Dell PowerEdge T560

Installation and Service Manual

Regulatory Model: E86S
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DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

About this document

This document provides an overview about the system, information about installing and replacing components, diagnostic tools, and guidelines to be followed while installing certain components.

2

Dell PowerEdge T560 system overview

The PowerEdge T560 system is a 2-socket 4.5U tower server that supports:

- Up to two 4 th Generation Intel® Xeon® Scalable Processors with up to 32 cores
- Up to two 5 th Generation Intel® Xeon® Scalable Processors with up to 28 cores
- 16 RDIMM slots
- Two redundant AC or DC power supply units
- Up to 12 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/ SATA HDD + 8 x 2.5-inch NVMe SSD drives
- Up to 8 x 2.5-inch SAS/SATA HDD drives
- Up to 16 x 2.5-inch SAS/SATA HDD drives
- Up to 24 x 2.5-inch SAS/SATA HDD drives

NOTE: For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at Dell Support page **> Browse all Products** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Documentation** > **Manuals and Documents**.

NOTE: All instances of SAS, SATA, and NVMe drives are referred to as drives in this document, unless specified otherwise.

CAUTION: Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.

Topics:

- Front view of the system
- Rear view of the system
- Inside the system
- Locating the Express Service Code and Service Tag
- System information labels

Front view of the system

Figure 1. Front view of 12 x 3.5-inch drive system

Table 1. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	🛈	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to

Table 1. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
			iDRAC, the Information tag will also contain the iDRAC secure default password.
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

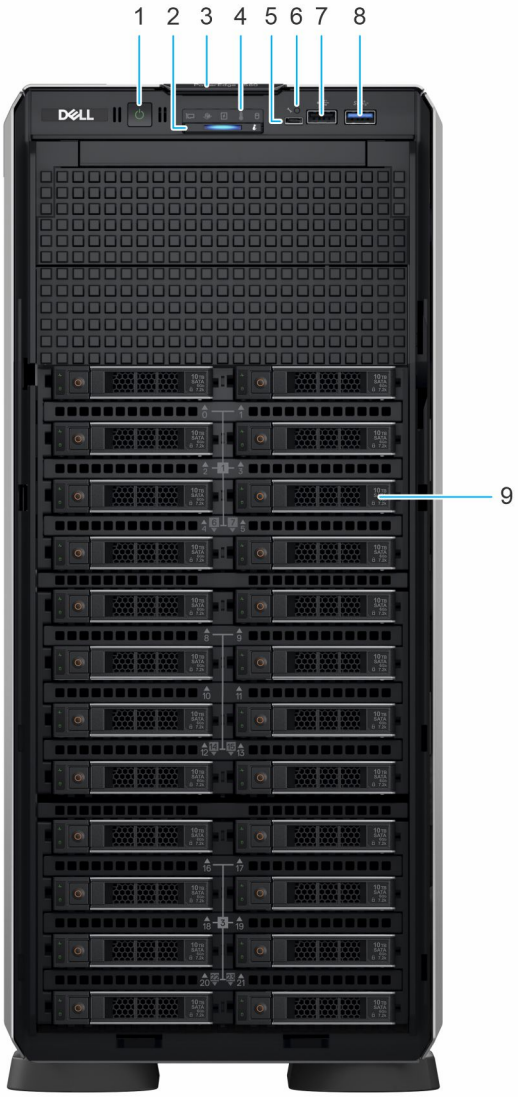


Figure 2. Front view of 24 x 2.5-inch drive system

Table 2. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	𝒊	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 2. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

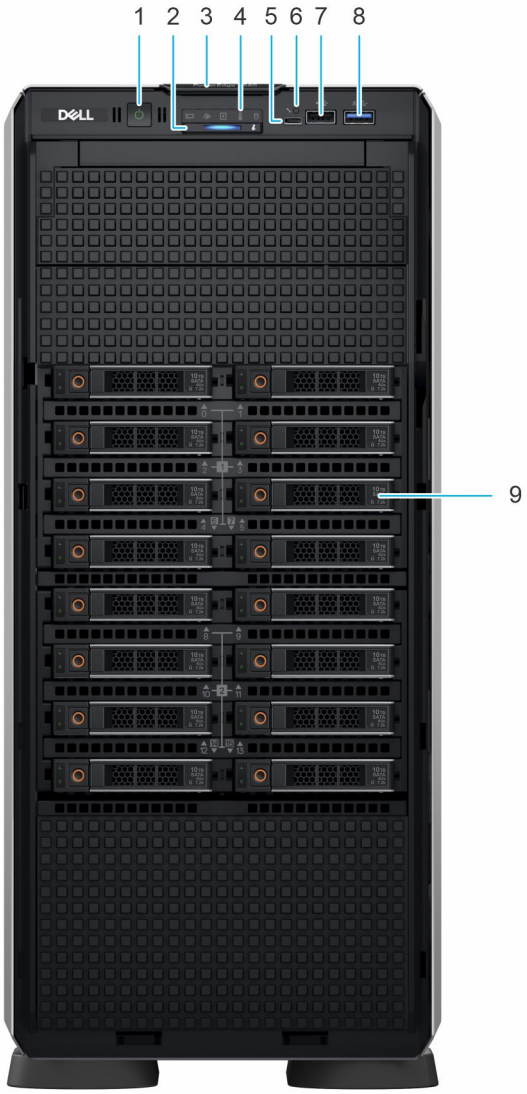


Figure 3. Front view of 16 x 2.5-inch drive system

Table 3. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	🛈	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 3. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

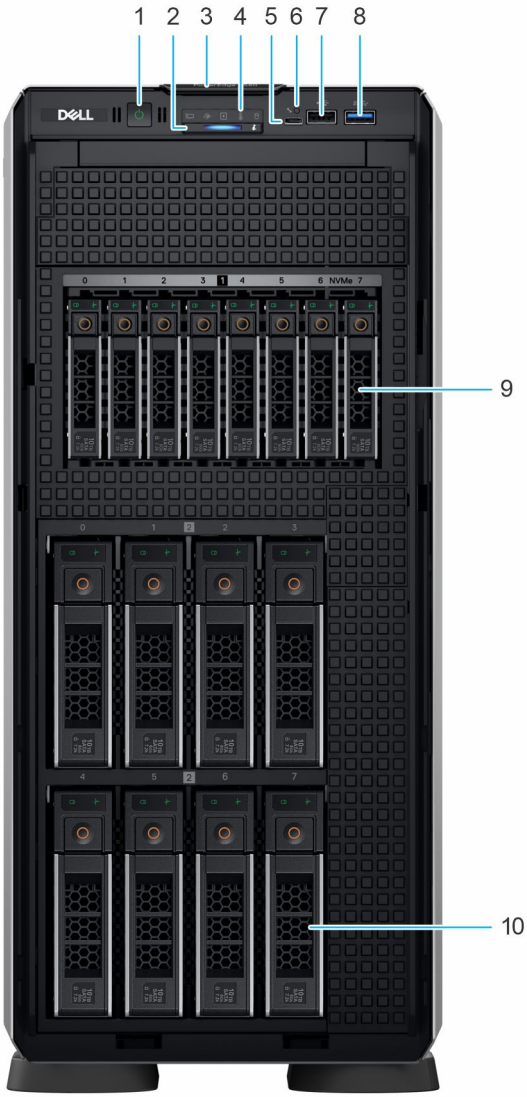


Figure 4. Front view of 8 x 3.5-inch + 8 x 2.5-inch drive system

Table 4. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	𝒊	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 4. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	2.5-inch Drive Bay	N/A	Enables you to install NVMe drives that are supported on your system
10	3.5-inch Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

Figure 5. Front view of 8 x 3.5-inch drive system

Table 5. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	🛈	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 5. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

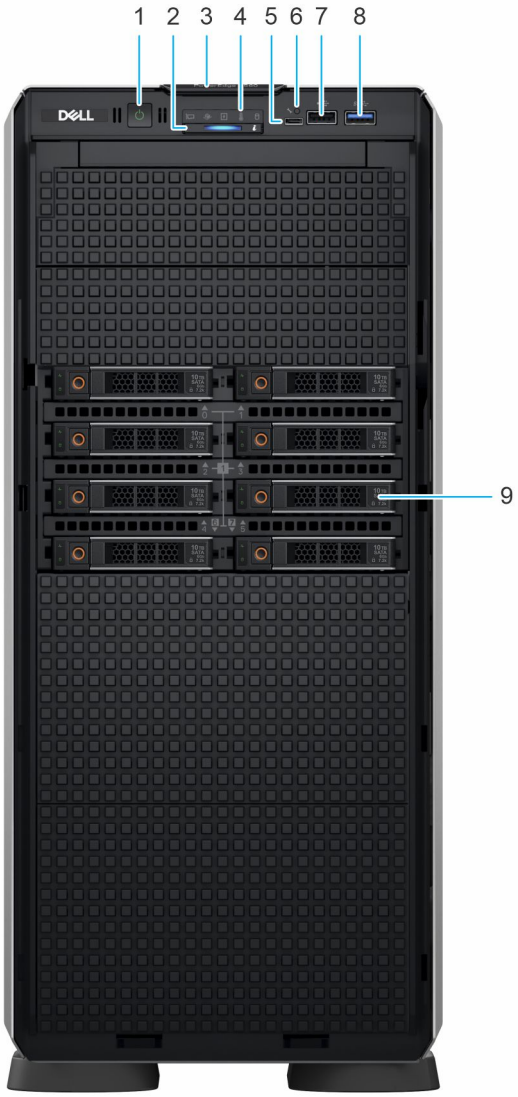


Figure 6. Front view of 8 x 2.5-inch drive system

Table 6. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	System health and ID indicator	𝒊	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 6. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
4	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
6	iDRAC status LED	N/A	The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. For more information, see iDRAC Direct LED indicator codes
7	USB 2.0 port		Supports 4-pin, USB 2.0 compliant devices.
8	USB 3.0 port		Supports 9-pin, USB 3.0 compliant devices
9	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.

NOTE: For more information about ports, panels, and slots, see the Technical specifications section.

Rear view of the system

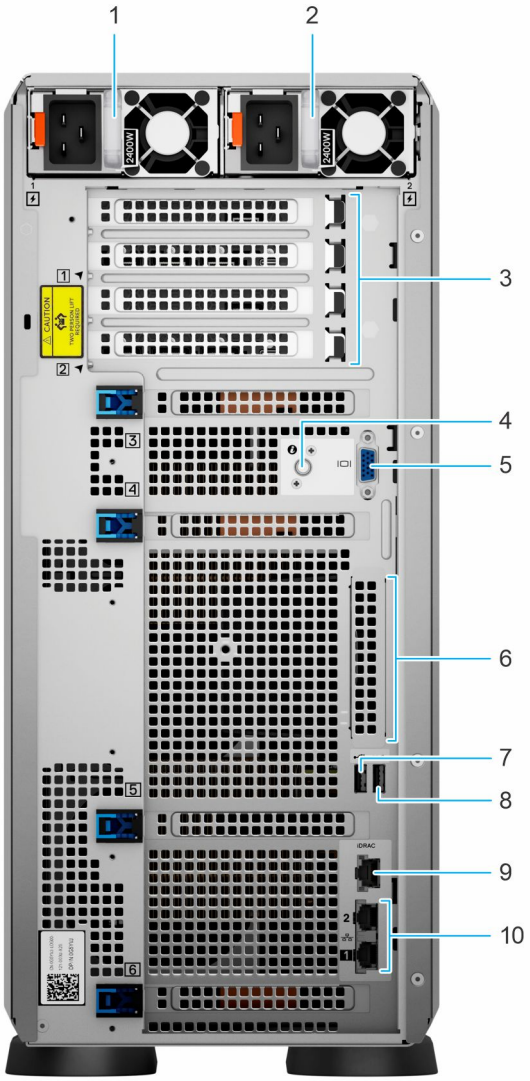


Figure 7. Rear view of the system

Table 7. Rear view of the system

Item	Ports, panels, or slots	Icon	Description
1	Power supply unit (PSU 1)	N/A	PSU1 is the primary PSU of the system.
2	Power supply unit (PSU 2)	N/A	PSU2 is the secondary PSU of the system.
3	PCIe expansion card slots (4)	N/A	Enables you to connect PCI Express expansion cards.
4	System identification button	ⓘ	The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to

Table 7. Rear view of the system (continued)

Item	Ports, panels, or slots	Icon	Description
			access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode.
5	VGA port		Enables you to connect a display device to the system.
6	OCP NIC port (optional)	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.
7	USB 2.0		Supports 4-pin, USB 2.0 compliant devices
8	USB 3.0	N/A	Supports 9-pin, USB 3.0 compliant devices
9	Dedicated iDRAC9 Ethernet port	iDRAC	Enables you to remotely access iDRAC. For more information, see the Integrated *Dell Remote Access Controller User's Guide* at PowerEdge Manuals.
10	NIC ports (2)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.

NOTE: For more information about ports, panels, and slots, see the Technical specifications section.

Inside the system

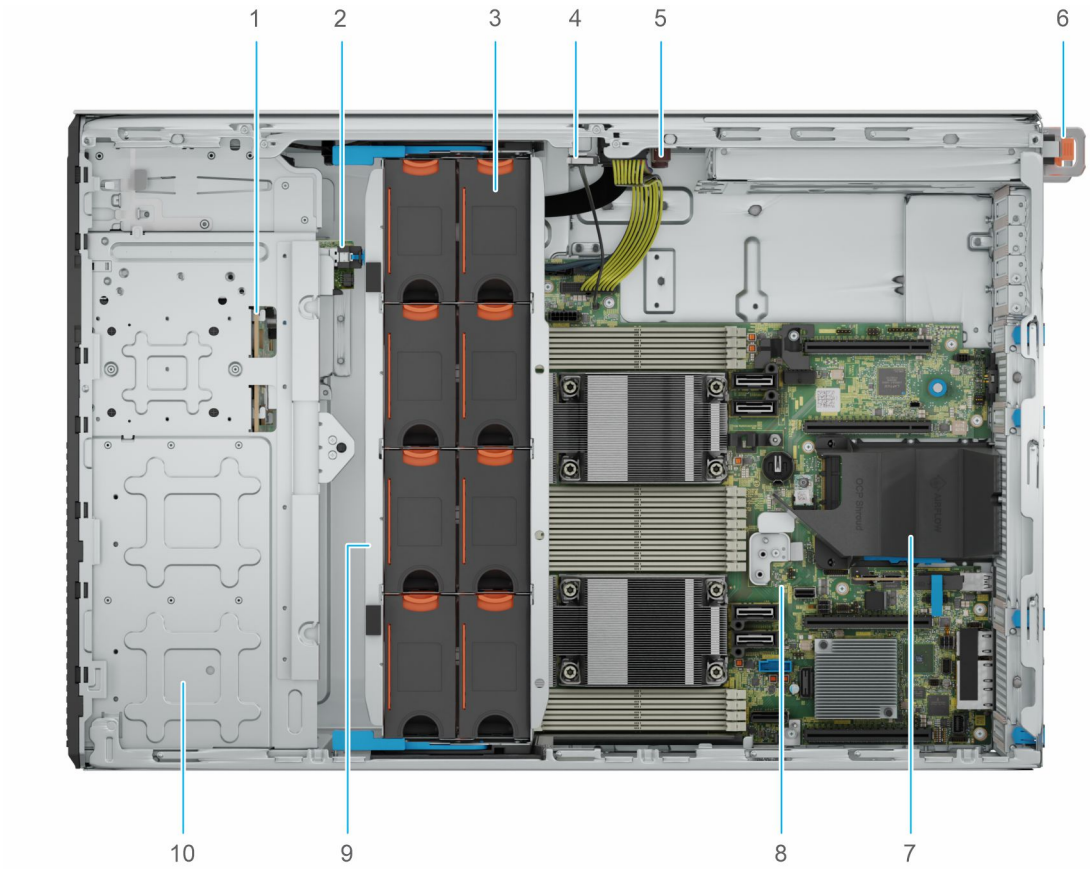


Figure 8. Inside the system for 24 x 2.5-inch configuration

1. 2.5-inch drive backplane
2. BOSS-N1 module
3. Cooling fan
4. Intrusion switch
5. Power interposer board
6. PSU 1
7. OCP air shroud
8. System board
9. Cooling fan cage
10. 2.5-inch drive bay

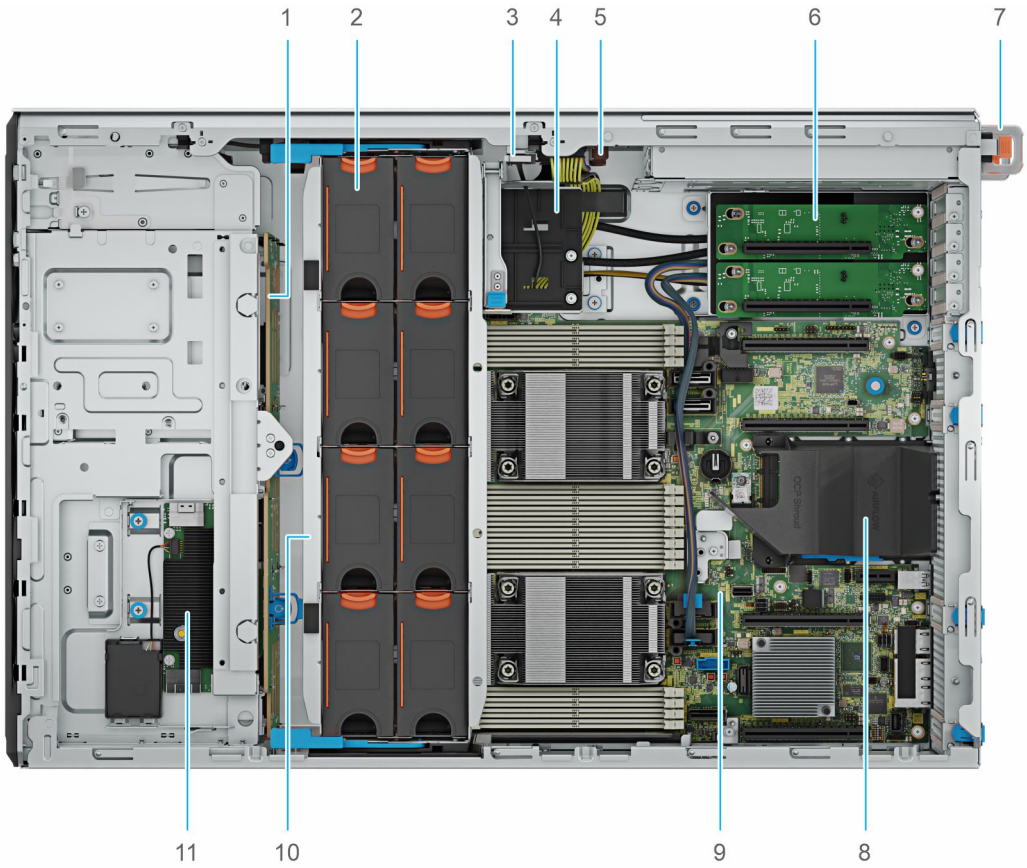


Figure 9. Inside the system for 8 x 3.5-inch + 8 x 2.5-inch configuration

1. 3.5-inch drive backplane
2. Cooling fans
3. Intrusion switch
4. GPU card holde
5. Power interposer board
6. PCIe Gen5 GPU riser
7. PSU 1
8. OCP air shroud
9. System board
10. Cooling fan cage
11. fPERC module

Locating the Express Service Code and Service Tag

The unique Express Service Code and Service Tag are used to identify the system.

The express service tag is located on the front of the system that includes system information such as the Service Tag, Express Service Code, Manufacture date, NIC, MAC address, QR code, and so on.

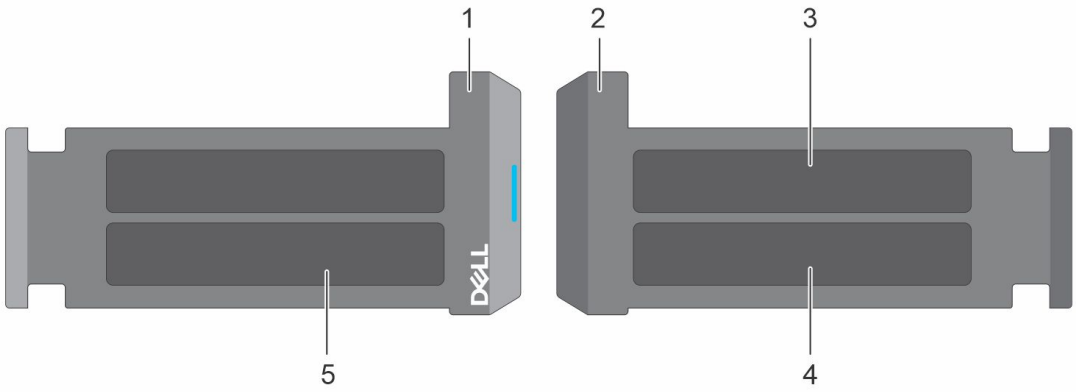


Figure 10. Locating the Express Service Code and Service tag

1. Express Service Tag (front view)
2. Express Service Tag (rear view)
3. OMM (not applicable)
4. Password and MAC address
5. Service Tag, Express Service Code, QR code

System information labels

The system information label is on the back of the system cover.

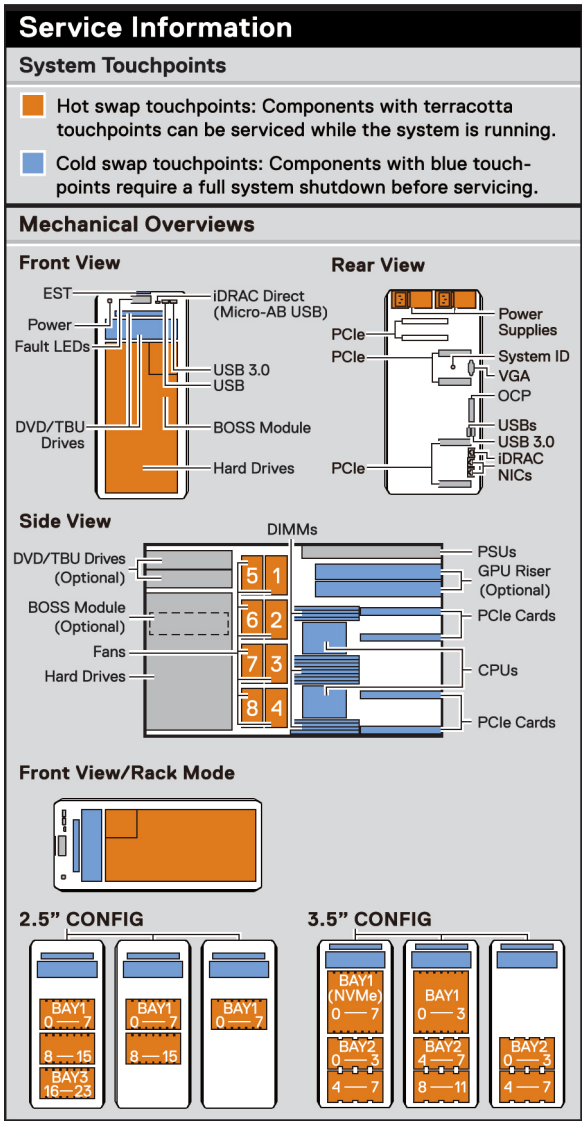


Figure 11. Service information

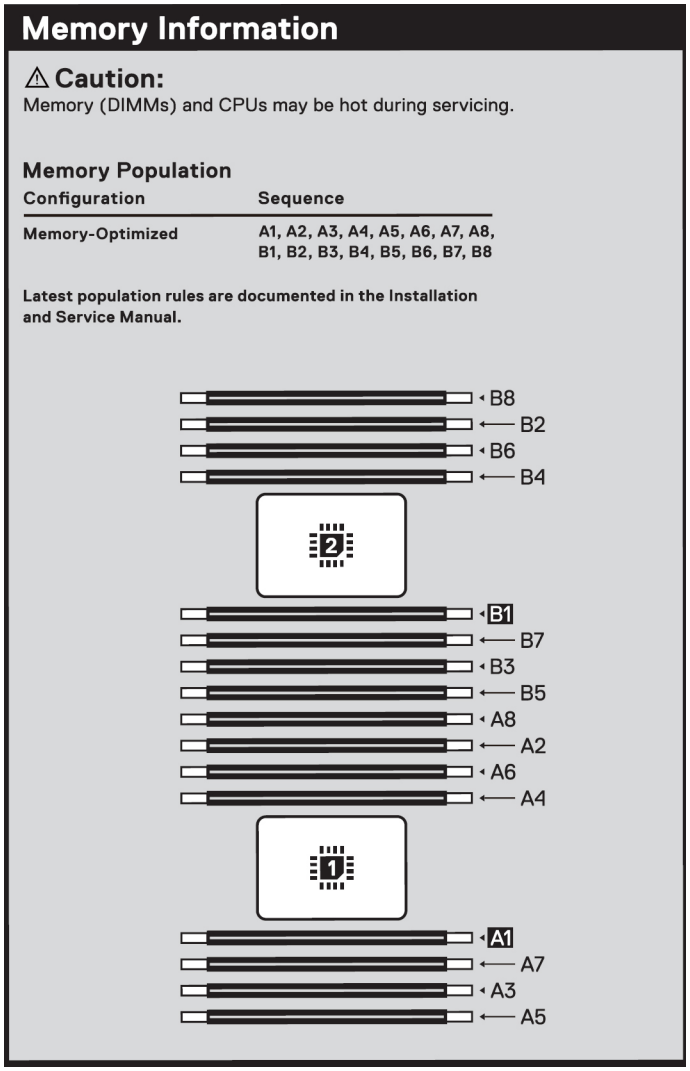


Figure 12. Memory information

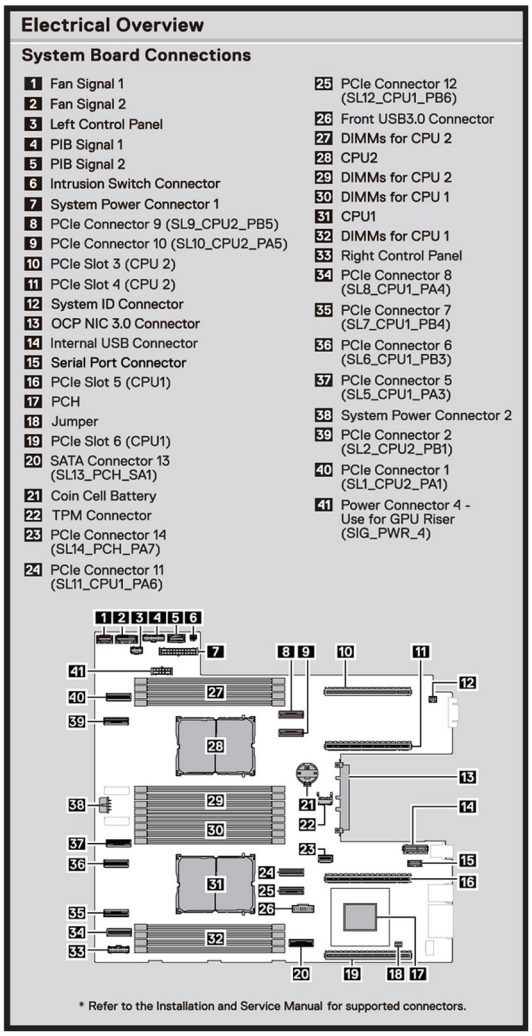


Figure 13. Electrical overview

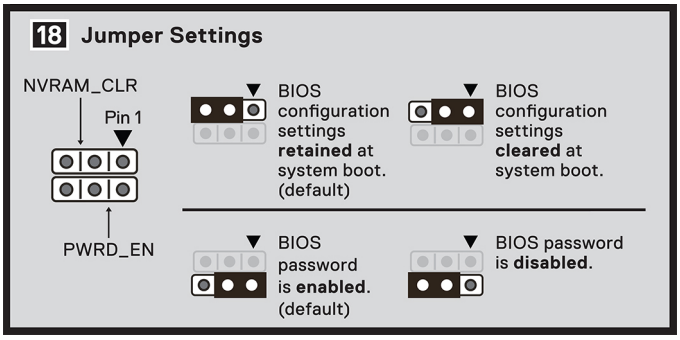


Figure 14. Jumper settings

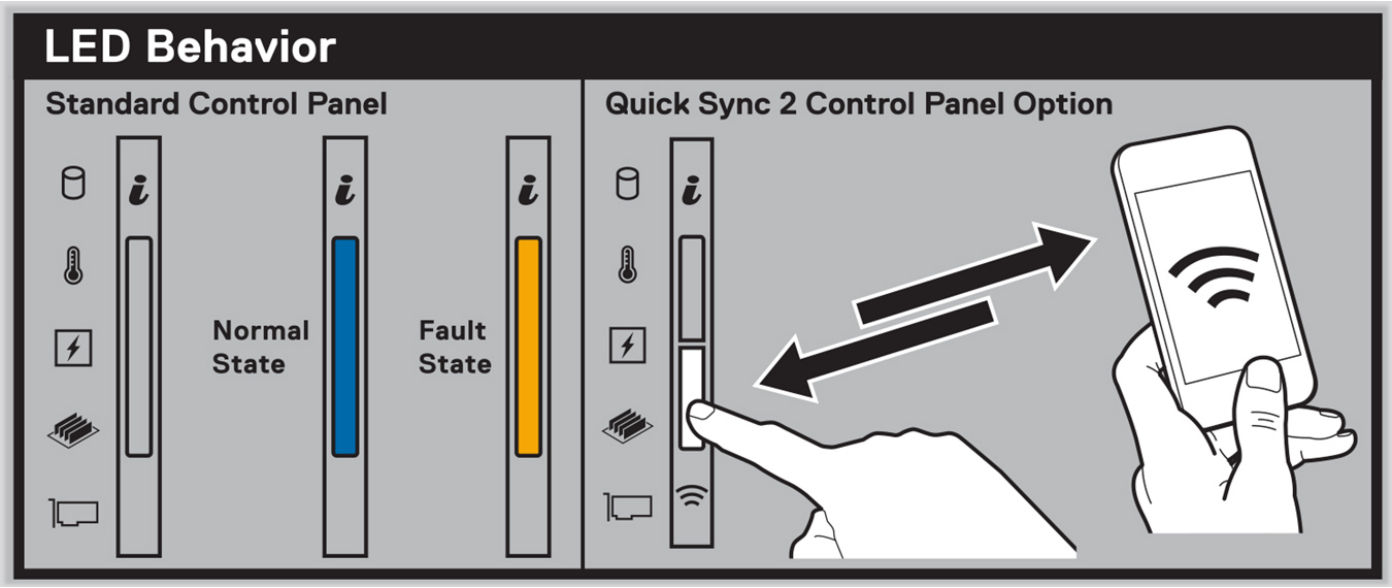


Figure 15. LED behavior

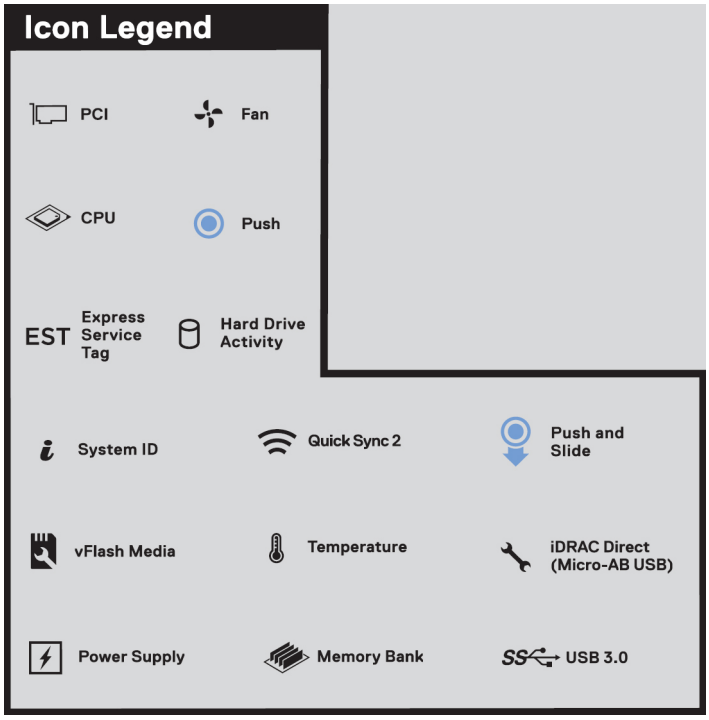
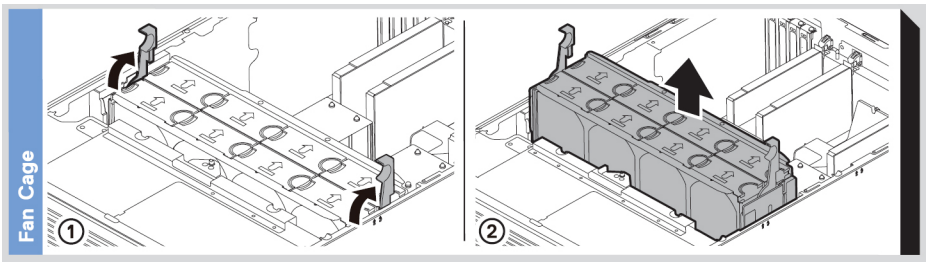
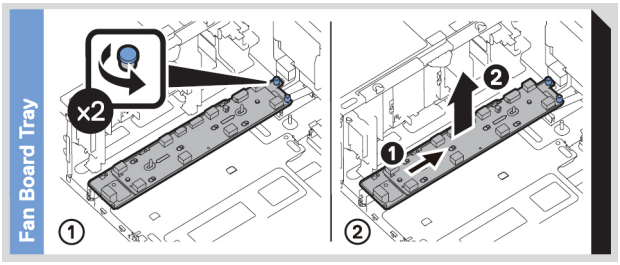
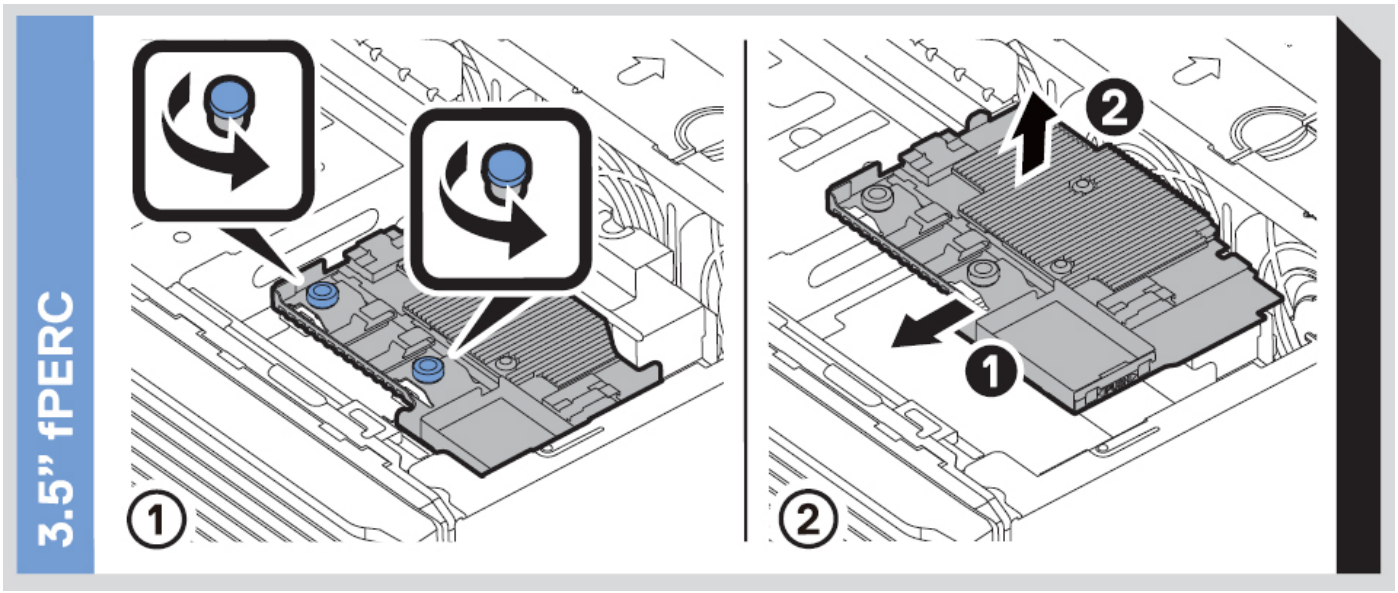
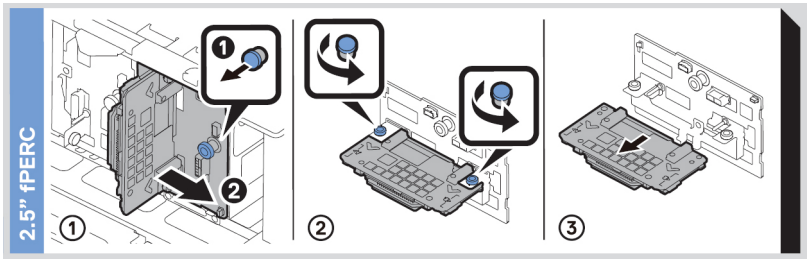


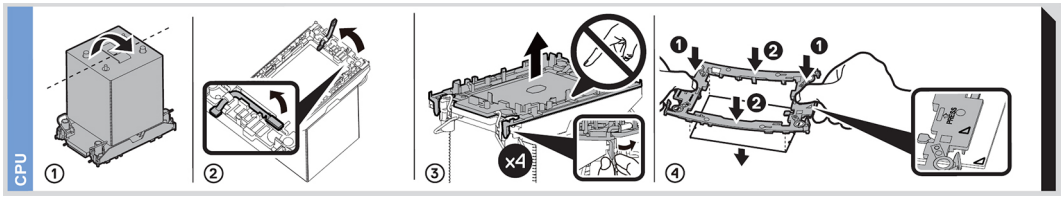
Figure 16. Icon legend

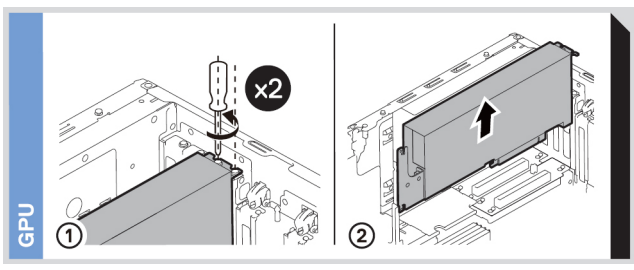

Fan Cage
1
2

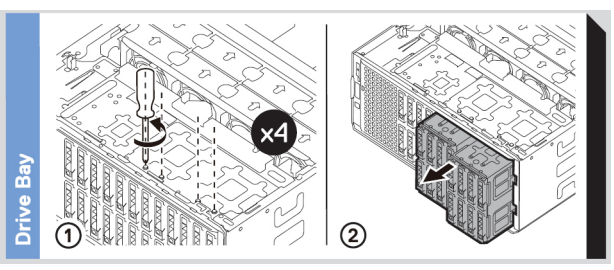

Fan Board Tray
×2
1
2
1
2


3.5” fPERC
1
2
1
2


2.5” fPERC
1
2
1
2
3


CPU
1
2
3
×4
4


GPU
×2
1
2


Drive Bay
×4
1
2

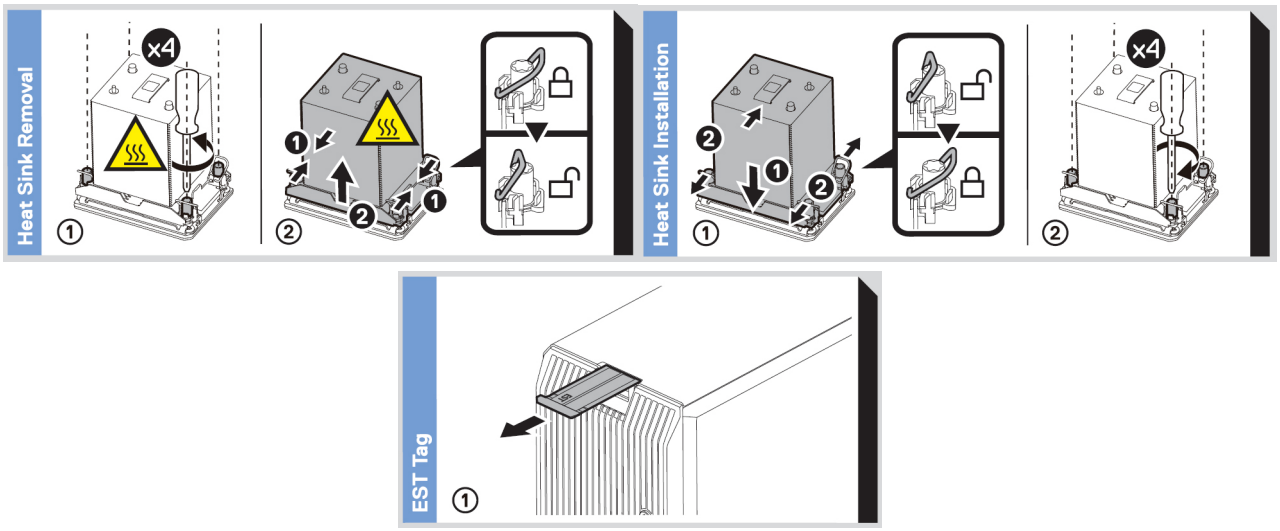


Figure 17. System tasks

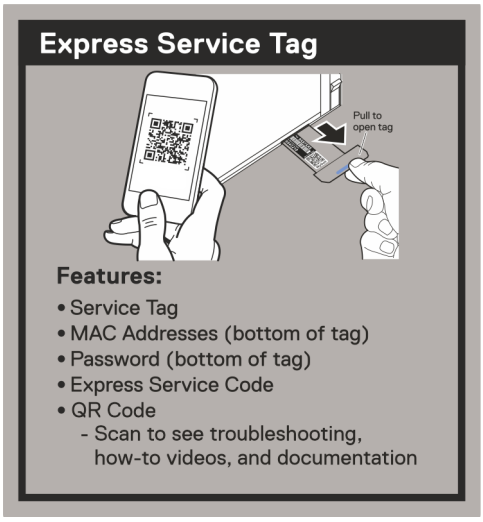


Figure 18. Express service tag

3

Technical specifications

The technical and environmental specifications of your system are outlined in this section.

Topics:

- Chassis dimensions
- System weight
- Processor specifications
- PSU specifications
- Cooling fan specifications
- Supported operating systems
- System battery specifications
- Expansion card riser specifications
- Memory specifications
- Storage controller specifications
- Drives
- GPU specifications
- Ports and connectors specifications
- Video specifications
- Environmental specifications

Chassis dimensions

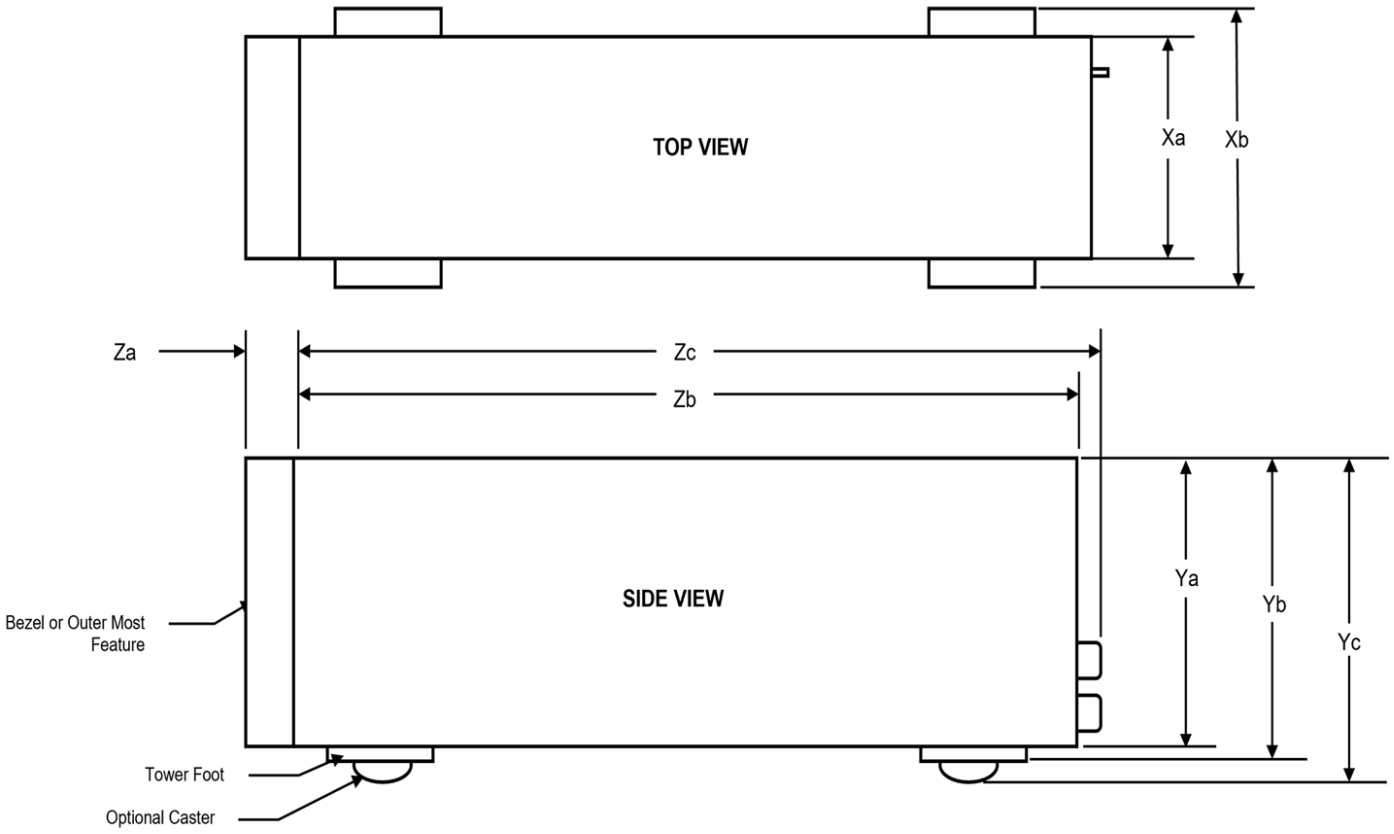


Figure 19. Chassis dimensions

Table 8. Chassis dimension for the system

Drives	Xa	Xb	Ya	Yb	Yc	Za (with bezel)	Zb	Zc
12 x 3.5-inch SAS/SATA HDD	200.0 mm (7.87 inches)	293.0 mm (11.53 inches)	446.0 mm (17.55 inches)	464.0 mm (18.26 inches)	508.8 mm (20.03 inches)	17.6 mm (0.69 inches)	660.6 mm (26.00 inches)	695.5 mm (27.38 inches)

System weight

Table 9. PowerEdge T560 system weight

System configuration	Maximum weight (with all drives/SSDs)
12 x 3.5-inch (SAS/SATA)	48 kg (107.32 pound)
8 x 3.5-inch (SAS/SATA)	43.16 kg (95.15 pound)
8 x 3.5-inch (SAS/SATA) + 8 x 2.5-inch NVMe	46.84 kg (103.26 pound)
8 x 2.5-inch (SAS/SATA)	39.40 kg (86.86 pound)
16 x 2.5-inch (SAS/SATA)	42.02 kg (92.63 pound)
24 x 2.5-inch (SAS/SATA)	44.64 kg (98.41 pound)

Processor specifications

Table 10. PowerEdge T560 processor specifications

Supported processors	Number of processors supported
4th or 5th Generation Intel ® Xeon Scalable processors	Up to two

PSU specifications

The PowerEdge T560 system supports up to two AC or DC power supply units (PSUs).

Table 11. PSU specifications

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	AC Voltage			DC Voltage			Current (A)
				100–120 V	200–240 V	277 V	240 V	336 V	-48—(-60) V	
600 W mixed mode	Platinum	2250	50/60	600 W	600 W	N/A	N/A	N/A	N/A	7.1 - 3.6
	N/A		N/A	N/A	N/A	N/A	600 W	N/A	N/A	2.9
700 W mixed mode HLAC	Titanium	2625	50/60	N/A	700 W	N/A	N/A	N/A	N/A	4.1
	N/A		N/A	N/A	N/A	N/A	700 W	N/A	N/A	3.4
800 W mixed mode	Platinum	3000	50/60	800 W	800 W	N/A	N/A	N/A	N/A	9.2 - 4.7
	N/A		N/A	N/A	N/A	N/A	800 W	N/A	N/A	3.8

Table 11. PSU specifications (continued)

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	AC Voltage			DC Voltage			Current (A)
				100–120 V	200–240 V	277 V	240 V	336 V	-48—(-60) V	
1100 W -48 V DC	N/A	4265	N/A	N/A	N/A	N/A	N/A	N/A	1100 W	27.0
1100 W mixed mode	Titanium	4125	50/60	1050 W	1100 W	N/A	N/A	N/A	N/A	12 - 6.3
	N/A		N/A	N/A	N/A	N/A	1100 W	N/A	N/A	5.2
1400 W mixed mode	Platinum	5250	50/60	1050 W	1400 W	N/A	N/A	N/A	N/A	12 - 8
	N/A		N/A	N/A	N/A	N/A	1400 W	N/A	N/A	6.6
	Titanium		50/60	1050 W	1400 W	N/A	N/A	N/A	N/A	12 - 8
	N/A		N/A	N/A	N/A	N/A	1400 W	N/A	N/A	6.5
1400 W 277 Vac and HVDC	Titanium	5250	50/60	N/A	N/A	1400 W	N/A	N/A	N/A	5.8
		5250	N/A	N/A	N/A	N/A	N/A	1400 W	N/A	5.17
1800 W mixed mode HLAC	Titanium	6610	50/60	N/A	1800 W	N/A	N/A	N/A	N/A	10.0
	N/A		N/A	N/A	N/A	N/A	1800 W	N/A	N/A	8.2
2400 W mixed mode	Platinum	9000	50/60	1400 W	2400 W	N/A	N/A	N/A	N/A	16 - 13.5
	N/A		N/A	N/A	N/A	N/A	2400 W	N/A	N/A	11.2
2800 W mixed mode HLAC	Titanium	10500	50/60	N/A	2800 W	N/A	N/A	N/A	N/A	15.6
			N/A	N/A	N/A	N/A	2800 W	N/A	N/A	13.6

NOTE: If a system with AC 1400W/1100W PSUs operates at low line 100-120 V AC, then the power rating per PSU is derated to 1050 W.

NOTE: If a system with AC 2400 W PSUs operates at low line 100-120 V AC, then the power rating per PSU is derated to 1400 W.

NOTE: Heat dissipation is calculated using the PSU wattage rating.

NOTE: When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Dell Energy Smart Solution Advisor available at **Dell.com/ESSA**.

NOTE: The input voltage for the 1400 W mixed mode PSU is 277 V AC (249 V AC - 305 V AC) and 336 V DC (260 V DC - 400 V DC).

Figure 20. PSU power cord connectors

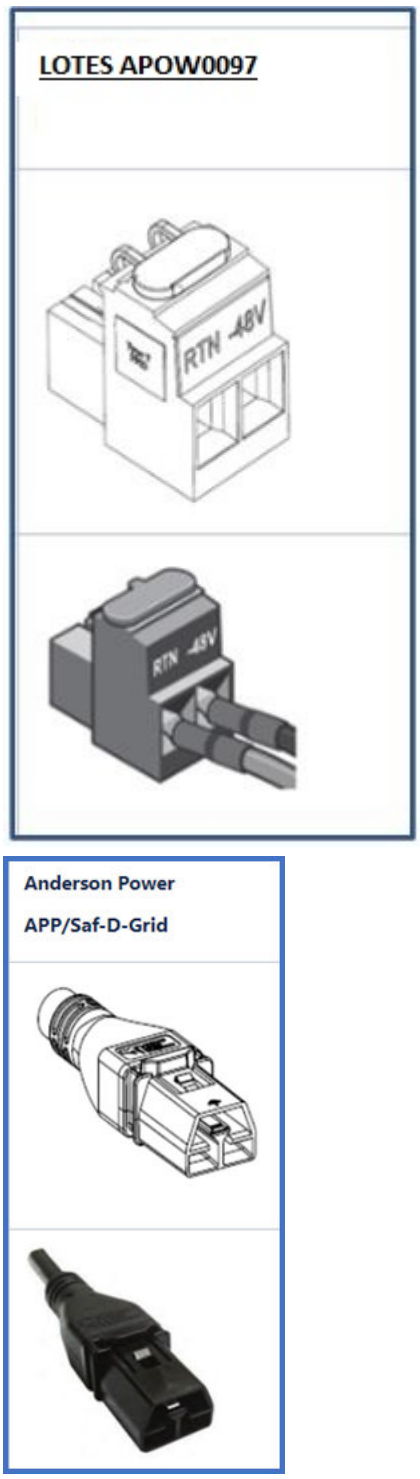


Figure 21. Types of PSU power cords

Table 12. PSU power cables

Form factor	Output	Power cord
Redundant 60 mm	600 W mixed mode	C13
	700 W mixed mode HLAC	
	800 W mixed mode	
	1100 W mixed mode	

Table 12. PSU power cables (continued)

Form factor	Output	Power cord
	1400 W mixed mode	
	1100 W -48 V DC	LOTES APOW0097
	1400W 277Vac and HVDC	APP 2006G1
	1800 W mixed mode HLAC	C15
Redundant 86 mm	2400 W mixed mode	C19
	2800 W mixed mode HLAC	C21

NOTE: C13 power cable combined with C14 to C15 jumper power cable can be used to adapt 1800 W PSU.

Cooling fan specifications

The Dell PowerEdge T560 system supports up to eight standard (STD) or High Performance (HPR) cooling fans that are connected to the system board directly.

Table 13. Cooling fan specifications

Fan type	Abbreviation	Also known as	Label color	Label image
Standard fan	STD	STD - Standard	N/A	
High Performance (HPR) fan	HPR	HPR - High Performance	N/A	

Supported operating systems

The PowerEdge T560 system supports the following operating systems:

- Canonical Ubuntu Server LTS
- Microsoft Windows Server with Hyper-V
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi

For more information, go to OS support.

System battery specifications

The PowerEdge T560 system uses one CR 2032 3.0-V lithium coin cell battery.

Expansion card riser specifications

The PowerEdge T560 system supports up to four PCIe x16 slots (3 Gen4 with x16 lanes, 1 Gen4 x16 slot with x8 lanes) on the system board. Additionally, the system supports two Gen5 x16 GPU riser slots.

Table 14. Expansion card slots supported on the system board

PCIe slot	Expansion card riser	Processor connection	Height	Length	Slot width
Slot 1	GPU riser	Processor 2	Full Height	Full Length	x16
Slot 2	GPU riser	Processor 1	Full Height	Full Length	x16
Slot 3	NA	Processor 2	Full Height	Half Length	x16
Slot 4	NA	Processor 2	Full Height	Half Length	x16
Slot 5	NA	Processor 1	Full Height	Half Length	x16 (with x8 lanes)
Slot 6	NA	Processor 1	Full Height	Half Length	x16

Memory specifications

The PowerEdge T560 system supports the following memory specifications for optimized operation.

Table 15. Memory specifications for 4 th Generation Intel ® Xeon Scalable processors

DIMM type	DIMM rank	DIMM capacity	Single processor		Dual processors	
			Minimum system capacity	Maximum system capacity	Minimum system capacity	Maximum system capacity
DDR5 RDIMM	Single rank	16 GB	16 GB	128 GB	32 GB	256 GB
	Dual rank	32 GB	32 GB	256 GB	64 GB	512 GB
		64 GB	64 GB	512 GB	128 GB	1 TB

Table 16. Memory module sockets

Memory module sockets	Rated DIMM Speed
16, 288-pin	4000 MT/s, 4400 MT/s, 4800 MT/s

NOTE: Memory DIMM slots are not hot pluggable.

NOTE: The processor may reduce the performance of the rated DIMM speed.

Table 17. Memory specifications for 5 th Generation Intel ® Xeon Scalable processors

DIMM type	DIMM rank	DIMM capacity	Single processor		Dual processors	
			Minimum system capacity	Maximum system capacity	Minimum system capacity	Maximum system capacity
DDR5 RDIMM	Single rank	16 GB	16 GB	128 GB	32 GB	256 GB
	Dual rank	32 GB	32 GB	256 GB	64 GB	512 GB
		64 GB	64 GB	512 GB	128 GB	1 TB
		96 GB	96 GB	768 TB	192 GB	1.5 TB

Table 18. Memory module sockets

Memory module sockets	Rated DIMM Speed
16, 288-pin	4000 MT/s, 4400 MT/s, 4800 MT/s, 5200 MT/s, 5600 MT/s

NOTE: Memory DIMM slots are not hot pluggable.

NOTE: The processor may reduce the performance of the rated DIMM speed.

Storage controller specifications

The PowerEdge T560 system supports the following controller cards:

Table 19. Storage controller cards

Supported storage controller cards
Internal controllers • HBA465i fPERC • HBA355i fPERC • H355 fPERC • H755 fPERC • H755N fPERC • H965i fPERC
External controllers • HBA355e
Internal Boot • Boot Optimized Storage Subsystem (BOSS-N1): HWRAID 0/1 (2x M.2 NVMe SSDs)
Software RAID • S160
SAS Hot Bus Adapters (HBA) • 22.5 Gbps SAS Ext. HBA

Drives

The PowerEdge T560 system supports:

- Up to 12 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/SATA HDD drives
- Up to 8 x 3.5-inch SAS/ SATA HDD + 8 x 2.5-inch NVMe SSD drives
- Up to 8 x 2.5-inch SAS/SATA HDD drives
- Up to 16 x 2.5-inch SAS/SATA HDD drives
- Up to 24 x 2.5-inch SAS/SATA HDD drives

NOTE: For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at Dell Support page >**Browse all Products** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Documentation** > **Manuals and Documents**.

GPU specifications

The PowerEdge T560 system supports one of the following GPU configurations:

- Up to two 300 W double-width GPUs on PCIe slot 1.
- Up to six 75 W single-width GPUs on PCIe slot 2.

NOTE: Systems that are configured with GPUs have higher fan acoustics.

Ports and connectors specifications

NIC port specifications

The PowerEdge T560 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) and integrated on the optional Open Compute Project (OCP) cards.

Table 20. NIC port specification for the system

Feature	Specifications
LOM on Planar	2 x 1 GbE
OCP card	1 x OCP x8 3.0

Serial connector specifications

The PowerEdge T560 system supports one serial port on the system board, which is Data Terminal Equipment (DTE), 16550-compliant .

The serial connector is installed as default on the system board.

Ports specifications

Table 21. PowerEdge T560 port specifications

Front		Rear		Internal (Optional)	
Port type	**No. of ports**	**Port type**	**No. of ports**	**Port type**	**No. of ports**
1 x USB 2.0-compliant port	One	1 x Dedicated iDRAC (RJ45) port	One	Internal USB 3.0-compliant port	One
1 x USB 3.0-compliant port	One	1 x USB 2.0-compliant port	One		
1 x iDRAC Direct (Micro-AB USB) port	One	1 x USB 3.0-compliant port	One		
		DB-15 VGA port	One		

NOTE: The micro USB 2.0 compliant port can only be used as an iDRAC Direct or a management port.

Video specifications

The PowerEdge T560 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 22. Supported video resolution options

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32

Table 22. Supported video resolution options (continued)

Resolution	Refresh rate (Hz)	Color depth (bits)
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

Environmental specifications

NOTE: For additional information about environmental certifications, refer to the *Product Environmental Datasheet* located with the *Documentation* on Dell Support.

Table 23. Continuous Operation Specifications for ASHRAE A2

Description	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (33.8°F/984 Ft) above 900 m (2953 Ft)

Table 24. Continuous Operation Specifications for ASHRAE A3

Description	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (33.8°F/574 Ft) above 900 m (2953 Ft)

Table 25. Continuous Operation Specifications for ASHRAE A4

Description	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft)

Table 26. Continuous Operation Specifications for Rugged Environment

Description	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–55°C (41–131°F) with no direct sunlight on the equipment

Table 26. Continuous Operation Specifications for Rugged Environment (continued)

Description	Allowable continuous operations
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft)

Table 27. Common Environmental Specifications for ASHRAE A2, A3, A4 and Rugged

Description	Allowable continuous operations
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-104 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,048 meters (10,000 feet)

Table 28. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26 G_{rms} at 5 Hz to 350 Hz (all operation orientations)
Storage	1.88 G_{rms} at 10 Hz to 500 Hz for 15 minutes (all six sides tested)

Table 29. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms.
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axis (one pulse on each side of the system) of 71 G for up to 2 ms.

Particulate and gaseous contamination specifications

The following table defines the limitations that help avoid any equipment damage or failure from particulates and gaseous contamination. If the levels of particulates or gaseous pollution exceed the specified limitations and result in equipment damage or failure, you must rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 30. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration: Conventional Data Center only	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit **NOTE:** Filtering room air with a MERV8 filter, as specified in ANSI/ASHRAE Standard 127, is a recommended method for achieving the necessary environmental conditions. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration. **NOTE:** This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be

Table 30. Particulate contamination specifications (continued)

Particulate contamination	Specifications
	used outside a data center, in environments such as an office or factory floor.
Walk-Up Edge Data Center or Cabinet (sealed, closed loop environment)	Filtration is not required for cabinets that are anticipated to be opened six times or less per year. Class 8 per ISO 1466-1 filtration as defined above is required otherwise. **NOTE:** In environments commonly above ISA-71 Class G1 or that may have known challenges, special filters may be required.
Conductive dust: data center and non-data center environments	Air must be free of conductive dust, zinc whiskers, or other conductive particles. **NOTE:** Conductive dust, which can interfere with equipment operation, can originate from various sources, including manufacturing processes and zinc whiskers that may develop on the plating of raised floor tiles. **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust: data center and non-data center environments	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. **NOTE:** This condition applies to data center and non-data center environments.

Table 31. Gaseous contamination specifications

Gaseous contamination	Specifications	Notes
Copper coupon corrosion rate	ISA-71 Class G1: <300 Å/month	Per ANSI/ISA71.04
Silver coupon corrosion rate	ISA-71 Class G1: <200 Å/month	Per ANSI/ISA71.04

Thermal restriction matrix

Table 32. Processor and heat sink matrix

Heat sink	Processor TDP
STD HSK	≤ 150 W
HPR HSK	> 150 W

Table 33. Label reference

Label	Description
STD	Standard
HPR	High performance
HSK	Heat sink

Table 34. Thermal restriction matrix

Drive Configuration	Processor	Fans	CPU TDP	Fan redundancy	CPU HSK		GPU support		TBU support	GPU riser configuration
					TDP>150 W	TDP<=150 W	GPU<=75 W	GPU>75 W		
8 x 3.5	1	STDx3	<=185	No	HPR HSK	STD HSK	No	No	No	Riser 0,2
	1 or 2	STDx4	<=185	No			No	No	No	Riser 0,1,2
	1 or 2	STDx8	<=250	Yes			No	No	No	Riser 0,1,2
	1 or 2	HPRx4	<=250	No			Yes/No	No	No	Riser 0,1,2
	1 or 2	*HPRx7	<=250	Yes			***Yes/No	No	Yes	Riser 0
				**No			** Yes /No	**Yes	Yes	Riser 1,2
	1 or 2	HPRx8	<=250	Yes			Yes/No	Yes	No	Riser 1,2
12x3.5 & ****8x2.5 16x2.5 24x2.5	1 or 2	STDx4	<=185	No	HPR HSK	STD HSK	No	No	No	Riser 0,1,2
	1 or 2	STDx8	<=250	Yes			No	No	No	Riser 0,1,2
	1 or 2	HPRx4	<=250	No			Yes/No	No	No	Riser 0,1,2
	1 or 2	*HPRx7	<=250	Yes			***Yes/No	No	Yes	Riser 0
				**No			** Yes /No	** Yes	Yes	Riser 1,2
	1 or 2	HPRx8	<=250	Yes			Yes/No	Yes	No	Riser 1,2
8 x 3.5 + 8 x 2.5 (NVMe)	1 or 2	HPRx4	<=250	No	HPR HSK	STD HSK	Yes/No	No	No	Riser 0,1,2
	1 or 2	*HPRx7	<=250	Yes			*** Yes/No	No	Yes	Riser 0
				**No			** Yes /No	** Yes	Yes	Riser 1,2
	1 or 2	HPRx8	<=250	Yes			Yes/No	Yes	No	Riser 1,2

NOTE: STD and HPR fans support DIMM capacity of less than or equal to 64 GB. Memory capacity of greater than/equal to 96 GB or less than/equal to 128 GB is supported by HPR fan only.

NOTE: *HPRx7 counts are only for with TBU configuration. System without TBU configuration does not support HPRx7 counts.

NOTE: **HPRx7 with TBU configuration:

- Riser 1 does not support GPU >75W. GPU <75W support Nvidia A2 and does not support Nvidia L4..
- Riser 2 GPU <75 W supports Nvidia A2 and Nvidia L4. For GPU >150 W supports Nvidia A30 (165 W) only.
- Fan redundance is not supported with riser installed.

NOTE: ***HPRx7 with TBU configuration supports fan redundancy when GPUs <75W are installed on PCIe slot 3,4,5,6.

NOTE: **** SAS4 configuration requires minimum STDx8 fans.

Table 35. Thermal matrix for all configurations

System Configuration		Configuration 1: 8 x 2.5-inch, 16 x 2.5-inch and 24 x 2.5-inch SAS/SATA				Configuration 2: 8x3.5-inch SAS/SATA				Configuration 3: 8x3.5-inch + 8 x NVMe		Configuration 4: 12 x 3.5-inch SAS/SATA			
Fan		STD	STD	HPR	HPR	STD	STD	HPR	HPR	HPR	HPR	STD	STD	HPR	HPR
Fan count		x4	x8	x4	x8	x3, x4	x8	x4	x8	x4	x8	x4	x8	x4	x8
CPU TDP	125 W	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK
	135 W	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK
	150 W	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK	STD HSK
	165 W	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK
	185 W	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK
	205 W	Not Supported: Requires < 25°C	HPR HSK	HPR HSK	HPR HSK	Not Supported: Requires < 25°C	HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK	Not Supported: Requires < 25°C	HPR HSK	HPR HSK	HPR HSK
			HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK
	225 W		HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK
	250 W		HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK	HPR HSK	HPR HSK		HPR HSK	HPR HSK	HPR HSK

Table 36. GPU thermal restriction matrix

GPU TDP	Supported GPU	Fan configuration	Maximum supported quantity	Note
300 W	Nvidia A40, L40	HPRx8	2	NA
165 W	Nvdia A30	HPRx8	2	NA
		HPRx7 (with TBU only)	1	Only supported on Riser 2 and does not support fan redundancy.
< 75 W	Nvidia A2	HPRx8	6	NA

Table 36. GPU thermal restriction matrix (continued)

GPU TDP	Supported GPU	Fan configuration	Maximum supported quantity	Note
		HPRx7 (with TBU only)	6	Does not support fan redundancy when installed on Riser
		HPRx4	6	Does not support fan redundancy
	Nvidia L4	HPRx8	5	NA
		HPRx7 (with TBU only)	4	Only supported on Riser 2 and does not support fan redundancy.
		HPRx4	4	Does not support fan redundancy

NOTE: Nvidia L4 GPU is not supported on Riser 1 in HPRx7 and HPRx4 configurations due to thermal constraint and is not supported at PCIe slot 5 as Nvidia L4 is a PCIe x16 GPU card.

Thermal air restrictions

Thermal air restrictions for different configurations

Table 37. 8 x 3.5-inch drive configuration

Standard Operating Support (ASHRAE A2 compliant) **NOTE:** All options supported unless otherwise noted.	Extended ambient 40° C Operating Support (ASHRAE A3 compliant)	Extended ambient 45° C Operating Support (ASHRAE A4 compliant)

• 3x or 4x STD Fan config only support CPU Base TDP<=185W
• 3x STD Fans config does Does not support BOSS module
• HPR fan is required to support 96GB <= DDR5 DIMM <= 128GB
• With STD Fans, the following OCP3.0 & PCIe cards only support optic cable with thermal Spec 85C and power <=1.2W
  ○ Mellanox CX6 Lx 25GB 2P PCIe card
  ○ Broadcom 25GB 4P SPF 57504 PCIe card
  ○ Intel 25GB 4P E810-CCV PCIe card
  ○ Intel 25GB 2P XXV710 PCIe card
  ○ Intel 25GB 4P E810-XXV OCP card
	• Two PSUs are required. System performance may be reduced in the event of a PSU failure
	• Does not support 3x or 4x STD Fans configs
	• Does not support 8x STD fans configurations with CPU Base TDP > 125W
	• HPRx8 Fans configuration is required to support BOSS M.2 Module
	• Does not support TBU
	• Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards
	• Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card
	• Does not support OCP transfer rate >25G or cooling tier > 10
	• Does not support GPU card
	• Optic Cable with spec 85C is required.
		• Two PSUs are required. System performance may be reduced in the event of a PSU failure
		• Does not support STD fans configs
		• Does not support 4x HPR fans config with CPU Base TDP > 150W
		• Does not support 8x HPR fans configs with CPU Base TDP > 225W
		• Does not support TBU
		• Does not support BOSS M.2 Module
		• Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards
		• Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card
		• Does not support OCP transfer rate >25G or cooling tier > 10
		• Does not support GPU card
		• Optic Cable with spec 85C is required.

Table 38. 8 x 2.5-inch, 16 x 2.5-inch, 24 x 2.5-inch and 12 x 3.5-inch drive configuration

Standard Operating Support (ASHRAE A2 compliant)	Extended ambient 40° C Operating Support (ASHRAE A3 compliant)	Extended ambient 45° C Operating Support (ASHRAE A4 compliant)

• 4x STD fans support only processor with TDP<=185W
• Does not support 2.5" SAS4 drives with STDx4 Fans
• With STD Fans, the following OCP3.0 & PCIe cards only support optic cable with thermal Spec 85C and power <=1.2W
  ○ Mellanox CX6 Lx 25GB 2P PCIe card
  ○ Broadcom 25GB 4P SPF 57504 PCIe card
  ○ Intel 25GB 4P E810-CCV PCIe card
  ○ Intel 25GB 2P XXV710 PCIe card
  ○ Intel 25GB 4P E810-XXV OCP card
  ○ HPR fan is required to support 96GB <= DDR5 DIMM <= 128GB
	• Two PSUs are required. System performance may be reduced in the event of a PSU failure
	• Does not support 3x or 4x STD Fans configs
	• Does not support 8x STD fans configurations with CPU Base TDP > 125W
	• HPRx8 Fans configuration is required to support BOSS M.2 Module
	• Does not support TBU
	• Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards
	• Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card
	• Does not support OCP transfer rate >25G or cooling tier > 10
	• Does not support GPU card
	• Optic Cable with spec 85C is required.
		• Two PSUs are required. System performance may be reduced in the event of a PSU failure
		• Does not support STD fans configs
		• Does not support 4x HPR fans config with CPU Base TDP > 150W
		• Does not support 8x HPR fans configs with CPU Base TDP > 225W
		• Does not support TBU
		• Does not support BOSS M.2 Module
		• Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards
		• Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card
		• Does not support OCP transfer rate >25G or cooling tier > 10
		• Does not support GPU card
		• Optic Cable with spec 85C is required.

Table 39. 8 x 3.5-inch + 8 x 2.5-inch NVMe drive configuration

Standard Operating Support (ASHRAE A2 compliant)	Extended ambient 40° C Operating Support (ASHRAE A3 compliant)	Extended ambient 45° C Operating Support (ASHRAE A4 compliant)
HPR fans are required.	• Two PSUs are required • System performance may be reduced in the event of a PSU failure • Does not support TBU • HPRx8 Fans configuration is required to support BOSS M.2 Module • Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards • Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card • Does not support OCP transfer rate >25G or cooling tier > 10 • Does not support GPU card • Optic Cable with spec 85C is required	• Two PSUs are required. System performance may be reduced in the event of a PSU failure • Does not support 4x HPR fans config with CPU Base TDP > 150W • Does not support 8x HPR fans configs with CPU Base TDP > 225W • Does not support TBU • Does not support BOSS M.2 Module • Does not support Non-Dell qualified peripheral cards and Channel devices (FW) cards • Does not support PCIe card consuming power >= 25W and Mellanox CX6 Lx 25GB 2P PCIe card • Does not support OCP transfer rate >25G or cooling tier > 10 • Does not support GPU card • Optic Cable with spec 85C is required.

4

Initial system setup and configuration

This section describes the tasks for initial setup and configuration of the Dell system. The section also provides general steps to set up the system and the reference guides for detailed information.

Topics:

- Setting up the system
- iDRAC configuration
- Resources to install operating system

Setting up the system

Perform the following steps to set up the system:

Steps

Unpack the system.

iDRAC configuration

The Integrated Dell Remote Access Controller (iDRAC) is designed to make you more productive as a system administrator and improve the overall availability of Dell servers. iDRAC alerts you to system issues, helps you to perform remote management, and reduces the need for physical access to the system.

Options to set up iDRAC IP address

To enable communication between your system and iDRAC, you must first configure the network settings based on your network infrastructure. The network settings option is set to **DHCP**, by default.

NOTE: For static IP configuration, you must request for the settings at the time of purchase.

You can set up the iDRAC IP address using one of the interfaces in the table below. For information about setting up iDRAC IP address, see the documentation links provided in the table below.

NOTE: To access iDRAC, ensure that you connect the ethernet cable to the iDRAC dedicated network port or use the iDRAC Direct port by using the micro USB (type AB) cable.

Options to log in to iDRAC

To log in to the iDRAC Web User Interface, open a browser and enter the IP address.

You can log in to iDRAC as:

- iDRAC user
- Microsoft Active Directory user
- Lightweight Directory Access Protocol (LDAP) user

In the login screen displayed, if you have opted for secure default access to iDRAC, the default username is `root` and enter the iDRAC secure default password available on back of the Information Tag. If you opted for legacy password, use the iDRAC legacy username and password - `root` and `calvin`, the iDRAC default password will be blank on the information tag. Then you will be prompted and required to create a password of your choice before proceeding. You can also log in by using your Single Sign-On or Smart Card.

NOTE: Ensure that you change the default username and password after setting up the iDRAC IP address.

For more information about logging in to the iDRAC and iDRAC licenses, see the latest Integrated Dell Remote Access Controller User's Guide

NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article KB78115.

You can also access iDRAC using command-line protocol - RACADM. For more information, see the Integrated Dell Remote Access Controller RACADM CLI Guide .

You can also access iDRAC using automation tool - Redfish API. For more information, see the Integrated Dell Remote Access Controller User's Guide Redfish API Guide.

Resources to install operating system

If the system is shipped without an operating system, you can install a supported operating system by using one of the resources provided in the table below. For information about how to install the operating system, see the documentation links provided in the table below.

Table 40. Resources to install the operating system

Resource	Documentation links
iDRAC	Integrated Dell Remote Access Controller User's Guideor for system specific Integrated Dell Remote Access Controller User's Guide, go to PowerEdge Manuals > **Product Support** page of your system > **Documentation**. **NOTE:** To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at KB78115.
Lifecycle Controller	Dell Lifecycle Controller User's Guide at iDRAC Manualsor for system specific Dell Lifecycle Controller User's Guide , go to PowerEdge Manuals > **Product Support** page of your system > **Documentation**. Dell recommends using Lifecycle Controller to install the OS, since all required drivers are installed on the system. **NOTE:** To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at KB78115.
OpenManage Deployment Toolkit	OpenManage Manuals > OpenManage Deployment Toolkit
Dell certified VMware ESXi	Virtualization solutions

NOTE: For more information about installation and how-to videos for operating systems supported on PowerEdge systems, see Supported Operating Systems for Dell PowerEdge systems.

Options to download drivers and firmware

You can download the firmware from the Dell support site. For information about downloading firmware, see the Downloading drivers and firmware section.

You can also choose any one of the following options to download the firmware. For information about how to download the firmware, see the documentation links provided in the table below.

Table 41. Options to download firmware

Option	Documentation link
Using Integrated Dell Remote Access Controller Lifecycle Controller (iDRAC with LC)	iDRAC Manuals
Using Dell Repository Manager (DRM)	OpenManage Manuals
Using Dell Server Update Utility (SUU)	OpenManage Manuals

Table 41. Options to download firmware (continued)

Option	Documentation link
Using Dell OpenManage Deployment Toolkit (DTK)	OpenManage Manuals
Using iDRAC virtual media	iDRAC Manuals

Options to download and install OS drivers

You can choose any one of the following options to download and install OS drivers. For information about how to download or install OS drivers, see the documentation links provided in the table below.

Table 42. Options to download and install OS drivers

Option	Documentation
Dell support site	Downloading drivers and firmware section.
iDRAC virtual media	Integrated Dell Remote Access Controller User's Guide or for system specific, go to Integrated Dell Remote Access Controller User's Guide > **Product Support** page of your system > **Documentation** . **NOTE:** To determine the most recent iDRAC release for your platform and for latest documentation version, see Integrated Dell Remote Access Controller Release Notes.

Downloading drivers and firmware

It is recommended that you download and install the latest BIOS, drivers, and systems management firmware on the system.

Prerequisites

Ensure that you clear the web browser cache before downloading the drivers and firmware.

Steps

1. Go to Drivers.
2. Enter the Service Tag of the system in the **Enter a Dell Service Tag, Dell Product ID or Model** field, and then press Enter.

   NOTE: If you do not have the Service Tag, click **Browse all products**, and navigate to your product.

3. On the displayed product page, click **Drivers & Downloads**.
   On the **Drivers & Downloads** page, all drivers that are applicable to the system are displayed.
4. Download the drivers to a USB drive, CD, or DVD.

5

Pre-operating system management applications

You can manage basic settings and features of a system without booting to the operating system by using the system firmware.

Options to manage the pre-operating system applications

You can use any one of the following options to manage the pre-operating system applications:

- System Setup
- Dell Lifecycle Controller
- Boot Manager
- Preboot Execution Environment (PXE)

Topics:

- System Setup
- Dell Lifecycle Controller
- Boot Manager
- PXE boot

System Setup

Using the **System Setup** option, you can configure the BIOS settings, iDRAC settings, and device settings of the system.

You can access system setup by using any one of the following interfaces:

- Graphical User interface — To access go to iDRAC Dashboard, click **Configurations** > **BIOS Settings**.
- Text browser — To enable the text browser, use the Console Redirection.

To view **System Setup**, power on the system, press F2, and click **System Setup Main Menu**.

NOTE: If the operating system begins to load before you press F2, wait for the system to finish booting, and then restart the system and try again.

The options on the **System Setup Main Menu** screen are described in the following table:

Table 43. System Setup Main Menu

Option	Description
System BIOS	Enables you to configure the BIOS settings.
iDRAC Settings	Enables you to configure the iDRAC settings. The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI (Unified Extensible Firmware Interface). You can enable or disable various iDRAC parameters by using the iDRAC settings utility. For more information about this utility, see Integrated Dell Remote Access Controller User's Guide

Table 43. System Setup Main Menu (continued)

Option	Description
Device Settings	Enables you to configure device settings for devices such as storage controllers or network cards.
Service Tag Settings	Enables you to configure the System Service Tag.

System BIOS

To view the **System BIOS** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS**.

Table 44. System BIOS details

Option	Description
System Information	Provides information about the system such as the system model name, BIOS version, and Service Tag.
Memory Settings	Specifies information and options related to the installed memory.
Processor Settings	Specifies information and options related to the processor such as speed and cache size.
SATA Settings	Specifies options to enable or disable the embedded SATA controller and ports.
NVMe Settings	Specifies options to change the NVMe settings. If the system contains the NVMe drives that you want to configure in a RAID array, you must set both this field and the **Embedded SATA** field on the **SATA Settings** menu to **RAID** mode. You might also need to change the **Boot Mode** setting to **UEFI**. Otherwise, you should set this field to **Non-RAID** mode.
Boot Settings	Specifies options to specify the Boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.
Network Settings	Specifies options to manage the UEFI network settings and boot protocols. Legacy network settings are managed from the **Device Settings** menu. **NOTE:** Network Settings are not supported in BIOS boot mode.
Integrated Devices	Specifies options to manage integrated device controllers and ports, specifies related features, and options.
Serial Communication	Specifies options to manage the serial ports, its related features, and options.
System Profile Settings	Specifies options to change the processor power management settings, memory frequency.
System Security	Specifies options to configure the system security settings, such as system password, setup password, Trusted Platform Module (TPM) security, and UEFI secure boot. It also manages the power button on the system.
Redundant OS Control	Sets the redundant OS information for redundant OS control.
Miscellaneous Settings	Specifies options to change the system date and time.

System Information

To view the **System Information** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Information**.

Table 45. System Information details

Option	Description
System Model Name	Specifies the system model name.

Table 45. System Information details (continued)

Option	Description
System BIOS Version	Specifies the BIOS version installed on the system.
System Management Engine Version	Specifies the current version of the Management Engine firmware.
System Service Tag	Specifies the system Service Tag.
System Manufacturer	Specifies the name of the system manufacturer.
System Manufacturer Contact Information	Specifies the contact information of the system manufacturer.
System CPLD Version	Specifies the current version of the system Complex Programmable Logic Device (CPLD) firmware.
UEFI Compliance Version	Specifies the UEFI compliance level of the system firmware.

Memory Settings

To view the **Memory Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Memory Settings**.

Table 46. Memory Settings details

Option	Description
System Memory Size	Specifies the size of the system memory.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the speed of the system memory.
Video Memory	Specifies the size video memory.
System Memory Testing	Specifies whether the system memory tests are run during system boot. The two options available are **Enabled** and **Disabled**. This option is set to **Disabled** by default.
Memory Operating Mode	This field selects the memory operating mode. This feature is active only if a valid memory configuration is detected. When **Optimizer Mode** is enabled, the DRAM controllers operate independently in 64-bit mode and provide optimized memory performance. When **Dell Fault Resilient Mode (FRM)** is enabled, a percentage of the total installed memory is configured to create a fault resilient zone starting from lowest system memory address for use by select hypervisors for host virtualization resilience. Specify the FRM percentage by using the Fault Resilient Mode Memory Size[%] feature. When **Dell NUMA Fault Resilient Mode (FRM)** is enabled, a percentage of the installed memory in every NUMA node is configured to create a fault resilient zone for use by select hypervisors for host virtualization resilience. Specify the FRM percentage by using the Fault Resilient Mode Memory Size[%] feature.
Current State of Memory Operating Mode	Specifies the current state of the memory operating mode.
Fault Resilient Mode Memory Size[%]	Select to define the percent of total memory size that must be used by the fault resilient mode, when selected in the Memory Operating mode. When Fault Resilient Mode is not selected, this option is grayed out and not used by Fault Resilient Mode.
Node Interleaving	Enables or disables the Node interleaving option. Specifies if the Non-Uniform Memory Architecture (NUMA) is supported. If this field is set to **Enabled**, memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to **Disabled**, the system supports NUMA (asymmetric) memory configurations. This option is set to **Disabled** by default.
ADDDC Settings	Enables or disables ADDDC Setting feature. When Adaptive Double DRAM Device Correction (ADDDC) is enabled, failing DRAMs are dynamically

Table 46. Memory Settings details (continued)

Option	Description
	mapped out. When set to **Enabled** it can impact the system performance under certain workloads. This feature is applicable for x4 DIMMs only. This option is set to **Enabled** by default.
Memory training	When option is set to **Fast** and memory configuration is not changed, the system uses previously saved memory training parameters to train the memory subsystems and system boot time is also reduced. If memory configuration is changed, the system automatically enables **Retrain at Next boot** to force one-time full memory training steps, and then go back to **Fast** afterward. When option is set to **Retrain at Next boot**, the system performs the force one-time full memory training steps at next power on and boot time is slowed on next boot. When option is set to **Enable**, the system performs the force full memory training steps on every power on and boot time is slowed on every boot.
DIMM Self Healing (Post Package Repair) on Uncorrectable Memory Error	Enables or disables Post Packing Repair (PPR) on uncorrectable memory error. This option is set to **Enabled** by default.
Correctable Error Logging	Enables or disables correctable error logging. This option is set to **Disabled** by default.
Memory Paging Policy	This option sets Memory Paging Policy.
Memory Map Out	This option controls DIMMs slots on the system. This option is set to **Enabled** by default. It allows to disable system installed DIMMs.

Processor Settings

To view the **Processor Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Processor Settings**.

Table 47. Processor Settings details

Option	Description
Logical Processor	Each processor core supports up to two logical processors. If this option is set to **Enabled**, the BIOS displays all the logical processors. If this option is set to **Disabled**, the BIOS displays only one logical processor per core. This option is set to **Enabled** by default.
CPU Interconnect Speed	Enables you to govern the frequency of the communication links among the processors in the system. **NOTE:** The standard and basic bin processors support lower link frequencies. The options available are **Maximum data rate**, **16 GT/s**, **14.4 GT/s**, and **12.8 GT/s**. This option is set to **Maximum data rate** by default. Maximum data rate indicates that the BIOS runs the communication links at the maximum frequency supported by the processors. You can also select specific frequencies that the processors support, which can vary. For best performance, you should select **Maximum data rate**. Any reduction in the communication link frequency affects the performance of non-local memory access and cache coherency traffic.

Table 47. Processor Settings details (continued)

Option	Description
	In addition, it can slow access to non-local I/O devices from a particular processor. However, if power saving considerations outweigh performance, reduce the frequency of the processor communication links. Before reducing the frequency, you must localize the memory and I/O access to the nearest NUMA node to minimize the impact to system performance.
Virtualization Technology	Enables or disables the virtualization technology for the processor. This option is set to **Enabled** by default.
Kernel DMA Protection	This option is set to **Disabled** by default. When option is set to **Enabled**, BIOS and Operating System will enable direct memory access protection for DMA capable peripheral devices using virtualization technology.
Directory Mode	Enables or disables the directory mode. This option is set to **Enabled** by default.
Adjacent Cache Line Prefetch	Optimizes the system for applications that need high utilization of sequential memory access. This option is set to **Enabled** by default. You can disable this option for applications that need high utilization of random memory access.
Hardware Prefetcher	Enables or disables the hardware prefetcher. This option is set to **Enabled** by default.
DCU Streamer Prefetcher	Enables or disables the Data Cache Unit (DCU) streamer prefetcher. This option is set to **Enabled** by default.
DCU IP Prefetcher	Enables or disables the Data Cache Unit (DCU) IP prefetcher. This option is set to **Enabled** by default.
Sub NUMA Cluster	Enables or disables the Sub NUMA Cluster. This option is set to **Disabled** by default.
MADT Core Enumeration	Specifies the MADT Core Enumeration. This option is set to default in **Round Robin**. Linear option supports industry core enumeration whereas, Round Robin option supports Dell optimized core enumeration.
UMA Based Clustering	It is a read-only field and displays as **Quadrant** , when Sub NUMA Cluster is disabled or displays as **Disabled**, when Sub NUMA Cluster is either 2-way or 4-way.
UPI Prefetch	Enables you to get the memory read started early on DDR bus. The Ultra Path Interconnect (UPI) Rx path spawns the speculative memory that is read to Integrated Memory Controller (iMC) directly. This option is set to **Enabled** by default.
XPT Prefetch	This option is set to **Enabled** by default.
LLC Prefetch	Enables or disables the LLC Prefetch on all threads. This option is set to **Enabled** by default.
Dead Line LLC Alloc	Enables or disables the Dead Line LLC Alloc. This option is set to **Enabled** by default. You can enable this option to enter the dead lines in LLC or disable the option to not enter the dead lines in LLC.
Directory AtoS	Enables or disables the Directory AtoS. AtoS optimization reduces remote read latencies for repeat read accesses without intervening writes. This option is set to **Disabled** by default.

Table 47. Processor Settings details (continued)

Option	Description
AVX P1	Enables you to reconfigure the processor Thermal Design Power (TDP) levels during POST based on the power and thermal delivery capabilities of the system. TDP verifies the maximum heat the cooling system is must dissipate. This option is set to **Normal** by default. **NOTE:** This option is only available on certain stock keeping units (SKUs) of the processors.
Dynamic SST-Performance Profile	Enables you to reconfigure the processor using Dynamic or Static Speed Select Technology. This option is set to **Disabled** by default.
SST-Performance Profile	Enables you to reconfigure the processor using Speed Select Technology.
Intel SST-BF	Enables Intel SST-BF. This option is displayed if Performance Per Watt (operating system) or Custom (when OSPM is enabled) system profiles are selected. This option is set to **Disabled** by default.
Intel SST-CP	Enables Intel SST-CP. This option is displayed if Performance Per Watt (operating system) or Custom (when OSPM is enabled) system profiles are selected. This option is displayed and selectable for each system profile mode. This option is set to **Disabled** by default.
x2APIC Mode	Enables or disables x2APIC mode. This option is set to **Enabled** by default. **NOTE:** For two processors 64 cores configuration, x2APIC mode is not switchable if 256 threads are enabled (BIOS settings: All CCD, cores, and logical processors enabled).
AVX ICCP Pre-Grant License	Enables or disables AVX ICCP Pre-Grant License. This option is set to **Disabled** by default.
AVX ICCP Pre-Grant Level	Enables you to select between the different AVX ICC transition levels offered by Intel. This option is set to **128 heavy** by default.
Opportunistic Snoop Broadcast	Opportunistic Snoop Broadcast (OSB) is a feature within the PCIe protocol that enhances system performance by reducing latency and improving data transfer efficiency. **Auto** is default and controlled by SI Compatibility and Directory Mode Enable or Disable.
Dell Controlled Turbo	
Dell Controlled Turbo Setting	Controls the turbo engagement. Enable this option only when System Profile is set to **Performance** or **Custom**, and CPU Power Management is set to **Performance**. This item can be selected for each system profile mode. This option is set to **Disabled** by default. **NOTE:** Depending on the number of installed processors, there might be up to two processor listings.
Dell AVX Scaling Technology	Enables you to configure the Dell AVX scaling technology. This option is set to **0** by default. Enter the value from 0 to 12 bins. The value that is entered decreases the Dell AVX Scaling Technology frequency when the Dell-controlled Turbo feature is enabled.
Number of Cores per Processor	Controls the number of enabled cores in each processor. This option is set to **All** by default.

Table 47. Processor Settings details (continued)

Option	Description
CPU Physical Address Limit	Limit CPU physical address to 46 bits to support older Hyper-V. If enabled, automatically disables TME-MT. This option is set to **Enabled** by default.
AMP Prefetch	This option enables one of the Mid-Level Cache (MLC) AMP hardware Prefetcher. This option is set to **Disabled** by default.
Homeless Prefetch	This option allows L1 Data Cache Unit (DCU) to prefetech, when the Fill Buffers (FB) is full. Auto maps to hardware default setting. This option is set to **Auto** by default.
Uncore Frequency RAPL	This setting controls whether the Running Average Power Limit (RAPL) balancer is enabled or not. If enabled, it activates the uncore power budgeting. This option is set to **Enabled** by default.
Processor Core Speed	Specifies the maximum core frequency of the processor.
Processor Bus Speed	Specifies the bus speed of the processor. **NOTE:** The processor bus speed option displays only when both processors are installed.
Local Machine Check Exception	Enables or disables the local machine check exception. This is an extension of the MCA Recovery mechanism providing the capability to deliver Uncorrected Recoverable (UCR) Software Recoverable Action Required (SRAR) errors to one or more specific logical processors threads receiving previously poisoned or corrupted data. When enabled, the UCR SRAR Machine Check Exception is delivered only to the affected thread rather than broadcast to all threads in the system. The feature supports operating system recovery for cases of multiple recoverable faults that are detected close, which would otherwise result in a fatal machine check event. The feature is available only on Advanced RAS processors. This option is set to **Enabled** by default.
CPU Crash Log Support	This field controls Intel CPU Crash Log feature for collection of previous crash data from shared SRAM of Out-of -Band Management Service Module at post reset. This option is set to **Disabled** by default.
PROCESSOR n	**NOTE:** Depending on the number of processors, there might be up to n processors listed. The following settings are displayed for each processor:

Table 48. Processor n details

Option	Description
Family-Model-Stepping	Specifies the family, model, and stepping of the processor as defined by Intel.
Brand	Specifies the brand name.
Level 2 Cache	Specifies the total L2 cache.
Level 3 Cache	Specifies the total L3 cache.
Number of Cores	Specifies the number of cores per processor.
Microcode	Specifies the processor microcode version.

SATA Settings

To view the **SATA Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **SATA Settings**.

Table 49. SATA Settings details

Option	Description
Embedded SATA	Enables the embedded SATA option to be set to **Off**, **AHCI mode** , or **RAID modes**. This option is set to **AHCI Mode** by default. **NOTE:** 1. You might also need to change the Boot Mode setting to UEFI. Otherwise, you should set the field to Non-RAID mode. 2. No ESXi and Ubuntu OS support under RAID mode.
Security Freeze Lock	Sends **Security Freeze Lock** command to the embedded SATA drives during POST. This option is applicable only for AHCI Mode. This option is set to **Enabled** by default.
Write Cache	Enables or disables the command for the embedded SATA drives during POST. This option is applicable only for AHCI Mode. This option is set to **Disabled** by default.
Port n	Sets the drive type of the selected device. For **AHCI Mode**, BIOS support is always enabled.

Table 50. Port n

Options	Descriptions
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the drive. This field is undefined for removable media devices such as optical drives.

NVMe Settings

This option sets the NVMe drive mode. If the system contains NVMe drives that you want to configure in a RAID array, you must set both this field and the Embedded SATA field on the SATA settings menu to RAID Mode. You may also need to change the Boot Mode setting to UEFI.

To view the **NVMe Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **NVMe Settings**.

Table 51. NVMe Settings details

Option	Description
NVMe Mode	Enables or disables the boot mode. The option is set to **Non-RAID** mode by default. **NOTE: NVMe mode** option is available only when the boot mode is set to **UEFI mode**.
BIOS NVMe Driver	Sets the drive type to boot the NVMe driver. The available options are **Dell Qualified Drives** and **All Drives**. This option is set to **Dell Qualified Drives** by default.

Boot Settings

You can use the **Boot Settings** screen to set the boot mode to either **BIOS** or **UEFI**. It also enables you to specify the boot order. The **Boot Settings** only support **UEFI** mode.

- **UEFI**: The Unified Extensible Firmware Interface (UEFI) is a new interface between operating systems and platform firmware. The interface consists of data tables with platform related information, boot and runtime service calls that are available to the operating system and its loader. The following benefits are available when the **Boot Mode** is set to **UEFI**:

- Support for drive partitions larger than 2 TB.
- Enhanced security (e.g., UEFI Secure Boot).
- Faster boot time.

NOTE: You must use only the UEFI boot mode in order to boot from NVMe drives.

- **BIOS**: The **BIOS Boot Mode** is the legacy boot mode. It is maintained for backward compatibility.

To view the **Boot Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Boot Settings**.

Table 52. Boot Settings details

Option	Description
Boot Mode	Enables you to set the boot mode of the system. If the operating system supports UEFI, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems. This option is set to **UEFI** by default. **CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.** **NOTE:** Setting this field to UEFI disables the **BIOS Boot Settings** menu.
Boot Sequence Retry	Enables or disables the Boot sequence retry feature or resets the system. When this option is set to **Enabled** and the system fails to boot, the system re-attempts the boot sequence after 30 seconds. When this option is set to **Reset** and the system fails to boot, the system reboots immediately. This option is set to **Enabled** by default.
Hard-disk Failover	Enables or disables the Hard-disk failover. This option is set to **Disabled** by default.
Generic USB Boot	Enables or disables the generic USB boot placeholder. This option is set to **Disabled** by default.
Hard-disk Drive Placeholder	Enables or disables the Hard-disk drive placeholder. This option is set to **Disabled** by default.
Clean all SysPrep variables and order	When this option is set to **None**, BIOS will do nothing. When set to **Yes**, BIOS will delete variables of SysPrep #### and SysPrepOrder this option is a onetime option, will reset to none when deleting variables. This setting is only available in **UEFI Boot Mode**. This option is set to **None** by default.
UEFI Boot Settings	Specifies the UEFI boot sequence. Enables or disables UEFI Boot options. **NOTE:** This option controls the UEFI boot order. The first option in the list will be attempted first.

Table 53. UEFI Boot Settings

Option	Description
UEFI Boot Sequence	Enables you to change the boot device order.
Boot Option Enable/Disable	Enables you to select the enabled or disabled boot devices

Choosing system boot mode

System Setup enables you to specify one of the following boot modes for installing your operating system:

- UEFI boot mode (the default), is an enhanced 64-bit boot interface. If you have configured your system to boot to UEFI mode, it replaces the system BIOS.

1. From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.
2. Select the UEFI boot mode you want the system to boot into.

CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.

3. After the system boots in the specified boot mode, proceed to install your operating system from that mode.

NOTE: Operating systems must be UEFI-compatible to be installed from the UEFI boot mode. DOS and 32-bit operating systems do not support UEFI and can only be installed from the BIOS boot mode.

NOTE: For the latest information about supported operating systems, go to OS support.

Changing boot order

About this task

You may have to change the boot order if you want to boot from a USB key or an optical drive. The following instructions may vary if you have selected **BIOS** for **Boot Mode**.

NOTE: Changing the drive boot sequence is only supported in BIOS boot mode.

Steps

1. On the **System Setup Main Menu** screen, click **System BIOS** > **Boot Settings** > **UEFI Boot Settings** > **UEFI Boot Sequence**.
2. Use the arrow keys to select a boot device, and use the plus (+) and minus (-) sign keys to move the device down or up in the order.
3. Click **Exit**, and then click **Yes** to save the settings on exit.

   NOTE: You can also enable or disable boot order devices as needed.

Network Settings

To view the **Network Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Network Settings**.

NOTE: Network Settings are not supported in BIOS boot mode.

Table 54. Network Settings details

Option	Description
UEFI PXE Settings	Enables you to control the configuration of the UEFI PXE device.
Number of PXE Devices	This field specifies the number of PXE devices. This option is set to **4** by default.
PXE Device n (n = 1 to 4)	Enables or disables the device. When enabled, a UEFI PXE boot option is created for the device.
PXE Device n Settings(n = 1 to 4)	Enables you to control the configuration of the PXE device.
UEFI HTTP Settings	Enables you to control the configuration of the UEFI HTTP device.
HTTP Device n (n = 1 to 4)	Enables or disables the device. When enabled, a UEFI HTTP boot option is created for the device.
HTTP Device n Settings (n = 1 to 4)	Enables you to control the configuration of the HTTP device.
UEFI iSCSI Settings	Enables you to control the configuration of the iSCSI device.
iSCSI Initiator Name	Specifies the name of the iSCSI initiator in IQN format.
iSCSI Device1	Enables or disables the iSCSI device. When disabled, a UEFI boot option is created for the iSCSI device automatically. This is set to **Disabled** by default.
iSCSI Device1 Settings	Enables you to control the configuration of the iSCSI device.
UEFI NVMe-oF Settings	Enables you to control the configuration of the NVMe-oF devices.

Table 54. Network Settings details (continued)

Option	Description
NVMe-oF	Enables or disables the NVMe-oF feature. When enabled, it allows to configure the host and target parameters needed for fabric connection. This is set to **Disabled** by default.
NVMe-oF Host NQN	This field specifies the name of the NVMe-oF host NQN. Allowed input is in the following format: nqn.yyyy-mm.<Reserved Domain Name>:<Unique String>. Leave it empty to use system generated value with following format: nqn.1988-11.com.dell:<Model name>.<Model number>.<Service Tag>.
NVMe-oF Host Id	This field specifies a 16 bytes value of the NVMe-oF host identifier that uniquely identifies this host with the controller in the NVM subsystem. Allowed input is a hexadecimal-encoded string in this format: 00112233-4455-6677-8899-aabbccddeeff. Leave it empty to use system generated value. A value of all FF is not allowed.
Host Security Key Path	This field specifies the Host security key path.
NVMe-oF SubSystem Settings	This field controls the parameters for the NVMe-oF subsystem n connections.

Table 55. PXE Device n Settings details

Option	Description
Interface	Specifies NIC interface used for the PXE device.
Protocol	Specifies Protocol used for PXE device. This option is set to **IPv4** or **IPv6**. This option is set to **IPv4** by default.
VLAN	Enables VLAN for PXE device. This option is set to **Enabled** or **Disabled**. This option is set to **Disabled** by default.
VLAN ID	Shows the VLAN ID for the PXE device
VLAN Priority	Shows the VLAN Priority for the PXE device.

Table 56. HTTP Device n Settings details

Option	Description
Interface	Specifies NIC interface used for the HTTP device.
Protocol	Specifies Protocol used for HTTP device. This option is set to **IPv4** or **IPv6**. This option is set to **IPv4** by default.
VLAN	Enables VLAN for HTTP device. This option is set to **Enable** or **Disable**. This option is set to **Disable** by default.
VLAN ID	Shows the VLAN ID for the HTTP device
VLAN Priority	Shows the VLAN Priority for the HTTP device.
DHCP	Enables or disables DHCP for this HTTP device. This option is set to **Enabled** by default.
IP Address	Specifies IP address for the HTTP device.
Subnet Mask	Specifies subnet mask for the HTTP device.
Gateway	Specifies gateway for the HTTP device.
DNS info via DHCP	Enables or disables DNS Information from DHCP. This option is set to **Enabled** by default.
Primary DNS	Specifies the primary DNS server IP address for the HTTP Device.
Secondary DNS	Specifies the secondary DNS server IP address for the HTTP Device.

Table 56. HTTP Device n Settings details (continued)

Option	Description
URI (will obtain from DHCP server if not specified)	Obtain URI from the DHCP server if not specified
TLS Authentication Configuration	Specifies the option for TLS authentication configuration.

Table 57. ISCSI Device1 Settings screen details

Option	Description
Connection 1	Enables or disables the iSCSI connection. This option is set to **Disabled** by default.
Connection 2	Enables or disables the iSCSI connection. This option is set to **Disabled** by default.
Connection 1 Settings	Enables you to control the configuration for the iSCSI connection.
Connection 2 Settings	Enables you to control the configuration for the iSCSI connection.
Connection Order	Enables you to control the order for which the iSCSI connections will be attempted.
ISCSI F1/F2 Prompt on Error	This field determines whether the BIOS stops and displays a prompt when iSCSI connection errors occur during POST. The BIOS will display the prompt when this setting is **Enabled**, otherwise, the BIOS will continue through POST and attempt to boot an operating system. **NOTE:** This setting will be grayed out if F1/F2 Prompt on Error in the Miscellaneous Settings menu is **Disabled**.

Table 58. ISCSI Device1 Settings Connection 1 details

Option	Description
Interface	Specifies NIC interface used for the ISCSI device.
Protocol	Specifies Protocol used for ISCSI device. This option is set to **IPv4** or **IPv6**. This option is set to **IPv4** by default.
VLAN	Enables VLAN for ISCSI device. This option is set to **Enable** or **Disable**. This option is set to **Disable** by default.
VLAN ID	Shows the VLAN ID for the ISCSI device
VLAN Priority	Shows the VLAN Priority for the ISCSI device.
Retry Count	Specifies the retry count for this ISCSI device connection. This option is set to **3** by default.
Timeout	Specifies the time out for this ISCSI device connection. This option is set to **10000** by default.
DHCP	Enables or disables DHCP for this ISCSI device. This option is set to **Enable** by default.
Initiator IP Address	Specifies IP address for the ISCSI device.
Initiator Subnet Mask	-
Initiator Gateway	-
Target info via DHCP	-
Target Name	-
Target IP Address	-
Target Port	-
Target Boot LUN	-
ISID	-

Table 58. ISCSI Device1 Settings Connection 1 details (continued)

Option	Description
Authentication type	Specifies the authentication type for this ISCSI device connection. This option is set to **None** by default.
CHAP Type	-
CHAP Name	-
CHAP Secret	-
Reverse CHAP Name	-
Reverse CHAP Secret	-

Table 59. TLS Authentication Configuration screen details

Option	Description
TLS Authentication Mode	View or modify the device's boot TLS Authentication Mode. This option is set to **One Way** by default. **None** means the HTTP server and the client will not authenticate each other for this boot.
Root Certificate Configuration	Import, delete, or export the root certificate.

Table 60. NVMe-oF SubSystem Settings screen details

Option	Description
NVMe-oF SubSystem n (n = 1 to 4)	Enables or disables NVMe-oF SubSystem. This option is set to **Disabled** by default.
NVMe-oF SubSystem n Settings (n = 1 to 4)	Enables you to control the configuration of the NVMe-oF SubSystem, if **Enabled**.

Table 61. NVMe-oF SubSystem n Settings

Option	Description
Interface	NIC interface used for NVMe-oF connections. This option is set to **Embedded NIC 1 Port 1 Partition 1** by default.
Transport Type	This field sets the value of transport type for NVMe-oF connection. This option is set to **TCP** by default.
Protocol	This field sets the value of protocol type for NVMe-oF connection. This option is set to **IPv4** by default.
VLAN	Enables or disables VLAN for this NVMe-oF connections. This option is set to **Disabled** by default.
VLAN ID	Specifies the VLAN Id for this NVMe-oF connection. This option is set to **1** by default.
VLAN Priority	Specifies the VLAN priority for this NVMe-oF connection. This option is set to **0** by default.
Retry Count	Specifies the retry count for this NVMe-oF connection. This option is set to **3** by default.
Timeout	Specifies the time out for this NVMe-oF connection. This option is set to **10000** by default.
DHCP	Enables and disables the DHCP for this NVMe-oF connection. This option is set to **Disabled** by default.
Host IP Address	Specifies the Host IP Address for this NVMe-oF connection.
Host Subnet Mask	Specifies the Host Subnet Mask for this NVMe-oF connection.
Host Gateway	Specifies the Host Gateway for this NVMe-oF connection.

Table 61. NVMe-oF SubSystem n Settings (continued)

Option	Description
NVMe-oF Subsystem info via DHCP	Enables and disables the NVMe-oF subsystem's DHCP for this connection. This option is set to **Disabled** by default.
NVMe-oF Subsystem NQN	Specifies the NVMe-oF subsystem's NQN for this connection.
NVMe-oF Subsystem Address	Specifies the NVMe-oF subsystem's IP address for this connection.
NVMe-oF Subsystem Port	Specifies the NVMe-oF subsystem's port for this connection. This option is set to **4420** by default.
NVMe-oF Subsystem NID	Specifies the NamespaceID (NID) for this NVMe-oF connection.
NVMe-oF Subsystem Controller ID	Specifies the NVMe-oF subsystem's Controller ID for this connection. This option is set to **0** by default.
Security	Enables or disables the security option for this NVMe-oF connection. This option is set to **Disabled** by default.
Authentication Type	Specifies the authentication type for this NVMe-oF connection. This option is set to **None** by default.
SecurityKeyPath	Specifies the SecurityKeyPath for this NVMe-oF connection.

Integrated Devices

To view the **Integrated Devices** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Integrated Devices**.

Table 62. Integrated Devices details

Option	Description
User Accessible USB Ports	Configures the user accessible USB ports. Selecting **Only Back Ports On** disables the front USB ports; selecting **All Ports Off** disables all front and back USB ports. Selecting **Only Back Ports On** disables the front USB ports; selecting **All Ports Off** disables all front and back USB ports; selecting **All Ports Off (Dynamic)** disables all front and back USB ports during POST.Selecting **All Ports Off** disables all front and back USB ports; selecting **All Ports Off (Dynamic)** disables all front and back USB ports during POST. Selecting **All Ports Off** disables all front and back USB ports.This option is set to **All Ports On** by default. When user accessible USB ports are set to **All Ports Off (Dynamic)** the **Enable Front Ports Only** option is enabled. • **Enable Front Ports Only**: Enables or disables the front USB ports during the operating system runtime.
	The USB keyboard and mouse still function in certain USB ports during the boot process, depending on the selection. After the boot process is complete, the USB ports will be enabled or disabled as per the setting.
Internal USB Port	Enables or disables the internal USB port. This option is set to **On** or **Off**. This option is set to **On** by default. **NOTE:** The Internal USB port is on the PCIe riser 1b.
iDRAC Direct USB Port	The iDRAC Direct USB port is managed by iDRAC exclusively with no host visibility. This option is set to **ON** or **OFF**. When set to **OFF**, iDRAC does not detect any USB devices installed in this managed port. This option is set to **On** by default.
Integrated Network Card1	Enables or disables the integrated network card. When this option is set to **Enabled**, the card is not available to the operating system. This option is set to **On** by default. **NOTE:** If set to Disabled (operating system), the Integrated NICs might still be available for shared network access by iDRAC.

Table 62. Integrated Devices details (continued)

Option	Description
Embedded NIC1 and NIC2Embedded NIC1, NIC2, NIC3 and NIC4 Embedded NIC1 Integrated RAID controller	Enables or disables the Embedded NIC1 and NIC2. If set to **Disabled (OS)**, the NIC may still be available for shared network access by the embedded management controller. Configure the **Embedded NIC1 and NIC2** option by using the NIC management utilities of the system. This option is set to **Enabled** by default. Enables or disables the Embedded NIC1 and NIC2. If set to **Disabled (OS)**, the NIC may still be available for shared network access by the embedded management controller. Configure the **Embedded NIC1, NIC2, NIC3 and NIC4** option by using the NIC management utilities of the system. This option is set to **Enabled** by default. Enables or disables the Embedded NIC1. If set to **Disabled (OS)**, the NIC may still be available for shared network access by the embedded management controller. Configure the **Embedded NIC1** option by using the NIC management utilities of the system. This option is set to **Enabled** by default. Enables or disables the integrated RAID controllers. This option is set to **Enabled** by default.
I/OAT DMA Engine	Enables or disables the I/O Acceleration Technology (I/OAT) option. I/OAT is a set of DMA features designed to accelerate network traffic and lower CPU utilization. Enable only if the hardware and software support the feature. This option is set to **Disabled** by default.
Embedded Video Controller	Enables or disables the use of Embedded Video Controller as the primary display. When set to **Enabled**, the Embedded Video Controller will be the primary display even if add-in graphic cards are installed. When set to **Disabled**, an add-in graphics card is used as the primary display. BIOS will output displays to both the primary add-in video and the embedded video during POST and preboot environment. The embedded video will then be disabled right before the operating system boots. This option is set to **Enabled** by default. **NOTE:** When there are multiple add-in graphic cards installed in the system, the first card discovered during PCI enumeration is selected as the primary video. You might have to rearrange the cards in the slots in order to control which card is the primary video.
I/O Snoop HoldOff Response	Selects the number of cycles PCI I/O can withhold snoop requests, from the CPU, to allow time to complete its own write to LLC. This setting can help improve performance on workloads where throughput and latency are critical. The option available is **2K Cycles** by default.
Current State of Embedded Video Controller	Displays the current state of the embedded video controller. The **Current State of Embedded Video Controller** option is a read-only field. If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the **Embedded Video Controller** setting is set to **Disabled**.
SR-IOV Global Enable	Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to **Disabled** by default.
OS Watchdog Timer	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to **Enabled**, the operating

Table 62. Integrated Devices details (continued)

Option	Description
	system initializes the timer. When this option is set to **Disabled** (the default), the timer does not have any effect on the system.
Empty Slot Unhide	Enables or disables the root ports of all the empty slots that are accessible to the BIOS and operating system. This option is set to **Disabled** by default.
Memory Mapped I/O above 4 GB	Enables or disables the support for the PCIe devices that need large amounts of memory. Enable this option only for 64-bit operating systems. This option is set to **Enabled** by default.
Memory Mapped I/O Base	When set to **12 TB** , the system maps the MMIO base to 12 TB. Enable this option for an operating system that requires 44-bit PCIe addressing. When set to **512 GB** , the system maps the MMIO base to 512 GB, and reduces the maximum support for memory to less than 512 GB. Enable this option only for the 4 GPU DGMA issue. This option is set to **56 TB** by default.
IIO PCIe Data Link Feature Exchange	This field allows globally disabling **PCIe Data Link Feature Exchange**. This may be needed to support certain legacy hardware.
Slot Disablement	Enables or disables or boot driver disables the available PCIe slots on your system. The slot disablement feature controls the configuration of the PCIe cards installed in the specified slot. Slots must be disabled only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled. Only slots that are present on the system will be available for control. When this option is set to boot driver disabled, both the Option ROM and UEFI driver from the slot will not run during POST. The system will not boot from the card and its pre-boot services will not be available. However, the card is available to the operating system.
	Slot n: Enables or disables or only the boot driver is disabled for the PCIe slot n. This option is set to **Enabled** by default.
Slot Bifurcation	**Auto Discovery Bifurcation Settings** allows **Platform Default Bifurcation**, **Auto Discovery of Bifurcation**, and **Manual bifurcation Control**.
	This option is set to **Platform Default Bifurcation** by default. The slot bifurcation field is accessible when set to **Manual bifurcation Control** and is grayed out when set to **Platform Default Bifurcation** and **Auto Discovery of Bifurcation**. **NOTE:** The slot bifurcation supports on PCIe slot only, does not support slot type from Paddle card to Riser and Slimline connector to Riser.

Serial Communication

To view the **Serial Communication** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Serial Communication**.

NOTE: The serial port is optional for the PowerEdge T560 system. The Serial Communication option is applicable only if the serial COM port is installed in the system.

Table 63. Serial Communication details

Option	Description
Serial Communication	Enables the serial communication options. Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled, and the port address can be specified. The options available for System without serial COM port (DB9) are **On without Console Redirection**, **On with Console Redirection**, **Off**, **Auto**. This option is set to **Auto** if the external serial connector is available (connected to the rear I/O

Table 63. Serial Communication details (continued)

Option	Description
	board). Else the default will be **Off**.
Serial Port Address	Enables you to set the port address for serial devices. This option is set to either **COM1** or **COM2** for the serial device **(COM1=0x3F8,COM2=0x2F8)**and set to **COM1** by default. **NOTE:** You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device. **NOTE:** Every time the system boots, the BIOS syncs the serial MUX setting that is saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1.
External Serial Connector	Enables you to associate the External Serial Connector to **Serial Device 1**, **Serial Device 2**, or the **Remote Access Device** by using this option. This option is set to **Serial Device 1** by default. **NOTE:** Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device. **NOTE:** Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert this setting to the default setting of Serial Device 1.
Failsafe Baud Rate	Specifies the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails, and the value must not be changed. This option is set to **115200** by default.
Remote Terminal Type	Sets the remote console terminal type. This option is set to **VT100/VT220** by default.
Redirection After Boot	Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to **Enabled** by default.

System Profile Settings

To view the **System Profile Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Profile Settings**.

Table 64. System Profile Settings details

Option	Description
System Profile	Sets the system profile. If you set the System Profile option to a mode other than **Performance Per Watt (DAPC)**, the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to **Custom**. This option is set to **Performance Per Watt (DAPC)** by default. Other options include **Custom**, **Performance**, **Performance Per Watt (OS)** and **Workstation Performnce**. **NOTE:** All the parameters on the system profile setting screen are available only when the **System Profile** option is set to **Custom**.
Optimized Power Mode	When set to **Enabled**, processor is tuned for lower power consumption. Also sets C1E to Enabled, sets CPU Power Management to System DBPM mode, sets Energy Efficient Policy

Table 64. System Profile Settings details (continued)

Option	Description
	to Performance, sets Uncore Frequency to Dynamic, and sets Dynamic Load Line Switch to **Enabled**.
CPU Power Management	Sets the CPU power management. This option is set to **System DBPM (DAPC)** by default. Other option includes **Maximum Performance**, **OS DBPM**.
Memory Frequency	Sets the speed of the system memory. You can select **Maximum Performance**, **Maximum Reliability** or a specific speed. This option is set to **Maximum Performance** by default.
Turbo Boost	Enables or disables the processor to operate in the turbo boost mode. This option is set to **Enabled** by default.
Enery Efficient Turbo	Energy Efficient Turbo (EET) is a mode of operation where a processor's core frequency is adjusted within the turbo range based on workload. This option is set to **Enabled** by default.
C1E	Enables or disables the processor to switch to a minimum performance state when it is idle. This option is set to **Enabled** by default.
C-States	Enables or disables the processor to operate in all available power states. C States allow the processor to enter lower power states when idle. When set to **Enabled** (OS controlled) or when set to **Autonomous** (if hardware controlled is supported), the processor can operate in all available Power States to save power, but may increase memory latency and frequency jitter. This option is set to **Enabled** by default.
Memory Patrol Scrub	Sets the memory patrol scrub mode. This option is set to **Standard** by default.
Memory Refresh Rate	Sets the memory refresh rate to either 1x or 2x. This option is set to **1x** by default.
Uncore Frequency	Enables you to select the **Uncore Frequency** option. **Dynamic mode** enables the processor to optimize power resources across cores and uncores during runtime. The optimization of the uncore frequency to either save power or optimize performance is influenced by the setting of the **Energy Efficiency Policy** option.
Energy Efficient Policy	Enables you to select the **Energy Efficient Policy** option. The CPU uses the setting to manipulate the internal behavior of the processor and determines whether to target higher performance or better power savings. This option is set to **Balanced Performance** by default.
Monitor/Mwait	Enables the Monitor/Mwait instructions in the processor. This option is set to **Enabled** for all system profiles, except **Custom** by default. **NOTE:** This option can be disabled when System Profile is set to **Custom**. **NOTE:** When C States is set to Enabled in the Custom mode, changing the Monitor/Mwait setting does not impact the system power or performance.
Workload Profile	This option allows the user to specify the targeted workload of a server. It allows optimization of performance based on the workload type. This option is set to **Not Configured** by default.
CPU Interconnect Bus Link Power Management	Enables or disables the CPU Interconnect Bus Link Power Management. This option is set to **Enabled** by default.
PCI ASPM L1 Link Power Management	Enables or disables the PCI **ASPM L1 Link Power Management**. This option is set to **Enabled** by default.

System Security

To view the **System Security** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Security**.

Table 65. System Security details

Option	Description
CPU AES-NI	Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set (AES-NI). This option is set to **Enabled** by default.
Strong Password Status	If enabled, you must set up a password that has at least one character in lowercase, uppercase, digit, and a special character. Also, you have the option to set the minimum number of characters in both the new passwords. If disabled, you can set a password that has any character in it but the passwords must not have more than 32 characters. Changes made by enabling or disabling this feature become immediately effective.
System Password	Sets the system password. This option is set to **Enabled** by default and is read-only if the password jumper is not installed in the system.
Setup Password	Sets the setup password. This option is read-only if the password jumper is not installed in the system.
Password Status	Locks the system password. This option is set to **Unlocked** by default.
TPM Information	Indicates the type of Trusted Platform Module, if present.
EMR CPU TDX/ IFS features	This option is set to **Disabled** by default.

Table 66. TPM 2.0 security information

Option	Description	
TPM Information		
TPM Security	**NOTE:** The TPM menu is available only when the TPM module is installed. Enables you to control the reporting mode of the TPM. When set to Off, the presence of the TPM is not reported to the OS. When set to On, the presence of the TPM is reported to the OS. The **TPM Security** option is set to **Off** by default.	
	When TPM 2.0 is installed, the **TPM Security** option is set to **On** or **Off**. This option is set to **Off** by default.	
TPM Information	Indicates the type of Trusted Platform Module, if present.	
TPM Firmware	Indicates the firmware version of the TPM.	
TPM Hierarcy	Enables, disables, or clears the storage and endorsement hierarchies. When set to **Enabled**, the storage and endorsement hierarchies can be used.	
	When set to **Disabled**, the storage and endorsement hierarchies cannot be used.	
	When set to **Clear**, the storage and endorsement hierarchies are cleared of any values, and then reset to **Enabled**.	
TPM Advanced Settings	Specifies TPM Advanced Settings details.	
	TPM PPI Bypass Provision	When set to **Enabled**, allows the Operating System to bypass Physical Presence Interface (PPI) prompts when issuing PPI Advanced Configuration and Power interface (ACPI) provisioning operations
	TPM PPI Bypass Clear	When set to **Enabled** allows the Operating System to bypass Physical Presence Interface (PPI) prompts when issuing PPI Advanced Configuration and Power Interface (ACPI) clear operations.
	TPM Algorithm Selection	Allows to choose between the TPM encryption standards SHA1 and SHA256

Table 67. System Security details

Option	Description
Intel(R) TXT	Enables you to set the Intel Trusted Execution Technology (TXT) option. To enable the **Intel TXT** option, virtualization technology and TPM Security must be enabled with Pre-boot measurements. This option is set to **Off** by default. It is set **On** for Secure Launch (Firmware Protection) support on Windows 2022.
Memory Encryption	Enables or disables the Intel Total Memory Encryption (TME) and Multi-Tenant (Intel® TME-MT). When option is set to **Disabled**, BIOS disables both TME and MK-TME technology. When option is set to **Single Key** BIOS enables the TME technology. When option is set to **Multiple Keys**, BIOS enables the TME-MT technology. This option is set to **Disabled** by default.
TME Encryption Bypass	This option is set to **Disabled** by default when Memory Encryption option is disabled.
Intel(R) SGX	Enables you to set the Intel Software Guard Extension (SGX) option. To enable the **Intel SGX** option, processor must be SGX capable, memory population must be compatible (minimum x8 identical DIMM1 to DIMM8 per CPU socket, not support on persistent memory configuration), memory operating mode must be set at optimizer mode, memory encryption must be enabled and node interleaving must be disabled. This option is set to **Off** by default. When this option is to **Off**, BIOS disables the SGX technology. When this option is to **On**, BIOS enables the SGX technology.
SGX Package Info In-Band Access	Enables you to access the Intel Software Guard Extension (SGX) package info in-band option. This option is set to **Off** by default.
PPMRR Size	Sets the PPMRR size.
SGX QoS	Enables or disables the SGX quality of service.
Select Owner EPOCH input type	Enables you to select **Change to New random Owner EPOCHs** or **Manual User Defined Owner EPOCHs**. Each EPOCH is 64-bit. After generating new EPOCH by selecting **Change to New random Owner EPOCHs**, the selection reverts back to **Manual User Defined Owner EPOCHs**.
	Software Guard Extensions Epoch n: Sets the Software Guard Extensions Epoch values.
Enable writes to SGXLEPUBKEYHASH[3:0] from OS/SW	Enables or disables the Enable writes to SGXLEPUBKEYHASH[3:0] from OS/SW.
	SGX LE Public Key Hash0: Sets the bytes from 0-7 for SGX Launch Enclave Public Key Hash.
	SGX LE Public Key Hash1: Sets the bytes from 8-15 for SGX Launch Enclave Public Key Hash.
	SGX LE Public Key Hash2: Sets the bytes from 16-23 for SGX Launch Enclave Public Key Hash.
	SGX LE Public Key Hash3: Sets the bytes from 24-31 for SGX Launch Enclave Public Key Hash.
Enable/Disable SGX Auto MP Registration Agent	Enables are disables the SGX Auto MP Registration. The MP registration agent is responsible to register the platform.
SGX Factory Reset	Enables you to reset the SGX option to factory settings. This option is set to **Off** by default.
Power Button	Enables or disables the power button on the front of the system. This option is set to **EnabledDisabled** by default.
AC Power Recovery	Sets how the system behaves after AC power is restored to the system. This option is set to **Last** by default. **NOTE:** The host system will not power on up until iDRAC Root of Trust (RoT) is completed, host power on will be delayed by minimum 90 seconds after the AC applied.
AC Power Recovery Delay	Sets the time delay for the system to power up after AC power is restored to the system. This option is set to **Immediate** by default. When this option is set to

Table 67. System Security details (continued)

Option	Description
	Immediate, there is no delay for power up. When this option is set to **Random**, the system creates a random delay for power up. When this option is set to **User Defined**, the system delay time is manually to power up.
User Defined Delay (120 s to 600 s)	Sets the **User Defined Delay** option when the **User Defined** option for **AC Power Recovery Delay** is selected. The actual AC recovery time needs to add iDRAC root of trust time (around 50 seconds).
UEFI Variable Access	Provides varying degrees of securing UEFI variables. When set to **Standard** (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to **Controlled**, selected UEFI variables are protected in the environment and new UEFI boot entries are forced to be at the end of the current boot order.
In-Band Manageability Interface	When set to **Disabled** , this setting hides the Management Engine's (ME), HECI devices, and the system's IPMI devices from the operating system. This prevents the operating system from changing the ME power capping settings, and blocks access to all in-band management tools. All management should be managed through out-of-band. This option is set to **Enabled** by default. **NOTE:** BIOS update requires HECI devices to be operational and DUP updates require IPMI interface to be operational. This setting needs to be set to Enabled to avoid updating errors.
SMM Security Mitigation	Enables or disables the UEFI SMM security migration protections. It is enabled for Windows 2022 support.
Secure Boot	Enables Secure Boot, where the BIOS authenticates each pre-boot image by using the certificates in the Secure Boot Policy. Secure Boot is set to **Disabled** by default.
Secure Boot Policy	Allows selecting the Secure Boot Policy. • When set to **Standard**, the BIOS uses the key and certificates from the system manufacturer to authenticate pre-boot images. • When set to **Linux(R) Boot**, VMware(R) Boot, or Microsoft(R) Boot, the Secure Boot Policy includes only certificates necessary for the corresponding operating system. • When set to **Custom**, the BIOS uses the user-customized key and certificates. **NOTE:** Note: If Custom mode is selected, the Secure Boot Custom Policy Settings menu is displayed. **NOTE:** Note: Changing the default security certificates may cause the system to fail booting from certain boot options.
Secure Boot Mode	Configures how the BIOS uses the Secure Boot Policy Objects (PK, KEK, db, dbx).
	If the current mode is set to **Deployed Mode**, the available options are **User Mode** and **Deployed Mode**. If the current mode is set to **User Mode**, the available options are **User Mode**, **Audit Mode**, and **Deployed Mode**
	Below are the details of different boot modes available in the **Secure Boot Mode** option. **User Mode** — In **User Mode**, PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects. The BIOS allows unauthenticated programmatic transitions between modes. **Audit mode** — In **Audit Mode**, PK is not present. BIOS does not authenticate programmatic update to the policy objects and transitions between modes. The BIOS performs a signature verification on pre-boot images and logs the results in the image Execution Information Table, but executes the images whether they pass

Table 67. System Security details (continued)

Option	Description
	or fail verification. **Audit Mode** is useful for programmatic determination of a working set of policy objects. **Deployed Mode** — **Deployed Mode** is the most secure mode. In **Deployed Mode**, PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects. **Deployed Mode** restricts the programmatic mode transitions.
Secure Boot Policy Summary	Specifies the list of certificates and hashes that secure boot uses to authenticate images. Below are the list of options available on the **Secure Boot Policy Summary** screen: 1. **Platform Key (PK)** 2. **Key Exchange Key (KEK) Database Entries** 3. **Authorized Signature Database (db) Entries** The options above are described through the following fields: • Type • Issuer • Subject • Signature Owner GUID 4. **Forbidden Signature Database (dbx) Entries**
Secure Boot Custom Policy Settings	Configures the Secure Boot Custom Policy. To enable this option, set the Secure Boot Policy to **Custom** option. Below are the list of options available on the **Secure Boot Custom Policy Settings** screen: 1. **Platform Key (PK)** 2. **Key Exchange Key (KEK) Database Entries** 3. **Authorized Signature Database (db) Entries** 4. **Forbidden Signature Database (dbx) Entries** 5. **Delete All Policy Entries (PK, KEK, db, and dbx)** 6. **Restore Default Policy Entries (PK, KEK, db, and dbx)** 7. **Export Firmware Hash Values**
Intel Trust Domain Extension(TDX)	**Intel Trust Domain Extension (TDX)** is a hardware-based trusted execution environment. It is designed to protect sensitive data and applications in Trust Domain(TD) or Virtual Machine(VM) from unauthorized access. **Memory Encryption** must be set to **Multiple Keys** for TDX to be enabled. TDX is set to **Disabled** by default.
TME-MT/TDX Key Spilt to non-zero value	When the TME-MT/TDX Key Spilt to non-zero value is set to **1**, **2**, **3**, **4**, **5**, or **6**, it designates the number of bits for TDX usage, while the rest will be used by TME-MT. It is set to **1** by default.
TDX Secure Arbitration Mode Loader(SEAM)	This SW module runs in a new CPU Secure Arbitration Mode (SEAM) as peer virtual machine manager (VMM). This SEAM module supports TD entry and exit using the existing virtualization infrastructure. It is set to **Disabled** by default.
Intel(R) In-Field Scan	The Intel(R) In-field Scan feature allows software to scan processor cores for latent faults. The scan can be performed in the field after the server is deployed. When **Enabled**, the BIOS configures all processors to respond to software scan requests. When this setting is **Disabled**, the processors will not respond to software scan requests. It is set to **Disabled** by default.

Creating a system and setup password

Prerequisites

Ensure that the password jumper is enabled. The password jumper enables or disables the system password and setup password features. For more information, see the section.

NOTE: If the password jumper setting is disabled, the existing system password and setup password are deleted and you need not provide the system password to boot the system.

Steps

1. To enter System Setup, press F2 immediately after turning on or rebooting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.
3. On the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, type your system password, and press Enter or Tab.
   Use the following guidelines to assign the system password:
   - A password can have up to 32 characters.

   A message prompts you to reenter the system password.
5. Reenter the system password, and click **OK**.
6. In the **Setup Password** field, type your setup password and press Enter or Tab.
   A message prompts you to reenter the setup password.
7. Reenter the setup password, and click **OK**.
8. Press Esc to return to the System BIOS screen. Press Esc again.
   A message prompts you to save the changes.
   NOTE: Password protection does not take effect until the system reboots.

Using your system password to secure your system

About this task

If you have assigned a setup password, the system accepts your setup password as an alternate system password.

Steps

1. Turn on or reboot your system.
2. Type the system password and press Enter.

Next steps

When **Password Status** is set to **Locked**, type the system password and press Enter when prompted at reboot.

NOTE: If an incorrect system password is typed, the system displays a message and prompts you to reenter your password. You have three attempts to type the correct password. After the third unsuccessful attempt, the system displays an error message that the system has stopped functioning and must be turned off. Even after you turn off and restart the system, the error message is displayed until the correct password is entered.

Deleting or changing system and setup password

Prerequisites

NOTE: You cannot delete or change an existing system or setup password if the **Password Status** is set to **Locked**.

Steps

1. To enter System Setup, press F2 immediately after turning on or restarting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.
3. On the **System Security** screen, ensure that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, alter or delete the existing system password, and then press Enter or Tab.
5. In the **Setup Password** field, alter or delete the existing setup password, and then press Enter or Tab.
   If you change the system and setup password, a message prompts you to reenter the new password. If you delete the system and setup password, a message prompts you to confirm the deletion.
6. Press Esc to return to the **System BIOS** screen. Press Esc again, and a message prompts you to save the changes.

7. Select **Setup Password**, change, or delete the existing setup password and press Enter or Tab.

   NOTE: If you change the system password or setup password, a message prompts you to reenter the new password. If you delete the system password or setup password, a message prompts you to confirm the deletion.

Operating with setup password enabled

If **Setup Password** is set to **Enabled**, type the correct setup password before modifying the system setup options.

If you do not type the correct password in three attempts, the system displays the following message:

```
Invalid Password! Number of unsuccessful password attempts: <x> System Halted! Must
power down.
```

Even after you power off and restart the system, the error message is displayed until the correct password is typed. The following options are exceptions:

- If **System Password** is not set to **Enabled** and is not locked through the **Password Status** option, you can assign a system password. For more information, see the System Security Settings screen section.
- You cannot disable or change an existing system password.

NOTE: You can use the password status option with the setup password option to protect the system password from unauthorized changes.

Redundant OS Control

To view the **Redundant OS Control** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Redundant OS Control**.

Table 68. Redundant OS Control details

Option	Description
Redundant OS Location	Enables you to select a backup disk from the following devices:
Redundant OS State	**NOTE:** This option is disabled if **Redundant OS Location** is set to **None**. When set to **Visible**, the backup disk is visible to the boot list and OS. When set to **Hidden**, the backup disk is disabled and is not visible to the boot list and OS. This option is set to **Visible** by default. **NOTE:** BIOS disables the device in hardware, so it is not accessed by the OS.
Redundant OS Boot	**NOTE:** This option is disabled if **Redundant OS Location** is set to **None** or if **Redundant OS State** is set to **Hidden**. When set to **Enabled**, BIOS boots to the device specified in **Redundant OS Location**. When set to **Disabled**, BIOS preserves the current boot list settings. This option is set to **Disabled** by default.

Miscellaneous Settings

To view the **Miscellaneous Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Miscellaneous Settings**.

Table 69. Miscellaneous Settings details

Option	Description
System Time	Enables you to set the time on the system.
System Date	Enables you to set the date on the system.
Time Zone	Enables you to select required Time Zone.

Table 69. Miscellaneous Settings details (continued)

Option	Description
Daylight Savings Time	Enables or disables Daylight Savings Time. This option is set to **Disabled** by default.
Asset Tag	Specifies the asset tag and enables you to modify it for security and tracking purposes.
Keyboard NumLock	Enables you to set whether the system boots with the NumLock enabled or disabled. This option is set to **On** by default. **NOTE:** This option does not apply to 84-key keyboards.
F1/F2 Prompt on Error	Enables or disables the F1/F2 prompt on error. This option is set to **Enabled** by default. The F1/F2 prompt also includes keyboard errors.
Load Legacy Video Option ROM	This option determines whether th system BIOS will load legacy video (INT 10h) option ROM from the video controller. This option is set to **Disabled** by default. **NOTE:** This option cannot be set to Enabled, when the Boot mode is UEFI and Secure Boot is enabled.
Dell Wyse P25/P45 BIOS Access	Enables or disables the Dell Wyse P25/P45 BIOS Access. This option is set to **Enabled** by default.
Power Cycle Request	Enables or disables the Power Cycle Request. This option is set to **None** by default.

iDRAC Settings

The iDRAC settings is an interface to set up and configure the iDRAC parameters by using UEFI. You can enable or disable various iDRAC parameters by using the iDRAC settings.

NOTE: Accessing some of the features on the iDRAC settings needs the iDRAC Enterprise License upgrade.

For more information about using iDRAC, see *Dell Integrated Dell Remote Access Controller User's Guide* at iDRAC Manuals.

Device Settings

Device Settings enables you to configure device parameters such as storage controllers or network cards.

Service Tag Settings

Service Tag Settings enables you to configure the System Service Tag.

Dell Lifecycle Controller

Dell Lifecycle Controller (LC) provides advanced embedded systems management capabilities including system deployment, configuration, update, maintenance, and diagnosis. LC is delivered as part of the iDRAC out-of-band solution and Dell system embedded Unified Extensible Firmware Interface (UEFI) applications.

Embedded system management

The Dell Lifecycle Controller provides advanced embedded system management throughout the lifecycle of the system. The Dell Lifecycle Controller is started during the boot sequence and functions independently of the operating system.

NOTE: Certain platform configurations may not support the full set of features provided by the Dell Lifecycle Controller.

For more information about setting up the Dell Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Dell Lifecycle Controller documentation at iDRAC Manuals.

Boot Manager

The **Boot Manager** option enables you to select boot options and diagnostic utilities.

To enter **Boot Manager**, power on the system and press F11.

Table 70. Boot Manager details

Option	Description
Continue Normal Boot	The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found.
One-shot UEFI Boot Menu	Allows you to select a UEFI boot option for a one-time boot. The option selected does not modify the boot order settings.
Launch System Setup	Enables you to access System Setup.
Launch Lifecycle Controller	Exits the Boot Manager and invokes the Dell Lifecycle Controller program.
System Utilities	Enables you to launch System Utilities menu such as Launch Diagnostics, BIOS update File Explorer, Reboot System.

PXE boot

You can use the Preboot Execution Environment (PXE) option to boot and configure the networked systems remotely.

To access the **PXE boot** option, boot the system and then press F12 during POST instead of using standard Boot Sequence from BIOS Setup. It does not pull any menu or allows managing of network devices.

6

Minimum to POST and system management configuration validation

This section describes the minimum to POST system requirement and system management configuration validation of the Dell system.

Topics:

- Minimum configuration to POST
- Configuration validation

Minimum configuration to POST

The components listed below are the minimum configuration to POST:

- One processor in processor socket 1
- One memory modules (DIMM) in slot A1
- One power supply unit
- System board + PIB board + FIO board

Configuration validation

The new generation of Dell systems have added interconnect flexibility and advanced iDRAC management features to collect precise system configuration information and report configuration errors.

When the system is powered on, information about installed cables, risers, backplanes, power supplies, floating card (fPERC, adapter PERC , BOSS), and processor is obtained from the CPLD and backplane memory maps are analyzed. This information forms a unique configuration, which is compared with one of the qualified configurations that are stored in a table that is maintained by iDRAC.

One or more sensors are assigned to each of the configuration elements. During POST, any configuration validation error is logged in the System Event Log (SEL)/LifeCycle (LC) log. The reported events are categorized in the configuration validation error table.

Table 71. Configuration validation error

Error	Description	Possible cause and recommendations	Example
Config Error	A configuration element within the closest match contains something that is unexpected and does not match any Dell qualified configuration.	Wrong configuration	Config Error: Backplane cable CTRS_SRC_SA1 and BP-DST_SA1
		The element reported in HWC8010 errors are assembled incorrectly. Verify element (cable, risers, etc) placement in the system.	Config Error : SL Cable PLANAR_SL7 and CTRL_DST_PA1
Config Missing	iDRAC found a configuration element missing within the closest match detected.	Missing or damaged cable, device, or part	Config Missing: Float card front PERC/HBAadapter PERC/HBA
		Missing element or cable is reported in HWC8010 error logs. Install the	Config Missing : SL cable PLANAR_SL8 and CTRL_DST_PA1

Table 71. Configuration validation error (continued)

Error	Description	Possible cause and recommendations	Example
		missing element (cable, risers, etc).	
Comm Error	A configuration element is not responding to iDRAC using the management interface while running an inventory check.	System management sideband communication	Comm Error: Backplane 2
		Unplug AC Power, reseat the element and replace the element if the problem persists.	

Error messages

This section describes the error messages that are displayed on the screen during POST or captured in the system event log (SEL)/LifeCycle (LC) log.

Table 72. Error message HWC8010

Error code	HWC8010
Message	The System Configuration Check operation that is resulted in the following issue involving the indicated component type
Arguments	Riser, floating card (fPERC, adapter PERC, BOSS), backplane, processor, cable, or other components
Detailed Description	The issue that is identified in the message is observed in the System Configuration Check operation.
Recommended Response Action	Do the following and retry the operation: 1. Disconnect the input power. 2. Check for proper cable connection and component placement. If the issue persists, contact the service provider.
Category	System Health (HWC = Hardware Config)
Severity	Critical
Trap/EventID	2329

Table 73. Error message HWC8011

Error code	HWC8011
Message	The System Configuration Check operation that is resulted in multiple issues involving the indicated component type
Arguments	Riser, floating card (fPERC, adapter PERC, BOSS), backplane, processor, cable, or other components
Detailed Description	Multiple issues are observed in the System Configuration Check operation.
Recommended Response Action	Do the following and retry the operation: 1. Disconnect the input power. 2. Check for proper cable connection and component placement. If the issue persists, contact the service provider.
Category	System Health (HWC = Hardware Config)
Severity	Critical

7

Installing and removing system components

Topics:

- Safety instructions
- Before working inside your system
- After working inside your system
- Recommended tools
- Optional front bezel
- System feet
- Optional caster wheels
- System cover
- Air shroud
- Cooling fans
- Cable routing
- Front PERC module
- Drives
- Drive backplane
- Drive bays
- Optional optical drive
- Optional tape backup unit
- Front IO module
- System memory
- Optional BOSS-N1 module
- Optional internal USB card
- Expansion cards and expansion card risers
- Optional GPU card
- GPU riser
- Processor and heat sink
- Optional OCP NIC card
- Optional serial COM port
- System battery
- Intrusion switch
- Power supply unit
- Power interposer board
- System board
- Trusted Platform Module

Safety instructions

NOTE: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

CAUTION: Ensure that two or more people lift the system horizontally from the box and place it on a flat surface, rack lift, or into the rails.

WARNING: Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.

WARNING: Do not operate the system without the cover for a duration exceeding five minutes. Operating the system without the system cover can result in component damage.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use an antistatic mat and antistatic strap while working on components inside the system.

CAUTION: To ensure proper operation and cooling, all system bays and fans must always be populated with a component or a blank.

NOTE: While replacing the hot swappable PSU, after next server boot, the new PSU automatically updates to the same firmware and configuration of the replaced one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at iDRAC Manuals.

NOTE: While replacing faulty storage controller, FC, or NIC card with the same type of card, after you power on the system, the new card automatically updates to the same firmware and configuration of the faulty one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at iDRAC Manuals.

NOTE: Only use certified Optical Fiber Transceiver Class I Laser Products.

Before working inside your system

Prerequisites

Follow the safety guidelines listed in the Safety instructions.

Steps

1. Power off the system and all attached peripherals.
2. Disconnect the system from the electrical outlet and disconnect the peripherals.
3. If applicable, remove the system from the rack.
   For more information, see the *Rail Installation Guide* relevant to your rail solutions at PowerEdge Manuals.
4. Remove the system cover.

After working inside your system

Prerequisites

Follow the safety guidelines listed in Safety instructions.

Steps

Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.

Recommended tools

You may need some or all of the following tools to perform the removal and installation procedures:

You need the following tools to assemble the cables for a DC power supply unit:

- AMP 90871-1 hand-crimping tool or equivalent
- Tyco Electronics 58433-3 or equivalent
- Wire-stripper pliers to remove insulation from size 10 AWG solid or stranded, insulated copper wire

NOTE: Use alpha wire part number 3080 or equivalent (65/30 stranding).

Optional front bezel

Removing the front bezel

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Keep the bezel key handy.

NOTE: The bezel key is part of the security bezel package.

Steps

1. Unlock the bezel.
2. Pull from the top end of the bezel to disengage it from the system.
3. Unhook the bezel tabs from the slots at the bottom of the system to remove the bezel from the system.

Figure 22. Removing the front bezel

Next steps

Installing the front bezel.

Installing the front bezel

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions .
2. Locate and remove the bezel key.

NOTE: The bezel key is part of the security bezel package.

Steps

1. Align and insert the tabs on the bezel into the slots on the system.

2. Push the bezel toward the system until the it locks into place.
3. Lock the bezel.

Figure 23. Installing the front bezel

System feet

Removing the system feet

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Place the system on its side on a flat, stable surface.
3. Rotate the system feet inward.

Steps

1. Using the Phillips #2 screwdriver, remove the screw that secures the foot to the base of the system.
2. Repeat the preceding step to remove the remaining system feet.

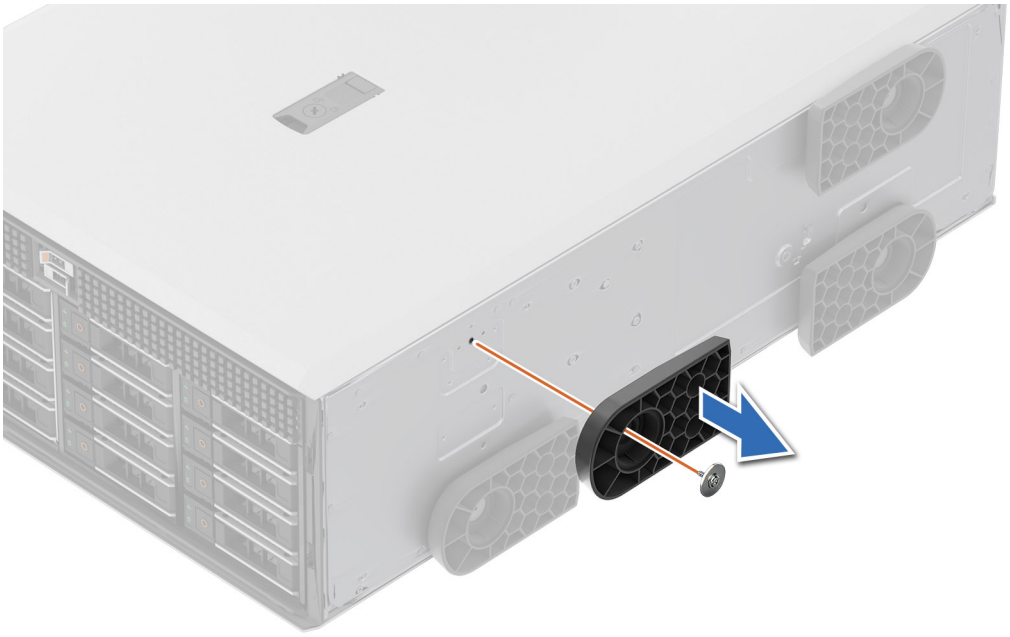


Figure 24. Removing the system feet

Next steps

Installing the system feet or install the caster wheels.

Installing the system feet

Prerequisites

CAUTION: Install the feet on a stand-alone tower system to provide stability to the system. An unstable system might tip over and cause injury to the user or damage to the system.

1. Follow the safety guidelines listed in Safety instructions.
2. Place the system on its side, on a flat, stable surface.

Steps

1. Align the three tabs on the system foot with the three slots on the base of the system.
2. Using the Phillips #2 screwdriver, tighten the screw that secures the foot to the base of the system.
3. Repeat the preceding step to install the remaining system feet.

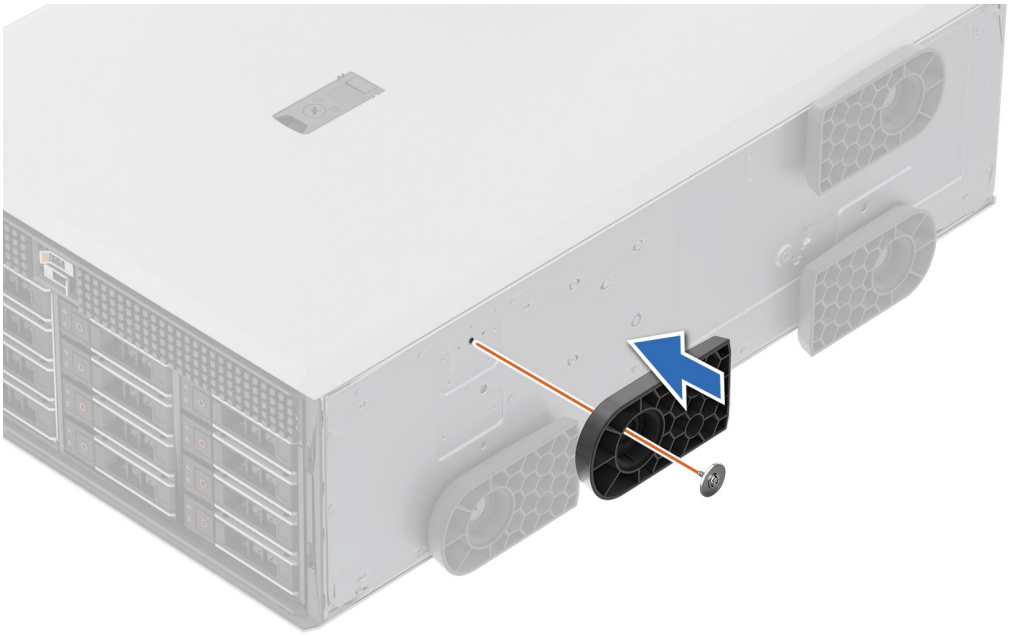


Figure 25. Installing the system feet

Next steps

1. Place the system upright on a flat, stable surface, and rotate the system feet outward.
2. Follow the procedure listed in After working inside your system.

Optional caster wheels

Removing caster wheels

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. If installed, remove the system feet.
3. Place the system on a flat, stable surface.

Steps

Using the Phillips #2 screwdriver, loosen the captive screw and remove the caster wheels from the base of the system.

Figure 26. Removing caster wheels

Next steps

replace the caster wheels or install the system feet.

Installing caster wheels

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Place the system on its side on a flat, stable surface.
3. If installed, remove the system feet.

CAUTION: Install the caster wheels on a stand-alone tower system to provide stability to the system. An unstable system might tip over and cause injury or damage to the system.

NOTE: This, T series server only uses Dell caster wheels.

Steps

Align the caster wheels to the base of system and tighten the captive screw to secure the caster wheels into place.

Figure 27. Installing caster wheels

Next steps

Follow the procedure listed in After working inside your system.

System cover

Removing the system cover

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Power off the system, and any attached peripherals.
3. Disconnect the system from the electrical outlet and peripherals.
4. If installed, remove the front bezel.

Steps

1. Use a 1/4-inch flat head or a Phillips #2 screwdriver to turn the cover release latch lock counterclockwise to the unlock position.
2. Lift the release latch until the system cover slides back.
3. Lift the cover from the system.

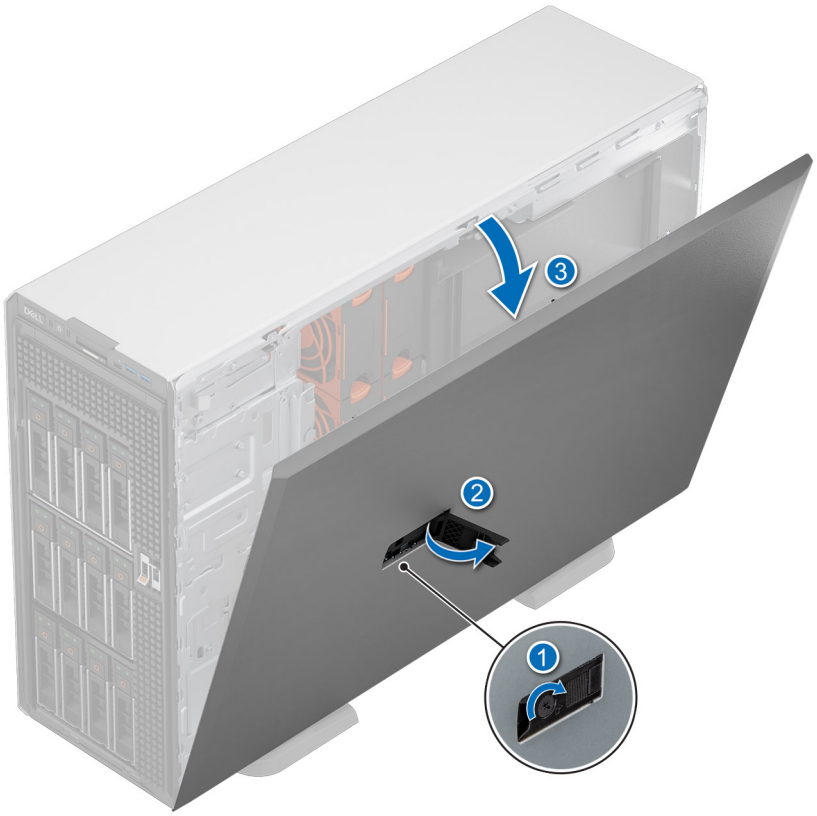


Figure 28. Removing the system cover

Next steps

Replace the system cover.

Installing the system cover

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure listed in Before working inside your system

NOTE: Ensure that all internal cables are connected and routed properly, and that there are no tools or extra parts that are left inside the system.

Steps

1. Align the tabs on the system cover with the guide slots on the system and slide the system cover.
2. Close the system cover release latch.

   NOTE: Ensure that the system cover closes without obstruction or unnecessary force. Reseat any cables or components or realign the system cover if necessary.

3. Using a 1/4-inch flat head or Phillips #2 screwdriver, rotate the lock clockwise to the lock position.

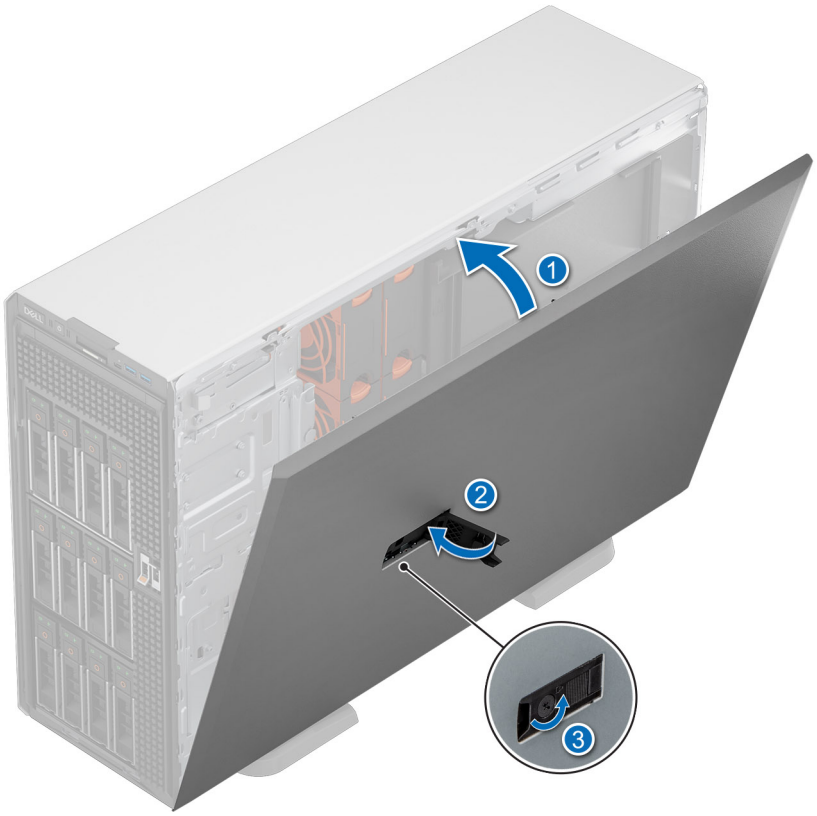


Figure 29. Installing the system cover

Next steps

1. If removed, install the front bezel.
2. Reconnect the peripherals and connect the system to the electrical outlet.
3. Power on the system, including all attached peripherals.

Air shroud

Removing the air shroud

Prerequisites

CAUTION: Never operate your system with the air shroud removed. The system may get overheated quickly, resulting in shutdown of the system and loss of data.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure listed in Before working inside your system.

Steps

Hold the edges of the air shroud, and lift the air shroud out of the system.

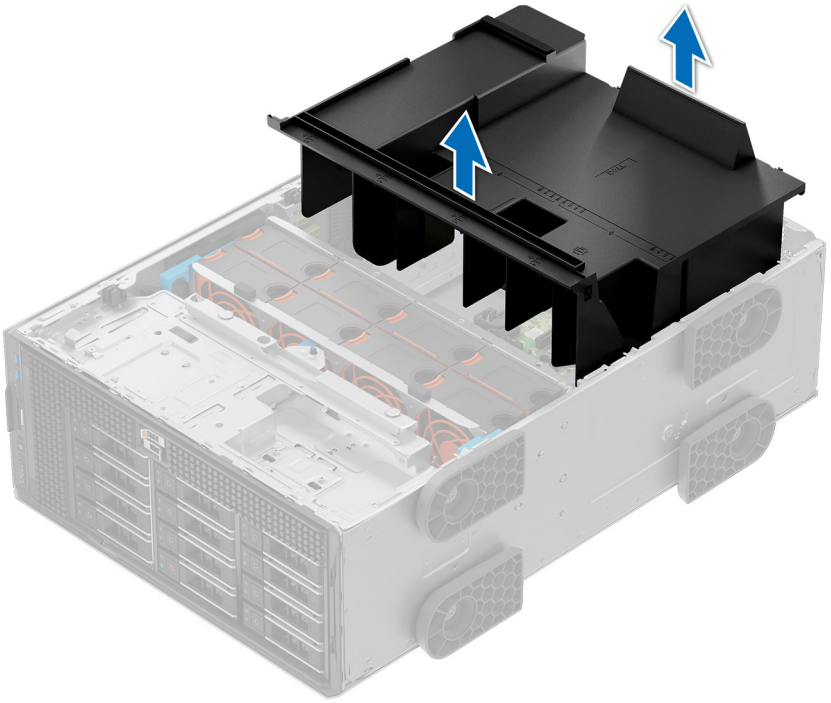


Figure 30. Removing the air shroud

Next steps

Replace the air shroud.

Installing the air shroud

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If applicable, route the cables inside the system along the chassis wall and secure the cables by using the cable-securing bracket.

Steps

1. Align the tabs on the air shroud with the guide pins on the system.

2. Lower the air shroud into the system, until firmly seated.

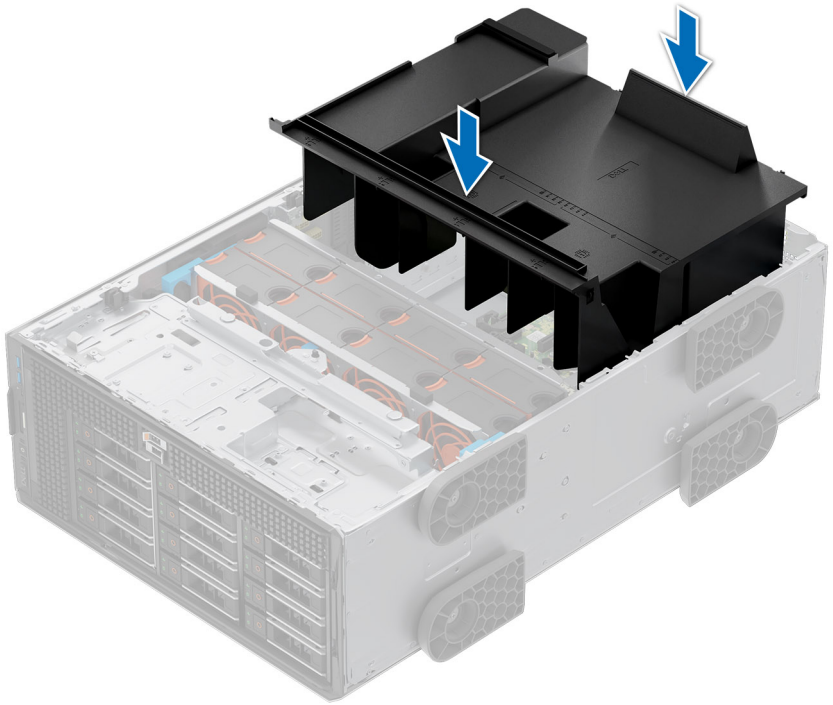


Figure 31. Installing the air shroud

Next steps

Follow the procedure listed in After working inside your system.

Cooling fans

Fan board view

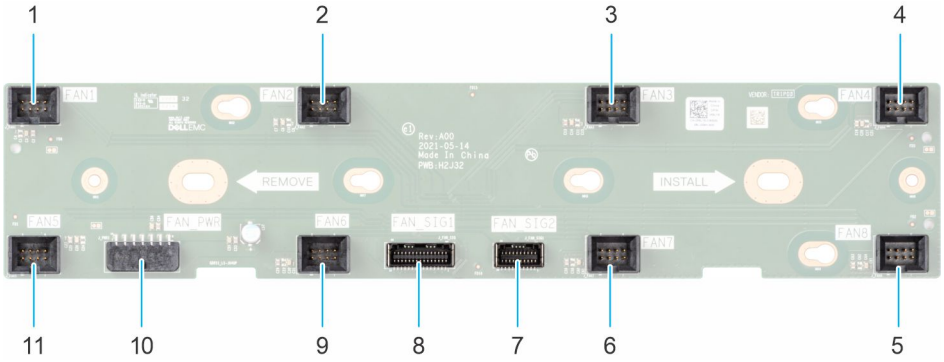


Figure 32. Fan board connectors

1. FAN1
2. FAN2
3. FAN3
4. FAN4
5. FAN8
6. FAN7
7. FAN_SIG2

8. FAN_SIG1
9. FAN6
10. FAN_PWR
11. FAN5

Removing the fan board tray

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the cooling fan cage.
5. Disconnect the cables that are connected to the fan board.

Steps

1. Loosen the captive screw and slide the fan board tray to the right of the system to disengage it from the chassis.
2. Lift the fan board tray out of the system.

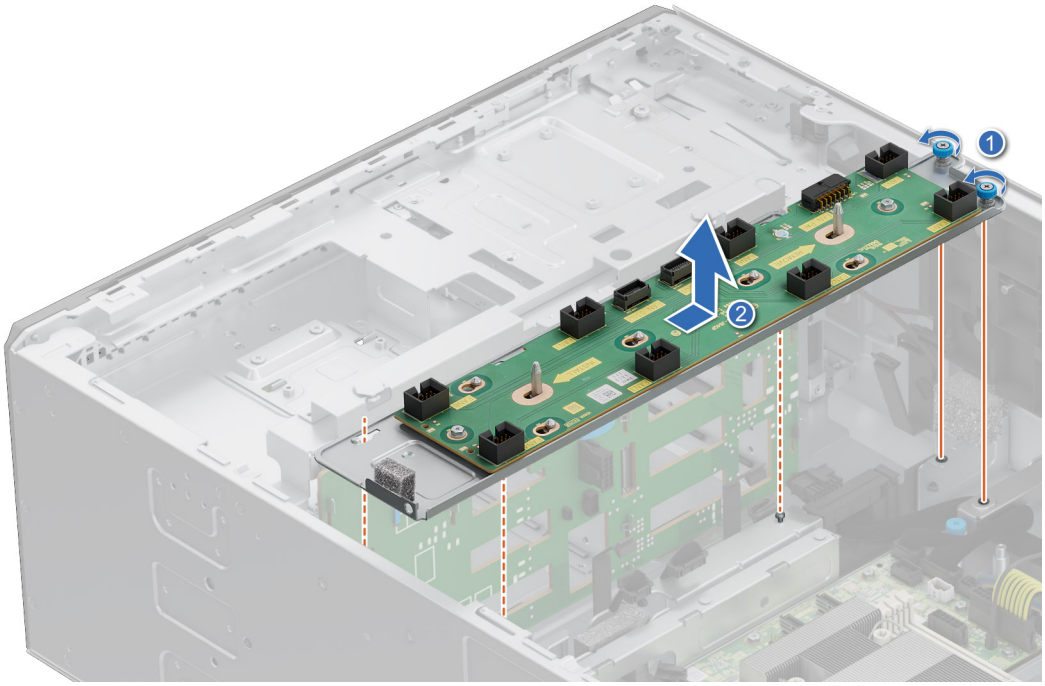


Figure 33. Remove the fan board tray

Next steps

Replace the fan board tray.

Installing the fan board tray

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the cooling fan assembly .
5. Disconnect the cables that are connected to the fan board.

Steps

1. Align the fan board tray to the guide pins on the system, slide the tray to the left of the system to lock it in place.
2. Tighten the captive screw to secure the fan board tray to the system.

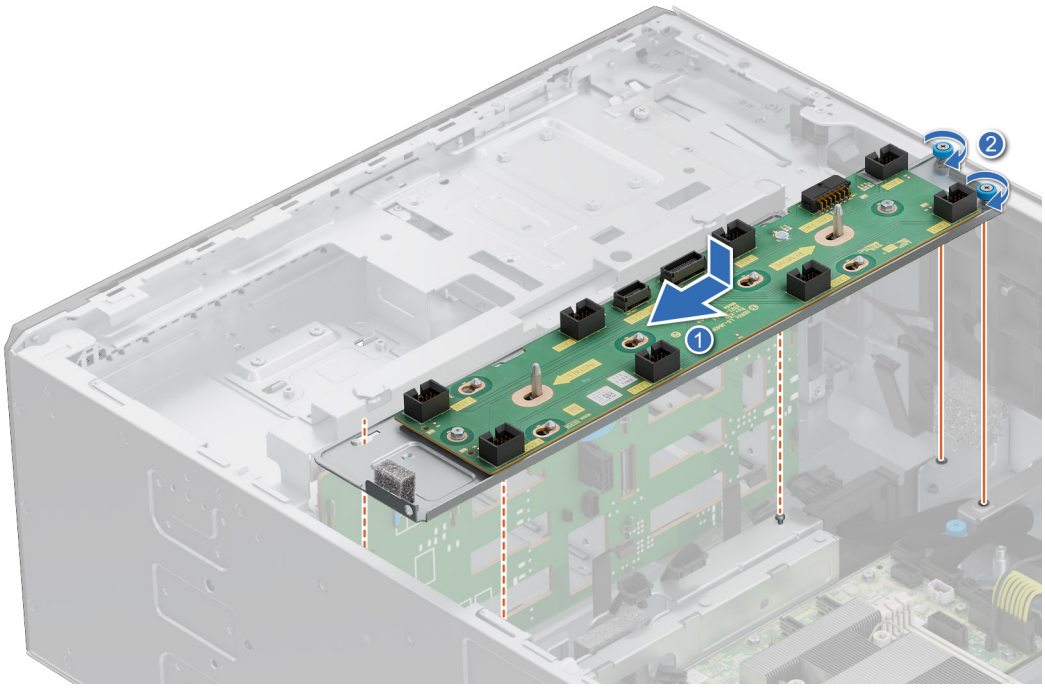


Figure 34. Installing the fan board tray

Next steps

1. Connect the cables to the fan board.
2. Install the cooling fan assembly.
3. Install the air shroud.
4. Follow the procedure listed in After working inside your system.

Removing the cooling fan cage

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Lift the blue release levers to unlock the cooling fan cage assembly from the system.
2. Hold the release levers, and lift the cooling fan cage assembly away from the system.

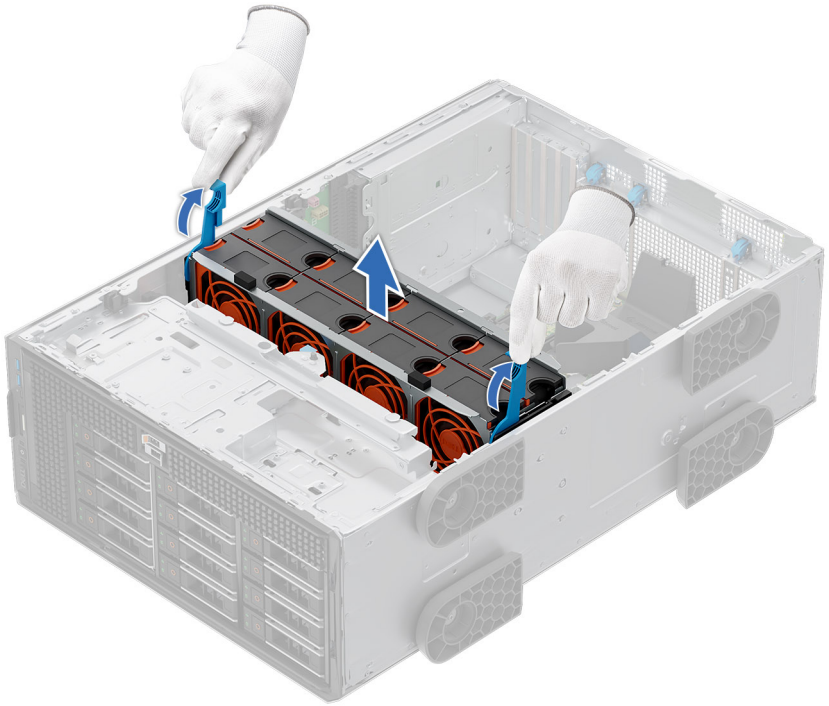


Figure 35. Removing the cooling fan assembly

Next steps

Replace the cooling fan assembly.

Installing the cooling fan cage

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.

   CAUTION: Ensure that the cables inside the system are correctly installed and retained by the cable retention bracket before installing the cooling fan cage. Incorrectly installed cables may get damaged.

2. Follow the procedure listed in Before working inside your system .
3. If installed, Remove the air shroud.

Steps

1. Holding the blue release lever of the cooling fan cage, align the guide rails with the guides on the system.
2. Lower the cooling fan cage assembly into the system until seated firmly.
3. Lower the blue release lever and press to lock the cooling fan cage assembly into the system.

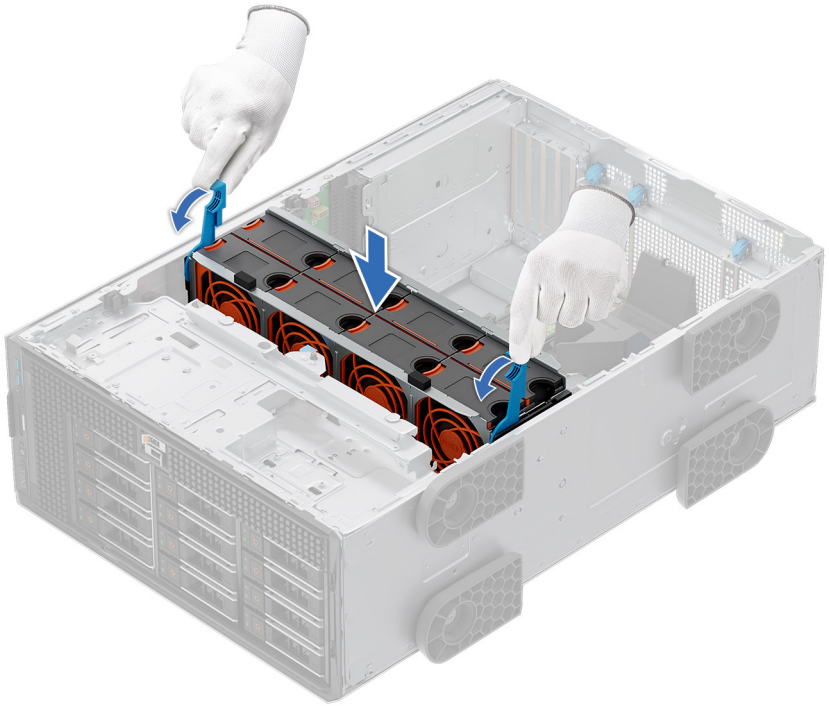


Figure 36. Installing the cooling fan assembly

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

Removing a cooling fan

The procedure for removing a standard and a high-performance fan is identical.

Prerequisites

NOTE: Opening or removing the system cover when the system is on may expose you to a risk of electric shock. Exercise utmost care while removing or installing cooling fans.

CAUTION: The cooling fans are hot swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .

Steps

Press the release tab and lift the cooling fan out of the cooling fan cage.

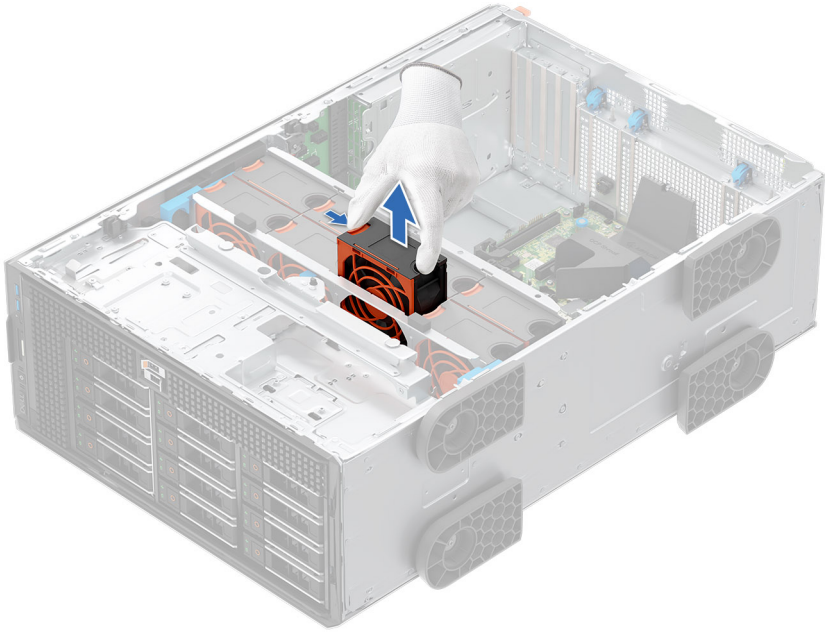


Figure 37. Removing a cooling fan

Next steps

Replace the cooling fan.

Installing a cooling fan

The procedure for installing a standard and a high-performance fan is identical.

Prerequisites

NOTE: Opening or removing the system cover when the system is on may expose you to a risk of electric shock. Exercise utmost care while removing or installing cooling fans.

CAUTION: The cooling fans are hot swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .

Steps

Align and lower the cooling fan into the cooling fan assembly until the fan clicks into place.

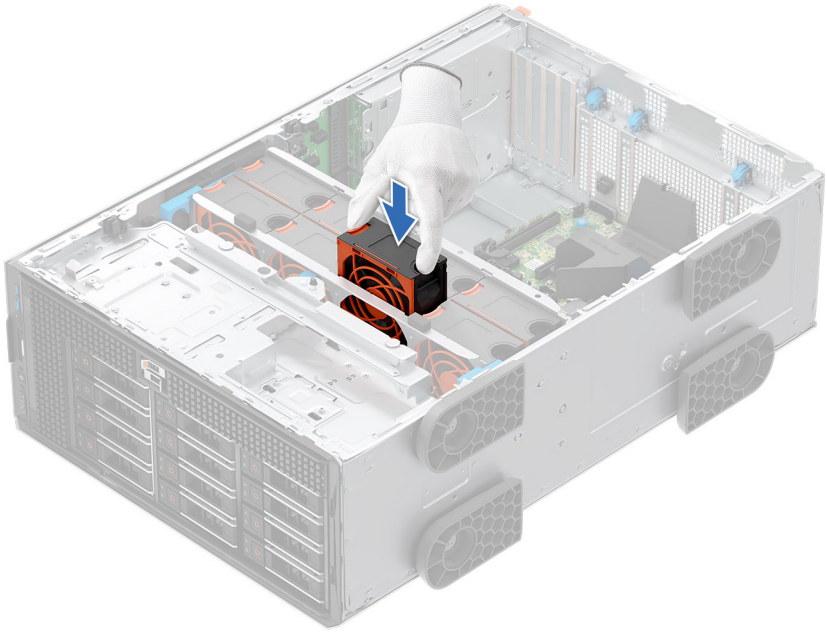


Figure 38. Installing a cooling fan

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

Cable routing

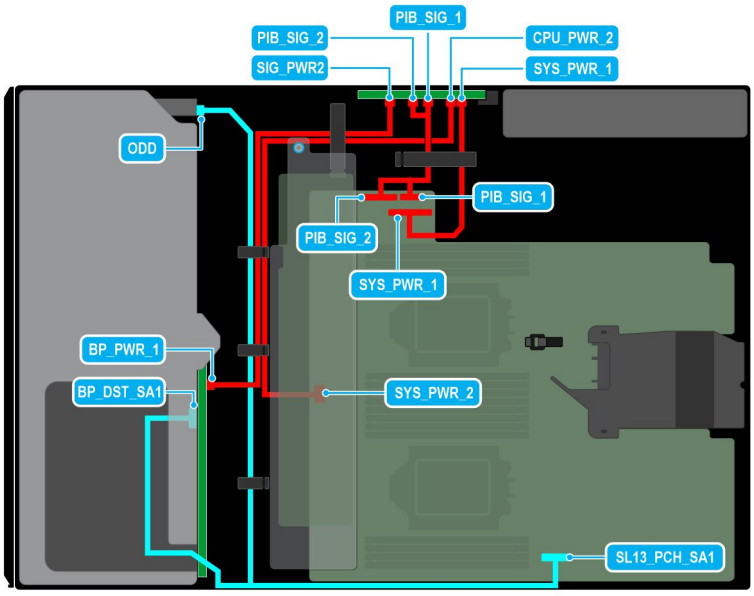


Figure 39. Configuration 1: 8x3.5-inch (ChipsetSATA) on CPU 2

Table 74. Configuration 1: 8x3.5-inch (ChipsetSATA) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	BP_DST_SA1 (Signal connector on backplane)	SL13_PCH_SA1 (Signal connector on system board)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	ODD (Optical disk drive)	SL13_PCH_SA1 (Signal connector on system board)

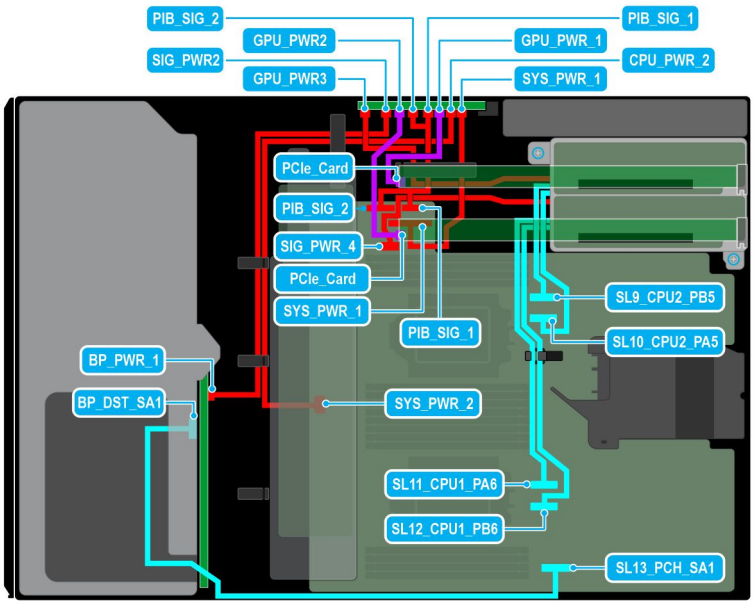


Figure 40. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2

Table 75. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	BP_DST_SA1 (Signal connector on backplane)	SL13_PCH_SA1 (Signal connector on system board)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)

Table 75. Configuration 2: 8x3.5-inch (ChipsetSATA) + GPUx2 on CPU 2 (continued)

Order	From	To
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2

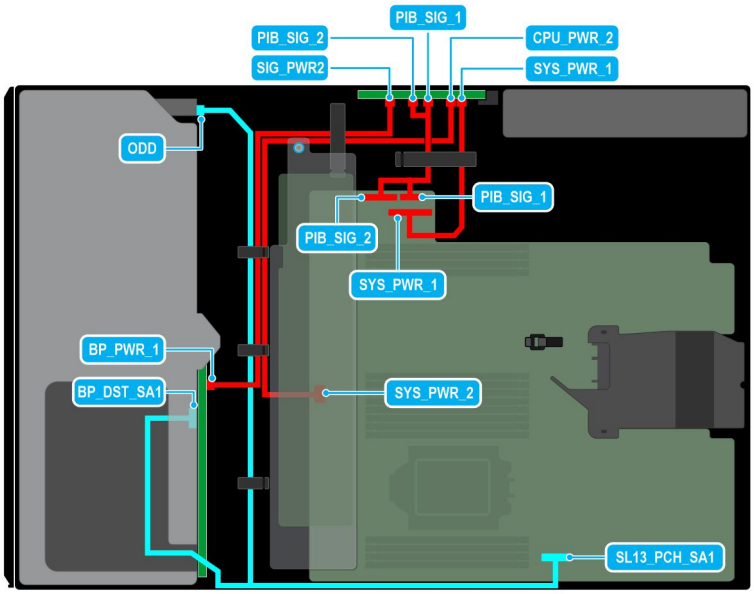


Figure 41. Configuration 3: 8x3.5-inch (ChipsetSATA) on CPU 1

Table 76. Configuration 3: 8x3.5-inch (ChipsetSATA) on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	BP_DST_SA1 (Signal connector on backplane)	SL13_PCH_SA1 (Signal connector on system board)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	ODD (Optical disk drive)	SL13_PCH_SA1 (Signal connector on system board)

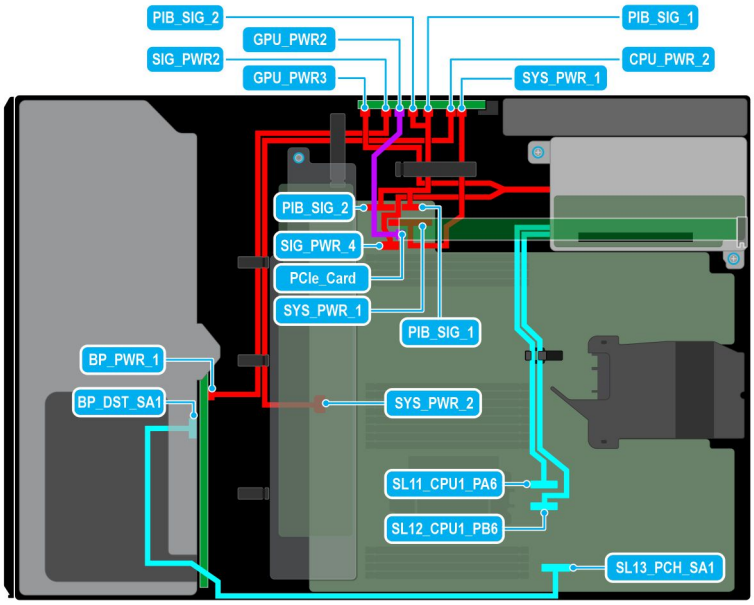


Figure 42. Configuration 4: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 1

Table 77. Configuration 4: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	BP_DST_SA1 (Signal connector on backplane)	SL13_PCH_SA1 (Signal connector on system board)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2

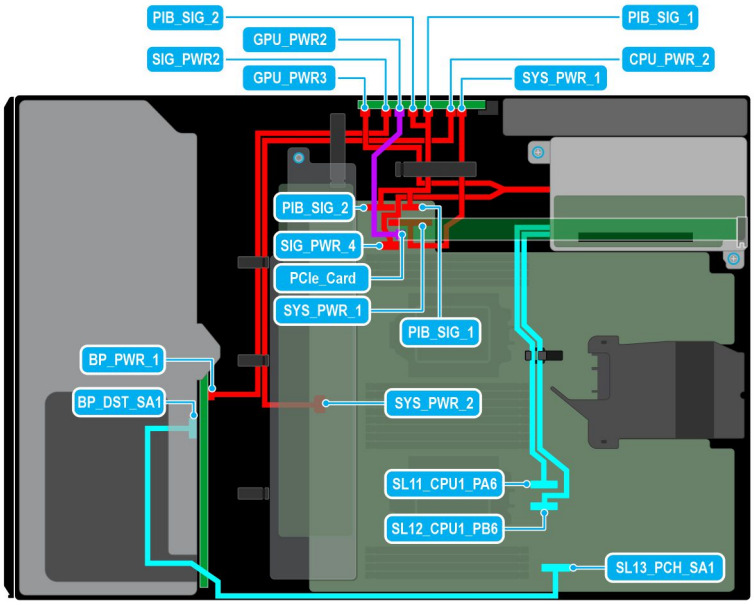


Figure 43. Configuration 5: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 2

Table 78. Configuration 5: 8 x 3.5-inch (Chipset SATA) + 1 x GPU on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	BP_DST_SA1 (Signal connector on backplane)	SL13_PCH_SA1 (Signal connector on system board)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2

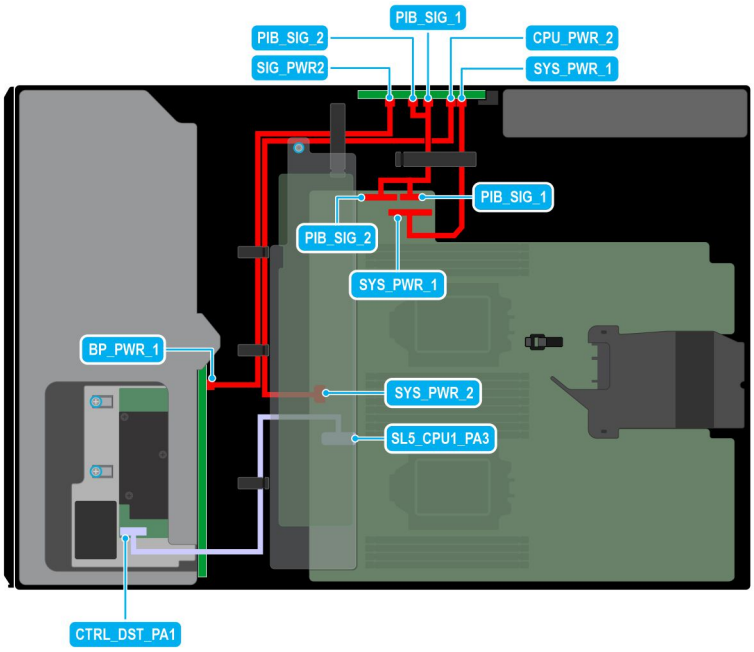


Figure 44. Configuration 6: 8x3.5-inch (SAS/SATA) on CPU 2

Table 79. Configuration 6: 8x3.5-inch (SAS/SATA) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
5	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
6	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

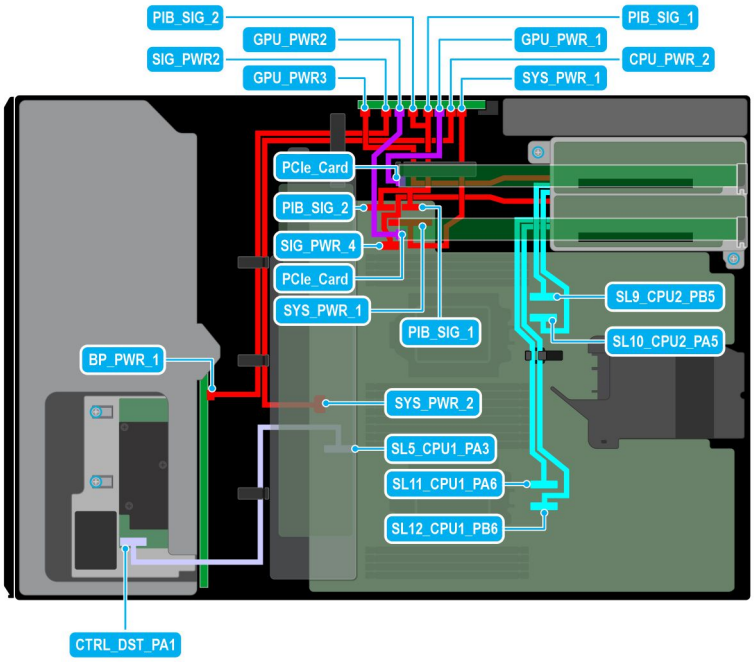


Figure 45. Configuration 7: 8x3.5-inch (SAS/SATA) + GPUx2 on CPU 2

Table 80. Configuration 7: 8x3.5-inch (SAS/SATA) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

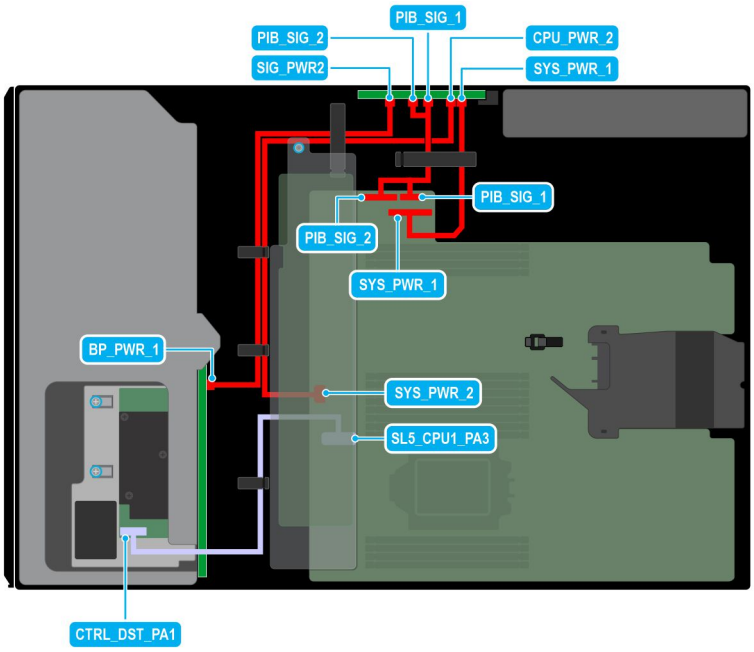


Figure 46. Configuration 8: 8x3.5-inch (SAS/SATA) on CPU 1

Table 81. Configuration 8: 8x3.5-inch (SAS/SATA) on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
5	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
6	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

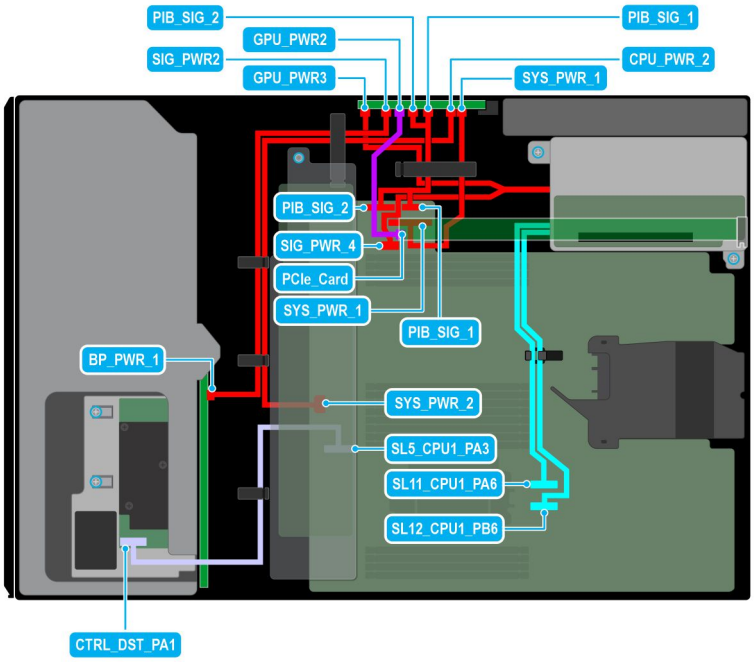


Figure 47. Configuration 9: 8x3.5-inch (SAS/SATA) + GPUx1 on CPU 1

Table 82. Configuration 9: 8x3.5-inch (SAS/SATA) + GPUx1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

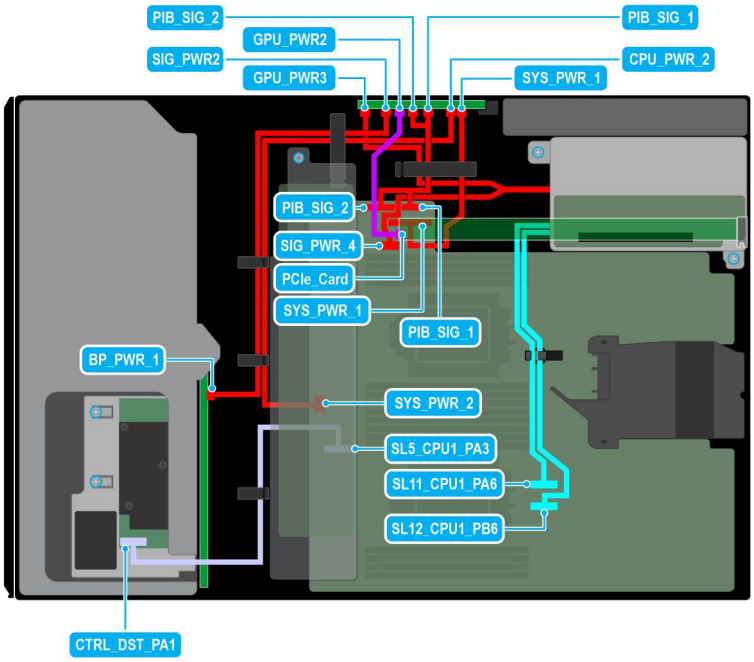


Figure 48. Configuration 10 : 8x3.5-inch (SAS/SATA) + GPUx1 on CPU 2

Table 83. Configuration 10 : 8x3.5-inch (SAS/SATA) + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

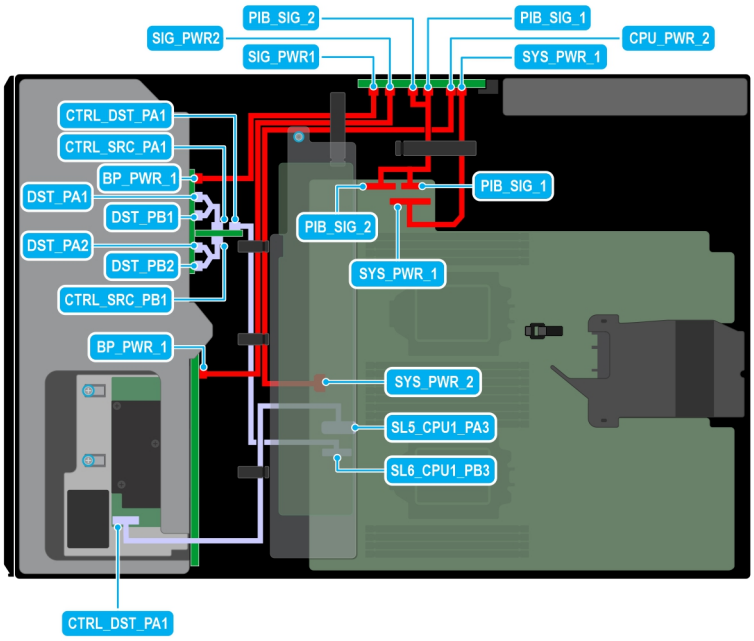


Figure 49. Configuration 11: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 2

Table 84. Configuration 11: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
8	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (NVMe RAID)
9	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
10	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

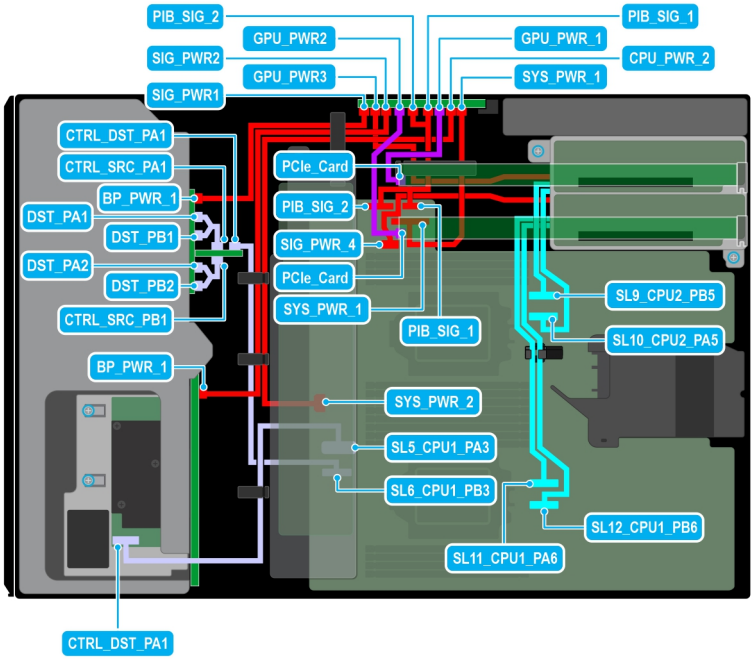


Figure 50. Configuration 12: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx2 on CPU 2

Table 85. Configuration 12: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PA1 (NVMe RAID)
12	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
13	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

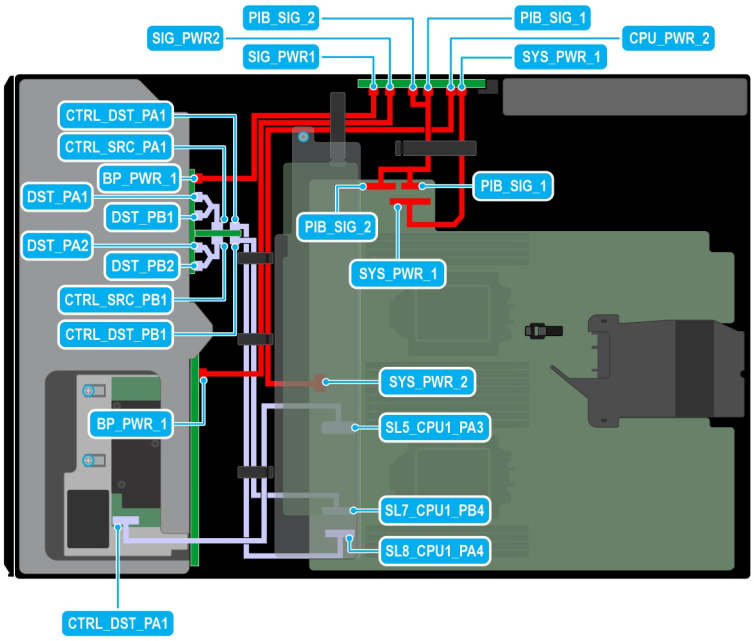


Figure 51. Configuration 13: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) on CPU 2

Table 86. Configuration 13: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
8	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
9	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
10	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
11	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

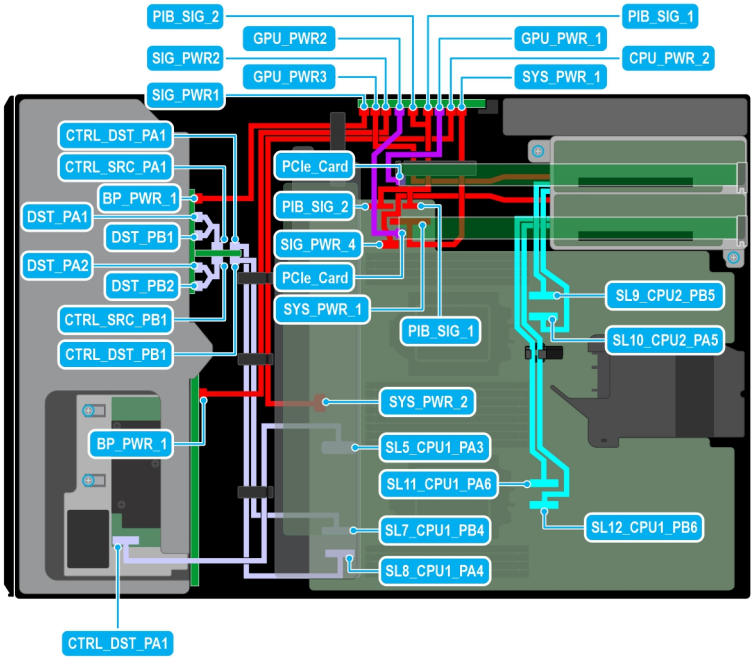


Figure 52. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx2 on CPU 2

Table 87. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
12	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
13	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)

Table 87. Configuration 14: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx2 on CPU 2 (continued)

Order	From	To
14	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

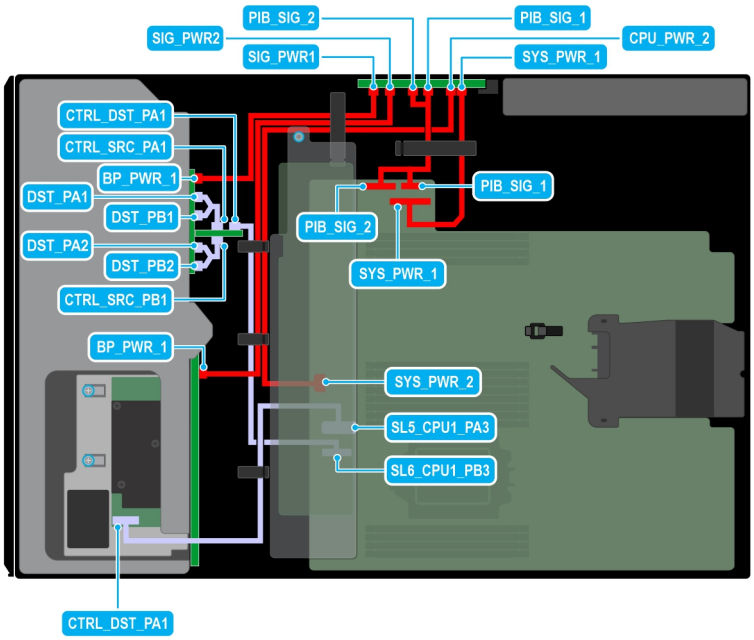


Figure 53. Configuration 15: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 1

Table 88. Configuration 15: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
8	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PA1 (NVMe RAID)
9	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
10	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

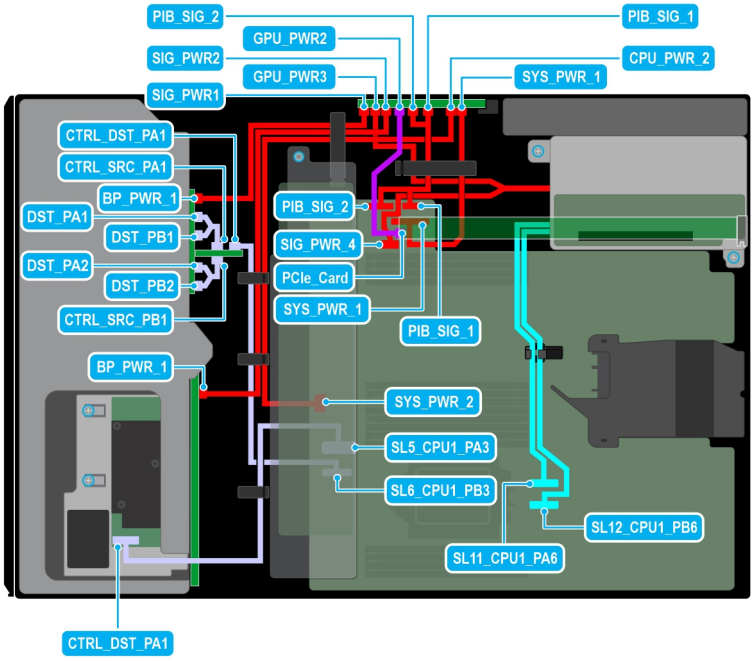


Figure 54. Configuration 16: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx 1 on CPU 1

Table 89. Configuration 16: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx 1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
12	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

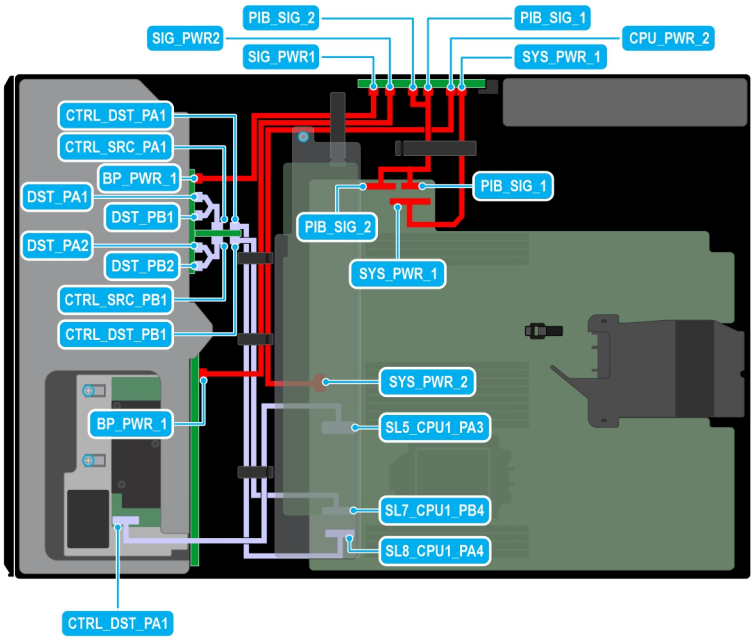


Figure 55. Configuration 17: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) on CPU 1

Table 90. Configuration 17: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
6	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
7	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
8	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
9	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

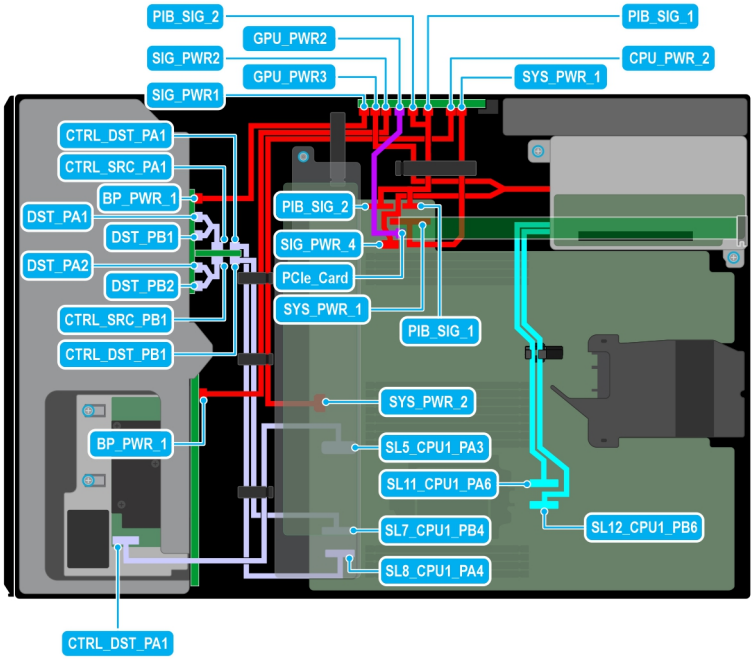


Figure 56. Configuration 18: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 1

Table 91. Configuration 18: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
11	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
12	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
13	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

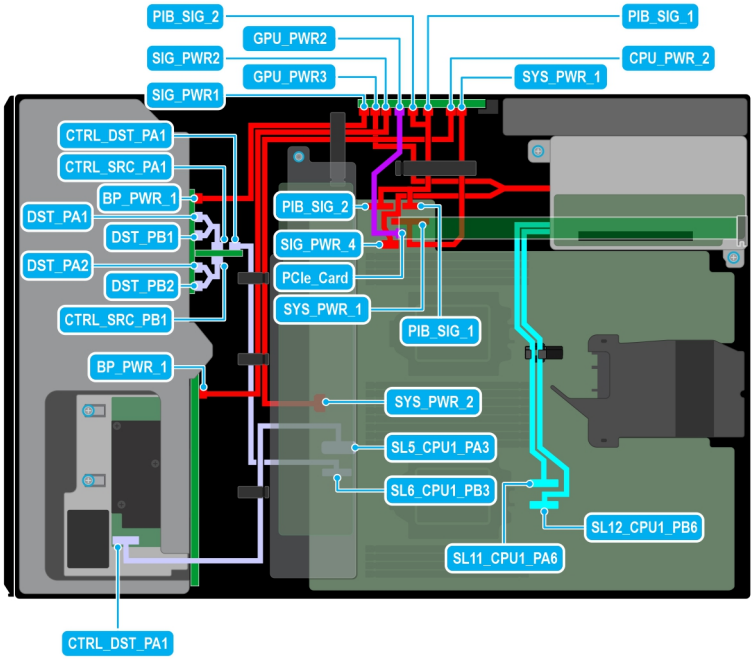


Figure 57. Configuration 19: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx 1 on CPU 2

Table 92. Configuration 19: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC11) + GPUx 1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
12	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

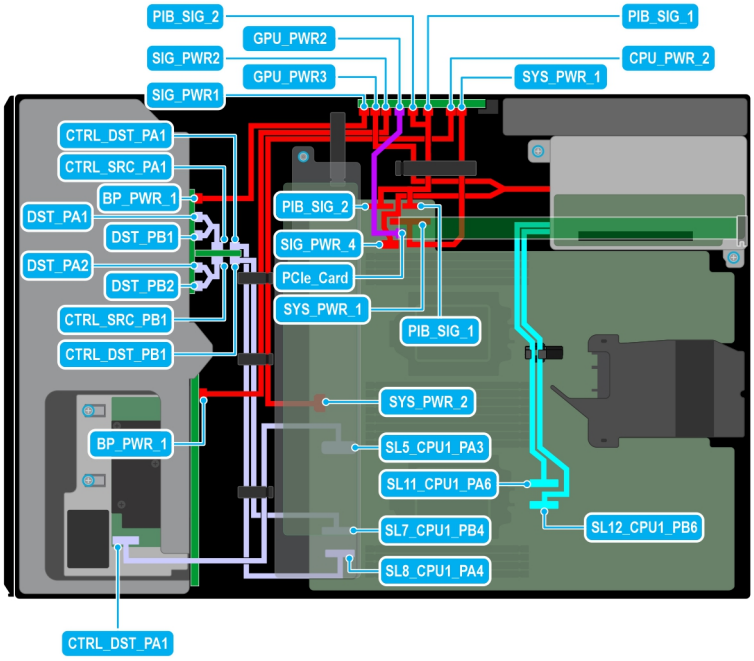


Figure 58. Configuration 20: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 2

Table 93. Configuration 20: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe RAID fPERC12) + GPUx 1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
11	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
12	DST_PA1 and DST_PB1 (Backplane signal connector)	CTRL_SRC_PA1 (Controller connector on NVMe RAID)
13	DST_PA2 and DST_PB2 (Backplane signal connector)	CTRL_SRC_PB1(Controller connector on NVMe RAID)

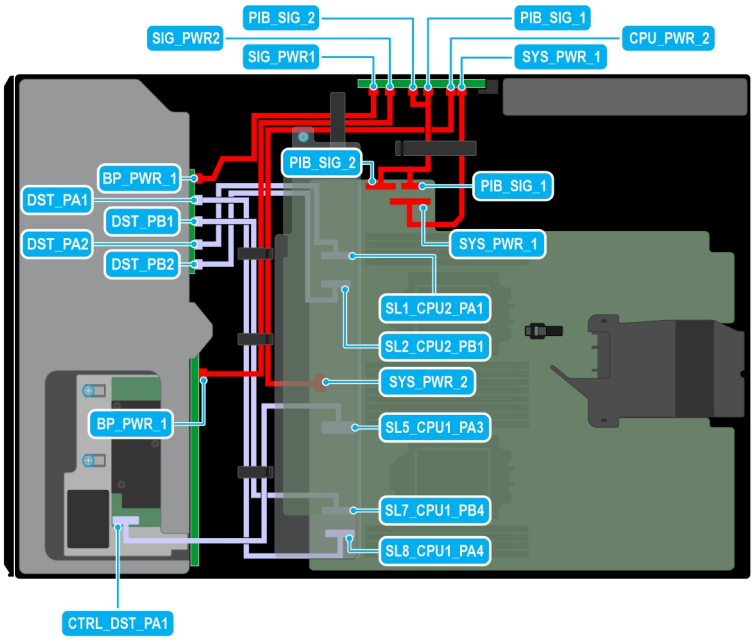


Figure 59. Configuration 21: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) on CPU 2

Table 94. Configuration 21: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SL1_CPU2_PA1 (Signal connector on system board)	DST_PA2 (Backplane signal connector)
7	SL2_CPU2_PB1(Signal connector on system board)	DST_PB2 (Backplane signal connector)
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
9	SL7_CPU1_PB4 (Signal connector on system board)	DST_PB1 (Backplane signal connector)
10	SL8_CPU1_PA4 (Signal connector on system board)	DST_PA1 (Backplane signal connector)

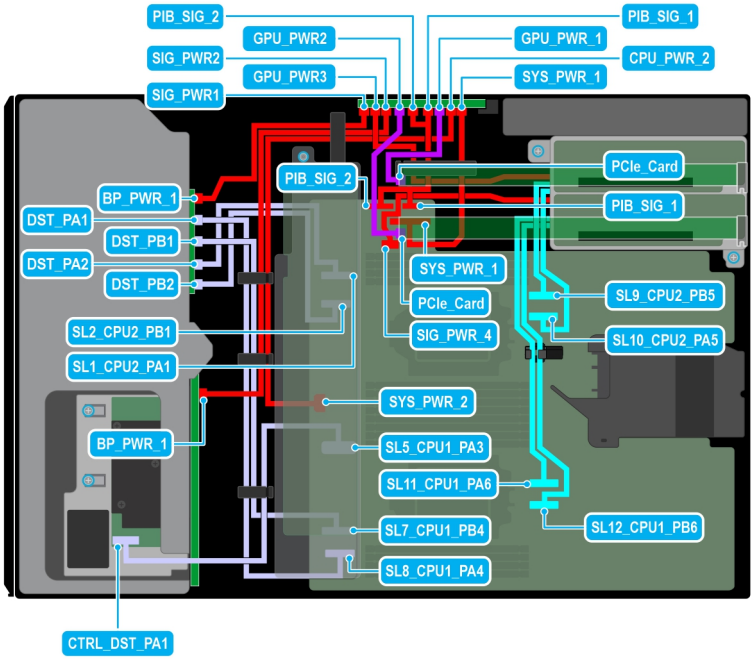


Figure 60. Configuration 22: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx2 on CPU 2

Table 95. Configuration 22: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	SL7_CPU1_PB4 (Signal connector on system board)	DST_PB1 (Backplane signal connector)
12	SL8_CPU1_PA4 (Signal connector on system board)	DST_PA1 (Backplane signal connector)

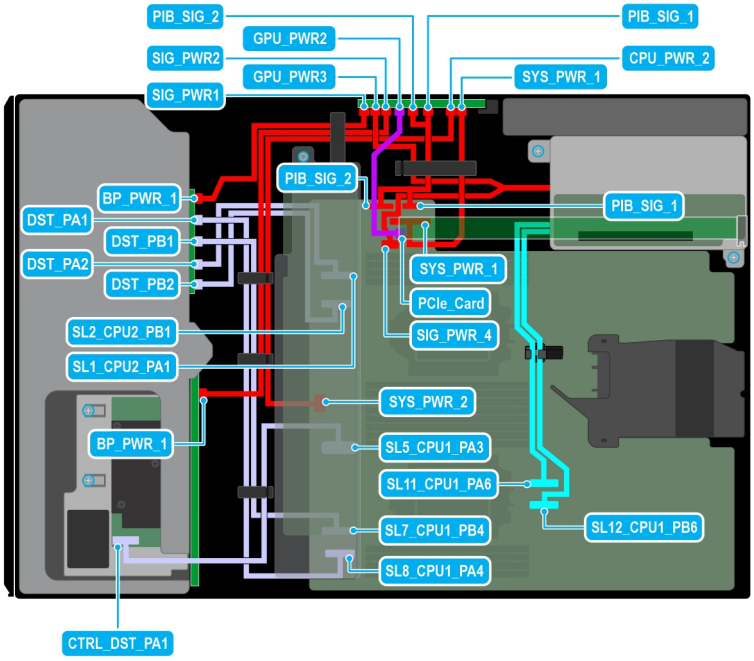


Figure 61. Configuration 23: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx1 on CPU 2

Table 96. Configuration 23: 8x3.5-inch (SAS/SATA) + 8x2.5-inch (NVMe) + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	SL7_CPU1_PB4 (Signal connector on system board)	DST_PB1 (Backplane signal connector)
11	SL8_CPU1_PA4 (Signal connector on system board)	DST_PA1 (Backplane signal connector)

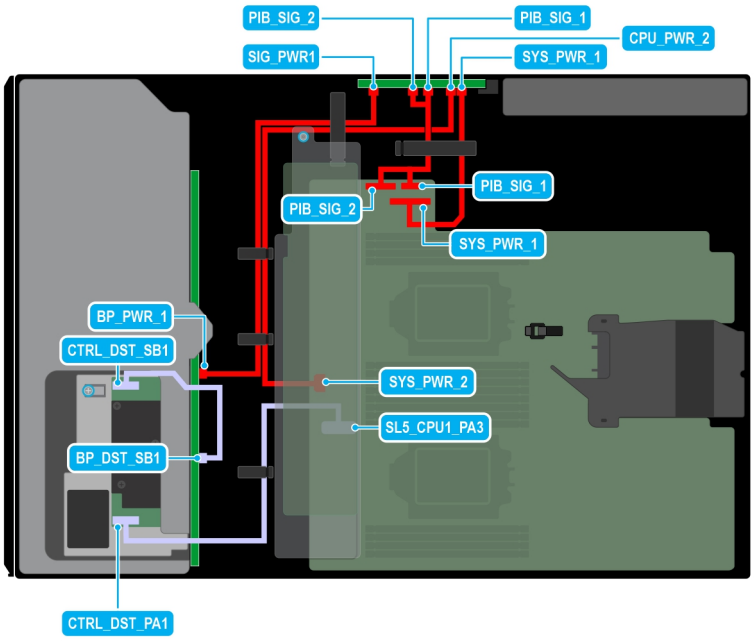


Figure 62. Configuration 24: 12x3.5-inch (SAS/SATA) on CPU 2

Table 97. Configuration 24: 12x3.5-inch (SAS/SATA) on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
5	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
6	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

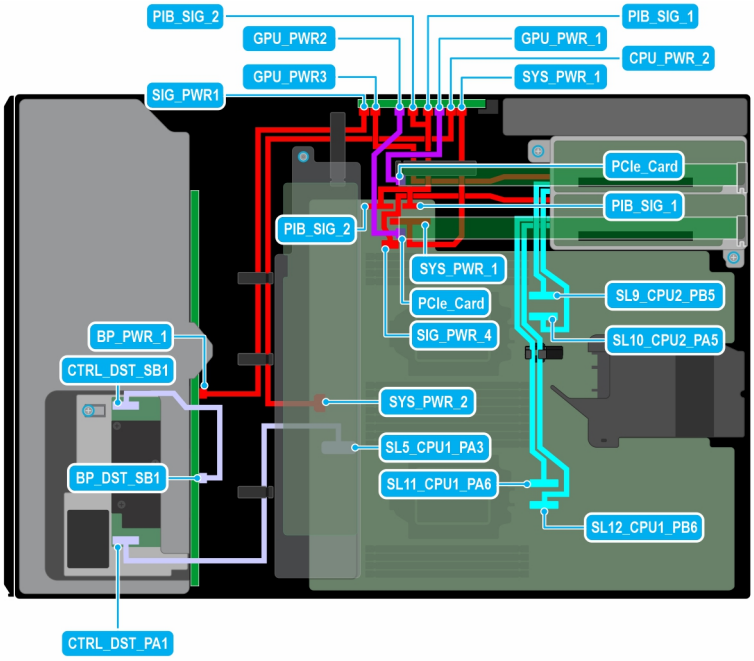


Figure 63. Configuration 25: 12x3.5-inch (SAS/SATA) + GPUx2 on CPU 2

Table 98. Configuration 25: 12x3.5-inch (SAS/SATA) + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

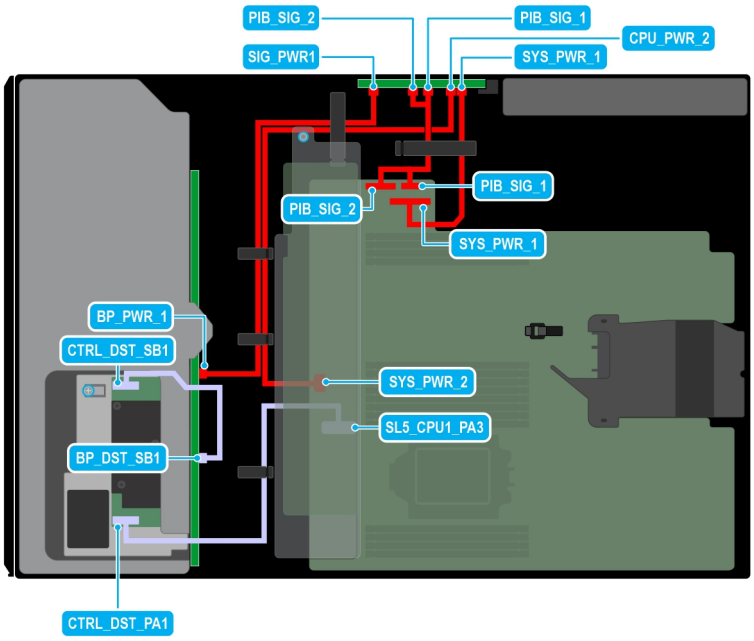


Figure 64. Configuration 26: 12x3.5-inch (SAS/SATA) on CPU 1

Table 99. Configuration 26: 12x3.5-inch (SAS/SATA) on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
5	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
6	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

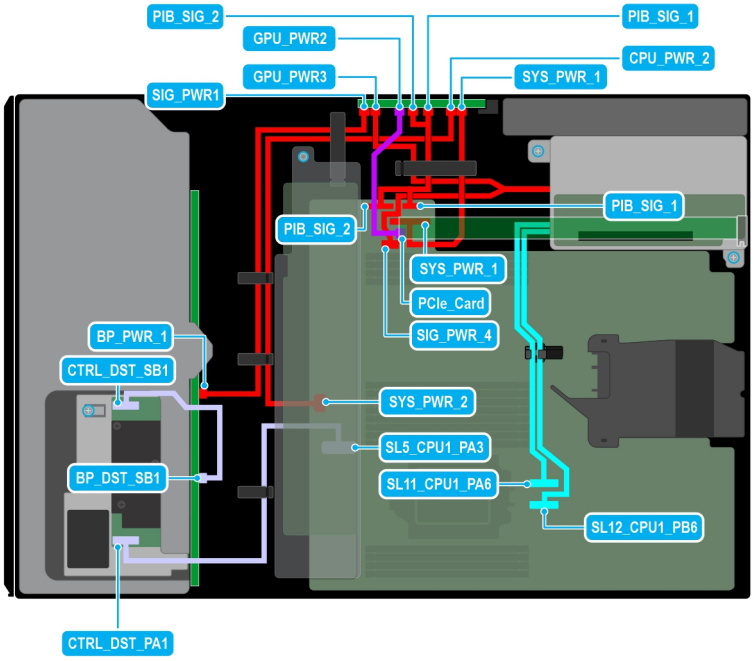


Figure 65. Configuration 27 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 1

Table 100. Configuration 27 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
9	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

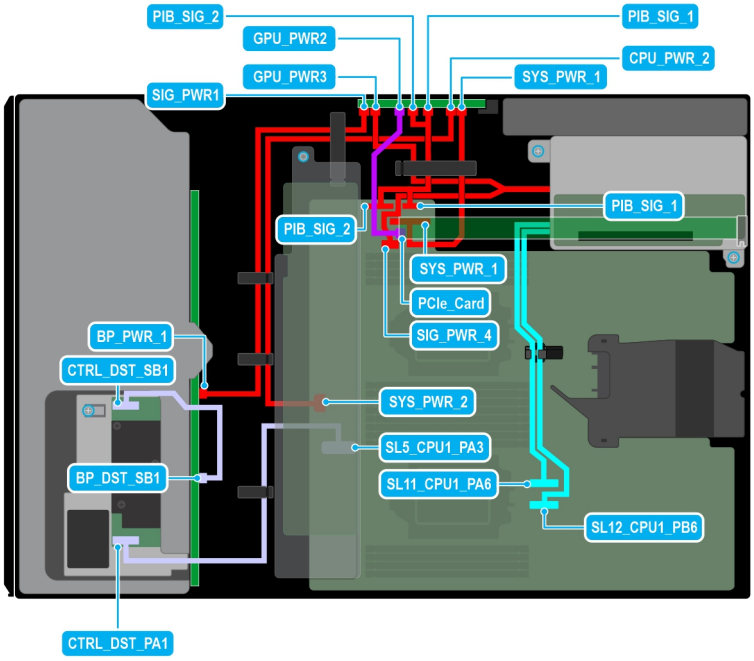


Figure 66. Configuration 28 : 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 2

Table 101. Configuration 28 : 12x3.5-inch (SAS/SATA) + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
9	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

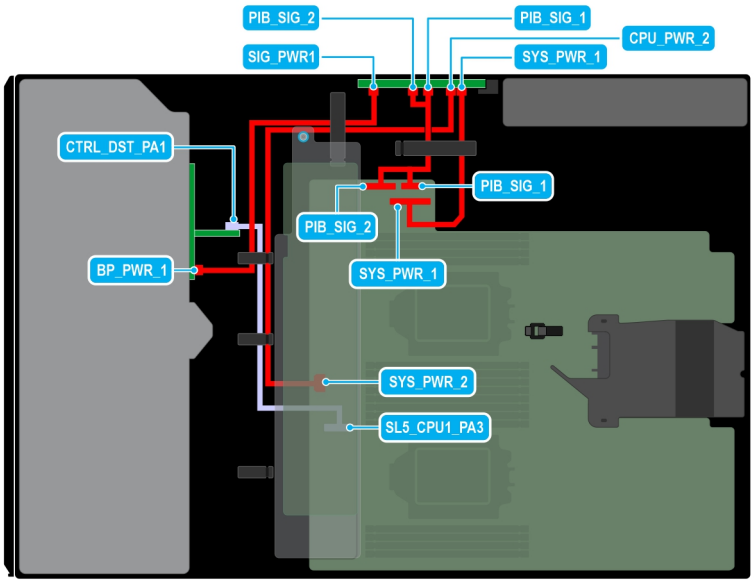


Figure 67. Configuration 29: 8 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2

Table 102. Configuration 29: 8 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
5	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
6	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

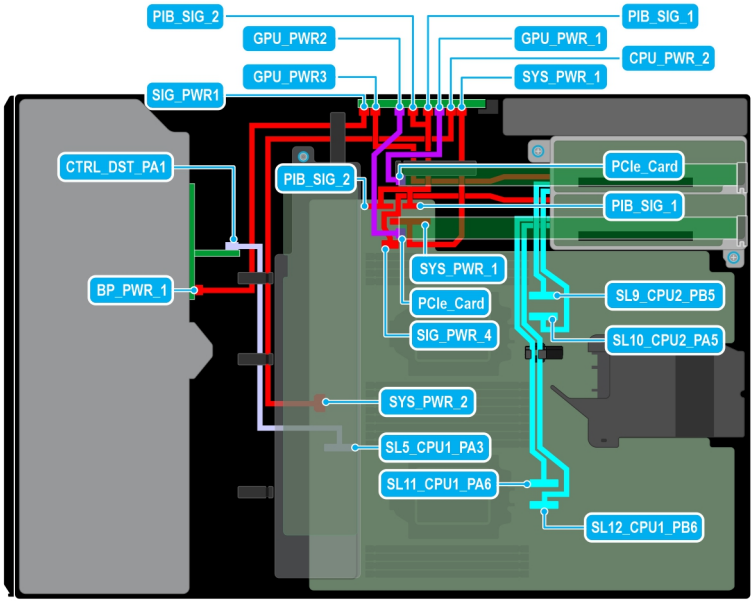


Figure 68. Configuration 30: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Table 103. Configuration 30: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

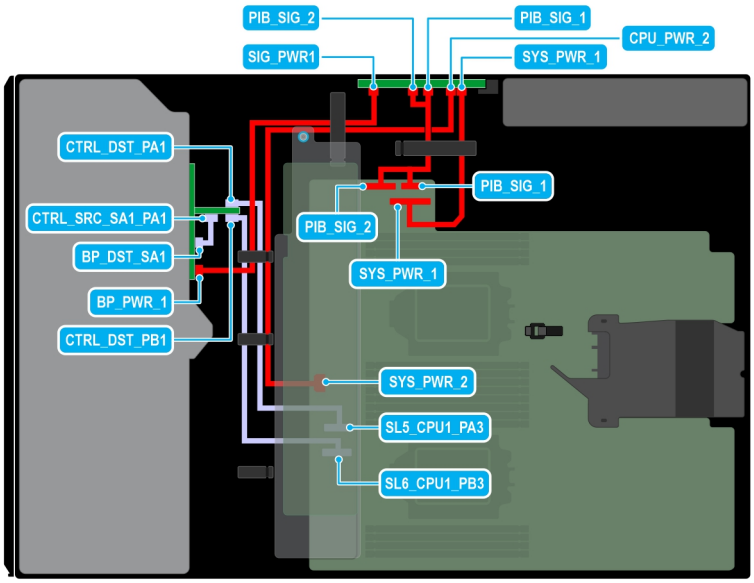


Figure 69. Configuration 31: 8 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Table 104. Configuration 31: 8 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
5	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
6	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
7	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
8	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)

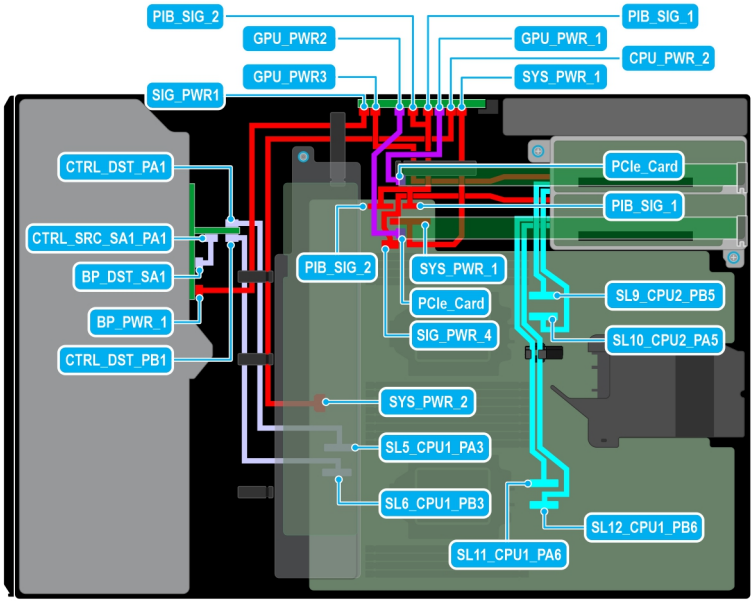


Figure 70. Configuration 32: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Table 105. Configuration 32: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
11	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)

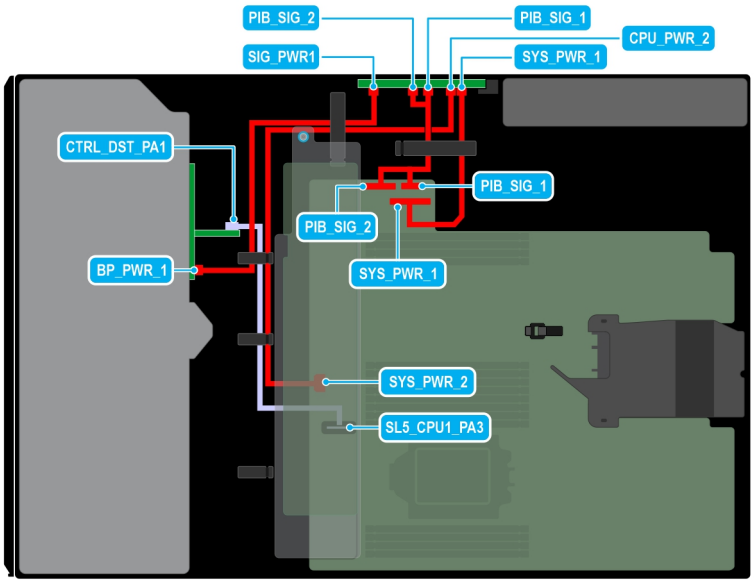


Figure 71. Configuration 33: 8 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Table 106. Configuration 33: 8 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
5	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
6	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

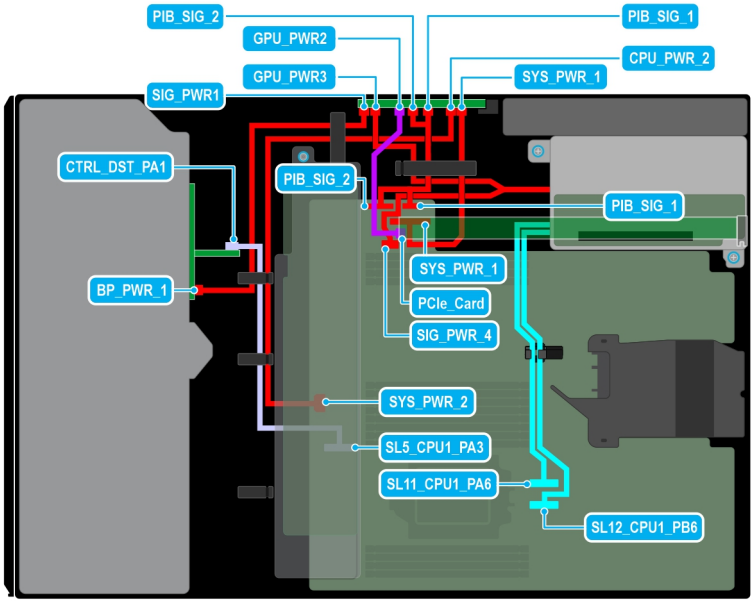


Figure 72. Configuration 34: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1

Table 107. Configuration 34: 8 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

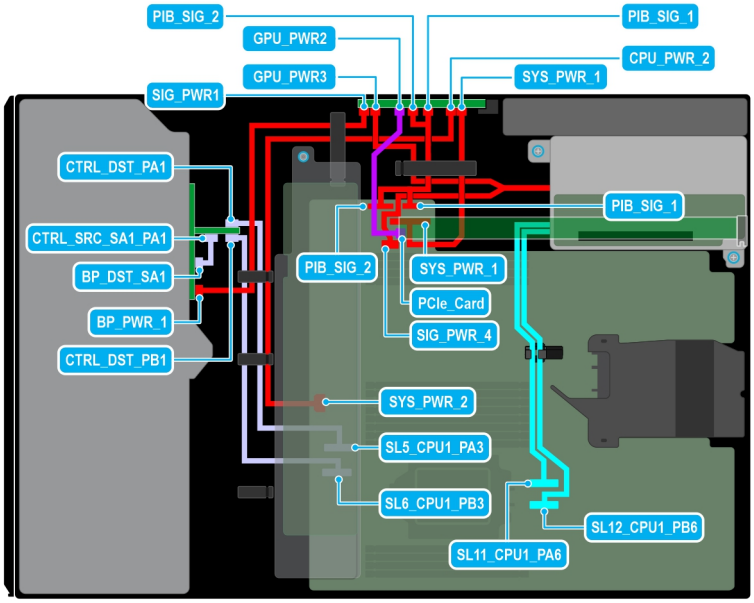


Figure 73. Configuration 35: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx 1 on CPU 1

Table 108. Configuration 35: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx 1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
9	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
10	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)

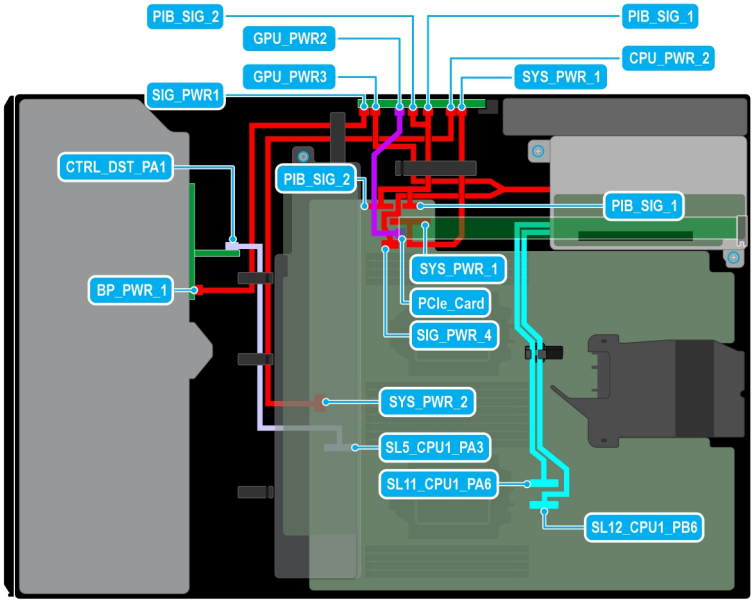


Figure 74. Configuration 36: 8 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2

Table 109. Configuration 36: 8 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

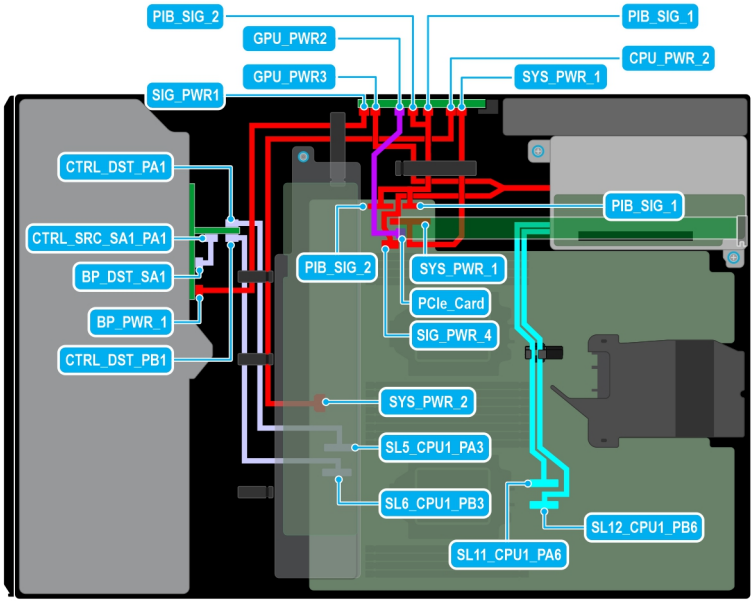


Figure 75. Configuration 37: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx 1 on CPU 2

Table 110. Configuration 37: 8 x2.5-inch (SAS4/SATA) fPERC12 + GPUx 1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane power connector)	SIG_PWR_2 (Power connector on PIB)
4	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
5	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
6	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
7	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
9	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
10	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)

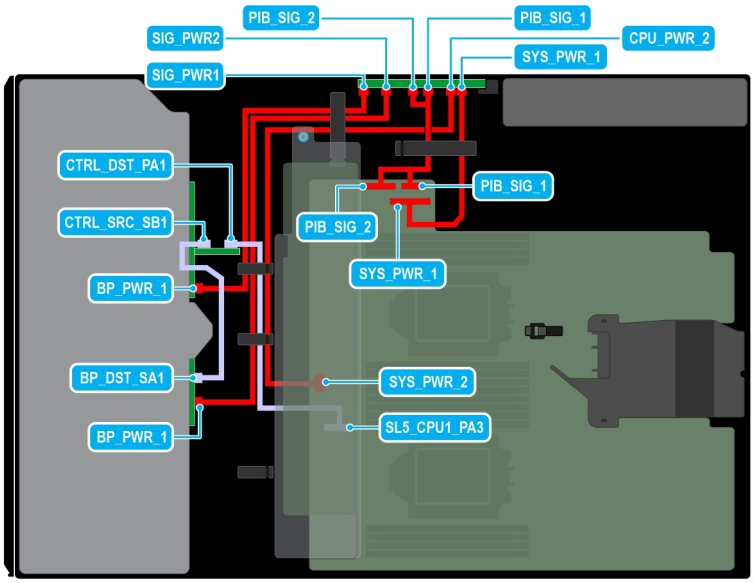


Figure 76. Configuration 38: 16 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2

Table 111. Configuration 38: 16 x2.5 -inch (SAS4/SATA) fPERC11 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
8	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

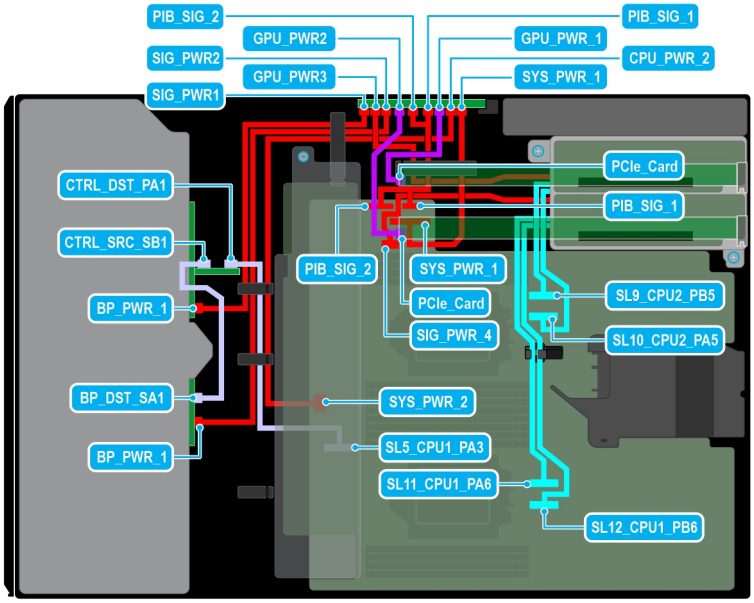


Figure 77. Configuration 39: 16 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Table 112. Configuration 39: 16 x2.5 -inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

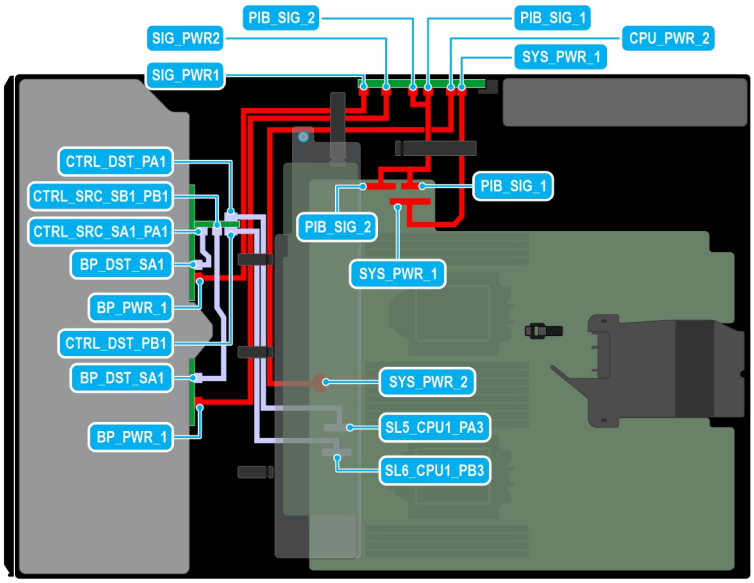


Figure 78. Configuration 40: 16 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Table 113. Configuration 40:16 x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
8	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
9	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
10	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

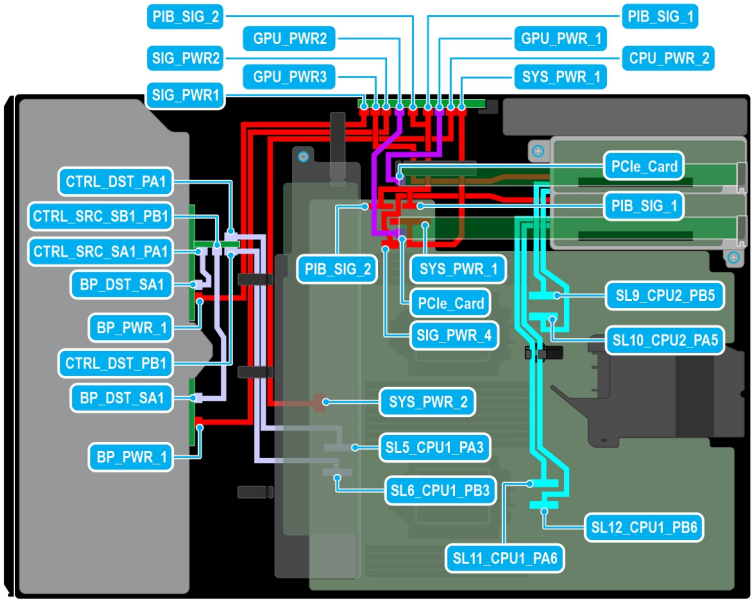


Figure 79. Configuration 41: 16 x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Table 114. Configuration 41: 16 x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
11	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
12	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
13	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

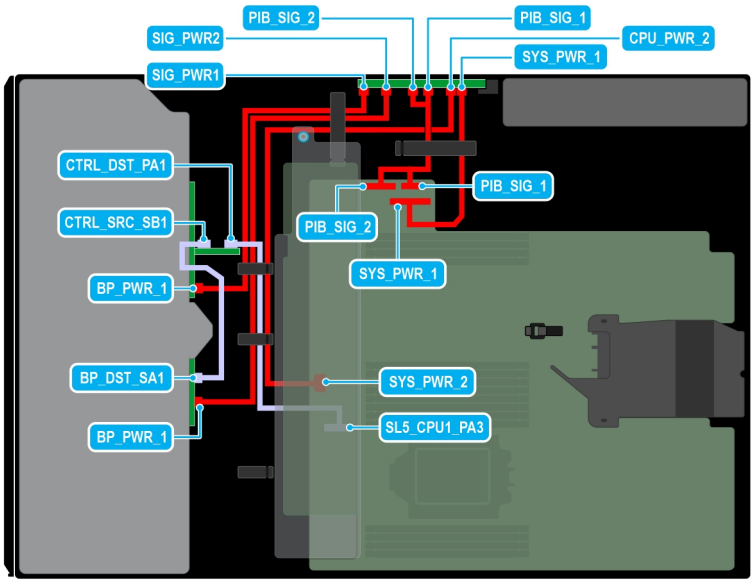


Figure 80. Configuration 42 : 16 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Table 115. Configuration 42 : 16 x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
8	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

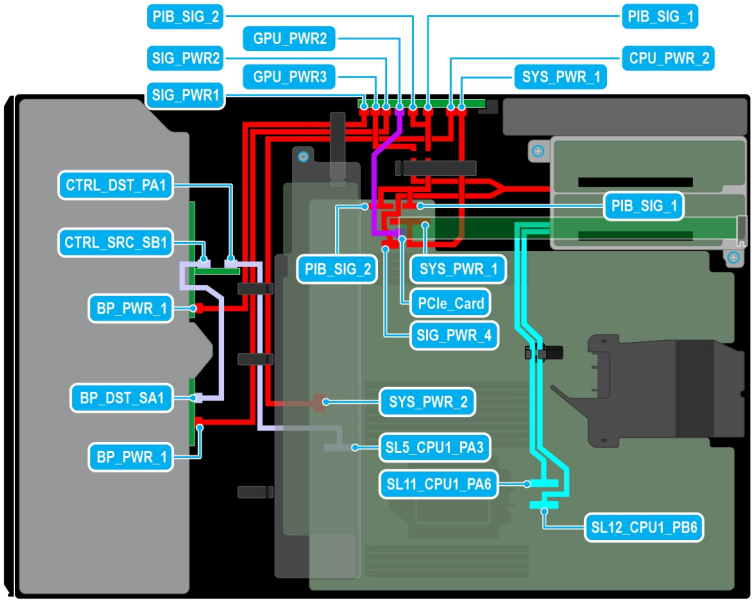


Figure 81. Configuration 43: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1

Table 116. Configuration 43: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

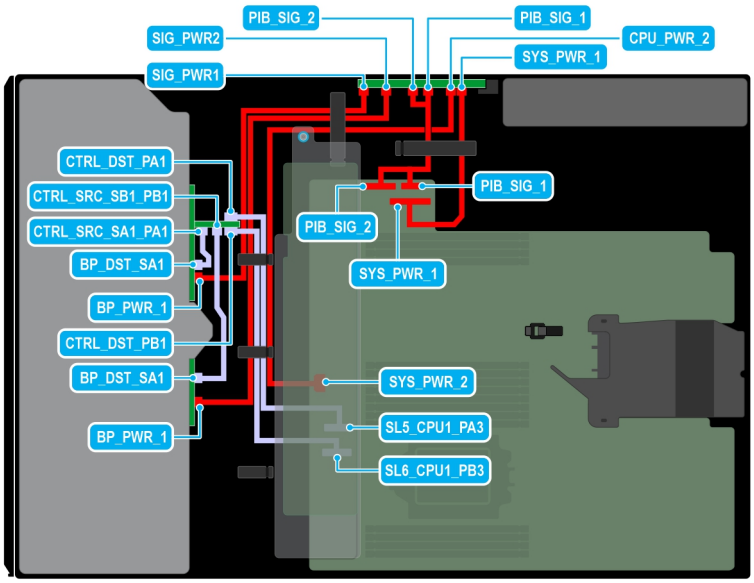


Figure 82. Configuration 44: 16 x2.5-inch (SAS4/SATA) fPERC12 on CPU 1

Table 117. Configuration 44: 16 x2.5-inch (SAS4/SATA) fPERC12 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
6	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
7	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
8	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
9	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
10	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

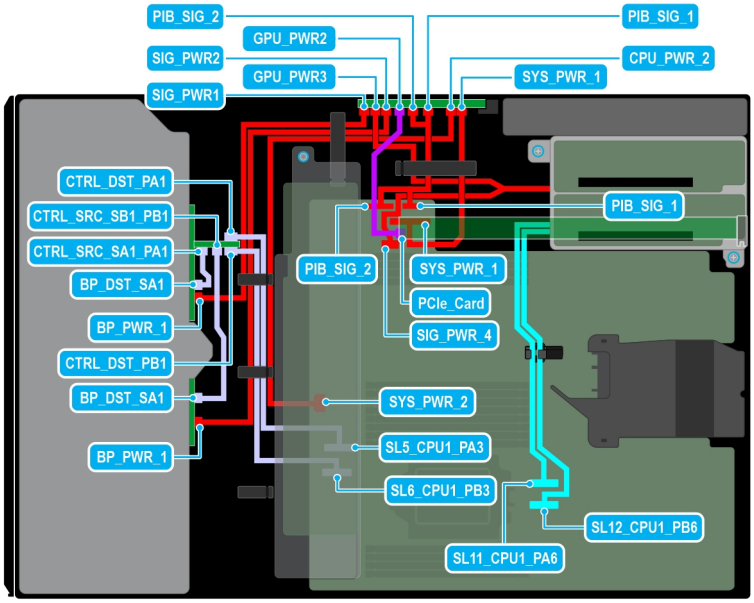


Figure 83. Configuration 45:16 x2.5 -inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1

Table 118. Configuration 45: 16 x2.5 -inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
11	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
12	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

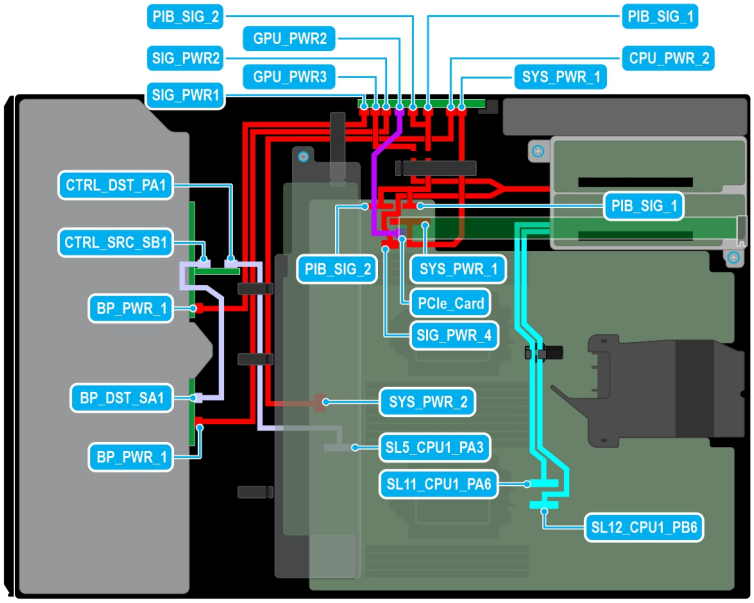


Figure 84. Configuration 46: 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2

Table 119. Configuration 46 16 x2.5-inch (SAS4/SATA) fPERC11 + GPUx 1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	BP_DST_SB1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)

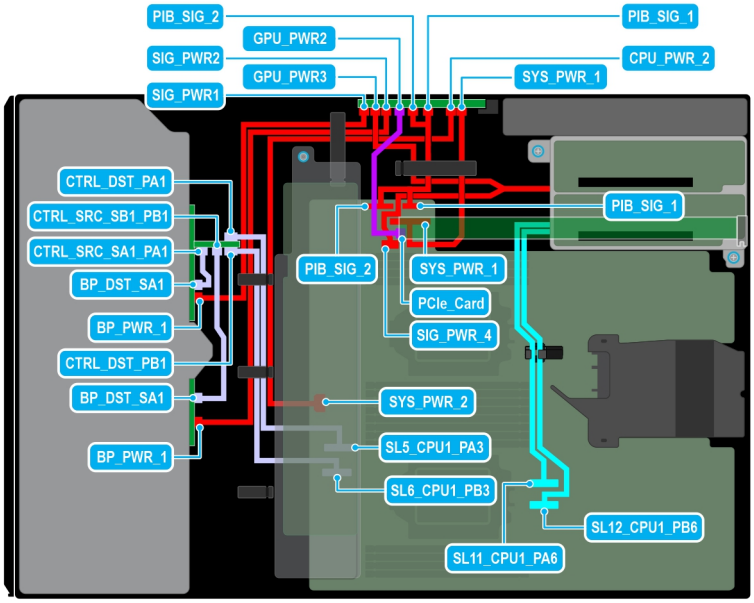


Figure 85. Configuration 47: 16 x2.5 -inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2

Table 120. Configuration 47: 16 x2.5 -inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
6	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
7	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
8	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
9	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
11	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
12	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

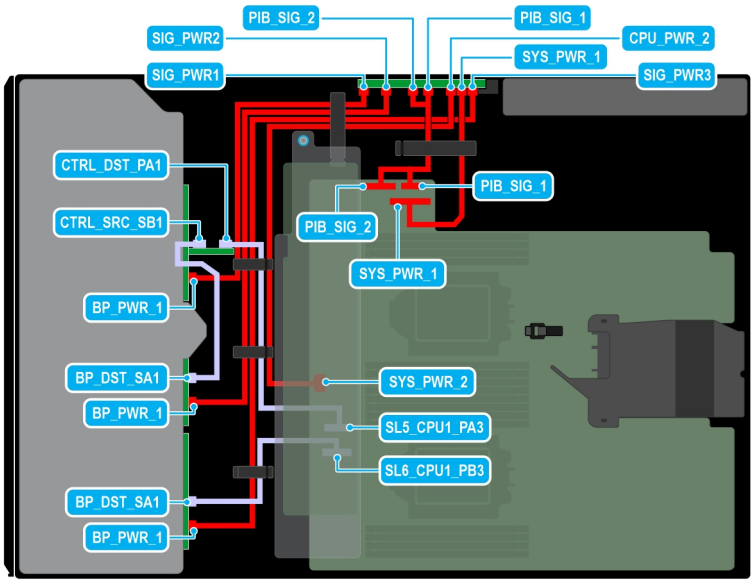


Figure 86. Configuration 48: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 2

Table 121. Configuration 48: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
7	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
9	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)

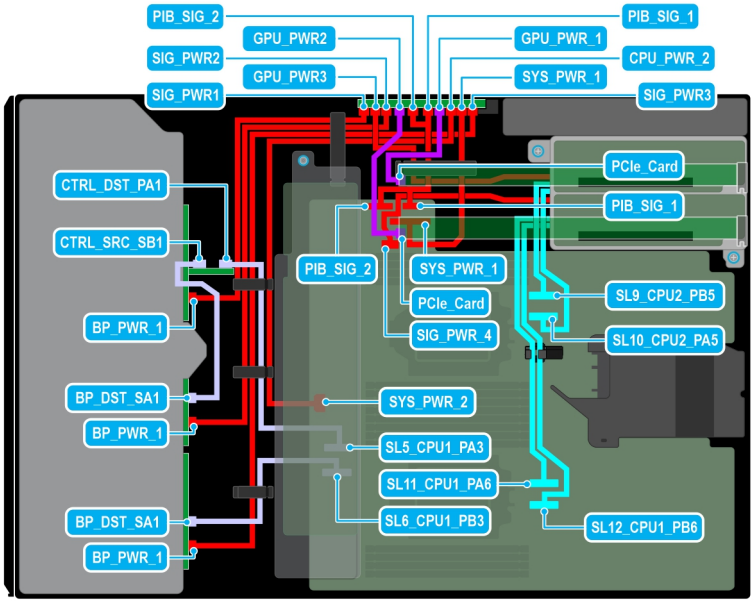


Figure 87. Configuration 49: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Table 122. Configuration 49: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
10	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
11	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
12	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)
13	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)

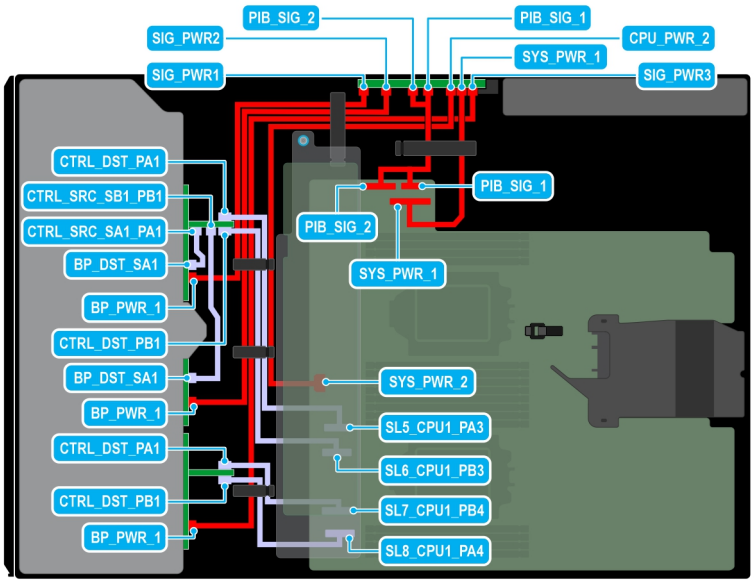


Figure 88. Configuration 50: 24x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Table 123. Configuration 50: 24x2.5-inch (SAS4/SATA) fPERC12 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
7	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
9	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 12 signal connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)
11	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
12	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
13	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
14	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

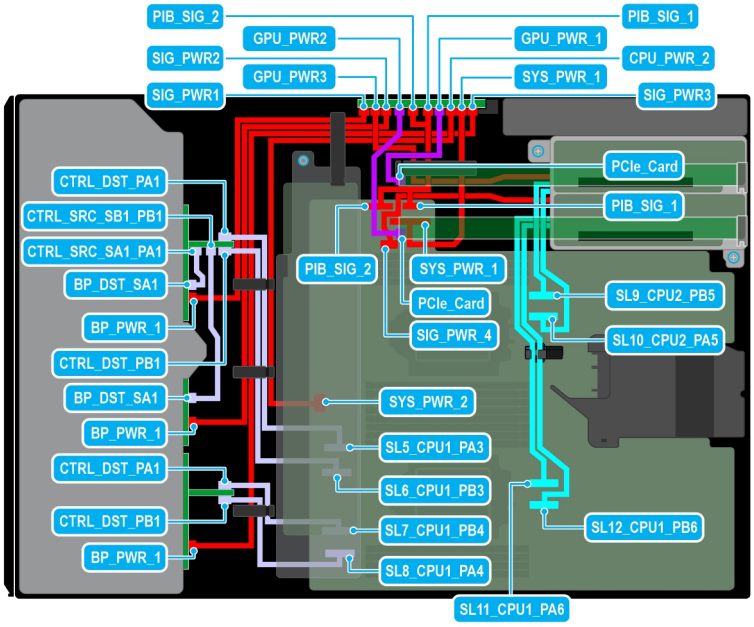


Figure 89. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Table 124. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
10	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
11	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
12	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 12 signal connector)
13	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)
14	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)

Table 124. Configuration 51: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx2 on CPU 2 (continued)

Order	From	To
15	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
16	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
17	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

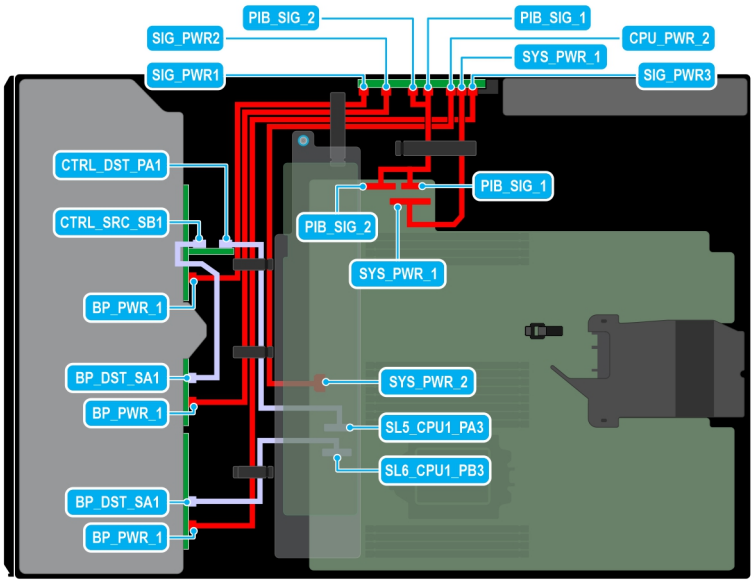


Figure 90. Configuration 52: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Table 125. Configuration 52: 24x2.5-inch (SAS4/SATA) fPERC11 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PIB_SIG_1 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB)
7	PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_2 (PIB signal connectors on PIB)
8	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
9	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)
10	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)

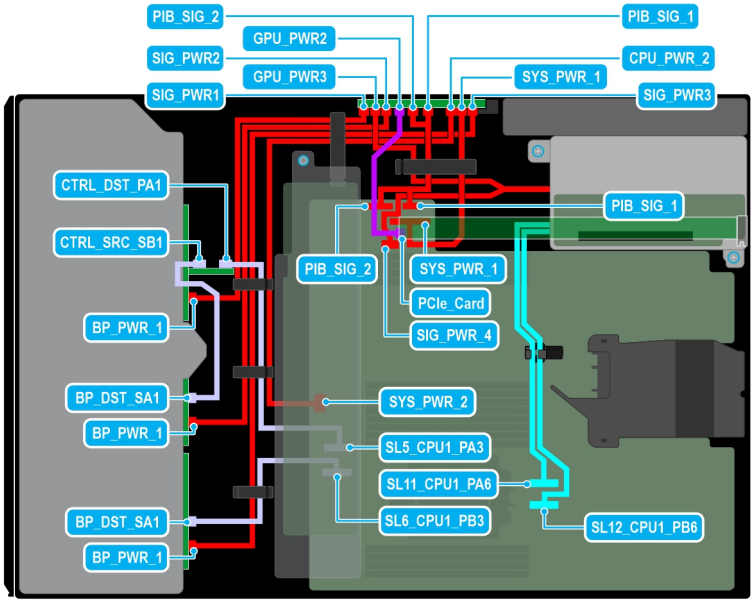


Figure 91. Configuration 53: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx1 on CPU 1

Table 126. Configuration 53: 24x2.5-inch (SAS4/SATA) fPERC11 + GPUx1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
10	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
11	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)
12	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)
13	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)

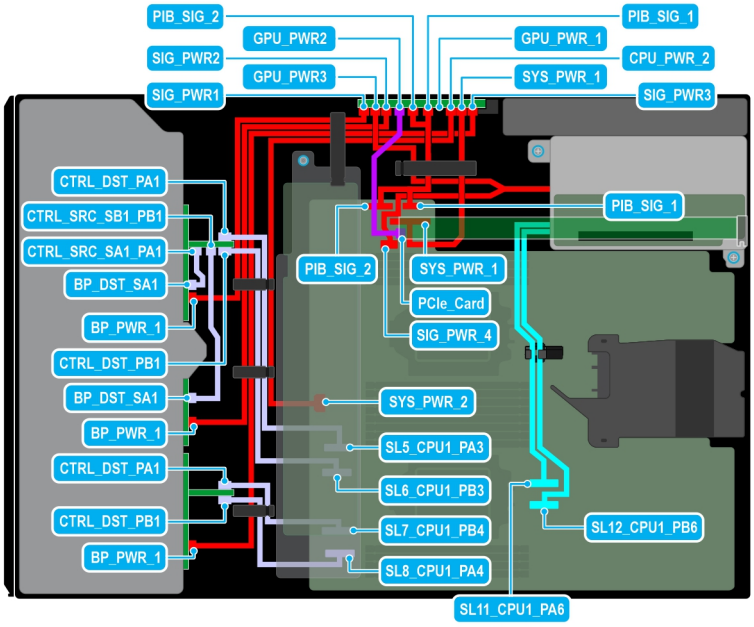


Figure 92. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1

Table 127. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
11	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 12 signal connector)
12	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)
13	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
14	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)

Table 127. Configuration 54: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 1 (continued)

Order	From	To
15	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
16	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

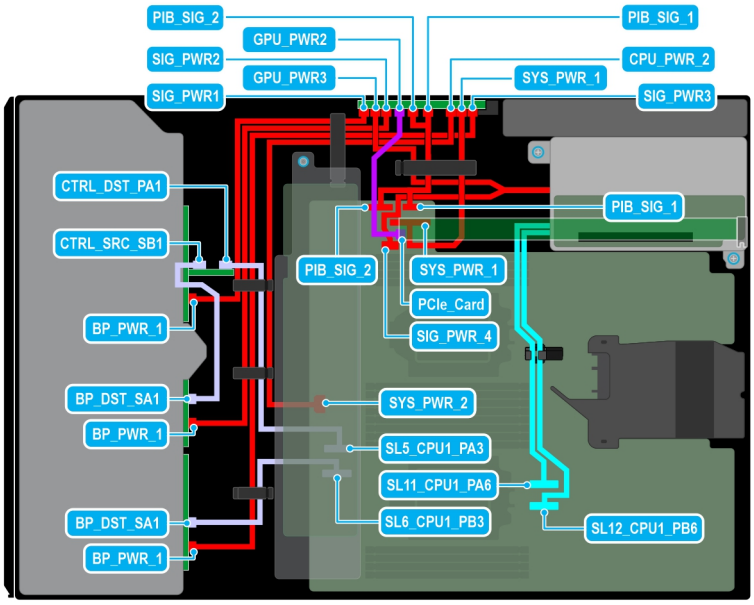


Figure 93. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2

Table 128. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL9_CPU2_PB5 and SL10_CPU2_PA5 (Signal connectors on system board)	GPU Riser 1
10	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
11	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 11 connector)

Table 128. Configuration 55: 24x2.5-inch (SAS4/SATA) PERC11 + GPUx1 on CPU 2 (continued)

Order	From	To
12	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 11 signal connector)
13	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)

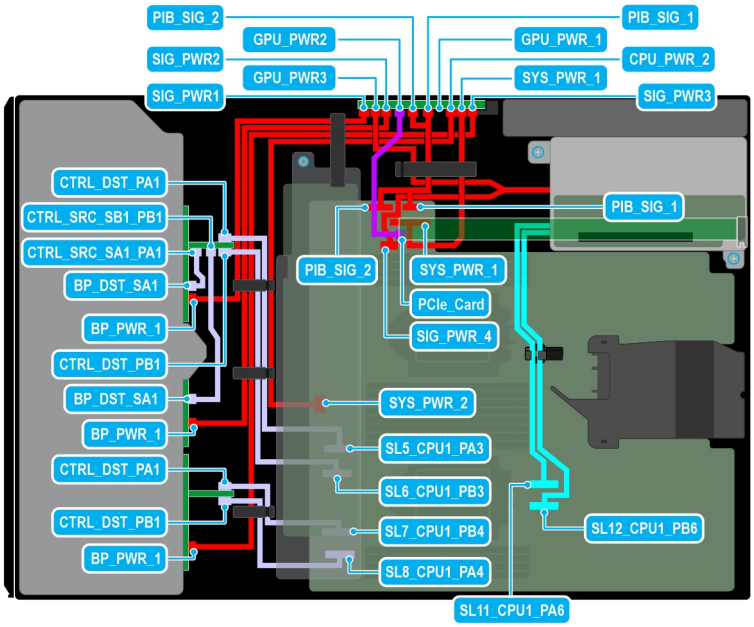


Figure 94. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2

Table 129. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2

Order	From	To
1	SYS_PWR_1 (Power connector on system board)	SYS_PWR_1 (Power connector on PIB)
2	SYS_PWR_2 (Power connector on system board)	CPU_PWR_2 (Power connector on PIB)
3	BP_PWR_1 (Backplane 1 power connector)	SIG_PWR_1 (Power connector on PIB)
4	BP_PWR_1 (Backplane 2 power connector)	SIG_PWR_2 (Power connector on PIB)
5	BP_PWR_1 (Backplane 3 power connector)	SIG_PWR_3 (Power connector on PIB)
6	PCIe card	GPU_PWR1 and GPU_PWR2 (GPU power connectors on PIB)
7	PIB_SIG_1 (PIB signal connector on system board) and PIB_SIG_2 (PIB signal connector on system board)	PIB_SIG_1 (PIB signal connectors on PIB) and PIB_SIG_2 (PIB signal connectors on PIB)
8	SIG_PWR_4 (Power connector on system board) and GPU_PWR3 (GPU power connector on PIB)	RISER_PWR_1 (GPU Riser)
9	SL11_CPU1_PA6 and SL12_CPU1_PB6 (Signal connectors on system board)	GPU Riser 2
10	SL5_CPU1_PA3 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
11	BP_DST_SA1 (Backplane signal connector)	CTRL_SRC_SB1 (fPERC 12 signal connector)

Table 129. Configuration 56: 24x2.5-inch (SAS4/SATA) fPERC12 + GPUx1 on CPU 2 (continued)

Order	From	To
12	SL6_CPU1_PB3 (Signal connector on system board)	BP_DST_PB1 (Backplane signal connector)
13	SL7_CPU1_PB4 (Signal connector on system board)	CTRL_DST_PA1 (fPERC 12 connector)
14	SL8_CPU1_PA4 (Signal connector on system board)	CTRL_DST_PB1 (fPERC 12 connector)
15	BP_DST_SA1 (Backplane 1 signal connector)	CTRL_SRC_SA1_PA1 (Signal connector on fPERC 12)
16	BP_DST_SA1 (Backplane 2 signal connector)	CTRL_SRC_SB1_PB1 (Signal connector on fPERC 12)

Figure 95. Configuration 57: 8x3.5 -inch (SAS/SATA) + Optical disk drive + Tape backup unit

Table 130. Configuration 57: 8x3.5 -inch (SAS/SATA) + Optical disk drive + Tape backup unit

Order	From	To
1	ODD_PWR (Optical disk drive power connector on PIB)	ODD (Optical disk drive)
2	DD_PWR (Optical disk drive power connector on PIB) and CTRL_SRC_SA1 (APERC connector)	TBU (Tape backup unit) and ODD (Optical disk drive)
3	SL13_PCH_SA1 (Signal connector on system board	BP_DST_SA1 (Backplane signal connector) and ODD (Optical disk drive)

Front PERC module

Removing the front PERC module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Disconnect all the cables connected to the front PERC module.

Steps

1. Using a Phillips #2 screwdriver, loosen the captive screws on the front PERC module.
2. Slide the front PERC module to disengage from the connector on the drive backplane.

Figure 96. Removing the front PERC module from the 3.5-inch drive backplane

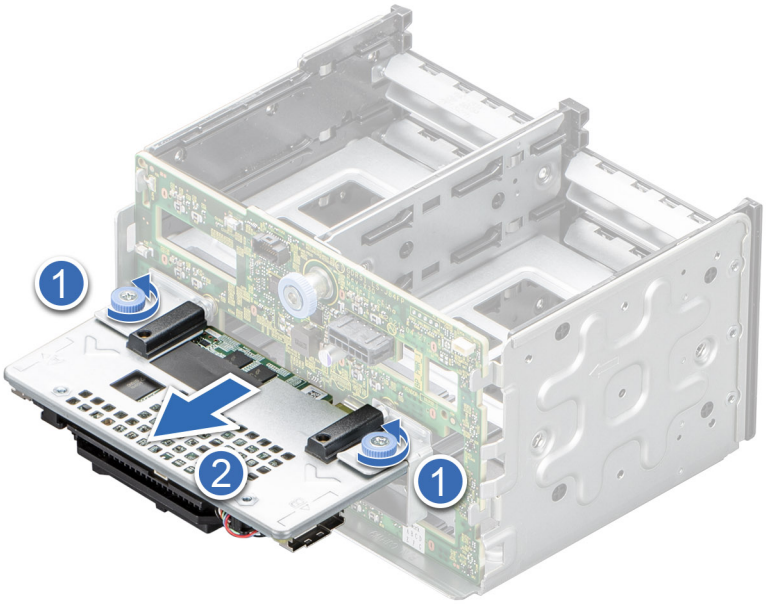


Figure 97. Removing the front PERC module from the 2.5-inch drive backplane

Next steps

Install the front PERC module.

Installing the front PERC module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Disconnect all the cables connected to the front PERC module.

Steps

1. Align the connectors and guide slots on the front PERC module with the connectors and guide pins on the drive backplane.
2. Slide the front PERC module until the module is connected to the drive backplane.
3. Using a Phillips #2 screwdriver, tighten the captive screws on the front PERC module.

NOTE: The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.

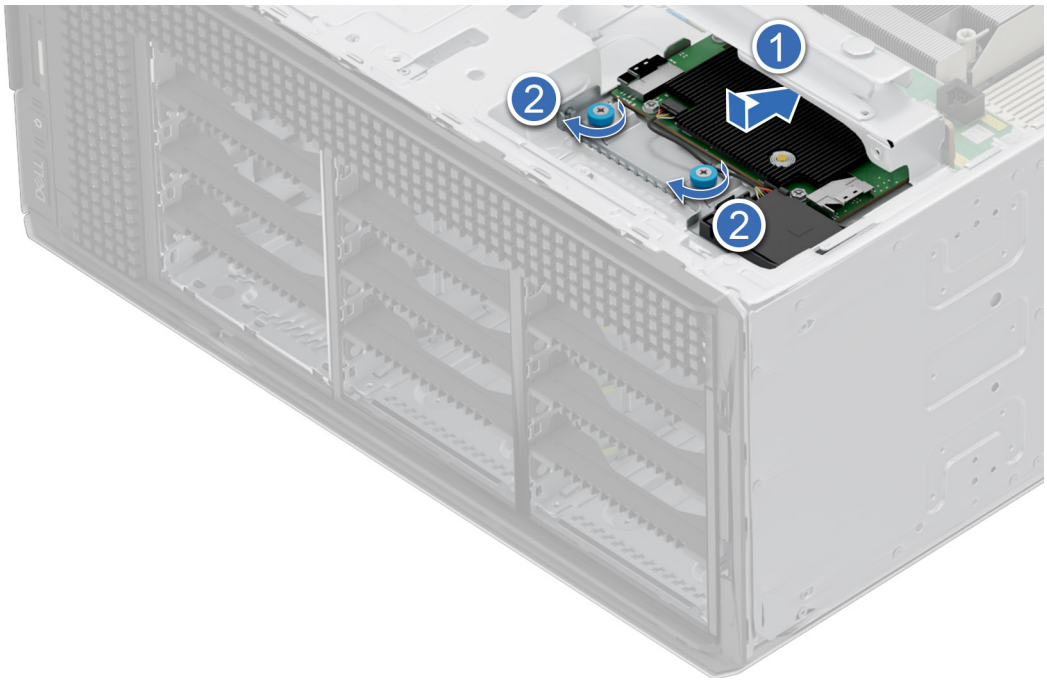


Figure 98. Installing the front PERC module to the 3.5-inch drive backplane

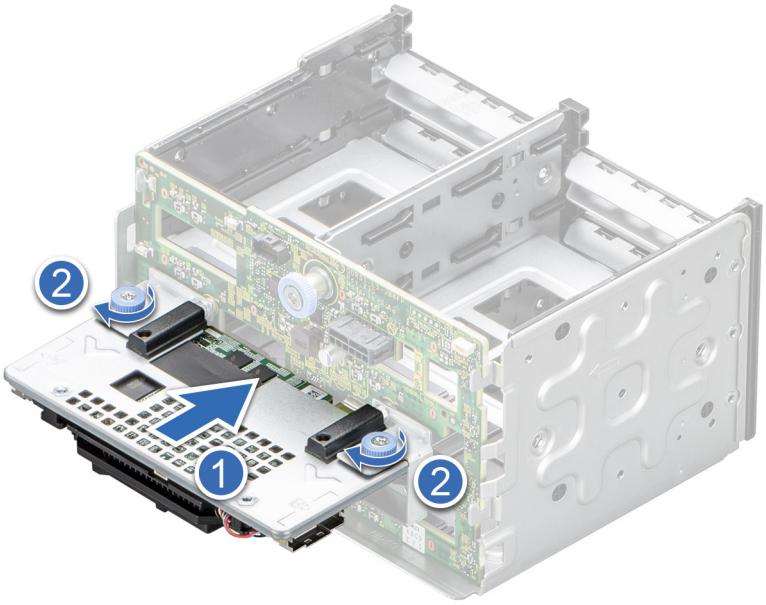


Figure 99. Installing the front PERC module to the 2.5-inch drive backplane

Next steps

1. Connect the cables to the front PERC module.
2. Follow the procedure listed in After working inside your system.

Drives

Removing a drive blank

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. If installed, remove the front bezel.

CAUTION: To maintain proper system cooling, drive blanks must be installed in all empty drive slots.

Steps

Press the release button, and slide the drive blank out of the drive slot.

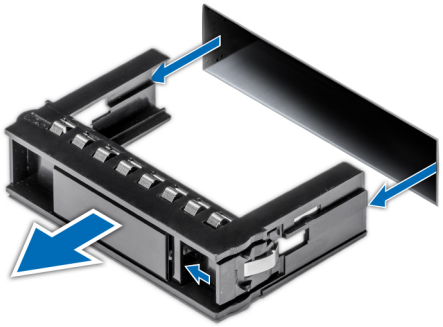


Figure 100. Removing a drive blank

Next steps

1. Replace the drive blank.

Installing a drive blank

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. If installed, remove the front bezel.

Steps

Slide the drive blank into the drive slot until the release button clicks into place.

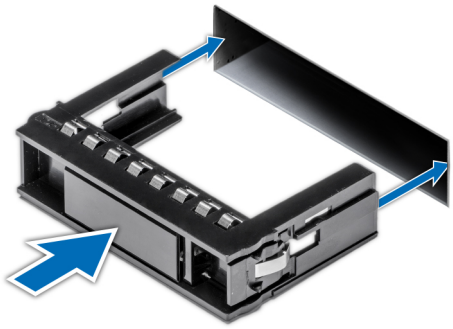


Figure 101. Installing a drive blank

Removing a drive carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Remove the front bezel.
3. Using the management software, prepare the drive for removal. If the drive is online, the green activity or fault indicator flashes while the drive is turning off. When the drive indicators are off, the drive is ready for removal. For more information, see the storage controller documentation.

CAUTION: Before attempting to remove or install a drive while the system is running, see the documentation for the storage controller card to ensure that the host adapter is configured correctly to support drive removal and insertion.

CAUTION: To prevent data loss, ensure that your operating system supports drive installation. See the documentation supplied with your operating system.

Steps

1. Press the release button to open the drive carrier release handle.
2. Holding the drive carrier release handle, slide the drive carrier out of the drive slot.

NOTE: If you are not replacing the drive immediately, install a drive blank in the empty drive slot to maintain proper system cooling.

Figure 102. Removing a drive carrier

Next steps

Replace the drive or a drive blank.

Installing the drive carrier

Prerequisites

CAUTION: Before removing or installing a drive while the system is running, see the Storage Controller Manuals documentation for the storage controller card to ensure that the host adapter is configured correctly to support drive removal and insertion.

CAUTION: Combining SAS and SATA drives in the same RAID volume is not supported.

CAUTION: When installing a drive, ensure that the adjacent drives are fully installed. Inserting a drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

NOTE: Ensure that the drive carrier's release handle is in the open position before inserting the carrier into the slot.

CAUTION: To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.

CAUTION: When a replacement hot swappable drive is installed and the system is powered on, the drive automatically begins to rebuild. Ensure that the replacement drive is blank or contains data that you wish to overwrite. Any data on the replacement drive is immediately lost after the drive is installed.

1. Follow the safety guidelines listed in Safety instructions.
2. Remove the front bezel.
3. Remove the drive carrier or remove the drive blank when you want to assemble the drives into the system.

Steps

1. Slide the drive carrier into the drive slot and push until the drive connects with the backplane.
2. Close the drive carrier release handle to lock the drive in place.

Figure 103. Installing a drive carrier

Next steps

install the front bezel.

Installing the drive into the drive carrier

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Remove the drive blank.

Steps

1. Insert the drive into the drive carrier with the drive connector facing towards the rear of the carrier.
2. Align the screw holes on the drive with the screws holes on the drive carrier.
3. Using a Phillips #1 screwdriver, secure the drive to the drive carrier with the screws.

   NOTE: When installing a drive into the drive carrier, ensure that the screws are torqued to 4 lbf-in.

   NOTE: If the drive carrier has Torx screw, use Torx 6 (for 2.5-inch drive) or Torx 8 (for 3.5-inch drive) screwdriver to install the drive.

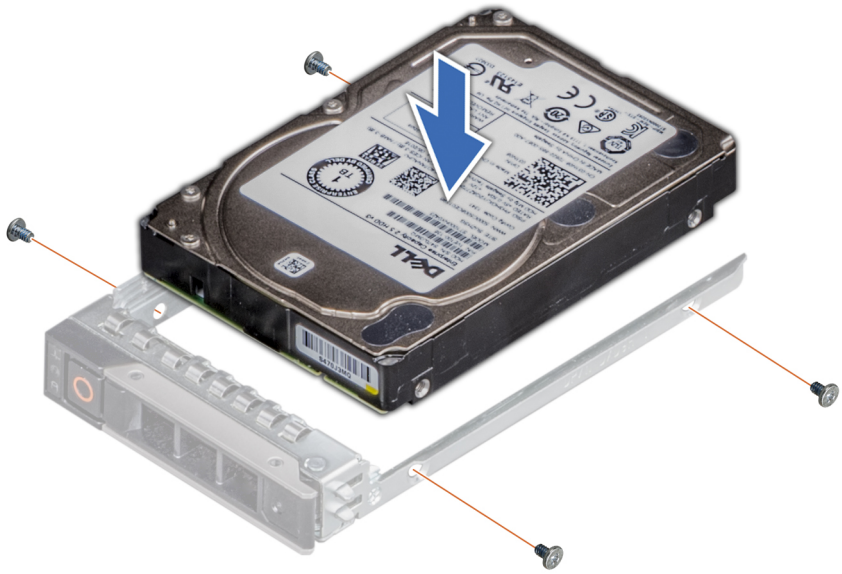


Figure 104. Installing a drive into the drive carrier

Next steps

1. Install the drive carrier.

Removing the drive from the drive carrier

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Remove the drive carrier..

Steps

1. Using a Phillips #1 screwdriver, remove the screws from the slide rails on the drive carrier.

   NOTE: If the drive carrier has Torx screw, use Torx 6 (for 2.5-inch drive) or Torx 8 (for 3.5-inch drive) screwdriver to remove the drive.

2. Lift the drive out of the drive carrier.

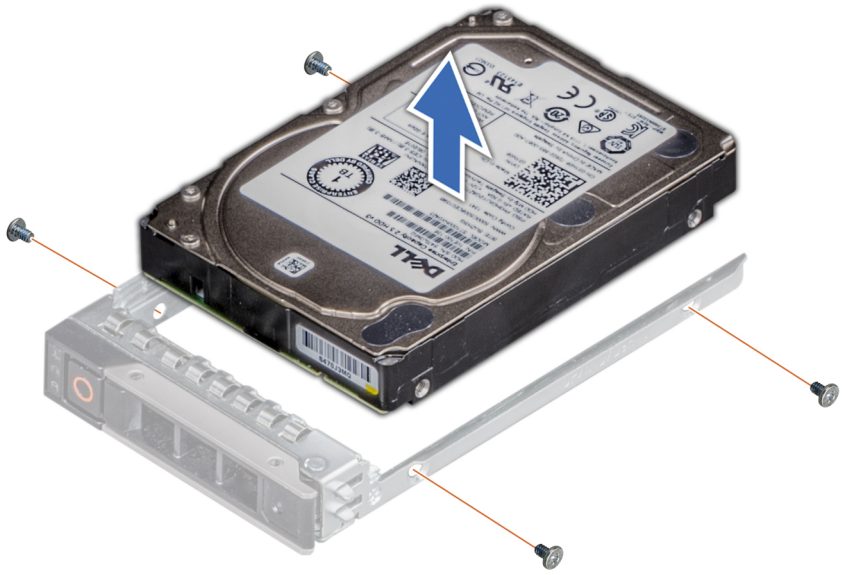


Figure 105. Removing the drive from the drive carrier

Next steps

Install the drive into the drive carrier.

Drive backplane

This is a service technician replaceable part only.

Drive backplane

Depending on your system configuration, the drive backplanes that are supported are listed here:

Table 131. Supported backplane options

System	Supported hard drives options
PowerEdge T560	2.5-inch (x 8) NVMe backplane
	2.5-inch (x 8) SAS, or SATA backplane
	3.5-inch (x 8) SAS or SATA backplane

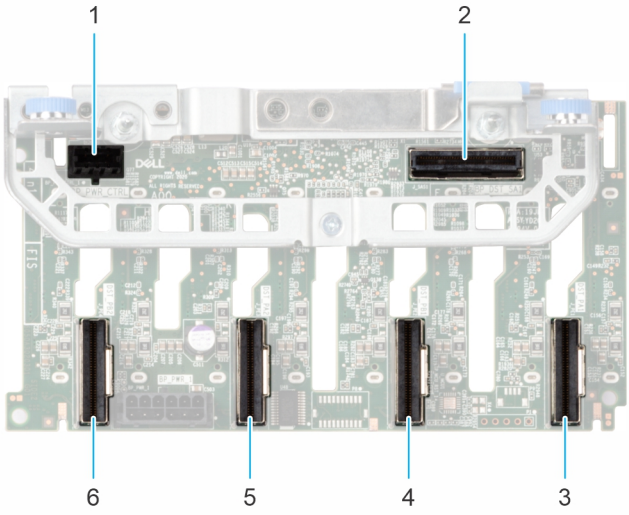


Figure 106. 8 x 2.5-inch NVMe drive backplane

1. BP_PWR_CTRL
2. BP_DST_SA1 (PERC to backplane)
3. BP_DST_PA1
4. BP_DST_PB1
5. BP_DST_PA2
6. BP_DST_PB2

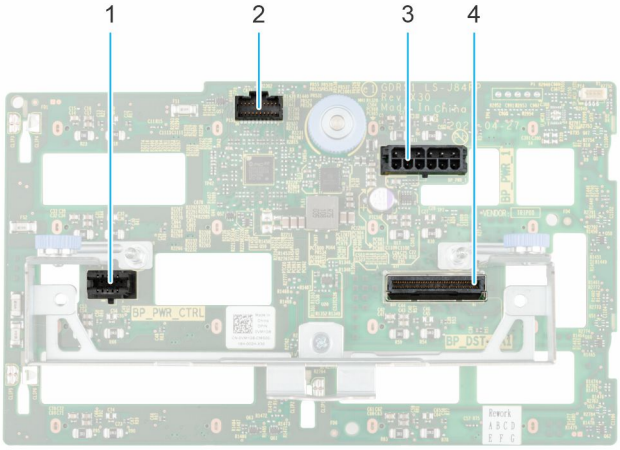


Figure 107. 8 x 2.5-inch drive backplane

1. BP_PWR_CTRL
2. BP_DST_SA1 (PERC to backplane)
3. BP_PWR_1 (backplane power and signal cable to system board)
4. BP_DST_PA1 (PCIe/NVMe connector)

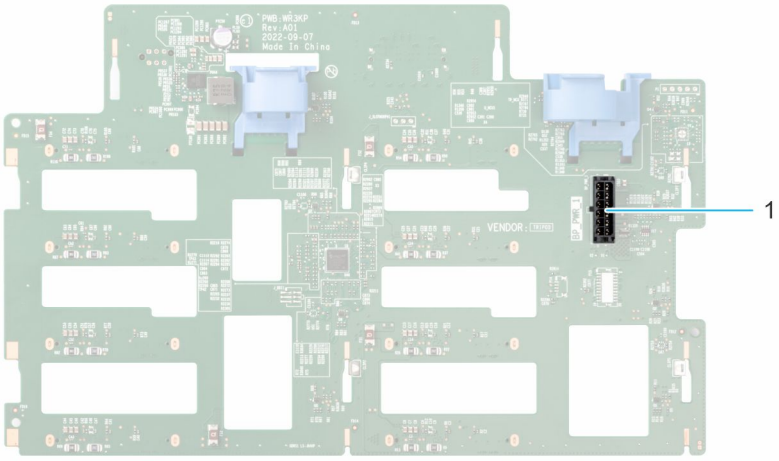


Figure 108. 8 x 3.5-inch drive backplane

1. BP_PWR_1 (backplane power and signal cable to system board)

Removing the 3.5-inch drive backplane

Prerequisites

CAUTION: To prevent damage to the drives and backplane, remove the drives from the system before removing the backplane.

CAUTION: Note the number of each drive and temporarily label them before you remove the drive so that you can reinstall them in the same location.

NOTE: The procedure to remove the backplane is similar for all backplane configurations.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the cooling fan assembly.
4. Remove the drives.
5. Removing the front PERC module
6. Disconnect the drive backplane cables from the connector on the backplane.

Steps

1. Press the blue release tabs to disengage the drive backplane from the hooks on the system.
2. Lift and pull the drive backplane out of the system.

Figure 109. Removing the 3.5-inch drive backplane

Next steps

Replace the 3.5-inch drive backplane .

Installing the 3.5-inch drive backplane

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the cooling fan assembly.
4. Remove the drives.
5. Remove the front PERC module

NOTE: To avoid damaging the backplane, ensure to move the control panel cables from the cable routing clips before removing the backplane.

NOTE: Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

Steps

1. Align the guides on the system with the slots on the backplane.
2. Insert the backplane into the guides and lower the backplane until the blue release tabs clicks into place.
3. Route the cables properly through the cable guide and connect the cables to the connector on the system board.

Figure 110. Installing the 3.5-inch drive backplane

Next steps

1. Install the drives.
2. Connect the drive backplane cables to the connector on the backplane.
3. Install the cooling fan assembly.
4. Install the front PERC module.
5. Follow the procedure listed in After working inside your system.

Removing the 2.5-inch drive backplane

Prerequisites

CAUTION: To prevent damage to the drives and backplane, remove the drives from the system before removing the backplane.

CAUTION: Note the number of each drive and temporarily label them before you remove the drive so that you can reinstall them in the same location.

NOTE: The procedure to remove the backplane is similar for all backplane configurations.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the cooling fan cage.
4. Remove the drives.
5. Remove the front PERC module
6. Disconnect the drive backplane cables from the connectors on the backplane.

Steps

1. Pull the blue release stand-off to disengage the drive backplane from the hooks on the system.
2. Lift and pull the drive backplane out of the system.

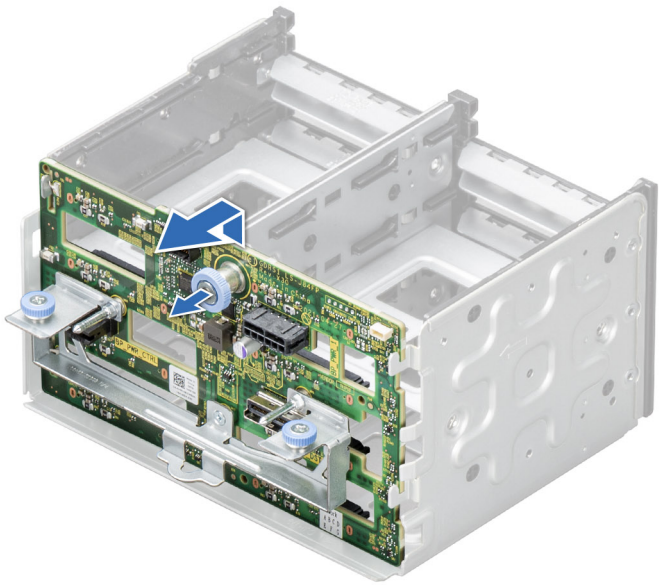


Figure 111. Removing the 2.5-inch drive backplane

Next steps

Replace the 2.5-inch drive backplane .

Installing the 2.5-inch drive backplane

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the cooling fan cage.
4. Remove the drives.
5. Remove the front PERC module

NOTE: Route the cable properly to prevent the cable from being pinched or crimped.

Steps

1. Align the guides on the system with the slots on the backplane.
2. Insert the backplane into the guides and lower the backplane until the blue release stand-off clicks into place.

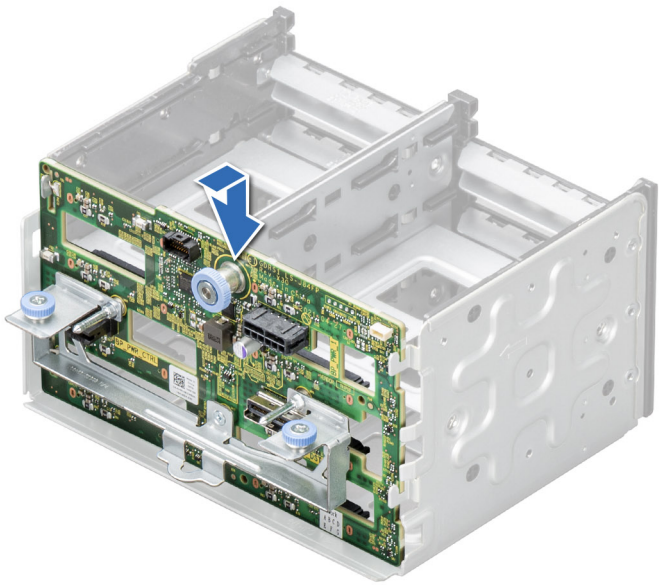


Figure 112. Installing the 2.5-inch drive backplane

Next steps

1. Install the drives.
2. Connect the drive backplane cables to the connector on the backplane.
3. Install the cooling fan cage.
4. Install the front PERC module.
5. Follow the procedure listed in After working inside your system.

Drive bays

Removing the drive bay blank

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Remove the system cover.
3. If installed, remove the front bezel.

Steps

1. Using a Phillips #2 screwdriver, remove the screws that secure the drive bay blank to the system.
2. Using a flat head screwdriver, remove the drive bay blank.

NOTE: The procedure to remove the drive bay blanks are similar.

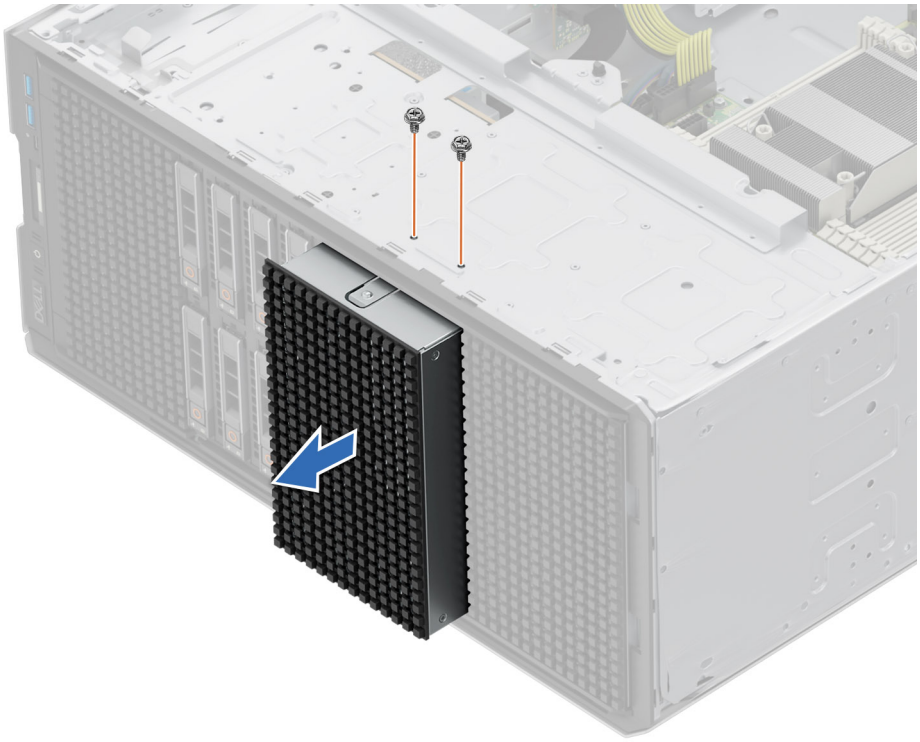


Figure 113. Removing the drive bay blank

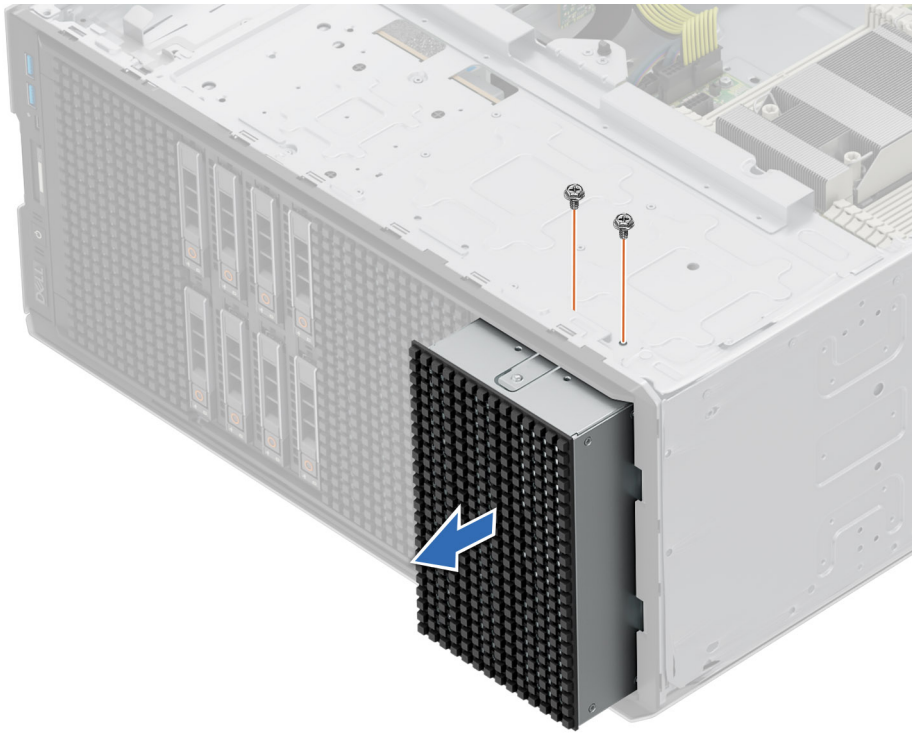


Figure 114. Removing the drive bay blank

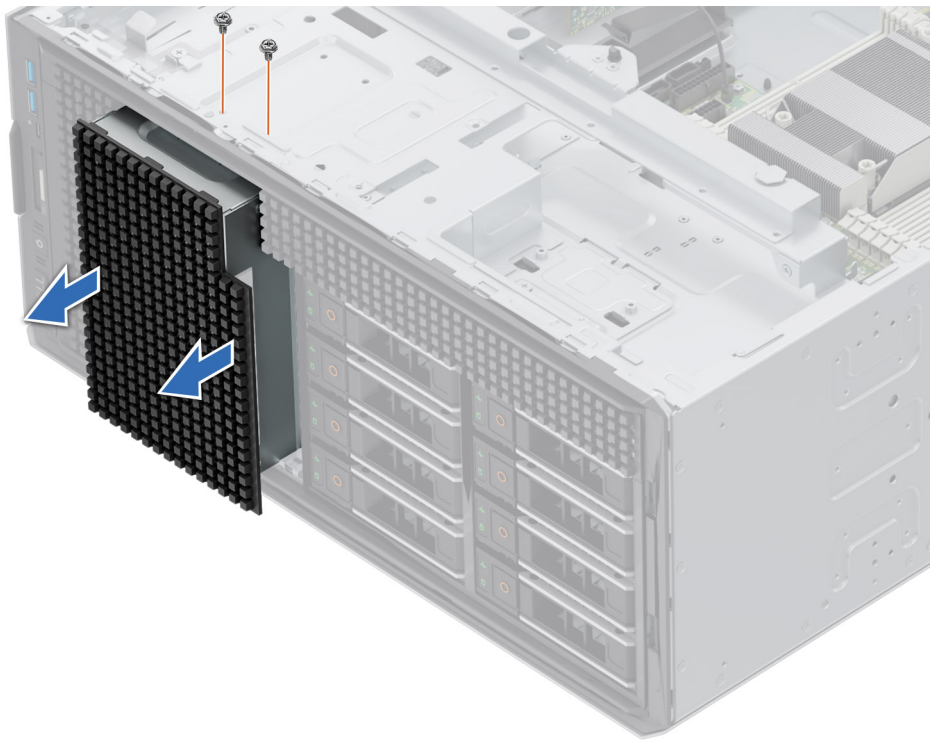


Figure 115. Removing the NVMe drive bay blank

Next steps

Replace the drive bay blank or install the drive bay.

Installing the drive bay blank

Prerequisites

Follow the safety guidelines listed in the Safety instructions.

Steps

1. Align and push the blank into the drive bay slot, until it clicks into place.

   NOTE: The procedure to install the drive bay blanks are similar.

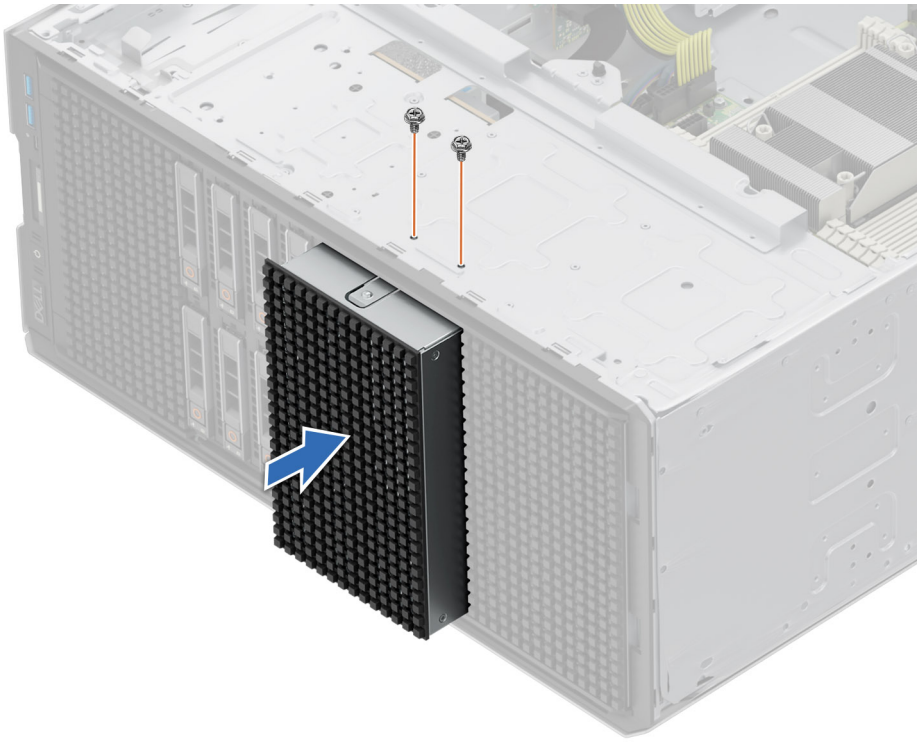


Figure 116. Installing the drive bay blank

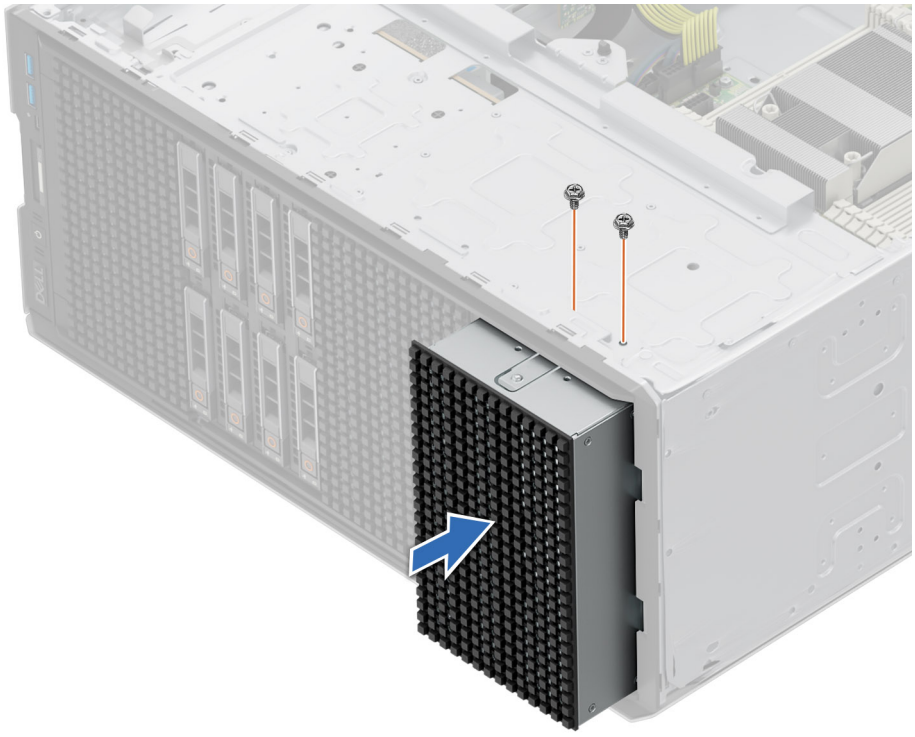


Figure 117. Installing the drive bay blank

Figure 118. Installing the NVMe drive bay blank

2. Using a Phillips #2 screwdriver, tighten the screws that secure the drive bay blank to the system.

Next steps

1. If removed, install the front bezel.
2. Replace the system cover.
3. Follow the procedure listed in After working inside your system.

Removing a drive bay

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove all the drives.
4. Remove the backplane from drive bay.

Steps

1. Using the Phillips #2 screwdriver, remove the screws securing the drive bay to the system.
2. Slide the drive bay out of the system.

NOTE: The procedure to remove the drive bays is similar for all configurations.

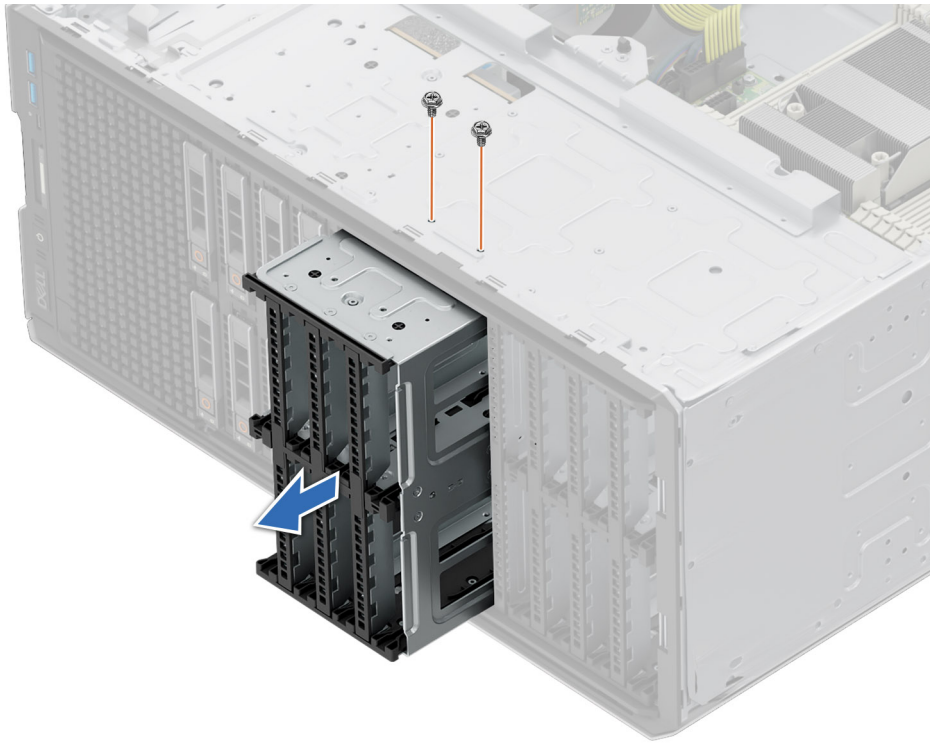


Figure 119. Removing a drive bay

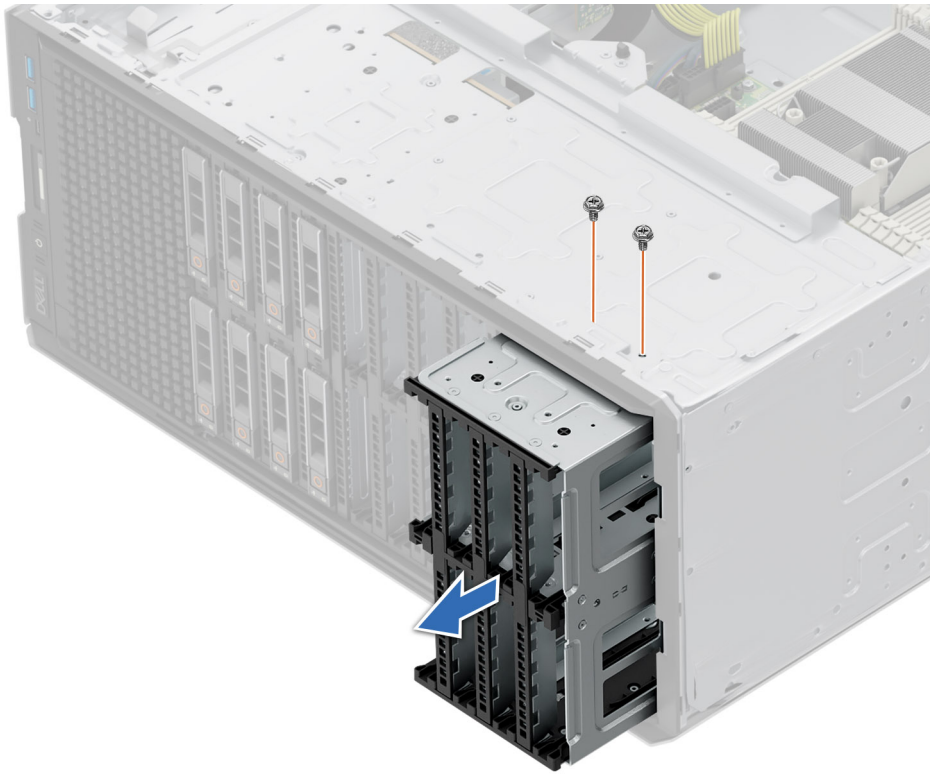


Figure 120. Removing a drive bay

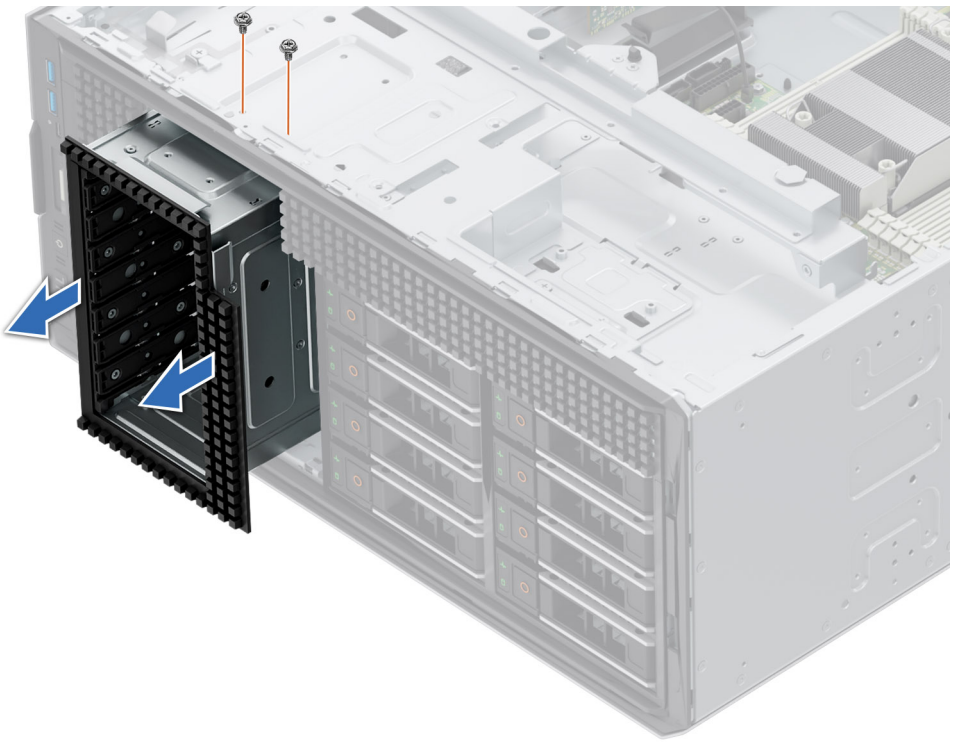


Figure 121. Removing a NVMe drive bay

Next steps

Replace the drive bay.

Installing a drive bay

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the drives.
4. Remove the drive from the drive backplane.

Steps

1. Insert the drive bay into the drive bay slot in the system.
2. Using the Phillips #2 screwdriver secure the drive bay to the system.

NOTE: The procedure to install the drive bays is similar for all configurations.

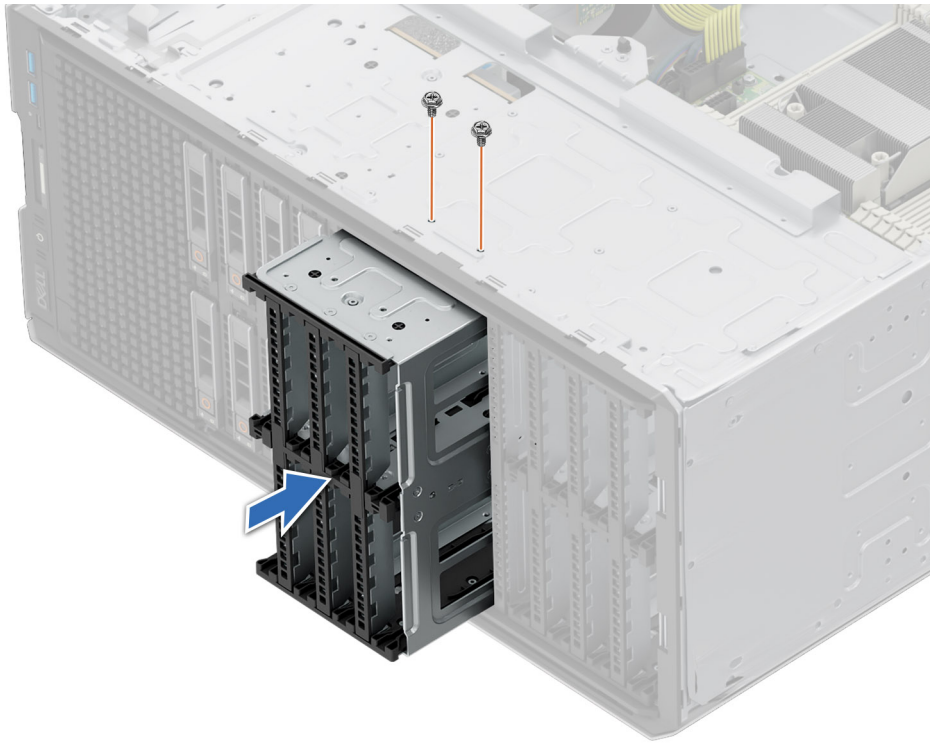


Figure 122. Installing a drive bay

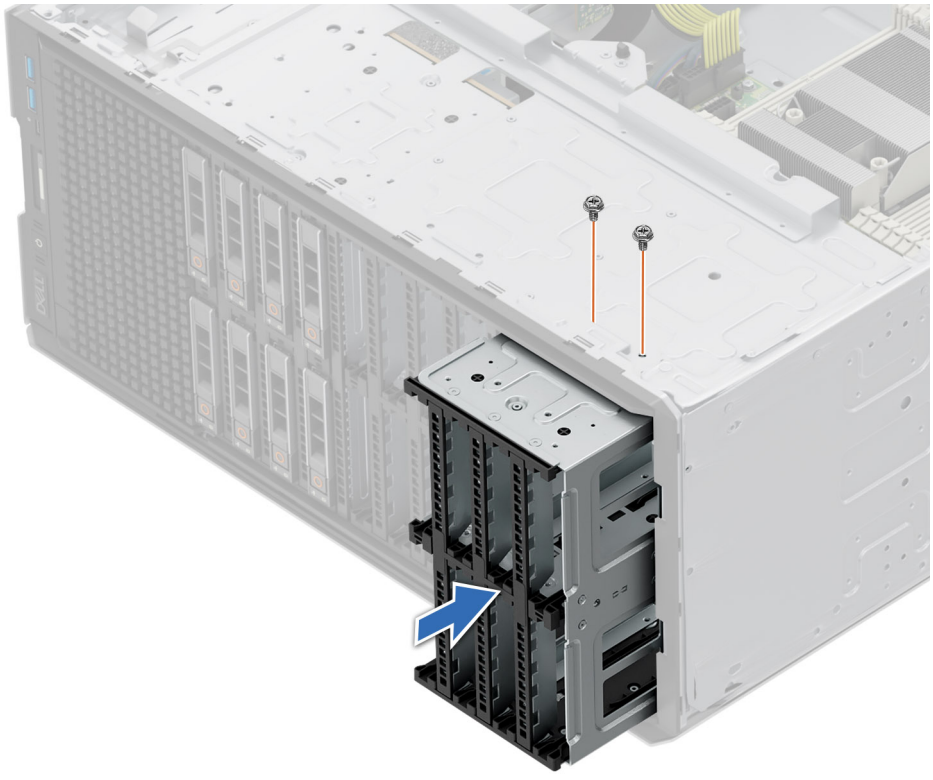


Figure 123. Installing a drive bay

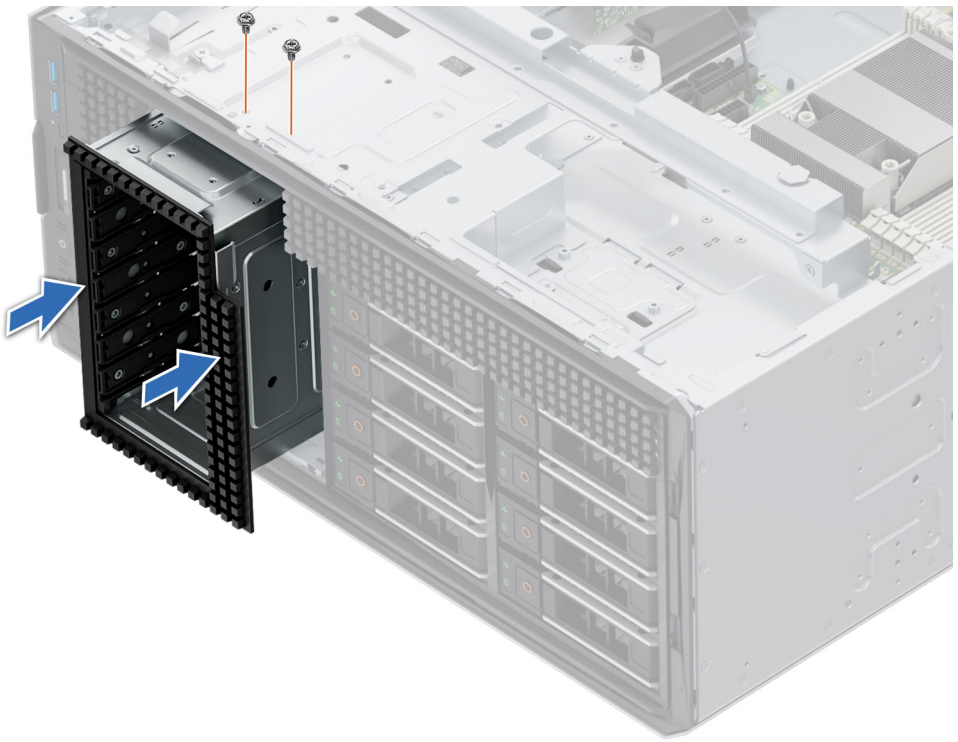


Figure 124. Installing a NVME drive bay

Next steps

1. Install the backplane to the drive plane.
2. Install the drives.
3. Follow the procedure listed in After working inside your system.

Optional optical drive

This is a service technician replaceable part only.

Removing the optical drive blank

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

Press the release tab and slide the optical drive blank out of the system.

Figure 125. Removing the optical drive blank

Next steps

Replace the optical drive blank or install the optical drive.

Installing the optical drive blank

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

Hold the tabs on the optical drive blank and push the optical drive blank into the optical drive slot.

Figure 126. Installing the optical drive blank

Next steps

1. If removed, install the front bezel.
2. Follow the procedure that is listed in After working inside your system.

Removing the optical drive

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.
4. Disconnect the power and data cables from the optical drive.

NOTE: Ensure that you note the routing of the power and data cable on the side of the system as you remove them from the system board and drive.

Steps

Press the release tab and slide the optical drive towards the front of the system.

Figure 127. Removing the optical drive

Next steps

Replace the optical drive or install the optical drive blank.

Installing the optical drive

Prerequisites

NOTE: Only slim 9.5-mm SATA DVD-ROM drive or DVD+/-RW drive can be installed in your system. External optical drives can be connected through USB ports.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

1. Align the optical drive with the slot on the system.
2. Slide the optical drive into the slot until the release tab clicks into place.

Figure 128. Installing the optical drive

Next steps

1. If removed, install the front bezel.
2. Connect the power cable and the data cable to the optical drive.

   NOTE: Route the cables properly to prevent them from being pinched or crimped.

3. Follow the procedure that is listed in After working inside your system.

Optional tape backup unit

This is a service technician replaceable part only.

Removing the tape backup unit blank

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

Push the protrusion at the rear of the tape backup unit blank and slide it towards the front of the system.

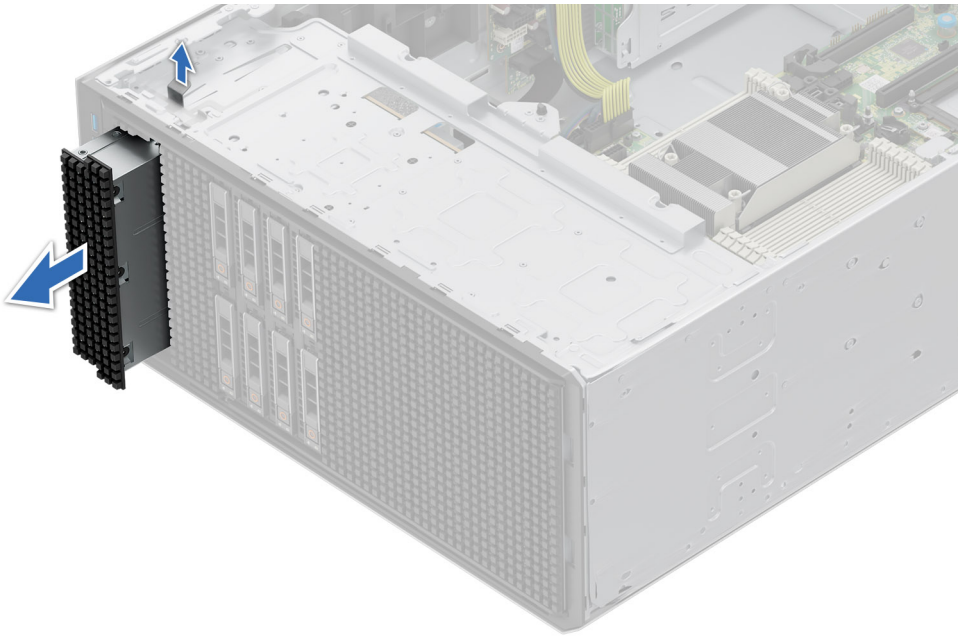


Figure 129. Removing the tape backup unit blank

Next steps

Replace the tape backup unit blank or install the tape backup drive.

Installing the tape backup unit blank

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

Align and slide the tape backup unit blank into the slot on the system until it clicks into place.

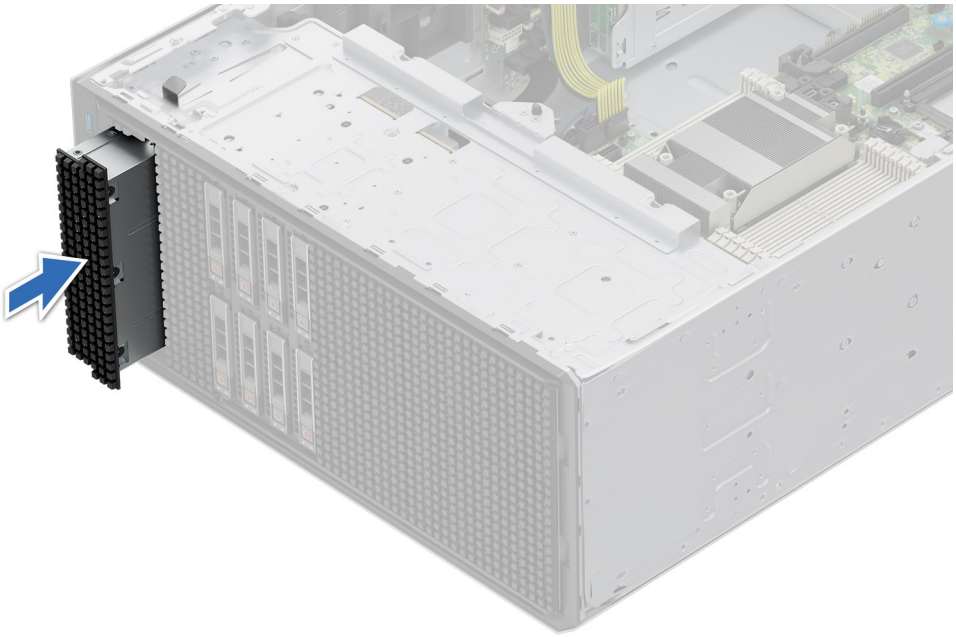


Figure 130. Installing the tape backup unit blank

Next steps

1. If removed, install the front bezel.
2. Follow the procedure that is listed in After working inside your system.

Removing the tape backup unit

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. If installed, remove the front bezel.
5. Disconnect the power and data cables from the tape backup unit.

NOTE: Ensure that you note the routing of the power and data cable on the side of the system as you remove them from the system board and drive.

Steps

1. Using a Phillips #2 screwdriver, remove the screw securing the tape backup unit to the system.
2. Slide the tape backup unit towards the front of the system.

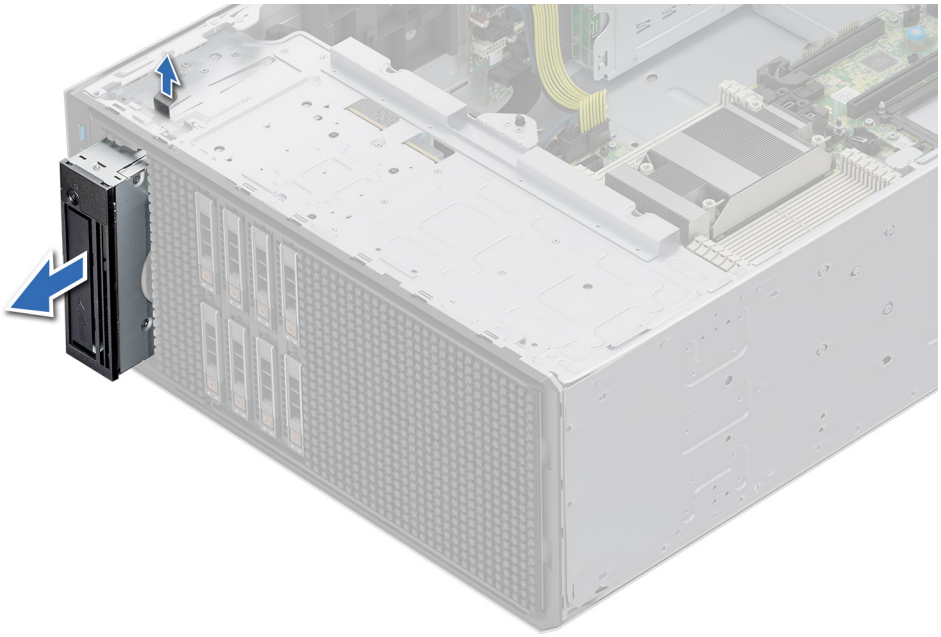


Figure 131. Removing the tape backup unit

Next steps

Replace the tape backup unit or install the tape backup unit blank.

Installing the tape backup unit

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. If installed, remove the front bezel.

Steps

1. Align and slide the tape backup unit in the slot on the system.
2. Using a Phillips #2 screwdriver, secure the tape backup unit to the system.

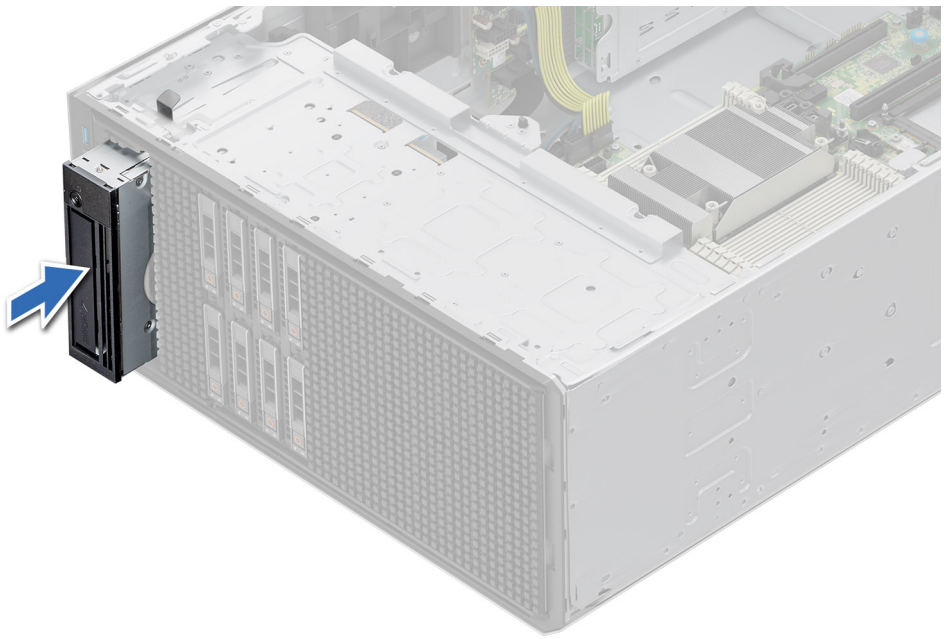


Figure 132. Installing the tape backup unit

Next steps

1. Connect the power cable and the data cable to the tape backup unit.

   NOTE: Route the cables properly to prevent them from being pinched or crimped.

2. Install the air shroud.
3. If removed, install the front bezel.
4. Follow the procedure that is listed in After working inside your system.

Front IO module

This is a service technician replaceable part only.

Removing the front IO module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the front bezel.

Steps

1. Disconnect the power and data cables of the front IO module from the system board.
2. Pull the metal release bracket and slide the front IO module towards the front of the system.

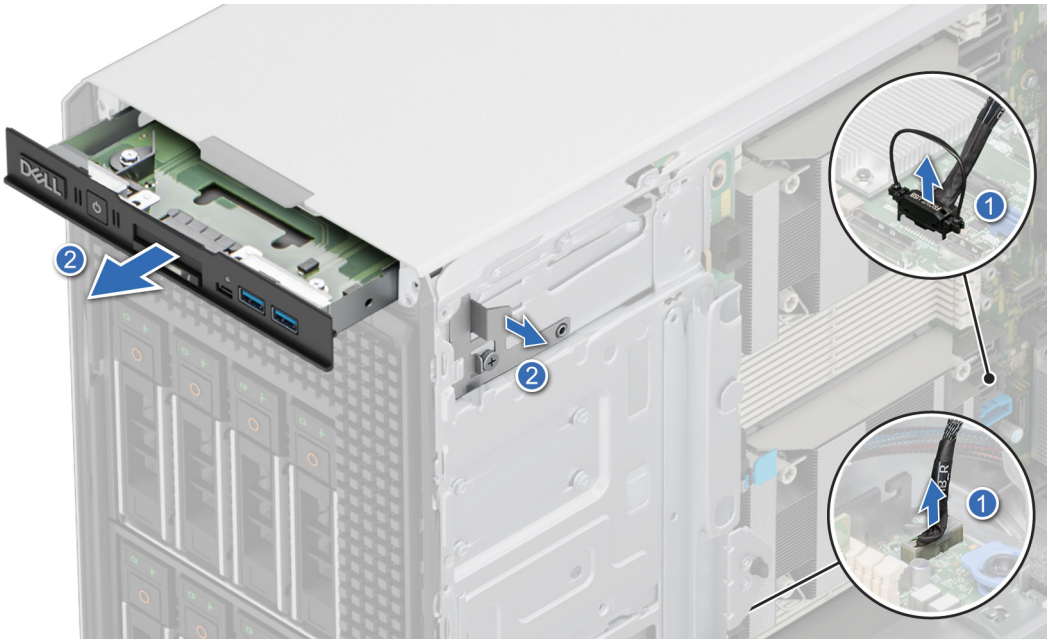


Figure 133. Removing the front IO module

Next steps

Replace the front IO module.

Installing the front IO module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the front bezel.

Steps

1. Align the front IO module with the slot on the system.
2. Slide the front IO module into the slot until the release bracket clicks into place.

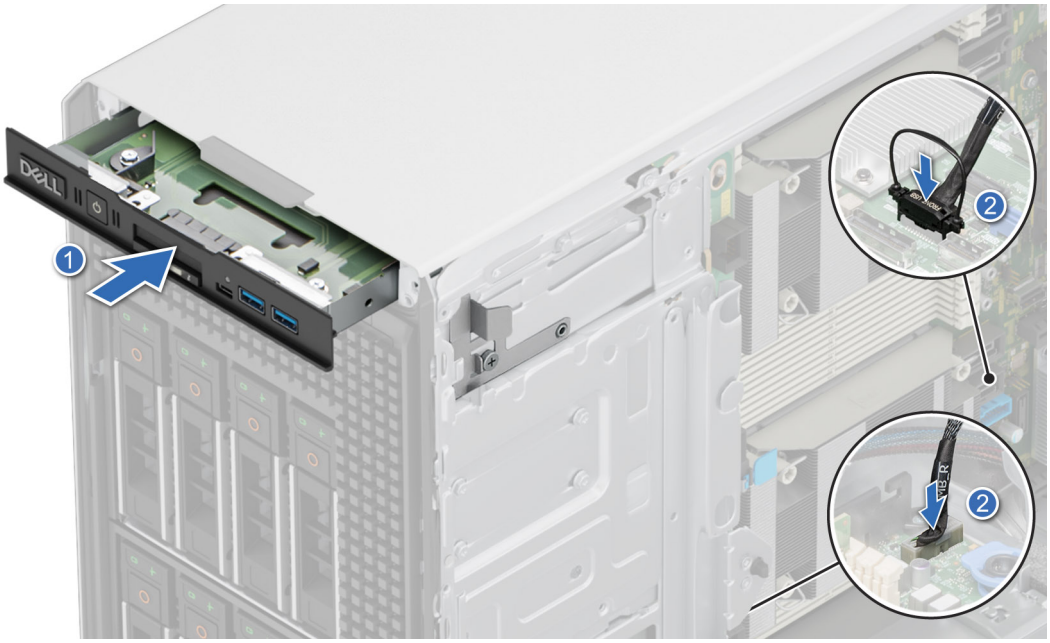


Figure 134. Installing the front IO module

3. Connect the power and data cables from the front IO module to the system board.

Next steps

1. Connect the power cable and the data cable to the front IO module.

   NOTE: Route the cables properly to prevent them from being pinched or crimped.

2. Install the front bezel.
3. Install the air shroud.
4. Follow the procedure that is listed in After working inside your system.

System memory

System memory guidelines

The PowerEdge T560 system supports DDR5 registered DIMMs (RDIMMs).

Your system memory is organized into eight channels per processor (one memory socket per channel), 8 memory sockets per processor and 16 memory sockets per system.

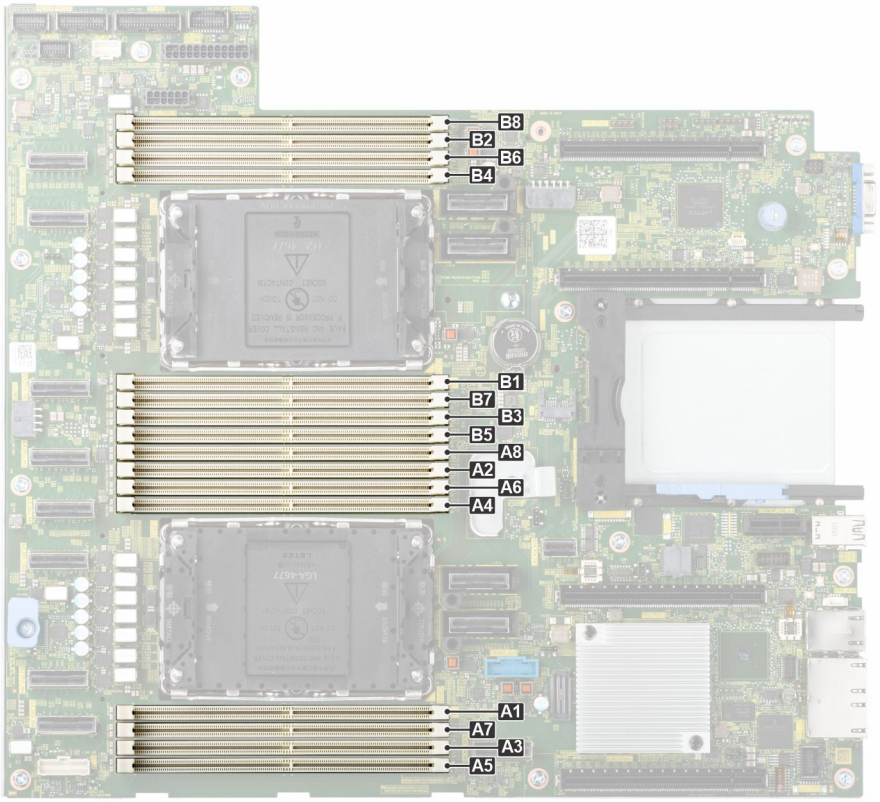


Figure 135. Memory channels

Memory channels are organized as follows:

Table 132. Memory channels

Processor	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F	Channel G	Channel H
Processor 1	A1	A7	A3	A5	A4	A6	A2	A8
Processor 2	B1	B7	B3	B5	B4	B6	B2	B8

Table 133. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed
				1 DIMM per channel (DPC)
RDIMM	1 R	16 GB	DDR5 (1.1 V), 4800 MT/s DDR5 (1.1 V), 5600 MT/s	Up to 4800 MT/s Up to 5200 MT/s
	2 R	32 GB, 64 GB, 96 GB	DDR5 (1.1 V), 4800 MT/s DDR5 (1.1 V), 5600 MT/s	Up to 4800 MT/s Up to 5200 MT/s

NOTE: 5600 MT/s RDIMMs are applicable for 5 th Generation Intel ® Xeon Scalable processors.

NOTE: The processor may reduce the performance of the rated DIMM speed.

General memory module installation guidelines

To ensure optimal performance of your system, observe the following general guidelines when configuring your system memory. If your system's memory configuration fails to observe these guidelines, your system might not boot, stop responding during memory configuration, or operate with reduced memory.

The memory bus may operate at speeds of 5200 MT/s, 4800 MT/s, 4400 MT/s or 4000 MT/s depending on the following factors:

- System profile selected (for example, Performance, Performance Per Watt Optimized (OS), or Custom [can be run at high speed or lower])
- Maximum supported DIMM speed of the processors
- Maximum supported speed of the DIMMs

NOTE: MT/s indicates DIMM speed in MegaTransfers per second.

NOTE: Fault Resilient Memory - Non-Uniform Memory Access (NUMA) is supported only when 8 or 16 DIMMs are installed.

The following are the recommended guidelines for installing memory modules:

- All DIMMs must be DDR5.
- Mixing of DIMMs is not allowed
- All DDR5 DIMMs must operate at the same speed per processor.
- If memory modules with different speeds are installed, they operate at the speed of the slowest installed memory module(s).
- Populate memory module sockets only if a processor is installed.
  - For single-processor systems, sockets A1 to A8 are available.
  - For dual-processor systems, sockets A1 to A8 and sockets B1 to B8 are available.
  - A minimum of 1 DIMM must be populated for each installed processor.
- In **Optimizer Mode**, the DRAM controllers operate independently in the 64-bit mode and provide optimized memory performance.

Table 134. Memory population rules

Processor	Memory population	Memory population information
Single processor	A{1}, A{2}, A{3}, A{4}, A{5}, A{6}, A{7}, A{8}	1, 2, 4, 6 and 8 DIMMs are allowed
Dual processor (Start with processor1. Processor 1 and processor 2 population should match)	A{1}, B{1}, A{2}, B{2}, A{3}, B{3}, A{4}, B{4}, A{5}, B{5}, A{6}, B{6}, A{7}, B{7} A{8}, B{8}	2, 4, 8, 12 and 16 DIMMs are supported per system

- Supported RDIMM configurations are 1, 2, 4, 6, and 8 DIMMs per processor.
- Supported 96GB RDIMM configurations are 1, 6 and 8 DIMMs per processor.
- Populate eight equal memory modules per processor (one DIMM per channel) at a time to maximize performance.

NOTE: Equal memory modules refer to DIMMs with identical electrical specification and capacity that may be from different vendors.

Removing a memory module

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system .
3. Remove the air shroud .

WARNING: The memory modules are hot to touch for some time after the system has been powered off. Allow the memory modules to cool before handling them.

NOTE: To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. The memory module blanks compatible with T560 are DDR5 gray color blanks. Remove the memory module blanks only if you intend to install memory modules in these sockets.

Steps

1. Locate the appropriate memory module socket.
2. To release the memory module from the socket, simultaneously press the ejectors on both ends of the memory module socket to fully open.

   CAUTION: Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

3. Lift the memory module away from the system.

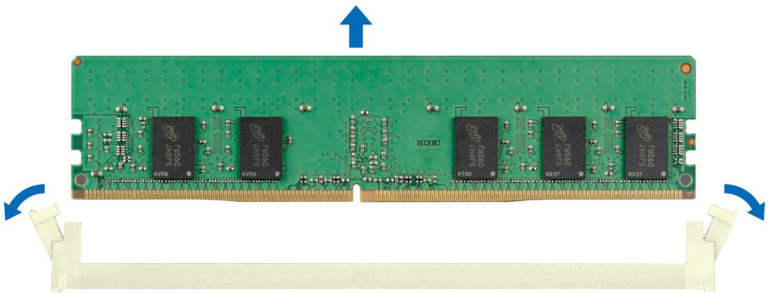


Figure 136. Removing a memory module

Next steps

Replace the memory module.

Installing a memory module

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system .
3. Remove the air shroud .

Steps

1. Locate the appropriate memory module socket.

   CAUTION: Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

   NOTE: Ensure that the socket ejector latches are fully open before installing the memory module.

2. Align the edge connector of the memory module with the alignment key of the memory module socket, and insert the memory module in the socket.

CAUTION: To prevent damage to the memory module or the memory module socket during installation, do not bend or flex the memory module; insert both ends of the memory module simultaneously.

NOTE: The memory module socket has an alignment key that enables you to install the memory module in the socket in only one orientation.

CAUTION: Do not apply pressure at the center of the memory module; apply pressure at both ends of the memory module evenly.

3. Press the memory module with your thumbs until the ejectors firmly click into place. When the memory module is properly seated in the socket, the levers on the memory module socket align with the levers on the other sockets that have memory modules that are installed.

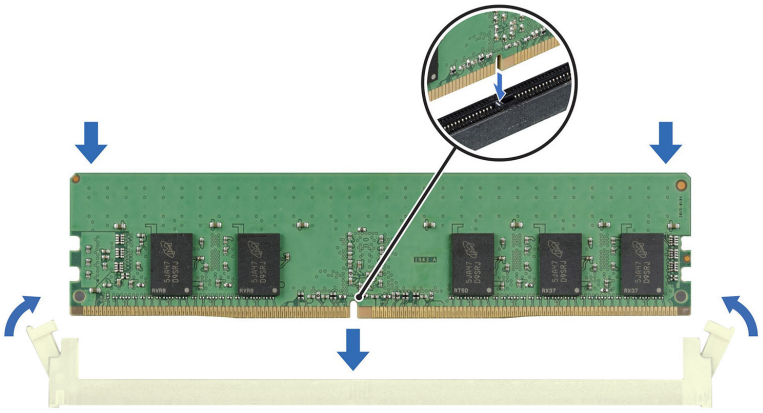


Figure 137. Installing a memory module

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.
3. To verify that the memory module has been installed properly, press F2 during reboot and navigate to **System Setup Main Menu > System BIOS > Memory Settings**. In the **Memory Settings** screen, the System Memory Size must reflect the updated capacity of the installed memory.
4. If the System Memory Size is incorrect, one or more of the memory modules may not be installed properly. . Shut down the system and ensure that the memory modules are firmly seated in the correct sockets.
5. Run the system memory test in system diagnostics.

Optional BOSS-N1 module

Removing the BOSS-N1 module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. If installed, remove the front bezel.

Steps

1. Disconnect the cables connected to the system board from the BOSS-N1 module.

2. Using a Phillips #2 screwdriver, remove the screw securing the BOSS-N1 module to the system.
3. Slide the BOSS-N1 module out of the system.

   NOTE: The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.

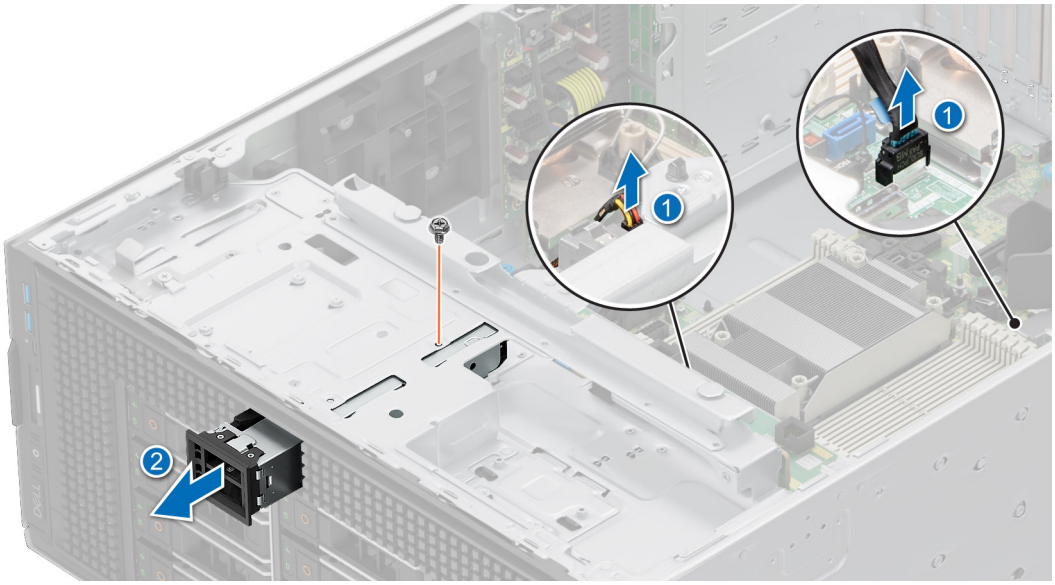


Figure 138. Removing the BOSS-N1 module

4. Align the blank with the BOSS-N1 module slot and push it into the bay until it clicks into place.

   NOTE: Blanks must be installed in empty slots to maintain FCC certification of the system. The blanks also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

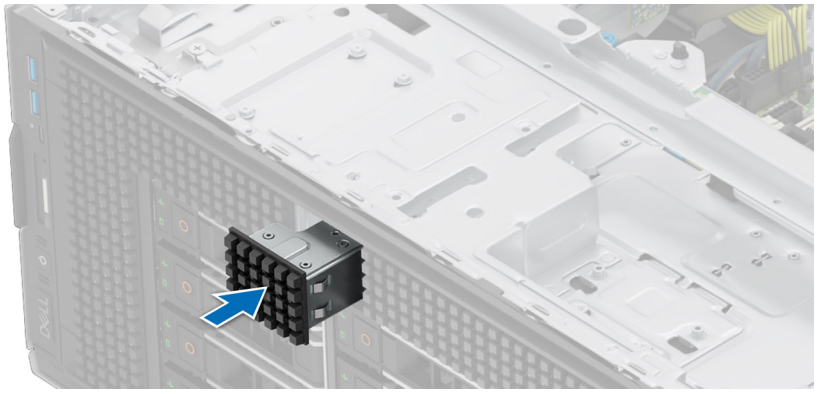


Figure 139. Installing the BOSS-N1 module blank

5. Using a Phillips #2 screwdriver, tighten the screw that secures the BOSS-N1 module blank to the system.

Next steps

Replace the BOSS-N1 module.

Installing the BOSS-N1 module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

4. If installed, remove the front bezel.

Steps

1. Using a Phillips #2 screwdriver, remove the screw that secures the BOSS-N1 module blank from the system.
2. Slide out the BOSS-N1 module blank from the system using a flat head screwdriver.

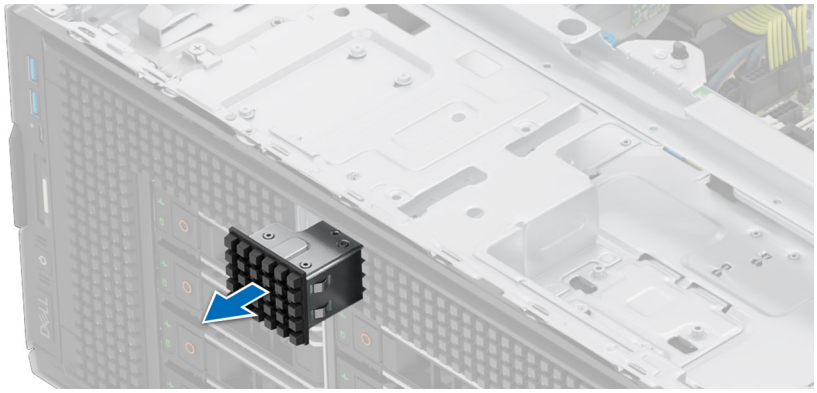


Figure 140. Removing the BOSS-N1 module blank

3. Align the BOSS-N1 module to the BOSS-N1 slot on the chassis and push it into the slot.
4. Using a Phillips #2 screwdriver, secure the BOSS-N1 module to the system.

NOTE: The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.

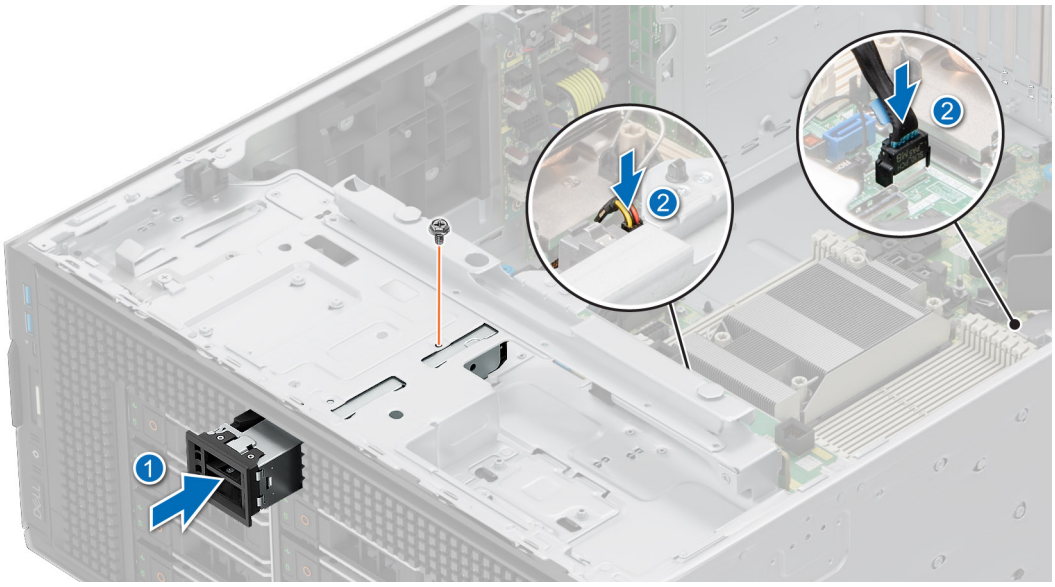


Figure 141. Installing the BOSS-N1 module

5. Connect the cables to the system board connectors.

NOTE: Route the cables properly to prevent them from being pinched or crimped.

Next steps

1. If removed, install the front bezel.
2. Install the air shroud.
3. Follow the procedure that is listed in After working inside your system.

Removing the BOSS-N1 card carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. If installed, remove the front bezel.

Steps

1. Open the release latch and slide the BOSS-N1 card carrier out of the BOSS-N1 module.

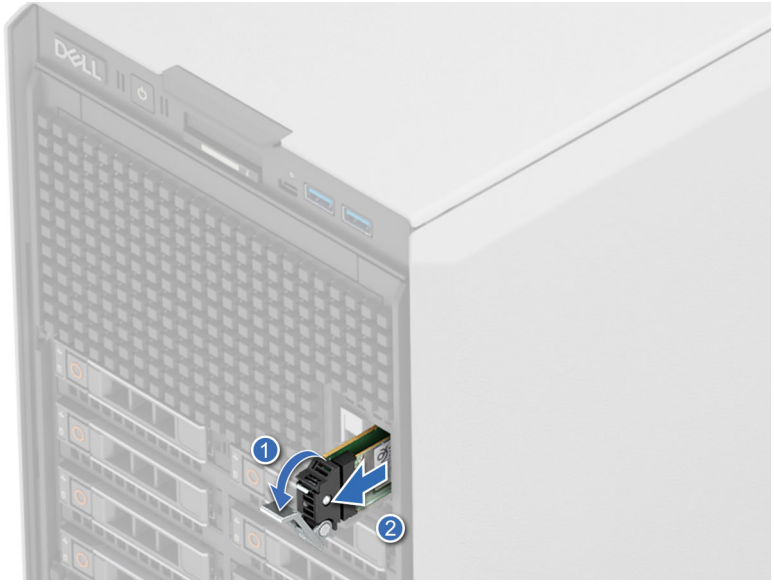


Figure 142. Removing the BOSS-N1 card carrier

2. Using the Phillips #1 screwdriver remove the M3 x 0.5 x 4.5 mm screw that secures the M.2 NVMe SSD to the BOSS-N1 card carrier.
3. Slide the M.2 NVMe SSD out from the BOSS-N1 card carrier.

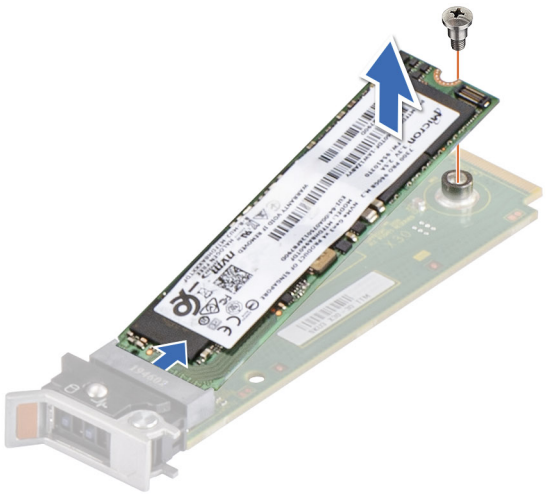


Figure 143. Removing the M.2 NVMe SSD

4. If not installing the BOSS-N1 card carrier, align and push the BOSS-N1 card carrier blank into the BOSS-N1 module to fill the empty BOSS-N1 card carrier slot.

Figure 144. Installing the BOSS-N1 card carrier blank

Next steps

Replace the BOSS-N1 module

Installing the BOSS-N1 card carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions .
2. Follow the procedure that is listed in .Before working inside your system
3. If installed, remove the front bezel.

Steps

1. Press the release clip and pull the BOSS-N1 card carrier blank out of the system.

Figure 145. Removing the BOSS-N1 card carrier blank

2. Align the M.2 NVMe SSD at an angle with the BOSS-N1 card carrier.
3. Insert the M.2 NVMe SSD until it is firmly seated in the BOSS-N1 card carrier.
4. Using the Phillips #1 screwdriver, secure the M.2 NVMe SSD on the BOSS-N1 card carrier with the M3 x 0.5 x 4.5 mm screw.

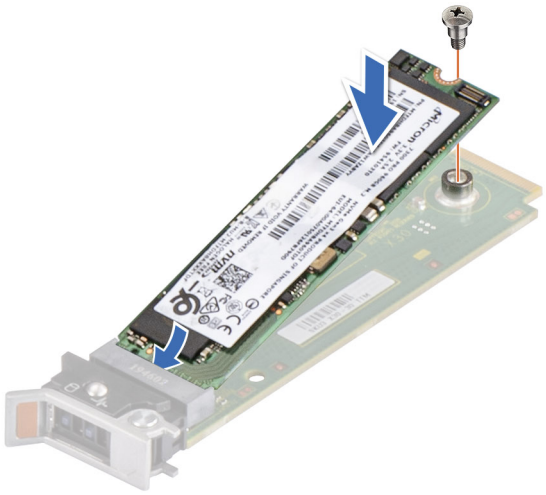


Figure 146. Installing the M.2 NVMe SSD

5. Align and push the BOSS-N1 card carrier into the slot in the BOSS-N1 module.
6. Close the release latch to secure the BOSS-N1 card carrier.

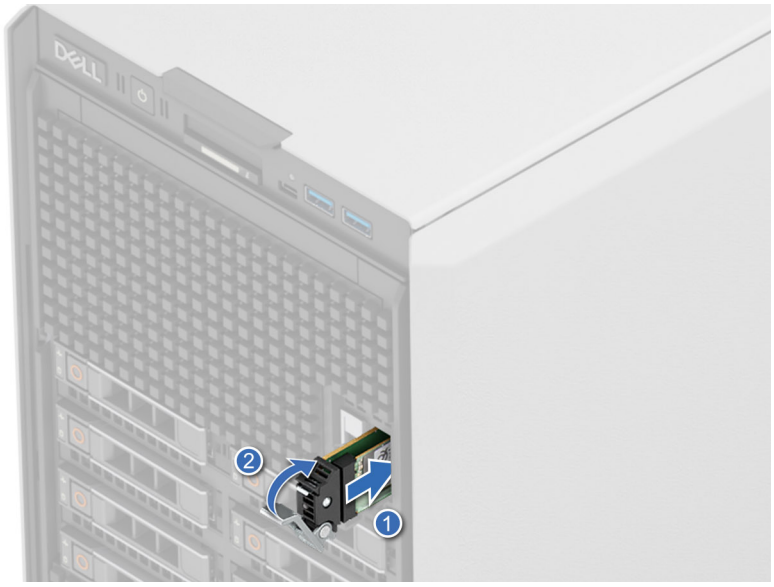


Figure 147. Installing the BOSS-N1 card carrier

Next steps

1. If removed, install the front bezel.
2. Follow the procedure that is listed in After working inside your system.

Optional internal USB card

NOTE: To locate the internal USB port on the system board, see the System board jumpers and connectors section.

Removing the internal USB card

Prerequisites

CAUTION: To avoid interference with other components in the server, the maximum permissible dimensions of the USB memory key are 15.9 mm wide x 57.15 mm long x 7.9 mm high.

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in the Before working inside your system .
3. Remove the expansion card risers.

Steps

1. Holding the blue tag, lift the internal USB card to disconnect from the connector on the system board.
2. Remove the USB memory key from the internal USB card.

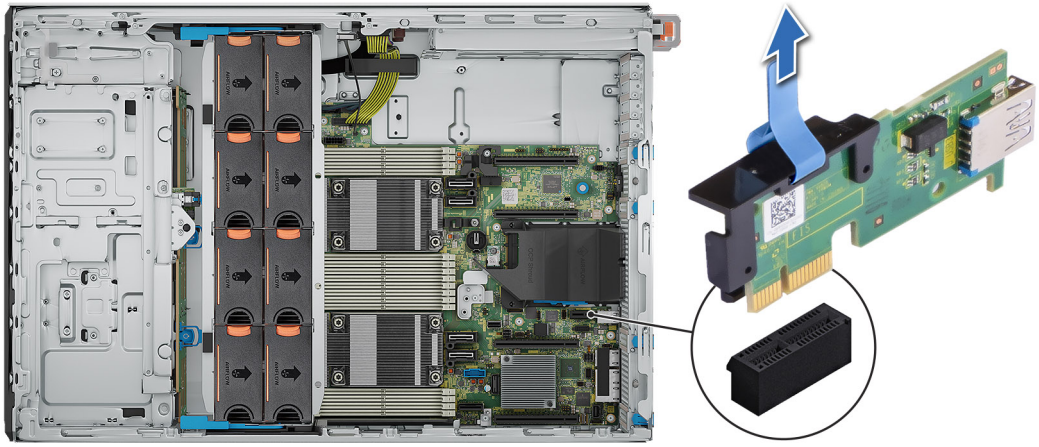


Figure 148. Removing the internal USB card

Next steps

1. Replace the internal USB card..

Installing the internal USB card

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in the Before working inside your system .
3. Remove the expansion card risers.

Steps

1. Connect the USB key to the internal USB card.

   NOTE: For information about the exact location of USB on system board, see System board jumpers and connectors section.

2. Align the internal USB card with the connector on the system board and press firmly until the internal USB card is seated.

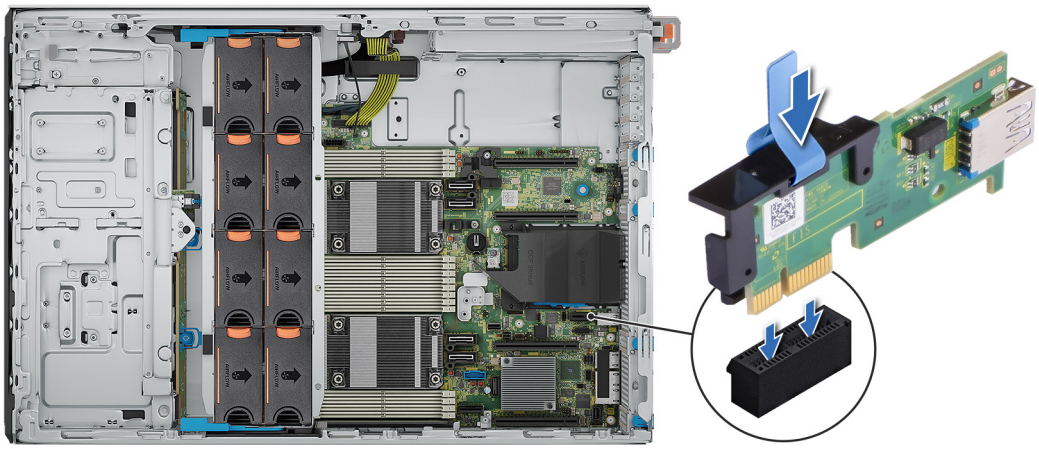


Figure 149. Installing the internal USB card

Next steps

1. Install the expansion card risers.
2. Follow the procedure listed in After working inside your system.
3. While booting, press F2 to enter **System Setup** and verify that the system detects the USB memory key.

Expansion cards and expansion card risers

NOTE: When an expansion card is not supported or missing, the iDRAC and Lifecycle Controller logs an event. This does not prevent your system from booting. However, if a F1/F2 pause occurs with an error message, see Troubleshooting expansion cards section in the PowerEdge Servers Troubleshooting Guide at PowerEdge Manuals.

Expansion card installation guidelines

The following table describes the supported expansion cards and riser configurations:

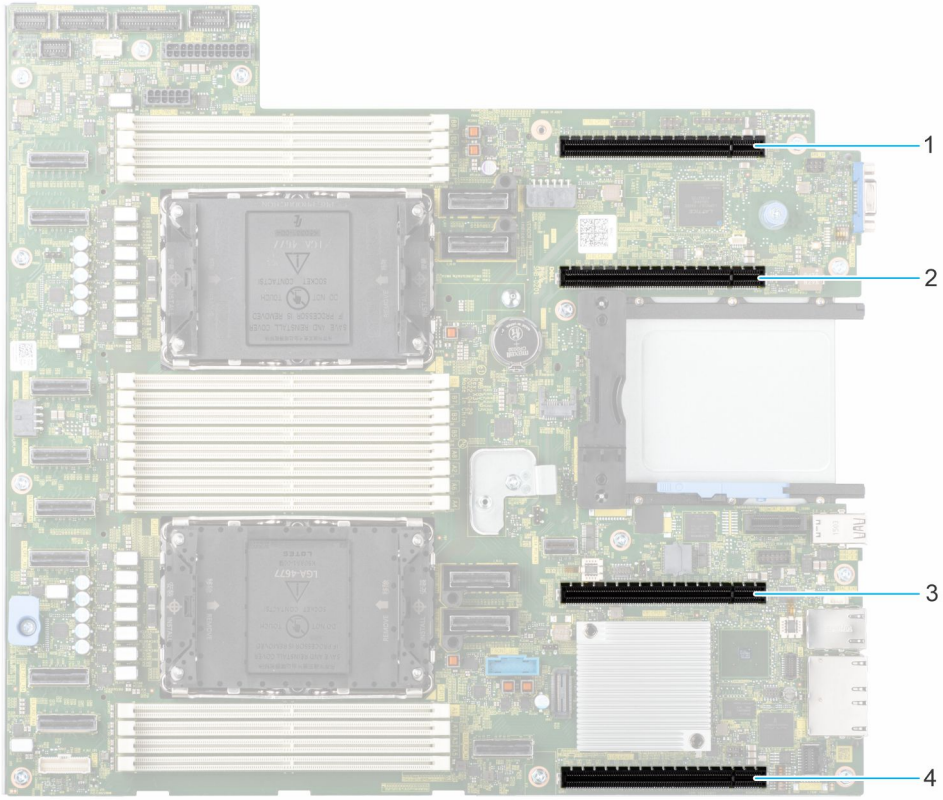


Figure 150. Expansion card riser slot connectors

1. PCIe Slot 3 (CPU 2)
2. PCIe Slot 4 (CPU 2)
3. PCIe Slot 5 (CPU 1)
4. PCIe Slot 6 (CPU 1)

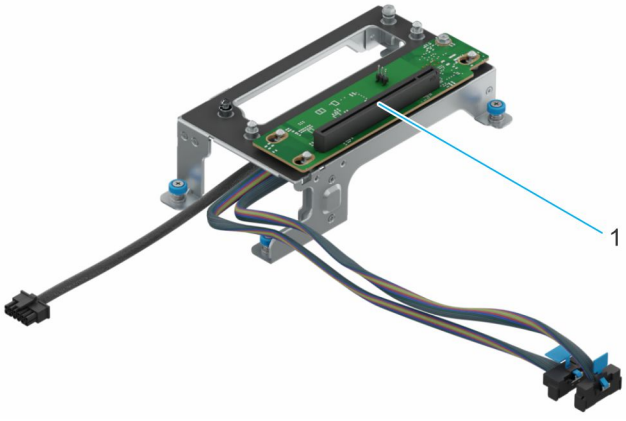


Figure 151. GPU Riser RC1 Module

1. Slot 2

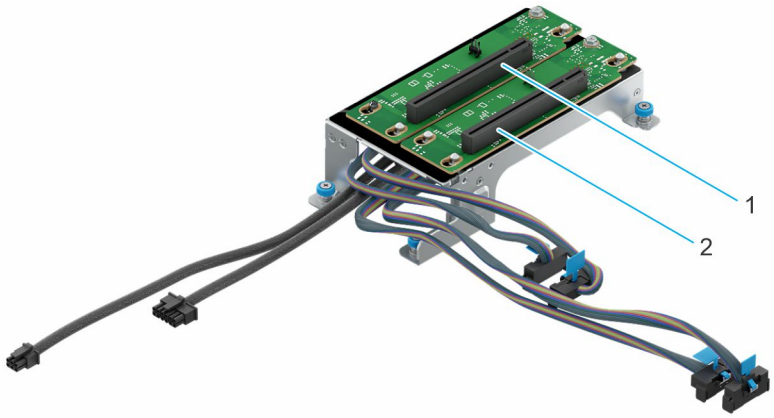


Figure 152. GPU Riser RC2 Module

1. Slot 1
2. Slot 2

Table 135. Expansion card riser configurations

Configurations	Expansion card risers	PCIe Slot ID	Form factor	Controlling processor	Slot's electrical bandwidth/ physical connector
Config1. 1 x16 FHFL + 2 x16 FHHL	RC1	2	Full height Full Length, Double Width	Processor 1	PCIe Gen5 x16 (x16 connector)
Config1-1. 1x FHFL + 4 x FHHL	RC1	2	Full height Full Length, Double Width	Processor 1	PCIe Gen5 x16 (x16 connector)
Config2. 2 x FHFL + 4x FHHL	RC2	1	Full height Full Length, Double Width	Processor 2	PCIe Gen5 x16 (x16 connector)
	RC2	2		Processor 1	PCIe Gen5 x16 (x16 connector)

NOTE: The expansion-card slots are not hot-swappable.

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

Table 136. Config 0: No riser – CPU

Card Type	Slot Priority	Maximum number of cards
Inventec Serial	5	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1

Table 136. Config 0: No riser – CPU (continued)

Card Type	Slot Priority	Maximum number of cards
Internalel COMMs Card (OCP 3.0)	1	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 6	1
Foxconn PERC/HBA	3, 4, 6	1
Compal/Foxconn/Inventec/Wistron	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 5, 6	4
Foxconn PERC/HBA	3, 4, 5, 6	4
Foxconn PERC/HBA	5	1
Nvidia GPU	3, 4, 5, 6	4
Broadcom COMMs Card (PCIe)	3, 4, 5, 6	4
Broadcom COMMs Card (PCIe)	3, 4, 5, 6	4
Broadcom COMMs Card (PCIe)	3, 4, 5, 6	4
Internalel COMMs Card (PCIe)	3, 4, 5, 6	4
Internalel COMMs Card (PCIe)	3, 4, 5, 6	4
Internalel COMMs Card (PCIe)	3, 4, 5, 6	4
Broadcom COMMs Card (PCIe)	3, 4, 5, 6	4

Table 137. Config0-1 No riser-CPU

Card type	Slot priority	Maximum number of cards
Inventec Serial	5	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1

Table 137. Config0-1 No riser-CPU (continued)

Card type	Slot priority	Maximum number of cards
Broadcom COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	6	1
Foxconn PERC/HBA	6	1
Compal/Foxconn/Inventec/Wistron	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	5, 6	2
Foxconn PERC/HBA	5, 6	2
Foxconn PERC/HBA	5	1
Nvidia GPU	5, 6	2
Broadcom COMMs Card (PCIe)	5, 6	2
Broadcom COMMs Card (PCIe)	5, 6	2
Broadcom COMMs Card (PCIe)	5, 6	2
Internalel COMMs Card (PCIe)	5, 6	2
Internalel COMMs Card (PCIe)	5, 6	2
Internalel COMMs Card (PCIe)	5, 6	2
Broadcom COMMs Card (PCIe)	5, 6	2

Table 138. Config1. R1A

Card type	Slot priority	Maximum number of cards
Inventec Serial	5	1
Nvidia GPU	2	1
Nvidia GPU	2	1
Nvidia GPU	2	1

Table 138. Config1. R1A (continued)

Card type	Slot priority	Maximum number of cards
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	2, 6	1
Foxconn PERC/HBA	2, 6	1
Compal/Foxconn/Inventec/Wistron	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	5, 2, 6	3
Foxconn PERC/HBA	5, 2, 6	3
Foxconn PERC/HBA	5	1
Nvidia GPU	2, 6	2
Broadcom COMMs Card (PCIe)	2, 5, 6	3
Internalel COMMs Card (PCIe)	2, 6	2
Mellanox COMMs Card (PCIe)	5, 2, 6	3
Broadcom COMMs Card (PCIe)	5, 2, 6	3
Broadcom COMMs Card (PCIe)	5, 2, 6	3
Internalel COMMs Card (PCIe)	5, 2, 6	3
Internalel COMMs Card (PCIe)	5, 2, 6	3
Internalel COMMs Card (PCIe)	5, 2, 6	3

Table 138. Config1. R1A (continued)

Card type	Slot priority	Maximum number of cards
Broadcom COMMs Card (PCIe)	5, 2, 6	3

Table 139. Config1-1. R1A

Card type	Slot priority	Maximum number of cards
Inventec Serial	5	1
Nvidia GPU	2	1
Nvidia GPU	2	1
Nvidia GPU	2	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 2, 6	1
Foxconn PERC/HBA	3, 4, 2, 6	1
Compal/Foxconn/Inventec/Wistron	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 2, 5, 6	5
Foxconn PERC/HBA	3, 4, 2, 5, 6	5
Foxconn PERC/HBA	5	1
Nvidia GPU	3, 4, 2, 6	4
Broadcom COMMs Card (PCIe)	3, 4, 2, 5, 6	5

Table 139. Config1-1. R1A (continued)

Card type	Slot priority	Maximum number of cards
Internalel COMMs Card (PCIe)	3, 4, 2, 6	4
Mellanox COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Broadcom COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Broadcom COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Internalel COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Internalel COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Internalel COMMs Card (PCIe)	3, 4, 2, 5, 6	5
Broadcom COMMs Card (PCIe)	3, 4, 2, 5, 6	5

Table 140. Config2. R1A + R1b

Card type	Slot priority	Maximum number of cards
Inventec Serial	5	1
Nvidia GPU	2, 1	2
Nvidia GPU	2, 1	2
Nvidia GPU	2, 1	2
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Broadcom COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Internalel COMMs Card (OCP 3.0)	1	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn BOSS	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 2, 1, 6	1
Foxconn PERC/HBA	3, 4, 2, 1, 6	1
Compal/Foxconn/Inventec/Wistron	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	Internal	1

Table 140. Config2. R1A + R1b (continued)

Card type	Slot priority	Maximum number of cards
Foxconn PERC/HBA	Internal	1
Foxconn PERC/HBA	Internal	2
Foxconn PERC/HBA	3, 4, 2, 1, 5, 6	6
Foxconn PERC/HBA	3, 4, 2, 1, 5, 6	6
Foxconn PERC/HBA	5	1
Nvidia GPU	3, 4, 2, 1, 6	5
Broadcom COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Internalel COMMs Card (PCIe)	3, 4, 2, 1, 6	5
Mellanox COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Broadcom COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Broadcom COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Internalel COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Internalel COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Internalel COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6
Broadcom COMMs Card (PCIe)	3, 4, 2, 1, 5, 6	6

Removing a expansion card

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Disconnect the cables from the expansion card.
2. Press the expansion card latch and push down the latch to open it.
3. Hold the expansion card by the edge, and pull the card up to remove it from the expansion card connector and the system.

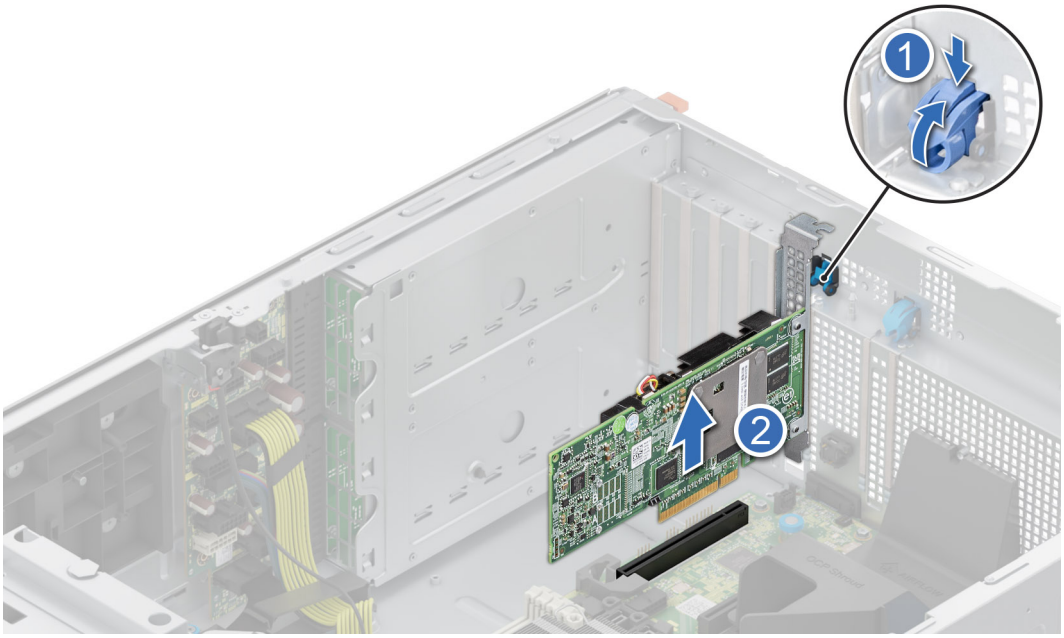


Figure 153. Removing an expansion card

4. Install the filler brackets by performing the following steps:
   a. Align the slot on the filler bracket with the tab on the expansion card slot.
   b. Press the expansion card latch till the filler bracket locks into place.

NOTE: Filler brackets must be installed in empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

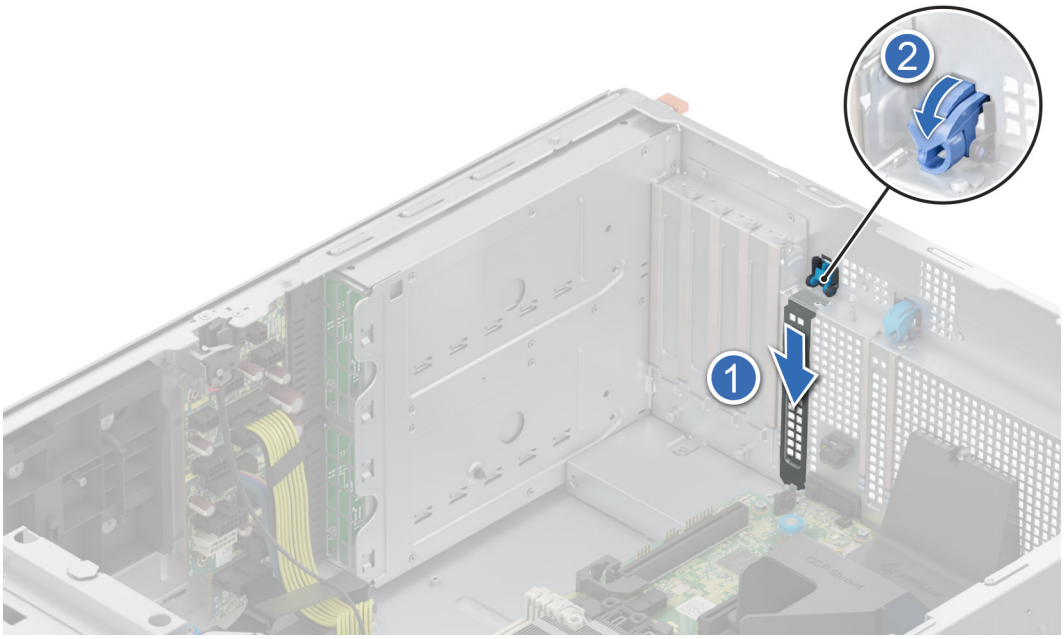


Figure 154. Installing the filler bracket

Next steps

Replace the expansion card.

Installing an expansion card

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remo\ve the air shroud.

Steps

1. Unpack the expansion card and prepare it for installation.
   For instructions, see the documentation accompanying the card.
2. Open the expansion card latch adjacent to the slot you want to install the expansion card.
3. Remove the existing expansion card or filler bracket from the expansion card holder.

   NOTE: Store this bracket for future use. Filler brackets must be installed in empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

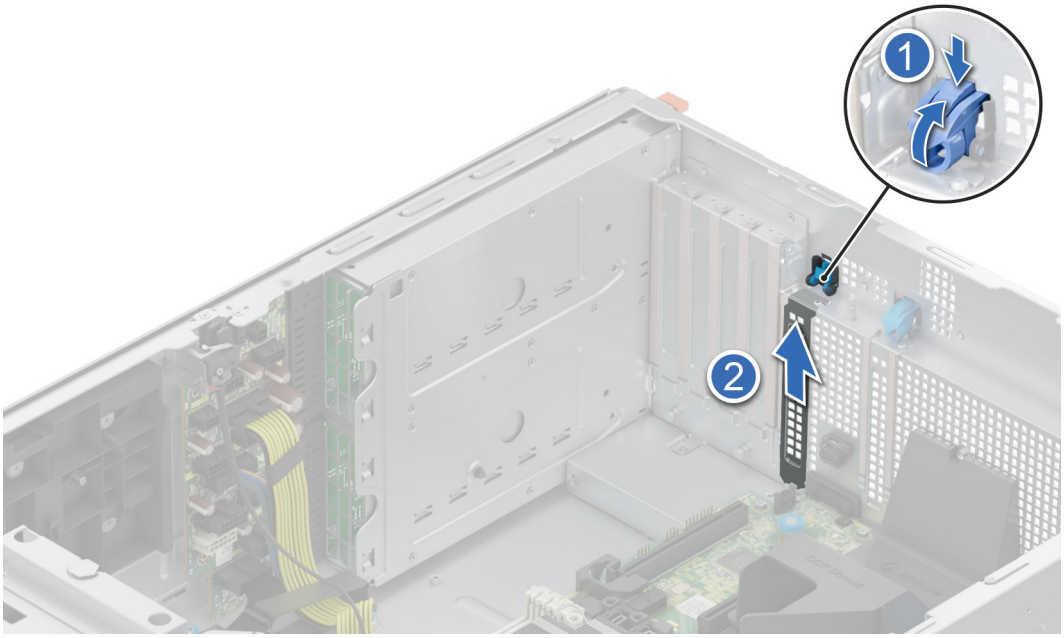


Figure 155. Removing the filler bracket

4. Holding the card by the edges, position the card so that the card aligns with the expansion card connector.
5. Insert the card firmly into the expansion card connector until the card is fully seated.
6. Close the expansion card latch by pushing the latch up until the latch snaps into place.

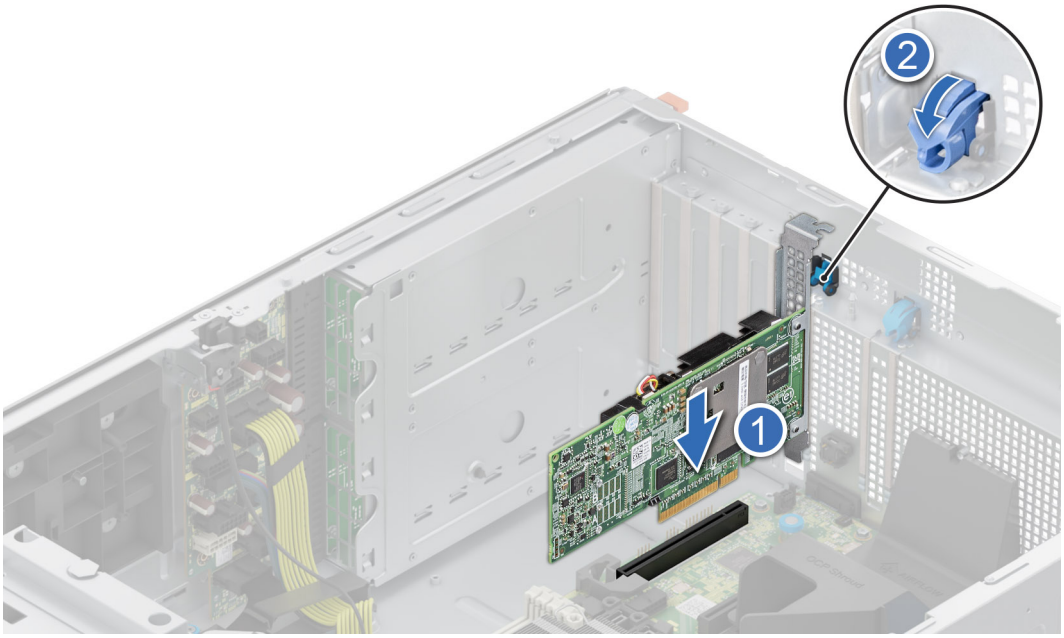


Figure 156. Installing an expansion card

7. Connect the cables to the expansion card.

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

Optional GPU card

Removing the GPU card holder

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

Loosen the captive screws and pull the GPU card holder from the system.

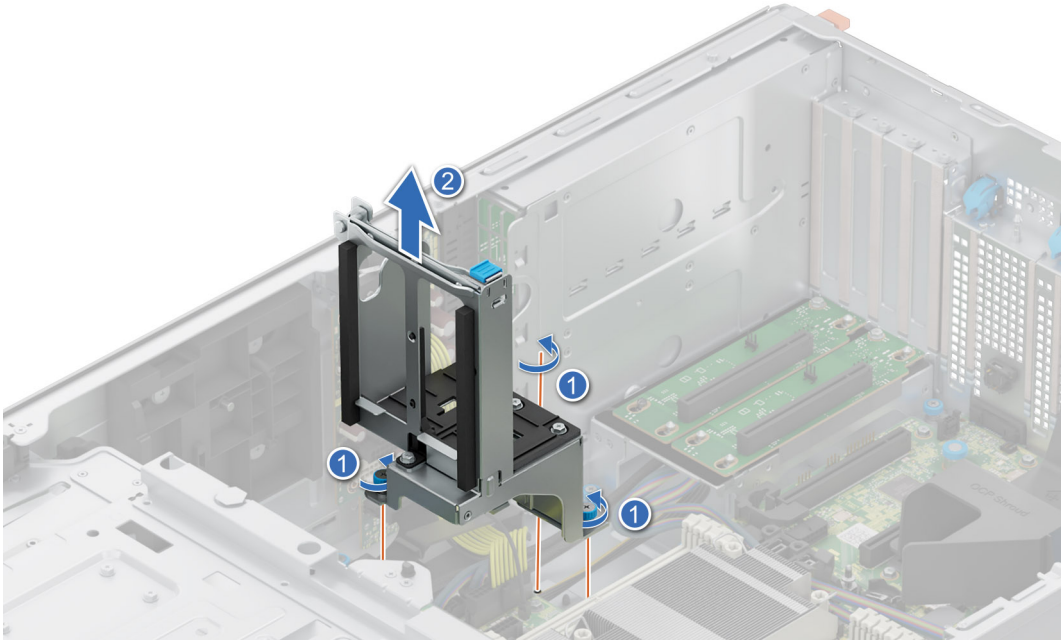


Figure 157. Removing GPU card holder

Next steps

Replace the GPU card holder.

Installing the GPU card holder

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Align and lower the GPU card holder to the guide pin on the system.
2. Tighten the captive screws, until the GPU card holder is firmly seated.

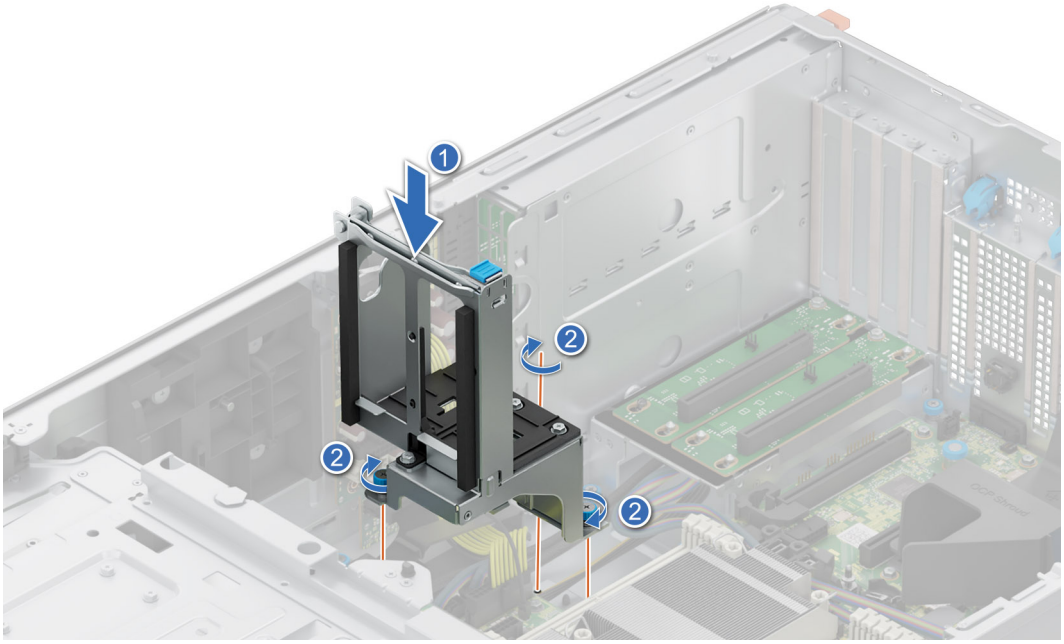


Figure 158. Installing the GPU card holder

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

GPU riser

Removing the GPU riser

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Disconnect the cables from the GPU riser connected to the system board.
2. Loosen the captive screws and pull the GPU riser from the system.

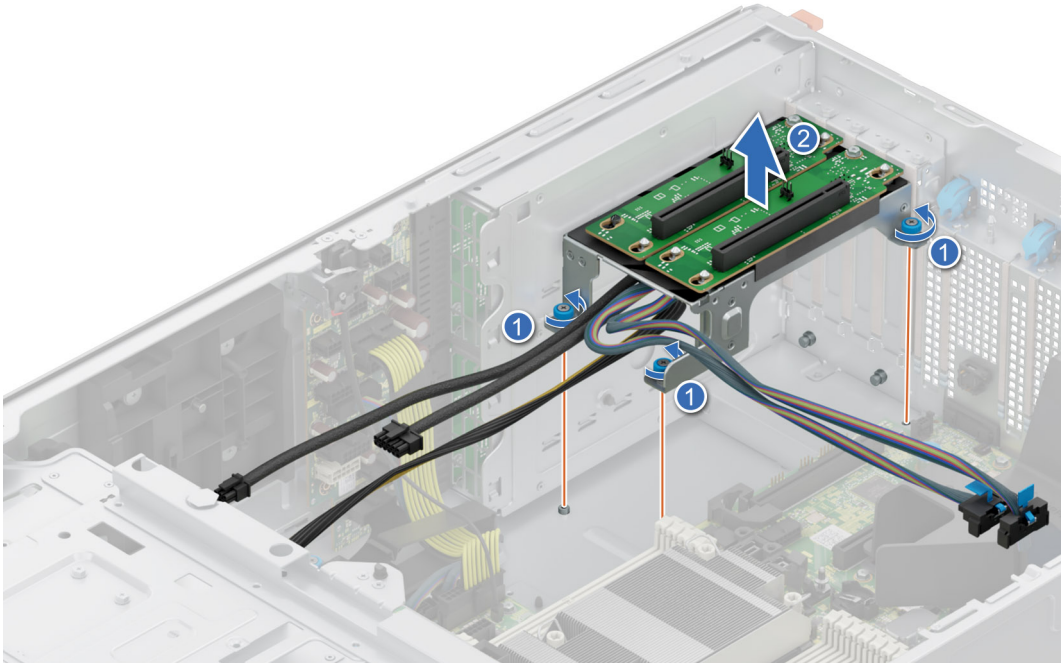


Figure 159. Removing the GPU riser

Next steps

Replace the GPU riser.

Installing the GPU riser

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Align the GPU riser to the guide pins and lower the GPU riser in the system.
2. Tighten the captive screws, until the GPU riser is firmly seated.

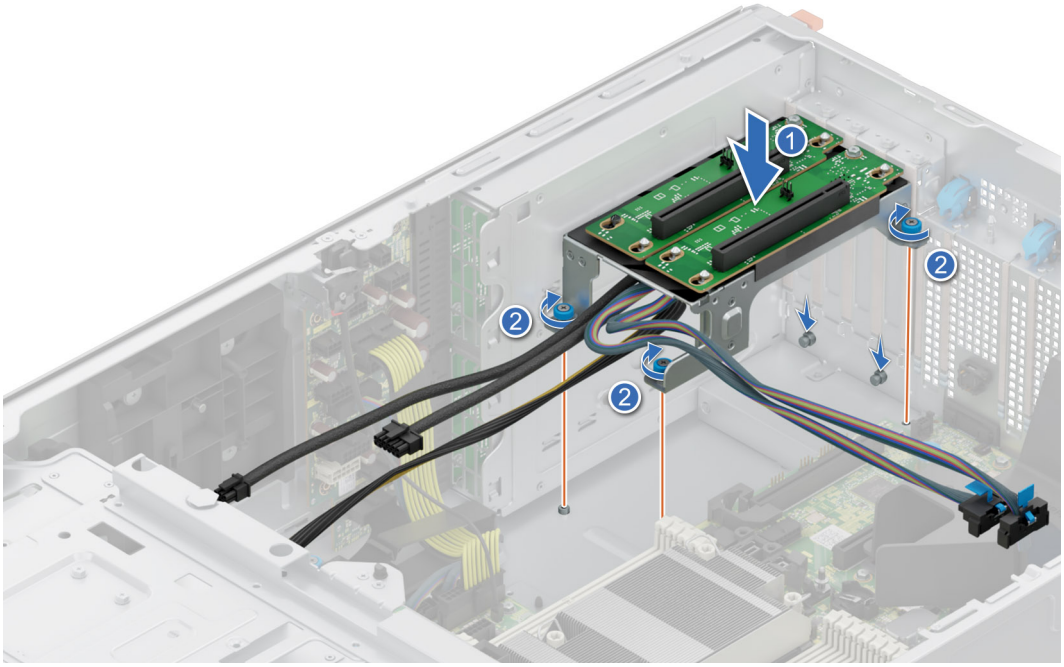


Figure 160. Installing the GPU riser

Next steps

1. Connect the cables to the system board connectors.
2. Install the air shroud.
3. Follow the procedure listed in After working inside your system.

Processor and heat sink

This is a service technician replaceable part only.

Removing the processor and heat sink module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

NOTE: The heat sink and processor are hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool down before handling them.

Steps

1. Ensure all four anti-tilt wires are in the locked position (outward position), and then using a Torx T30 tool, loosen the captive nuts on the processor heat sink module (PHM) in the order that is mentioned below:
   a. Loosen the first nut three turns.
   b. Loosen the nut diagonally opposite to the nut you loosened first.
   c. Repeat the procedure for the remaining two nuts.
   d. Return to the first nut and loosen it completely.

   NOTE: Ensure that the anti-tilt wires on the PHM are in locked position when loosening the captive nuts.

2. Set all the anti-tilt wires to unlocked position (inward position).

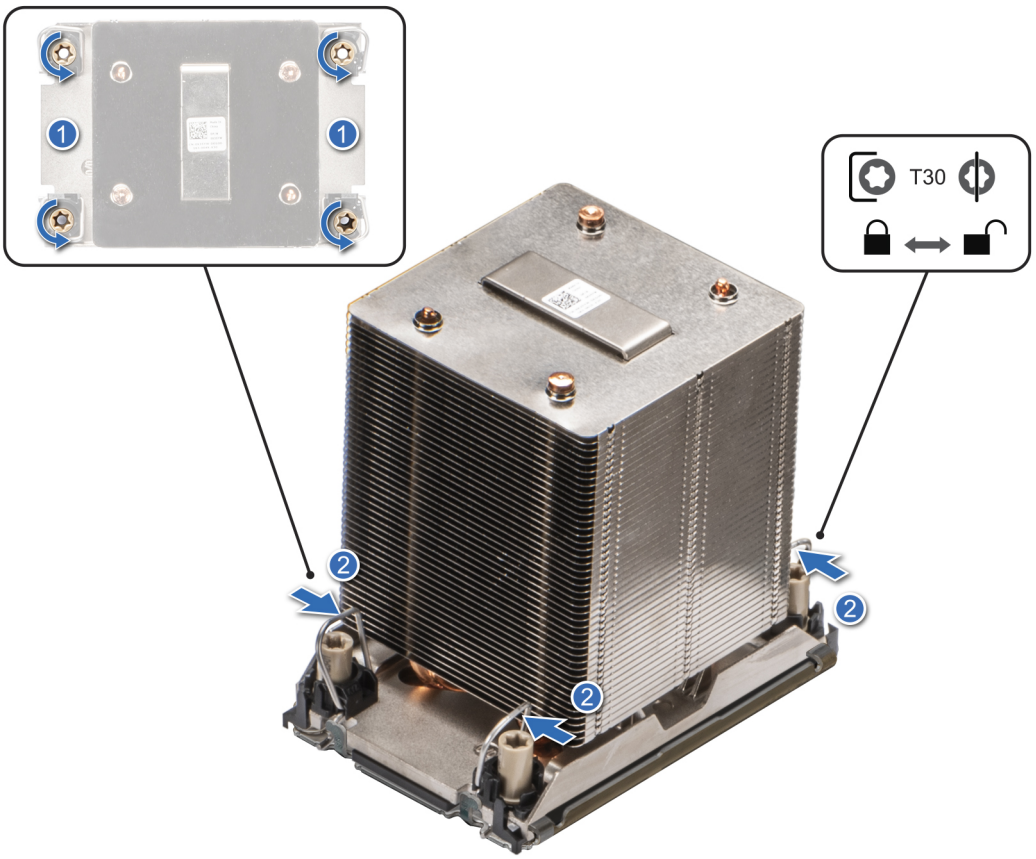


Figure 161. Removing the processor heat sink module

3. Lift the PHM from the system and set the PHM aside with the processor side facing up.

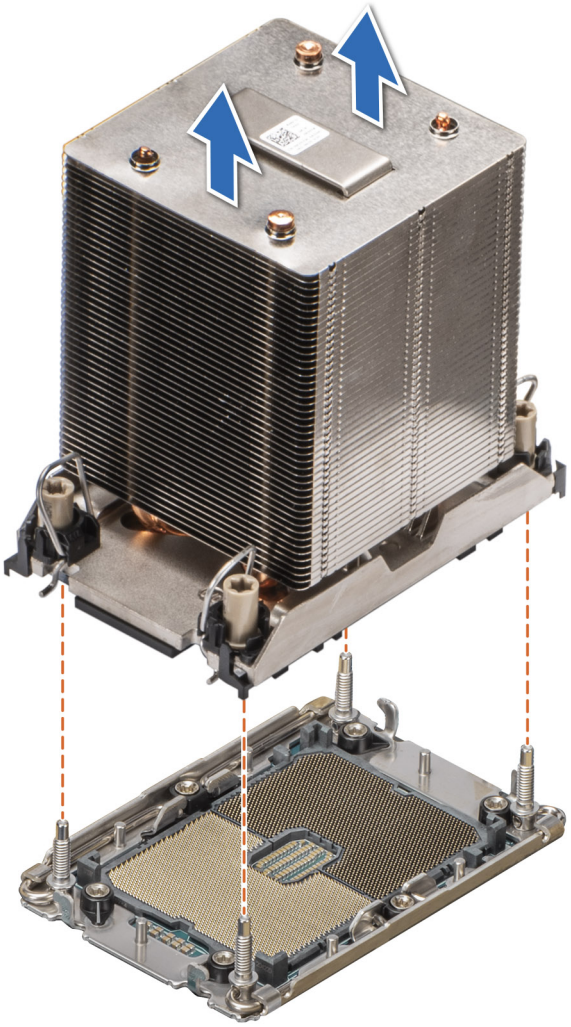


Figure 162. Removing a heat sink

Next steps

If you are removing a faulty heat sink, Removing the processor and heat sink module , if not, Removing the processor.

Removing the processor

Prerequisites

WARNING: Remove the processor from processor and heat sink module (PHM) only if you are replacing the processor or heat sink.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the processor heat sink module.

CAUTION: You may find the CMOS battery loss or CMOS checksum error displayed during the first instance of powering on the system after the processor or system board replacement which is expected. To fix this, simply go to setup option to configure the system settings.

Steps

1. Place the heat sink with the processor side facing up.

2. Using your thumb, lift up the Thermal Interface Material (TIM) break lever to release the processor from the TIM and retaining clip.
3. Holding the processor by the edges, lift the processor away from the retaining clip.

NOTE: Ensure to hold the retaining clip to the heat sink as you lift the TIM break lever.

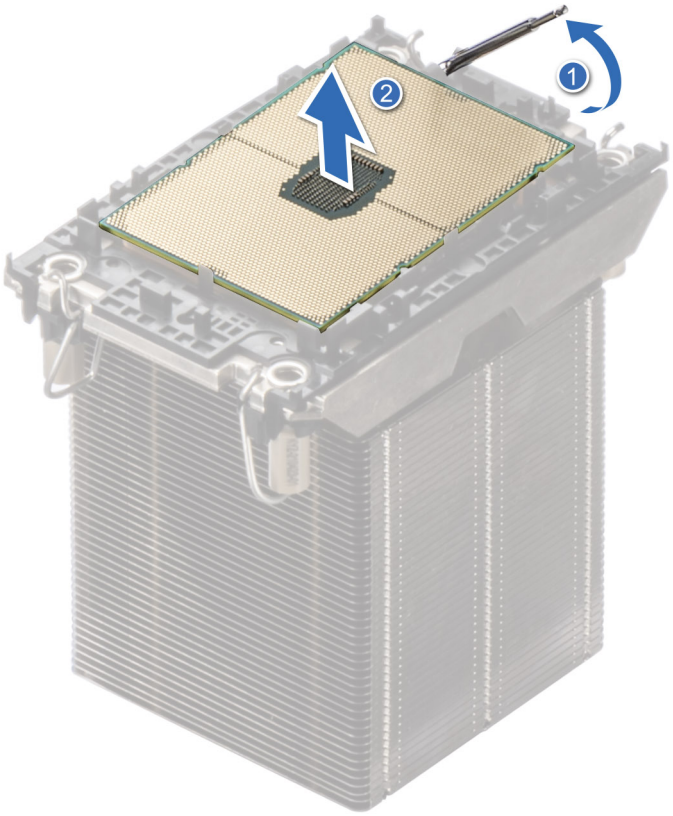


Figure 163. Lift up the TIM break lever

NOTE: Ensure to return the TIM break lever back to original position.

4. Using your thumb and index finger, first hold the retaining clip release tab at the pin 1 connector, pull out the tip of the retaining clip release tab, and then lift the retaining clip partially from the heat sink.
5. Repeat the procedure at the remaining three corners of the retaining clip.
6. After all the corners are released from the heat sink, lift the retaining clip from the pin 1 corner of the heat sink.

Figure 164. Removing the retaining clip

Next steps

Replace the processor.

Installing the processor

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Remove the processor and heat sink module.

Steps

1. Place the processor in the processor tray.

   NOTE: Ensure the pin 1 indicator on the processor tray is aligned with the pin 1 indicator on the processor.

2. Place the retaining clip on top of the processor in the processor tray aligning pin 1 indicator on the processor.

   NOTE: Ensure the pin 1 indicator on the retaining clip is aligned with the pin 1 indicator on the processor before placing the retaining clip on the processor.

   NOTE: Before you install the heat sink, ensure to place the processor and retaining clip in the tray.

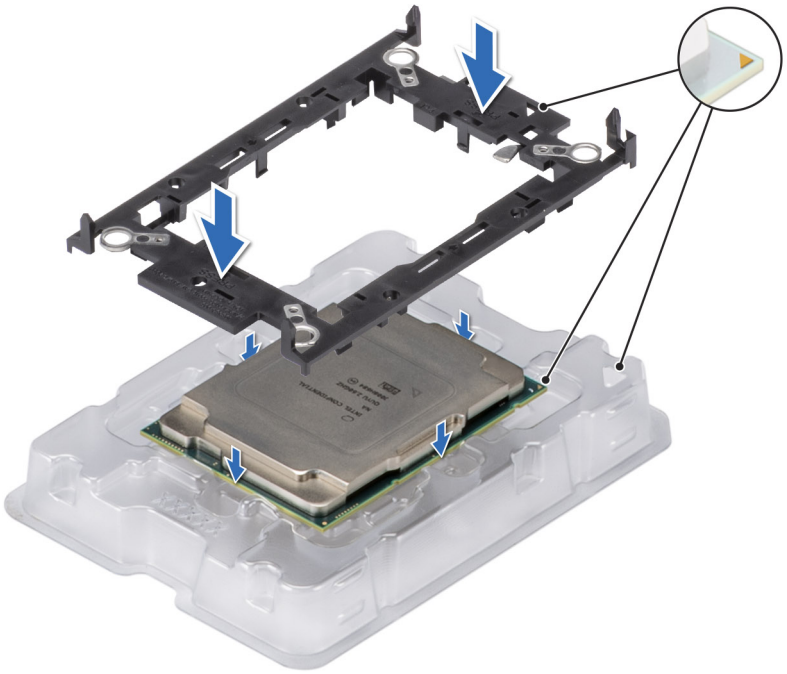


Figure 165. Installing the retaining clip

3. Align the processor with retaining clip, by using the fingers press the retaining clip on all the four sides until it clicks into place.

   NOTE: Ensure the processor is securely latched to the retaining clip.

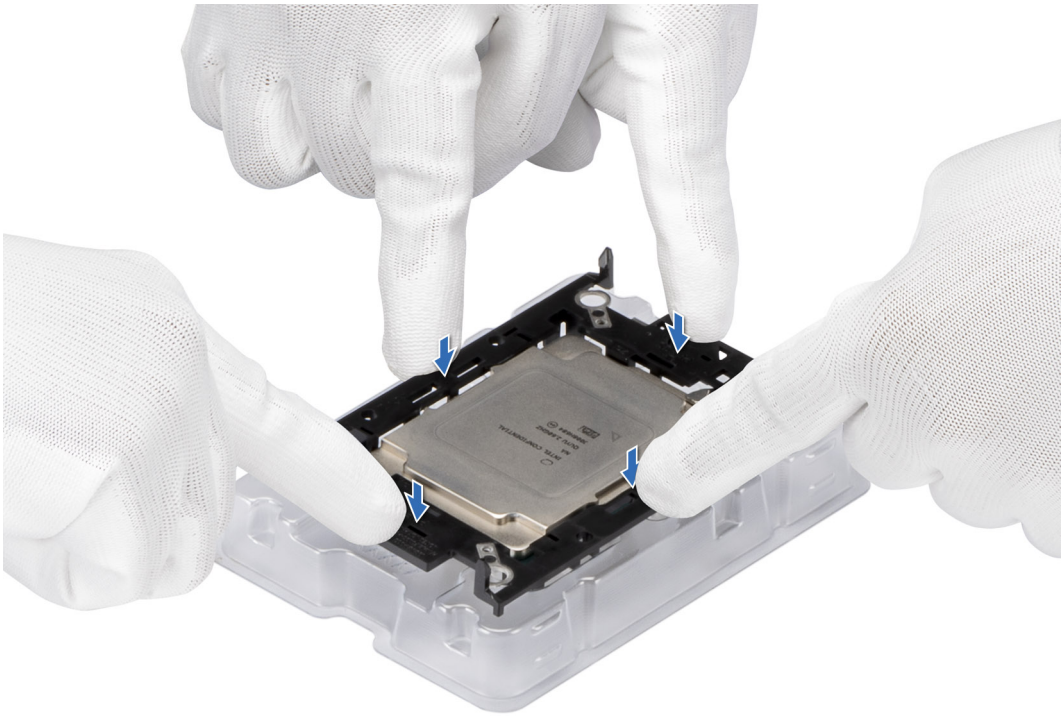


Figure 166. Press the retaining clip on the four sides

4. Apply thermal grease in a quadrilateral design on the top of the processor.

   CAUTION: Applying too much thermal grease can result in excess grease coming in contact with and contaminating the processor socket.

NOTE: The thermal grease syringe is intended for single use only. Dispose the syringe after you use it.

Figure 167. Applying thermal grease

5. For new heat sink, remove the Thermal Interface Material (TIM) protective film from the base of heat sink.

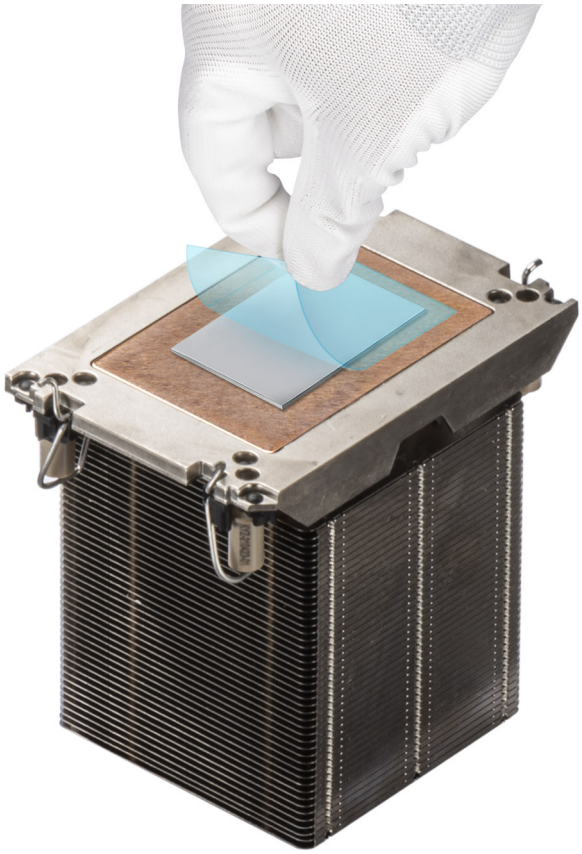


Figure 168. Removing the Thermal Interface Material (TIM) protective film

6. Place the heat sink on the processor and press the base of the heat sink until the retaining clip locks onto the heat sink at all the four corners.

CAUTION: To avoid damaging the fins on the heat sink, do not press down on the heat sink fins.

NOTE:

- Ensure latching features on retaining clip and heat sink are aligned during assembly.
- Ensure that the pin 1 indicator on the heat sink is aligned with the pin 1 indicator on the retaining clip before placing the heat sink onto the retaining clip.

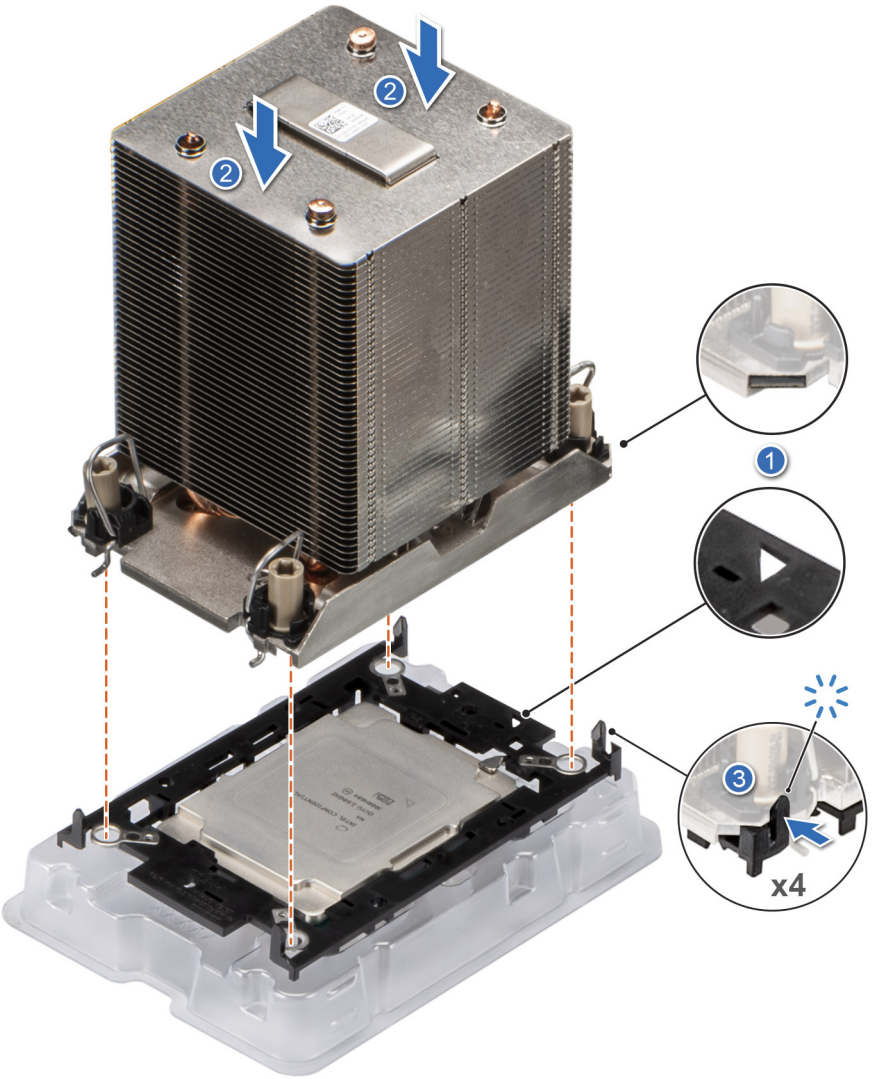


Figure 169. Installing the heat sink onto the processor

Next steps

1. Install the processor heat sink module.
2. Install the air shroud.
3. Follow the procedure listed in After working inside your system.

Installing the processor and heat sink module

Prerequisites

Never remove the heat sink from a processor unless you intend to replace the processor or system board. The heat sink is necessary to maintain proper thermal conditions.

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. If installed, remove the processor dust cover.

Steps

1. Set the anti-tilt wires to the unlocked position on the heat sink (inward position).

2. Align the pin 1 indicator of the heat sink to the system board, and then place the processor heat sink module (PHM) on the processor socket.

CAUTION: To avoid damaging the fins on the heat sink, do not press down on the heat sink fins.

NOTE: Ensure that the PHM is held parallel to the system board to prevent damaging the components.

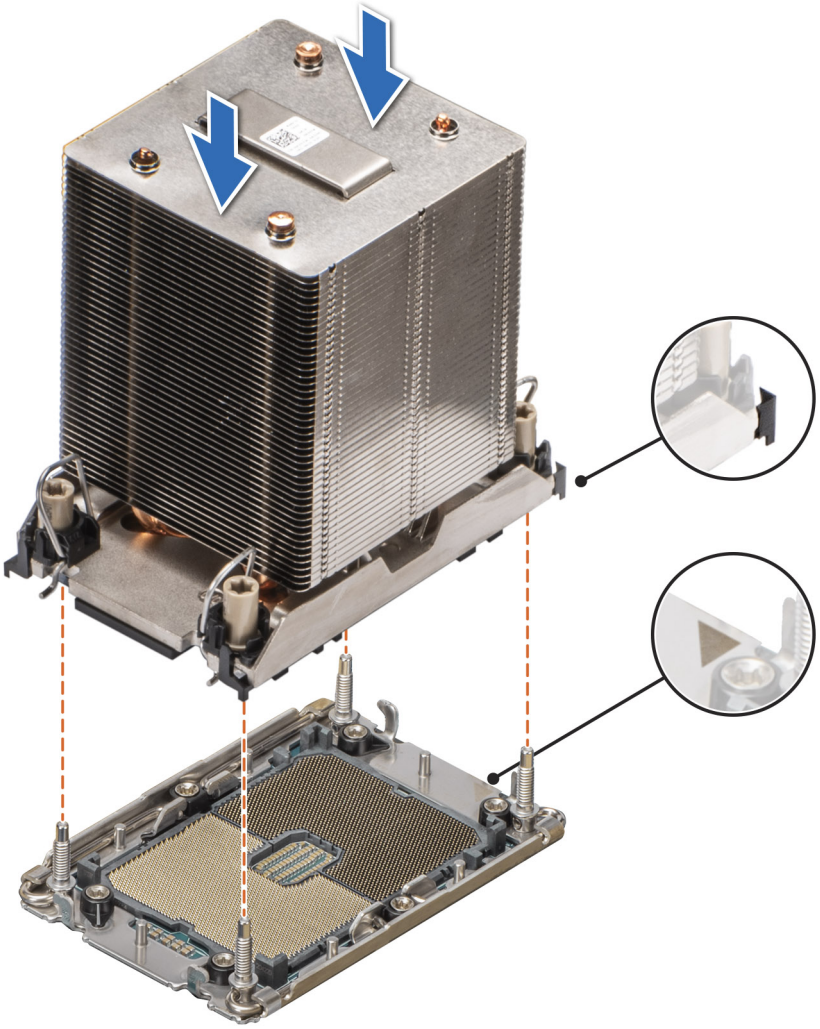


Figure 170. Installing the processor heat sink

3. Set the anti-tilt wires to the locked position (outward position), and then using the Torx T30 tool, tighten the nuts (12 in-lbf) on the PHM:
   a. Tighten the first nut three turns.
   b. Tighten the nut diagonally opposite to the nut you tighten first.
   c. Repeat the procedure for the remaining two nuts.
   d. Return to the first nut to tighten it completely.

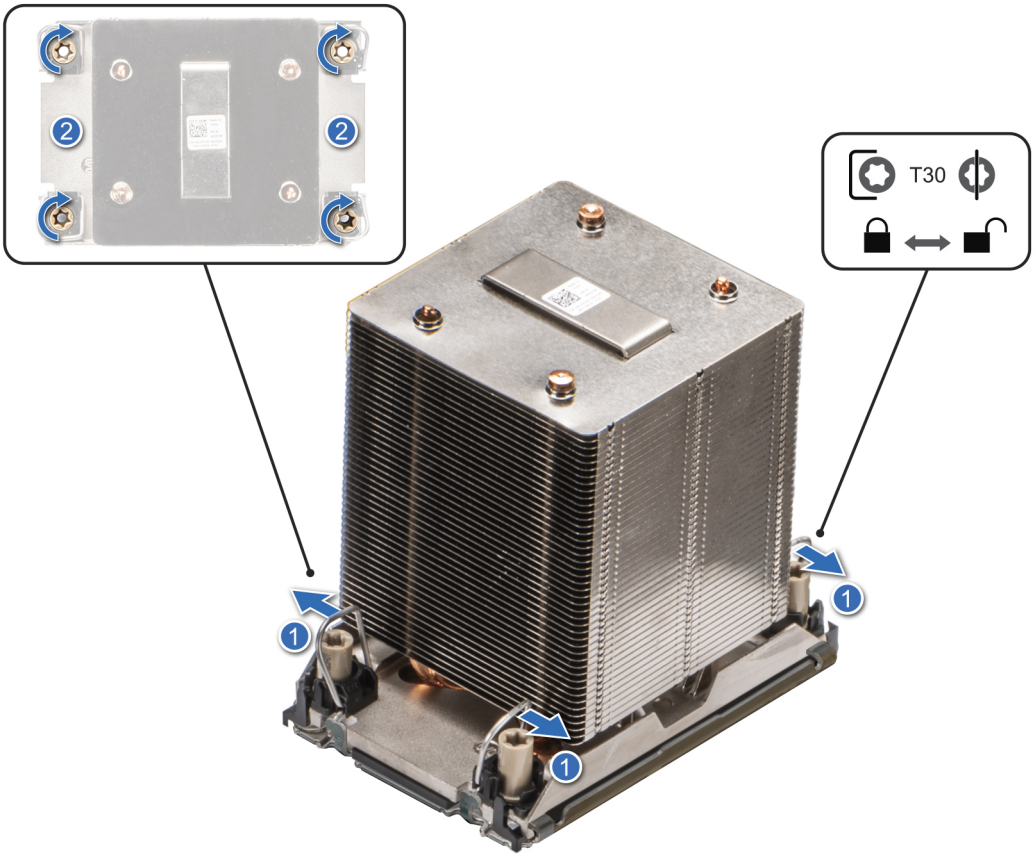


Figure 171. Set the anti-tilt wires to the locked position and tightening the nuts

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

Optional OCP NIC card

Removing the OCP card

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Slide the OCP air shroud toward the front of the system and lift the OCP air shroud out of the system.

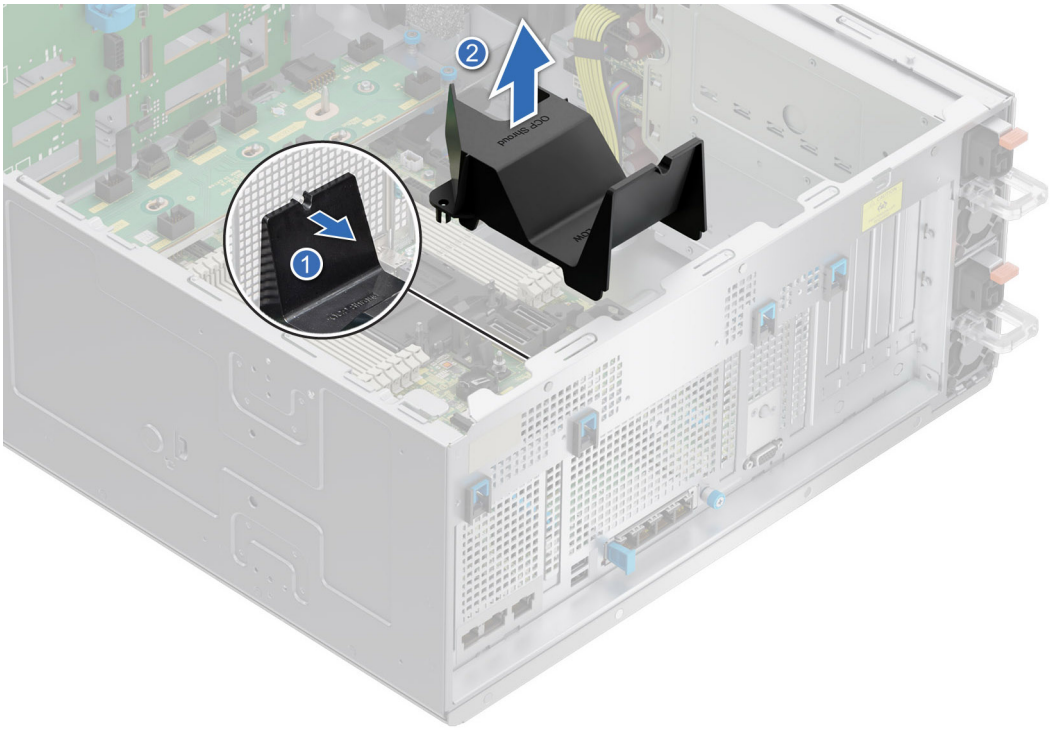


Figure 172. Removing the OCP air shroud

2. Open the blue latch to disengage the OCP card.
3. Push the OCP card towards the rear end of the system to disconnect from the connector on the system board.
4. Slide the OCP card out of the slot on the system.

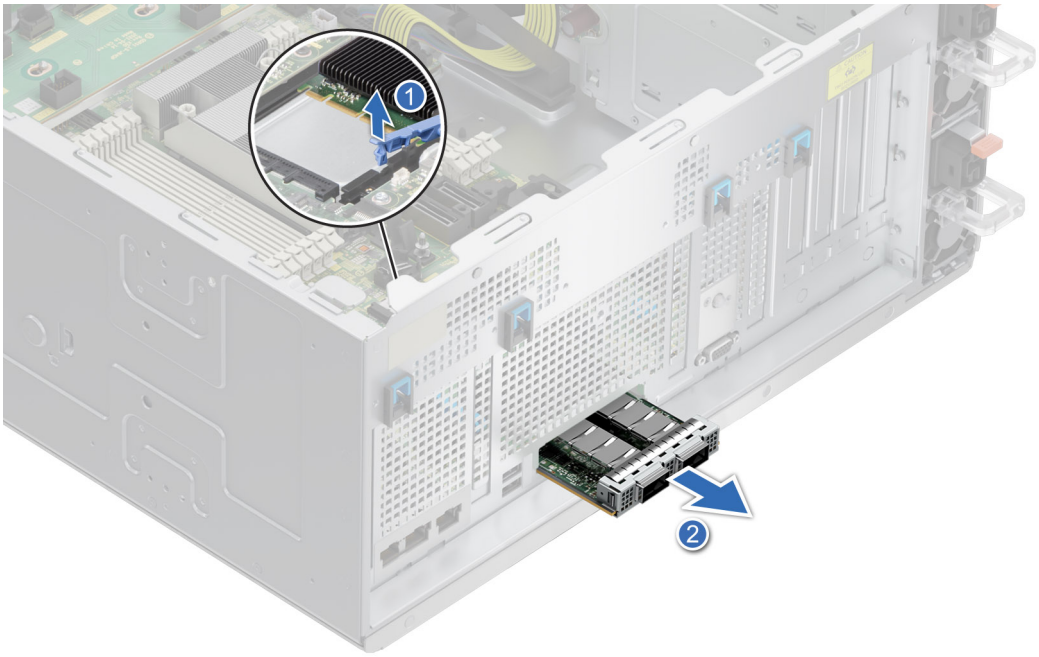


Figure 173. Removing the OCP card

5. If the OCP card is not going to be replaced, install the OCP card blank.

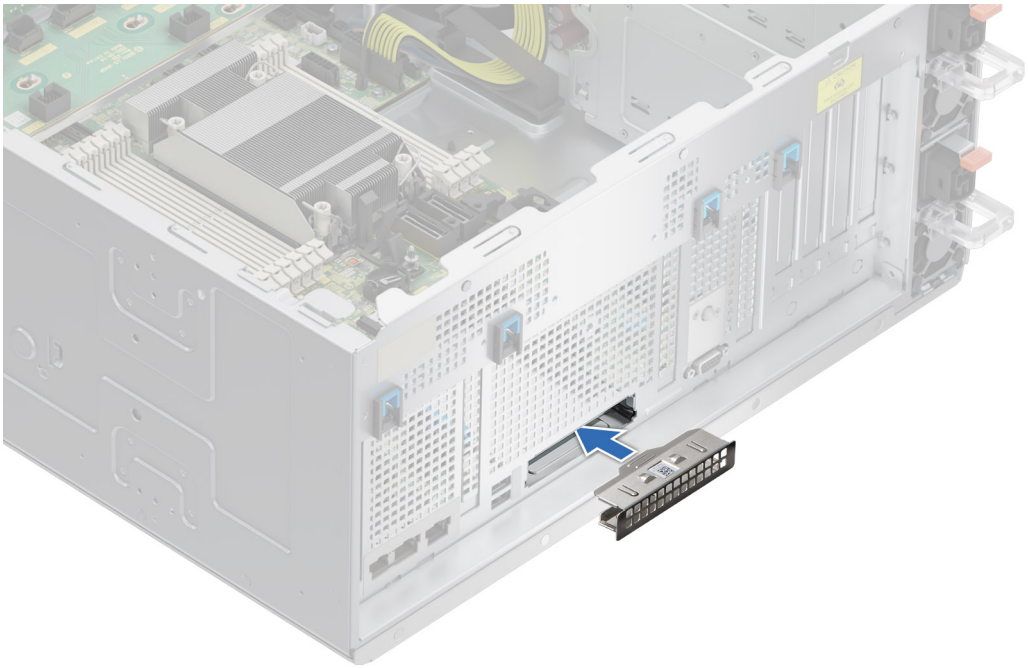


Figure 174. Installation of OCP card blank

Next steps

Replace the OCP card.

Installing the OCP card

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

CAUTION: Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.

Steps

1. If installed, remove the OCP card blank.

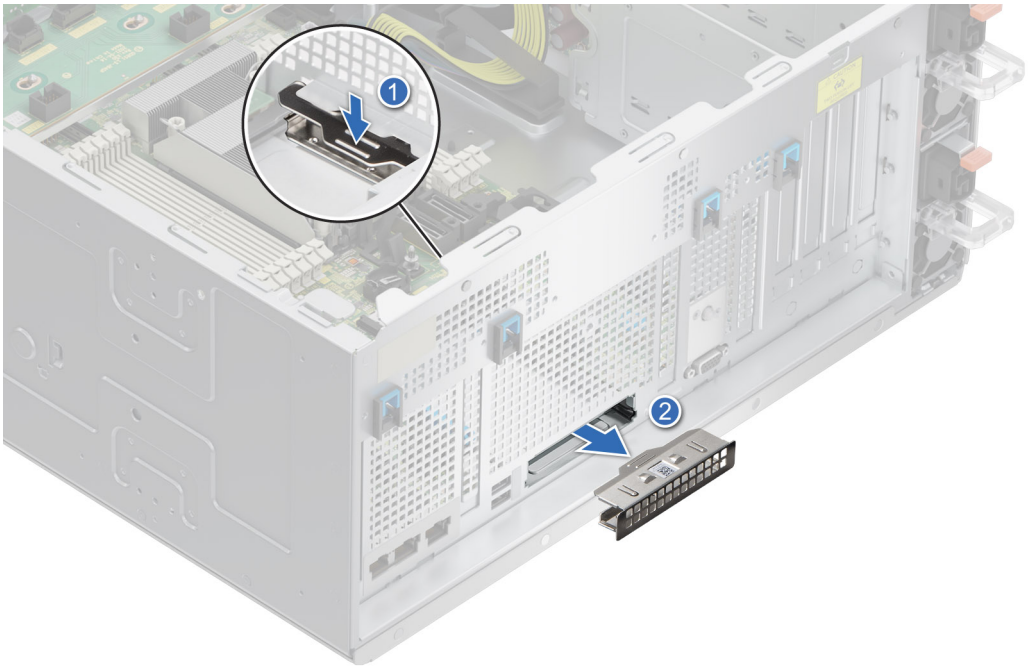


Figure 175. Removal of the OCP card blank

2. Open the blue latch on the system board.
3. Slide the OCP card into the slot in the system.
4. Push until the OCP card is connected to the connector on the system board.
5. Close the blue latch to lock the OCP card to the system.

NOTE: The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.

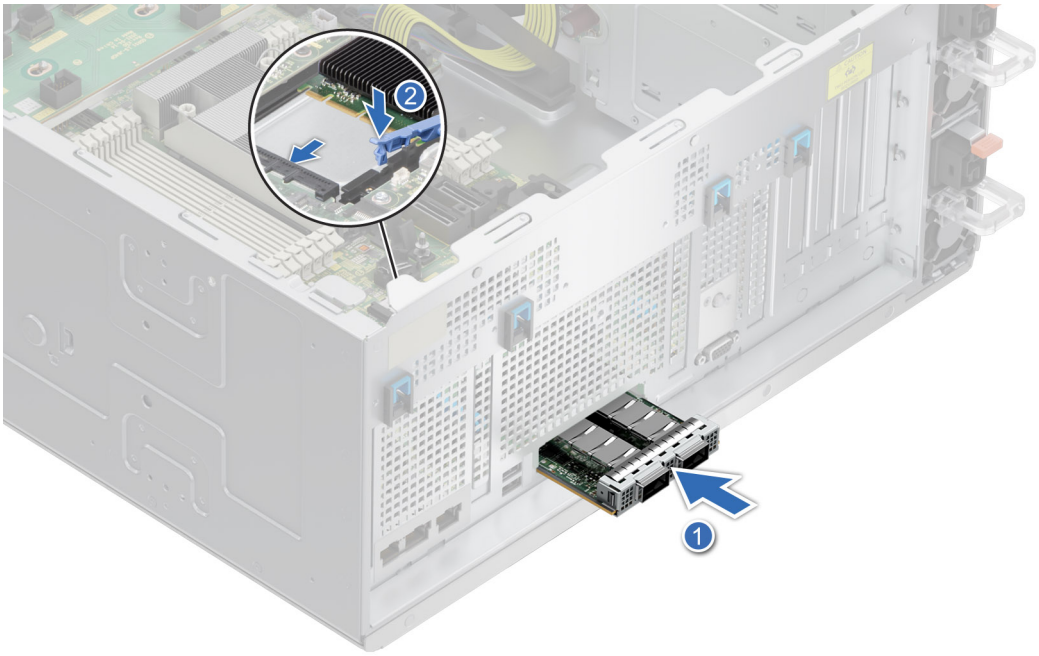


Figure 176. Installing the OCP card

6. Align the OCP air shroud to the guide pins on the chassis and lower the OCP air shroud.

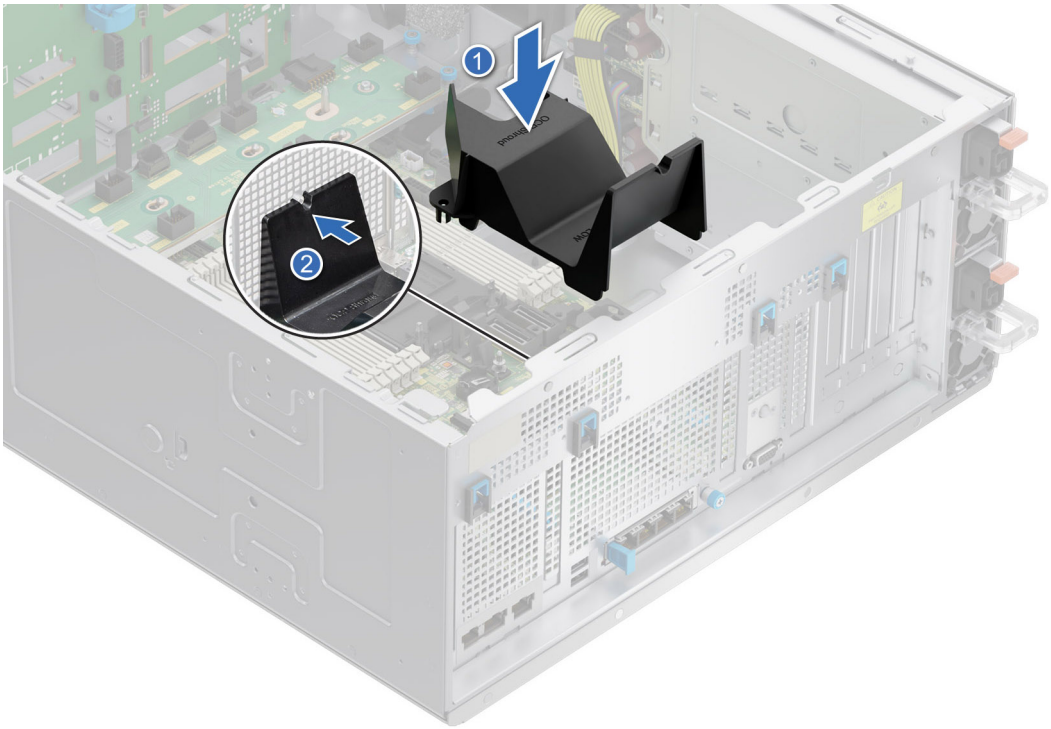


Figure 177. Installing the OCP air shroud

Next steps

1. Install the air shroud.
2. Follow the procedure listed in After working inside your system.

Optional serial COM port

This is a service technician replaceable part only.

Removing the serial COM port

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.
4. Disconnect the cable connected to the serial COM port.

Steps

1. Open the blue latch and slide the serial COM port out of the system.

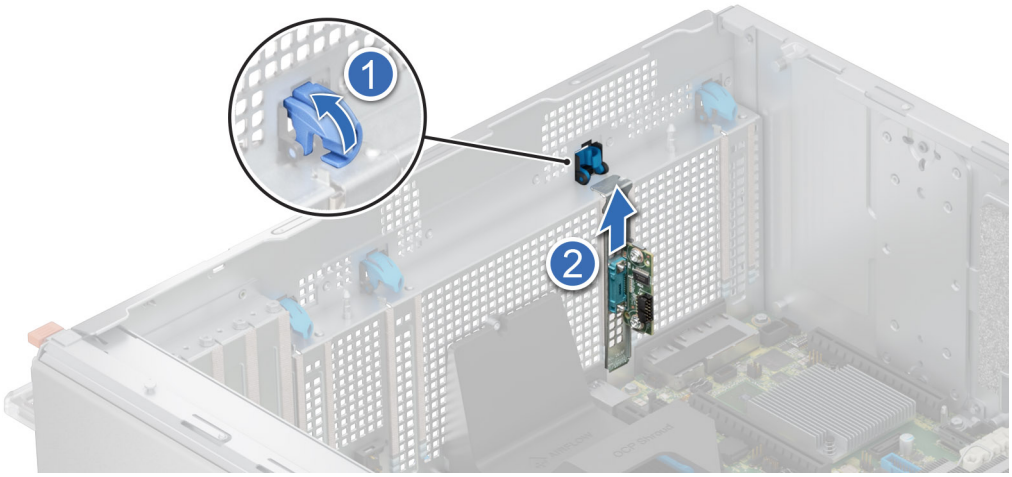


Figure 178. Removing the serial COM port

2. Install the filler bracket if not replacing the serial COM port.

Next steps

Replace the serial COM port.

Installing the serial COM port

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system .
3. Remove the air shroud.

Steps

1. Open the blue latch and remove the filler bracket from the system.
2. Slide the serial COM port and close the blue latch, until it snaps into place.

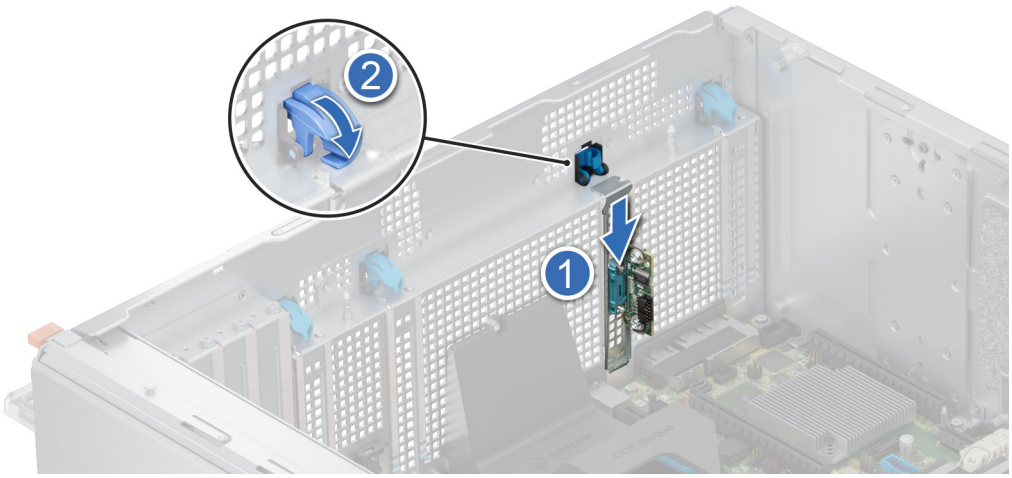


Figure 179. Installing the serial COM port

Next steps

1. Connect the cable to serial COM port.

2. Install the air shroud.
3. Follow the procedure listed in After working inside your system.

System battery

This is a service technician replaceable part only.

Replacing the system battery

Prerequisites

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type that is recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions. See the Safety instructions that came with your system for more information.

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in the Before working inside your system .
3. If applicable, disconnect the power or data cables from the expansion cards.
4. Remove the expansion card risers.

Steps

1. To remove the battery:
   a. Use a plastic scribe to pry out the system battery.

   CAUTION: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

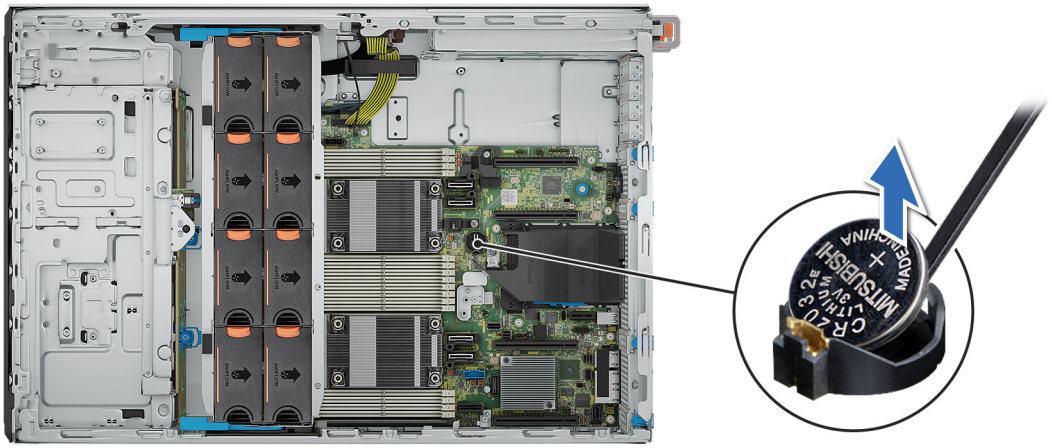


Figure 180. Removing the system battery

2. To install a new system battery:
   a. Hold the battery with the positive side facing up and slide it under the securing tabs.
   b. Press the battery into the connector until it snaps into place.

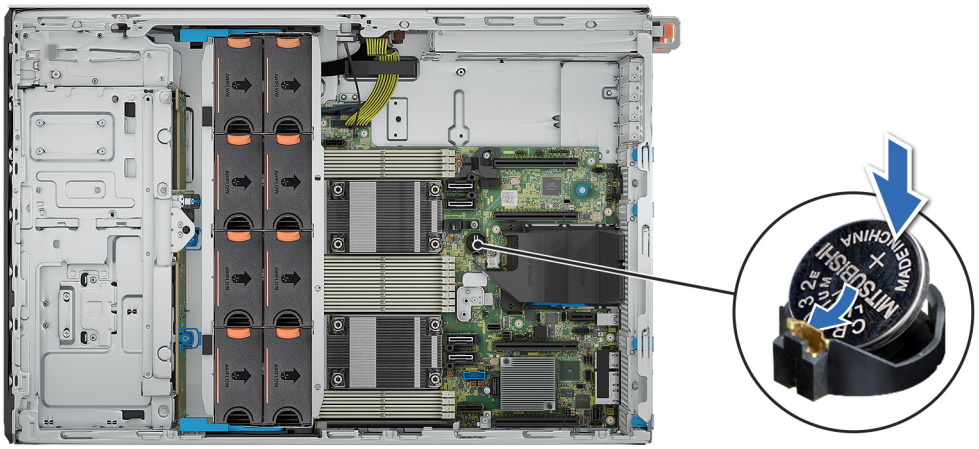


Figure 181. Installing the system battery

Next steps

1. Install the expansion card risers.
2. If applicable, connect the cables to one or more expansion cards.
3. Follow the procedure listed in After working inside your system.
4. Confirm that the battery is operating properly, by performing the following steps:
   a. Enter the System Setup, while booting, by pressing F2.
   b. Enter the correct time and date in the System Setup **Time** and **Date** fields.
   c. **Exit** the System Setup.
   d. To test the newly installed battery, check the time and date at least an hour after installing the battery.
   e. Enter the System Setup and if the time and date are still incorrect, see Getting help section.

Intrusion switch

This is a service technician replaceable part only.

Removing the intrusion switch module

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in the Before working inside your system.
3. Remove the expansion card riser.

NOTE: Ensure that you note the routing of the cable as you remove it from the system board. Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

Steps

1. Disconnect the intrusion switch cable from the connector on the rear I/O board.
2. Using a Phillips #1 screwdriver, loosen the screw on the intrusion switch module.
3. Slide the intrusion switch module out of the slot on the system.

NOTE: The numbers on the image do not depict the exact steps. The numbers are for representation of sequence.

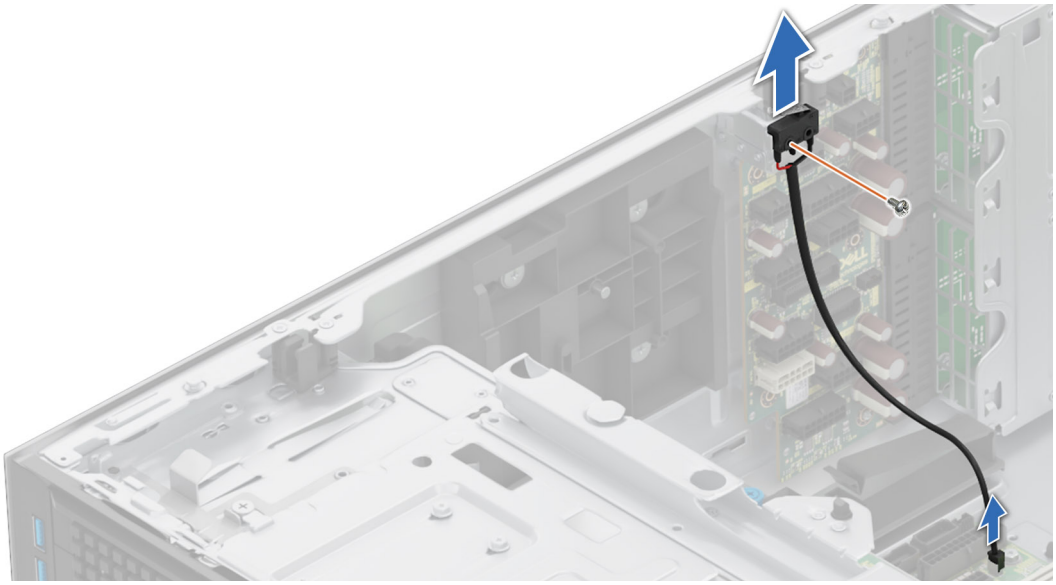


Figure 182. Removing the intrusion switch module

Next steps

1. Replace the intrusion switch module.

Installing the intrusion switch module

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Remove the expansion card riser.

NOTE: Ensure that you note the routing of the cable as you remove it from the system board. Route the cable properly when you replace it to prevent the cable from being pinched or crimped.

Steps

1. Align and slide the intrusion switch module into the slot in the system until firmly seated.
2. Using a Phillips #1 screwdriver, tighten the screw on the intrusion switch module.
3. Connect the intrusion switch cable to the connector on the rear I/O board.

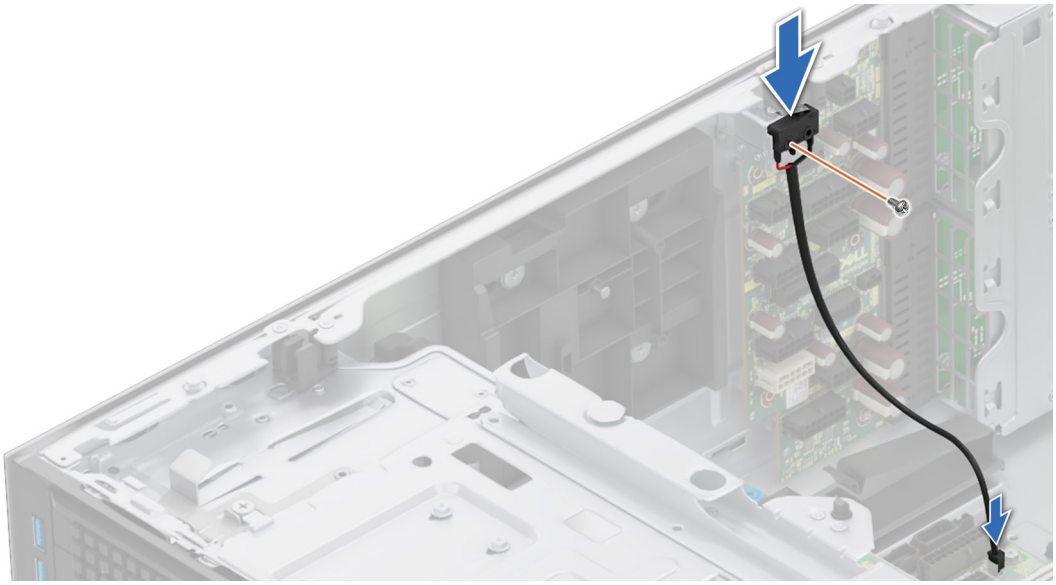


Figure 183. Installing the intrusion switch module

Next steps

1. Install the expansion card riser.
2. Follow the procedure listed in After working inside your system.

Power supply unit

NOTE: While replacing the hot swappable PSU, after next server boot; the new PSU automatically updates to the same firmware and configuration of the replaced one. For updating to the latest firmware and changing the configuration, see the *Lifecycle Controller User's Guide* at iDRAC Manuals.

Hot spare feature

Your system supports the hot spare feature that significantly reduces the power overhead associated with the power supply unit (PSU) redundancy.

When the hot spare feature is enabled, one of the redundant PSUs is switched to the sleep state. The active PSU supports 100 percent of the system load, thus operating at higher efficiency. The PSU in the sleep state monitors output voltage of the active PSU. If the output voltage of the active PSU drops, the PSU in the sleep state returns to an active output state.

If having both PSUs active is more efficient than having one PSU in the sleep state, the active PSU can also activate the sleeping PSU.

The default PSU settings are as follows:

- If the load on the active PSU is more than 50 percent of PSU rated power wattage, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20 percent of PSU rated power wattage, then the redundant PSU is switched to the sleep state.

You can configure the hot spare feature by using the iDRAC settings. For more information, see the *iDRAC User's Guide* available at PowerEdge Manuals.

Removing a power supply unit blank

Prerequisites

Follow the safety guidelines listed in the Safety instructions.

Steps

Pull the blank out of the system.

CAUTION: To ensure proper system cooling, the PSU blank must be installed in the second PSU bay in a non-redundant configuration. Remove the PSU blank only if you are installing a second PSU.

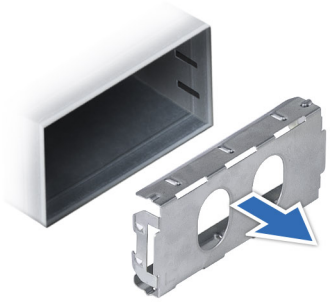


Figure 184. Removing a power supply unit blank

Next steps

1. Replace the PSU blank or install the PSU.

Installing a power supply unit blank

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.

   NOTE: Install the power supply unit (PSU) blank only in the second PSU bay.

2. If required, Remove the PSU.

Steps

Align the PSU blank with the PSU bay and push it into the PSU bay until it clicks into place.

Figure 185. Installing a power supply unit blank

Removing a power supply unit adapter

Remove the PSU adapter, when installing PSU with 86 mm wide form factor.

Prerequisites

Follow the safety guidelines listed in the Safety instructions.

Steps

Press release latch and remove the power supply unit adapter.

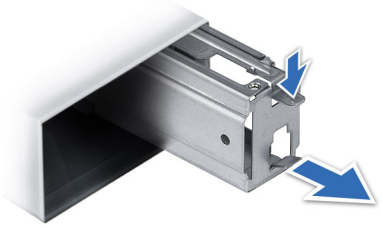


Figure 186. Removing a power supply unit adapter

Next steps

Replace the power supply unit adapter or Install the power supply unit.

Installing a power supply unit adapter

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. If required, remove the power supply unit.

NOTE: Remove the PSU adapter, when installing PSU with 86 mm wide form factor.

Steps

Align and insert the power supply unit adapter, until the adapter clicks into place.

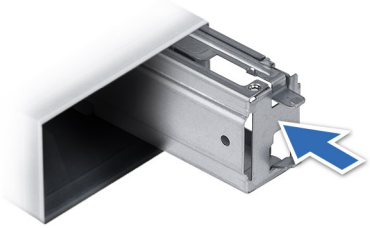


Figure 187. Installing a power supply unit adapter

Removing a power supply unit

Prerequisites

CAUTION: The system needs one power supply unit (PSU) for normal operation. On power-redundant systems, remove and replace only one PSU at a time in a system that is powered on.

1. Follow the safety guidelines listed in Safety instructions.

2. Disconnect the power cable from the power source and from the PSU that you intend to remove, and then remove the cable from the strap on the PSU handle.

Steps

Press the orange release latch and slide the PSU out of the system by using the PSU handle.

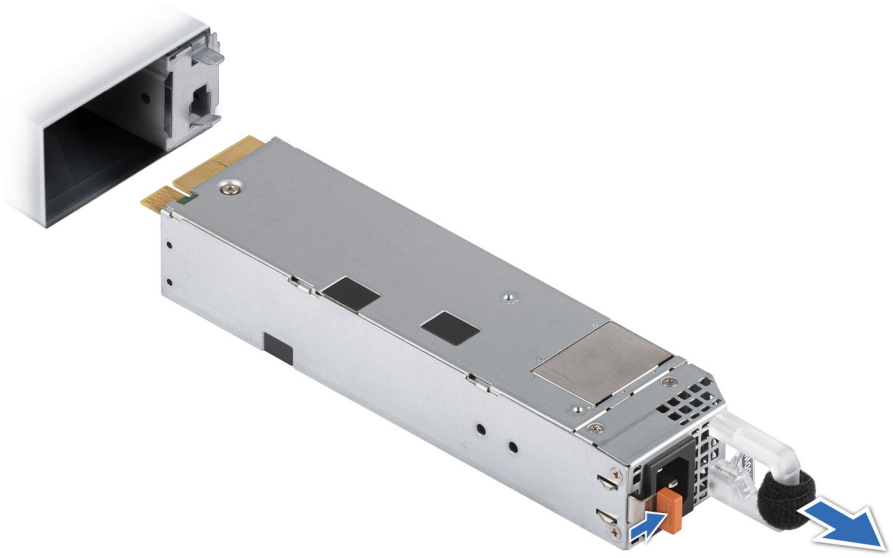


Figure 188. Removing a 60 mm power supply unit

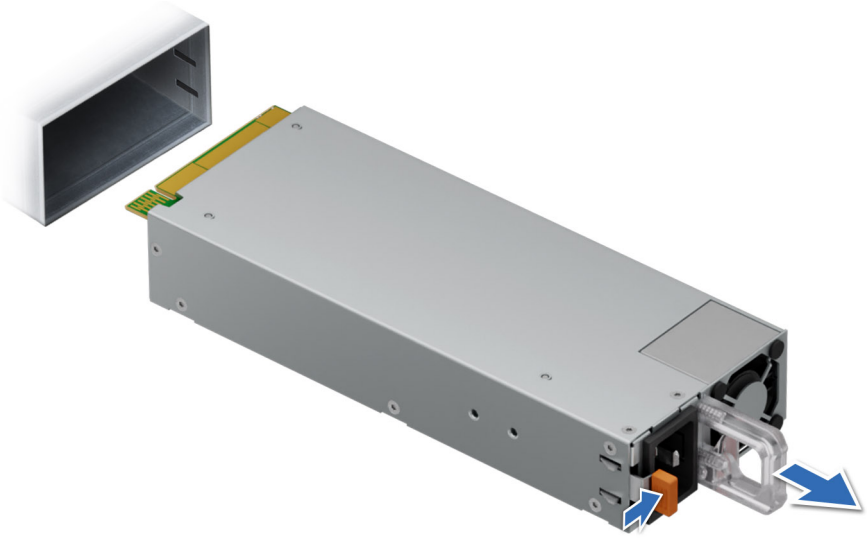


Figure 189. Removing a 86 mm power supply unit

Next steps

Replace the power supply unit..

Installing a power supply unit

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.

2. For systems that support redundant PSU, ensure that both the PSUs are of the same type and have the same maximum output power.

NOTE: The maximum output power (shown in watts) is listed on the PSU label.

Steps

Slide the PSU into the system until the PSU is fully seated and the release latch snaps into place.

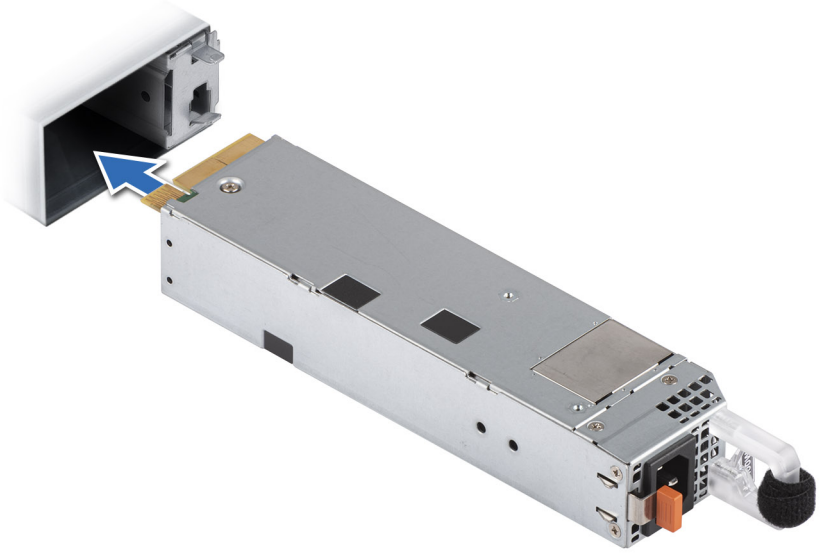


Figure 190. Installing a 60 mm power supply unit

Figure 191. Installing a 86 mm power supply unit

Next steps

1. Connect the power cable to the PSU, and plug the cable into a power outlet.

CAUTION: When connecting the power cable to the PSU, secure the cable to the PSU with the strap.

NOTE: When installing, hot swapping, or hot adding a new PSU, wait for 15 seconds for the system to recognize the PSU and determine its status. The PSU redundancy may not occur until discovery is complete. Wait until the new PSU is discovered and enabled before you remove the other PSU. The PSU status indicator turns green to signify that the PSU is functioning properly.

Power interposer board

This is a service technician replaceable part only.

PIB board view

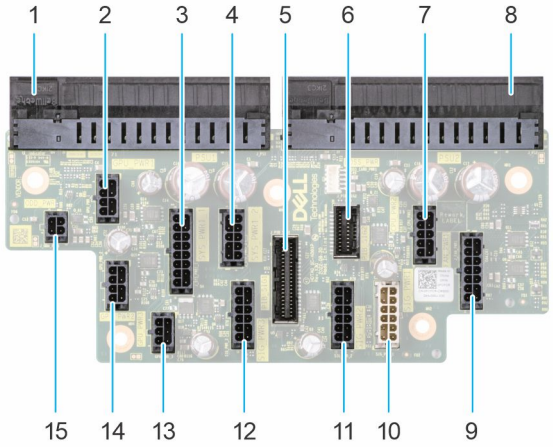


Figure 192. Power interposer board connectors

1. J_PS1
2. GPU_PWR1
3. SYS_PWR1_1
4. SYS_PWR1_2
5. PIB_SIG1
6. PIB_SIG2
7. CPU_PWR2
8. J_PS2
9. FAN_PWR1
10. SIG_PWR_1
11. SIG_PWR_2
12. SIG_PWR_3
13. GPU_PWR_3
14. GPU_PWR_2
15. ODD_PWR

Removing the power interposer board

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system.
3. Remove the air shroud.
4. Remove the PSU.

Steps

1. Disconnect all the power cables from the PIB.
2. Using the Phillips #2 screwdriver, remove the screws that secure the PIB to the system.
3. Lift the PIB out of the system.

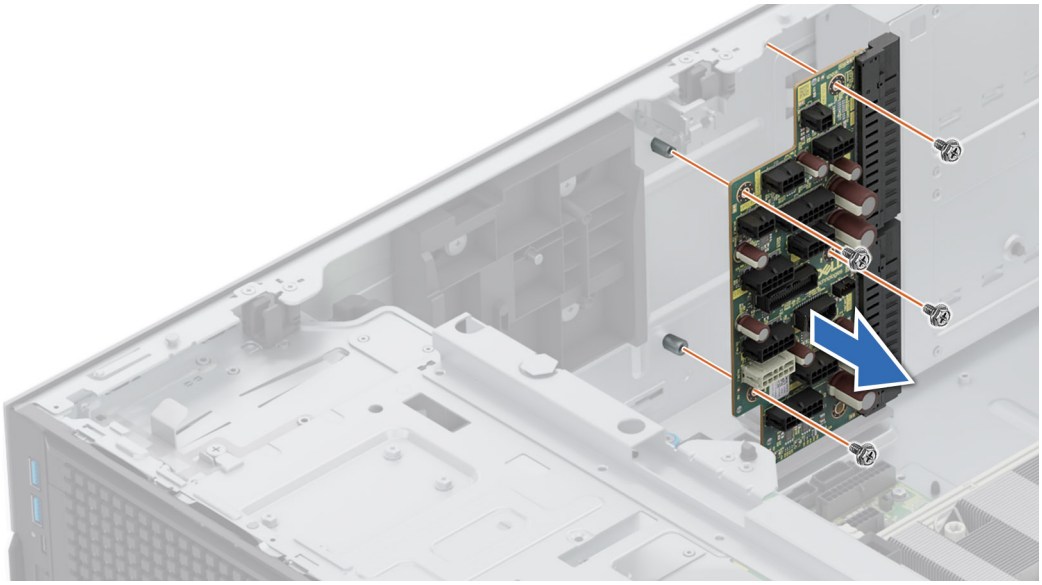


Figure 193. Removing the power interposer board

Next steps

Replace the power interposer board.

Installing the power interposer board

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Follow the procedure that is listed in Before working inside your system.
3. Remove the air shroud.
4. Remove the PSU.

Steps

1. Align the screw holes on the power interposer board (PIB) with the holes on the system.
2. Using the Phillips #2 screwdriver, secure the PIB to the system using the screws.
3. Connect all the disconnected power cables to the PIB.

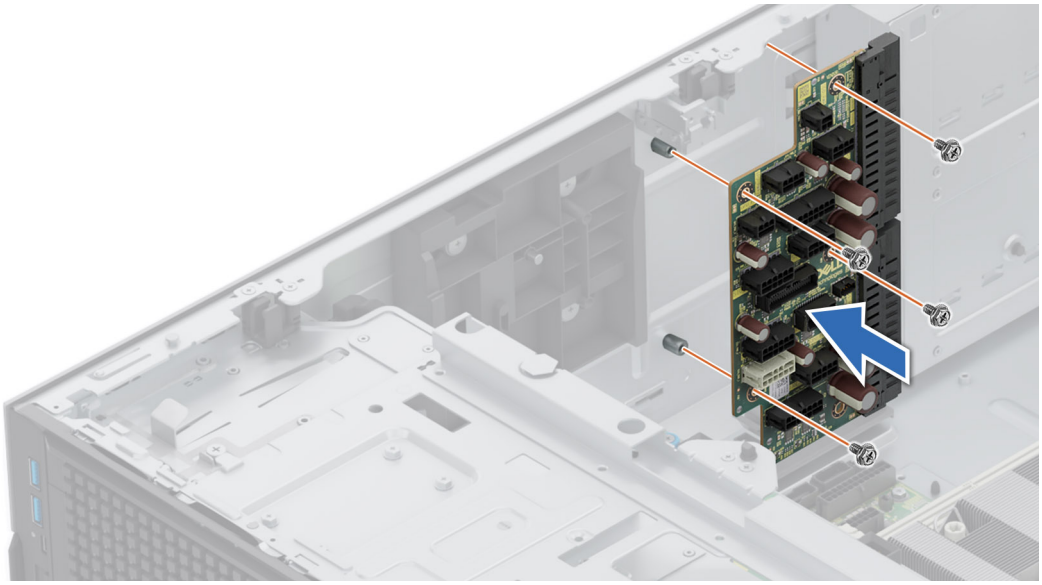


Figure 194. Installing the power interposer board

Next steps

1. Install the PSUs.
2. Install the air shroud.
3. Follow the procedure listed in After working inside your system.

System board

This is a service technician replaceable part only.

Removing the system board

Prerequisites

CAUTION: If you are using the Trusted Platform Module (TPM) with an encryption key, you may be prompted to create a recovery key during program or System Setup. Be sure to create and safely store this recovery key. If you replace this system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your drives.

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in the Before working inside your system.
3. Remove the following components:
   a. Air shroud
   b. Cooling fan cage assembly
   c. Memory modules
   d. Serial COM port (if installed)
   e. Expansion card risers
   f. Processor and heat sink module
   g. BOSS-N1 module
   h. Internal USB card (if installed)
   i. OCP card (if installed)
   j. Power supply units (PSU)
   k. Disconnect all the cables from the system board and make note of all the cable connections.

CAUTION: Take care not to damage the system identification button while removing the system board from the system.

CAUTION: Do not lift the system board by holding a memory module, processor, or other components.

Steps

1. Using the system board holder and plunger, slide the system board towards the front of the system.
2. At a tilted angle, lift the system board out of the chassis.

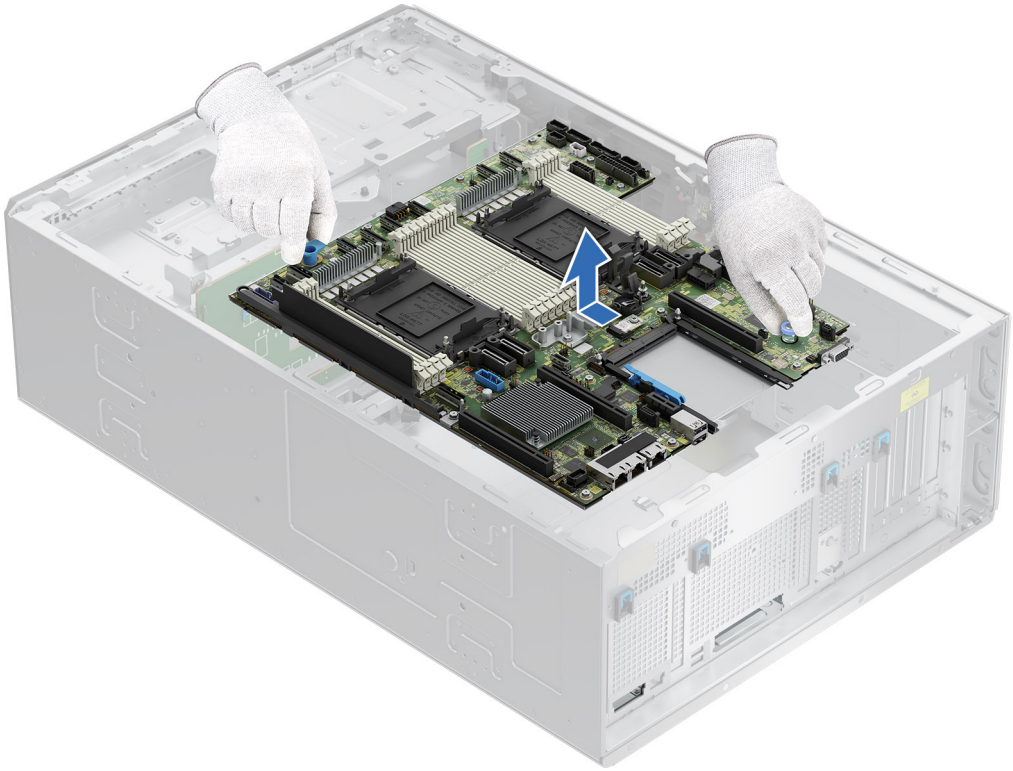


Figure 195. Removing the system board

Next steps

1. Replace the system board.

Installing the system board

Prerequisites

NOTE: Before replacing the system board, replace the old iDRAC MAC address label on the Express Service Tag with the iDRAC MAC address label of the replacement system board.

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If you are replacing the system board, remove all the components that are listed in the removing the system board section.

Steps

1. Unpack the new system board assembly.

CAUTION: Take care not to damage the system identification button while placing the system board into the chassis.

2. Holding the system board holder and plunger, lower the system board at a tilted angle into the system.
3. Slide the system board towards the rear of the chassis until the connectors are firmly seated in the slots.

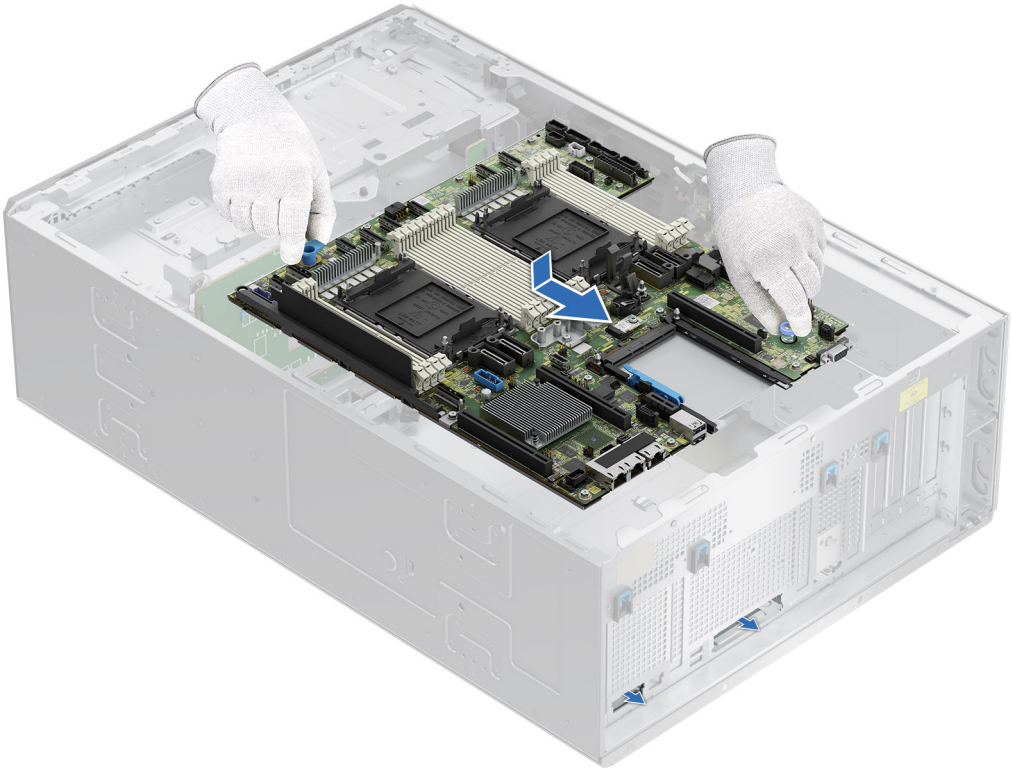


Figure 196. Installing the system board

Next steps

1. Replace the following components:
   a. Trusted Platform Module (TPM)

      NOTE: The TPM Module must be replaced only while installing new system board.

   b. Internal USB card (if removed)
   c. OCP card (if removed)
   d. Processor and heat sink module
   e. Memory modules
   f. Expansion card risers
   g. Serial COM port (if removed)
   h. BOSS-N1 module
   i. Cooling fan cage assembly
   j. Air shroud
   k. Power supply units (PSU)
2. Reconnect all cables to the system board.

   NOTE: Ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.

3. Ensure that you perform the following steps:
   a. Use the Easy Restore feature to restore the Service Tag. See the Restoring the system by using the Easy Restore feature section.
   b. If the service tag is not backed up in the backup flash device, enter the system service tag manually. See the Manually update the Service Tag by using System Setup section.
   c. Update the BIOS and iDRAC versions.
   d. Re-enable the Trusted Platform Module (TPM). See the Upgrading the Trusted Platform Module section.

4. Follow the procedure listed in After working inside your system.

Restoring the system using Easy Restore

The Easy Restore feature enables you to restore your service tag, license, UEFI configuration, and the system configuration data after replacing the system board. All data is backed up in a backup flash device automatically. If BIOS detects a new system board, and the service tag in the backup flash device, BIOS prompts the user to restore the backup information.

About this task

Below is a list of options/steps available:

Steps

1. Restore the service tag, license, and diagnostics information, press **Y**
2. Navigate to the Lifecycle Controller based restore options, press **N**
3. Restore data from a previously created **Hardware Server Profile**, press **F10**

   NOTE: When the restore process is complete, BIOS prompts to restore the system configuration data.

4. Restore data from a previously created **Hardware Server Profile**, press **F10**
5. To restore the system configuration data, press **Y**
6. To use the default configuration settings, press **N**

   NOTE: After the restore process is complete, system reboots.

Manually update the Service Tag

After replacing a system board, if Easy Restore fails, follow this process to manually enter the Service Tag, using **System Setup**.

About this task

If you know the system service tag, use the **System Setup** menu to enter the service tag.

Steps

1. Power on the system.
2. To enter the **System Setup**, press **F2**.
3. Click **Service Tag Settings**.
4. Enter the service tag.

   NOTE: You can enter the service tag only when the **Service Tag** field is empty. Ensure that you enter the correct service tag. Once the service tag is entered, it cannot be updated or changed. Incorrectly entered service tag will lead to system board replacement.

5. Click **OK**.

Trusted Platform Module

This is a service technician replaceable part only.

Upgrading the Trusted Platform Module

Removing the TPM

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system.

NOTE:

- Ensure that the operating system is compatible with the TPM version you are installing.
- Ensure that you download and install the latest BIOS firmware on your system.
- Ensure that the BIOS is configured to enable UEFI boot mode.

CAUTION: The TPM plug-in module is cryptographically bound to that particular system board after it is installed. When the system is powered on, any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, and the removed TPM cannot be installed on another system board. Ensure any keys that you have stored on the TPM have been securely transferred.

Steps

1. Locate the TPM connector on the system board.
2. Press to hold the module down and remove the screw using the security Torx 8-bit shipped with the TPM module.
3. Slide the TPM module out from its connector.
4. Push the plastic rivet away from the TPM connector and rotate it 90° counterclockwise to release it from the system board.
5. Pull the plastic rivet out of its slot on the system board.

Installing the TPM

Prerequisites

1. Follow the safety guidelines listed in the Safety instructions.
2. Follow the procedure listed in Before working inside your system.

Steps

1. To install the TPM, align the edge connectors on the TPM with the slot on the TPM connector.
2. Insert the TPM into the TPM connector such that the plastic rivet aligns with the slot on the system board.
3. Press the plastic rivet until the rivet snaps into place.
4. Replace the screw that secures the TPM to the system board.

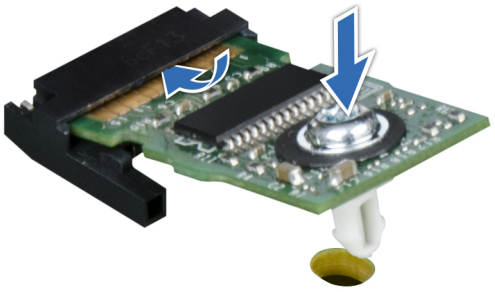


Figure 197. Installing the TPM

Initializing TPM for users

Steps

1. Initialize the TPM.
2. The **TPM Status** changes to **Enabled, Activated**.

Initializing the TPM 2.0 for users

Steps

1. While booting your system, press F2 to enter System Setup.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security Settings**.
3. From the **TPM Security** option, select **On**.
4. Save the settings.
5. Restart your system.

8

Upgrade Kits

The table lists the available After Point Of Sale [APOS] kits.

Table 141. Upgrade kits

Kits	Related links to service instructions
Bezel	See Installing the front bezel
BOSS-N1	See Installing the BOSS-N1 card carrier
GPU	See Installing the GPU riser
Drives	See Installing the drive carrier
Memory	See Installing a memory module
PERC	See Installing the front PERC module and also see the document included with the kit.
Network cards (OCP)	See Installing the OCP card
PCIe SSD card	See Installing the drive carrier
Power cords	Offered, but without special service instructions
Power supplies	See Installing a power supply unit
Quick sync	Offered, but without special service instructions
TPM	See Upgrading the Trusted Platform Module
Processor enablement thermal kits	See Installing the processor
Internal USB 3.0 card	See Installing the internal USB card
Serial COM port	See Installing the serial COM port
Cables	Offered, but without special service instructions
Fans	See Installing a cooling fan
Heat sink	See Installing the processor
Risers	Not available as APOS kits, upgrades offered only with the "Basic Deployment Upgrade of Dell Server" service
Cable Management Arm (CMA)	Offered, but without special service instructions

Topics:

- BOSS-N1 module kit
- GPU kit
- Internal USB card kit
- Serial COM port kit

BOSS-N1 module kit

The BOSS-N1 module supports up to two M.2 NVMe SSDs.

Before you begin the installation or removal process, follow the safety guidelines and before working inside the system instructions.

Table 142. BOSS-N1 module kit components

Components in kit	T560 (quantity)
BOSS-N1 controller card module	1
BOSS-N1 card carrier	1 or 2*
M.2 NVMe SSD	1 or 2*
M.2 NVMe SSD capacity label	1 or 2†
BOSS-N1 card carrier blank	1
M3 x 0.5 x 4.5 mm screws	1

NOTE: *The quantity depends on the purchase order.

NOTE: †The quantity depends on the BOSS-N1 card carrier

To remove the BOSS blank :

1. Power off the system.
2. Use a screwdriver to push out the blank from the BOSS-N1 module blank.

Figure 198. Removing the BOSS-N1 module blank

Figure 199. Installing the BOSS-N1 module blank

To install the BOSS-N1 module:

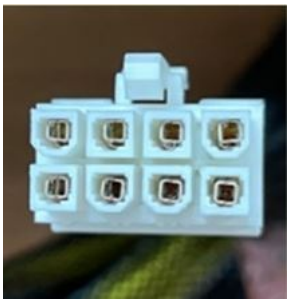
1. To install the BOSS-N1 module , see Installing the BOSS-N1 card carrier steps 1 to 5.

NOTE: Refer to cable routing section, configuration 49 and 50 for more information on connecting the BOSS cables to system board connectors.

NOTE: Installing the BOSS-N1 card carrier does not require the system to be powered off. System shutdown is only required when installing the BOSS-N1 controller card module.

GPU kit

Table 143. GPU power cable matrix

Category	Supported GPUs	Type	Vendor	Cable	Cable quantity
GPU	NVIDIA A2, NVIDIA L4	HL (FH and LP brackets)	NVIDIA	Not required	Not required
GPU	NVIDIA A30, NVIDIA L40	FH and FL	NVIDIA	CPU type 2 x 4 (8-position) 	Not required
HL - Half Length, FH - Full Height, FL - Full Length					

Internal USB card kit

The internal USB card kit contains one internal USB card. For installation of internal USB card, see Installing the internal USB card section.

Serial COM port kit

The serial COM port kit contains the components that are listed in the table.

Table 144. Serial COM port kit

Components	Quantity
Serial COM port card	1
Cable	1

For installation procedure of the serial COM port, see Installing the serial COM port section.

9

Jumpers and connectors

This topic provides some basic and specific information about jumpers and switches. It also describes the connectors on the various boards in the system. Jumpers on the system board help to disable the system and reset the passwords. To install components and cables correctly, you must know the connectors on the system board.

Topics:

- System board connectors
- System board jumper settings
- Disabling a forgotten password

System board connectors

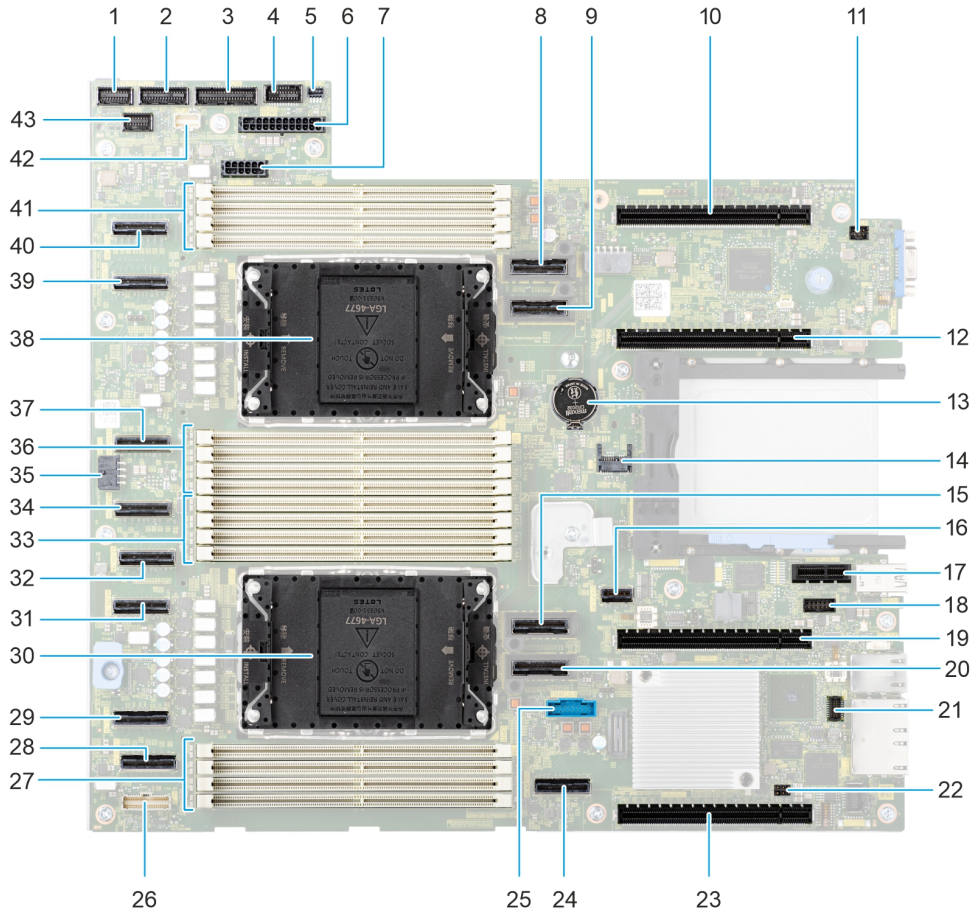


Figure 200. System board jumpers and connectors

Table 145. System board jumpers and connectors

Item	Connector	Description
1	FAN_SIG1	Fan Signal 1
2	FAN_SIG2	Fan Signal 2

Table 145. System board jumpers and connectors (continued)

Item	Connector	Description
3	PIB_SIG1	PIB Signal 1
4	PIB_SIG2	PIB Signal 2
5	Intrusion Switch Connector	Intrusion Switch Connector
6	SYS_PWR1	System Power Connector 1
7	SIG_PWR_4	Power Connector 4 (Use for GPU Riser)
8	SL9_CPU2_PB5	PCIe Connector 9
9	SL10_CPU2_PA5	PCIe Connector 10
10	x16 (CPU2)	PCIe Slot 3 (CPU 2)
11	System ID Connector	System ID Connector
12	x16 (CPU2)	PCIE Slot 4 (CPU 2)
13	Coin Cell Battery	Coin Cell Battery
14	TPM Connector	TPM Connector
15	SL11_CPU1_PA6	PCIe Connector 11
16	SL14_PCH_PA7	PCIe Connector 14
17	Internal USB Connector	Internal USB Connector
18	Serial Port Connector	Serial Port Connector
19	x16 (CPU1)	PCIe Slot 5
20	SL12_CPU1_PB6	PCIe Connector 12
21	J_RMII2_CBL *	SmartNIC NCSI Connector
22	Jumper	Jumper
23	x16 (CPU1)	PCIe Slot 6
24	SL13_PCH_SA1	SATA Connector 13
25	Front USB 3.0 Connector	Front USB 3.0 Connector
26	Right Control Panel	Right Control Panel
27	A1, A7, A3, A5	DIMMs for Processor 1, Channels A, B, C, D
28	SL8_CPU1_PA4	PCIe Connector 8
29	SL7_CPU1_PB4	PCIe Connector 7
30	CPU 1	Processor 1
31	SL6_CPU1_PB3	PCIe Connector 6
32	SL5_CPU1_PA3	PCIe Connector 5
33	A8, A2, A6, A4	DIMMs for Processor 1, Channels H, G, F, E
34	SL4_CPU2_PA2 *	PCIe cable connector (Processor 2)
35	SYS_PWR2	System Power Connector 2
36	B1, B7, B3, B5	DIMMs for Processor 2, Channels A, B, C, D
37	SL3_CPU2_PB2 *	PCIe cable connector (Processor 2)

Table 145. System board jumpers and connectors (continued)

Item	Connector	Description
38	CPU 2	Processor 2
39	SL2_CPU2_PB1	PCIe Connector 2
40	SL1_CPU2_PA1	PCIe Connector 1
41	B8, B2, B6, B4	DIMMs for Processor 2, Channels H, G, F, E
42	Left Control Panel	Left Control Panel
43	J_PIB_SIG3 *	SDPM Battery Connector

NOTE: The system board supports Maximum (MAX) and Mainstream (MS) configurations.

- J_RMII2_CBL*, SL4_CPU2_PA2 *, SL3_CPU2_PB2 *, J_PIB_SIG3 * connectors are available only on MAX system board.

System board jumper settings

For information about resetting the password jumper to disable a password, see the Disabling a forgotten password section.

Table 146. System board jumper settings

Jumper	Setting	Description
PWRD_EN		The BIOS password feature is enabled.
		The BIOS password feature is disabled. The BIOS password is now disabled and you are not allowed to set a new password.
NVRAM_CLR		The BIOS configuration settings are retained at system boot.
		The BIOS configuration settings are cleared at system boot.

CAUTION: You should be cautious when changing the BIOS settings. The BIOS interface is designed for advanced users. Any changes in the setting might prevent your system from starting correctly and may even result in data loss.

Disabling a forgotten password

The software security features of the system include a system password and a setup password. The password jumper enables or disables password features and clears any password(s) currently in use.

Prerequisites

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

Steps

1. Power off the system and all attached peripherals. Disconnect the system from the electrical outlet, and disconnect the peripherals.

2. Remove the system cover.
3. Move the jumper on the system board from pins 2 and 4 to pins 4 and 6.
4. Replace the system cover.

   NOTE: The existing passwords are not disabled (erased) until the system boots with the jumper on pins 4 and 6. However, before you assign a new system and/or setup password, you must move the jumper back to pins 2 and 4.

   NOTE: If you assign a new system and/or setup password with the jumper on pins 4 and 6, the system disables the new password(s) the next time it boots.

5. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.
6. Power off the system.
7. Remove the system cover.
8. Move the jumper on the system board from pins 4 and 6 to pins 2 and 4.
9. Replace the system cover.
10. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.
11. Assign a new system and/or setup password.

10

System diagnostics and indicator codes

The diagnostic indicators on the system front panel display system status during system startup.

Topics:

- System board diagnostic LED indicators
- Status LED indicators
- System health and system ID indicator codes
- iDRAC Quick Sync 2 indicator codes
- iDRAC Direct LED indicator codes
- NIC indicator codes
- Power supply unit indicator codes
- Drive indicator codes
- Using system diagnostics

System board diagnostic LED indicators

The system board LED indicators provide status of the system when it is powered on, which help identify POST and hardware issues.

The following tables show the behavior system board diagnostic LED indicators during power sequencing and power faults.

Table 147. Legend

LED ON	LED OFF	Blink
		B

Table 148. System board diagnostic LED indicators during power sequencing

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
							Power on Reset
							5V_AUX Enabled, waiting for 5V_AUX / V_VSB11_AUX Power Good
							VRD_1P05_PVNN_SW_EN enabled, waiting for VRD_1P05_PVNN_SW_PG Power Good &PCH_SLP_SUS_N

Table 148. System board diagnostic LED indicators during power sequencing (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
							PCH_RSMRST_R_N Enabled, waiting cBmcPostReady ready. Waiting for PS*_PG ready.
							Waiting for cSysPowerOn = '1' & cBMCHoldInS5 = '0'. CPLD_MEM_VIN_MGMT_EN_R = cDimmCheck Good
							Vrd_12V_DIMM_EN / P12V_EN / CPLD_MEM_VIN_MGMT_EN Enabled, waiting BP_SIG_PWR*_PG.
							VRD_3P3_EN Enabled, waiting for VRD_3P3_MAIN_PG Power Good
							VRD_CPU*_VCCD Enabled, waiting for VRD_CPU*_VCCD_PG = '1'
							VRD_CPU*_VPP Rail(s) Enabled, waiting for VRD_CPU*_VPP Rail(s) Power Good
							VRD_CPU*_VCCFA Rail(s) Enabled, waiting for VRD_CPU*_

Table 148. System board diagnostic LED indicators during power sequencing (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
							VCCFA Rail(s) Power Good
							VRD_CPU*_ FIVRA Rail(s) Enabled, waiting for VRD_CPU*_ FIVRA Rail(s) Power Good
							VRD_CPU*_I NFAON Rail(s) Enabled, waiting for VRD_CPU*_I NFAON Rail(s) Power Good
							VRD_CPU*_ PVNN Rail(s) Enabled, waiting for VRD_CPU*_ PVNN Rail(s) Power Good
							VRD_CPU*_ VCCIN Rail(s) Enabled, cDramPwrOk Enable, waiting for VRD_CPU*_ VCCIN Rail(s)Power Good and hold after Power Good for 100ms
							PCH_PWRGO OD Enabled, CLK_BUFFER _EN Enabled, SYSTEM_PW RGOOD Enable, waiting forPCH_CPL D_PROCPWR GD and wait 5ms
							VRD_P5V_E N Enabled, waiting for

Table 148. System board diagnostic LED indicators during power sequencing (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
							VRD_P5V_PG Power Good.
							[S0_RUN]
							[PD_IDLE]
							[SPD_STATE 7]
							[SPD_IDLE]
							[KULL_MAIN]
							[KULL_AUX]

Table 149. System board diagnostic LED indicators during power faults

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
B	B	B					VrdCpu1Vccd Fault
			B		B	B	VrdCpu1Vccin Fault
B	B	B				B	VrdCpu1VppFault
B	B	B			B		VrdCpu1Vccfa Fault
B	B	B			B	B	VrdCpu1Fivra Fault
B	B	B		B			VrdCpu1InfaonFault

Table 149. System board diagnostic LED indicators during power faults (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
B	B	B		B		B	VrdCpu1Pvnn Fault
B	B	B	B		B		VrdCpu2Vccd Fault
B	B	B	B		B	B	VrdCpu2VppF ault
B	B	B	B	B			VrdCpu2Vccf aFault
		B	B		B		VrdCpu2Vccin Fault
B	B	B	B	B		B	VrdCpu2Fivra Fault
B	B	B	B	B	B		VrdCpu2Infao nFault
B	B	B	B	B	B	B	VrdCpu2Pvnn Fault
	B	B	B	B		B	BpSigPwrFaul t0
	B	B	B	B	B		BpSigPwrFaul t1
	B	B	B	B	B	B	BpSigPwrFaul t2
B							BpSigPwrFaul t3
B						B	BpSigPwrFaul t4
B					B		BpSigPwrFaul t5

Table 149. System board diagnostic LED indicators during power faults (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
B	●	●	●	●	B	B	BpSigPwrFault6
B	●	B	●	●	●	B	Vrd1v05PvnnSwFault
B	B	●	●	B	●	B	VrdP5vFault
B	●	B	●	B	B	●	VrdP3v3Fault
B	●	B	B	●	B	B	VrdP5vSwFault
B	●	B	B	B	●	●	cVrdVsb11SwFault
B	●	B	B	B	●	B	OcpFault
B	B	●	B	B	●	●	CPU1_M_CHAB_fault
B	B	●	B	B	●	B	CPU1_M_CHCD_fault
B	B	●	B	B	B	●	CPU1_M_CHEF_fault
B	B	●	B	B	B	B	CPU1_M_CHGH_fault
B	B	B	●	B	B	●	CPU2_M_CHAB_fault
B	B	B	●	B	B	B	CPU2_M_CHCD_fault
B	B	B	B	●	●	●	CPU2_M_CHEF_fault

Table 149. System board diagnostic LED indicators during power faults (continued)

DS7	DS6	DS5	DS4	DS3	DS2	DS1	Description
B	B	B	B	●	●	B	CPU2_M_CHGH_fault
B	●	●	●	●	●	●	RUN_SDPM_ARMED
B	●	●	●	●	●	B	SDPM_STATE4
B	●	●	●	●	B	B	SDPM_STATE5
B	●	B	●	B	●	B	SDPM_STATE45
B	B	●	●	●	●	●	SDPM_DISARM2
B	●	●	B	●	●	B	RUN_CPS_ARMED

Status LED indicators

NOTE: The indicators display solid amber if any error occurs.

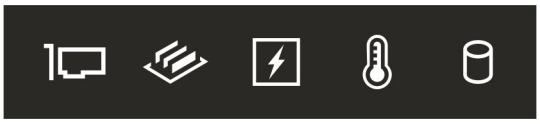


Figure 201. Status LED indicators

Table 150. Status LED indicators and descriptions

Icon	Description	Condition	Corrective action
	Drive indicator	The indicator turns solid amber if there is a drive error.	• Check the System Event Log to determine if the drive has an error. • Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics (ePSA). • If the drives are configured in a RAID array, restart the system, and enter the host adapter configuration utility program.
	Temperature indicator	The indicator turns solid amber if the system experiences a thermal error (for example, the ambient temperature is out of range or there is a fan failure).	Ensure that none of the following conditions exist: • A cooling fan has been removed or has failed. • System cover, air shrouds, or back filler bracket has been removed.

Table 150. Status LED indicators and descriptions (continued)

Icon	Description	Condition	Corrective action
			• Ambient temperature is too high. • External airflow is obstructed. If the problem persists, see the Getting help section.
	Electrical indicator	The indicator turns solid amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply unit (PSU) or voltage regulator).	Check the System Event Log or system messages for the specific issue. If it is due to a problem with the PSU, check the LED on the PSU. Reseat the PSU. If the problem persists, see the Getting help section.
	Memory indicator	The indicator turns solid amber if a memory error occurs.	Check the System Event Log or system messages for the location of the failed memory. Reseat the memory module. If the problem persists, see the Getting help section.
	PCIe indicator	The indicator turns solid amber if a PCIe card experiences an error.	Restart the system. Update any required drivers for the PCIe card. Reinstall the card. If the problem persists, see the Getting help section. **NOTE:** For more information about the supported PCIe cards, see the Expansion card installation guidelines section.

System health and system ID indicator codes

The system health and system ID indicator is located on the left control panel of the system.

Table 151. System health and system ID indicator codes

System health and system ID indicator code	Condition
Solid blue	Indicates that the system is powered on, is healthy, and system ID mode is not active. Press the system health and system ID button to switch to system ID mode.
Blinking blue	Indicates that the system ID mode is active. Press the system health and system ID button to switch to system health mode.
Solid amber	Indicates that the system is in fail-safe mode. If the problem persists, see the Getting help section.
Blinking amber	Indicates that the system is experiencing a fault. Check the System Event Log for specific error messages. EEMI guide

iDRAC Quick Sync 2 indicator codes

iDRAC Quick Sync 2 module (optional) is located on the left control panel front IO panel of the system.

Table 152. iDRAC Quick Sync 2 indicators and descriptions

iDRAC Quick Sync 2 indicator code	Condition	Corrective action
Off (default state)	Indicates that the iDRAC Quick Sync 2 feature is powered off. Press the iDRAC Quick Sync 2 button to power on the iDRAC Quick Sync 2 feature.	If the LED fails to power on, reseat the left control panel flex cable and check. If the problem persists, see the Getting help section.
Solid white	Indicates that iDRAC Quick Sync 2 is ready to communicate. Press the iDRAC Quick Sync 2 button to power off.	If the LED fails to power off, restart the system. If the problem persists, see the Getting help section.
Blinks white rapidly	Indicates data transfer activity.	If the indicator continues to blink indefinitely, see the Getting help section.
Blinks white slowly	Indicates that firmware update is in progress.	If the indicator continues to blink indefinitely, see the Getting help section.
Blinks white five times rapidly and then powers off	Indicates that the iDRAC Quick Sync 2 feature is disabled.	Check if iDRAC Quick Sync 2 feature is configured to be disabled by iDRAC. If the problem persists, see the Getting help section. PowerEdge Manuals or *Dell OpenManage Server Administrator User's Guide* at OpenManage Manuals.
Solid amber	Indicates that the system is in fail-safe mode.	Restart the system. If the problem persists, see the Getting help section.
Blinking amber	Indicates that the iDRAC Quick Sync 2 hardware is not responding properly.	Restart the system. If the problem persists, see the Getting help section.

iDRAC Direct LED indicator codes

The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem.

You can configure iDRAC Direct by using a USB to micro USB (type AB) cable, which you can connect to your laptop or tablet. Cable length should not exceed 3 feet (0.91 meters). Performance could be affected by cable quality. The following table describes iDRAC Direct activity when the iDRAC Direct port is active:

Table 153. iDRAC Direct LED indicator codes

iDRAC Direct LED indicator code	Condition
Solid green for two seconds	Indicates that the laptop or tablet is connected.
Blinking green (on for two seconds and off for two seconds)	Indicates that the laptop or tablet connected is recognized.

Table 153. iDRAC Direct LED indicator codes (continued)

iDRAC Direct LED indicator code	Condition
LED Indicator off	Indicates that the laptop or tablet is unplugged.

NIC indicator codes

Each NIC on the back of the system has indicators that provide information about the activity and link status. The activity LED indicator indicates if data is flowing through the NIC, and the link LED indicator indicates the speed of the connected network.

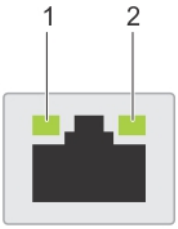


Figure 202. NIC indicator codes

1. Link LED indicator
2. Activity LED indicator

Table 154. NIC indicator codes

NIC indicator codes	Condition
Link and activity indicators are off.	Indicates that the NIC is not connected to the network.
Link indicator is green, and activity indicator is blinking green.	Indicates that the NIC is connected to a valid network at its maximum port speed, and data is being sent or received.
Link indicator is amber, and activity indicator is blinking green.	Indicates that the NIC is connected to a valid network at less than its maximum port speed, and data is being sent or received.
Link indicator is green, and activity indicator is off.	Indicates that the NIC is connected to a valid network at its maximum port speed, and data is not being sent or received.
Link indicator is amber, and activity indicator is off.	Indicates that the NIC is connected to a valid network at less than its maximum port speed, and data is not being sent or received.
Link indicator is blinking green, and activity is off.	Indicates that the NIC identity is enabled through the NIC configuration utility.

Power supply unit indicator codes

AC and DC power supply units (PSUs) have an illuminated translucent handle that serves as an indicator. The indicator shows if power is present or if a power fault has occurred.

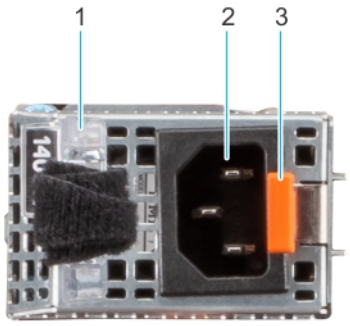


Figure 203. AC PSU status indicator

1. AC PSU handle
2. Socket
3. Release latch

Table 155. AC and DC PSU status indicator codes

Power indicator codes	Condition
Green	Indicates that a valid power source is connected to the PSU and the PSU is operational.
Blinking amber	Indicates an issue with the PSU.
Not powered on	Indicates that the power is not connected to the PSU.
Blinking green	Indicates that the firmware of the PSU is being updated. **CAUTION: Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs will not function.**
Blinking greens and powers off	When hot-plugging a PSU, it blinks green five times at a rate of 4 Hz and powers off. This indicates a PSU mismatch due to efficiency, feature set, health status, or supported voltage. **CAUTION: If two PSUs are installed, both the PSUs must have the same type of label; for example, Extended Power Performance (EPP) label. Mixing PSUs from previous generations of PowerEdge servers is not supported, even if the PSUs have the same power rating. This results in a PSU mismatch condition or failure to power on the system.** **CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.** **CAUTION: When correcting a PSU mismatch, replace the PSU with the blinking indicator. Swapping the PSU to make a matched pair can result in an error condition and an unexpected system shutdown. To change from a high output configuration to a low output configuration or vice versa, you must power off the system.** **CAUTION: AC PSUs support both 240 V and 120 V input voltages with the exception of Titanium PSUs, which support only 240 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.**

Drive indicator codes

The LEDs on the drive carrier indicate the state of each drive. Each drive carrier has two LEDs: an activity LED (green) and a status LED (bicolor, green/amber). The activity LED blinks whenever the drive is accessed.

NOTE: If the drive is in the Advanced Host Controller Interface (AHCI) mode, the status LED indicator does not power on.

NOTE: Drive status indicator behavior is managed by Storage Spaces Direct. Not all drive status indicators may be used.

Table 156. Drive indicator codes

Drive status indicator code	Condition
Blinks green twice per second	Indicates that the drive is being identified or preparing for removal.
Not powered on	Indicates that the drive is ready for removal. **NOTE:** The drive status indicator remains off until all drives are initialized after the system is powered on. Drives are not ready for removal during this time.
Blinks green, amber, and then powers off	Indicates that there is an unexpected drive failure.
Blinks amber four times per second	Indicates that the drive has failed.
Blinks green slowly	Indicates that the drive is rebuilding.
Solid green	Indicates that the drive is online.
Blinks green for three seconds, amber for three seconds, and then powers off after six seconds	Indicates that the rebuild has stopped.

Using system diagnostics

If you experience an issue with the system, run the system diagnostics before contacting Dell for technical assistance. The purpose of running system diagnostics is to test the system hardware without using additional equipment or risking data loss. If you are unable to fix the issue yourself, service and support personnel can use the diagnostics results to help you solve the issue.

Dell Embedded System Diagnostics

NOTE: The Dell Embedded System Diagnostics is also known as Enhanced Pre-boot System Assessment (ePSA) diagnostics.

The Embedded System Diagnostics provide a set of options for particular device groups or devices allowing you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of issues encountered during testing

Running the Embedded System Diagnostics from Boot Manager

Run the Embedded System Diagnostics (ePSA) if your system does not boot.

Steps

1. When the system is booting, press F11.
2. Use the up arrow and down arrow keys to select **System Utilities** > **Launch Diagnostics**.

3. Alternatively, when the system is booting, press F10, select **Hardware Diagnostics** > **Run Hardware Diagnostics**.
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

Running the Embedded System Diagnostics from the Dell Lifecycle Controller

Steps

1. When the system is booting, press F10.
2. Select **Hardware Diagnostics** → **Run Hardware Diagnostics**.
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics start executing the tests on all the detected devices.

System diagnostic controls

Table 157. System diagnostic controls

Menu	Description
Configuration	Displays the configuration and status information of all detected devices.
Results	Displays the results of all tests that are run.
System health	Provides the current overview of the system performance.
Event log	Displays a time-stamped log of the results of all tests run on the system. This is displayed if at least one event description is recorded.

11

Getting help

Topics:

- Recycling or End-of-Life service information
- Contacting Dell Technologies
- Accessing system information by using QR code
- Receiving automated support with Secure Connect Gateway (SCG)

Recycling or End-of-Life service information

Take back and recycling services are offered for this product in certain countries. If you want to dispose of system components, visit How to Recycle and select the relevant country.

Contacting Dell Technologies

Dell provides online and telephone based support and service options. If you do not have an active internet connection, you can find Dell contact information on your purchase invoice, packing slip, bill or Dell product catalog. The availability of services varies depending on the country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer service issues follow these steps:

Steps

1. Go to Dell Support.
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
   a. Enter the system Service Tag in the **Enter a Service Tag, Serial Number, Service Request, Model, or Keyword** field.
   b. Click **Search**.
   The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
   The support page that lists the various support categories is displayed.
5. For contact details of Dell Global Technical Support:
   a. Click Contact Technical Support.
   b. The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

Accessing system information by using QR code

You can use the QR code located on the Express service tag in the front of the T560 system, to access information about PowerEdge T560. There is also another QR code for accessing product information on the back of the system cover.

Prerequisites

Ensure that your smart phone or tablet has a QR code scanner installed.

The QR code includes the following information about your system:

- How-to videos
- Reference materials, including the Installation and Service Manual, and mechanical overview
- The system service tag to quickly access the specific hardware configuration and warranty information
- A direct link to Dell to contact technical support and sales teams

Steps

1. Go to PowerEdge Manuals, and navigate to your specific product or
2. Use your smart phone or tablet to scan the model-specific QR code on your system.

QR code for PowerEdge T560 system resources

Figure 204. QR code for PowerEdge T560 system

Receiving automated support with Secure Connect Gateway (SCG)

Dell Secure Connect Gateway (SCG) is an optional Dell Services offering that automates technical support for your Dell server, storage, and networking devices. By installing and setting up a Secure Connect Gateway (SCG) application in your IT environment, you can receive the following benefits:

- Automated issue detection — Secure Connect Gateway (SCG) monitors your Dell devices and automatically detects hardware issues, both proactively and predictively.
- Automated case creation — When an issue is detected, Secure Connect Gateway (SCG) automatically opens a support case with Dell Technical Support.
- Automated diagnostic collection — Secure Connect Gateway (SCG) automatically collects system state information from your devices and uploads it securely to Dell. This information is used by Dell Technical Support to troubleshoot the issue.
- Proactive contact — A Dell Technical Support agent contacts you about the support case and helps you resolve the issue.

The available benefits vary depending on the Dell Service entitlement purchased for your device. For more information about Secure Connect Gateway (SCG), go to secureconnectgateway.

12

Documentation resources

This section provides information about the documentation resources for your system.

To view the document that is listed in the documentation resources table:

- From the Dell support site:
  1. Click the documentation link that is provided in the Location column in the table.
  2. Click the required product or product version.

     NOTE: To locate the model number, see the front of your system.

  3. On the Product Support page, click **Documentation**.
- Using search engines:
  - Type the name and version of the document in the search box.

Table 158. Additional documentation resources for your system

Task	Document	Location
Setting up your system	For information about setting up your system, see the *Getting Started Guide* document that is shipped with your system.	PowerEdge Manuals
Configuring your system	For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide. For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC. For information about Redfish and its protocol, supported schema, and Redfish Eventing implemented in iDRAC, see the Redfish API Guide. For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide. For information about Intel QuickAssist Technology, see the Integrated Dell Remote Access Controller User's Guide.	PowerEdge Manuals
	For information about earlier versions of, the iDRAC documents. To identify the version of iDRAC available on your system, on the iDRAC web interface, click **?** > **About**.	iDRAC Manuals
	For information about installing the operating system, see the operating system documentation.	Operating System Manuals

Table 158. Additional documentation resources for your system (continued)

Task	Document	Location
	For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.	Drivers
Managing your system	For information about systems management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.	PowerEdge Manuals
	For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	OpenManage Manuals
	For information about installing and using Dell Secure Connect Gateway, see the Dell Secure Connect Gateway Enterprise User's Guide.	serviceability tools
	For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.	OpenManage Manuals
Working with the Dell PowerEdge RAID controllers (if applicable)	For information about understanding the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card and deploying the cards, see the Storage controller documentation.	Storage Controller Manuals
Understanding event and error messages	For information about the event and error messages generated by the system firmware and agents that monitor system components, see the EEMI guide.	EEMI Guide
Troubleshooting your system	For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.	PowerEdge Manuals