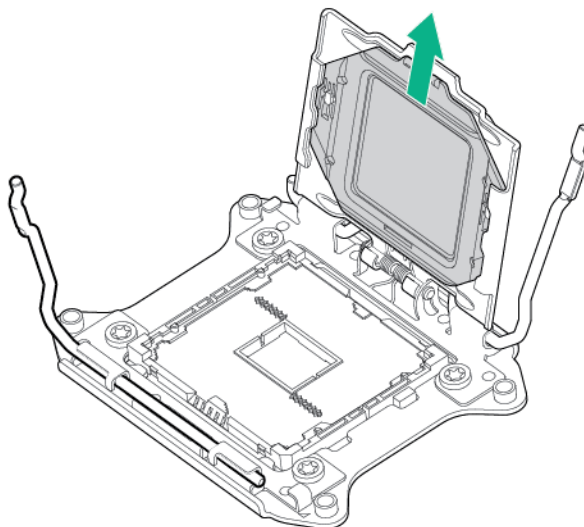
**IMPORTANT:**

Processor socket 1 must be populated at all times or the node does not function.

5. If installed in a 2U node, **remove the FlexibleLOM 2U node riser cage assembly.**
6. If installed in a 2U node, **remove the three-slot riser cage assembly.**
7. **Remove the air baffle.**
8. Open each of the processor locking levers in the order indicated in the following illustration, and then open the processor retaining bracket.

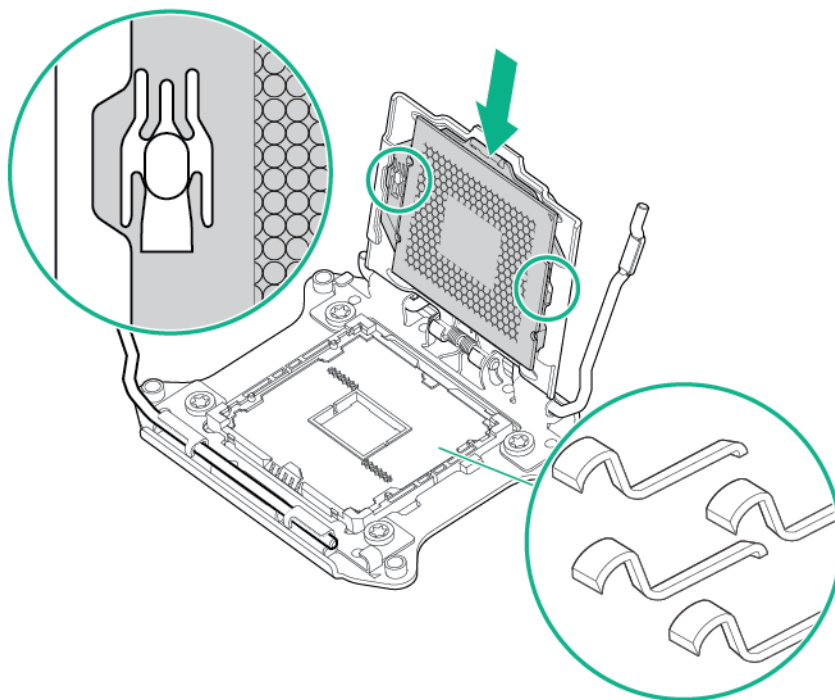


9. Remove the clear processor socket cover. Retain the processor socket cover for future use.



⚠ CAUTION:
THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED. To avoid damage to the system board, do not touch the processor or the processor socket contacts.

10. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor.



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

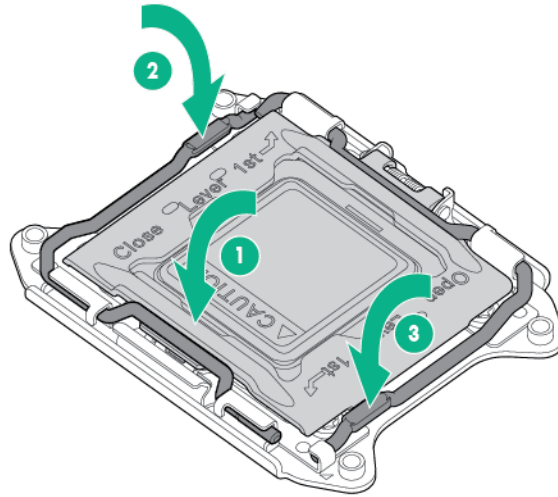
**CAUTION:**

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

**CAUTION:**

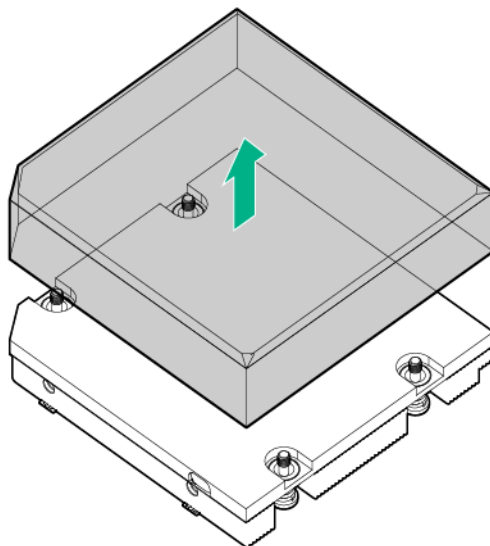
Close and hold down the processor cover socket while closing the processor locking levers. The levers should close without resistance. Forcing the levers closed can damage the processor and socket, requiring system board replacement.

12. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.

**CAUTION:**

Always use a new heatsink when replacing processors. Failure to use new components can cause damage to the processor.

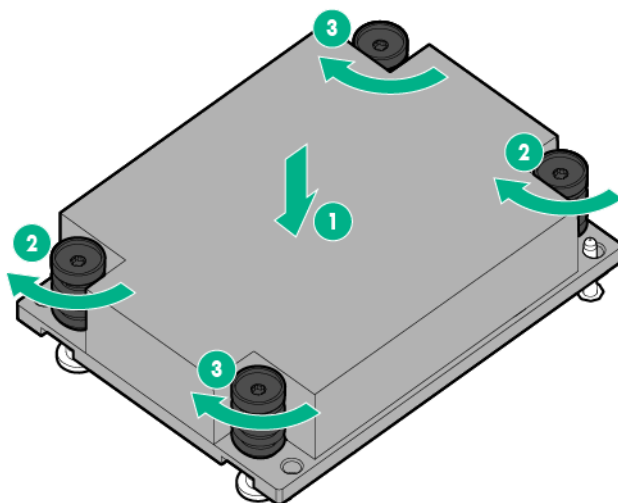
13. Remove the thermal interface protective cover from the heatsink.



CAUTION:

Heatsink retaining screws should be tightened or loosened in diagonally opposite pairs (in an "X" pattern). Do not overtighten the screws as this can damage the board, connectors, or screws.

14. Install the heatsink:
 - a. Position the heatsink on the processor backplate.
 - b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.
 - c. Finish the installation by completely tightening the screws in the same sequence.



15. Install the air baffle.
16. Install any removed PCI riser cage assemblies.
17. Install the node into the chassis.
18. Connect all peripheral cables to the nodes.
19. Power up the node.

Installing the dedicated iLO management port module option

Prerequisites

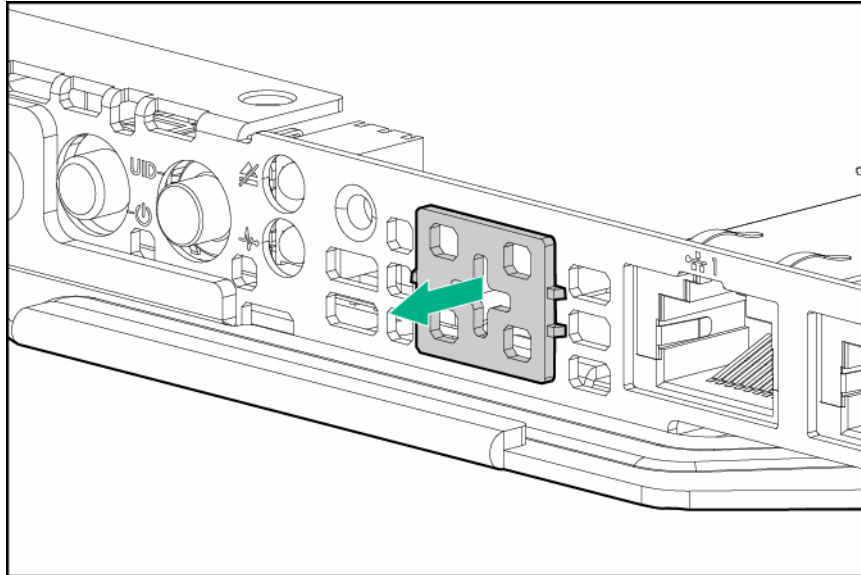
Observe the following rules and limitations when installing an dedicated iLO management port module:

- If a dedicated iLO management port module is installed in a node, the node can only connect to a network through the dedicated iLO management port module.
- If a dedicated iLO management port module is installed in a node, the node cannot be accessed through the RCM module.
- If using the RCM module iLO ports or the dedicated iLO management port module to connect to a network, the network must operate at a speed of 1 Gb/s. The server cannot connect to the network if the network is operating at a speed of 10/100 Mb/s or 10 Gb/s.

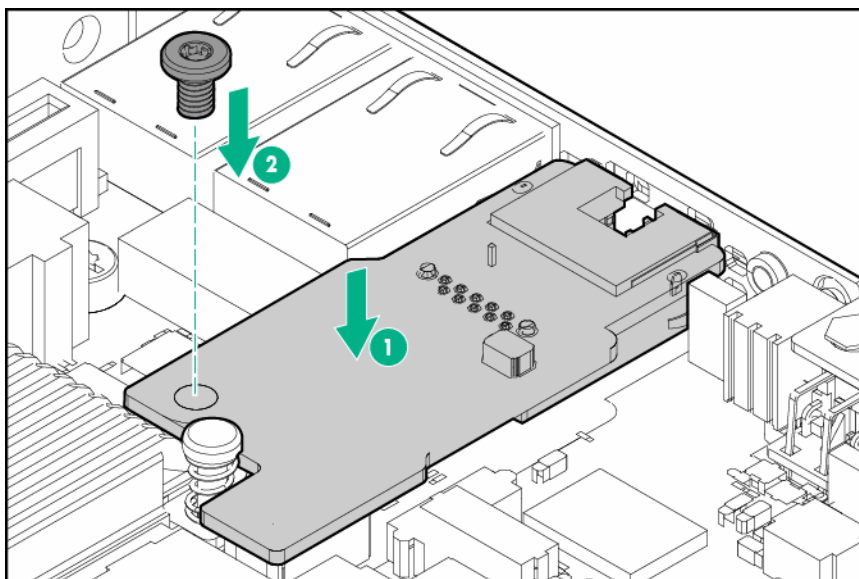
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the [Hewlett Packard Enterprise website](#).

Procedure

1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove any installed PCI riser cage assemblies.**
6. **Remove all rear I/O blanks.**
7. Remove the knockout.
 - a. Insert a flat screwdriver into the knockout.
 - b. Twist and pull to remove the knockout from the node.



8. Install the dedicated iLO management port card into the node.



9. If removed, **install all rear I/O blanks.**
10. **Install any removed PCI riser cage assemblies.**
11. **Install the node into the chassis.**
12. Connect all peripheral cables to the nodes.
13. **Power up the node.**

Enabling the dedicated iLO management module

Procedure

1. During the server startup sequence after installing the module, press **F9** in the POST screen.
The System Utilities screen appears.
2. Select **System Configuration | iLO 4 Configuration Utility**.
The iLO 4 Configuration Utility screen appears.
3. Select **Network Options**, and then press **Enter**.
The Network Options screen appears.
4. Set the **Network Interface Adapter** field to **ON**, and then press **Enter**.
5. Press **F10** to save your changes.
A message prompt to confirm the iLO settings reset appears.
6. Press **Enter** to reboot the iLO settings.
7. Press **Esc** until the main menu is displayed.
8. Select **Reboot the System** to exit the utility and resume the boot process.
The IP address of the enabled dedicated iLO connector appears on the POST screen on the subsequent boot-up. Access the Network Options screen again to view this IP address for later reference.

HP Trusted Platform Module option

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

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

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

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

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the **Microsoft website**.

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

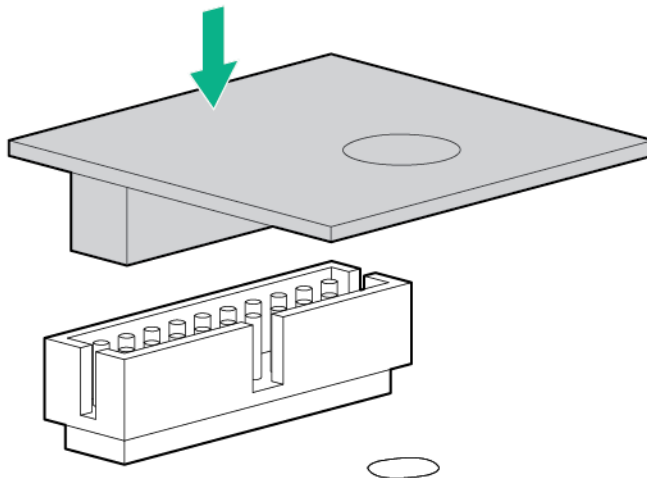
Installing the Trusted Platform Module board

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

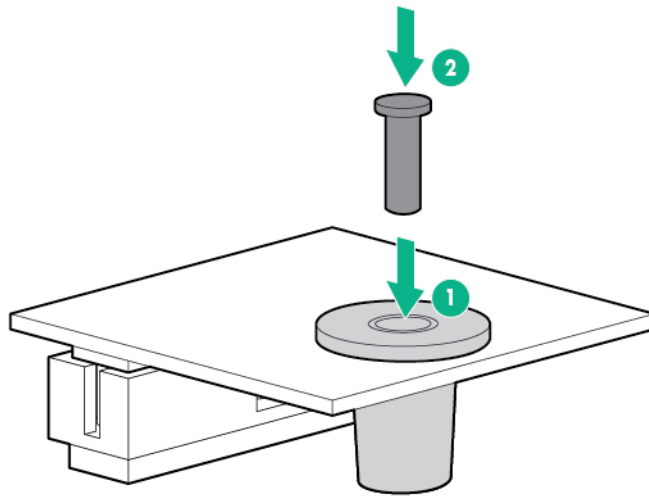
1. **Power down the node.**
2. Disconnect all peripheral cables from the node.
3. **Remove the node from the chassis.**
4. Place the node on a flat, level surface.
5. **Remove any installed PCI riser cage assemblies.**

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

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



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



8. Install any removed PCI riser cage assemblies.
9. Install the node into the chassis.
10. Connect all peripheral cables to the nodes.
11. Power up the node.

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

Enabling the Trusted Platform Module

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

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

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



CAUTION:

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

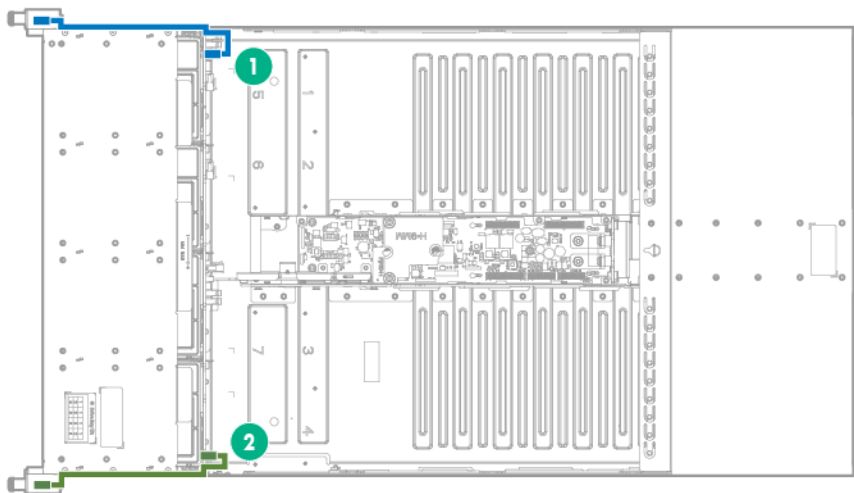
For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the **Hewlett Packard Enterprise Support Center website**.

For more information on adjusting TPM usage in BitLocker, see the **Microsoft website**.

Cabling

Chassis cabling

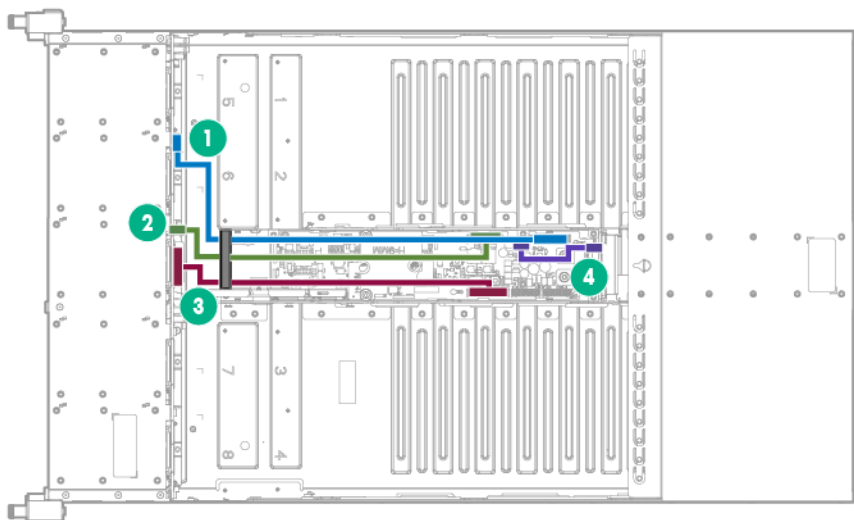
Front I/O cabling



Item	Description
1	Left front I/O cable
2	Right front I/O cable

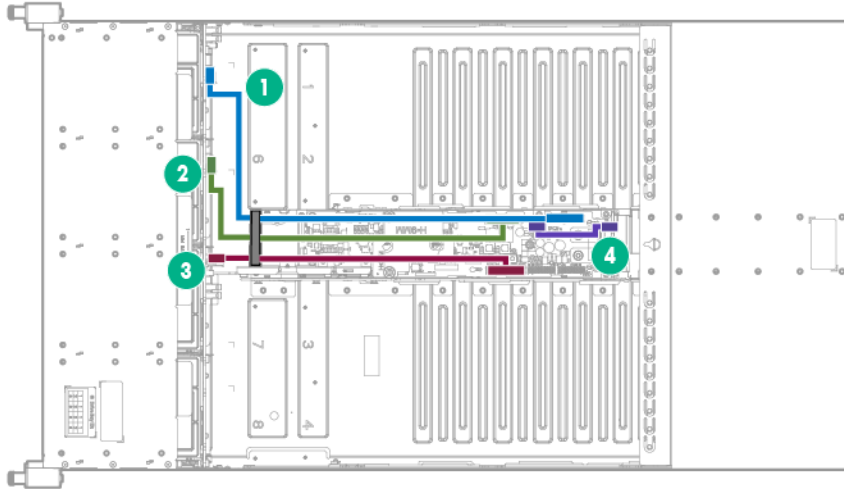
Drive backplane power cabling

HPE Apollo r2600 Chassis



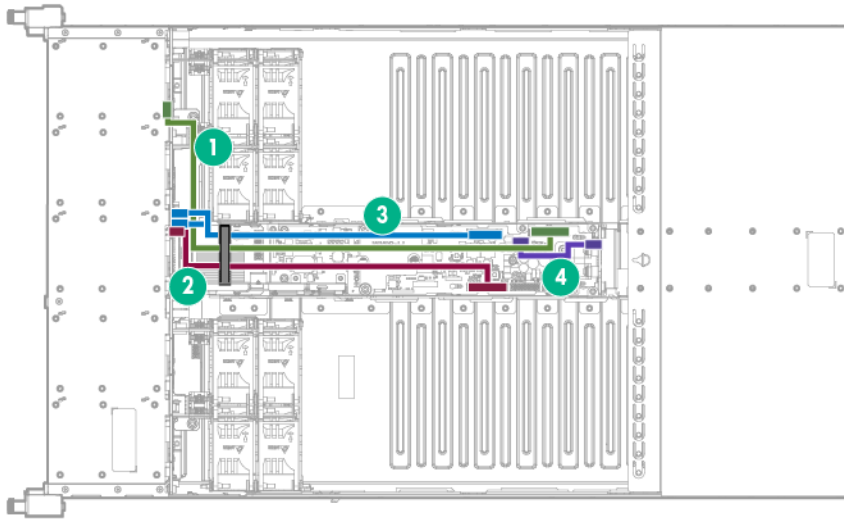
Item	Description
1	Power cable for Node 1 and Node 2
2	Power cable for drives
3	Power cable for Node 3 and Node 4
4	PDB Pass-through cable

HPE Apollo r2200 Chassis



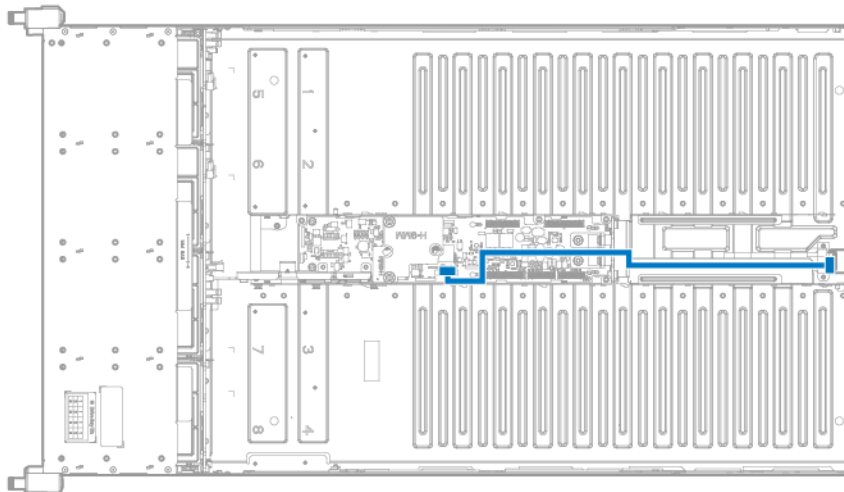
Item	Description
1	Power cable for Node 1 and Node 2
2	Power cable for drives
3	Power cable for Node 3 and Node 4
4	PDB Pass-through cable

HPE Apollo r2800 Chassis



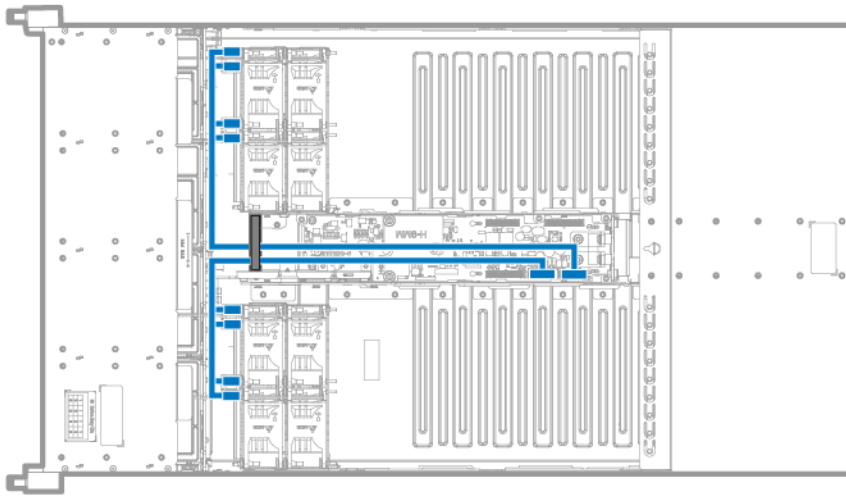
Item	Description
1	Power cable for Node 1 and Node 2
2	Power cable for drives
3	Power cable for Node 3 and Node 4
4	PDB Pass-through cable

RCM 2.0 cabling



Fan power cabling

HPE Apollo r2200 Chassis and HPE Apollo r2600 Chassis

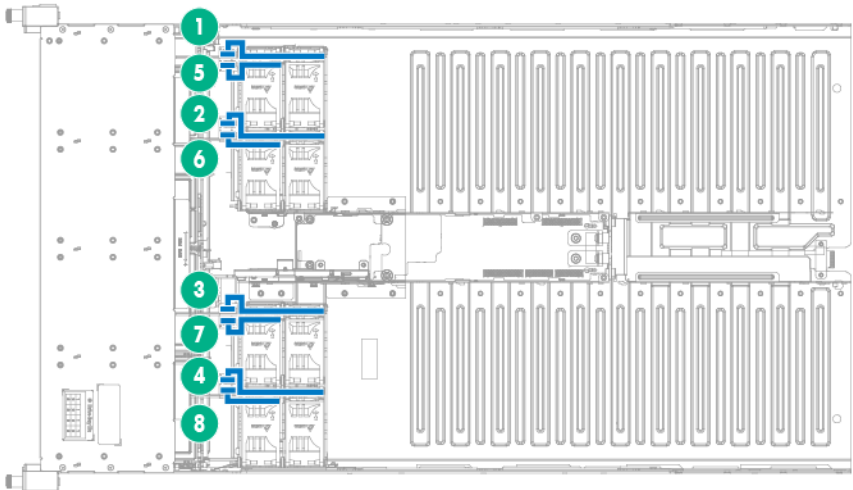


HPE Apollo r2800 Chassis



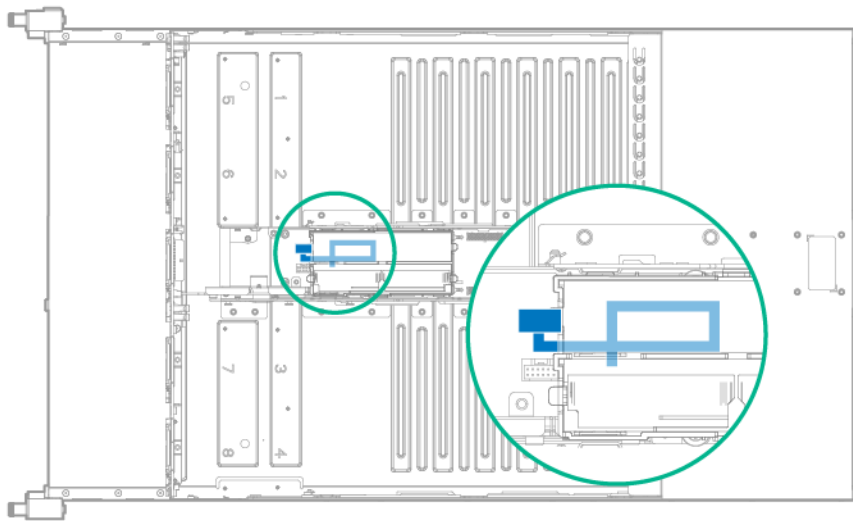
Item	Description
1	PDB to left fan cage power cable
2	Storage expander card to right fan cage power cable
3	PDB to storage expander card fan power cable

Fan module cabling



Item	Description
1	Fan 1 cable
2	Fan 2 cable
3	Fan 3 cable
4	Fan 4 cable
5	Fan 5 cable
6	Fan 6 cable
7	Fan 7 cable
8	Fan 8 cable

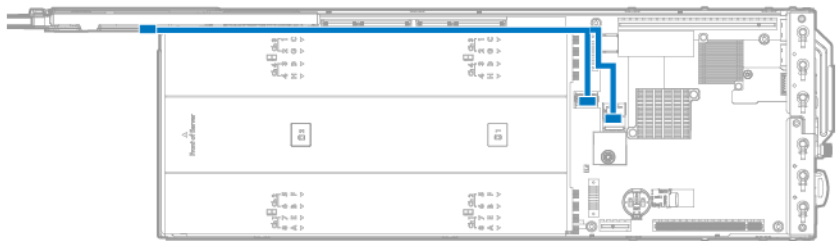
HPE Smart Storage Battery cabling



Node cabling

SATA and Mini-SAS cabling

B140i 1U node SATA

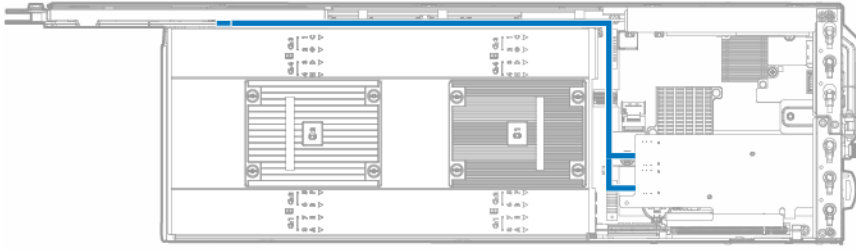


B140i 2U node SATA



Item	Description	Connection
1	SATA 1 cable	Mini-SAS connector 1 (SATA x4) on the system board to Port 1 on the bayonet board
2	SATA 2 cable	Mini-SAS connector 2 (SATA x4) on the system board to Port 2 on the bayonet board

Mini-SAS H240 1U node



Mini-SAS H240 2U node



Mini-SAS P440 2U node

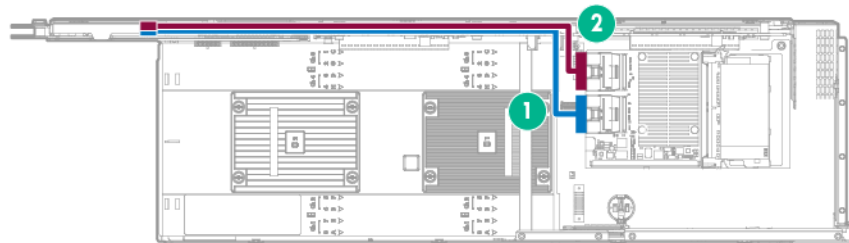


Mini-SAS P440/P840 node

HPE P440 Smart Array controller installed in a 1U node



HPE P840 Smart Array controller installed in FlexibleLOM 2U node riser cage assembly



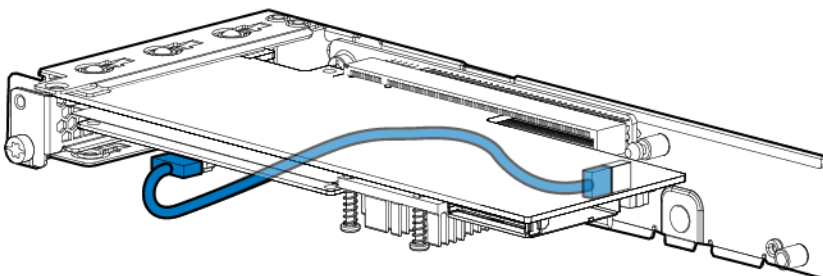
Item	Description	Connection
1	Mini-SAS P440/P840 cable	Port 1 on P840 Smart Array controller to Port 1 on the bayonet board
2	Mini-SAS P440/P840 cable	Port 2 on P840 Smart Array controller to Port 2 on the bayonet board

FBWC module cabling

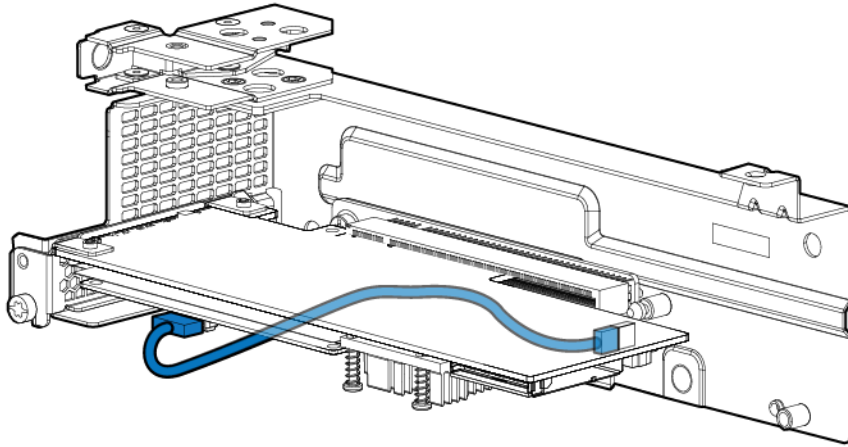
The FBWC solution is a separately purchased option. This node only supports FBWC module installation when a Smart Array P-Series controller is installed.

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

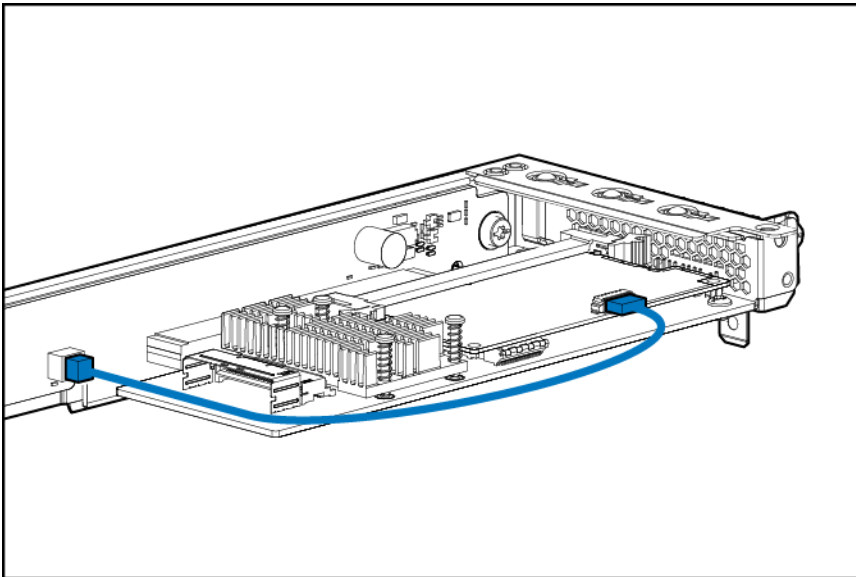
HPE P440 Smart Array controller in a single-slot left PCI riser cage assembly



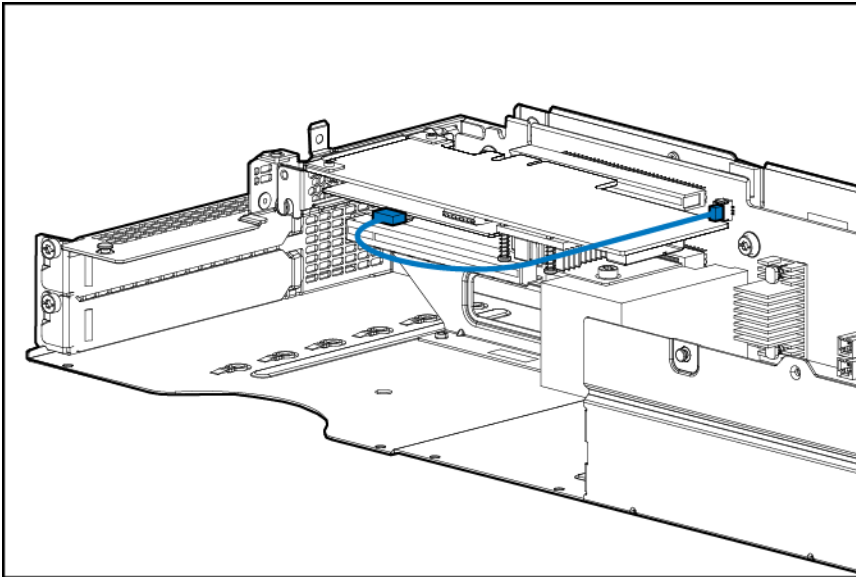
HPE P440 Smart Array controller in a single-slot 2U node PCI riser cage assembly



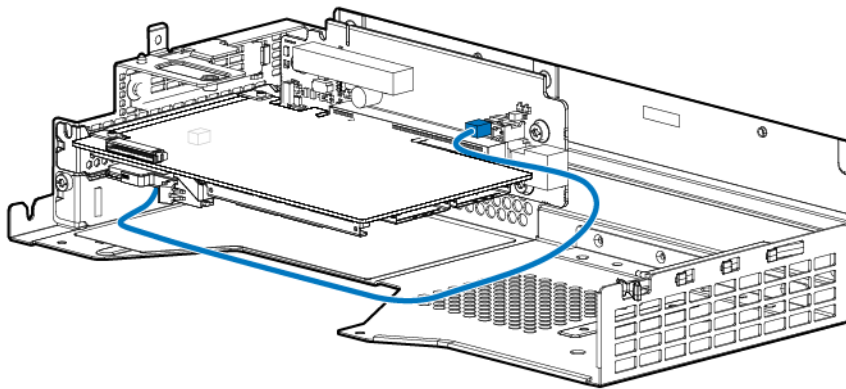
HPE P440 Smart Array controller in a single-slot 1U node right PCI riser cage assembly



HPE P440 Smart Array controller in a three-slot riser cage assembly



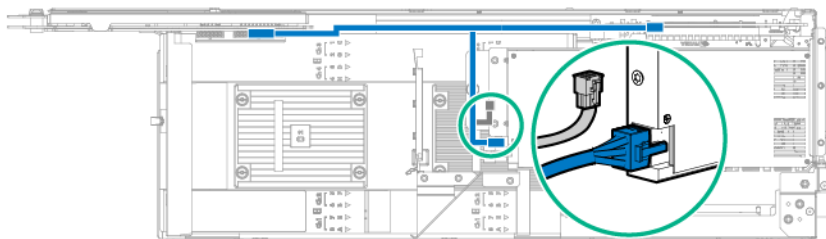
HPE P840 Smart Array controller in a FlexibleLOM 2U node riser cage assembly



Accelerator cabling

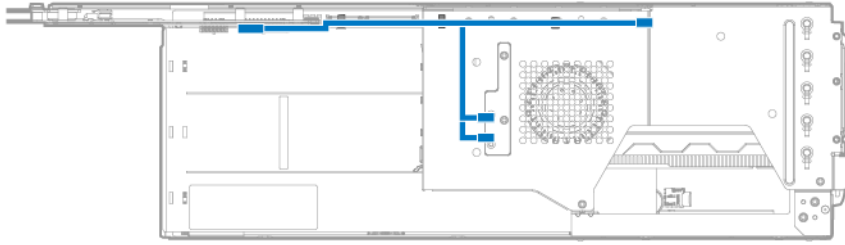
Accelerator cabling in the FlexibleLOM 2U node riser cage assembly

NVIDIA Quadro K4200 GPU or NVIDIA Quadro M4000 GPU



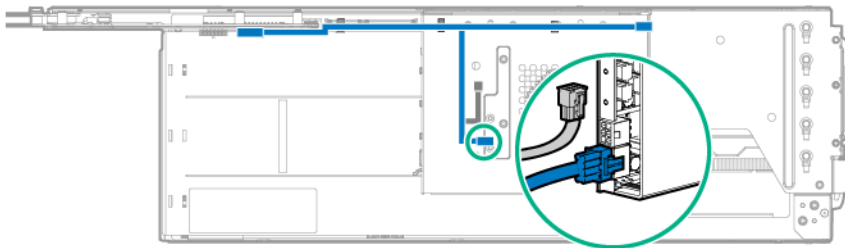
NVIDIA Tesla K40 GPU or AMD FirePro S9150 GPU

NOTE: Depending on the accelerator model purchased, the accelerator and cabling might look slightly different than shown.



Intel Xeon Phi Coprocessor 5110P

❗ **IMPORTANT:**
If installing an Intel Xeon Phi Coprocessor 5110P, connect the power cable to the 2x4 connector only. Do not connect the power cable to the 2x3 connector.



Accelerator cabling in a three-slot riser cage assembly

NOTE: Depending on the accelerator model purchased, the accelerator and cabling might look slightly different than shown.

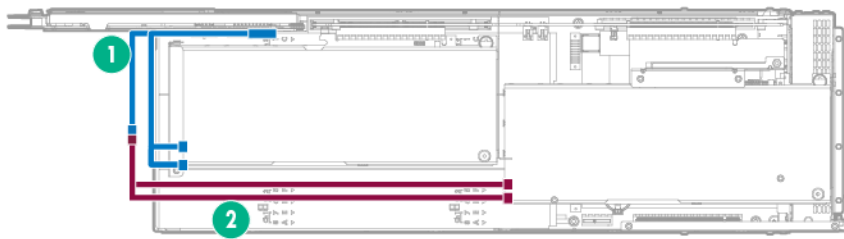
NOTE: Three-slot riser cage assemblies feature different riser boards. For more information on the riser board slot specifications, see "[PCIe riser board slot definitions](#)."

Single NVIDIA GRID K2 Reverse Air Flow GPU



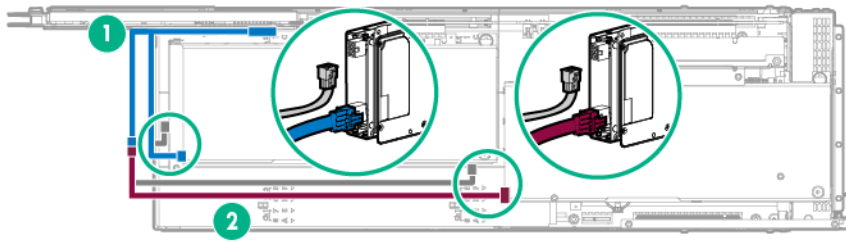
Item	Description
1	Accelerator 2 power cable (PN 825635-001)
2	Accelerator 1 power cable (PN 825634-001)

Dual NVIDIA Tesla K40 GPUs, NVIDIA GRID K2 Reverse Air Flow GPUs, AMD FirePro S9150 GPUs, or AMD FirePro S7150 GPUs



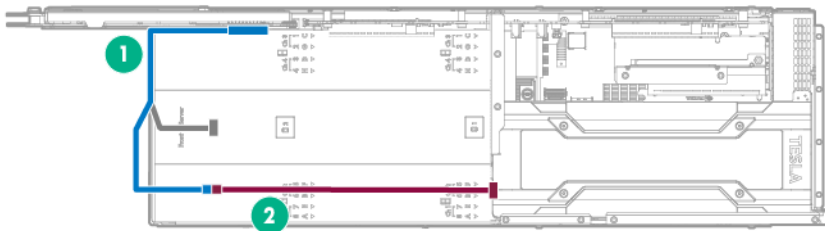
Item	Description
1	Accelerator 2 power cable (PN 825635-001)
2	Accelerator 1 power cable (PN 825634-001)

Dual Intel Xeon Phi Coprocessor 5110P



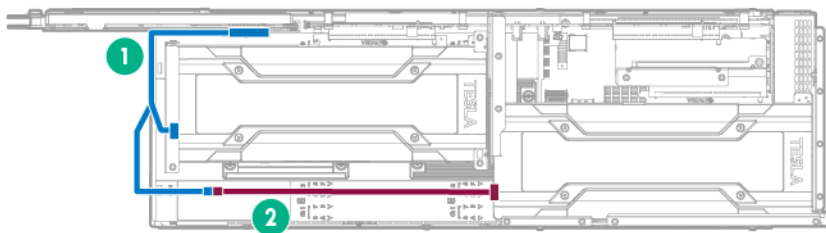
Item	Description
1	Accelerator 2 power cable (PN 825635-001)
2	Accelerator 1 power cable (PN 825634-001)

Single NVIDIA Tesla K80 GPU, NVIDIA Tesla M60 GPU, NVIDIA Tesla M40 GPU, and NVIDIA Tesla P100 GPU



Item	Description
1	Accelerator 2 power cable (PN 825637-001)
2	Accelerator 1 power cable (PN 825636-001)

Dual NVIDIA Tesla K80, NVIDIA Tesla M60, NVIDIA Tesla M40, NVIDIA Tesla P100 GPUs



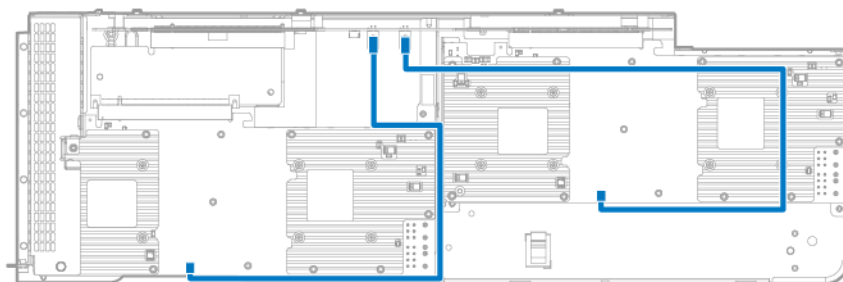
Item	Description
1	Accelerator 2 power cable (PN 825637-001)
2	Accelerator 1 power cable (PN 825636-001)

2-pin adapter cables

Single NVIDIA GRID K2 Reverse Air Flow GPU



Dual NVIDIA GRID K2 Reverse Air Flow GPUs



Software and configuration utilities

Server mode

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

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

Product QuickSpecs

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

HPE iLO

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

Features that enhance server administrator productivity are licensed. For more information, see the iLO documentation on the [Hewlett Packard Enterprise website](#).

Active Health System

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

The Active Health System provides:

- Continuous health monitoring of over 1600 system parameters
- Logging of all configuration changes
- Consolidated health and service alerts with precise time stamps
- Agentless monitoring that does not affect application performance

The Agentless Management Service is available in the SPP, which can be downloaded from the [Hewlett Packard Enterprise website](#). The Active Health System log can be downloaded manually from iLO 4 or Intelligent Provisioning and sent to Hewlett Packard Enterprise.

For more information, see the following documents:

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

iLO RESTful API support

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

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

HPE iLO 4 supports the iLO RESTful API with ProLiant Gen8 and later servers. For more information about the iLO RESTful API, see the [Hewlett Packard Enterprise website](#).

Integrated Management Log

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

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

- From within HPE SIM
- From within the UEFI System Utilities
- From within the Embedded UEFI shell
- From within operating system-specific IML viewers:
 - For Windows: IML Viewer
 - For Linux: IML Viewer Application
- From within the iLO web interface
- From within Insight Diagnostics

HPE Insight Remote Support

Hewlett Packard Enterprise strongly recommends that you register your device for remote support to enable enhanced delivery of your Hewlett Packard Enterprise warranty, HPE support services, or Hewlett Packard Enterprise contractual support agreement. Insight Remote Support supplements your monitoring continuously to ensure maximum system availability by providing 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. Notifications can be sent to your authorized Hewlett Packard Enterprise Channel Partner for onsite service, if configured and available in your country.

For more information, see *Insight Remote Support and Insight Online Setup Guide for ProLiant Servers and BladeSystem c-Class Enclosures* on the [Hewlett Packard Enterprise website](#). Insight Remote Support is available as part of Hewlett Packard Enterprise Warranty, HPE support services, or Hewlett Packard Enterprise contractual support agreement.

HPE Insight Remote Support central connect

When you use the embedded Remote Support functionality with ProLiant Gen8 and later server models and BladeSystem c-Class enclosures, you can register a node or chassis to communicate to Hewlett Packard Enterprise through an Insight Remote Support centralized Hosting Device in your local environment. All configuration and service event information is routed through the Hosting Device. This information can be viewed by using the local Insight Remote Support user interface or the web-based view in Insight Online.

For more information, see *Insight Remote Support Release Notes* on the [Hewlett Packard Enterprise website](#).

HPE Insight Online direct connect

When you use the embedded Remote Support functionality with ProLiant Gen8 and later server models and BladeSystem c-Class enclosures, you can register a node or chassis to communicate directly to Insight Online without the need to set up an Insight Remote Support centralized Hosting Device in your local environment. Insight Online will be your primary interface for remote support information.

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

Insight Online

HPE Insight Online is a capability of the Support Center portal. Combined with Insight Remote Support central connect or Insight Online direct connect, it automatically aggregates device health, asset, and support information with contract and warranty information, and then secures it in a single, personalized dashboard that is viewable from anywhere at any time. The dashboard organizes your IT and service data to help you understand and respond to that information more quickly. With specific authorization from you, an authorized Channel Partner can also view your IT environment remotely using Insight Online.

For more information about using Insight Online, see *Insight Online User's Guide* on the [Hewlett Packard Enterprise website](#).

Intelligent Provisioning

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

- Intelligent Provisioning prepares the system for installing "off-the-shelf" and Hewlett Packard Enterprise branded versions of operating system software and integrates optimized ProLiant server support software.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. For specific OS support, see the *Intelligent Provisioning Release Notes* on the [Hewlett Packard Enterprise website](#).
- Intelligent Provisioning provides maintenance-related tasks using the Perform Maintenance window.

For more information about Intelligent Provisioning software and recovery media downloads, see the [Hewlett Packard Enterprise website](#). For consolidated drive and firmware update packages, see the Smart Update: Server Firmware and Driver Updates page on the [Hewlett Packard Enterprise website](#).

Insight Diagnostics

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

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

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

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

Insight Diagnostics survey functionality

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

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

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

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

Erase Utility

CAUTION:

Perform a backup before running the Erase Utility. The utility completes the following:

- Sets the system to its original factory state
- Deletes the current hardware configuration information, including array setup and disk partitioning
- Erases all connected hard drives completely.

Before using this utility, see the instructions in the Intelligent Provisioning User Guide.

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](#).

Service Pack for ProLiant

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

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

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

- [Service Pack for ProLiant download page](#)
- [Smart Update: Server Firmware and Driver Updates page](#)

HP Smart Update Manager

HP SUM is a product used to install and update firmware, drivers, and systems software on ProLiant servers. The HP SUM provides a GUI and a command-line scriptable interface for deployment of systems software for single or one-to-many ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

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

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

To access the *HP Smart Update Manager User Guide*, see the [HP SUM Information Library](#).

UEFI System Utilities

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

- Configuring system devices and installed options
- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Selecting a language
- Launching other preboot environments such as the Embedded UEFI Shell and Intelligent Provisioning

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

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

Using UEFI System Utilities

To use the System Utilities, use the following keys.

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

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

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

- Upon the first system power-up
- After defaults have been restored

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

Flexible boot control

This feature enables you to do the following:

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

The new boot option is appended to the boot-order list. When you select a file, you are prompted to enter the boot option description. This description, and any optional data to be passed to an .EFI application, is then displayed in the boot menu.
 - Boot to System Utilities
- After pre-POST, the boot options screen appears. During this time, you can access the UEFI System Utilities by pressing the **F9** key.
- Choose between supported modes:
 - Legacy BIOS Boot Mode
 - UEFI Boot Mode



IMPORTANT:

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

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

Restoring and customizing configuration settings

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

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

Secure Boot configuration

Secure Boot is integrated in the UEFI specification on which the Hewlett Packard Enterprise implementation of UEFI is based. Secure Boot is implemented in the BIOS and does not require special hardware. Secure Boot ensures that each component launched during the boot process is digitally signed. Secure Boot also ensures that the signature is validated against a set of trusted certificates embedded in the UEFI BIOS. Secure Boot validates the software identity of the following components in the boot process:

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

When enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot. For more

information about supported operating systems, see the UEFI System Utilities and Shell release notes for your node on the [Hewlett Packard Enterprise website](#).

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

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

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

Embedded UEFI shell

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

For more information, see the following documents:

- *UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the [Hewlett Packard Enterprise website](#)
- *UEFI Shell Specification* on the [UEFI website](#)

Embedded Diagnostics option

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

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

iLO RESTful API support for UEFI

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

For more information about the iLO RESTful API and the RESTful Interface Tool, see the [Hewlett Packard Enterprise website](#).

Re-entering the server serial number and product ID

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

Procedure

1. During the node startup sequence, press the **F9** key to access UEFI System Utilities.
2. Select **System Configuration > BIOS/Platform Configuration (RBSU) > Advanced Options > Advanced System ROM Options > Serial Number**, and then press the **Enter** key.
3. Enter the serial number and press the **Enter** key.

The following message appears:

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

4. To clear the warning, press the **Enter** key.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**.

The following warning appears:

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

7. Enter the product ID and press the **Enter** key.
8. To confirm exiting System Utilities, press the **F10** key.

The node automatically reboots.

Utilities and features

HPE Smart Storage Administrator

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

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

Some HPE SSA features include the following:

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab
- For supported controllers, provides access to additional features.

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

Automatic Server Recovery

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

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

USB support

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

- USB 3.0 capable devices operate at USB 2.0 speeds when installed in a USB 2.0 port.
- In UEFI Boot Mode, Hewlett Packard Enterprise provides legacy USB support in the preboot environment before the operating system loading for USB 1.0, USB 2.0, and USB 3.0 speeds.
- In Legacy BIOS Boot Mode, Hewlett Packard Enterprise provides legacy USB support in the preboot environment before the operating system loading for USB 1.0 and USB 2.0 speeds. USB 3.0 ports can

be used with all devices in Legacy BIOS Boot Mode but are not available at USB 3.0 speeds in the preboot environment. Standard USB support (USB support from within the operating system) is provided by the OS through the appropriate USB device drivers. Support for USB 3.0 varies by operating system.

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

- **Auto (default)**—If configured in Auto Mode, USB 3.0 capable devices operate at USB 2.0 speeds in the preboot environment and during boot. When a USB 3.0 capable OS USB driver loads, USB 3.0 devices transition to USB 3.0 speeds. This mode is compatible with operating systems that do not support USB 3.0 while allowing USB 3.0 devices to operate at USB 3.0 speeds with state-of-the-art operating systems.
- **Enabled**—If Enabled, USB 3.0 capable devices operate at USB 3.0 speeds at all times (including the preboot environment) when in UEFI Boot Mode. Do not use this mode with operating systems that do not support USB 3.0. If operating in Legacy Boot BIOS Mode, the USB 3.0 ports cannot function in the preboot environment and are not bootable.
- **Disabled**—If configured for Disabled, USB 3.0 capable devices function at USB 2.0 speeds at all times.

The pre-OS behavior and default operation of the USB ports is configurable in the UEFI System Utilities. For more information, see the UEFI System Utilities user guide for your product on the [Hewlett Packard Enterprise website](#).

External USB functionality

Hewlett Packard Enterprise provides external USB support to enable local connection of USB devices for node 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 node enables you to upgrade or configure the ROM safely with redundant ROM support. The node has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

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

Safety and security benefits

When you flash the system ROM, ROMPaq 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

Access to Hewlett Packard Enterprise Support Materials

Access to some updates for ProLiant Servers may require product entitlement when accessed through the Hewlett Packard Enterprise Support Center support portal. Hewlett Packard Enterprise recommends that you have an HP Passport set up with relevant entitlements. For more information, see the [Hewlett Packard Enterprise website](#).

Updating firmware or System ROM

Multiple methods exist to update the firmware or System ROM:

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

Product entitlement is required to perform updates.

FWUPDATE utility

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

To use the utility to upgrade the firmware:

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

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

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

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

FWUpdate command from within the Embedded UEFI Shell

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

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

For more information about accessing a file system from the shell, see the *UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the [Hewlett Packard Enterprise website](#).

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

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

```
help fwupdate -b
```

9. Reboot the node .

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

For more information about the commands used in this procedure, see the *UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the [Hewlett Packard Enterprise website](#).

Firmware Update application in the UEFI System Utilities

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

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

Online Flash components

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

Drivers



IMPORTANT:

Always perform a backup before installing or updating device drivers.

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

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

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

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

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

Software and firmware

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

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

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

Operating System Version Support

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

Version control

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

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

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

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

To locate the documents, do the following:

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

Operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the [Hewlett Packard Enterprise website](#).

HPE Technology Service Portfolio

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

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

Utilize our consulting expertise in the following areas:

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

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

Change control and proactive notification

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

- Upcoming hardware and software changes
- Bulletins
- Patches

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

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

Troubleshooting

Troubleshooting resources

The HPE ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

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

The HPE ProLiant Gen9 Troubleshooting Guide, Volume II: Error Messages provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

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

System battery

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



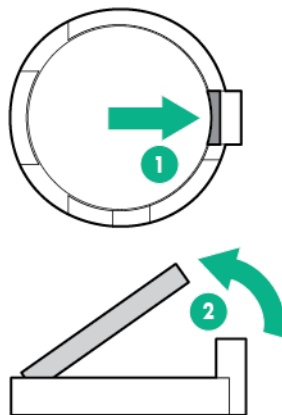
WARNING:

The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:

1. **Power down the node .**
2. Disconnect all peripheral cables from the node .
3. **Remove the node from the chassis .**
4. Place the node on a flat, level surface.
5. **Remove any installed PCI riser cage assemblies.**
6. **Locate the battery on the system board.**
7. If the system battery is secured by a metal tab, do the following:
 - a. Use your finger or a small flat-bladed, nonconductive tool to press the metal tab. This will partially release the battery from the socket.
 - b. Remove the battery.



IMPORTANT:

Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To replace the component, reverse the removal procedure.

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

Warranty and regulatory information

Warranty information

HPE ProLiant and x86 Servers and Options

HPE Enterprise Servers

HPE Storage Products

HPE Networking Products

Regulatory information

Belarus Kazakhstan Russia marking



Manufacturer and Local Representative Information

Manufacturer information:

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

Local representative information Russian:

- **Russia:**

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

- **Belarus:**

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

- **Kazakhstan:**

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

Local representative information Kazakh:

- **Russia:**

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

- **Belarus:**

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

- **Kazakhstan:**

Manufacturing date:

The manufacturing date is defined by the serial number.

CCSYWWZZZZ (serial number format for this product)

Valid date formats include:

- YWW, where Y indicates the year counting from within each new decade, with 2000 as the starting point; for example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- YYWW, where YY indicates the year, using a base year of 2000; for example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

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

Electrostatic discharge

Preventing electrostatic discharge

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

To prevent electrostatic damage:

Procedure

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

Grounding methods to prevent electrostatic discharge

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

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

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

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

Specifications

Environmental specifications

Specification	Value
Temperature range¹	—
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (noncondensing)	—
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature

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

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

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

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

Mechanical specifications

HPE Apollo r2200 Chassis (12 LFF)

Specifications	Value
Dimensions	—
Height	8.73 cm (3.44 in)
Depth	86.33 cm (33.40 in)
Width	44.81 cm (17.64 in)
Weight (approximate values)	—
Weight (maximum)	25.37 kg (55.94 lb)
Weight (minimum)	11.94 kg (26.37 lb)

HPE Apollo r2600 Chassis (24 SFF)

Specifications	Value
Dimensions	—
Height	8.73 cm (3.44 in)
Depth	82.27 cm (32.40 in)
Width	44.81 cm (17.64 in)
Weight (approximate values)	—
Weight (maximum)	23.45 kg (51.70 lb)
Weight (minimum)	9.86 kg (21.74 lb)

HPE Apollo r2800 Chassis (24 SFF with storage expander backplane)

Specifications	Value
Dimensions	—
Height	8.73 cm (3.44 in)
Depth	82.27 cm (32.40 in)
Width	44.81 cm (17.64 in)
Weight (approximate values)	—
Weight (maximum)	23.59 kg (52.00 lb)
Weight (minimum)	10.00 kg (22.05 lb)

HPE ProLiant XL170r Gen9 Server Node (1U)

Specifications	Value
Dimensions	—
Height	4.13 cm (1.63 in)
Depth	64.15 cm (25.26 in)
Width	17.95 cm (7.07 in)
Weight (approximate values)	—
Weight (maximum)	1.73 kg (3.82 lb)
Weight (minimum)	1.67 kg (3.69 lb)

HPE ProLiant XL190r Gen9 Server Node (2U)

Specifications	Value
Dimensions	—
Height	8.36 cm (3.30 in)
Depth	69.15 cm (27.23 in)
Width	17.95 cm (7.07 in)
Weight (approximate values)	—

Table Continued

Specifications	Value
Weight (maximum)	6.47 kg (14.27lb)
Weight (minimum)	4.73 kg (10.43 lb)

Power supply specifications

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

- HPE 800W Flex Slot Titanium Hot Plug Power Supply Kit – 96% efficiency
- HPE 800W Flex Slot Platinum Hot Plug Power Supply Kit – 94% efficiency
- HPE 800W Flex Slot Universal Hot Plug Power Supply Kit – 94% efficiency
- HPE 800W Flex Slot -48VDC Hot Plug Power Supply Kit – 94% efficiency
- HPE 1400W Flex Slot Platinum Plus Hot Plug Power Supply Kit – 94% efficiency

For more information about the power supply features, specifications, and compatibility, see the [Hewlett Packard Enterprise website](#).

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](#).

Thermal limitations

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

The operating temperature inside the rack is always higher than the room temperature and is dependent on the configuration of equipment in the rack. Check the TMRA for each piece of equipment before installation.

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 chassis or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

List of options with thermal limitations

Processors

Description	Maximum inlet ambient temperature
Intel® Xeon® Processor E5-2643 v4 ¹	30°C (86°F)
Intel® Xeon® Processor E5-1680 v3 ¹	23°C (73.4°F)

¹ If the Intel® Xeon® Processor E5-2643 v4 is installed in a 2U node, and a PCIe NIC card, storage controller, or GPU accelerator is installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21), note the maximum inlet ambient temperature for the option installed in slot 2.

Expansion boards installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21)

Description	Maximum inlet ambient temperature
Low-profile or single-width PCIe card (such as the P440 Smart Array controller or P840 Smart Array controller)	20°C (68°F)
Single-width GPU accelerator (such as the NVIDIA Quadro M4000 or the NVIDIA Quadro K4200)	21°C (69.8°F)
Double-width GPU accelerator (such as the NVIDIA Tesla K40 or the AMD FirePro S9150)	23°C (73.4°F)

GPU accelerators

Description	Maximum inlet ambient temperature
NVIDIA Quadro K4200 ¹	N/A
NVIDIA Quadro M4000 ¹	30°C (86°F)
NVIDIA Tesla K40 ²	30°C (86°F)
NVIDIA Tesla M40	29°C (84.2°F)
NVIDIA Tesla M60	22°C (71.6°F)
NVIDIA Tesla K80	22°C (71.6°F)
NVIDIA Tesla P100	24°C (75.2°F) if the server node is installed in the HPE Apollo r2200 Chassis 20°C (68°F) if the server node is installed in the HPE Apollo r2600 Chassis
NVIDIA GRID K2	30°C (86°F)
Intel Xeon Phi Coprocessor 5110P ²	30°C (86°F)
AMD FirePro S9150 ²	30°C (86°F)
AMD FirePro S7150	30°C (86°F)

¹ If a single-width GPU accelerator is installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21), and the Intel® Xeon® Processor E5-2643 v4 is installed in a 2U node, the maximum inlet ambient temperature is 21°C (69.8°F).

² If a double-width GPU accelerator is installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21), and the Intel® Xeon® Processor E5-2643 v4 is installed in a 2U node, the maximum inlet ambient temperature is 23°C (73.4°F).

DIMMs

Description	Maximum inlet ambient temperature
64 GB, quad-rank x4 PC4-2400T-L	25°C (77°F)
128 GB, octal-rank x4 PC4-2400T-L	29°C (84.2°F)

PCIe NIC cards

Description	Maximum inlet ambient temperature
InfiniBand EDR/EN 100-GB 1-port 840QSFP28 Adapter ^{1,2}	20°C (68°F) if using an optical fiber cable in a 2U node 21°C (69.8°F) if using an optical fiber cable in a 1U node 22°C (71.6°F) if using a copper direct-attach cable in a 2U node 23°C (73.4°F) if using a copper cable in a 1U node
InfiniBand EDR/EN 100-GB 2-port 840QSFP28 Adapter ^{1,2}	20°C (68°F) if using an optical fiber cable in a 2U node 21°C (69.8°F) if using an optical fiber cable in a 1U node 22°C (71.6°F) if using a copper direct-attach cable in a 2U node 23°C (73.4°F) if using a copper direct-attach cable in a 1U node
100-GB 1-port OP101 QSFP28 x8 Intel Omni-path architecture Adapter ^{1,2}	21°C (69.8°F) in a 2U node 24°C (75.2°F) in a 1U node

¹ If a low-profile or single-width PCIe card is installed in slot 2 of the FlexibleLOM 2U node riser cage assembly (PN 798184-B21), and the Intel® Xeon® Processor E5-2643 v4 is installed in the HPE ProLiant XL190r Gen9 Server Node, the maximum inlet ambient temperature is 20°C (68°F).

² The maximum inlet ambient temperature varies depending on the node (1U or 2U) and the type of cable (optical fiber cable or copper direct-attach cable).

Support and other resources

Websites

- [Hewlett Packard Enterprise Information Library](#)
- [Hewlett Packard Enterprise Support Center](#)
- [Contact Hewlett Packard Enterprise Worldwide](#)
- [Subscription Service/Support Alerts](#)
- [Software Depot](#)
- [Customer Self Repair](#)
- [Insight Remote Support](#)
- [Serviceguard Solutions for HP-UX](#)
- [Single Point of Connectivity Knowledge \(SPOCK\) Storage compatibility matrix](#)
- [Storage white papers and analyst reports](#)

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
<http://www.hpe.com/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
<http://www.hpe.com/support/hpesc>

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

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

Hewlett Packard Enterprise Support Center

www.hpe.com/support/hpesc

Hewlett Packard Enterprise Support Center: Software downloads

www.hpe.com/support/downloads

Software Depot

www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:

www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

www.hpe.com/support/AccessToSupportMaterials



IMPORTANT:

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

Customer self repair

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

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

<http://www.hpe.com/support/selfrepair>

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

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

Proactive Care customer information

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

Warranty information

To view the warranty for your product, see the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* document, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information

HPE ProLiant and x86 Servers and Options	www.hpe.com/support/ProLiantServers-Warranties
HPE Enterprise Servers	www.hpe.com/support/EnterpriseServers-Warranties
HPE Storage Products	www.hpe.com/support/Storage-Warranties
HPE Networking Products	www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

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Acronyms and abbreviations

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ABEND	abnormal end
ACU	Array Configuration Utility
ADM	Advanced Data Mirroring
AMP	Advanced Memory Protection
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASR	Automatic Server Recovery
CSA	Canadian Standards Association
CSR	Customer Self Repair
DDR	double data rate
DPC	DIMMs per channel
EAC	EuroAsian Economic Commission
FBWC	flash-backed write cache
GPU	graphics processing unit
HP SUM	HP Smart Update Manager
HPE APM	HPE Advanced Power Manager
HPE SIM	HPE Systems Insight Manager
HPE SSA	HPE Smart Storage Administrator
IEC	International Electrotechnical Commission
iLO	Integrated Lights-Out
IML	Integrated Management Log
ISO	International Organization for Standardization
LFF	large form factor
LOM	LAN on Motherboard
LRDIMM	load reduced dual in-line memory module
NIC	network interface controller

NMI	nonmaskable interrupt
NVRAM	nonvolatile memory
OA	Onboard Administrator
PCIe	Peripheral Component Interconnect Express
PDB	power distribution board
PDU	power distribution unit
POST	Power-On Self-Test
RBSU	ROM-Based Setup Utility
RCM	Rack control management
RDIMM	registered dual in-line memory module
RDP	Remote Desktop Protocol
RoHS	Restriction of Hazardous Substances
RPS	redundant power supply
SAS	serial attached SCSI
SATA	serial ATA
SFF	small form factor
SIM	Systems Insight Manager
SPP	Service Pack for ProLiant
SUV	serial, USB, video
TMRA	recommended ambient operating temperature
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
UID	unit identification
USB	universal serial bus
VCA	Version Control Agent
VCRM	Version Control Repository Manager
VM	Virtual Machine

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