


Dell EMC PowerEdge R7515

Field Service Manual

Uwagi, przestrogi i ostrzeżenia

 **UWAGA** Napis UWAGA oznacza ważną wiadomość, która pomoże lepiej wykorzystać komputer.

 **OSTRZEŻENIE** Napis PRZESTROGA informuje o sytuacjach, w których występuje ryzyko uszkodzenia sprzętu lub utraty danych, i przedstawia sposoby uniknięcia problemu.

 **PRZESTROGA** Napis OSTRZEŻENIE informuje o sytuacjach, w których występuje ryzyko uszkodzenia sprzętu, obrażeń ciała lub śmierci.

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Product overview

The PowerEdge R7515 system is Dell's latest powerful, expandable 1-socket rack server for small and medium businesses and remote office/branch office. Now with a faster 32 core AMD processor supports to help run applications faster and support for full feature remote management (iDRAC9), PowerEdge R7515 is also excellent for web hosting, backup/recovery, file/print, mail/messaging, and video surveillance.

PowerEdge R7515 is a general purpose rack server capable of supporting a wide range of workloads. It is particularly well suited for the following:

- Software Defined Storage/Storage scale out: Mid core solution with 4 x 25 G networking cards and 10 NVMe drives
- Hybrid Cloud and Dense virtualization: High Core count performance with 32 G per core, 4 x 25 G networking cards and 10 SAS Drives
- Web Tech/Service Provider: High core count performance with 32 G per core, 4 x 10 G cards plus an FPGA on a 10 SAS drive chassis



Figure 1. 8 x 3.5-inch system



Figure 2. 12 x 3.5-inch system



Figure 3. 24 x 2.5-inch system

Product positioning

The product positioning of PowerEdge R7515 is represented in the following view:

Performance

- One AMD EYPC 7002 series processor
- 16 DIMM slots
- Up to 2 x PCI Express (PCIe) 4.0 expansion slots

Availability

- Redundant power supply units (PSUs)

- Hot-plug and hot-swappable PSUs, disk drives
- PERC 9/SAS HBA/Chipset SATA
- iDRAC9 with Lifecycle Controller
- Internal Dual SD Module (IDSMD)

Expandability and I/O Storage

- Up to 12 x 3.5-inch (with 2 x 3.5-inch rear drives), and 24 x 2.5-inch SAS, SATA, or NVMe drives

Product features

Table 1. New technologies

New Technologies	Description
AMD EPYC 7002 Series Processor - High-Performance Zen 2 Based Server SOCs	A highly scalable, 32-core System on Chip (SoC) design, with support for two high-performance threads per core.
Next Generation SW RAID, PERC S150	The new AMD servers support the latest S150 software RAID along with H330 and H730P controller cards with improved functionality and faster performance. New SW RAID supports RAID 0, 1, 5 and 10.
iDRAC 9	The embedded systems management solution for Dell servers features hardware and firmware inventory and alerting, in- depth memory alerting, faster performance, a dedicated gigabit port and many more features.
Wireless Management	The 15G Quick Sync feature is an extension of NFC based low bandwidth 15G Quick sync interface. Quick Sync 2.0 will offer feature parity with 13G NFC interface with improved user experience.

Product comparison

Table 2. Feature comparison

Feature	PowerEdge R7515	PowerEdge R7415
Processors	AMD EPYC 7002 Series Processor	AMD Naples SP3 compatible processor
Number of Processors	1	1
Chipset	System on Chip (SoC) design	System on Chip (SoC) design
Number of cores	Up to 32 cores	Up to 32 cores
Memory	16x DDR4 (RDIMM, LRDIMM, 3DS)	16x DDR4 (RDIMM, LRDIMM)
Disk Drives	3.5 inch or 2.5 inch 12 Gb SAS, 6 Gb SATA or NVMe drives	3.5 inch or 2.5 inch 12 Gb SAS, 6 Gb SATA or NVMe drives
Embedded drive Controller	Chipset based SATA PERC S150 (Embedded SW RAID)	Chipset based SATA PERC S140 (Embedded SW RAID)
RAID Controller	<ul style="list-style-type: none"> • S150 • HBA330 • H330 Mini • H730P Mini • H740P Mini • H840 	<ul style="list-style-type: none"> • S140 • HBA330 • H330 Mini • H730P Mini • H740P Mini • H840
Backplane	<ul style="list-style-type: none"> • 24x 2.5 inch SATA/SAS/ NVMe (Up to 12 SAS/SATA + 12 NVMe) 	<ul style="list-style-type: none"> • 24x 2.5 inch SATA/SAS/ NVMe (Up to 12 SAS/SATA + 12 NVMe) • 24 x 2.5 inch SATA/SAS

Feature	PowerEdge R7515	PowerEdge R7415
	<ul style="list-style-type: none"> 24 x 2.5 inch SATA/SAS 12 x 3.5 inch SATA/SAS 8 x 3.5 inch SATA/SAS 2 x 3.5 inch rear SATA/SAS 24 x 2.5 inch NVMe only 8 x 2.5 inch (universal drive) + 16 NVMe 	<ul style="list-style-type: none"> 12 x 3.5 inch SATA/SAS 8 x 3.5 inch SATA/SAS 2 x 3.5 inch rear SATA/SAS 24 x 2.5 inch NVMe only 8 x 2.5 inch (universal drive) + 16 NVMe
PCIe Slots	<p>4 slots + LOM Riser connectors (slot -1)</p> <p>Slot-1: LOM riser connector (PCIe Gen x8 from CPU)</p> <p>Slot-2: PCIe Gen3 x16 from CPU (Right Riser1 slot)</p> <p>Slot-3: PCIe Gen4 x16 from CPU (Right Riser1 slot)</p> <p>Slot-4: PCIe Gen3 x16 from CPU</p> <p>Slot-5: PCIe Gen4 x16 from CPU</p> <p>Internal PERC slot (C-stack): PCIe Gen3 x8 from CPU</p> <p>Without rear drives: 2 low profile + 2 full height, full length/Gen3 x16</p> <p>With rear drives: 2 low profile/Gen3 x16</p>	<p>4 slots + LOM Riser connectors (slot -1)</p> <p>Slot-1: LOM riser connector (PCIe Gen x8 from CPU)</p> <p>Slot-2: PCIe Gen3 x16 from CPU (Right Riser1 slot)</p> <p>Slot-3: PCIe Gen3 x16 from CPU (Right Riser1 slot)</p> <p>Slot-4: PCIe Gen3 x16 from CPU</p> <p>Slot-5: PCIe Gen3 x8 from CPU</p> <p>Internal PERC slot (C-stack): PCIe Gen3 x8 from CPU</p> <p>Without rear drives: 2 low profile + 2 full height, full length/Gen3 x16</p> <p>With rear drives: 2 low profile/Gen3 x16</p>
Embedded NIC	<p>2 x 1 Gb LOM and optional LAN on LOM riser card:</p> <p>LOM riser options:</p> <ul style="list-style-type: none"> 2 x 1 Gb 2 x 10 Gb Base-T 2 x 10 Gb SFP+ 2 x 25Gb SPF+ 	<p>2 x 1 Gb LOM and optional LAN on LOM riser card:</p> <p>LOM riser options:</p> <ul style="list-style-type: none"> 2 x 1 Gb 2 x 10 Gb Base-T 2 x 10 Gb SFP+
Power Supplies	<p>Redundant PSU</p> <ul style="list-style-type: none"> 495 W AC 750 W AC 1100 W AC 1600 W AC 750 W Mixed Mode HVDC 1100 W Mixed Mode HVDC 	<ul style="list-style-type: none"> 450 W AC Cabled PSU <p>Redundant PSU</p> <ul style="list-style-type: none"> 495 W AC 750 W AC 1100 W AC 1600 W AC 750 W Mixed Mode HVDC 1100 W Mixed Mode HVDC
Remote Management	iDRAC9	iDRAC9
USB Ports	<p>Front:</p> <ul style="list-style-type: none"> 2 USB 2.0 ports <p>Rear:</p> <ul style="list-style-type: none"> 2 USB 3.1 ports <p>Internal:</p> <ul style="list-style-type: none"> 1 USB 3.0 port 	<p>Front:</p> <ul style="list-style-type: none"> 1 USB 2.0 port <p>Rear:</p> <ul style="list-style-type: none"> 2 USB 3.1 ports <p>Internal:</p> <ul style="list-style-type: none"> 1 USB 3.0 port
TPM	TPM China, TPM 1.2, TPM 2.0	TPM China, TPM 1.2, TPM 2.0

Feature	PowerEdge R7515	PowerEdge R7415
iDRAC Direct front port	Front: 1 iDRAC USB(Micro USB)	Front: 1 iDRAC USB(Micro USB)
Fan	Up to 6 fan support	Up to 6 fan support
IDSDM Module	Internal Dual SD Module (IDSDM)	Internal Dual SD Module (IDSDM) and vFlash card
BOSS Module	M.2 SATA interface	M.2 SATA interface
PERC	PCIe PERC 9 or PERC 10	PCIe PERC 9 or PERC 10
ODD	1 x 9.5mm slim optical drive	1 x 9.5mm slim optical drive
Server Management	Dell OpenManage, QuickSync 2.0, iDRAC Direct	Dell OpenManage, QuickSync 2.0, iDRAC Direct
	Lifecycle Controller 3.0	Lifecycle Controller 3.0

Supported operating systems

The PowerEdge R7515 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 on the specific versions and additions, see <https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r6515><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r6525><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r7515><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-c6525>.

System Information label

 **NOTE:** The system information label is located on back side of the system cover.

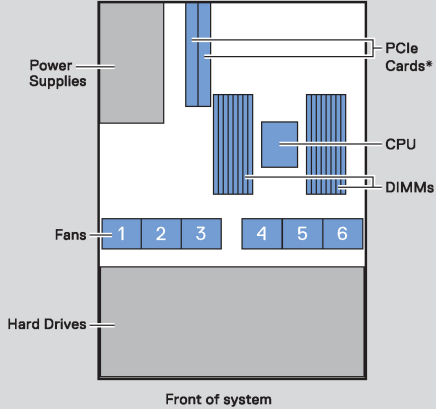
Service Information

System Touchpoints

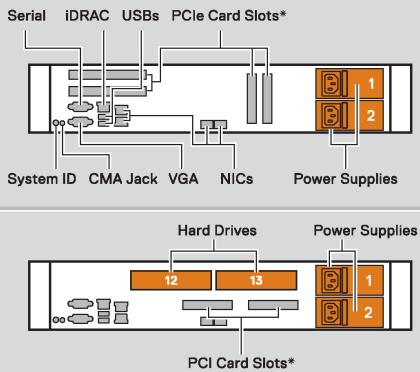
- Hot swap touchpoints: Components with terracotta touchpoints can be serviced while the system is running.
- Cold swap touchpoints: Components with blue touchpoints require a full system shutdown before servicing.

Mechanical Overview

Top View



Rear View

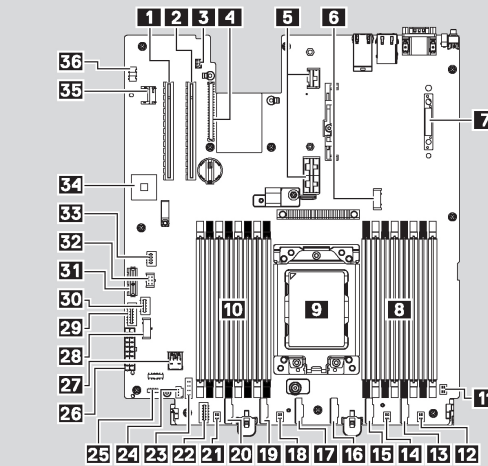


*Your system may be configured with Riser or non-Riser in PCIe Card Slots. Follow the corresponding instructions.

Electrical Overview

System Board Connections

- | | | |
|--------------------|-----------------------------|-----------------------------|
| 1 PCI Card Slot 5 | 14 Fan 4 | 23 System Power 1 |
| 2 PCI Card Slot 4 | 15 PCIE-B | 27 Internal USB 3.0 |
| 3 Jumpers | 16 SATA-B/PCIE-C | 23 System Power 2 |
| 4 LOM Riser Card | 17 PCIE-D | 23 PIB Signal 2 |
| 5 Riser Slot 1A/1B | 18 Fan 3 | 30 PIB Signal 1 |
| 6 System Power 3 | 19 PCIE-E | 31 iDSDM |
| 7 Mini PERC | 20 PCIE-F | 32 Rear Backplane/ODD Power |
| 8 DIMMs For CPU | 21 Fan 2 | 33 Front Backplane Signal 0 |
| 9 CPU | 22 Left Control Panel | 34 iDRAC |
| 10 DIMMs For CPU | 23 Front Backplane Signal 1 | 35 TPM |
| 11 Fan 6 | 24 Intrusion Switch | 36 Front Video |
| 12 Fan 5 | 25 Right Control Panel | |
| 13 SATA-A/PCIE-A | | |



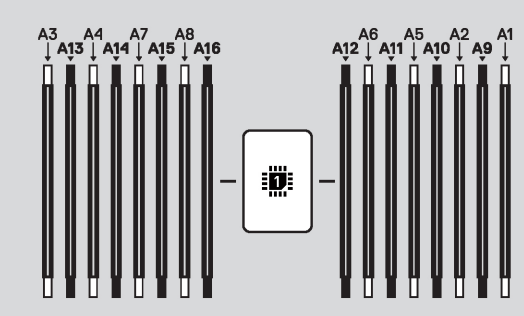
Jumper Settings

Jumper	Setting	Description
	(default)	BIOS password is enabled.
PWRD_EN		BIOS password is disabled. iDRAC local access is unlocked at next AC power cycle. iDRAC password reset is enabled in F2 iDRAC settings menu.
	(default)	BIOS configuration settings retained at system boot.
NVRAM_CLR		BIOS configuration settings cleared at system boot.

Figure 4. Service information

Memory Information


⚠ Caution: Memory (DIMMs) and CPUs may be hot during servicing



A3 A13 A4 A14 A7 A15 A8 A16 A12 A6 A11 A5 A10 A2 A9 A1

Quick Resource Locator

Scan to see hardware servicing and software setup videos, how-to's, and documentation.



Quick Resource Locator
www.Dell.com/GRL/Server/PER7515

Icon Legend

EST Express Service Tag	Hard Drive Activity
Memory Bank	Push
Power Supply	Fan
System ID	CPU
iDRAC Direct (Micro-AB USB)	

Memory Population

Configuration	Sequence
Memory-Optimized	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

Latest population rules are documented in the *Installation and Service Manual*.

⚠ 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 came with the product.

To learn more about this Dell product or to order additional or replacement parts, go to Dell.com/support

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Figure 5. Memory Information and icon legend

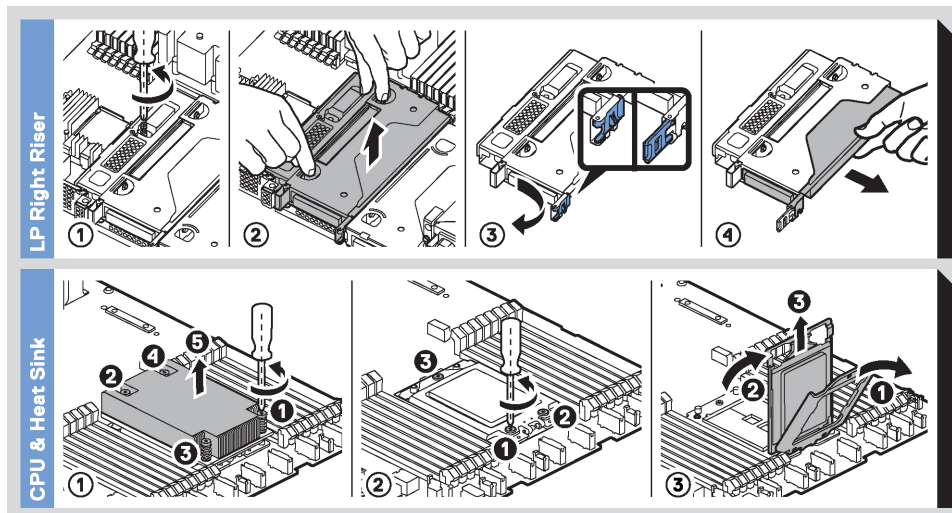


Figure 6. CPU and heat sink and LP right riser

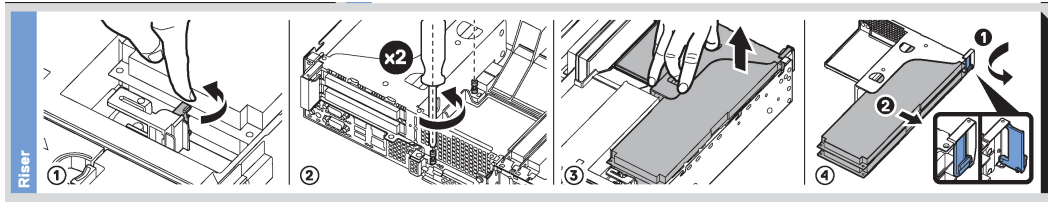


Figure 7. Riser

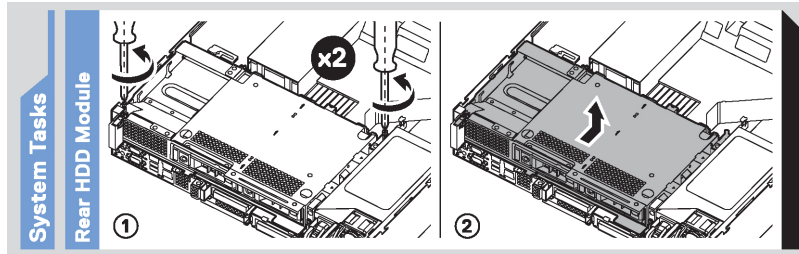


Figure 8. System tasks

Field service information

The information in this section is for field service personnel to perform any installation, diagnosis, and repair activities. Field personnel must read the information and procedures in this section before performing the service tasks.

NOTE: Information in this section is required knowledge, but should never override regional or local Policy and Procedure.

Field service overview

Field service information for the system includes the following content:

- **Product overview** – High-level description of the system that includes features and functions, product-to-product comparison, and supported operating systems, if applicable, and OEM branding information.
- **OEM Branding** - Information about the OEM feature includes the required special processes, notes, and callouts that the technician must know before servicing a system.
- **Safety precautions** – Generic safety precautions for every service event.
- **Tools and utilities** – Hand tools, diagnostic tools or utilities, software applications, or GUIs that are required to service the system.
- **Need to know** – Specific callouts about the system, common error codes, version control for BIOS, firmware, or software for OEM, required startup or shutdown sequence, new product technologies or components comparison.
- **Diagnostics and indicators** – Visual information about the health and state of the system.
- **System board connectors** – Information on system board connectors.
- **System board jumper settings** – Information on system board jumper settings.
- **Disassembly and reassembly** – Instructions for removing and replacing each replaceable part, with information needed before, during, and after parts replacement.
- **Update BIOS** – Information and procedures for updating the BIOS after the system has been serviced.
- **Restoring the service tag using easy restore** - Information on updating the system Service Tag. This procedure is required when a system board or chassis is replaced to make sure that the system functions properly and can be verified.
- **Installation** – Includes the Getting Started Guide, information about rack rails, cabling, system initialization, and basic configuration.
- **Quick Resource Locator** – Information on the Quick Resource Locator (QRL) feature.

PowerEdge R7515 system overview

The PowerEdge R7515 is a 2U rack server that supports:

- One AMD EPYC 7002 series processor
- 16 DIMM slots
- Two redundant power supply units
- Up to 8 x 3.5-inch, 12 x 3.5-inch, 12 x 3.5-inch + 2 x 3.5-inch (rear), or 24 x 2.5-inch up to 12 SAS/SATA/NVMe + 12 NVMe drives / 8 x 2.5-inch (universal drive) + 16 (NVMe drive) / 24 x 2.5-inch (NVMe drive only).

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 > [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 and SATA drives are seen as drives in this document, unless specified otherwise.

For more information about supported drives, see the [Drive specifications](#).

Front view of the system

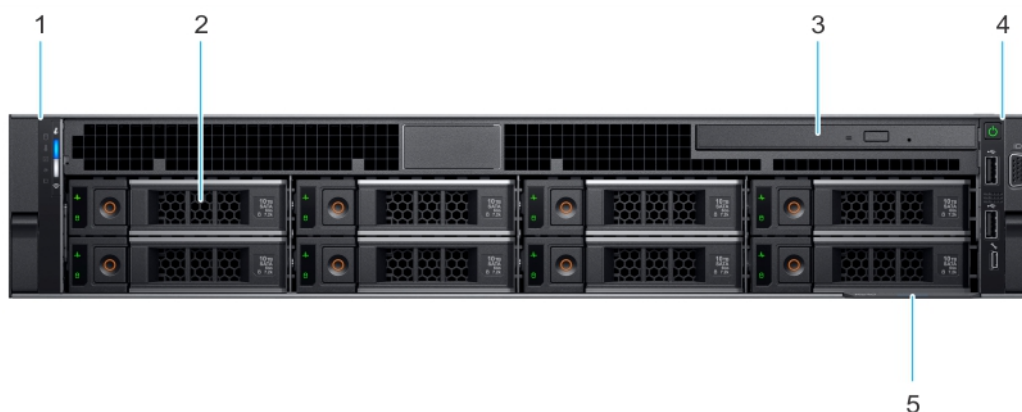


Figure 9. Front view of the 8 x 3.5-inch drive system

- | | |
|-----------------------|------------------------|
| 1. Left control panel | 2. Drives (8) |
| 3. Optical drive slot | 4. Right control panel |
| 5. Information tag | |

Table 3. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	<p>Contains the system health, system ID, status LED, and the iDRAC Quick Sync 2 (wireless) indicator.</p> <p>NOTE: The iDRAC Quick Sync 2 indicator is available only on certain configurations.</p> <ul style="list-style-type: none"> Status LED: Enables you to identify any failed hardware components. There are up to five status LEDs and an overall system health LED (Chassis health and system ID) bar. For more information, see the Status LED indicators section. Quick Sync 2 (wireless): Indicates a Quick Sync enabled system. The Quick Sync feature is optional. This feature allows management of the system by using mobile devices called as OpenManage Mobile (OMM) feature. Using iDRAC Quick Sync 2 with OpenManage Mobile (OMM) aggregates hardware or firmware inventory and various system level diagnostic and error information that can be used in troubleshooting the system. For more information, see the
2	Drive (8)	N/A	Enables you to install drives that are supported on your system. For more information about drives, see the Drives section.
3	Optical drive (optional)	N/A	One optional slim SATA DVD-ROM drive or DVD+/-RW drive.
4	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct micro port, and the iDRAC Direct status LED.
5	Information tag		The Information tag is a slide-out label panel that contains 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 also contains the iDRAC secure default password.



Figure 10. Front view of the 12 x 3.5-inch drive system

- 1. Left control panel
- 2. Drives (12)
- 3. Right control panel
- 4. Information tag

Table 4. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	<p>Contains the system health, system ID, status LED, and the iDRAC Quick Sync 2 (wireless) indicator.</p> <p>NOTE: The iDRAC Quick Sync 2 indicator is available only on certain configurations.</p> <ul style="list-style-type: none"> • Status LED: Enables you to identify any failed hardware components. There are up to five status LEDs and an overall system health LED (Chassis health and system ID) bar. For more information, see the Status LED indicators section. • Quick Sync 2 (wireless): Indicates a Quick Sync enabled system. The Quick Sync feature is optional. This feature allows management of the system by using mobile devices called as OpenManage Mobile (OMM) feature. Using iDRAC Quick Sync 2 with OpenManage Mobile (OMM) aggregates hardware or firmware inventory and various system level diagnostic and error information that can be used in troubleshooting the system. For more information, see the
2	Drive (12)	N/A	Enables you to install drives that are supported on your system. For more information about drives, see the Drives section.
3	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct micro port, and the iDRAC Direct status LED.
4	Information tag		The Information tag is a slide-out label panel that contains 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 also contains the iDRAC secure default password.



Figure 11. Front view of the 24 x 2.5-inch drive system

- 1. Left control panel
- 2. Drives (24)
- 3. Right control panel
- 4. Information tag

Table 5. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	<p>Contains the system health, system ID, status LED, and the iDRAC Quick Sync 2 (wireless) indicator.</p> <p>NOTE: The iDRAC Quick Sync 2 indicator is available only on certain configurations.</p> <ul style="list-style-type: none"> • Status LED: Enables you to identify any failed hardware components. There are up to five status LEDs and an overall system health LED (Chassis health and system ID) bar. For more information, see the Status LED indicators section. • Quick Sync 2 (wireless): Indicates a Quick Sync enabled system. The Quick Sync feature is optional. This feature allows management of the system by using mobile devices called as OpenManage Mobile (OMM) feature. Using iDRAC Quick Sync 2 with OpenManage Mobile (OMM) aggregates hardware or firmware inventory and various system level diagnostic and error information that can be used in troubleshooting the system. For more information, see the
2	Drive (24)	N/A	Enables you to install drives that are supported on your system. For more information about drives, see the Drives section.
3	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct micro port, and the iDRAC Direct status LED.
4	Information tag		The Information tag is a slide-out label panel that contains 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 also contains the iDRAC secure default password.

For more information about the ports, see the [Technical Specifications](#) section.

Left control panel view

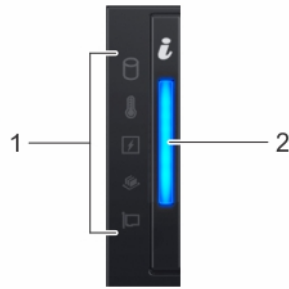


Figure 12. Left control panel without optional iDRAC Quick Sync 2.0 indicator

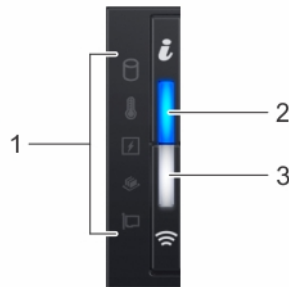


Figure 13. Left control panel with optional iDRAC Quick Sync 2.0 indicator

1. Status LED indicators
2. System health and system ID indicator
3. iDRAC Quick Sync 2 wireless indicator (optional)

Table 6. Left control panel

Item	Indicator, button, or connector	Icon	Description
1	Status LED indicators	N/A	Indicates the status of the system. For more information, see the Status LED indicators section.
2	System health and system ID indicator	i	Indicates the system health. For more information, see the System health and system ID indicator codes section.
3	iDRAC Quick Sync 2 wireless indicator (optional)	☎	Indicates if the iDRAC Quick Sync 2 wireless option is activated. The Quick Sync 2 feature allows management of the system using mobile devices. This feature aggregates hardware/firmware inventory and various system level diagnostic/error information that can be used in troubleshooting the system. You can access system inventory, Dell Lifecycle Controller logs or system logs, system health status, and also configure iDRAC, BIOS, and networking parameters. You can also launch the virtual Keyboard, Video, and Mouse (KVM) viewer and virtual Kernel based Virtual Machine (KVM), on a supported mobile device. For more information, see the Integrated Dell Remote Access Controller User's Guide at

NOTE: For more information about the indicator codes, see the [System diagnostics and indicator codes](#) section.

Table 7. Decoding of ID button and Wireless button

Status	ID Button	Wireless Button
Healthy	Solid Blue	Off
Fault	Blinking Amber	Off
System ID	Blinking Blue	Off

Status	ID Button	Wireless Button
Healthy, Wireless ON	Solid Blue	Solid White
Fault, Wireless ON	Blinking Amber	Solid White
System ID, Wireless ON	Blinking Blue	Solid White
Healthy, Wireless Communication	Solid Blue	Blinking White
Fault, Wireless Communication	Blinking Amber	Blinking White
System ID, Wireless Communication	Solid Blue	Blinking White
Healthy, Wireless Fault	Solid Blue	Blinking Amber
Fault, Wireless Fault	Blinking Amber	Blinking Amber
System ID, Wireless Fault	Blinking Blue	Blinking Amber

Status LED indicators

NOTE: The indicators display solid amber if any error occurs.

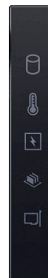

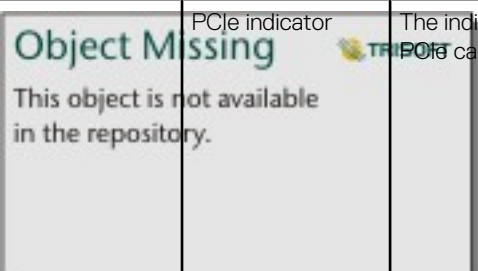


Figure 14. Status LED indicators

Table 8. Status LED indicators and descriptions

Icon	Description	Condition	Corrective action
	Drive indicator	The indicator turns solid amber if there is a drive error.	<ul style="list-style-type: none"> 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).	<p>Ensure that none of the following conditions exist:</p> <ul style="list-style-type: none"> A cooling fan has been removed or has failed. System cover, air shroud, memory module blank, or back filler bracket is removed. Ambient temperature is too high. External airflow is obstructed. <p>If the problem persists, see the Getting help section.</p>
	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).	<p>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.</p> <p>If the problem persists, see the Getting help section.</p>

Icon	Description	Condition	Corrective action
	Memory indicator	The indicator turns solid amber if a memory error occurs.	<p>Check the System Event Log or system messages for the location of the failed memory. Reseat the memory module.</p> <p>If the problem persists, see the Getting help section.</p>
	PCIe indicator	The indicator turns solid amber if a PCIe card experiences an error.	<p>Restart the system. Update any required drivers for the PCIe card. Reinstall the card.</p> <p>If the problem persists, see the Getting help section.</p> <p>NOTE: For more information about the supported PCIe cards, see the Expansion card installation guidelines section.</p>

System health and system ID indicator codes

The system health and system ID indicator is located on the left control panel of the system.



Figure 15. System health and system ID indicator



Figure 16. System health and system ID indicator

Table 9. 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.

iDRAC Quick Sync 2 indicator codes

iDRAC Quick Sync 2 module (optional) is located on the left control panel of the system.



Table 10. 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, reseal 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.	NA If the indicator continues to blink indefinitely, see the Getting help section.
Blinks white slowly	Indicates that firmware update is in progress.	NA 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. or <i>Dell OpenManage Server Administrator User's Guide</i> at .
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.

Right control panel

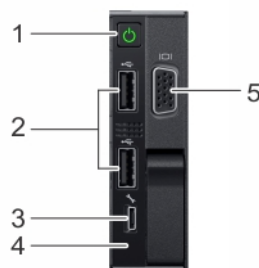



Figure 17. Right control panel view

Table 11. Right control panel

Item	Indicator or button	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. NOTE: Press the power button to gracefully shut down an ACPI-compliant operating system.
2	USB 2.0-compliant port		The USB port is a 4-pin connector and 2.0-compliant. This port enables you to connect USB devices to the system.
3	iDRAC Direct port (Micro-AB USB)		The iDRAC direct Micro USB port enables you to access the iDRAC Direct Micro USB features. For more information, see the NOTE: 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

Item	Indicator or button	Icon	Description
			length should not exceed 3 feet (0.91 meters). Performance could be affected by cable quality.
4	iDRAC Direct LED indicator	N/A	The iDRAC Direct LED indicator lights up to indicate that the iDRAC Direct port is actively connected to a device.
5	VGA port		Enables you to connect a display device to the system. For more information, see the Technical specifications section.

NOTE: For more information about the ports, see the [Ports and connectors specifications](#) 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 12. 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.
Powers off	Indicates that the laptop or tablet is unplugged.

Drive indicator codes

The LEDs on the drive carrier indicates 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.



Figure 18. Drive indicators on the drive and the mid drive tray backplane

1. Drive activity LED indicator
2. Drive status LED indicator
3. Drive capacity label



Figure 19. Drive indicators

- 1. Drive activity LED indicator
- 2. Drive status LED indicator
- 3. Drive capacity label

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 13. Drive indicator codes

Drive status indicator code	Condition
Blinks green twice per second	Indicates that the drive is being identified or preparing for removal.
Off	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 expected 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.

Rear view of the system

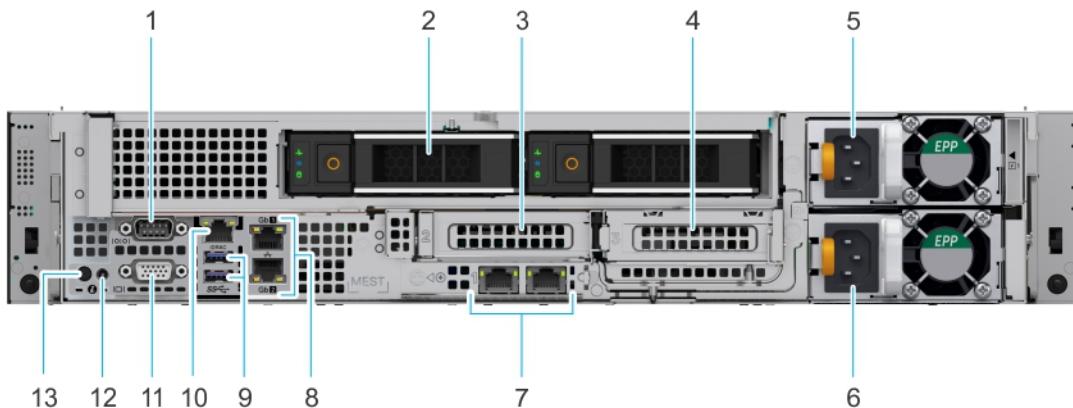








Figure 20. Rear view of the system with two rear drives

- 1. Serial port
- 2. Drive
- 3. Riser slot 2
- 4. Riser slot 3

- 5. Redundant power supply unit (PSU)
- 7. Ethernet port (2)
- 9. iDRAC9 dedicated network port
- 11. System status indicator cable port (CMA)
- 6. LOM Riser Ethernet port (2) (Optional)
- 8. USB 3.0 port (2)
- 10. VGA port
- 12. System identification button

Table 14. Rear view of the system with two rear drives

Item	Ports, panels, or slots	Icon	Description
1	Serial port		Enables you to connect a serial device to the system. For more information, see the Technical Specifications section.
2	Drive	N/A	Enables you to install drives that are supported on your system. For more information about drives, see the Drive specifications section.
3	PCIe expansion card riser 1A (slot 2)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
4	PCIe expansion card riser 2 (slot 3)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
5	Power supply unit (PSU)	N/A	For more information about the PSU configurations, see the Technical Specifications section.
6	Power supply unit (PSU)	N/A	For more information about the PSU configurations, see the Technical Specifications section.
7	LOM Riser Ethernet port (2) (Optional) (slot 1)		The NIC ports that are integrated on the LAN on Motherboard (LOM) riser provide network connectivity. For more information about the supported configurations, see the Technical Specifications section.
8	Ethernet ports (2)		The Ethernet ports that are integrated on the system board provide network connectivity. These NIC ports can also be shared with iDRAC when iDRAC network settings is set to shared mode. For more information about the supported configurations, see the Technical Specifications section.
9	USB 3.0 port (2)		These USB ports support USB 3.0.
10	iDRAC dedicated port		Enables you to remotely access iDRAC. For more information, see the iDRAC User's Guide at .
11	VGA port		Enables you to connect a display device to the system. For more information, see the Technical Specifications section.
12	System status indicator cable port (CMA)	N/A	Enables you to connect the status indicator cable and view system status when the CMA is installed.
13	System identification button		<p>Press the system ID button:</p> <ul style="list-style-type: none"> • To locate a particular system within a rack. • To turn the system ID on or off. <p>To reset iDRAC, press and hold the button for 16 seconds.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • To reset iDRAC using system ID, ensure that the system ID button is enabled in the iDRAC setup. • If the system stops responding during POST, press and hold the system ID button (for more than five seconds) to enter the BIOS progress mode.

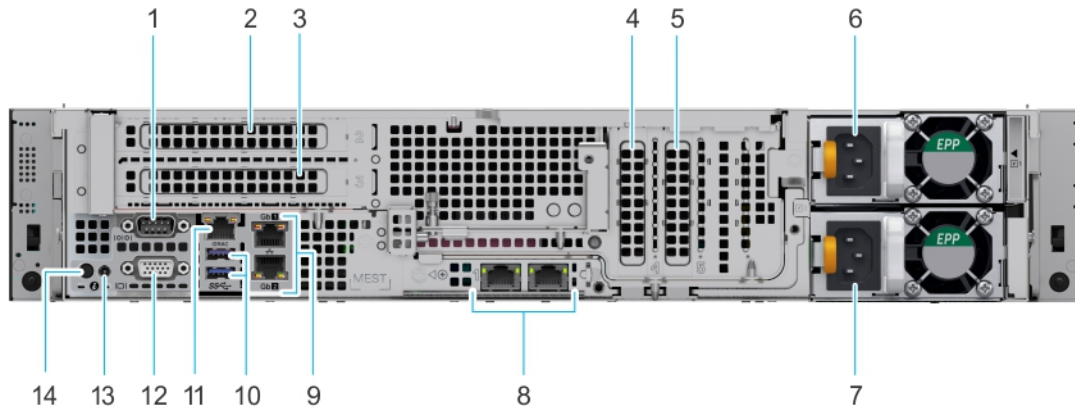








Figure 21. Rear view of the system with no rear drives

- | | |
|--|---|
| 1. Serial port | 2. Riser slot 2 |
| 3. Riser slot 3 | 4. PCIe slot 4 |
| 5. PCIe slot 5 | 6. Redundant power supply unit (PSU) |
| 7. Power supply unit blank | 8. LOM Riser Ethernet port (2) (Optional) |
| 9. Ethernet port (2) | 10. USB 3.0 port (2) |
| 11. iDRAC9 dedicated network port | 12. VGA port |
| 13. System status indicator cable port (CMA) | 14. System identification button |

Table 15. Rear view of the system with no rear drives

Item	Ports, panels, or slots	Icon	Description
1	Serial port		Enables you to connect a serial device to the system. For more information, see the Technical Specifications section.
2	PCIe expansion card riser 1B (slot 2)	N/A	The expansion card slot enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
3	PCIe expansion card riser 1B (slot 3)	N/A	The expansion card slot enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
4	PCIe slot 4	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
5	PCIe slot 5	N/A	The expansion card riser enables you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see Technical Specifications section.
6	Power supply unit (PSU)	N/A	For more information about the PSU configurations, see the Technical Specifications section.
7	Power supply unit (PSU)	N/A	For more information about the PSU configurations, see the Technical Specifications section.
8	LOM Riser Ethernet port (2) (Optional) (slot 1)		The NIC ports that are integrated on the LAN on Motherboard (LOM) riser provide network connectivity. For more information about the supported configurations, see the Technical Specifications section.
9	Ethernet ports (2)		The Ethernet ports that are integrated on the system board provide network connectivity. These NIC ports can also be shared with iDRAC when iDRAC network settings is set to shared mode. For more information about the supported configurations, see the Technical Specifications section.
10	USB 3.0 port (2)		These USB ports support USB 3.0.

Item	Ports, panels, or slots	Icon	Description
11	iDRAC dedicated port		Enables you to remotely access iDRAC. For more information, see the iDRAC User's Guide at .
12	VGA port		Enables you to connect a display device to the system. For more information, see the Technical Specifications section.
13	System status indicator cable port (CMA)	N/A	Enables you to connect the status indicator cable and view system status when the CMA is installed.
14	System identification button		Press the system ID button: <ul style="list-style-type: none"> To locate a particular system within a rack. To turn the system ID on or off. <p>To reset iDRAC, press and hold the button for 16 seconds.</p> <p>NOTE:</p> <ul style="list-style-type: none"> To reset iDRAC using system ID, ensure that the system ID button is enabled in the iDRAC setup. If the system stops responding during POST, press and hold the system ID button (for more than five seconds) to enter the BIOS progress mode.

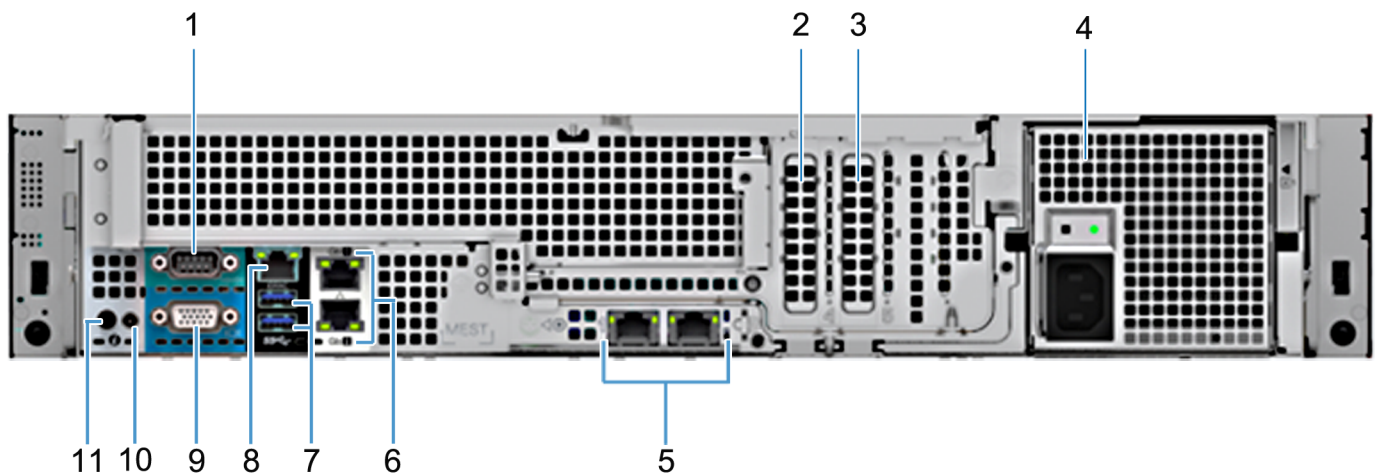


Figure 22. Rear view of the system with cabled PSU

- | | |
|---|--|
| 1. Serial port | 2. Riser slot 4 |
| 3. Riser slot 5 | 4. Cabled power supply unit |
| 5. LOM Riser Ethernet port (2) (Optional) | 6. Ethernet port (2) |
| 7. USB 3.0 port (2) | 8. iDRAC9 dedicated network port |
| 9. VGA port | 10. System status indicator cable port (CMA) |
| 11. System identification button | |

For more information about the ports and connectors, see the [Technical Specifications](#) section.

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 23. NIC indicator codes

1. Link LED indicator
2. Activity LED indicator

Table 16. 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 identify is enabled through the NIC configuration utility.

Power supply unit indicator codes

AC 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 24. AC PSU status indicator

1. AC PSU status indicator/handle



Figure 25. AC PSU status indicator

1. AC PSU status indicator/handle

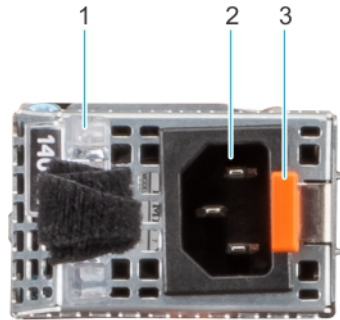


Figure 26. AC PSU status indicator

1. AC PSU handle
2. Socket
3. Release latch

Table 17. AC 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 do not function.
Blinking green 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.

Table 18. 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	<p>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.</p> <p>⚠ 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.</p> <p>⚠ CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.</p> <p>⚠ 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 conversely, you must power off the system.</p> <p>⚠ CAUTION: Combining AC and DC PSUs is not supported.</p>

Inside the system

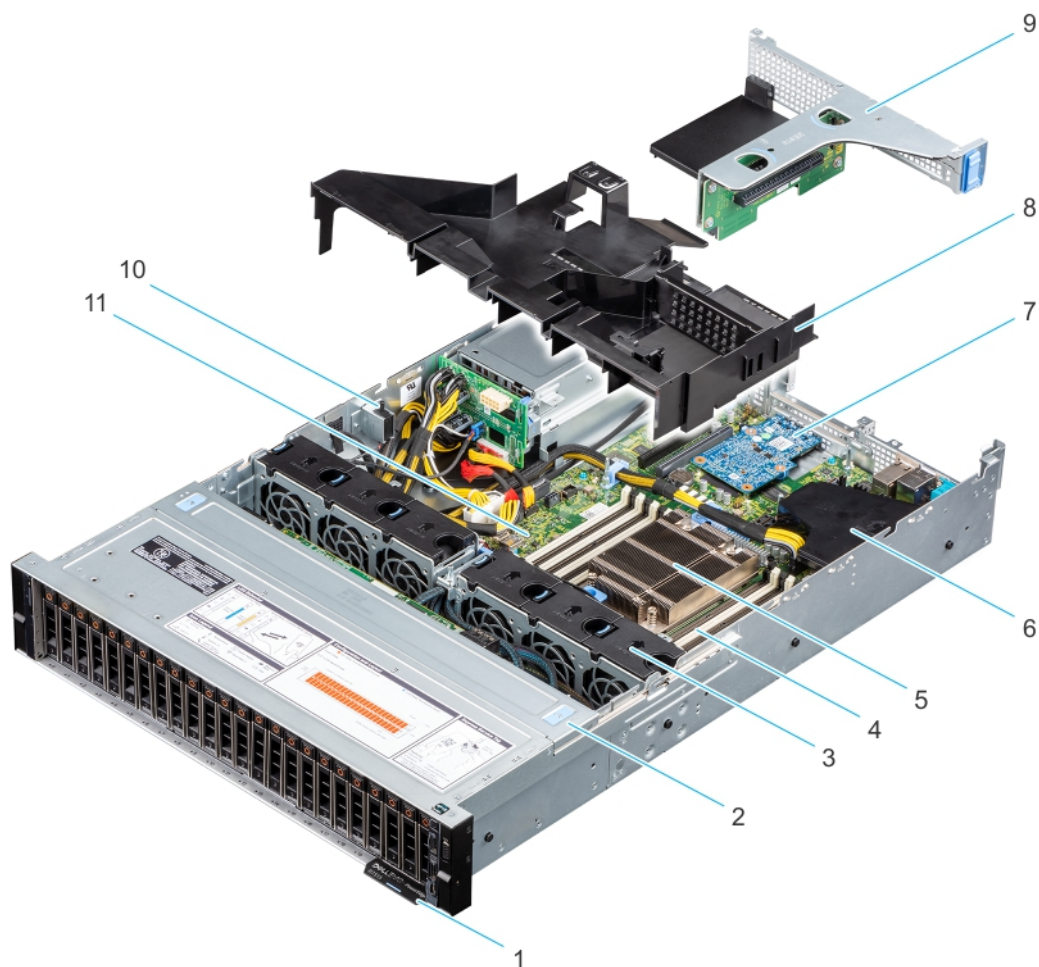


Figure 27. Inside the system

- | | |
|--------------------|---|
| 1. Information tag | 2. Drive backplane cover |
| 3. Fan (6) | 4. Memory module sockets |
| 5. Heat sink | 6. Internal PERC mini card and air shroud |
| 7. LOM riser card | 8. Air shroud |
| 9. Riser 1B | 10. Intrusion switch |
| 11. System board | |

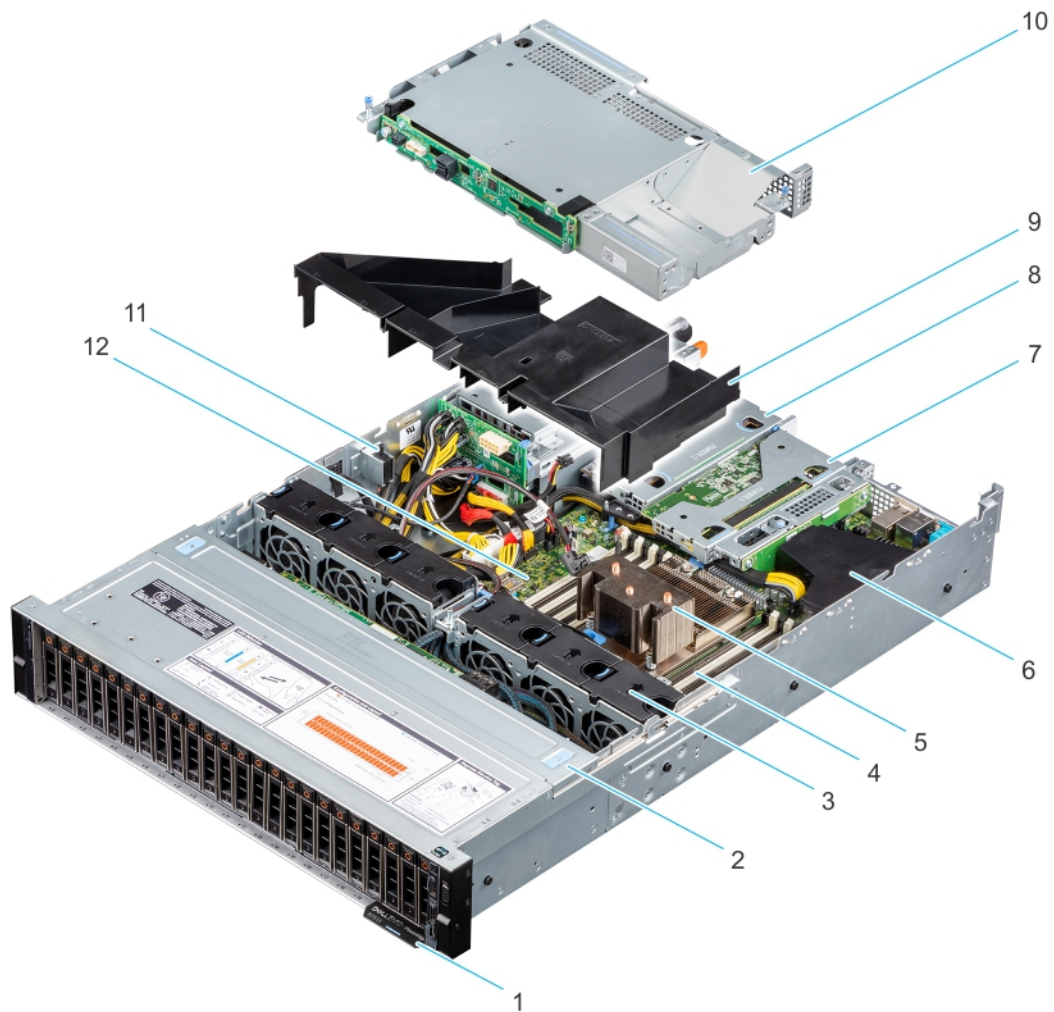


Figure 28. Inside the system with rear drive configuration

- 1. Information tag
- 2. Drive backplane cover
- 3. Fan (6)
- 4. Memory module sockets
- 5. Heat sink
- 6. Internal PERC mini card and air shroud
- 7. Riser 1A (Low profile right riser)
- 8. Riser 2 (Low profile left riser)
- 9. Air shroud
- 10. Rear drive cage
- 11. Intrusion switch
- 12. System board

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.

For information about the different LED indicator sequences and description, see the interactive **LED pattern decoder tool** -<https://internal.software/blink/>.

Table 19. LED status

○	LED Off
●	LED on

B	Blinking LED
*	LED Off : PFAULT
	LED Blink : FAILSAFE Timeout
	LED On : FAILSAFE Strike Out

Table 20. Power-up LED sequence

							Power-Up Sequence	
LED7	LED6	LED5	LED4	LED3	LED2	LED1	Description	
○	○	○	○	○	○	●	2.5V_AUX EN. Waiting for 2.5V_AUX PG	
○	○	○	○	○	●	○	1.8V_AUX EN. Waiting for 1.8V_AUX PG	
○	○	○	○	○	●	●	5V SW EN. CKMNG EN. Waiting for 5V SW PG	
○	○	○	○	●	○	○	V_PVNN EN. Waiting for V_PVNN PG	
○	○	○	○	●	○	●	1.05V SW EN. Waiting for 1.05V SW PG	
○	○	○	○	●	●	○	V_VSBM EN. Waiting for V_VSBM PG	
○	○	○	○	●	●	●	V_VSB11 EN. Waiting for V_VSB11 PG	
○	○	○	●	○	○	●	Waiting for PCH_SLP_SUS_N. PCH_RSMRST_N still asserted	
○	○	○	●	○	●	○	Config check. Waiting for BMC to boot. PCH_RSMRST_N de-asserted	
○	○	○	●	○	●	●	Waiting for PWR button	
○	○	○	●	●	○	○	12V EN. Waiting for PSU* PG	
○	○	○	●	●	●	●	3.3V_AB EN. Waiting for 3.3V A+B PG	
○	○	●	○	○	○	○	BP VRs EN. Waiting for BP* PG	
○	○	●	○	○	○	●	MEM VPP EN. Waiting for MEM VPP PGs	
○	○	●	○	○	●	○	MEM VDDQ EN. Waiting for MEM VDDQ PGs	
○	○	●	○	○	●	●	MEM VTT EN. Waiting for MEM VTT PGs	
○	○	●	○	●	○	○	CPU* VCCIO and PCIe clocks EN. Waiting for CPU VCCIO PGs	
○	○	●	○	●	○	●	CPU* VCORE/VSA EN. Waiting for CPU* VCORE+VSA PGs	
○	○	●	○	●	●	○	Waiting for NDC PG	
○	○	●	○	●	●	●	Waiting for PCH PROCPWRGD	
○	○	●	●	○	○	○	CPU* PG Asserted. SYS PWRGOOD Asserted	
●	●	●	●	●	●	●	RUN State	
○	○	●	●	○	●	○	PLTRST_N Asserted	
○	○	●	●	○	●	●	CPU & MEM VR's Shutdown	
○	○	●	●	●	○	○	MAIN Rails Shutdown (7 seconds)	

Table 21. NvDIMM LED sequence

							NvDIMM	
LED7	LED6	LED5	LED4	LED3	LED2	LED1	Description	
●	●	●	●	●	●	●	RUN State – System operating normally	
●	○	○	○	●	○	○	System powered down, NVsave in progress	
●	○	○	●	●	○	●	NVsave complete. Asserting EMMC_PWROFF_NOTIFY_N to BMC	

○	○	○	○	○	○	○	V_12V_SW powered down. System in G3, waiting for AC power
---	---	---	---	---	---	---	---

Table 22. System board LED sequence

Error							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
B	○	○	○	○	○	B	Config Error: CPU1 present? DIMMs OK? Install DBG JMPR1 to bypass
B	B	○	○	○	B	B	CPU IERR
○	●	●	●	●	●	○	CPU COMBINED MCERR
B	B	B	B	B	B	B	Thermal Issue on CPU* or MEM
B	○	B	B	B	○	B	Internal VR Issue on CPU*
B	○	○	●	○	○	B	AUX Power Failsafe

Table 23. Pfault or failsafe errors LED sequence

Pfault or Failsafe Errors							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
*	B	○	○	○	○	○	12V Failure
*	B	○	○	○	○	●	5V BP0 Failure
*	B	○	○	○	●	○	5V BP1 Failure
*	B	○	○	○	●	●	5V BP2 Failure
*	B	○	○	●	○	○	3.3V A Failure
*	B	○	○	●	○	●	3.3V B Failure
*	B	○	○	●	●	○	5V SW Failure
*	B	○	○	●	●	●	1.05V SW Failure
*	B	○	●	○	○	○	CPU1 VCORE Failure
*	B	○	●	○	○	●	CPU2 VCORE Failure
*	B	○	●	○	●	○	CPU1 VCCIO Failure
*	B	○	●	○	●	●	CPU2 VCCIO Failure
*	B	○	●	●	○	○	CPU1 VSA Failure
*	B	○	●	●	○	●	CPU2 VSA Failure
*	B	○	●	●	●	○	CPU1 MEM012 VTT Failure
*	B	○	●	●	●	●	CPU1 MEM345 VTT Failure
*	B	●	●	○	○	○	CPU2 MEM012 VTT Failure
*	B	●	○	○	○	●	CPU2 MEM345 VTT Failure
*	B	●	○	○	●	○	CPU1 MEM012 VPP Failure
*	B	●	○	○	●	●	CPU1 MEM345 VPP Failure
*	B	●	○	●	○	○	CPU2 MEM012 VPP Failure
*	B	●	○	●	○	●	CPU2 MEM345 VPP Failure
*	B	●	○	●	●	○	CPU1 MEM012 VDDQ Failure
*	B	●	○	●	●	●	CPU1 MEM345 VDDQ Failure
*	B	●	○	○	○	○	CPU2 MEM012 VDDQ Failure

*	B	●	●	○	○	●	CPU2 MEM345 VDDQ Failure
*	B	●	●	○	●	○	V_PVNN SW Failure
*	B	●	●	○	●	●	1.8V SW Failure
*	B	●	●	●	○	○	V_VSB11 SW Failure
*	B	●	●	●	○	●	V_VSBM SW Failure
*	B	●	●	●	●	○	NDC Failure
*	B	●	●	●	●	●	2.5V SW Failure

PowerEdge OEM Branding

The PowerEdge OEM Branding reference guide contains information and instructions for OEM branding of Dell PowerEdge systems.

Internal link: [PowerEdge OEM Branding](#)

External link: [PowerEdge OEM Branding](#)

OEM Ready

Dell offers the systems in a non-Dell branded version, known as the Dell OEM Ready (OEM R) system. The OEM R PowerEdge systems have minor cosmetic changes from the Dell-branded version. All visible references to Dell (with the covers and bezel installed) are removed/covered up, except for the Service Tag.

Safety precautions

Follow the safety precautions that are described in the following sections during an installation or a disassembly/reassembly procedure:

- Power off the system and all attached peripherals.
- Disconnect the system and all attached peripherals from AC or DC power.
- Disconnect all network cables from the system.
- Use a wrist grounding strap and mat when working inside any system to avoid electrostatic discharge (ESD) damage.
- After removing a system component, carefully place the removed component on an antistatic mat.
- Wear shoes with nonconductive soles or rubber soles to help reduce the risk of electrical shock or seriously injured in an electrical accident.

Standby power

When applicable Dell products that feature a standby power mode, must be unplugged before the system is serviced.

NOTE: Systems that incorporate standby power, continue to use power even when they are powered off. For example, standby power enables the system to be powered on remotely with the wake on LAN feature enabled, suspended into sleep mode, or other advanced power management features.

After you unplug a system and before you remove components, wait approximately 30 to 45 seconds to allow the charge to drain from the circuits.

Bonding

Bonding is a method of connecting two or more grounding conductors to the same electrical potential. This method requires the Field Service ESD kit. When connecting a bonding wire, always ensure that it is connected to a bare metal system and never to a painted or nonmetal surface. The Wrist Strap should be secured to your skin. Ensure that you remove all jewelry such as watches, bracelets, or rings before bonding yourself and the equipment.

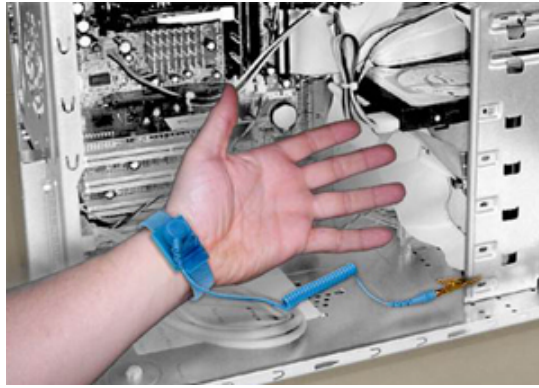


Figure 29. Proper bonding method

Electrostatic discharge

Electrostatic discharge (ESD) is a major concern when you handle sensitive components such as expansion cards, processors, memory DIMMs, and system board. A slight charge can result in damaging the circuits on these components causing intermittent problems or shortening the life span.

Due to the increased density of semiconductors that are used in recent Dell products, the sensitivity to static damage is now higher than in earlier Dell products. For this reason, some previously approved methods of handling parts are no longer applicable.

There are two recognized types of ESD damage: catastrophic and intermittent failures.

- Catastrophic—The damage causes an immediate and complete loss of device functionality. For example, a memory DIMM that has received a static shock, immediately generates a No POST/No Video symptom.

NOTE: Catastrophic failures represent approximately 20 percent of ESD-related failures.

- Intermittent—The damage weakens the component causing intermittent failure in performance. For example, if a memory DIMM receives a static shock, the tracing weakens without producing any outward symptoms that are related to damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity and intermittent memory errors.

NOTE: Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable.

Intermittent or latent failures are difficult to identify and troubleshoot. The image shows an example of damage to a memory module trace. Although the damage is complete, the symptoms may not become an issue or cause permanent failure for some time after the damage occurs.

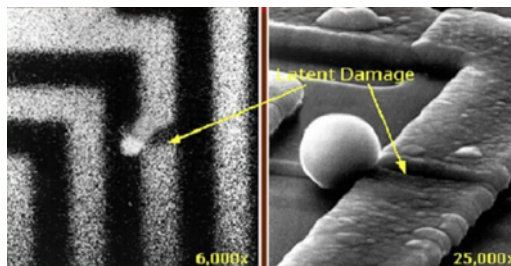


Figure 30. Intermittent, latent damage to a wiring trace

To avoid an ESD damage, ensure you:

- Use a wired ESD Wrist Strap that is properly grounded.

NOTE: Wireless antistatic straps or touching the chassis is not recommended as they do not provide adequate ESD protection.

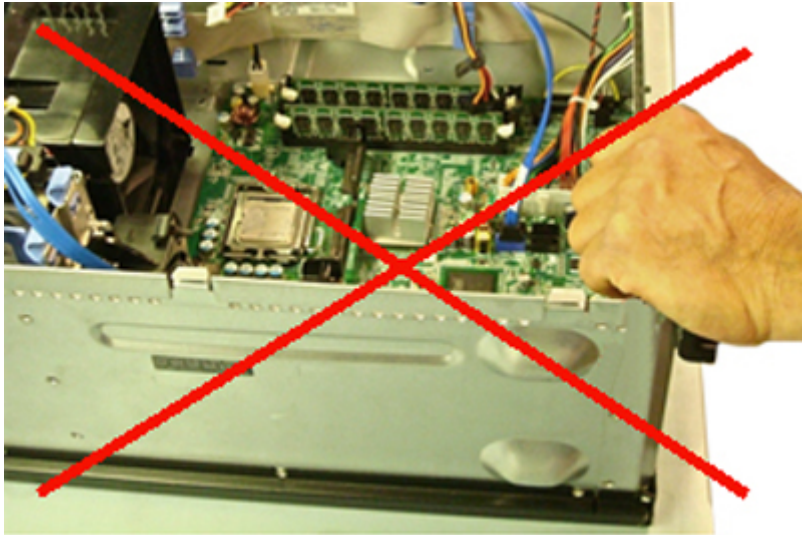


Figure 31. Incorrect handling of components without ESD protection

- Handle all static-sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.
- Grasp the static-sensitive components by the side and not the top.
- Avoid touching the pins and circuit boards.
- Do not remove components from the antistatic packing material until you are ready to install the components. Before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- Place the component in an antistatic container or packaging before transporting the components.

ESD field service kit

The unmonitored Field Service kit is the most commonly used. Each Field Service kit includes three main components:

- Antistatic mat
- Wrist Strap
- Bonding wire



Figure 32. ESD field service kit

The antistatic mat is dissipative and must be used to safely place parts on during service procedures. When using an antistatic mat, your Wrist Strap must be snug, connected to the mat, and to the bare-metal on the system that is being worked on. After the mat and Wrist Strap are deployed properly, remove the components to be serviced from the ESD bag and place them on the mat. Remember, the only safe place for ESD-sensitive items are in your hand, on the ESD mat, in the system, or inside a bag.



Figure 33. Antistatic mat

The Wrist Strap and bonding wire can be connected either to:

- Your wrist and bare metal of the hardware
- Your wrist and antistatic mat, to protect hardware that is temporarily placed on the mat

NOTE: The physical connection of the Wrist Strap and bonding wire between your skin, the ESD mat, and the hardware is known as bonding.

NOTE: Use only Field Service kits with a Wrist Strap, mat, and bonding wire. Avoid using wireless Wrist Straps.

The internal wires of a Wrist Strap are prone to damage from normal wear and tear, and must be checked regularly with a Wrist Strap tester to avoid accidental ESD hardware damage. Dell recommends to test the Wrist Strap and bonding wire regularly.

ESD Wrist Strap tester

The wires inside an ESD strap are prone to damage over time. When using an unmonitored kit, Dell recommends to regularly test the strap before each service call, and at a minimum, test once per week. A Wrist Strap tester is the best method for performing this test. If you do not have your own Wrist Strap tester, check with your regional office to find out if they have one. To perform the test, plug the bonding wire on the Wrist Strap to the tested while it is strapped to your wrist and press the button. A green LED lights up if the test is successful; a red LED lights up and an alarm sounds if the test fails.



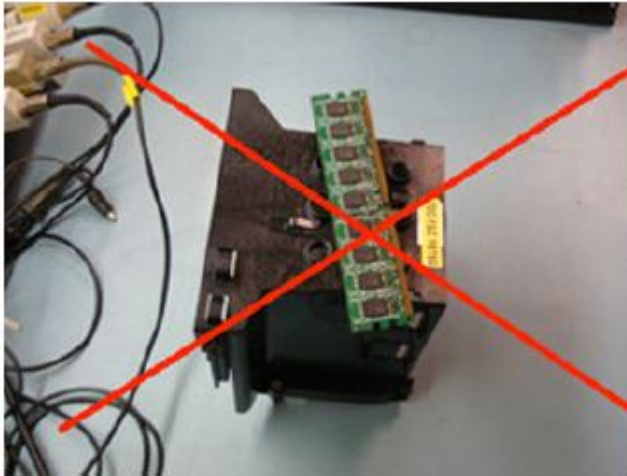
Figure 34. Wrist Strap tester

Insulator elements

Dell recommends to place ESD sensitive devices, such as plastic heat sink casings, away from internal components that are insulators and highly charged.

Table 24. Placement of insulator elements

Unacceptable placement



Acceptable placement



Consider the working environment

Before deploying the ESD Field Service kit, assess the situation at the customer location. For example, deploying the kit for a server environment is different than for a desktop or portable environment. Servers are typically installed in a rack within a data center; desktops or portables are typically placed on office desks or cubicles.

Look for a large open flat work area that is free of clutter and large enough to deploy the ESD kit with more space to accommodate the type of system that is being repaired. The workspace should also be free of insulators that can cause an ESD event. On the work area, insulators such as Styrofoam and other plastics must be moved at least 12-inches or 30 centimeters away from sensitive parts before physically handling any hardware components.

ESD packaging

All ESD sensitive devices must be shipped and received in static-safe packaging. Preferably, metal, static-shielded bags. Ensure that you return the damaged parts in the same ESD bag or packaging in which the new part arrived in. The ESD bag should be folded over and taped shut, and the foam packing material used in the original box must be used.

ESD sensitive devices should be removed from packaging only at an ESD protected work surface, and parts should never be placed on top of the ESD bag because only the inside the bag is shielded. Always place parts in your hand, on the ESD mat, in the system, or inside an antistatic bag.



Figure 35. ESD packaging

Transporting sensitive components

When transporting ESD sensitive components such as replacement parts or returned parts to Dell, it is critical to place these parts in antistatic bags for safe transport.

ESD protection summary

It is suggested that all field service engineers use the traditional wired ESD grounding Wrist Strap and protective antistatic mat when servicing Dell products. In addition, it is critical that engineers place sensitive parts separate from all insulator parts while performing service and that they use antistatic bags for transporting sensitive components.

Lifting equipment



NOTE: Do not lift systems that are greater than 50 pounds. Always obtain assistance, or use a mechanical lifting device.

Adhere to the following guidelines when lifting equipment:

1. Get a firm balanced footing. Keep your feet apart for a stable base, and point out your toes.
2. Bend your knees. Do not bend at the waist.
3. Tighten stomach muscles. Abdominal muscles support your spine when you lift, offsetting the force of the load.
4. Lift with your legs, not your back.
5. Keep the load close. The closer it is to your spine, the less force it exerts on your back.
6. Keep your back upright, whether lifting or setting down the load. Do not add the weight of your body to the load. Avoid twisting your body and back.
7. Follow the same techniques in reverse to set the load down.

Recommended tools

Table 25. Recommended tools and optional tools

Recommended tools	Optional tools
	
<ul style="list-style-type: none"> • Key to the bezel lock The key is required only if your system includes a bezel. • Phillips #1 screwdriver • Phillips #2 screwdriver • Torx #T20 screwdriver • 5mm hex nut screwdriver • 1/4 inch flat blade screwdriver • Wrist grounding strap connected to the ground • ESD mat 	<ul style="list-style-type: none"> • Needle-nose pliers to disconnect cables and connectors in hard-to-reach locations • Small flat-head screwdriver to disconnect small cables from boards • Plastic scribe

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).

Need to know

Before you begin servicing the system, you must read the following information:

- Critical callouts
- Common error codes
- Version control for BIOS/firmware/software
- Startup/Shutdown Sequence

Critical call-outs

Common error messages

The Event Message Reference contains the error and event information that the firmware and other monitoring agents generate. These events might be logged, presented to the user on one of the system management consoles, or both logged and displayed at the same time.

Table 26. Event message fields

Event Message Fields	
Item	Description
Message ID	The unique alphanumeric identifier for the event. This identifier can be up to 8 characters long and consist of 2 parts: <ul style="list-style-type: none"> Message ID Prefix—Up to 4 alphabetic characters. Message ID Sequence—Up to 4 numeric digits.
Message	The message text that is displayed to the user or logged as a result of the event. <i>Italic</i> text is reflected if the message has variable content in it. The substitution variables are described in the Arguments field of the event.
Arguments	Describes the values for any substitution variables appearing in the event message text. If there is no variable content in the message, this field is omitted from the event description.
Detailed Description	Additional information describing the event.
Recommended Response Action	The recommended action to remedy the event described. The response action can vary based on the platform.
Category	Dell Lifecycle Controller log filter used to select a subset of messages from different domains or agents.
Subcategory	More filters to further subset the event.
Trap/EventID	The identification number used as the Trap ID for SNMP alert traps and as the Event ID when the message is logged in operating system logs.
Severity	The classification of the event based on its impact to the platform or system. The severity can be: <ul style="list-style-type: none"> Severity 1 Critical—Indicates a catastrophic production problem that might severely impact production systems or components, or systems are down or not functioning. Severity 2 Warning—Indicates a high-impact problem where a system or component is disrupted but can remain productive and perform business-level operations. Severity 3 Information—Indicates a medium-to-low impact problem that involves a partial or noncritical loss of functionality; operations are impaired but can continue to function.
LCD Message	The event message text that is displayed on the system's LCD.
Initial Default	Event messages result in event actions such as logging, SNMP, or email alerts. Generally, the event actions are configurable using the Dell iDRAC event action filtering feature. This item describes the initial default and possible event actions for the message.
Event Action Filter	Describes more configurable actions that are available for the event action for this message. This information is presented in a table, and each entry has a value of <code>TRUE</code> or <code>FALSE</code> to indicate its applicability. <ul style="list-style-type: none"> Filter Visibility—Event visible to the iDRAC event filtering. IPMI Alert—Event can generate an IPMI alert. SNMP Alert—Event can generate an SNMP trap. Email Alert—Event can generate an email alert. WS-Man Alert—Event can generate a WS-Man event. Redfish Alert—Event can generate a Redfish event. Syslog Alert—Event can generate a Syslog entry. LC Log—Event can generate a Dell Lifecycle Controller log entry. LCD — Event is displayed on the system's LCD. Power Off—Event can cause the system to power off. Power Cycle—Event can cause the system to perform a power cycle. Reset—Event can cause the system to perform a reset.

Version control

For the latest BIOS, firmware, and software updates, see .

Startup or Shutdown sequence

New POST display

The following are the POST display enhancements:

- Revamped look of the boot process
- High-resolution splash screen displays instantly after powering on the system
- Progress bar and descriptive text are displays
- Uniform look and feel through the boot process. When booting in legacy mode, the system briefly changes to text mode to run legacy option ROMs
- POST error messages are compliant with Event and Error Message standards

NOTE: All POST error and warning messages are logged in the LC log.

Enhanced boot support

The following lists the boot support enhancements:

- Enhanced method to change the boot list based on Fully Qualified Descriptors (FQDDs). This allows for systems management consoles and the factory to specify a boot list for devices that are not currently present, for example, disabled NDC or other boot mode.
- New ability to toggle between LC and BIOS.
- The Boot Manager (F11) and BIOS Setup (F2) will only contain the boot option enumeration of the current Boot mode.
- Completely revised boot flow.

System diagnostics and indicator codes for PowerEdge R7515

The diagnostic indicators on the system front panel display system status during system startup.

The following sections contain information about the chassis LEDs and indicator codes for Dell EMC PowerEdge R7515 system.

Status LED indicators

NOTE: The indicators display solid amber if any error occurs.

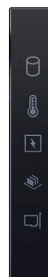



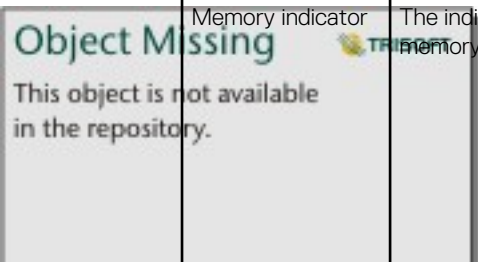
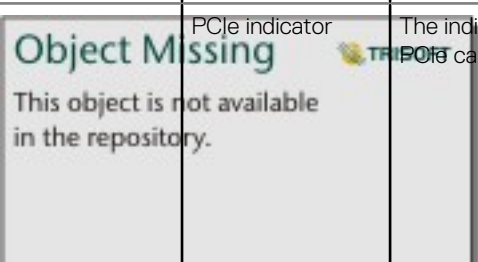


Figure 36. Status LED indicators

Table 27. Status LED indicators and descriptions

Icon	Description	Condition	Corrective action
	Drive indicator	The indicator turns solid amber if there is a drive error.	<ul style="list-style-type: none"> 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).	<p>Ensure that none of the following conditions exist:</p> <ul style="list-style-type: none"> A cooling fan has been removed or has failed. System cover, air shroud, memory module blank, or back filler bracket is removed. Ambient temperature is too high. External airflow is obstructed. <p>If the problem persists, see the Getting help section.</p>
	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).	<p>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.</p> <p>If the problem persists, see the Getting help section.</p>
	Memory indicator	The indicator turns solid amber if a memory error occurs.	<p>Check the System Event Log or system messages for the location of the failed memory. Reseat the memory module.</p> <p>If the problem persists, see the Getting help section.</p>
	PCIe indicator	The indicator turns solid amber if a PCIe card experiences an error.	<p>Restart the system. Update any required drivers for the PCIe card. Reinstall the card.</p> <p>If the problem persists, see the Getting help section.</p> <p>NOTE: For more information about the supported PCIe cards, see the Expansion card installation guidelines section.</p>

System health and system ID indicator codes

The system health and system ID indicator is located on the left control panel of the system.



Figure 37. System health and system ID indicator



Figure 38. System health and system ID indicator

Table 28. 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.

iDRAC Quick Sync 2 indicator codes

iDRAC Quick Sync 2 module (optional) is located on the left control panel of the system.

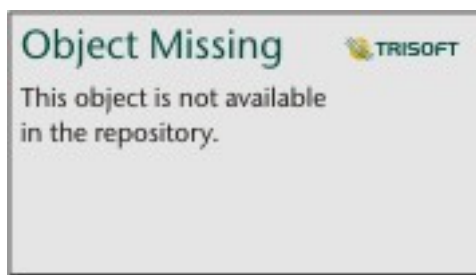


Table 29. iDRAC Quick Sync 2 indicators and descriptions

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, reseal 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.	NA If the indicator continues to blink indefinitely, see the Getting help section.
Blinks white slowly	Indicates that firmware update is in progress.	NA 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. or <i>Dell OpenManage Server Administrator User's Guide</i> at .
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 30. 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.
Powers off	Indicates that the laptop or tablet is unplugged.

LCD panel

The LCD panel provides system information, status, and error messages to indicate if the system is functioning correctly or requires attention. The LCD panel is used to configure or view the iDRAC IP address of the system. .

The LCD panel is available only on the optional front bezel. The optional front bezel is hot pluggable.

The status and conditions of the LCD panel are outlined here:

- The LCD backlight is white during normal operating conditions.
- If there is an issue, the LCD backlight turns amber and displays an error code followed by descriptive text.

NOTE: If the system is connected to a power source and an error is detected, the LCD turns amber regardless of whether the system is powered on or off.

- When the system powers off and there are no errors, the LCD enters the standby mode after five minutes of inactivity. Press any button on the LCD to power it on.
- If the LCD panel stops responding, remove the bezel and reinstall it.
If the problem persists, see [Getting help](#).
- The LCD backlight remains off if LCD messaging is powered off using the iDRAC utility, the LCD panel, or other tools.



Figure 39. LCD panel features




Table 31. LCD panel features

Item	Button or display	Description
1	Left	Moves the cursor back in one-step increments.
2	Select	Selects the menu item highlighted by the cursor.
3	Right	Moves the cursor forward in one-step increments. During message scrolling: <ul style="list-style-type: none"> • Press and hold the right button to increase scrolling speed. • Release the button to stop. <p>NOTE: The display stops scrolling when the button is released. After 45 seconds of inactivity, the display starts scrolling.</p>
4	LCD display	Displays the system information, status, and error messages or iDRAC IP address.

Viewing Home screen

The **Home** screen displays user-configurable information about the system. This screen is displayed during normal system operation when there are no status messages or errors. When the system turns off and there are no errors, LCD enters the standby mode after five minutes of inactivity. Press any button on the LCD to turn it on.

Steps

1. To view the **Home** screen, press one of the three navigation buttons (Select, Left, or Right).
2. To navigate to the **Home** screen from another menu, complete the following steps:
 - a) Press and hold the navigation button till the up arrow  is displayed.
 - b) Navigate to the **Home** icon  using the up arrow .
 - c) Select the **Home** icon.
 - d) On the **Home** screen, press the **Select** button to enter the main menu.

Setup menu

NOTE: When you select an option in the Setup menu, you must confirm the option before proceeding to the next action.

Table 32. Setup menu

Option	Description
iDRAC	Select DHCP or Static IP to configure the network mode. If Static IP is selected, the available fields are IP , Subnet (Sub) , and Gateway (Gtw) . Select Setup DNS to enable DNS and to view domain addresses. Two separate DNS entries are available.
Set error	Select SEL to view LCD error messages in a format that matches the IPMI description in the SEL. This enables you to match an LCD message with an SEL entry. Select Simple to view LCD error messages in a simplified user-friendly description. .
Set home	Select the default information to be displayed on the Home screen. See View menu section for the options and option items that can be set as the default on the Home screen.

View menu

NOTE: When you select an option in the View menu, you must confirm the option before proceeding to the next action.

Table 33. View menu

Option	Description
iDRAC IP	Displays the IPv4 or IPv6 addresses for iDRAC9. Addresses include DNS (Primary and Secondary) , Gateway , IP , and Subnet (IPv6 does not have Subnet).
MAC	Displays the MAC addresses for iDRAC , iSCSI , or Network devices.
Name	Displays the name of the Host , Model , or User String for the system.
Number	Displays the Asset tag or the Service tag for the system.
Power	Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the Set home submenu of the Setup menu.
Temperature	Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the Set home submenu of the Setup menu.

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 40. NIC indicator codes

1. Link LED indicator
2. Activity LED indicator

Table 34. 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.

NIC indicator codes	Condition
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 identify is enabled through the NIC configuration utility.

Power supply unit indicator codes

AC 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 41. AC PSU status indicator

1. AC PSU status indicator/handle

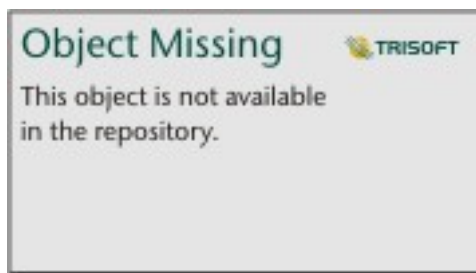


Figure 42. AC PSU status indicator

1. AC PSU status indicator/handle



Figure 43. AC PSU status indicator


1. AC PSU handle
2. Socket
3. Release latch

Table 35. AC 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 do not function.
Blinking green 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.

Table 36. 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	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 conversely, you must power off the system.

Power indicator codes	Condition
	 CAUTION: Combining AC and DC PSUs is not supported.

Drive indicator codes

The LEDs on the drive carrier indicates 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.

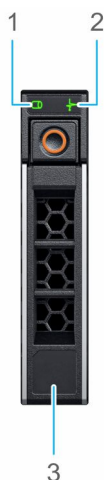


Figure 44. Drive indicators on the drive and the mid drive tray backplane

1. Drive activity LED indicator
2. Drive status LED indicator
3. Drive capacity label




Figure 45. Drive indicators

1. Drive activity LED indicator
2. Drive status LED indicator
3. Drive capacity label

 **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 37. Drive indicator codes

Drive status indicator code	Condition
Blinks green twice per second	Indicates that the drive is being identified or preparing for removal.
Off	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.

Drive status indicator code	Condition
Blinks green, amber, and then powers off	Indicates that there is an expected 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 the Dell Lifecycle Controller

Steps

1. As the system boots, 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 starts executing the tests on all the detected devices.

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.

Results

System diagnostic controls

Table 38. 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.

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.

For information about the different LED indicator sequences and description, see the interactive **LED pattern decoder tool** -<https://internal.software/blink/>.

Table 39. LED status

○	LED Off
●	LED on
B	Blinking LED
*	LED Off : PFAULT
	LED Blink : FAILSAFE Timeout
	LED On : FAILSAFE Strike Out

Table 40. Power-up LED sequence

Power-Up Sequence							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
○	○	○	○	○	○	●	2.5V_AUX EN. Waiting for 2.5V_AUX PG
○	○	○	○	○	●	○	1.8V_AUX EN. Waiting for 1.8V_AUX PG
○	○	○	○	○	●	●	5V SW EN. CKMNG EN. Waiting for 5V SW PG
○	○	○	○	●	○	○	V_PVNN EN. Waiting for V_PVNN PG
○	○	○	○	●	○	●	1.05V SW EN. Waiting for 1.05V SW PG
○	○	○	○	●	●	○	V_VSBM EN. Waiting for V_VSBM PG
○	○	○	○	●	●	●	V_VSB11 EN. Waiting for V_VSB11 PG
○	○	○	●	○	○	●	Waiting for PCH_SLP_SUS_N. PCH_RSMRST_N still asserted
○	○	○	●	○	●	○	Config check. Waiting for BMC to boot. PCH_RSMRST_N de-asserted
○	○	○	●	○	●	●	Waiting for PWR button
○	○	○	●	●	○	○	12V EN. Waiting for PSU* PG
○	○	○	●	●	●	●	3.3V_AB EN. Waiting for 3.3V A+B PG
○	○	●	○	○	○	○	BP VRs EN. Waiting for BP* PG
○	○	●	○	○	○	●	MEM VPP EN. Waiting for MEM VPP PGs
○	○	●	○	○	●	○	MEM VDDQ EN. Waiting for MEM VDDQ PGs

○	○	●	○	○	●	●	MEM VTT EN. Waiting for MEM VTT PGs
○	○	●	○	●	○	○	CPU* VCCIO and PCIe clocks EN. Waiting for CPU VCCIO PGs
○	○	●	○	●	○	●	CPU* VCORE/VSA EN. Waiting for CPU* VCORE+VSA PGs
○	○	●	○	●	●	○	Waiting for NDC PG
○	○	●	○	●	●	●	Waiting for PCH PROCPWRGD
○	○	●	●	○	○	○	CPU* PG Asserted. SYS PWRGOOD Asserted
●	●	●	●	●	●	●	RUN State
○	○	●	●	○	●	○	PLTRST_N Asserted
○	○	●	●	○	●	●	CPU & MEM VR's Shutdown
○	○	●	●	●	○	○	MAIN Rails Shutdown (7 seconds)

Table 41. NvDIMM LED sequence

NvDIMM							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
●	●	●	●	●	●	●	RUN State – System operating normally
●	○	○	○	●	○	○	System powered down, NVsave in progress
●	○	○	●	●	○	●	NVsave complete. Asserting EMMC_PWROFF_NOTIFY_N to BMC
○	○	○	○	○	○	○	V_12V_SW powered down. System in G3, waiting for AC power

Table 42. System board LED sequence

Error							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
B	○	○	○	○	○	B	Config Error: CPU1 present? DIMMs OK? Install DBG JMPR1 to bypass
B	B	○	○	○	B	B	CPU IERR
○	●	●	●	●	●	○	CPU COMBINED MCERR
B	B	B	B	B	B	B	Thermal Issue on CPU* or MEM
B	○	B	B	B	○	B	Internal VR Issue on CPU*
B	○	○	●	○	○	B	AUX Power Failsafe

Table 43. Pfault or failsafe errors LED sequence

Pfault or Failsafe Errors							Description
LED7	LED6	LED5	LED4	LED3	LED2	LED1	
*	B	○	○	○	○	○	12V Failure
*	B	○	○	○	○	●	5V BP0 Failure
*	B	○	○	○	●	○	5V BP1 Failure
*	B	○	○	○	●	●	5V BP2 Failure
*	B	○	○	●	○	○	3.3V A Failure
*	B	○	○	●	○	●	3.3V B Failure
*	B	○	○	●	●	○	5V SW Failure
*	B	○	○	●	●	●	1.05V SW Failure
*	B	○	●	○	○	○	CPU1 VCORE Failure

*	B	○	●	○	○	●	CPU2 VCORE Failure
*	B	○	●	○	●	○	CPU1 VCCIO Failure
*	B	○	●	○	●	●	CPU2 VCCIO Failure
*	B	○	●	●	○	○	CPU1 VSA Failure
*	B	○	●	●	○	●	CPU2 VSA Failure
*	B	○	●	●	●	○	CPU1 MEM012 VTT Failure
*	B	○	●	●	●	●	CPU1 MEM345 VTT Failure
*	B	●	●	○	○	○	CPU2 MEM012 VTT Failure
*	B	●	○	○	○	●	CPU2 MEM345 VTT Failure
*	B	●	○	○	●	○	CPU1 MEM012 VPP Failure
*	B	●	○	○	●	●	CPU1 MEM345 VPP Failure
*	B	●	○	●	○	○	CPU2 MEM012 VPP Failure
*	B	●	○	●	○	●	CPU2 MEM345 VPP Failure
*	B	●	○	●	●	○	CPU1 MEM012 VDDQ Failure
*	B	●	○	●	●	●	CPU1 MEM345 VDDQ Failure
*	B	●	○	○	○	○	CPU2 MEM012 VDDQ Failure
*	B	●	●	○	○	●	CPU2 MEM345 VDDQ Failure
*	B	●	●	○	●	○	V_PVNN SW Failure
*	B	●	●	○	●	●	1.8V SW Failure
*	B	●	●	●	○	○	V_VSB11 SW Failure
*	B	●	●	●	○	●	V_VSBM SW Failure
*	B	●	●	●	●	○	NDC Failure
*	B	●	●	●	●	●	2.5V SW Failure

Enhanced Preboot System Assessment

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 requiring more 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 Preboot System Assessment (ePSA) diagnostics.

The embedded system diagnostics provides a set of options for particular device groups or devices that allow you to:

- Run tests automatically or in an interactive mode.
- Repeat tests
- Display or save test results.
- Introduce more test options for extra information about the failed devices, run a thorough test.
- View status messages that inform you if tests are completed successfully.
- View error messages that inform you of issues encountered during testing.

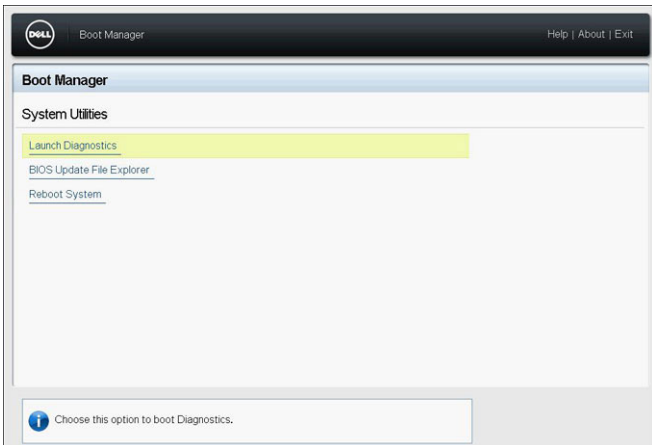
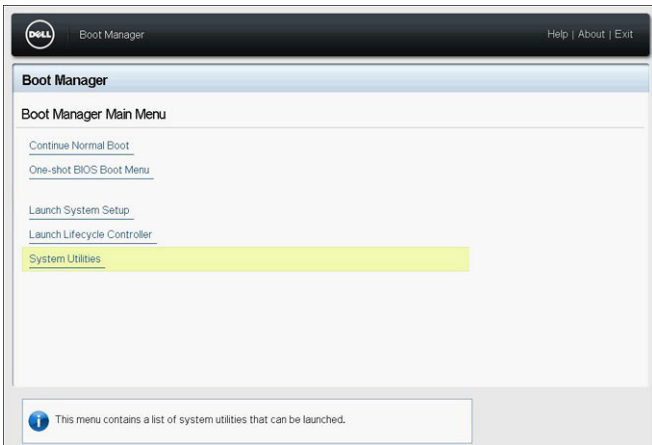
Running the Embedded system diagnostics from Boot Manager

To run the embedded system diagnostics from Boot Manager:

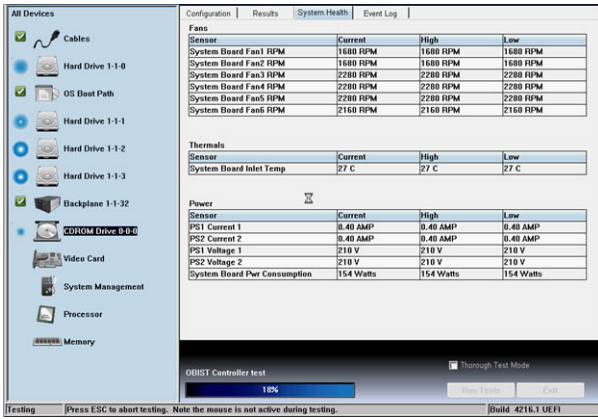
1. As the system boots, press <F11>.



2. Using the arrow keys select **System Utilities** → **Launch Diagnostics**.



3. Wait while the Quick Tests automatically run.

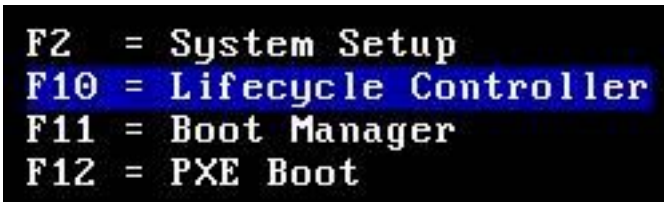


4. Once the tests have been completed, you can view the results and additional information on the **Results** tab, the **System Health** tab, the **Configuration** tab, and the **Event Log** tab.
5. Close the **Embedded System Diagnostics** utility.
6. To leave the diagnostics, click **Exit**.
7. Click **OK** when prompted, and the system reboots.

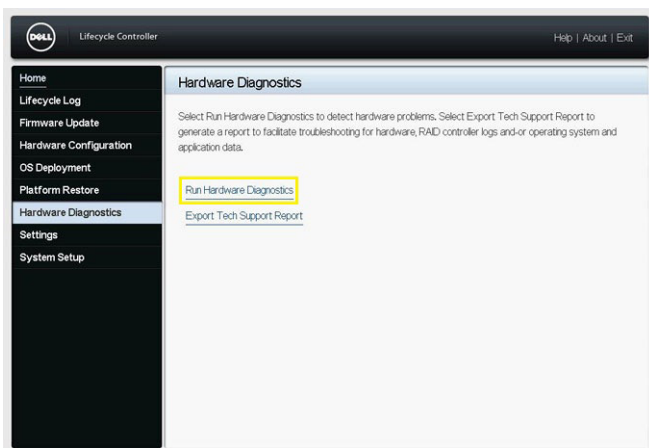
Running the Embedded System Diagnostics from the Dell Lifecycle Controller

To run the embedded system diagnostics from the Dell Lifecycle Controller:

1. As the system boots, press **F10**.



2. Select **Hardware Diagnostics** → **Run Hardware Diagnostics**.



Jumpers and connectors for PowerEdge R7515

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.

System board connectors

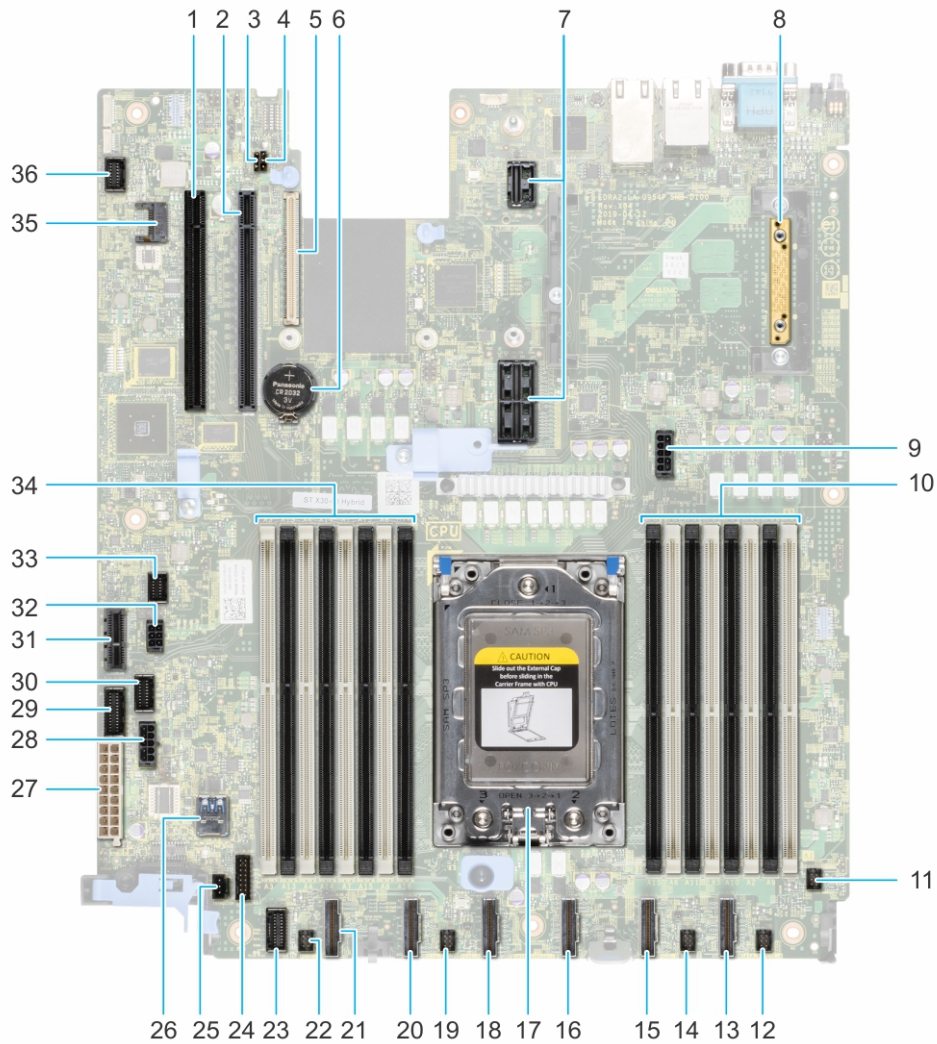


Figure 46. System board connectors

- | | |
|--------------------------------|-------------------------------|
| 1. PCI card Slot 5 | 2. PCI card Slot 4 |
| 3. PWRD_EN (Jumpers) | 4. NVRAM_CLR (Jumpers) |
| 5. LOM riser card | 6. Battery |
| 7. Riser slot 1A/Riser slot 1B | 8. Mini PERC |
| 9. System power 3 | 10. DIMMS for processor |
| 11. Fan 6 | 12. Fan 5 |
| 13. SATA_A/PCIE_A | 14. Fan 4 |
| 15. PCIE-B | 16. SATA_B/PCIE_C |
| 17. Processor | 18. PCIE-D |
| 19. Fan 3 | 20. PCIE-E |
| 21. PCIE-F | 22. Fan 2 |
| 23. Left control panel | 24. Front backplane signal 1 |
| 25. Intrusion switch | 26. Internal USB 3.0 |
| 27. System power 1 | 28. System power 2 |
| 29. PIB signal 2 | 30. PIB signal 1 |
| 31. IDSDM | 32. Rear backplane/ ODD power |
| 33. Front backplane signal 0 | 34. DIMMS for processor |

35. TPM

36. Front video

1. PCI card Slot 5
2. PCI card Slot 4
3. PWRD_EN (Jumpers)
4. NVRAM_CLR (Jumpers)
5. LOM riser card
6. Battery
7. Riser slot 1A
8. Mini PERC
9. System power 3
10. DIMMS for processor
11. Fan 6
12. Fan 5
13. SATA_A/PCIE_A
14. Fan 4
15. PCIE-B
16. SATA_B/PCIE_C
17. Processor
18. PCIE-D
19. Fan 3
20. PCIE-E
21. PCIE-F
22. Fan 2
23. Left control panel
24. Front backplane signal 1
25. Intrusion switch
26. Internal USB 3.0
27. System power 1
28. System power 2
29. PIB signal 2
30. PIB signal 1
31. IDSDM
32. Rear backplane/ ODD power
33. Front backplane signal 0
34. DIMMS for processor
35. TPM
36. Front video

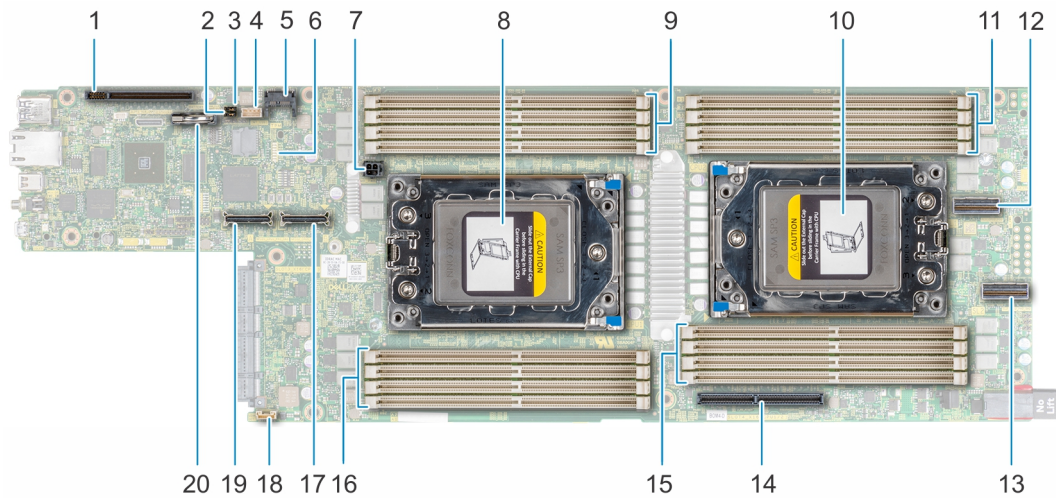
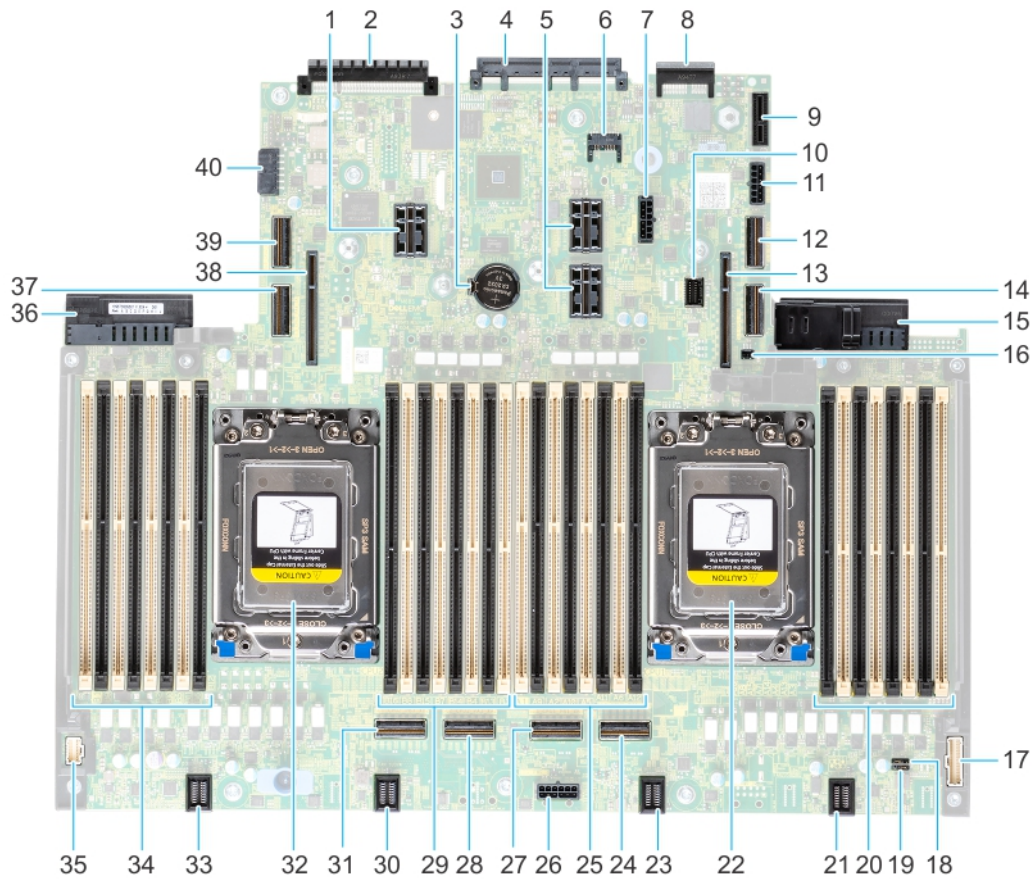


Figure 47. System board connectors

Table 44. System board jumpers and connectors

Item	Connector	Description
1.	SLOT1_X16 (CPU1/2)	Riser 1 connector
2.	PWRD_EN	Password clear jumper
3.	NVRAM_CLR	NVRAM clear jumper
4.	INT_USB1	Internal USB connector
5.	TPM	TPM connector
6.	CPLD Diagnostic LED / OmniVu Decoder	System board diagnostic LED indicators
7.	MB_PWR	PCIe Riser 2A Power Connector
8.	CPU1	Processor socket 1
9.	A3, A4, A7, A8	Memory module sockets for CPU 1
10.	CPU2	Processor socket 2
11.	B1, B2, B5, B6	Memory module sockets for CPU 2
12.	SL1_CPU2_PB2	Slimline cable connector 1
13.	SL2_CPU2_PA2_SA2	Slimline cable connector 2
14.	SLOT4_X16 (CPU1/2)	M.2 riser connector
15.	B3, B4, B7, B8	Memory module sockets for CPU 2
16.	A1, A2, A5, A6	Memory module sockets for CPU 1
17.	NPIO2_CPU1_PB1	NVMe Connector
18.	LEAK_DET	Leak Sensor Connector (Optional)
19.	NPIO_CPU1_PA1_SA1	SATA / NVMe Connector
20.	BATTERY	Coin Cell Battery







- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Riser 3 3. Coin cell battery 5. Riser 2 7. Backplane signal and power 0 9. IDSDM/Internal USB connector 11. GPU power 13. Riser 1 15. PSU 1 17. Right control panel 19. NVRAM_CLR (Jumpers) 21. Fan 4 23. Fan 3 25. DIMMs for processor 1 channels A, B, C, D 27. PCIe/NVMe connector 3 29. DIMMs for processor 2 channels E, F, G, H 31. PCIe/NVMe connector 1 33. Fan 1 35. Left control panel 37. PCIe/NVMe connector 5 39. PCIe/NVMe connector 6 | <ol style="list-style-type: none"> 2. Rear I/O connector 4. OCP NIC 3.0 connector 6. TPM 8. LOM connector 10. Front VGA 12. PCIe/NVMe connector 8 14. PCIe/NVMe connector 7 16. BOSS card power 18. PWRD_EN (Jumpers) 20. DIMMs for processor 1 channels E, F, G, H 22. Processor 1 24. PCIe/NVMe connector 4 26. Backplane signal and power 1 28. PCIe/NVMe connector 2 30. Fan 2 32. Processor 2 34. DIMMs for processor 2 channels A, B, C, D 36. PSU 2 38. Riser 4 40. GPU power |
|--|--|

System board jumper settings

For information about resetting the password jumper to disable a password, see the [Disabling a forgotten password](#) section.

Table 45. System board jumper settings

Jumper	Setting	Description
PWRD_EN	 2 4 6 (default)	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	 1 3 5 (default)	The BIOS configuration settings are retained at system boot.
		The BIOS configuration settings are cleared at system boot.

CAUTION: Be careful when changing the BIOS settings. The BIOS interface is designed for advanced users. Any change in the setting could prevent your system from starting correctly and you might have potential loss of data.

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 the attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Move the jumper on the system board from pins 2 and 4 to pins 4 and 6.
4. Move the jumper on the system board from pins 1 and 2 to pins 2 and 3.
5. 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:** The existing passwords are not disabled (erased) until the system boots with the jumper on pins 2 and 3. However, before you assign a new system and/or setup password, you must move the jumper back to pins 1 and 2.
 - 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.
 - NOTE:** If you assign a new system and/or setup password with the jumper on pins 2 and 3, the system disables the new password(s) the next time it boots.
6. Reconnect the system and all the attached peripherals.
7. Power off the system.
8. Remove the system cover.
9. Move the jumper on the system board from pins 4 and 6 to pins 2 and 4.
10. Move the jumper on the system board from pins 2 and 3 to pins 1 and 2.
11. Replace the system cover.
12. Reconnect the system to the electrical outlet and power on the system, and all the attached peripherals.
13. Assign a new system and/or setup password.

Installing and removing system components

Disassembly and reassembly for PowerEdge R7515

The following sections contain the procedures for removing and replacing system components.

Safety instructions

-  **NOTE:** To avoid injury, do not lift the system on your own, get others to assist you.
-  **WARNING:** Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.
-  **CAUTION:** 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.
-  **CAUTION:** To ensure proper operation and cooling, all bays in the system and system fans must be always populated with a component or a blank.
-  **NOTE:** It is recommended that you always use an antistatic mat and antistatic strap while working on components inside the system.
-  **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 more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at
-  **NOTE:** While replacing faulty storage controller/FC/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 more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at

Before working inside your system

Prerequisites

Follow the safety guidelines listed in [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* at .
4. Remove the system cover.

After working inside your system

Prerequisites

Follow the safety guidelines listed in [Safety instructions](#).

Steps

1. Replace the system cover.
2. If applicable, install the system into the rack.
For more information, see the *Rail Installation Guide* at .
3. Reconnect the peripherals and connect the system to the electrical outlet, and then power on the system.

Recommended tools

You need the following tools to perform the removal and installation procedures:

- Key to the bezel lock
The key is required only if your system includes a bezel.
- Phillips #1 screwdriver
- Phillips #2 screwdriver
- Torx #T20 screwdriver
- 5mm hex nut screwdriver
- Plastic scribe
- 1/4 inch flat blade screwdriver
- Wrist grounding strap connected to the ground
- ESD mat

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

 **NOTE: LCD panel is optional on the front bezel. If the front bezel has an LCD panel, see [LCD panel](#) section.**

Removing the front bezel

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).

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

Steps

1. Unlock the bezel .
2. Press the release button, and remove the left end of the bezel.
3. Slide the tabs on the right end of the bezel out of the slots on the chassis and remove the bezel.

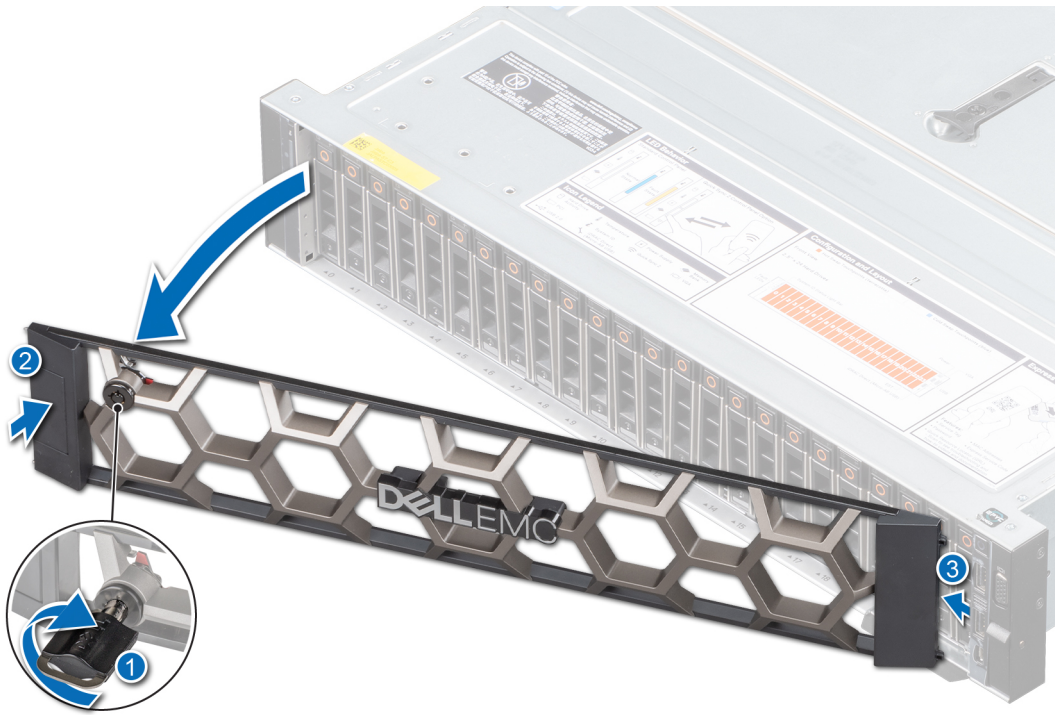


Figure 48. Removing the front bezel

Installing the front bezel

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).

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

Steps

1. Align and insert the tabs on the bezel into the slots on the chassis.
2. Press the bezel until the release button clicks in place.
3. Lock the bezel.

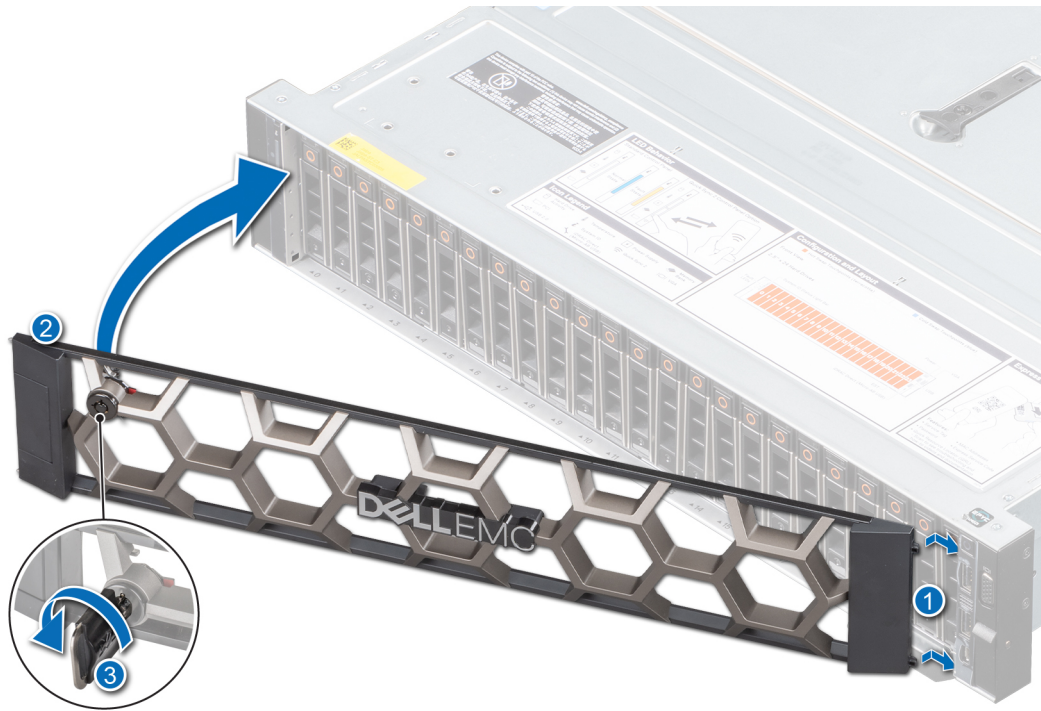


Figure 49. Installing the front bezel

System cover

Removing the system cover

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. Power off the system, including any attached peripherals.
4. Disconnect the system from the electrical outlet and peripherals.

Steps

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



Figure 50. Removing the system cover

Next steps

1. [Replace the system cover.](#)

Installing the system cover

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. Ensure that all internal cables are connected and placed out of the way, and no tools or extra parts are left inside the system.

Steps

1. Align the tabs on the system cover with the guide slots on the chassis.
2. Close the system cover release latch.
3. Using a 1/4 inch flat head or Phillips #2 screwdriver, turn the lock clockwise to the lock position.



Figure 51. Installing the system cover

Next steps

Follow the procedure listed in [After working inside your system](#).

Drive backplane cover

Removing the drive backplane cover

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).

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

Steps

1. Press and push the blue touch points to disengage the drive backplane cover.
2. Remove the cover from the chassis.

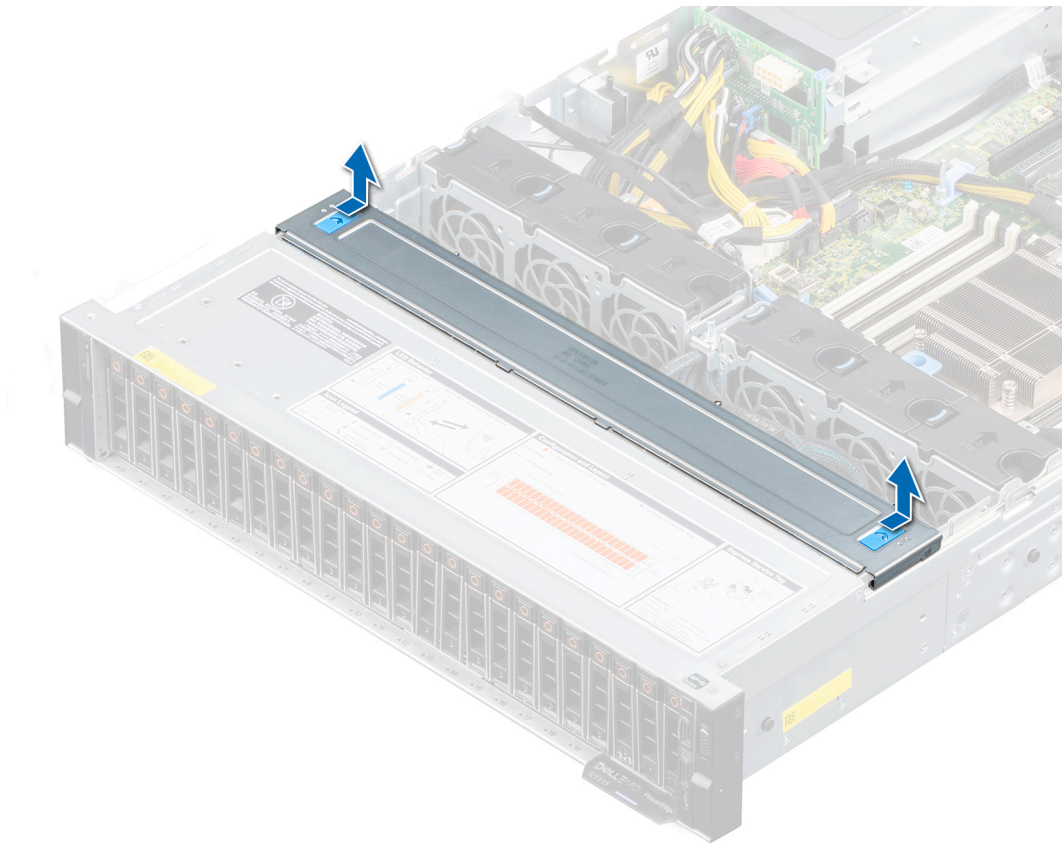


Figure 52. Removing the drive backplane cover

Next steps

1. [Install the drive backplane.](#)

Installing the drive backplane cover

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).

Steps

1. Align the tabs on the drive backplane cover with the guide slots on the system.
2. Slide the cover until it is securely seated.

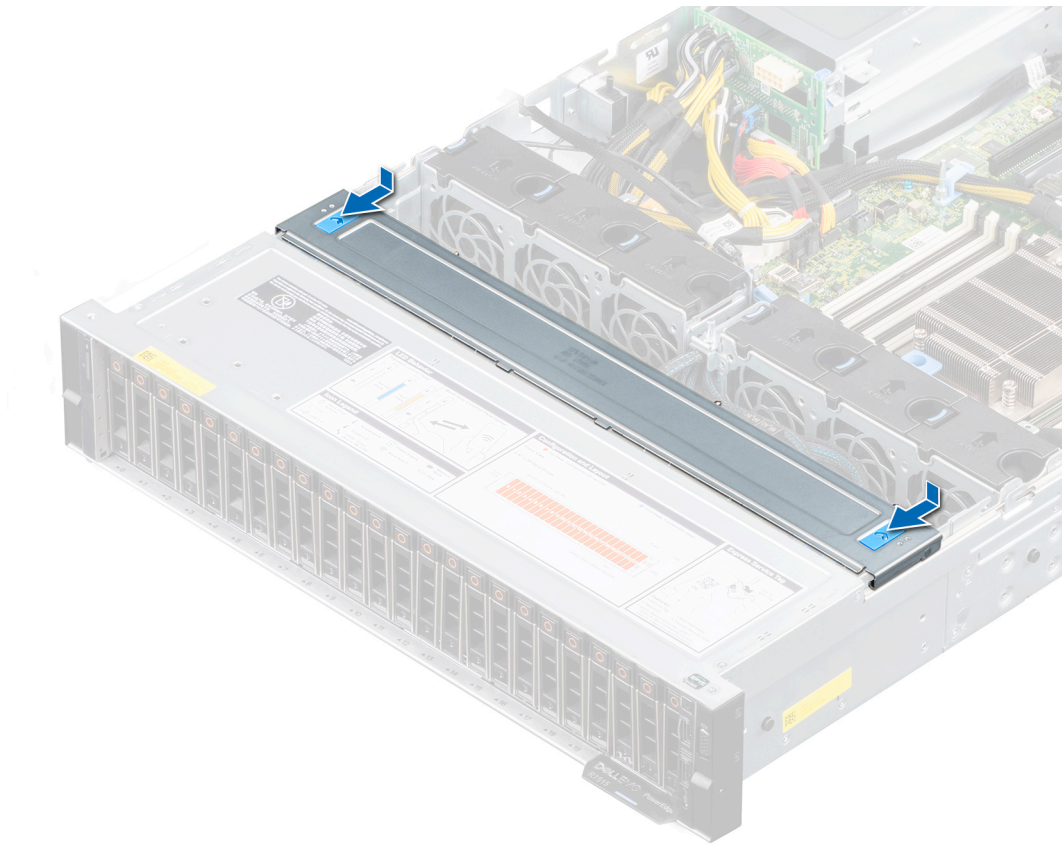


Figure 53. Installing the drive backplane cover

Next steps

1. Follow the procedure listed in [After working inside your system](#).

Air shroud

Removing the air shroud

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).

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.

Steps

Hold the air shroud at both the ends, and lift it from the system.

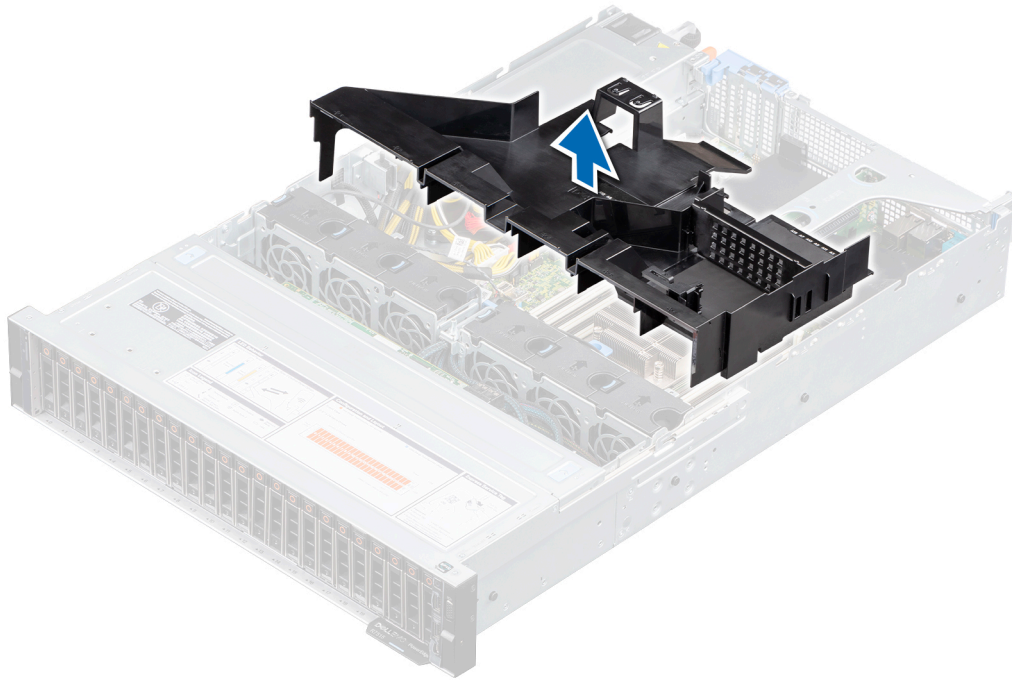


Figure 54. Removing the air shroud

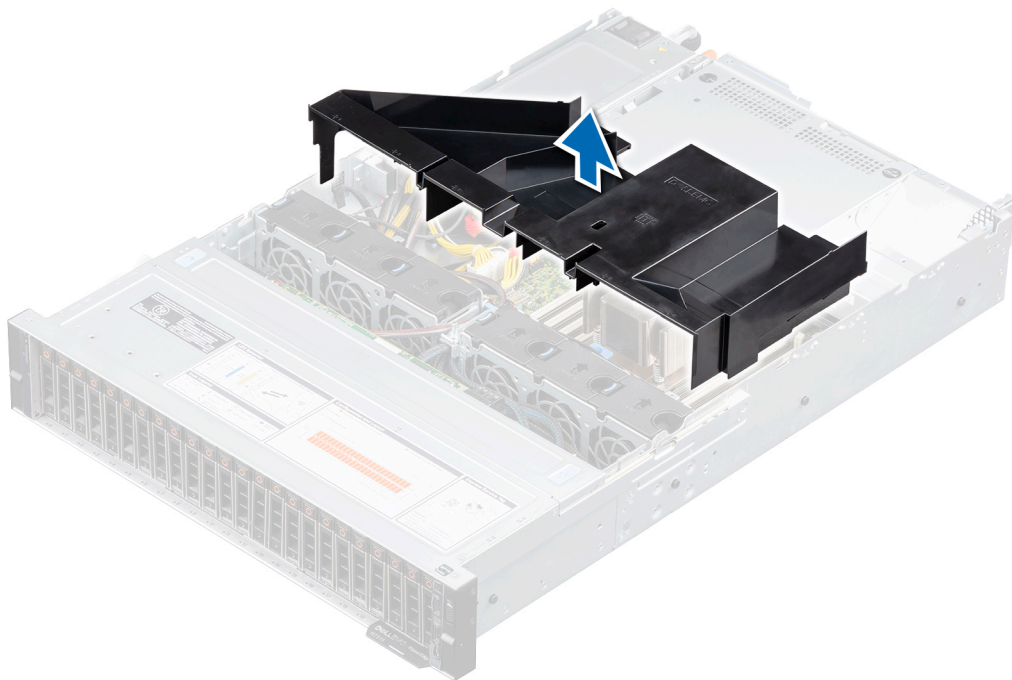


Figure 55. Removing the air shroud for system with rear drives

Next steps

1. [Replace the air shroud.](#)

Installing the air shroud

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).

Steps

1. Align the tabs on the air shroud with the slots on the chassis.

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

2. Lower the air shroud into the system until it is firmly seated.

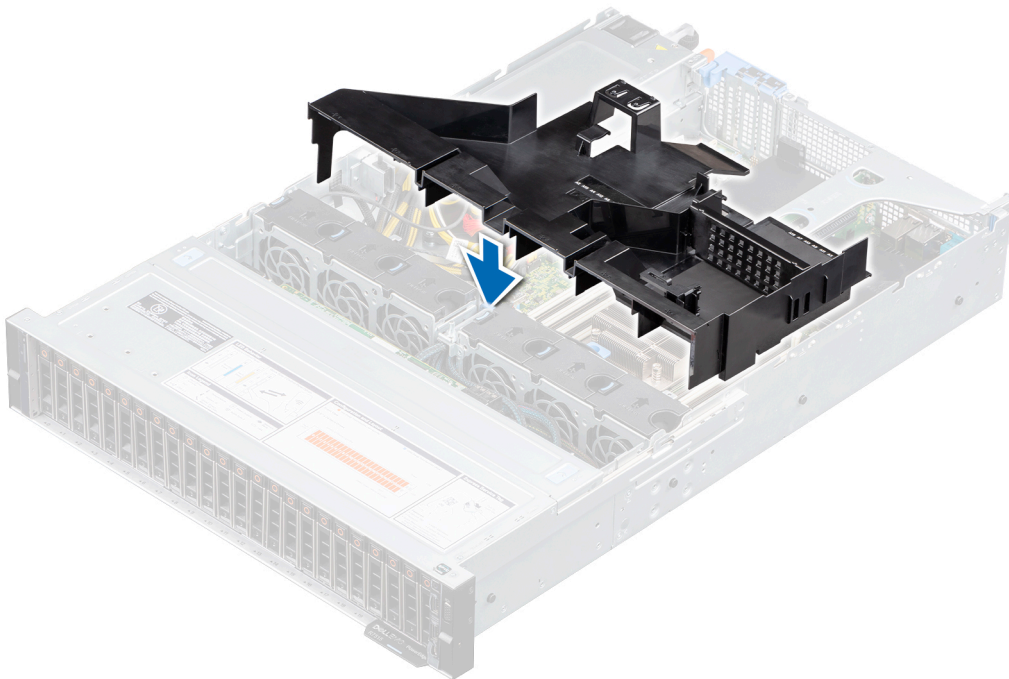


Figure 56. Installing the air shroud

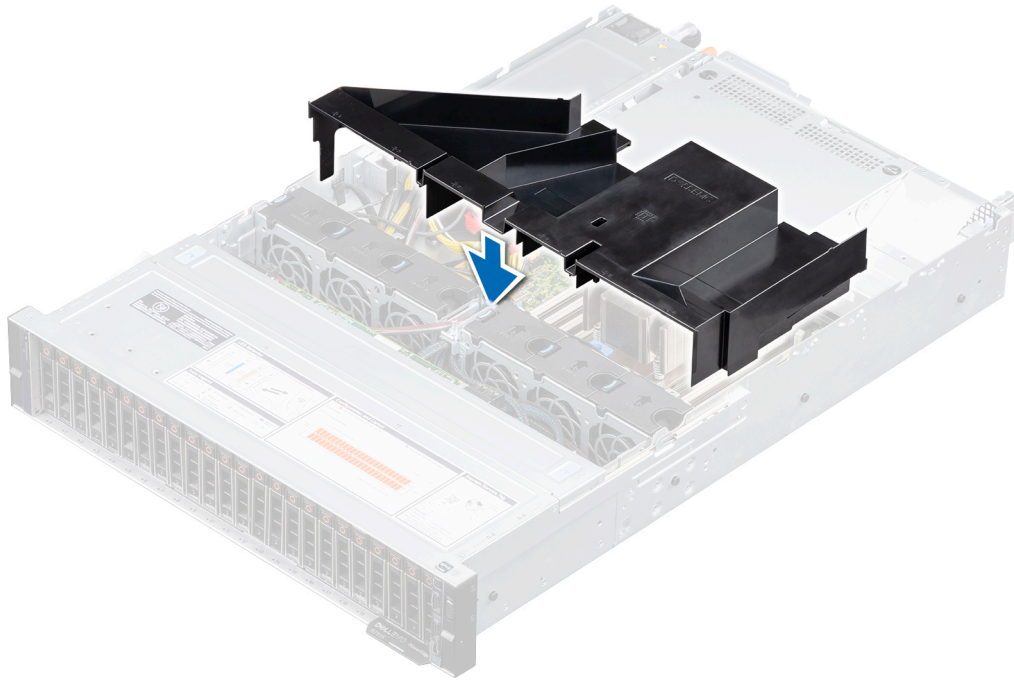


Figure 57. Installing the air shroud for system with rear drives

Next steps

1. Follow the procedure listed in [After working inside your system](#).

Cooling fan

Removing a cooling fan

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 air shroud](#).

Steps

1. Disconnect the cooling fan cable from the system board connector.
2. Remove the cable from the cable retention tabs.

i **NOTE:** Observe the routing of the cable as you remove it from the system.

3. Press the release tab, and lift the cooling fan from the cooling fan cage.

i **NOTE:** The numbers on the image does not depict the exact steps. The numbers are just for representation of sequence.

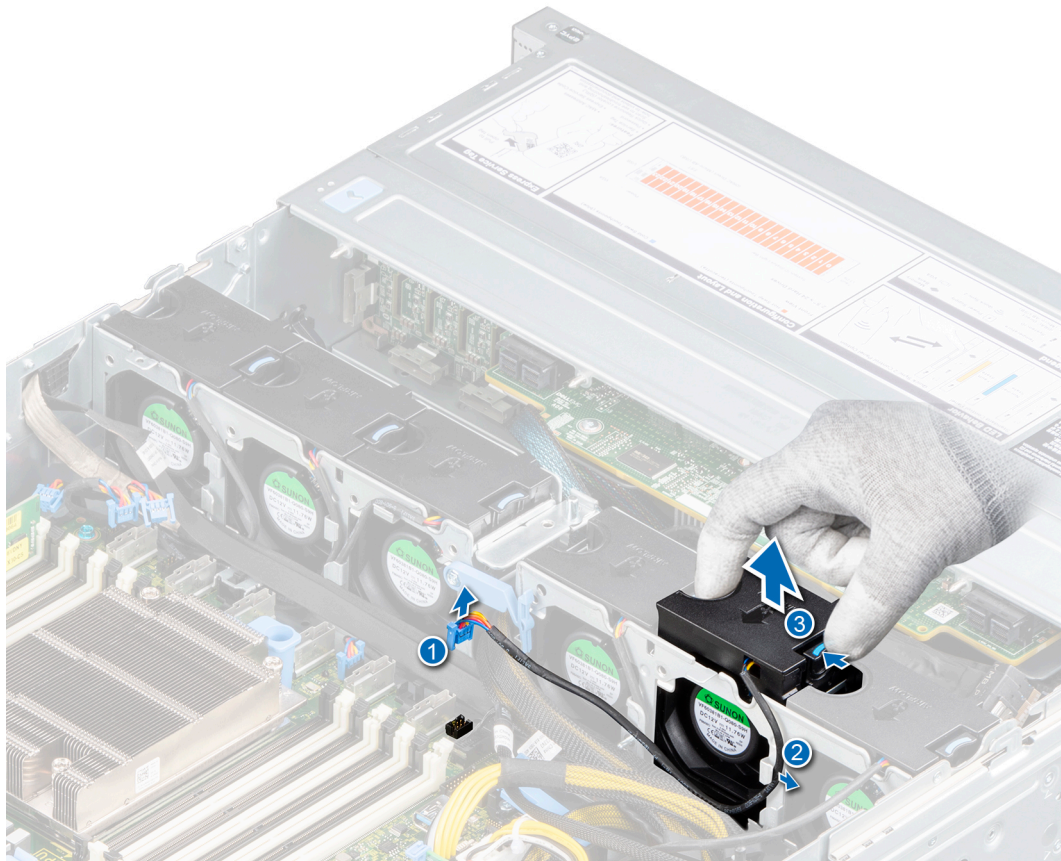


Figure 58. Removing a fan

NOTE: Ensure to disconnect the cooling fan 1 cable from the connector on the power interposer board.

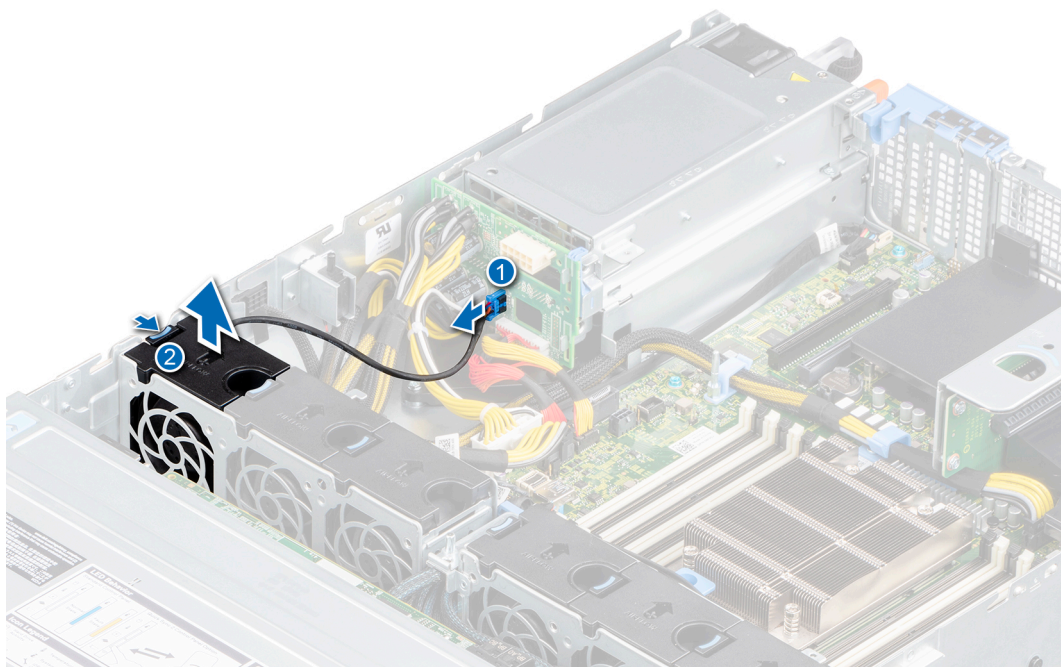


Figure 59. Disconnecting fan 1 cable from PIB

Next steps

1. Replace the cooling fan.

Installing a cooling fan

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 air shroud](#).

Steps

1. Lower the cooling fan into the cooling fan cage, until the blue release tab clicks into place.
2. Route the cable through the cable retention tabs.

(i) NOTE: The numbers on the image does not depict the exact steps. The numbers are just for representation of sequence.

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

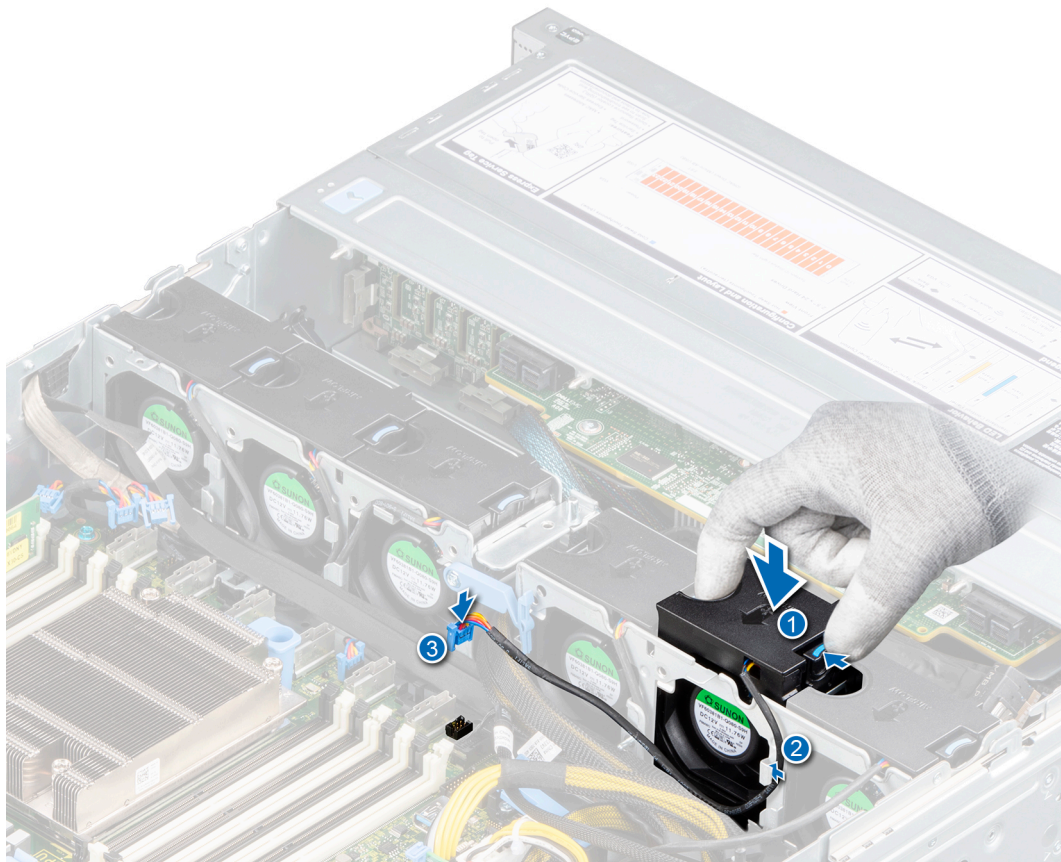


Figure 60. Installing a fan

3. Connect the cooling fan cable (2, 3, 4, 5, and 6) to the connector on system board.

(i) NOTE: Ensure to connect the cooling fan 1 cable from the connector on the power interposer board.

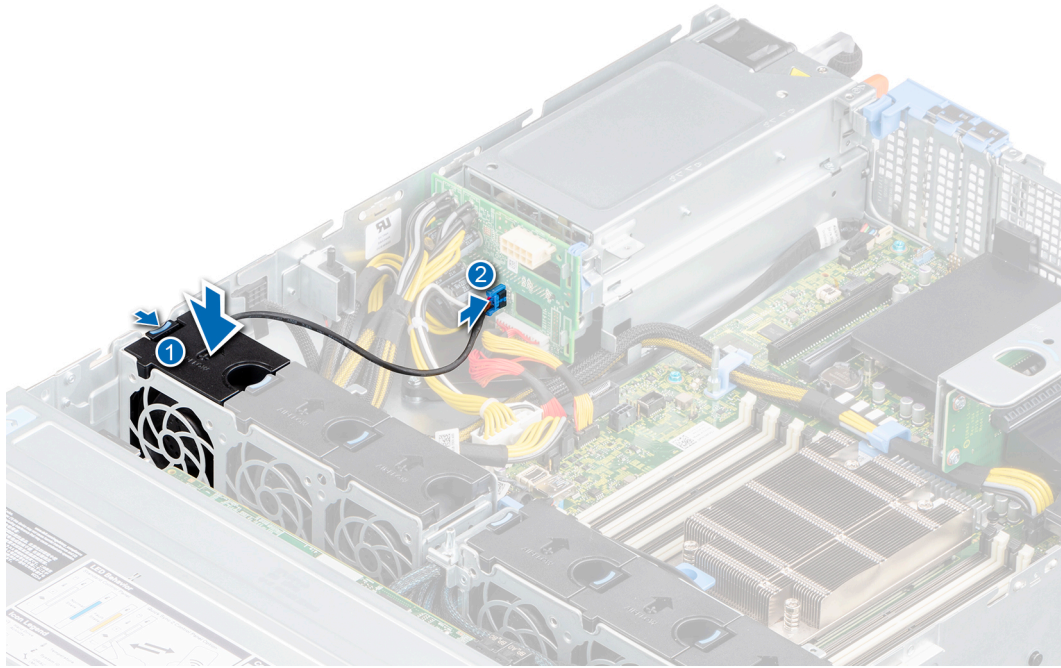


Figure 61. Connecting fan 1 cable to PIB

Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

Intrusion switch

Removing the intrusion switch

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 air shroud.](#)
4. Keep the plastic scribe ready.

Steps

1. Disconnect and remove the intrusion switch cable connector from connector on the system board.

NOTE: Observe the routing of the cable as you remove it from the system.

2. Using a plastic scribe, slide the intrusion switch out of the intrusion switch slot.

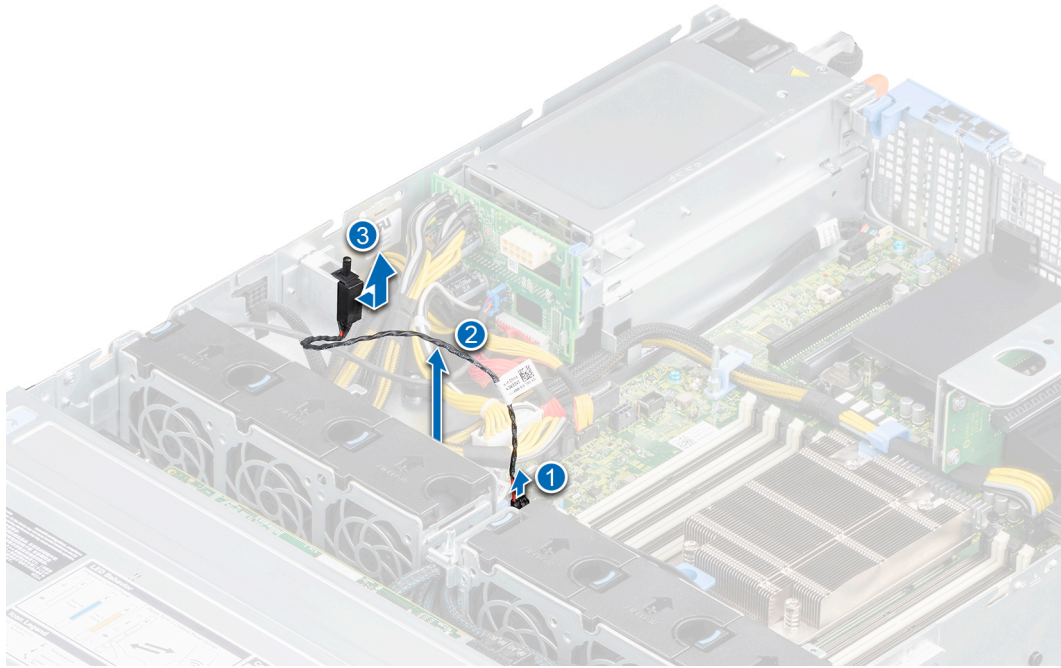


Figure 62. Removing the intrusion switch

Next steps

1. [Replace the intrusion switch.](#)

Installing the intrusion switch

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 air shroud.](#)

Steps

1. Align and insert the intrusion switch in the slot until it is firmly seated in the slot on the chassis.

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

2. Connect the intrusion switch cable to the connector on the system board.

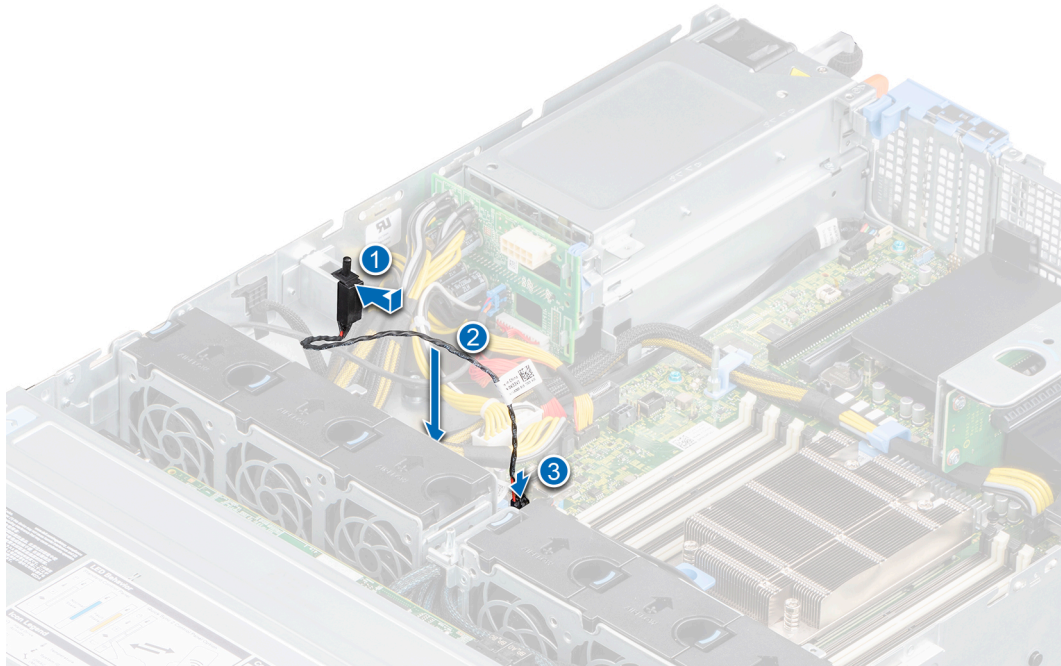


Figure 63. Installing the intrusion switch

Next steps

1. [Install the air shroud.](#)
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.

CAUTION: Mixing drive blanks from previous generations of PowerEdge servers is not supported.

Steps

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

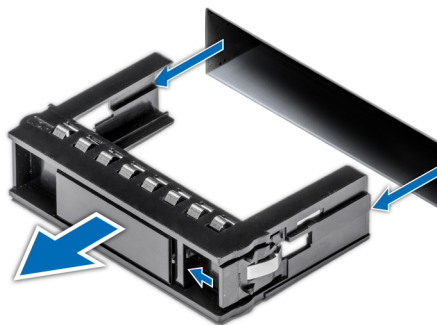


Figure 64. Removing a drive blank

Next steps

1. [Install a drive or replace the drive blank.](#)

Installing the drive blank

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).

Steps

Insert the drive blank into the drive slot, and push the blank until the release button clicks into place.

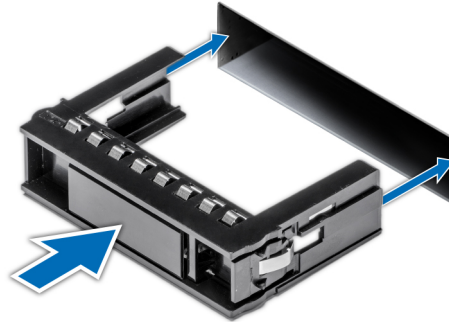


Figure 65. Installing the drive blank

Next steps

1. [Install the front bezel.](#)

Removing the drive carrier

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. 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 documentation for the storage controller.

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.

3. If installed, [remove the front bezel](#).

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.



Figure 66. Removing the drive carrier

Next steps

1. [Install a drive carrier or a drive blank.](#)

Installing the drive carrier

Prerequisites

- CAUTION:** Before removing or installing 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:** 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.
 - 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.
- NOTE:** Ensure that the drive carrier's release handle is in the open position before inserting the carrier into the slot.

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).
3. [Remove the drive carrier or drive blank](#) when you want to assemble the drives in to the system.

Steps

1. Slide the drive carrier into the drive slot.
2. Close the drive carrier release handle to lock the drive in place.



Figure 67. Installing the drive carrier

Next steps

1. If removed, install the front bezel.

Removing the drive from the drive carrier

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).
3. [Remove the drive](#).

Steps

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



Figure 68. Removing the drive from the drive carrier

Next steps

1. [Install the drive into the drive carrier.](#)

Installing the drive into the drive carrier

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. If installed, [remove the front bezel](#).
3. [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, replace the screws to secure the drive to the drive carrier.

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

(i) NOTE: Use the screws shipped with the drive carrier to secure the drive to the drive carrier.



Figure 69. Installing a drive into the drive carrier

Next steps

1. [Install the drive carrier.](#)
2. If removed, [install the front bezel](#).

Cable routing

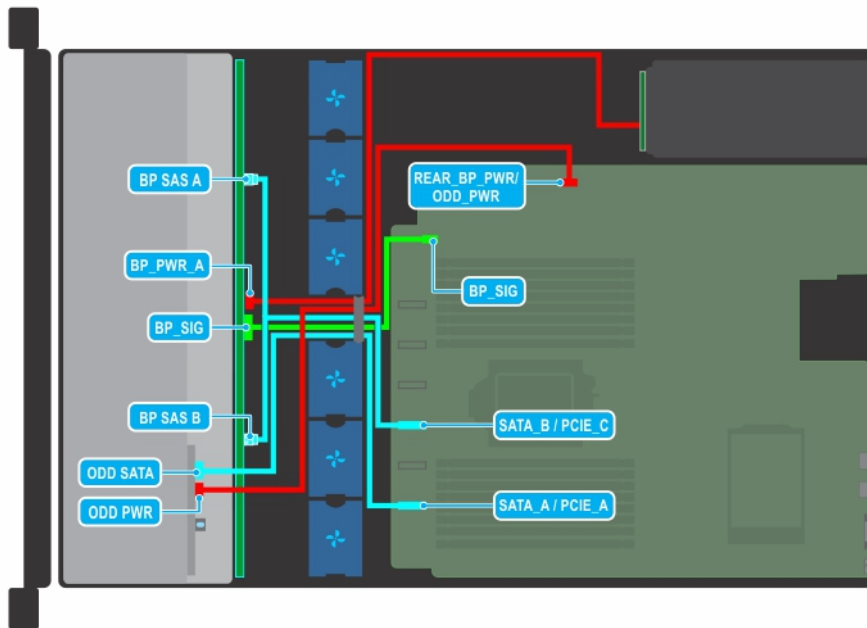


Figure 70. Cable routing - 8 x 3.5 inch drive backplane with ODD

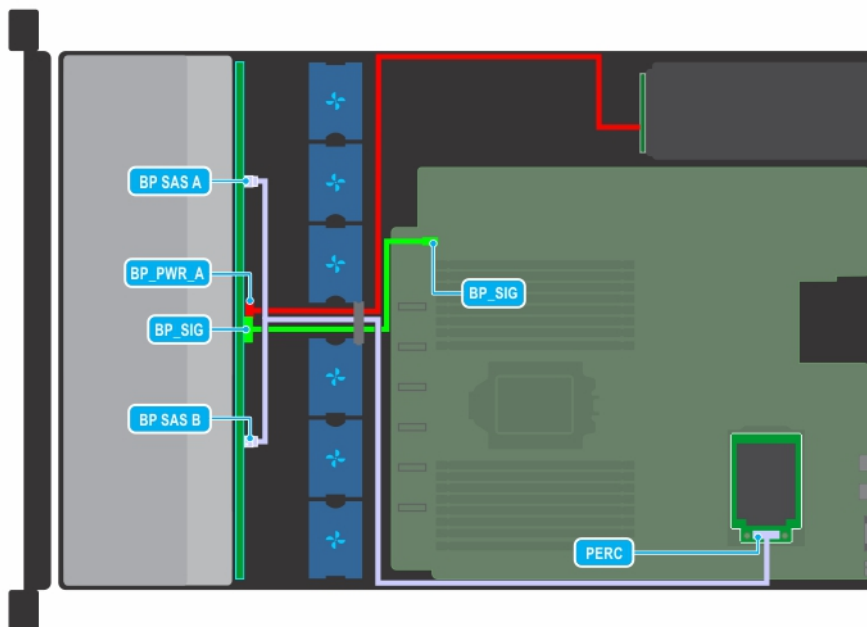


Figure 71. Cable routing - 8 x 3.5 inch drive backplane with mini PERC card

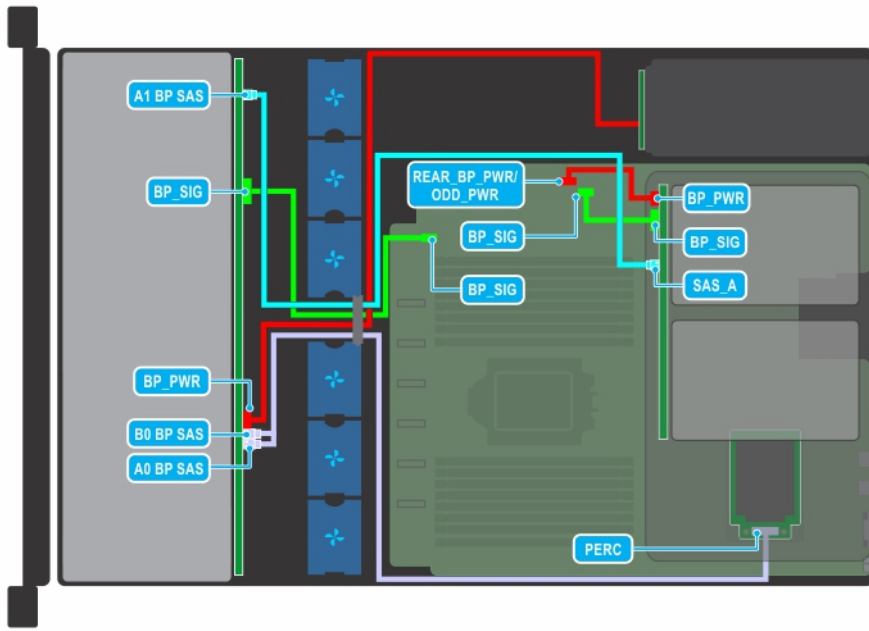


Figure 72. Cable routing - 12 x 3.5 inch drive backplane with 2 x 3.5 inch rear drive backplane

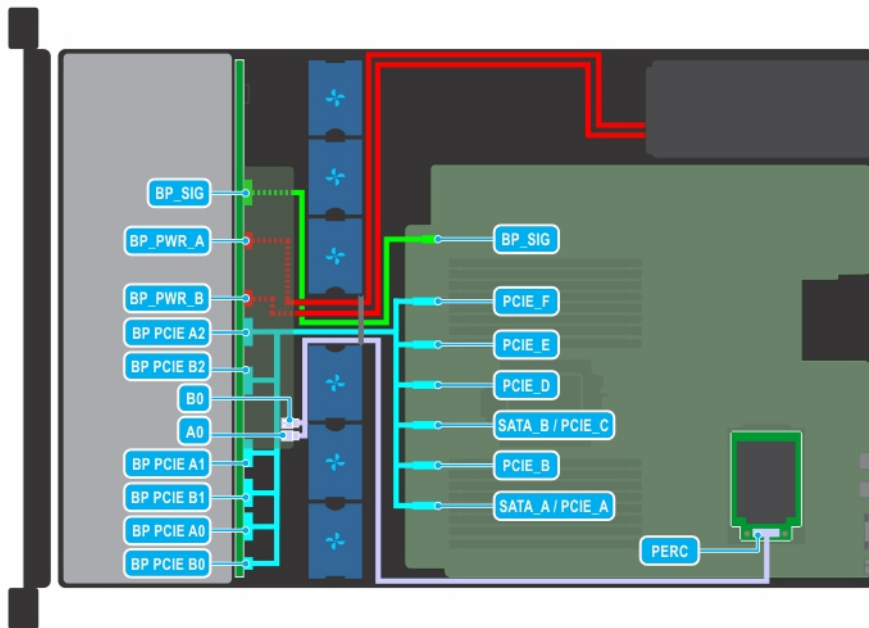


Figure 73. Cable routing - 12 x 2.5 inch SAS drive + 12 x 2.5 inch NVMe drive backplane

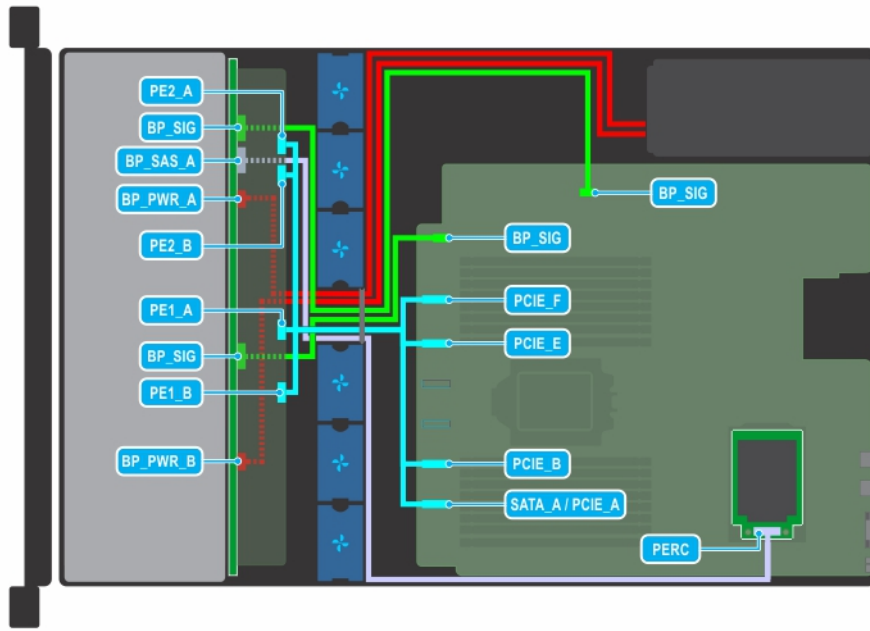


Figure 74. Cable routing - 24 x 2.5 inch NVMe drive backplane

Drive backplane

Drive backplane

Depending on your system configuration, the drive backplanes supported in PowerEdge R7515 are listed here:

- 3.5 inch (x8) SAS, SATA backplane
- 3.5 inch (x12) SAS or SATA backplane and 3.5 inch (x2) SAS or SATA backplane (rear)
- 2.5 inch (x12) SAS or SATA + 2.5 inch (x12) NVMe backplane
- 2.5 inch (x24) SAS or SATA backplane
- 2.5 inch (x24) NVMe backplane
- 2.5 inch (x8) SAS or SATA + 2.5 inch (x16) NVMe backplane

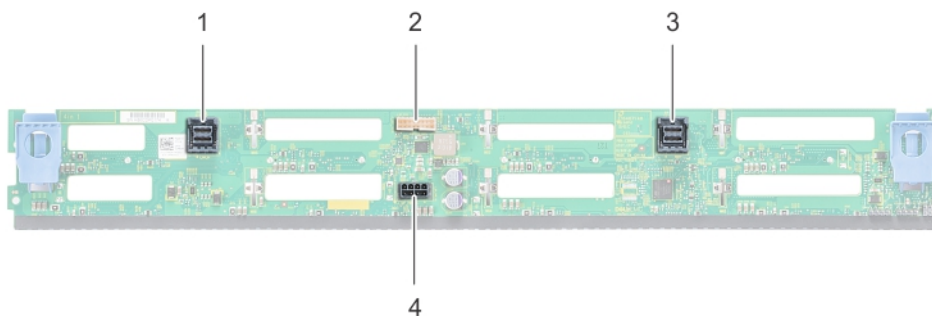


Figure 75. 8 X 3.5 inch drive backplane

- | | |
|-------------------------------|---------------------|
| 1. SAS/SATA B cable connector | 2. Signal connector |
| 3. SAS/SATA A cable connector | 4. Power connector |

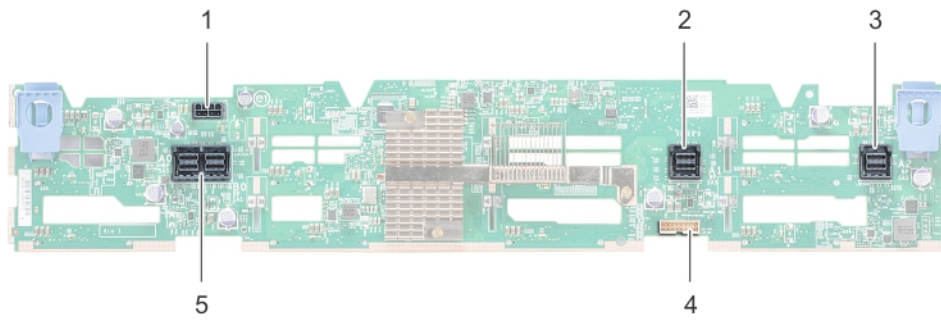


Figure 76. 12 X 3.5 inch drive backplane

- | | |
|-----------------------------|-------------------------------|
| 1. Power cable connector | 2. SAS/SATA cable connector |
| 3. SAS/SATA cable connector | 4. Backplane signal connector |
| 5. SAS cable connector | |

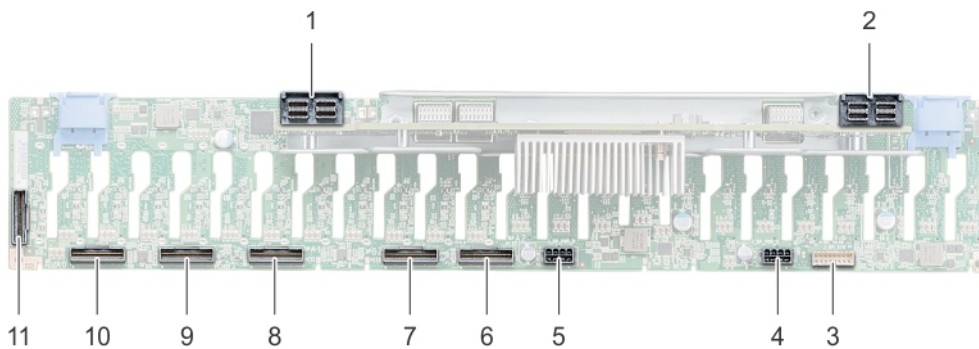


Figure 77. 24 X 2.5 inch drive backplane

- | | |
|---------------------------------|---------------------------------|
| 1. SAS cable connector | 2. SAS cable connector |
| 3. Signal cable connector | 4. Power cable connector |
| 5. Power cable connector | 6. Signal cable (A2)connector |
| 7. Signal cable (B2) connector | 8. Signal cable (A1) connector |
| 9. Signal cable (B1) connector | 10. Signal cable (A0) connector |
| 11. Signal cable (B0) connector | |

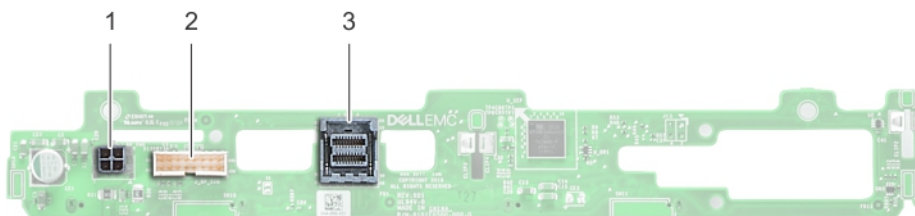


Figure 78. 2 x 3.5 inch drive backplane (rear)

1. Power connector
2. Signal connector
3. SAS cable connector

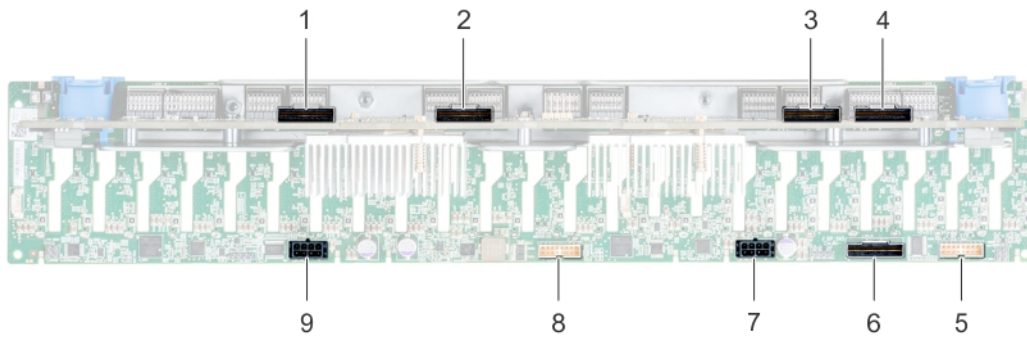


Figure 79. 24 x 2.5 inch NVMe drive backplane

- | | |
|--|--|
| 1. Expander board connector B1 (PE1_B) | 2. Expander board connector A1 (PE1_A) |
| 3. Expander board connector B2 (PE2_B) | 4. Expander board connector A2 (PE2_A) |
| 5. signal connector (J_SIG_A1) | 6. SAS connector (J_BP_SAS) |
| 7. power connector (J_BP_PWR_A1) | 8. signal connector (J_SIG_A2) |
| 9. power connector (J_BP_PWR_A2) | |

Removing the drive backplane

Prerequisites

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

CAUTION: Note the number of each drive and temporarily label them before removal so that you can replace them in the same drive slots.

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. [Remove all the drives](#) from the front.
4. If applicable, [remove the drive backplane cover](#).

NOTE: Observe the routing of the cable as you remove it from the system.

Steps

1. Press the blue release tabs to disengage the drive backplane from the hooks on the chassis.
2. Lift the drive backplane from the system.

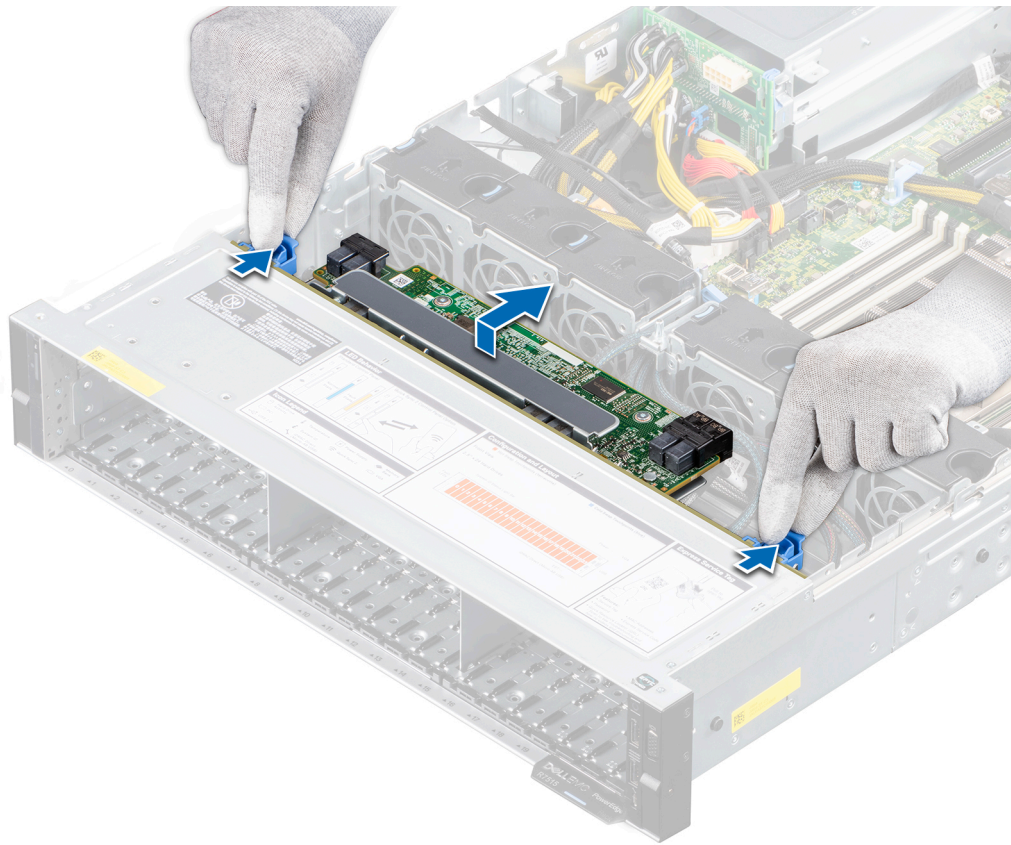


Figure 80. Removing the drive backplane

3. Disconnect the following cables from the backplane:
 - a. Backplane signal cable
 - b. Backplane power cable
 - c. If applicable, PERC cable

Next steps

1. [Replace the drive backplane.](#)

Installing the drive backplane

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 drives](#).
4. If applicable, [remove the drive backplane cover](#).

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

Steps

1. Connect the following cables to the backplane:
 - a. Backplane signal cable
 - b. Backplane power cable
 - c. If applicable, PERC cable
2. Align the slots on the backplane with the hooks on the chassis.
3. Lower the backplane until the blue release tabs click into place.

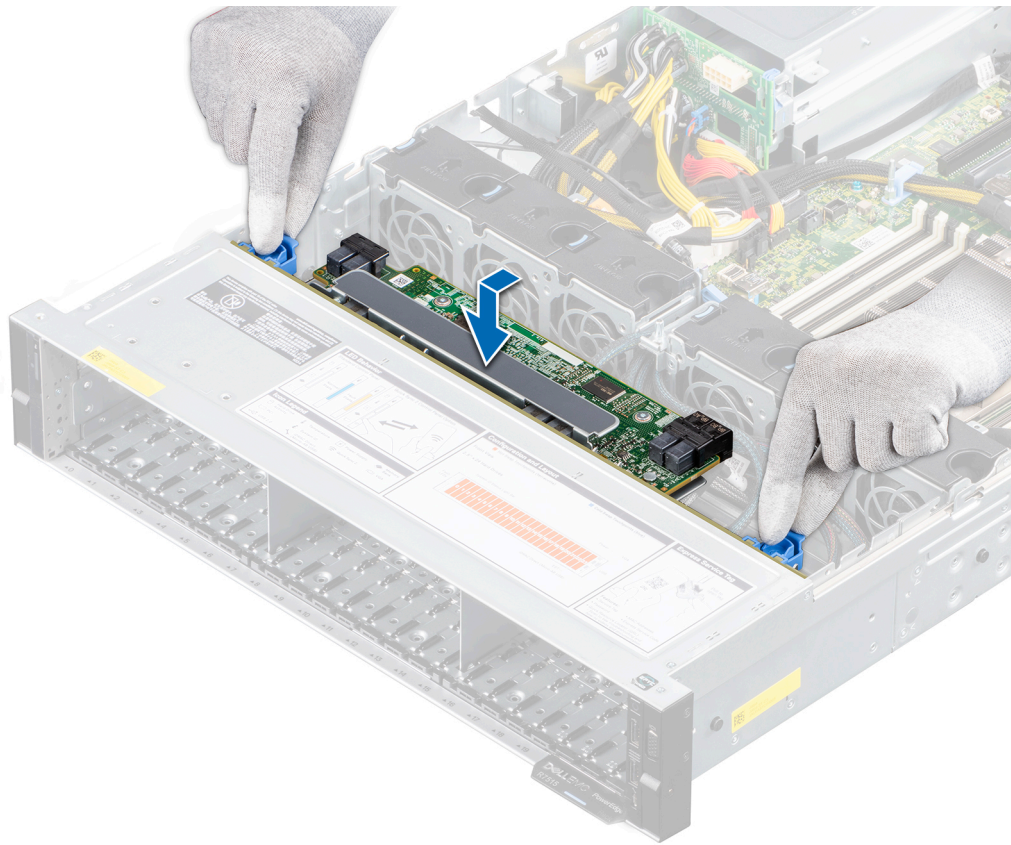


Figure 81. Installing the drive backplane

Next steps

1. [Install the drives](#) in their original locations.
2. [Install the drive backplane cover](#).
3. Follow the procedure listed in [After working inside your system](#).

Removing the rear drive backplane

Prerequisites

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

⚠ CAUTION: You must note the number of each hard drive and temporarily label them before removal so that you can replace them in the same locations.

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. [Remove all the drives](#) from the rear drive cage.
4. Disconnect all the cables from the backplane.
5. [Remove the rear drive cage](#).

Steps

1. Using a Phillips #2 screwdriver, remove the screws that secure the drive backplane to the rear drive cage.
2. Disengage the backplane from the hooks on the rear drive cage, and remove it from the rear drive cage.

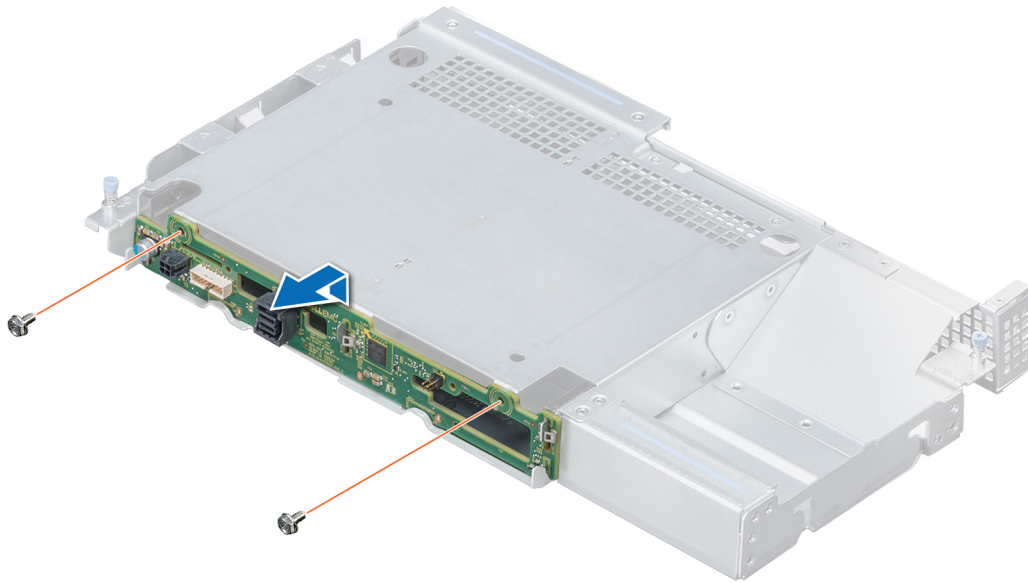


Figure 82. Removing the rear drive backplane

Next steps

Install the rear drive backplane.

Installing the rear drive backplane

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 all the drives from the rear drive cage.
4. Disconnect all the cables from the backplane.
5. [Remove the rear drive cage](#).

Steps

1. Align the slots on the backplane with the hooks on the rear drive cage.
2. Lower the backplane into the rear drive cage until it is firmly seated.
3. Using a Phillips #2 screwdriver, tighten the screws to secure the backplane to the rear drive cage.

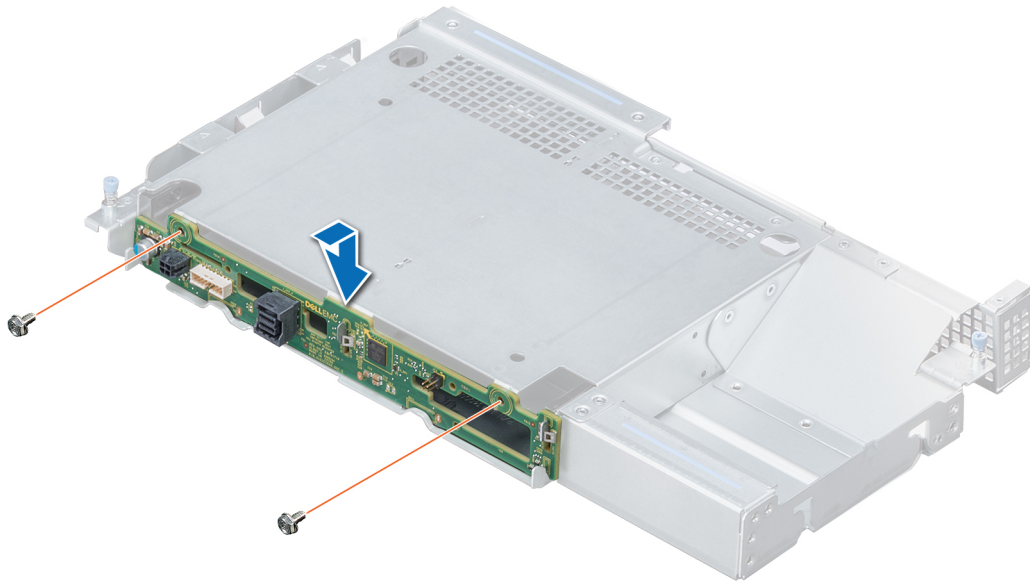


Figure 83. Installing the rear drive backplane

Next steps

1. [Install the rear drive cage.](#)
2. Connect all the cables to the backplane.
3. [Install the drives](#) in their original location.
4. Follow the procedure listed in [After working inside your system.](#)

Object Missing

This object is not available in the repository.

Removing the rear drive cage

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 drives.](#)
4. [Remove the air shroud.](#)

Steps

1. Using a Phillips #2 screwdriver, loosen the captive screws that secure the rear drive cage to the system.
2. Slide the rear drive cage towards the front of the system to disengage it from the system.
3. Remove the rear drive cage from the system.

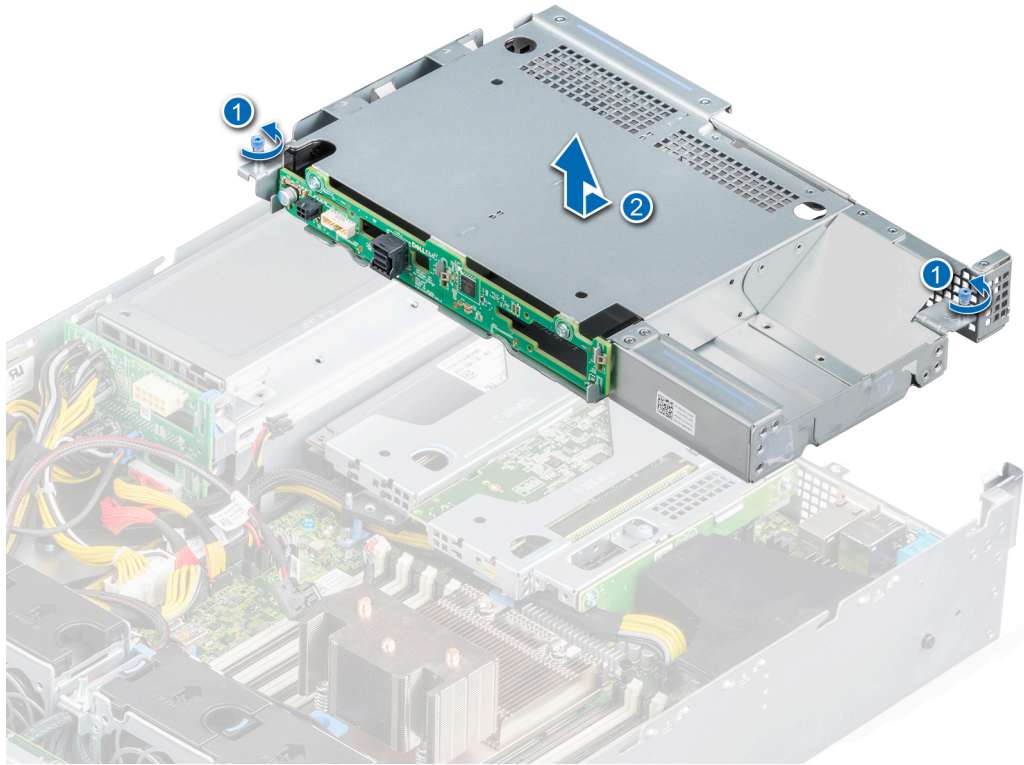


Figure 84. Removing the rear drive cage

Next steps

1. [Replace the rear drive cage.](#)

Installing the rear drive cage

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 drives.](#)

Steps

1. Align the rear drive cage with the guide pins on the PSU cage.
2. Lower the rear drive cage and slide it to the rear of the system until it is firmly seated.
3. Using a Phillips #2 screwdriver, tighten the captive screws to secure the rear drive cage to the system.

NOTE: Store the filler bracket for future use. Filler brackets must be installed in empty expansion card slots to maintain Federal Communications Commission (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.

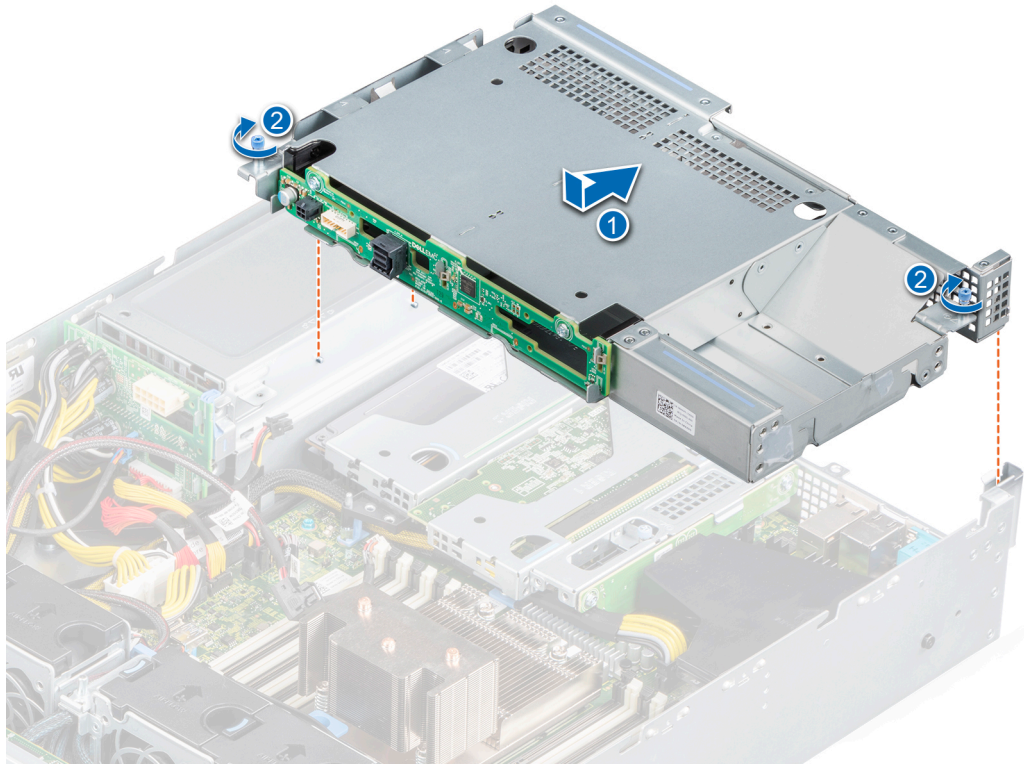


Figure 85. Installing the rear drive cage

Next steps

1. [Install the drives](#) in their original locations.
2. [Install the air shroud](#).
3. Follow the procedure listed in [After working inside your system](#).

System memory

System memory guidelines

The PowerEdge R7515 system supports DDR4 registered DIMMs (RDIMMs) and load reduced DIMMs (LRDIMMs). System memory holds the instructions that are executed by the processor.

Your system memory is organized into eight channels per processor (two memory sockets per channel) for a total of 16 memory sockets per processor. In each channel, the 1st socket is marked white and the 2nd socket black.

Memory channels are organized as follows:

Table 46. Memory channels

Processor	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F	Channel G	Channel H
AMD Processor	Slots 6 and 12	Slots 5 and 11	Slots 2 and 10	Slots 1 and 9	Slots 8 and 16	Slots 7 and 15	Slots 4 and 14	Slots 3 and 13

Table 47. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed	
				1 DIMMs per Channel (DPC)	2 DIMMs per Channel (DPC)
RDIMM	1R	8 GB	DDR4 (1.2V), 3200 MT/s	3200 MT/s	2933 MT/s

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed	
	2R	16 GB, 32 GB, 64 GB	DDR4 (1.2V), 3200 MT/s	3200 MT/s	2933 MT/s
LRDIMM	8R	128 GB	DDR4 (1.2V), 2666 MT/s	2666 MT/s	2666 MT/s

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 configurations fail to observe these guidelines, your system might not boot, stop responding during memory configuration, or operate with reduced memory. This section provides information on the memory population rules and about the non-uniform memory access (NUMA) for single or dual processor system.

The memory bus may operate at speeds of 3200 MT/s, 2933 MT/s, or 2666 MT/s depending on the following factors:

- System profile selected (for example, Performance Optimized, 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.

The system supports Flexible Memory Configuration, enabling the system to be configured and run in any valid chipset architectural configuration. The following are the recommended guidelines for installing memory modules:

- All DIMMs must be DDR4.
- Mixing of memory module capacities in a system is not supported.
- 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 A16 are available.
 - For single-processor systems, sockets A1 to A8 are available.
 - In Optimizer Mode, the DRAM controllers operate independently in the 64-bit mode and provide optimized memory performance.

Table 48. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Odd amount of DIMMs per processor allowed.

Table 49. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Odd amount of DIMMs per processor allowed.
Dual processor (Start with processor1. Processor 1 and processor 2 population should match)	Optimizer (Independent channel) population order	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{6} A{6}, B{6}	Odd amount of DIMMs per processor allowed. NOTE: Odd number of DIMMs will result in unbalanced memory configurations, which in turn will result in performance loss. It is recommended to populate all memory channels identically with identical electrical

Processor	Configuration	Memory population	Memory population information
			<p>specification DIMMs for best performance.</p> <p>Optimizer population order is not traditional for 8 and 16 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> For 8 DIMMs: A1, A2, A4, A5, B1, B2, B4, B5 For 16 DIMMs: A1, A2, A4, A5, A7, A8, A10, A11 B1, B2, B4, B5, B7, B8, B10, B11

Table 50. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	A{1}, A{2}, A{3}, A{4}, A{5}, A{6}, A{7}, A{8}	Odd amount of DIMMs per processor allowed.
Dual processor (Start with processor 1. Processor 1 and processor 2 population should match)	Optimizer (Independent channel) population order	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}	<p>Odd amount of DIMMs per processor allowed.</p> <p>NOTE: Odd number of DIMMs will result in unbalanced memory configurations, which in turn will result in performance loss. It is recommended to populate all memory channels identically with identical electrical specification DIMMs for best performance.</p> <p>Optimizer population order is not traditional for 8 and 16 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> For 8 DIMMs: A{6}, A{5}, A{2}, A{1}, A{8}, A{7}, A{4}, A{3} For 16 DIMMs: A{6}, B{6}, A{5}, B{5}, A{2}, B{2}, A{1}, B{1}, A{8}, B{8}, A{7}, B{7}, A{4}, B{4}, A{3}, B{3}

- For dual-processor systems, sockets A1 to A16 and sockets B1 to B16 are available.
- For dual-processor systems, sockets A1 to A8 and sockets B1 to B8 are available.
- Populate all the sockets with white release tabs first, followed by the black release tabs.
- In a dual-processor configuration, the memory configuration for each processor must be identical.

For example, if you populate socket A1 for processor 1, then populate socket B1 for processor 2, and so on.

- Unbalanced or odd memory configuration results in a performance loss and system may not identify the memory modules being installed, so always populate memory channels identically with identical electrical specification DIMMs for best performance.
- Minimum recommended configuration is to populate four identical electrical specifications memory modules per processor. AMD recommends limiting processors in that system to 32 cores or less.

- Populate eight identical electrical specification memory modules per processor (one DIMM per channel) at a time to maximize performance.

Non-uniform memory access (NUMA)

Non-uniform memory access (NUMA) is a memory design used in multi-processing, where the memory access time depends on the memory location relative to the processor. In NUMA, a processor can access its own local memory faster than the non-local memory.

NUMA nodes per socket (NPS)

NUMA nodes per socket (NPS) is a new feature added that allows you to configure the memory NUMA domains per socket. The configuration can consist of one whole domain (NPS1), two domains (NPS2), or four domains (NPS4). In the case of a two-socket platform, an additional NPS profile is available to have whole system memory to be mapped as single NUMA domain (NPS0).

In the processors, each physical processor package contains multiple processor cores that are grouped together into core complexes and core complex dies. A core complex (CCX) consists of maximum four processor cores and an L3 cache memory. A core complex die (CCD) contains two CCXs. The physical processor package contains maximum eight core CCDs. A max CCD x CCX x Core processor will have 64 cores. The BIOS setup allows for the selection of an NPS profile based on down core profile and by processor SKU.

Table 51. NPS options per processor SKU or down core configuration

Cores	CCDs x CCXs x Cores/CCX	NPSx options - Single processor
64	8x2x4	4, 2, 1
48	6x2x4	2, 1
32	4x2x4	4, 2, 1
24	3x2x4	1
16	2x2x4	2, 1
16	4x2x2	4, 2, 1
8	4x2x1	4, 2, 1
8	2x2x2	2, 1

Table 52. NPS options per processor SKU or down core configuration

Cores	CCDs x CCXs x Cores/CCX	NPSx options - Single processor	NPSx options - Dual processor
64	8x2x4	4, 2, 1	4, 2, 1, 0
48	6x2x4	2, 1	2, 1, 0
32	4x2x4	4, 2, 1	4, 2, 1, 0
24	3x2x4	1	1, 0
16	2x2x4	2, 1	2, 1, 0
16	4x2x2	4, 2, 1	4, 2, 1, 0
8	4x2x1	4, 2, 1	4, 2, 1, 0
8	2x2x2	2, 1	2, 1, 0

NOTE: If the system configuration does not support an NPS profile, the options are not displayed until the configuration changes.

NOTE: If there is a memory training failure, configuration change, or processor swap that no longer supports a specific NPS profile, an error message is displayed at the end of POST and logged in the LifeCycle Controller.

Interleaving option

Based on the NPSx selection, the AMD Platform Security Processor (PSP) firmware selects the corresponding preferred memory interleaving. If the memory configuration does not allow the preferred option (Example: a channel is not populated or one or more DIMMs on a channel does not initialize or train properly), the pre-BIOS firmware selects the corresponding alternate memory interleaving option.

Table 53. Interleaving Options Based on NPSx

NPSx	Preferred	Alternate
4	2-channel	None
2	4-channel	2-channel
1	8-channel	4-channel, 2-channel

Table 54. Interleaving Options Based on NPSx

NPSx	Preferred	Alternate
4	2-channel	None
2	4-channel	2-channel
1	8-channel	4-channel, 2-channel
0	16-channel (dual processor)	2-channel

Two channel interleaving (per quadrant) - NPS4 and fallback for NPS2/1/0

- This interleaves two channels in each quadrant.
- Does not require the memory to be equal on both channels of a quadrant. Any non-symmetrical DIMM is stacked on top.
- Any quadrant where one of the two channels is not populated is not interleaved.
- There is no alternate, as all configurations can be mapped into this mode.

Four channel interleaving (per half-socket) - NPS2

- This interleaves the four channels on the left or right half of a socket. As an alternative option from NPS1 only, the four channels {CS A, B, C, D} may be interleaved.
- Requires all four channels to be populated with equal size memory.
- There is no requirement that the two halves have equal size memory with respect to each other.
- The system has support for one half to have no memory.
- In a dual processor system:
 - There is no requirement that both sockets have the same number of halves populated.
 - There is no requirement that each of the four halves has the same amount of memory with respect to each other.
 - The system allows for one of the sockets to have no memory.

Eight channel interleaving (per socket) - NPS1

- This interleaves eight channels in a socket.
 - NOTE: {CS A, B, C, D} and {CS E, F, G, H} is only recommended as a memory population if all eight channels are populated as NPS2.**
 - NOTE: It is recommended that all channels must be populated (CS A, B, C, D, E, F, G, H) for NPS1, but NPS1 does support a 4 channel configuration of (CS C, D, G, H) but does not have optimal performance.**
- Requires all populated channels in a socket to have equal size memory.
- In a dual processor system:
 - There is no requirements for both sockets to have equal size memory.
 - If both sockets have memory the interleaving mode must be the same for both sockets.
 - The system allows for one of the sockets to have no memory.
- Single processor system creates a single NUMA node for the system, the SRAT and SLIT table are not required.

Socket interleaving (dual processor only) - NPS0

- This interleaves all 16 channels (eight per socket) in a dual processor system.
- Requires all channels in the system to be populated with equal size memory.
- Creates a single NUMA node for the system, the SRAT and SLIT table are not required.

CCX/Last-Level Cache (LLC) as NUMA domains

In addition to selecting the number of NUMA domains via NPS option, the processor allows for making memory per CCX as NUMA domain. In the processor each CCD has a maximum of two CCXs with each CCX having a shared last-level cache (LLC, or L3 cache) for all cores. The CCX as NUMA domain option allows for each LLC to be configured as a NUMA domain so that for certain workloads pinning execution to a single NUMA domain can be done.

The total amount of memory for each default NUMA node is divided by the number of CCXs within each CCD and distributed equally to each new per-CCX. The max number of NUMA domains generated will based on how many CCD and CCX are fused for that processor SKU.

Removing a memory 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 air shroud](#).

NOTE: The memory modules are hot to touch for some time after the system has been powered down. Allow the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components or metallic contacts on the memory module.

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.

2. To release the memory module from the socket, simultaneously press the ejectors on both ends of the memory module socket.
3. Lift the memory module away from the system.

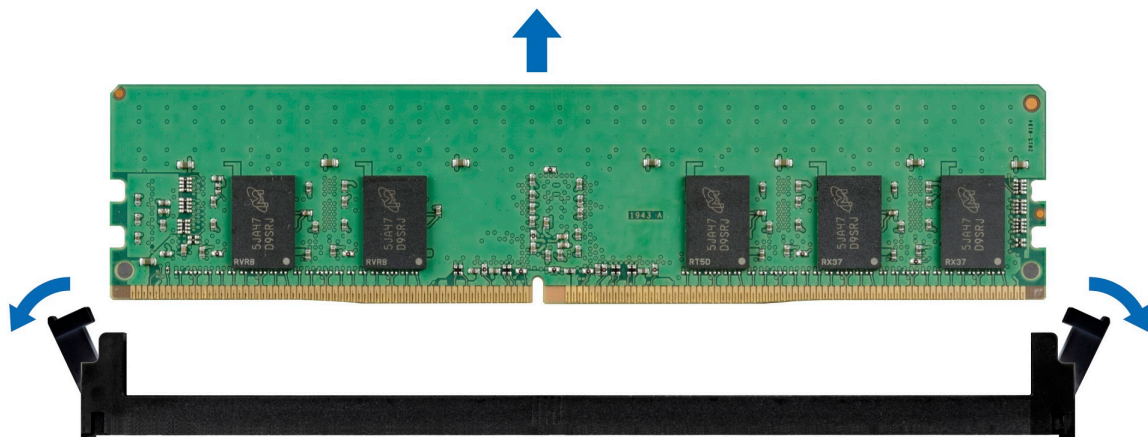


Figure 86. Removing a memory module

Next steps

1. [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 the [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.

2. If a memory module is installed in the socket, remove it.

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

- 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.

- 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 installed.

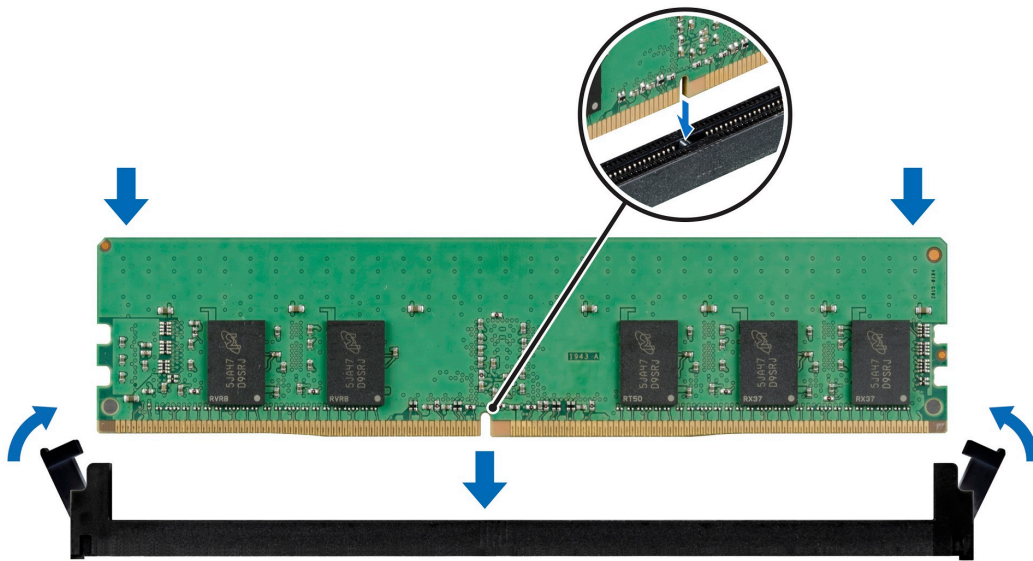


Figure 87. Installing a memory module

Next steps

- Install the air shroud.
- Follow the procedure listed in [After working inside your system](#).
- Press F2 to enter System Setup, and check the **System Memory** setting.

The **System Memory Size** indicates the installed memory.

- If the **System Memory Size** is incorrect, one or more of the memory modules may not be installed properly. Ensure that the memory modules are firmly seated in their sockets.
- Run the system memory test in the system diagnostics.

Processor and heat sink

Removing the heat sink

Prerequisites

- Follow the safety guidelines listed in the [Safety instructions](#).
- Follow the procedure listed in the [Before working inside your system](#).
- Remove the air shroud.

NOTE: The heat sink and processor are too 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. Using a Torx #T20 screwdriver, loosen the captive screws in the order mentioned on the heat sink:

NOTE: The captive screw numbers are marked on the heat sink.

- a) Partially loosen the captive screws 1 and 2 (approximately 3 turns).
 - b) Partially loosen the captive screws 3 and 4 (approximately 3 turns).
 - c) Loosen the captive screws 1 and 2 completely.
 - d) Loosen the captive screws 3 and 4 completely.
2. Lift the heat sink from the system.

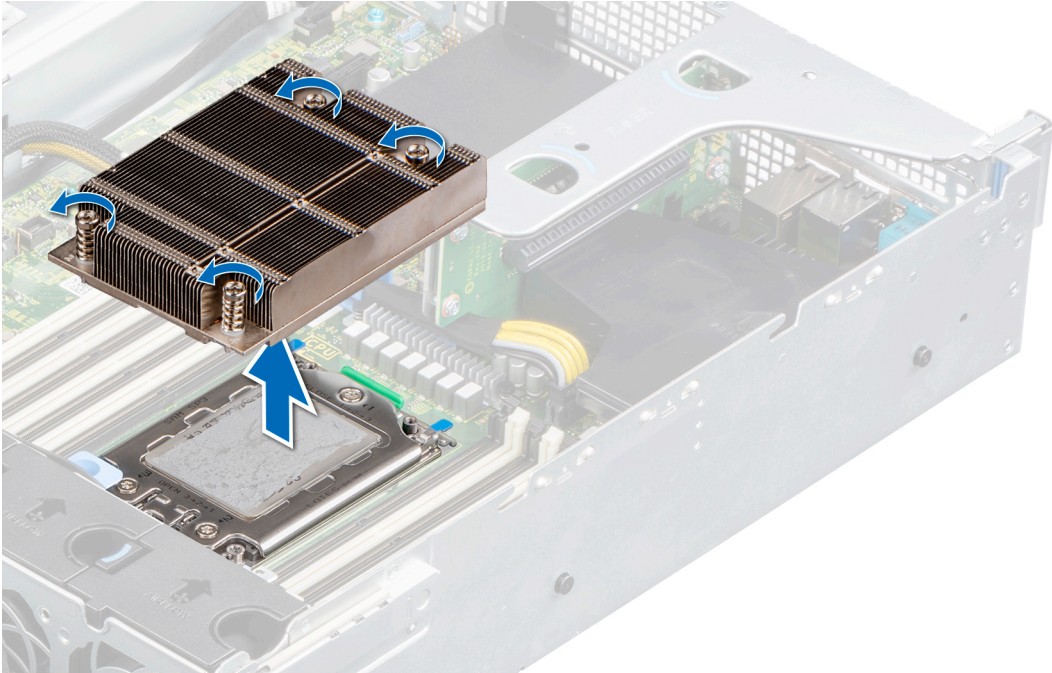


Figure 88. Removing the heat sink

Next steps

1. If you are removing a faulty heat sink, [replace the heat sink](#), if not, [remove the processor](#).

Removing the processor

Prerequisites

CAUTION: The heat sink may be hot to touch for some time after the system has been powered off. Allow the heat sink to cool before removing it.

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 air shroud](#).
4. [Remove the heat sink](#).

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. Using a Torx #T20 screwdriver, loosen the screws to release the force plate. The sequence to loosen the screws is 3, 2, and 1.

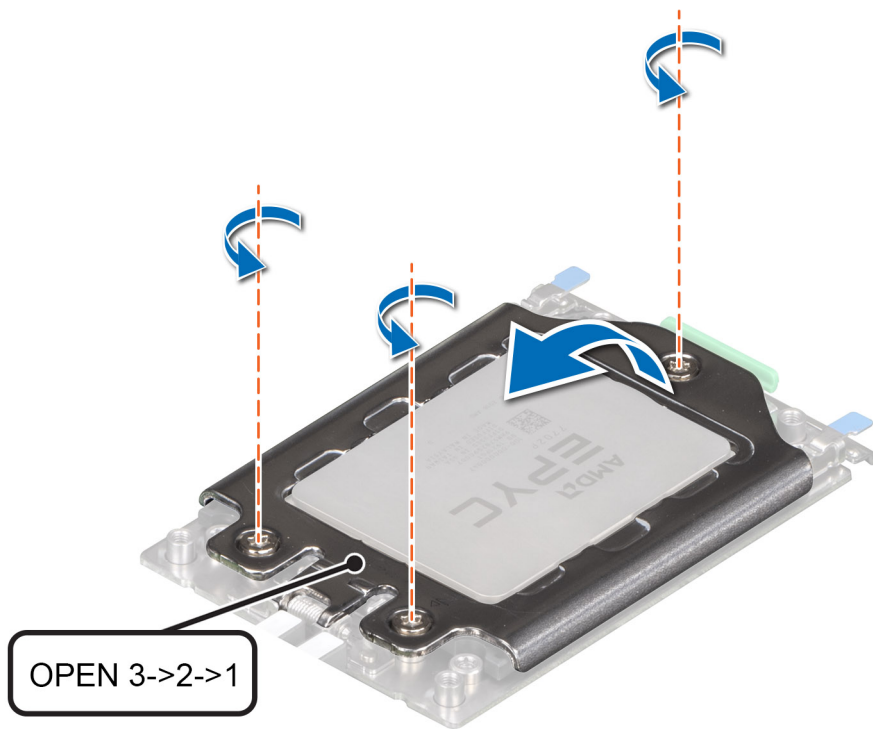


Figure 89. Removing screws on the force plate

2. Release the processor socket rail frame by lifting up the blue latches.

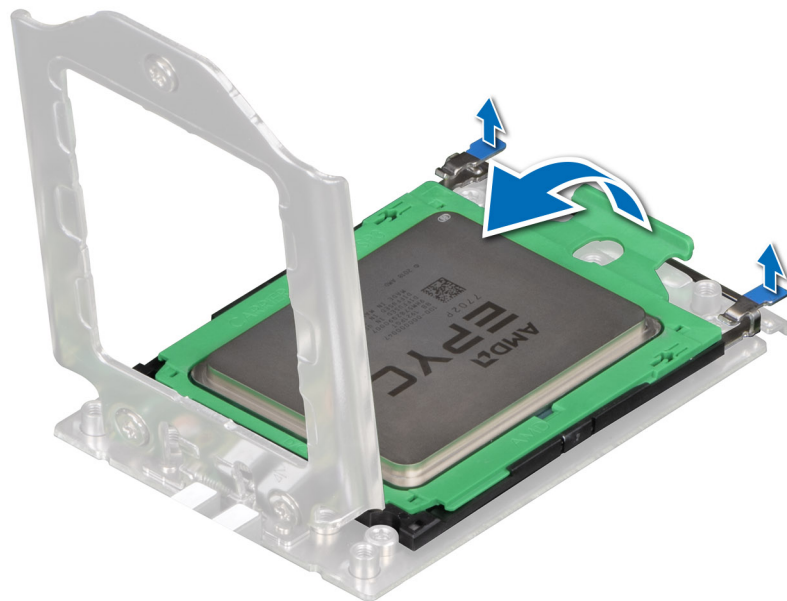


Figure 90. Lifting the rail frame

3. Holding the blue tab on the processor tray, slide the tray out of the rail frame.

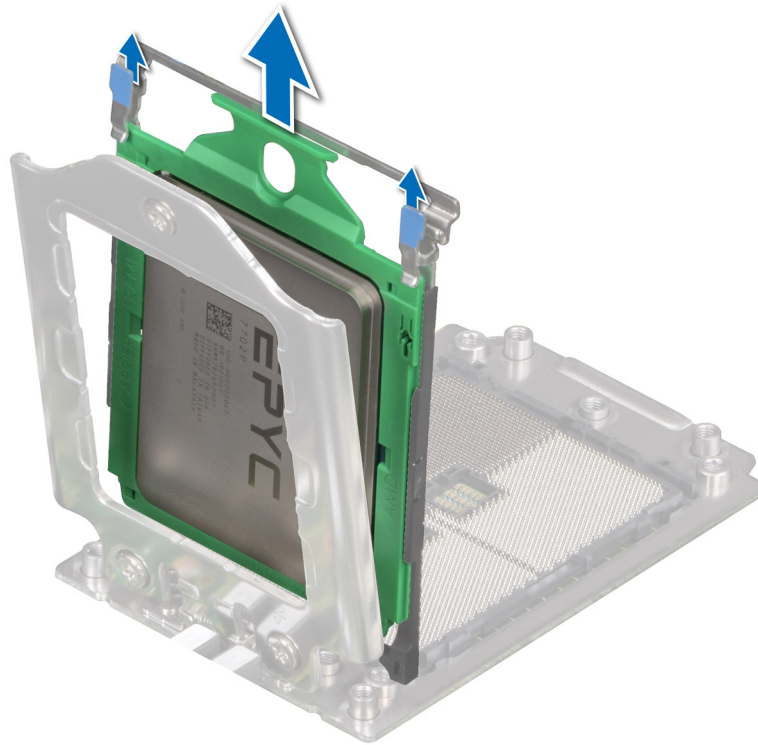


Figure 91. Removing the processor tray

Next steps

1. [Replace the processor.](#)

Installing the processor

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](#).
4. [Remove the heat sink](#).
5. If the processor has previously been used in a system, remove any remaining thermal grease from the processor by using a lint-free cloth.
6. Use the thermal grease syringe included with your processor kit to apply the 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.

Steps

1. Holding the blue tab on the processor tray, slide the tray into the processor socket rail frame until firmly seated.

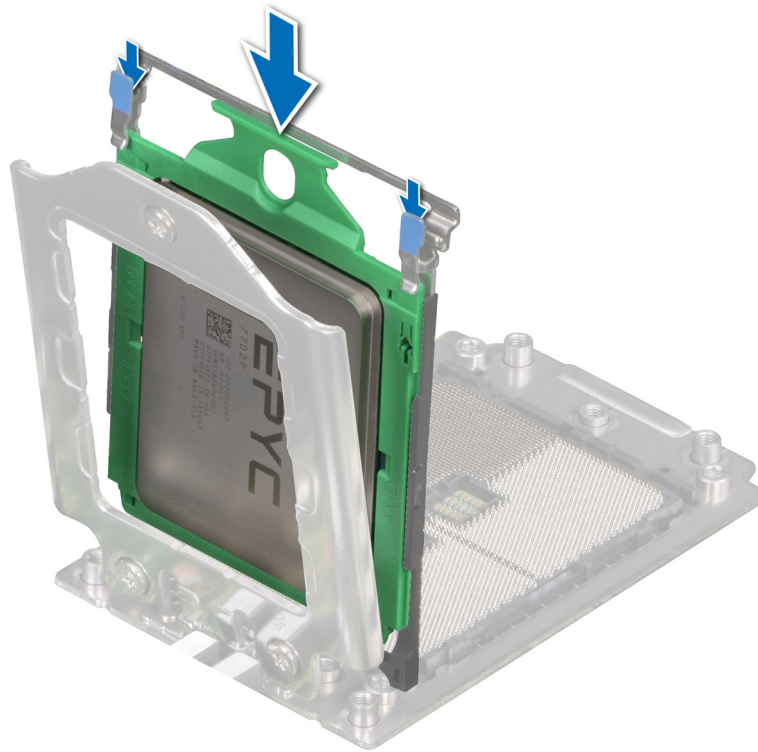


Figure 92. Placing the processor tray into the rail frame

2. Push the rail frame down until the blue latches lock into place.

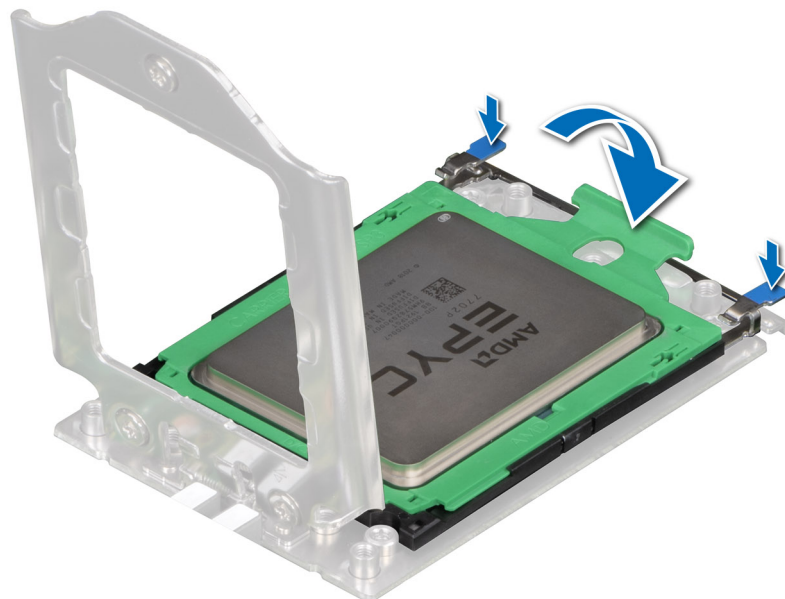


Figure 93. Closing the rail frame

3. Secure the force plate to the processor socket base by tightening the screws in the sequence 1, 2, and 3. When all three screws are fully threaded, the socket is then actuated. The three screws are tightened to a torque value of 12.0 ± 1.0 lbf-in.

NOTE: Press the force plate while tightening the screws to avoid tilting of the processor cover out of the processor socket.

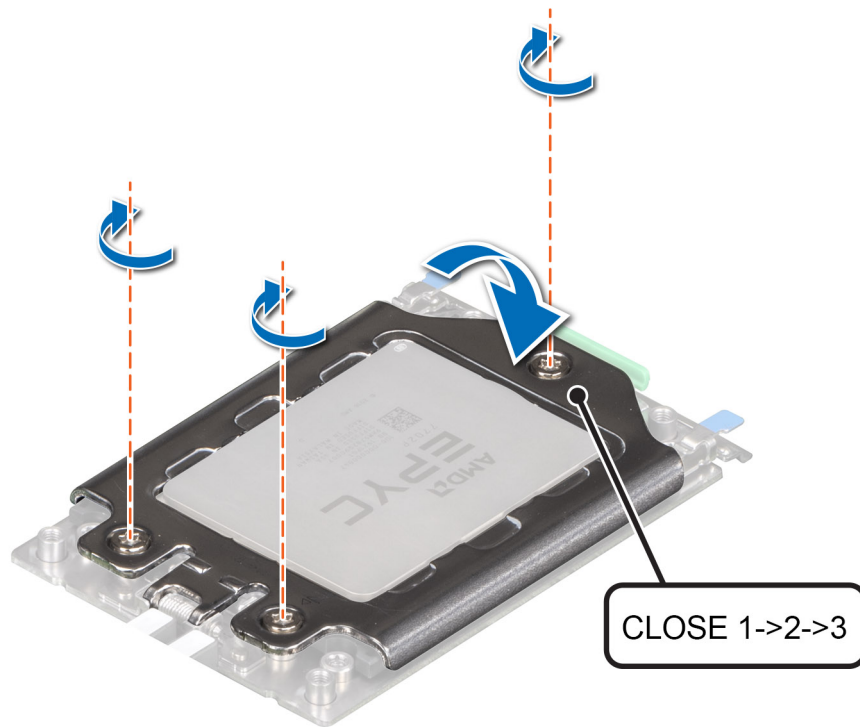


Figure 94. Securing the force plate

Next steps

1. [Install the heat sink.](#)
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

Installing the heat sink

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 air shroud.](#)

Steps

1. If you are using an existing heat sink, remove the thermal grease from the heat sink using a clean lint-free cloth.
2. Use the thermal grease syringe included with your processor kit to apply the grease in a thin spiral 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 one-time use only. Dispose the syringe after you use it.

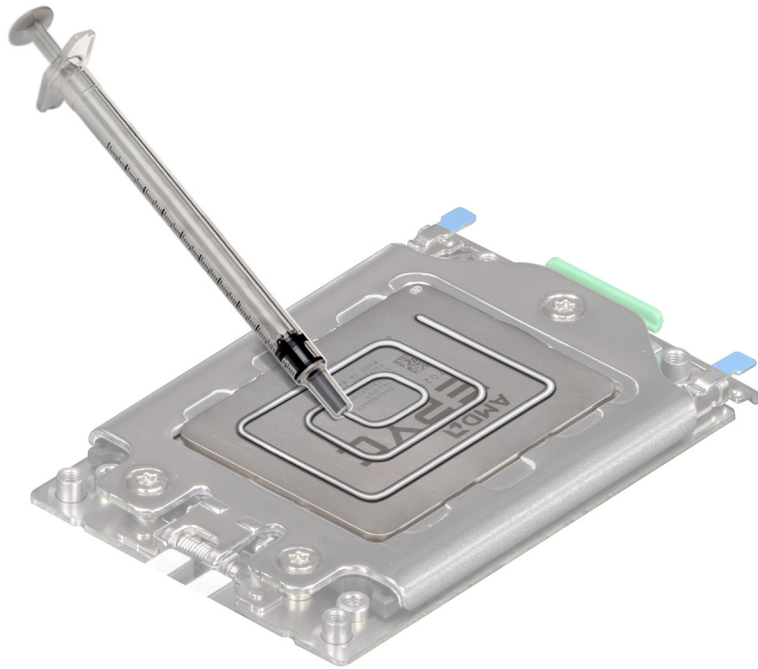


Figure 95. Applying thermal grease on the processor

3. Align the screws on the heat sink with the standoff screws on the system board.
4. Using a Torx #T20 screwdriver, tighten the captive screws in the order mentioned below:

NOTE: The captive screw numbers are marked on the heat sink.

- a) Partially tighten the captive screws 1 and 2 (approximately 3 turns).
- b) Partially tighten the captive screws 3 and 4 (approximately 3 turns).
- c) Tighten the captive screws 1 and 2 completely.
- d) Tighten the captive screws 3 and 4 completely.

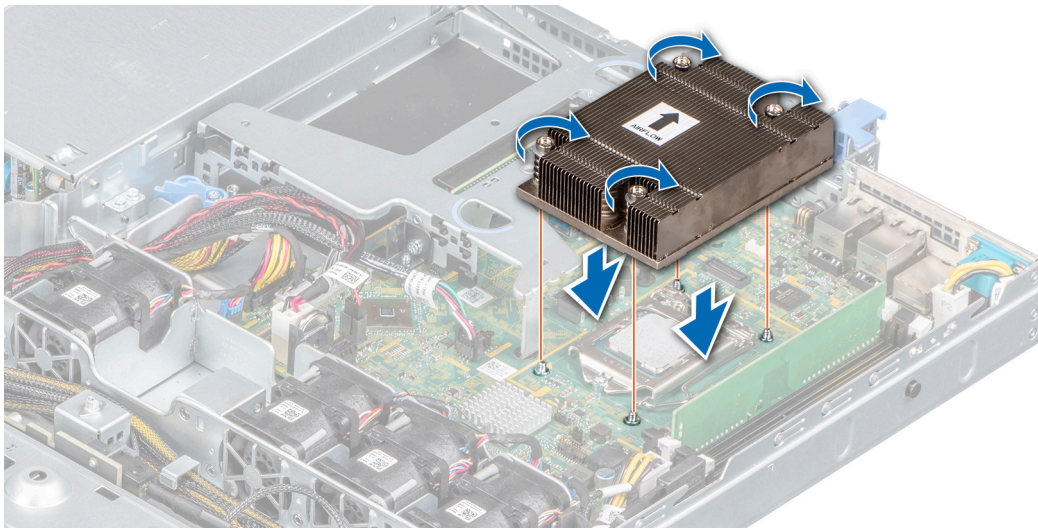


Figure 96. Installing the heat sink

5. Return to the first screw to tighten it.

Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

Expansion cards and expansion card risers

NOTE: A system event entry is logged in the iDRAC Lifecycle Controller if an expansion card riser is not supported or missing. It does not prevent your system from turning on. However, if a F1/F2 pause occurs with an error message, see *Troubleshooting expansion cards* section in the *Dell EMC PowerEdge Servers Troubleshooting Guide* at .

Expansion card installation guidelines

The following table describes the supported expansion cards:

Table 55. Expansion card riser configurations

Expansion card riser	PCIe slots on the riser	Processor connection	Height	Length	Slot width
Riser-1B (2U riser)	Slot 2	Processor 1	Full Height	Full Length	x16
Riser-1B (2U riser)	Slot 3	Processor 1	Full Height	Full Length	x16
Riser-1A (low profile riser right)	Slot 2	Processor 1	Low Profile	Half Length	x16
Riser-2 (low profile riser left)	Slot 3	Processor 1	Low Profile	Half Length	x16

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 56. Riser configurations: No riser - CPU

Card Type	Slot Priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L (FXN)	1	1
LOM riser ; 2x10G BCM57416 (BASeT/SFP +) (FXN)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
GPU: Nvidia T4 16GB	4, 5	2
PCIe SSD PCIe Card (SAMSUNG)	4, 5	2
HBA: FC32 (Emulex)	4, 5	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	4, 5	2
NIC: 100Gb (Mellanox)	4, 5	2
HBA: FC16 (Emulex, QLogic)	4, 5	2
NIC: 10Gb (Intel/Broadcom)	4, 5	2
NIC: 1Gb (Broadcom/Intel)	4, 5	2
PERC 10: External Adapter (Dell)	4, 5	1
HBA: External Adapter (Dell)	4, 5	1
Internal Storage (Dell)	4, 5	1
PERC 10: Mini mono/PERC 9: Mini mono/HBA: Mini mono (Dell)	Integrated Slot	1

Table 57. Riser configurations: Riser 1A + Riser 2 - CPU

Card type	Slot priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L	1	1

Card type	Slot priority	Maximum number of cards
LOM riser ; 2x10G BCM57416 (BASeT/SFP +)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
GPU: Nvidia T4 16GB	2, 3	2
PCIe SSD PCIe Card (Samsung)	2, 3	2
HBA: FC32 (Emulex)	2, 3	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	2, 3	2
NIC: 100Gb (Mellanox)	2, 3	2
HBA: FC16 (Emulex/QLogic)	2, 3	2
NIC: 10Gb (Intel/Broadcom/Mellanox)	2, 3	2
NIC: 1Gb (Broadcom/Intel)	2, 3	2
PERC 10: External Adapter (Dell)	2, 3	1
HBA: External Adapter (Dell)	2, 3	1
Internal Storage (Dell)	2, 3	1
PERC 10: Mini mono/PERC 9: Mini mono/ HBA: Mini mono (Dell)	Integrated Slot	1

Table 58. Riser configurations: Riser 1B - CPU

Card type	Slot priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L	1	1
LOM riser ; 2x10G BCM57416 (BASeT/SFP +)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
FPGA: XILINX FH	3	1
GPU: Nvidia T4 16GB	2, 3	2
NIC: 100Gb (Mellanox)	2, 3	2
HBA: FC32 (Emulex)	2, 3	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	2, 3	2
HBA: FC16 (Emulex/QLogic)	2, 3	2
NIC: 10Gb (Intel/Broadcom/QLogic/Marvell)	2, 3	2
NIC: 1Gb (Broadcom/Intel)	2, 3	2
PERC 10: External Adapter (Dell)	2, 3	2
HBA: External Adapter (Dell)	2, 3	1
Internal Storage FH (Dell)	2, 3	1
PCIe SSD PCIe Card (SAMSUNG/Intel)	2, 3, 4, 5	4
HBA: FC32 (Emulex)	4, 5	2
NIC: 100Gb (Mellanox)	4, 5	2
GPU: Nvidia T4 16GB	4, 5	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	4, 5	2

Card type	Slot priority	Maximum number of cards
HBA: FC16 (Emulex/Qlogic)	4, 5	2
NIC: 10Gb (Intel/Broadcom)	4, 5	2
HBA: FC16 (Emulex/QLogic)	4, 5	2
NIC: 1Gb (Broadcom/Intel)	4, 5	2
NIC: 10Gb (Intel/Broadcom/QLogic/Marvell)	4, 5	2
PERC 10: External Adapter (Dell)	4, 5	1
HBA: External Adapter (Dell)	4, 5	1
Internal Storage FH (Dell)	4, 5	1
PERC 10: Mini mono/PERC 9: Mini mono/ HBA: Mini mono (Dell)	Integrated Slot	1

Removing the expansion card riser

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 air shroud](#).
4. If installed, [remove the rear drive cage](#).
5. Disconnect any cables connected to the expansion card.
6. If installed, remove the PCIe filler bracket.

Steps

For riser 2, holding the blue touch points, lift the expansion card riser from the system.

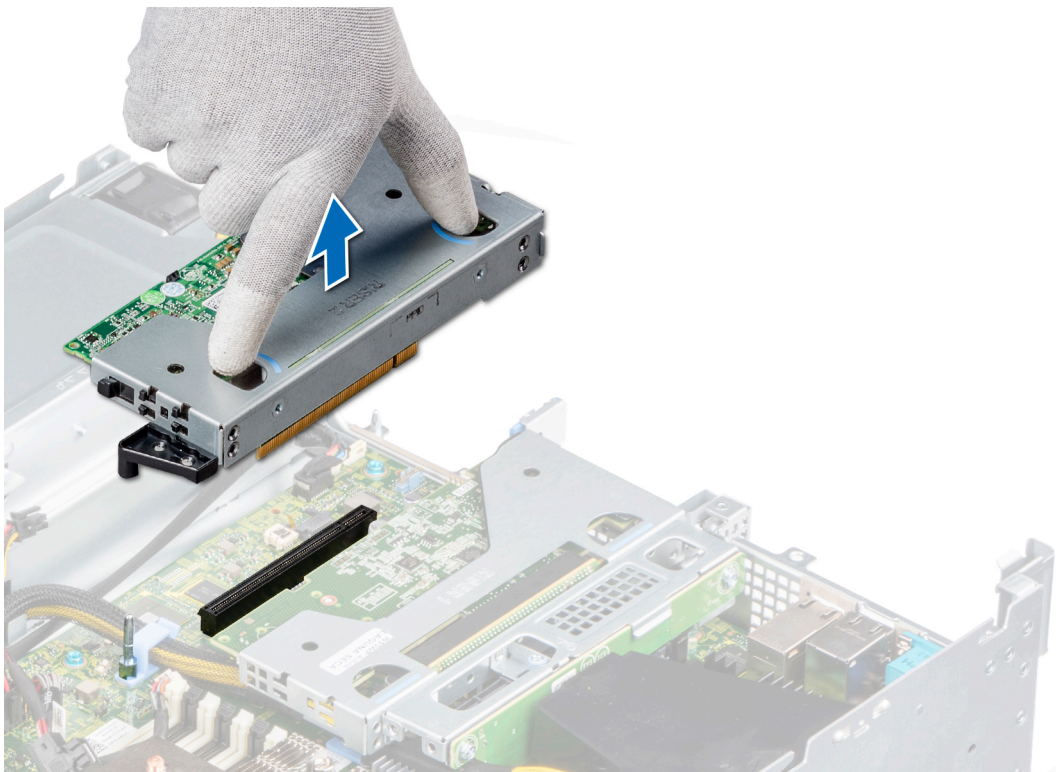


Figure 97. Removing the riser 2

- a) For the riser 1A, loosen the captive screw and then holding the blue touch points lift the riser from the system.

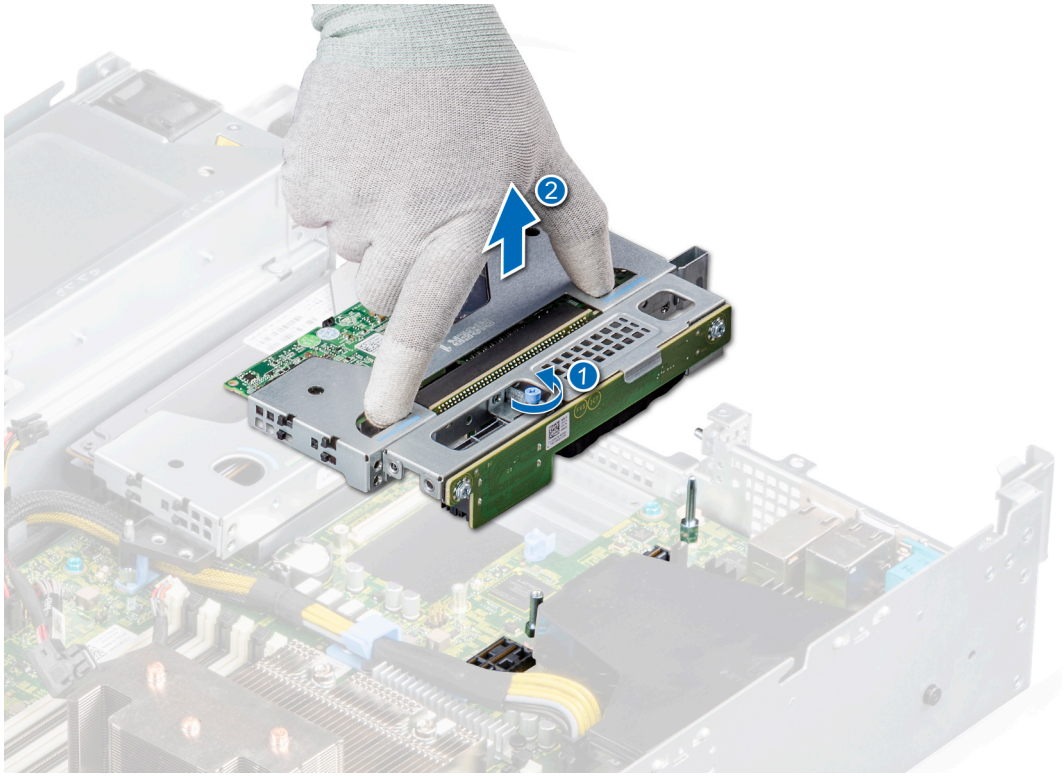


Figure 98. Removing the riser 1A

b) For the riser 1B,

1. Using a Phillips #2 screwdriver, loosen the captive screws securing the riser to the system board and the chassis.
2. Holding the touch points, lift the riser from the system.

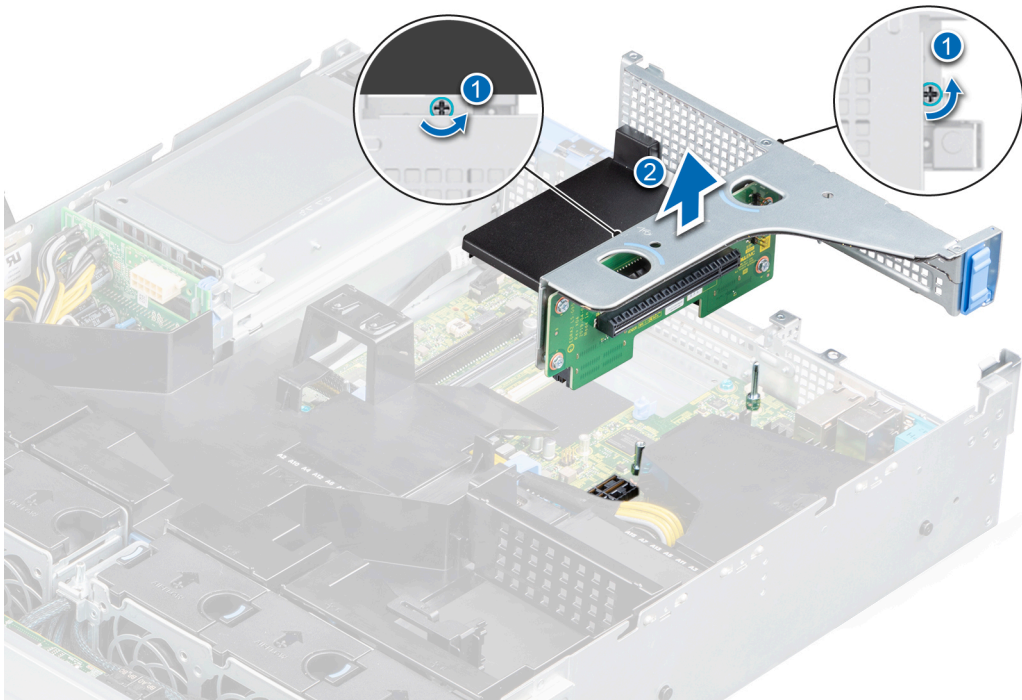


Figure 99. Removing the riser 1B

Next steps

1. [Replace the expansion card riser.](#)

Installing the expansion card riser

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 air shroud](#).
4. If installed, [remove the rear drive cage](#).
5. Disconnect any cables connected to the expansion card.
6. If installed, remove the PCIe filler bracket.
7. If applicable, [install the expansion card in the expansion card riser](#).

Steps

1. Align the guide on the expansion card riser with the guide pin on the chassis.
2. Lower the expansion card riser until the expansion card is firmly seated in the slot.

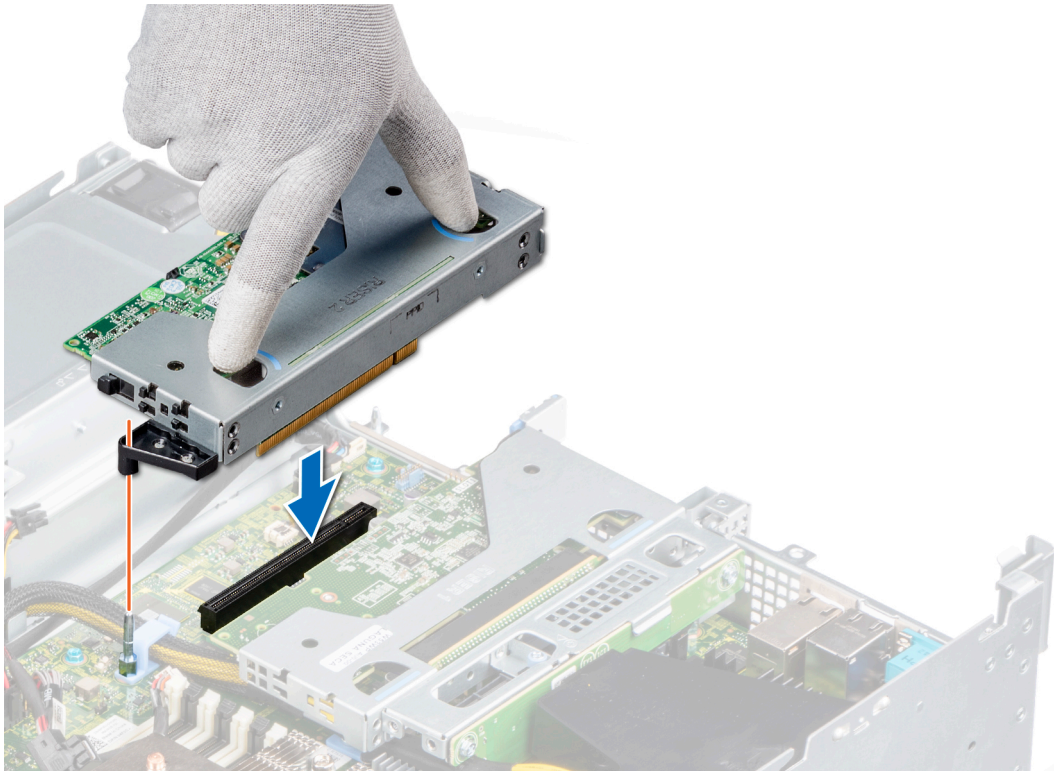


Figure 100. Installing the riser 2

- a) For the riser 1A, tighten the captive screw to secure the riser to the system board.

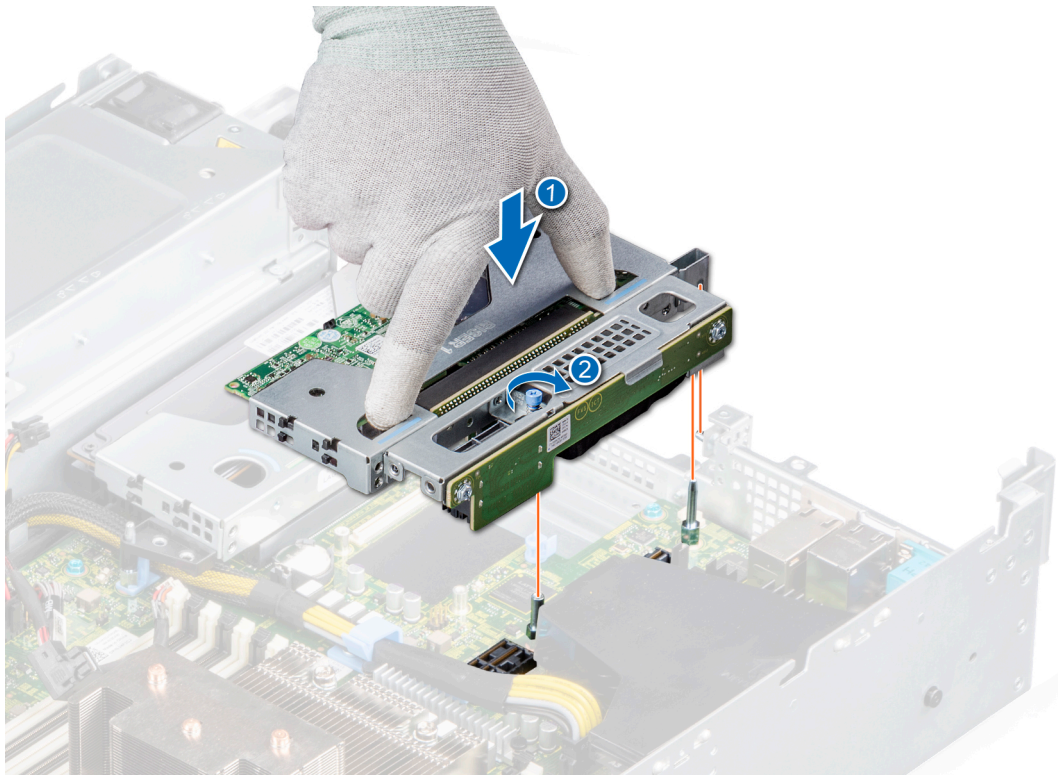


Figure 101. Installing the riser 1A

b) For the riser 1B, tighten the captive screws of the riser to fit the riser firmly to the system board and the chassis.

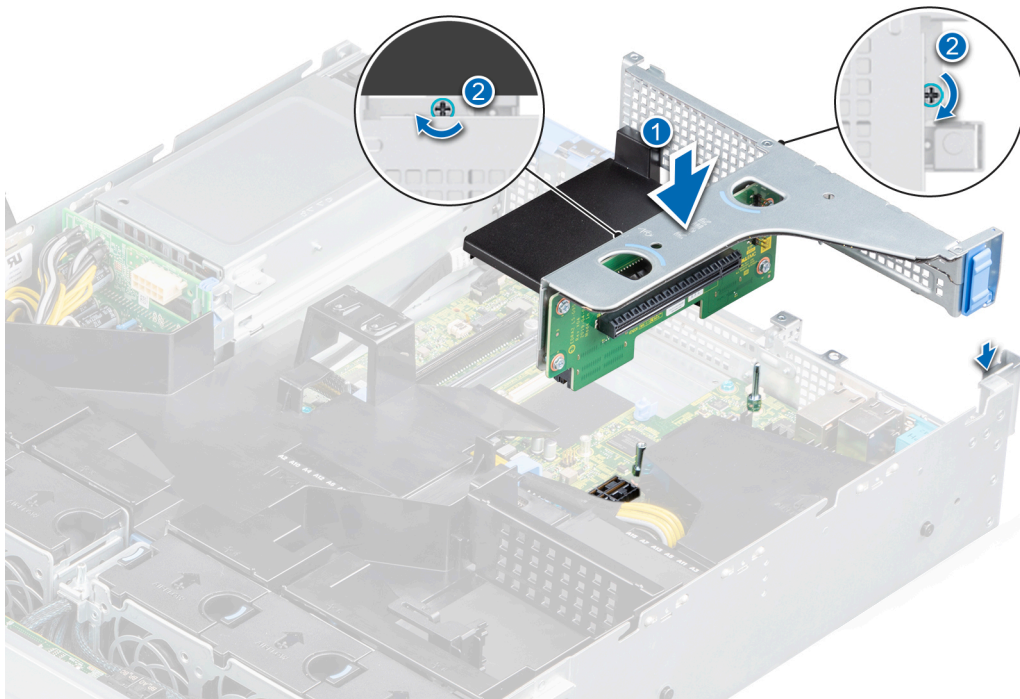


Figure 102. Installing the riser 1B

Next steps

1. [Install the rear drive cage.](#)
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

Removing an expansion 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 air shroud](#).
4. Disconnect any cables connected to the expansion card.
5. If installed, [remove the rear drive cage](#).

Steps

1. Pull and lift to open the expansion card retention latch lock.
2. Hold the expansion card by the edges and pull it to disconnect it from the connector on the system board..

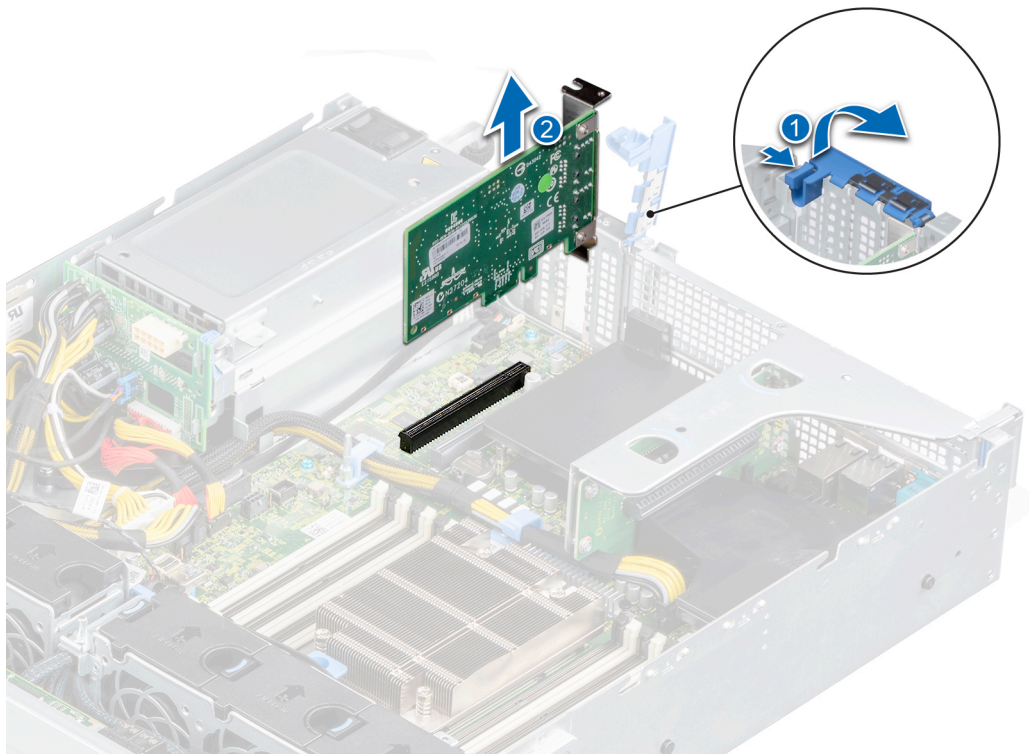


Figure 103. Removing an expansion card from the system board

3. If the expansion card is not going to be replaced, install a filler bracket by performing the following steps:

NOTE: If you are removing the card permanently, install a filler bracket in the empty expansion card slot.

- a) Pull and lift to open the expansion card retention latch.
- b) Install a filler bracket in the empty expansion card slot and close the retention latch.

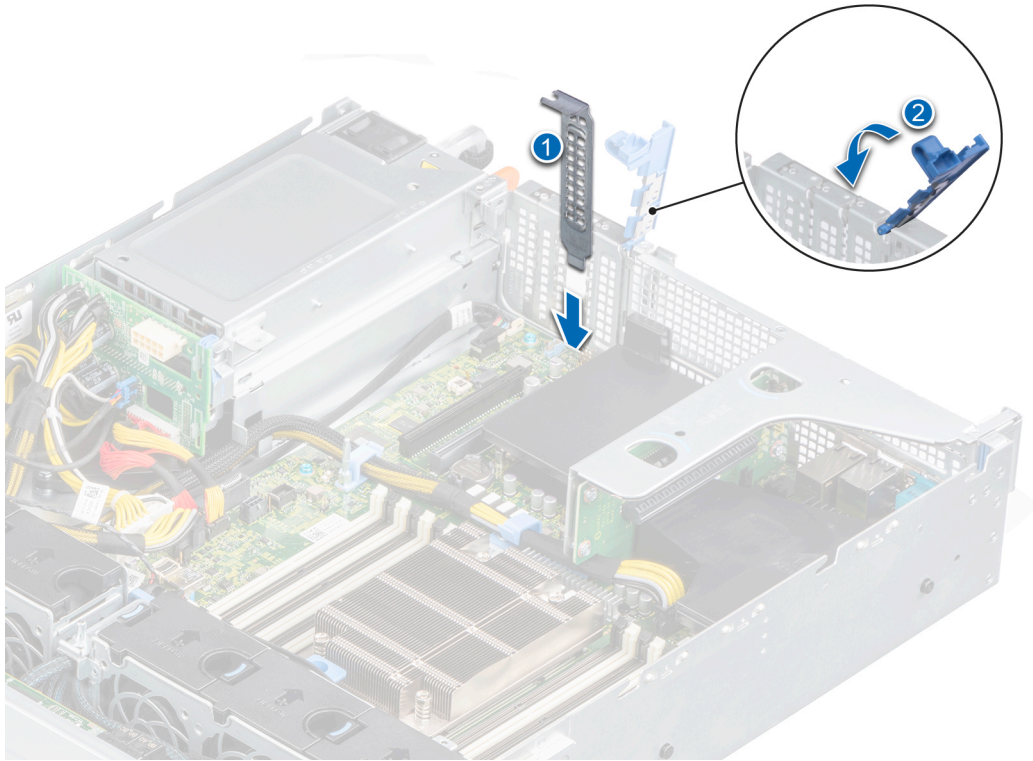


Figure 104. Installing the filler bracket

NOTE: Filler brackets must be installed over 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.

Next steps

Install an expansion card.

Installing an expansion 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 air shroud](#).
4. Disconnect any cables connected to the expansion card.
5. If installed, [remove the rear drive cage](#).

Steps

1. Unpack the expansion card and prepare it for installation.
For instructions, see the documentation accompanying the card.
2. If you are installing a new card, remove the filler bracket.
 - a) Pull and lift to open the expansion card retention latch.
 - b) Remove the filler bracket.

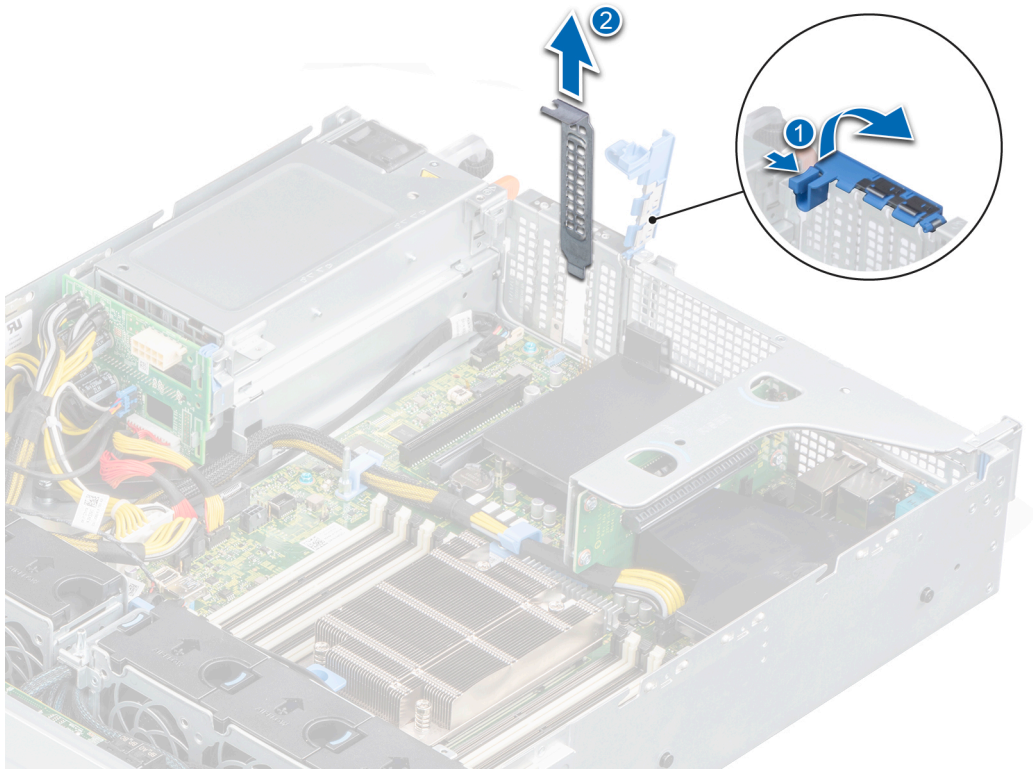


Figure 105. Removing the filler bracket

i **NOTE:** Store the filler 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.

3. Holding the card on the edges, align the card with the expansion card connector on the system board.
4. Press the expansion card until it is firmly seated in the slot on the system board.
5. Close the expansion card retention latch.

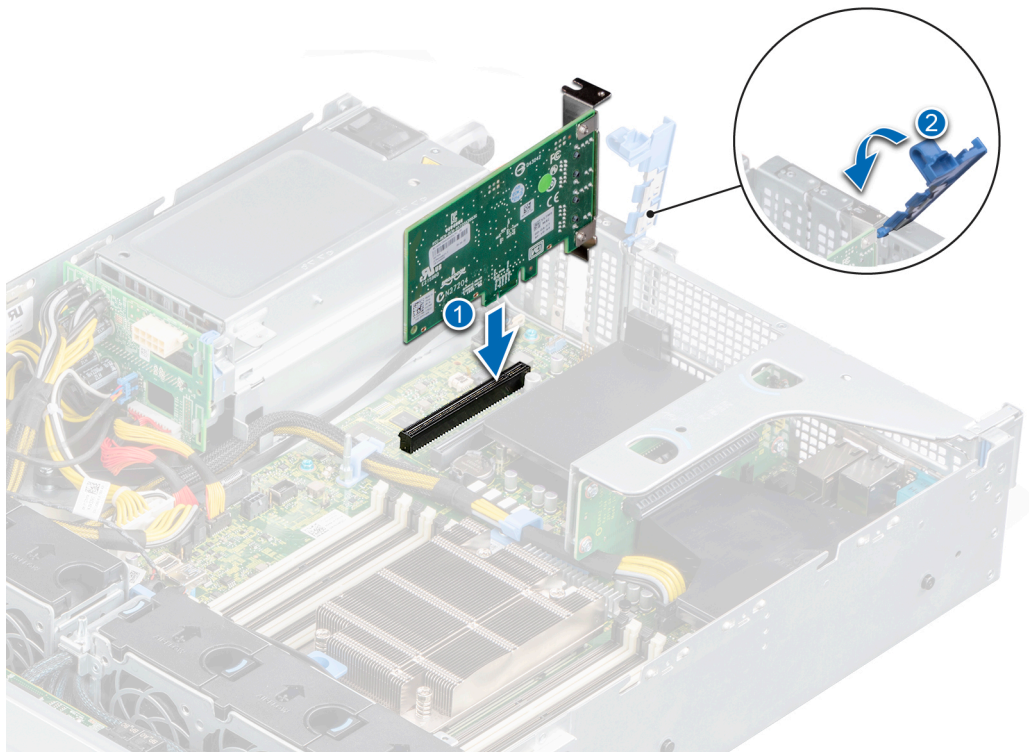


Figure 106. Installing an expansion card on the system board

Next steps

1. Connect the required cables to the expansion card.
2. If removed, [install the rear drive cage](#).
3. [Install the air shroud](#).
4. Follow the procedure listed in [After working inside your system](#).

Removing an expansion card from the expansion card riser

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. Disconnect any cables that are connected to the expansion card or expansion card riser.
4. [Remove the air shroud](#).
5. [Remove the expansion card riser](#).

i **NOTE:** The procedure to remove expansion card from riser 1A, riser 2, or riser 1B is identical.

Steps

1. Pull and lift to open the expansion card retention latch.
2. Hold the expansion card by its edges, and pull the card from the expansion card connector on the riser.

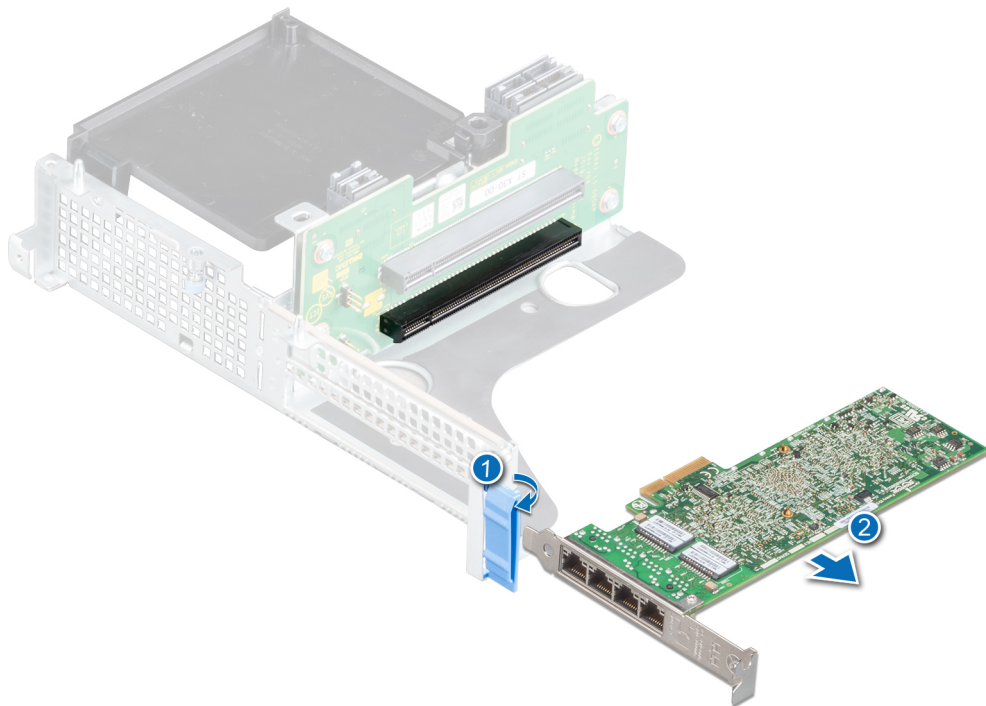


Figure 107. Removing the expansion card from riser 1B

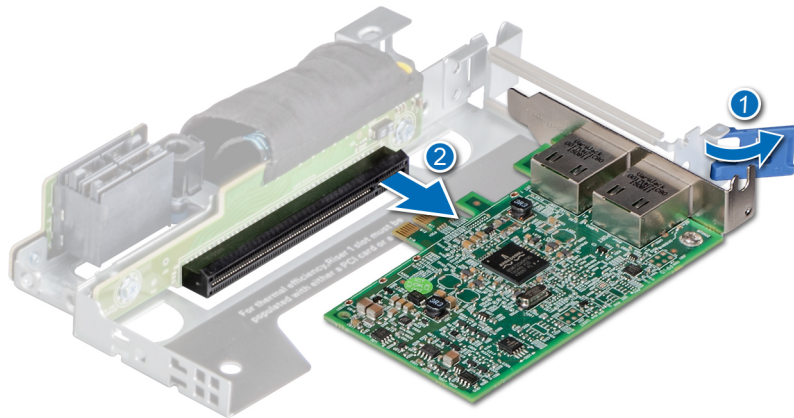


Figure 108. Removing the expansion card from riser 1A

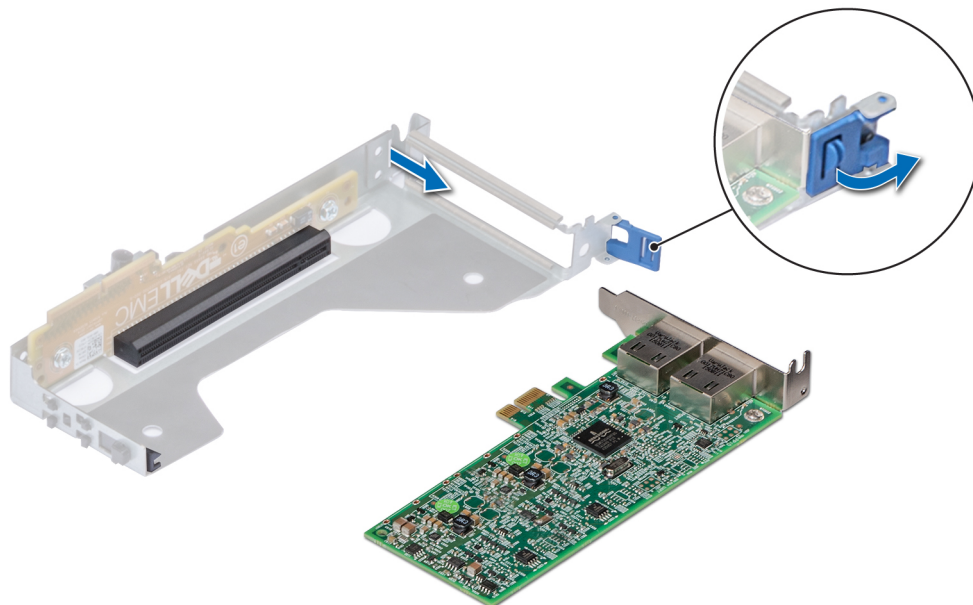


Figure 109. Removing the expansion card from riser 2

3. Install a filler bracket if you are not replacing the expansion card.

NOTE: You must install a filler bracket over an empty expansion card slot to maintain Federal Communications Commission (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.

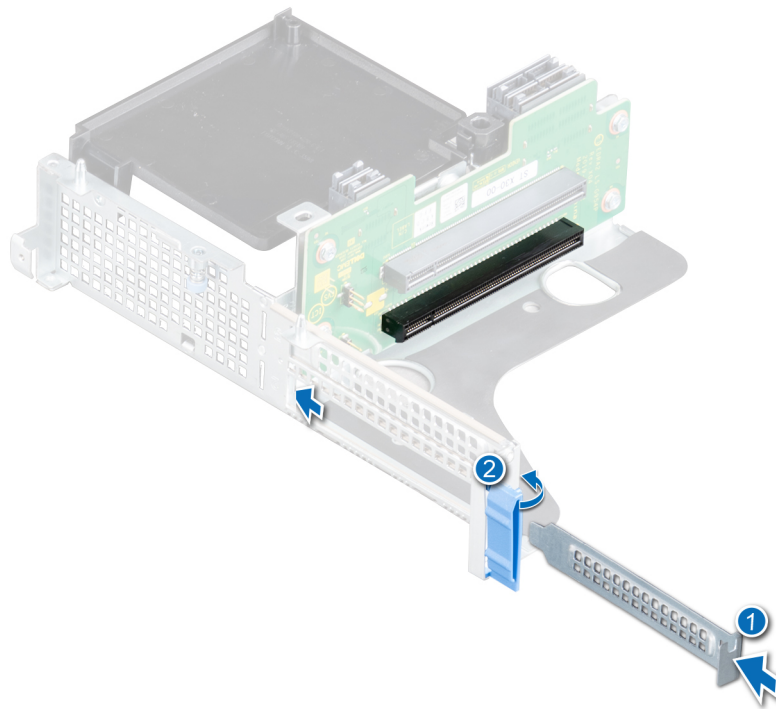


Figure 110. Installing a filler bracket for riser 1B

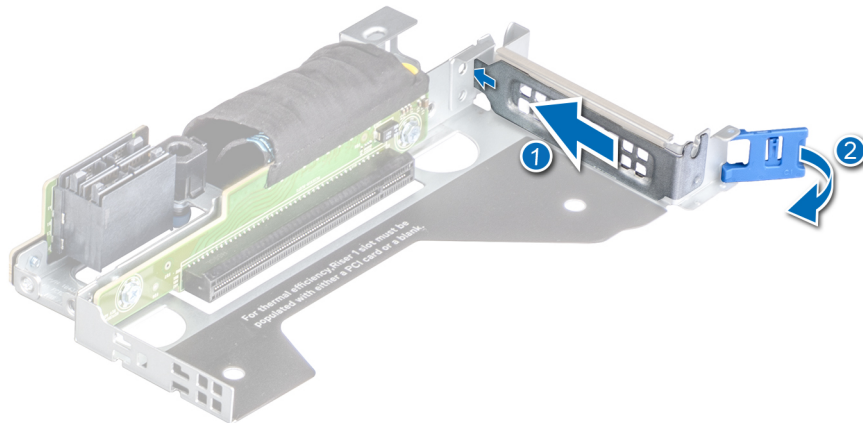


Figure 111. Installing a filler bracket for riser 1A

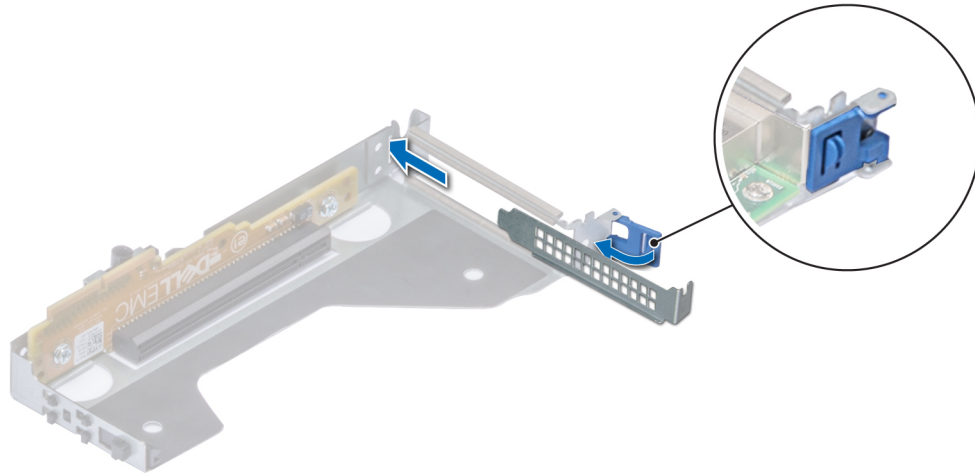


Figure 112. Installing a filler bracket for riser 2

Next steps

1. [Install the expansion card into the expansion card riser.](#)

Installing an expansion card into the expansion card riser

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. If installing a new expansion card, unpack it and prepare the card for installation.

NOTE: For instructions, see the documentation accompanying the card.

4. [Remove the expansion card riser.](#)
5. If installed, remove the filler bracket.

NOTE: The procedure to install expansion card into the riser 1A, riser 2, or riser 1B is identical.

Steps

1. Pull and lift to open the expansion card retention latch lock.
2. If installed, remove the filler bracket.

NOTE: Store the filler bracket for future use. Filler brackets must be installed in empty expansion card slots to maintain Federal Communications Commission (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.

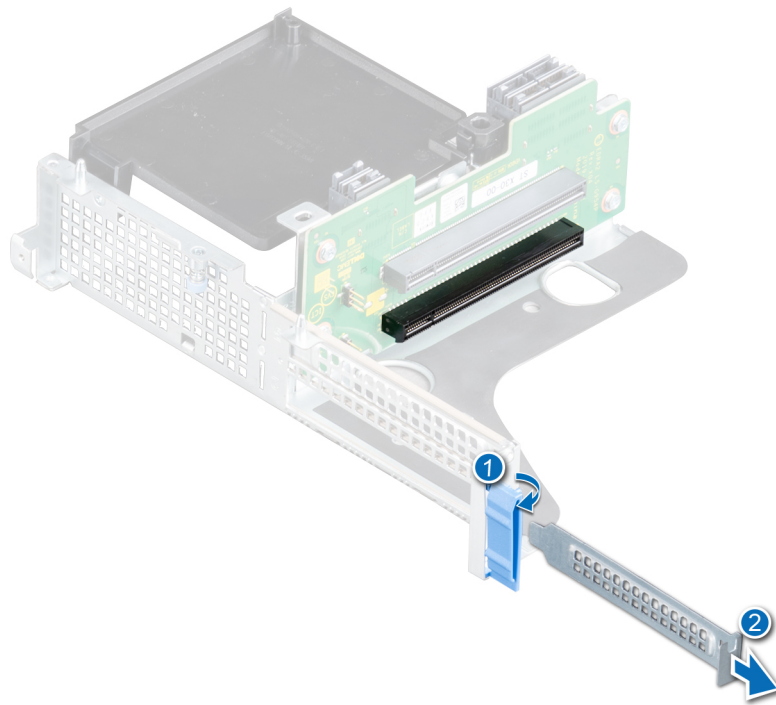


Figure 113. Removing a filler bracket for a riser 1B

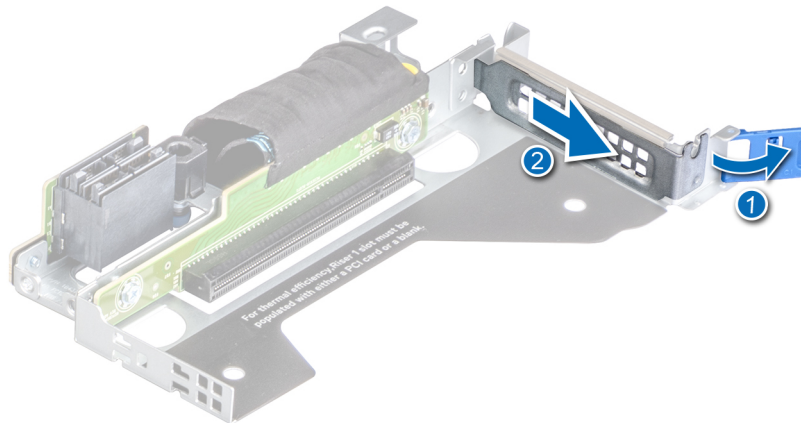


Figure 114. Removing a filler bracket for a riser 1A

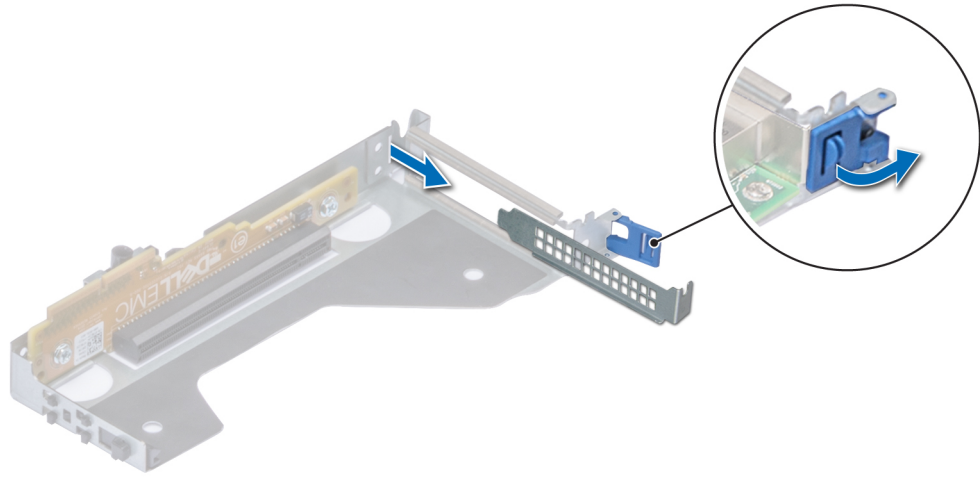


Figure 115. Removing a filler bracket for a riser 2

3. Holding the card by its edges, align the card and insert the expansion card in the connector on the expansion card riser.
4. Close the expansion card retention latch.

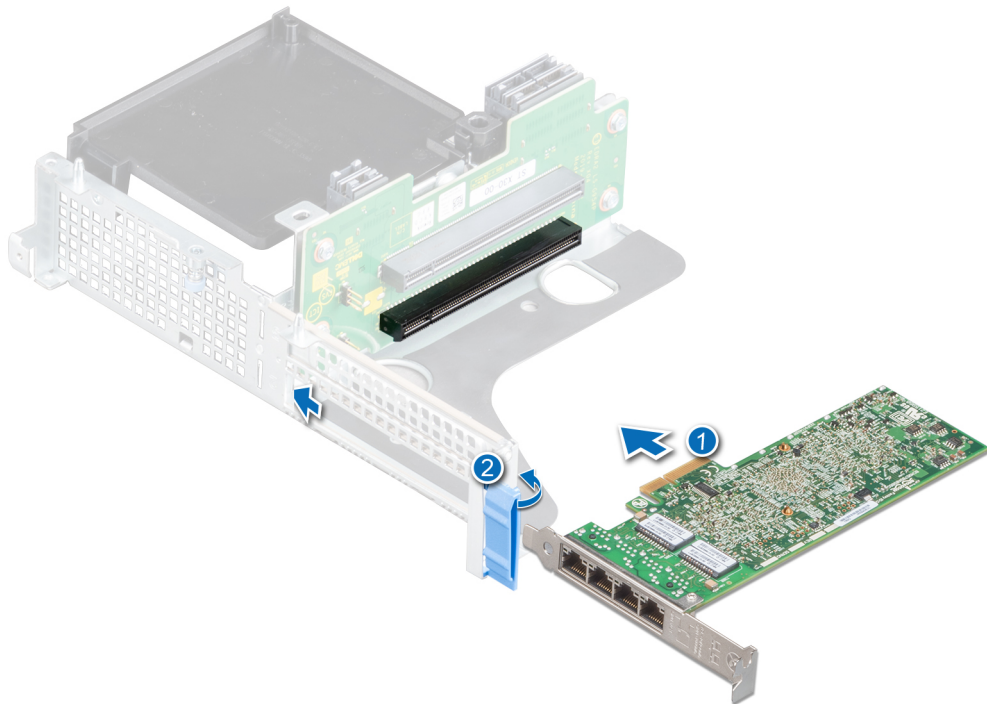


Figure 116. Installing the expansion card into a riser 1B

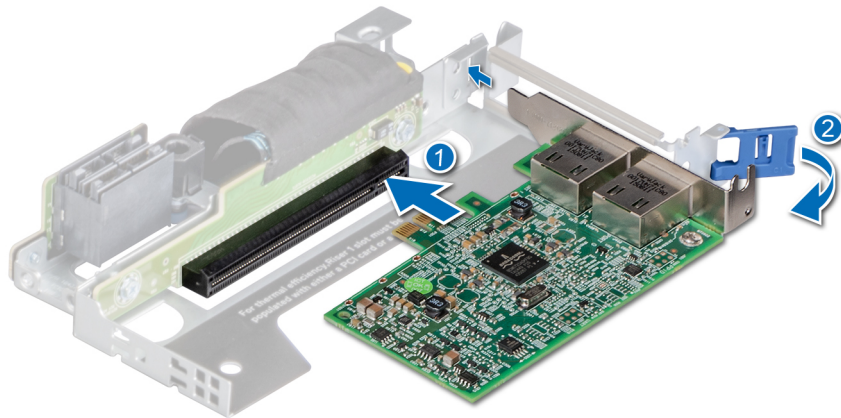


Figure 117. Installing the expansion card into a riser 1A

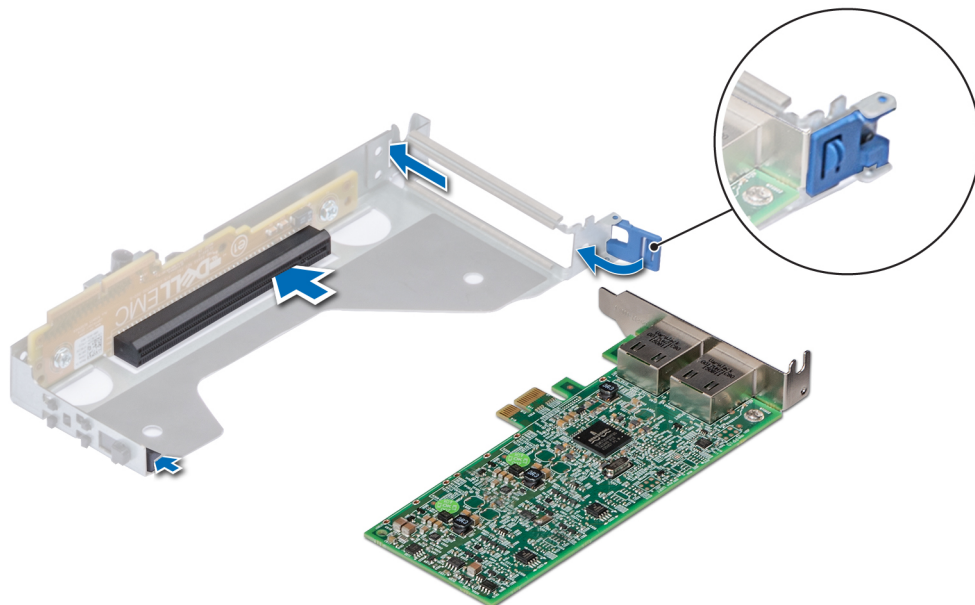


Figure 118. Installing the expansion card into a riser 2

Next steps

1. [Install the expansion card riser.](#)
2. [Install the air shroud.](#)
3. Follow the procedure listed in [After working inside your system.](#)

M.2 SSD module

Removing the M.2 SSD 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 air shroud.](#)

4. Remove the BOSS card from the riser.

NOTE: The procedure to remove the BOSS card is similar to removing an expansion card.

Steps

1. Using the Phillips #1 screwdriver, remove the screws that secure the M.2 SSD module to the BOSS card.
2. Pull the M.2 SSD module to remove it from the BOSS card.

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

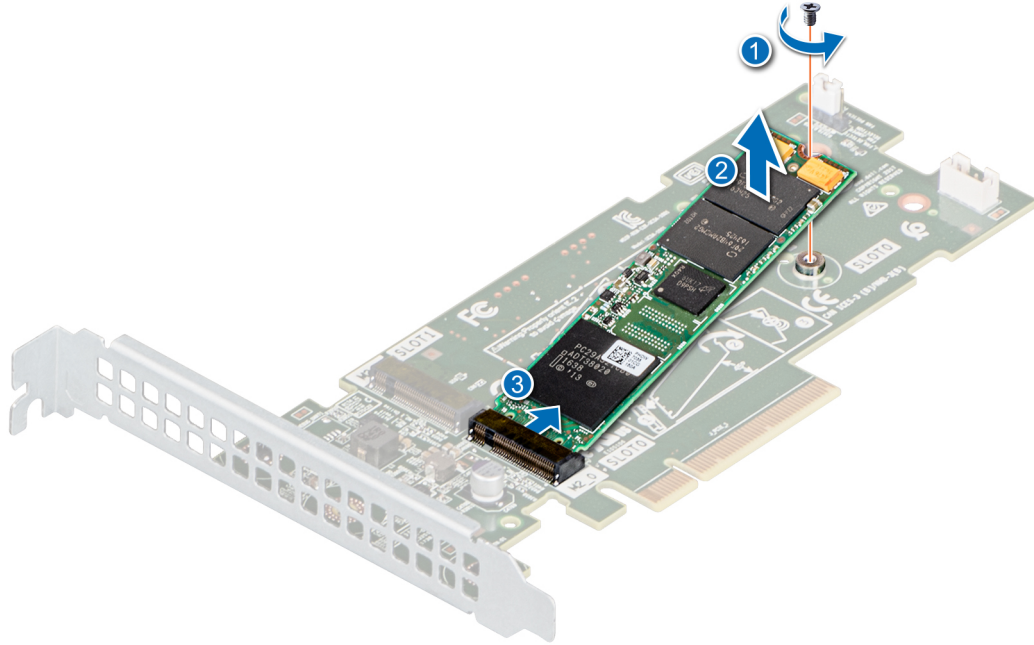


Figure 119. Removing the M.2 SSD module

Next steps

Replace the M.2 SSD module.

Installing the M.2 SSD 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 air shroud](#).
4. [Remove the BOSS card](#) from the riser.

NOTE: The procedure to remove the BOSS card is similar to removing an expansion card.

Steps

1. Align the M.2 SSD module at an angle with the BOSS card connector.
2. Insert the M.2 SSD module until it is firmly seated in the BOSS card connector.
3. Using the Phillips #1 screwdriver, secure the M.2 SSD module on the BOSS card.

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

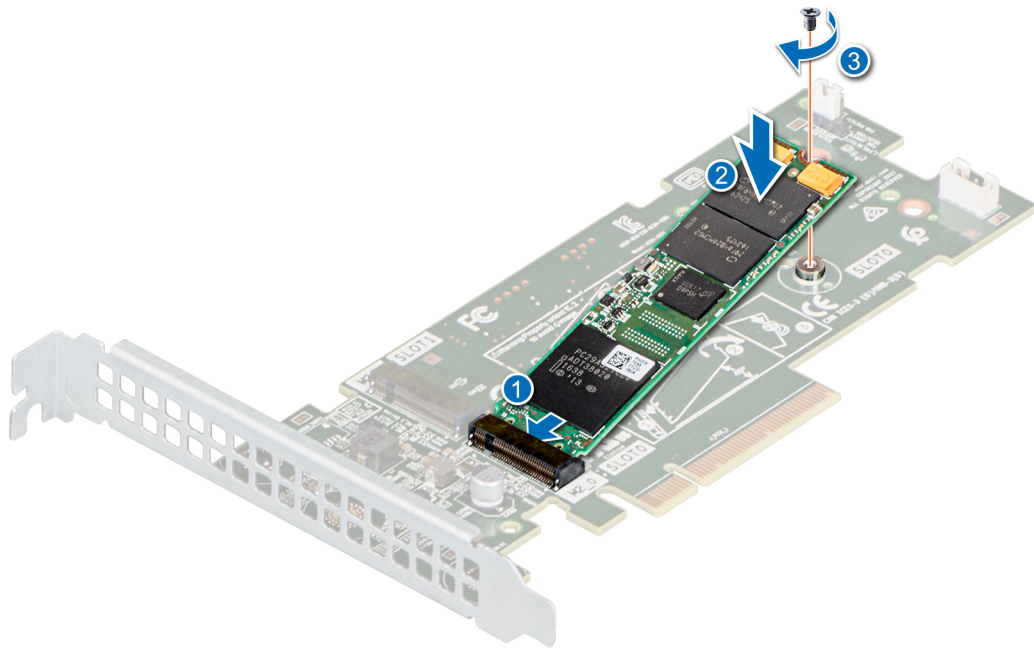


Figure 120. Installing the M.2 SSD module

Next steps

1. Install the BOSS card into the riser.
NOTE: The procedure to install the BOSS card is similar to removing an expansion card.
2. Install expansion card riser
3. Install the air shroud.
4. Follow the procedure listed in [After working inside your system](#).

Optional IDSDM module

Removing the IDSDM 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 air shroud](#).
4. If you are replacing the IDSDM card, [remove the MicroSD cards](#).
NOTE: Temporarily label each SD card with its corresponding slot number before removal. Reinstall the SD cards into the corresponding slots.

Steps

Holding the pull tab, lift the IDSDM card out of the system.

- NOTE:** There are two dip switches on the IDSDM card for write-protection.

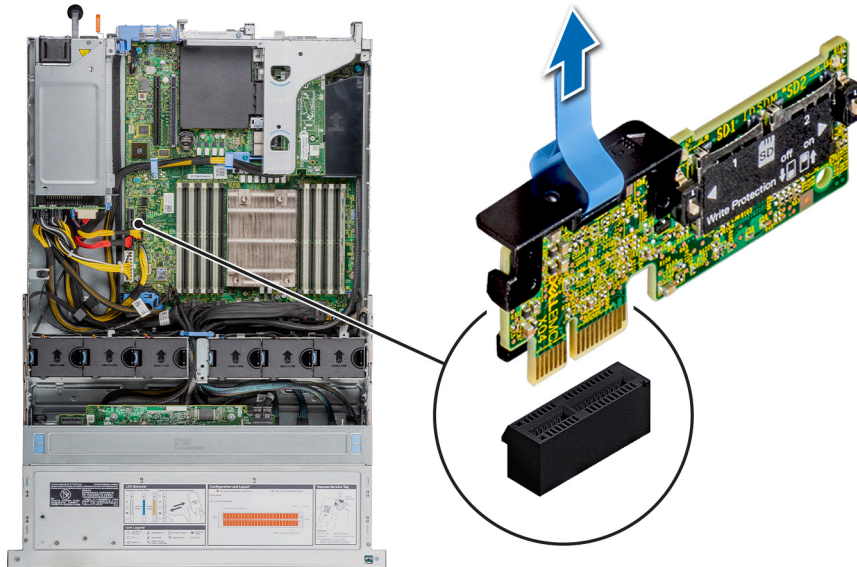


Figure 121. Removing the IDSDM card

Next steps

NOTE: If you are replacing the IDSDM module, remove the MicroSD cards.

1. Replace the IDSDM module.

Installing IDSDM 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 air shroud](#).
4. If you are replacing the IDSDM card, [remove the MicroSD cards](#).

NOTE: Temporarily label each SD card with its corresponding slot number before removal. Reinstall the SD cards into the corresponding slots.

Steps

1. Locate the IDSDM connector on the system board. To locate IDSDM connector, see [System board jumpers and connectors](#) section.
2. Align the IDSDM card with the connector on the system board.
3. Push the IDSDM card until it is firmly seated on the system board.

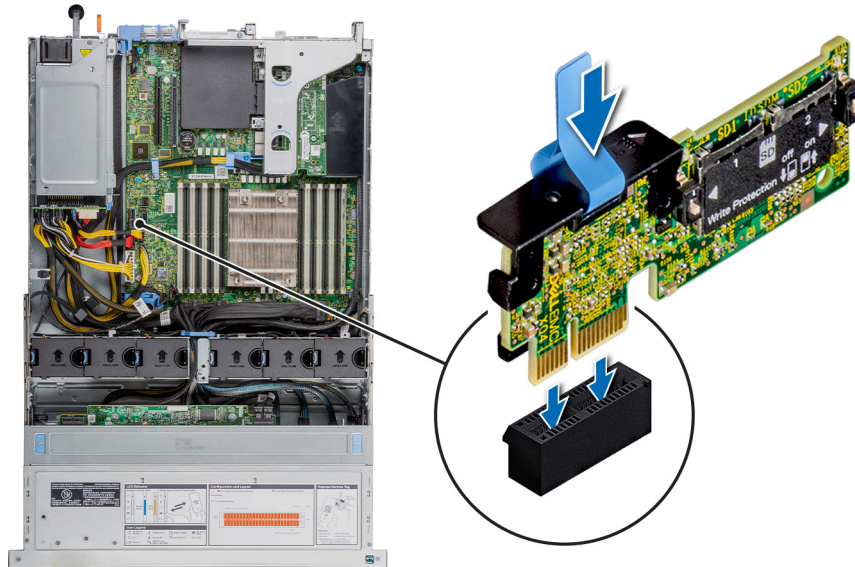


Figure 122. Installing IDSDM card

Next steps

1. Install the MicroSD cards.
NOTE: Reinstall the MicroSD cards into the same slots that are based on the labels you had marked on the cards during removal.
2. Install the air shroud.
3. Follow the procedure listed in [After working inside your system](#).

Micro SD card

Removing the MicroSD 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 air shroud](#).
4. [Remove the IDSDM module](#).

Steps

1. Locate the MicroSD card slot on the IDSDM module, and press the card to partially release it from the slot. To locate IDSDM module, see the [System board jumpers and connectors](#) section.
2. Hold the MicroSD card and remove it from the slot.

NOTE: Temporarily label each MicroSD card with its corresponding slot number after removal.

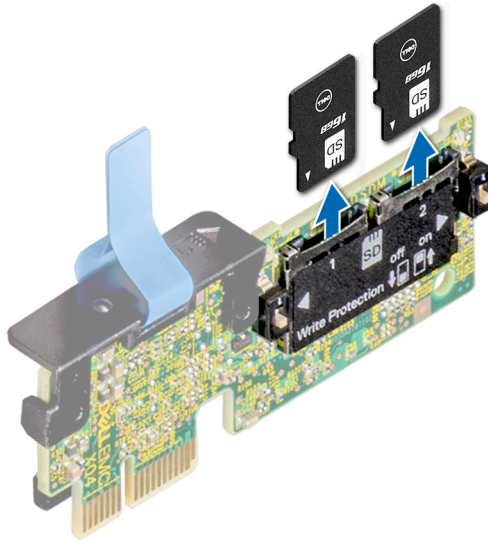


Figure 123. Removing the MicroSD card

Next steps

1. [Replace the MicroSD cards.](#)

Installing the MicroSD 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 air shroud](#).
4. [Remove the IDSDM module](#).

NOTE: To use a MicroSD card with your system, ensure that the Internal SD Card Port is enabled in System Setup.

NOTE: If reinstalling, ensure that you install the MicroSD cards into the same slots based on the labels you had marked on the cards during removal.

Steps

1. Locate the MicroSD card connector on the IDSDM module. Orient the MicroSD card appropriately and insert the contact-pin end of the card into the slot. To locate IDSDM/vFlash, see the [System board jumpers and connectors](#) section.

NOTE: The slot is keyed to ensure correct insertion of the card.

2. Press the card into the card slot to lock it into place.

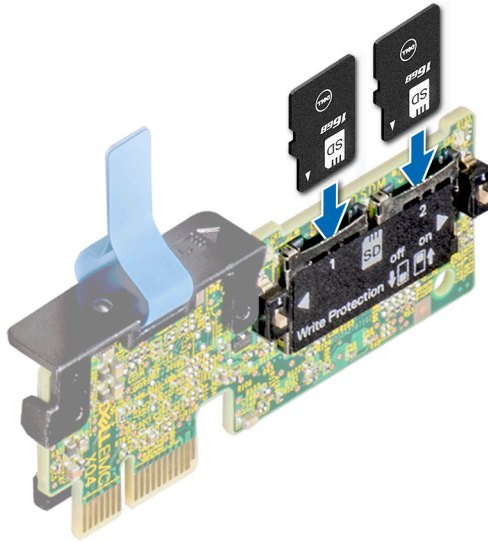


Figure 124. Installing the MicroSD card

Next steps

1. [Install the IDSDM module.](#)
2. Follow the procedure listed in [After working inside your system.](#)

LOM riser card

Removing the LOM riser 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 air shroud.](#)
4. If applicable, [remove the rear drive cage.](#)
5. [Remove the expansion card riser.](#)

Steps

1. Using a Phillips #2 screwdriver, remove the screws that secure the LOM riser card to the system board.
2. Push the retention clips to release the LOM riser card.
3. Hold the LOM riser card by the edges and lift to disconnect the card from the connector on the system board.
4. Slide the LOM riser card towards the front of the system to disengage the ports from the slot.

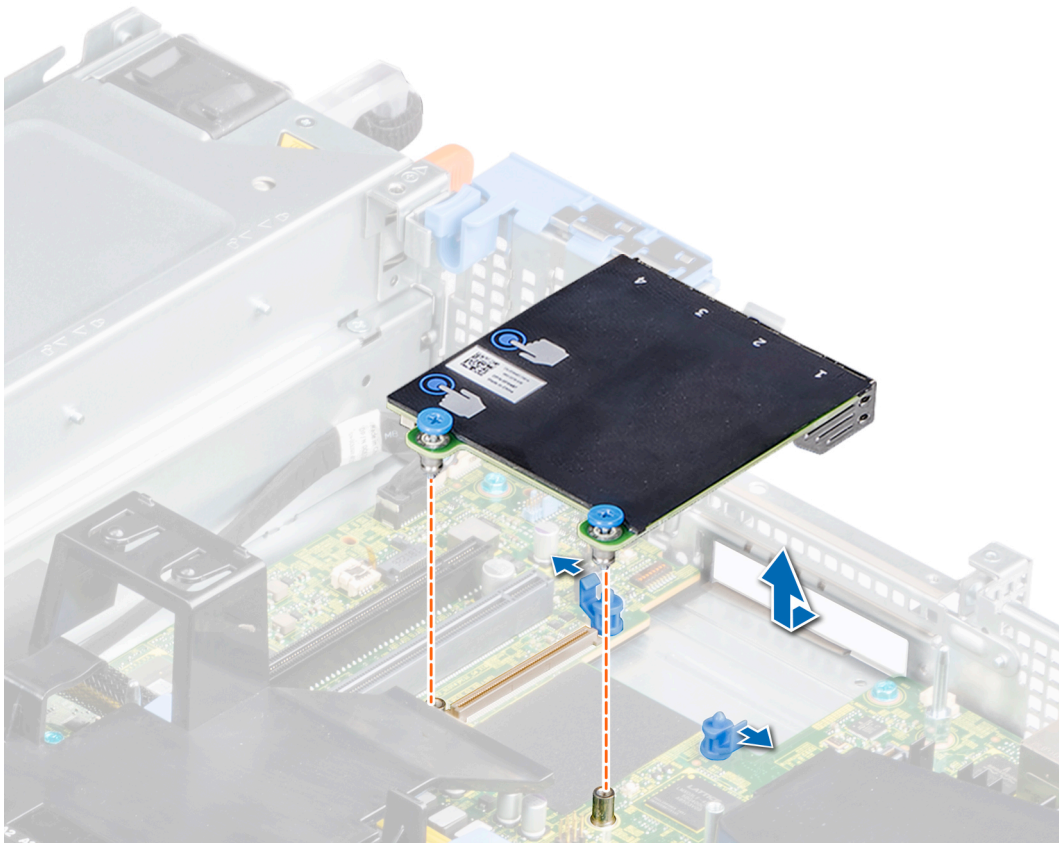


Figure 125. Removing the LOM riser card

5. Lift the LOM riser card out of the system.
6. Remove the LOM riser bracket.
 - a) Using a Phillips #2 screwdriver, remove the screw that secures the bracket to the chassis.
 - b) Slide the bracket out of the slot on the chassis.

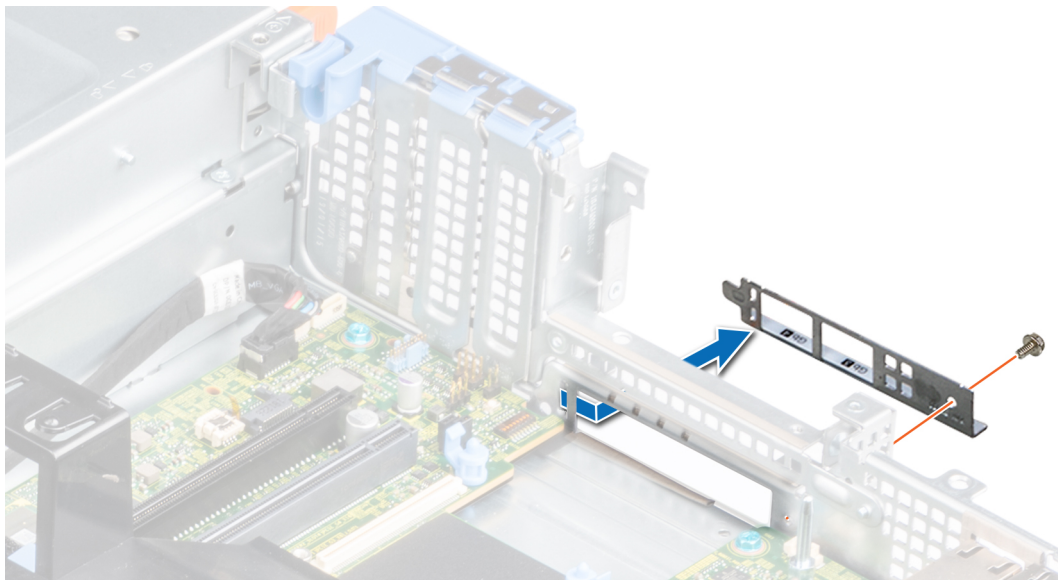


Figure 126. Removing the LOM riser bracket

7. If the LOM riser card is not being replaced immediately, install the LOM filler bracket.
 - a) Insert and slide the LOM filler bracket into the slot on the chassis.
 - b) Using a Phillips #2 screwdriver, secure the LOM filler bracket to the chassis with a screw

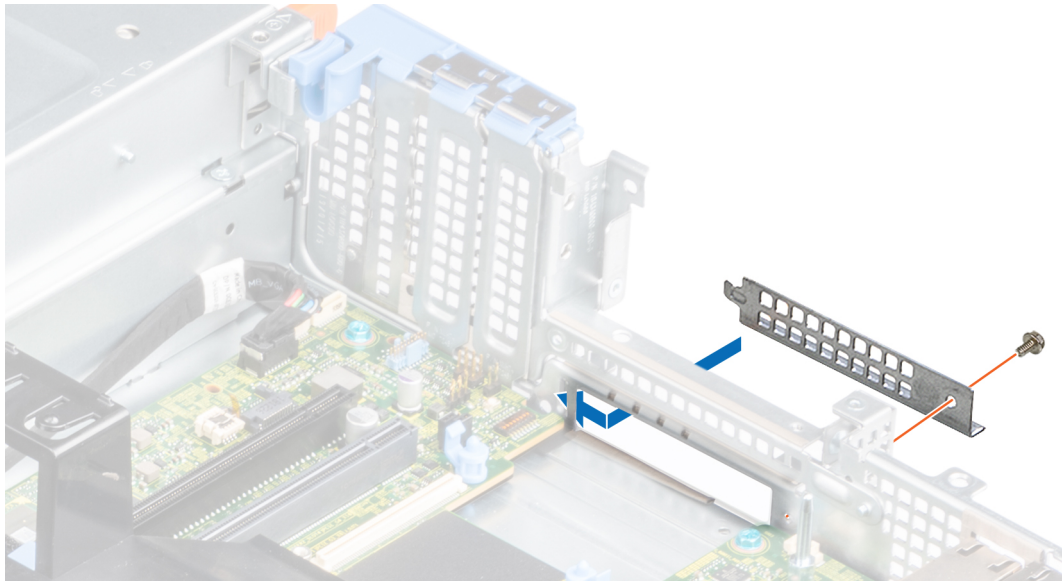


Figure 127. Installing the LOM filler bracket

Next steps

1. [Replace the LOM riser card.](#)

Installing the LOM riser 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 air shroud](#).
4. If applicable, [remove the rear drive cage](#).
5. [Remove the expansion card riser](#).

Steps

1. Remove the LOM filler bracket.
 - a) Using a Phillips #2 screwdriver, remove the screw that secures the bracket to the chassis.
 - b) Slide the LOM filler bracket out of the slot on the chassis.

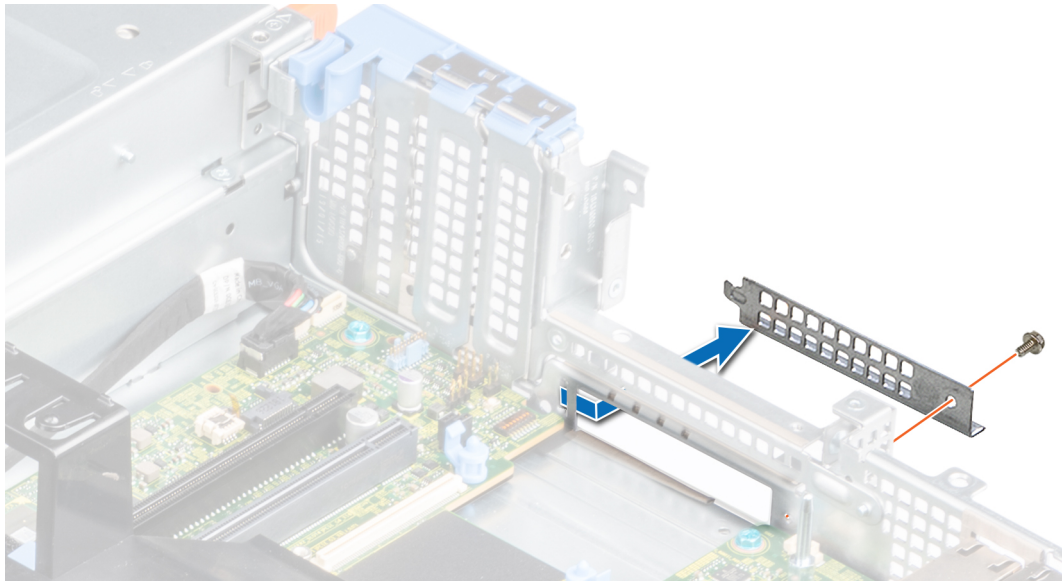


Figure 128. Removing the LOM filler bracket

2. Install the LOM riser bracket.
 - a) Insert and slide the LOM riser bracket into the slot on the chassis.
 - b) Using a Phillips #2 screwdriver, secure the bracket to the chassis with a screw.

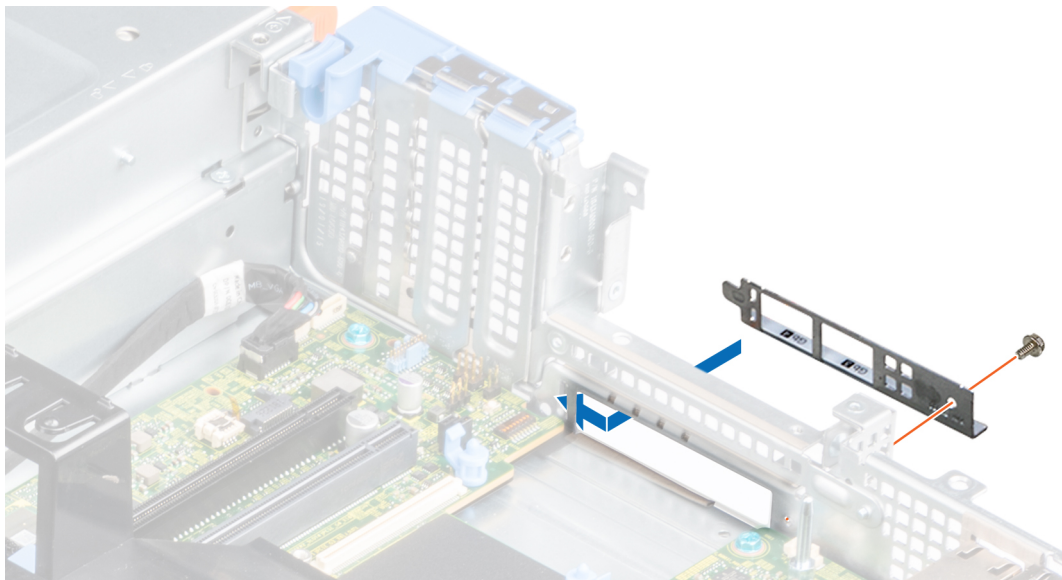


Figure 129. Installing the LOM riser bracket

3. Slide the LOM riser card towards the rear of the system to engage the ports from the slot on the chassis.
4. Connect the LOM riser card to the connector on the system board and push the card until the blue retention clip locks in place.
5. Using a Phillips #2 screwdriver, tighten the screws to secure the LOM card riser to the system..

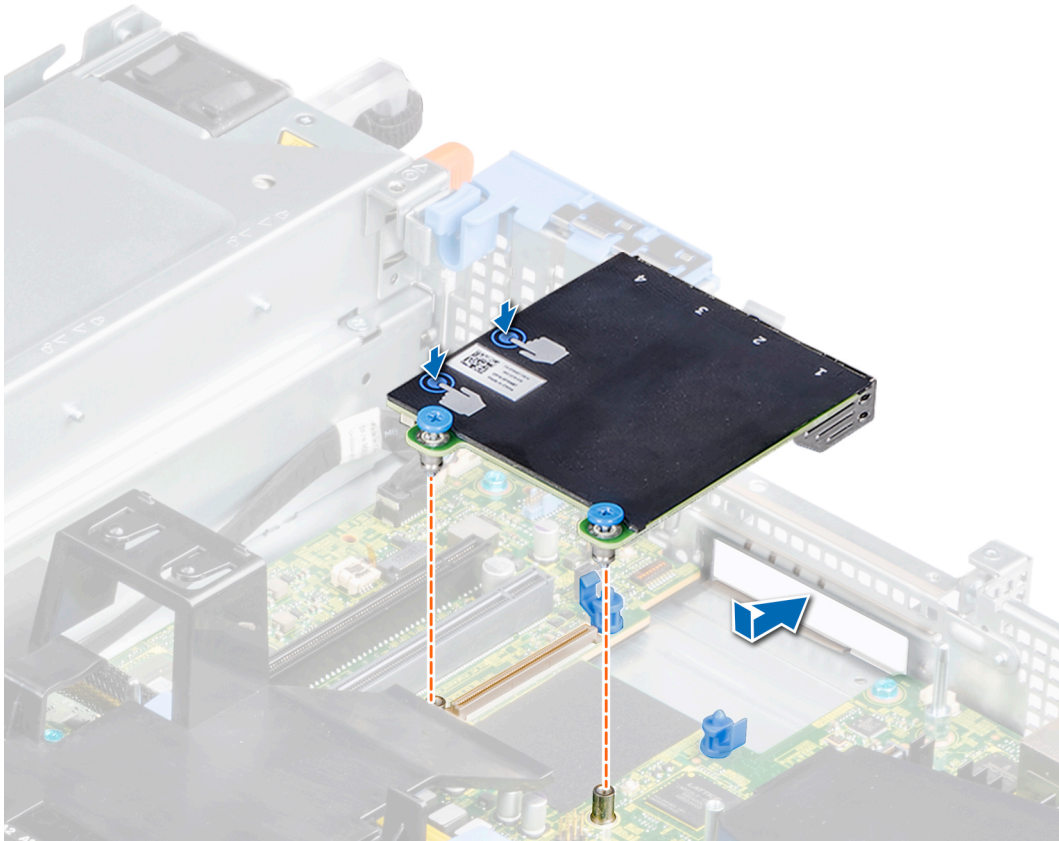


Figure 130. Installing the LOM riser card

Next steps

1. [Replace the expansion card riser.](#)
2. If removed, [replace the rear drive cage.](#)
3. [Install the air shroud.](#)
4. Follow the procedure listed in [After working inside your system.](#)

Object Missing

This object is not available in the repository.

Removing the mini PERC card air shroud

Prerequisites

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

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 air shroud.](#)
4. If applicable, [remove the rear drive cage.](#)
5. If applicable, [remove the expansion card riser.](#)

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

Steps

1. Remove the screw securing the mini PERC card air shroud to the system board.

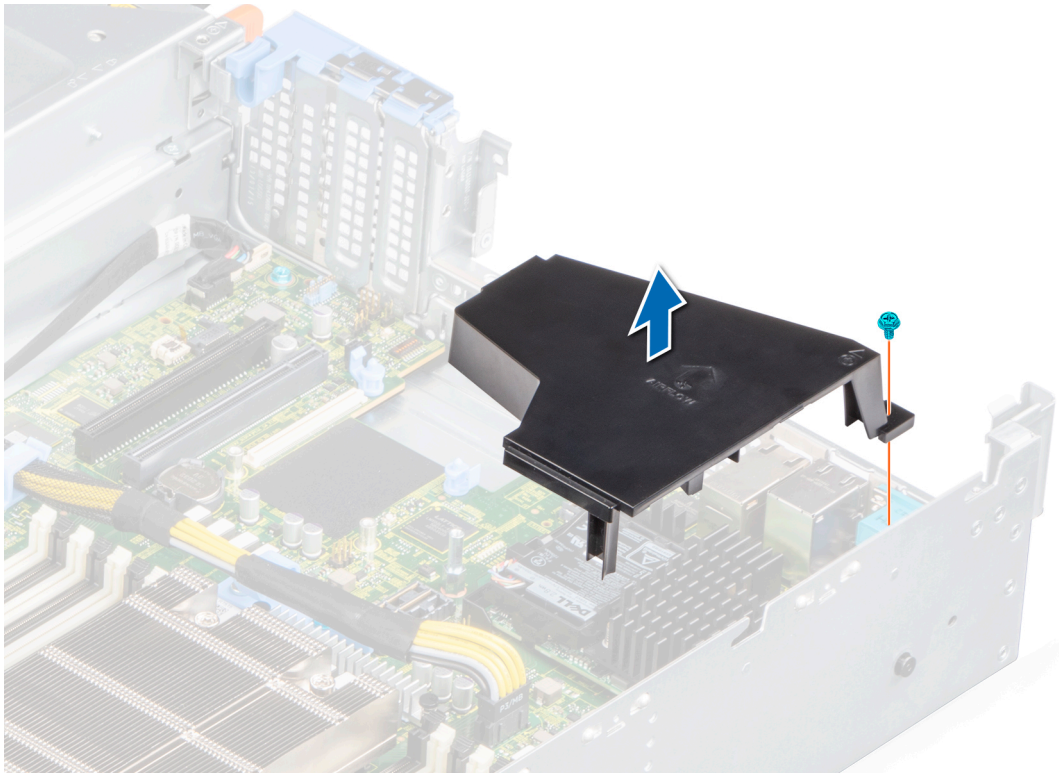


Figure 131. Removing the mini PERC card air shroud

2. Remove the air shroud from the system.

Next steps

1. [Replace the PERC card air shroud.](#)

Installing the mini PERC card air shroud

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 air shroud.](#)
4. If applicable, [remove the rear drive cage](#).
5. If applicable, [remove the expansion card riser](#).

Steps

1. Align the mini PERC card air shroud with the screw hole on the system board.

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

2. Lower the air shroud until it is firmly seated.
3. Tighten the screw to secure the mini PERC card air shroud to the system board.

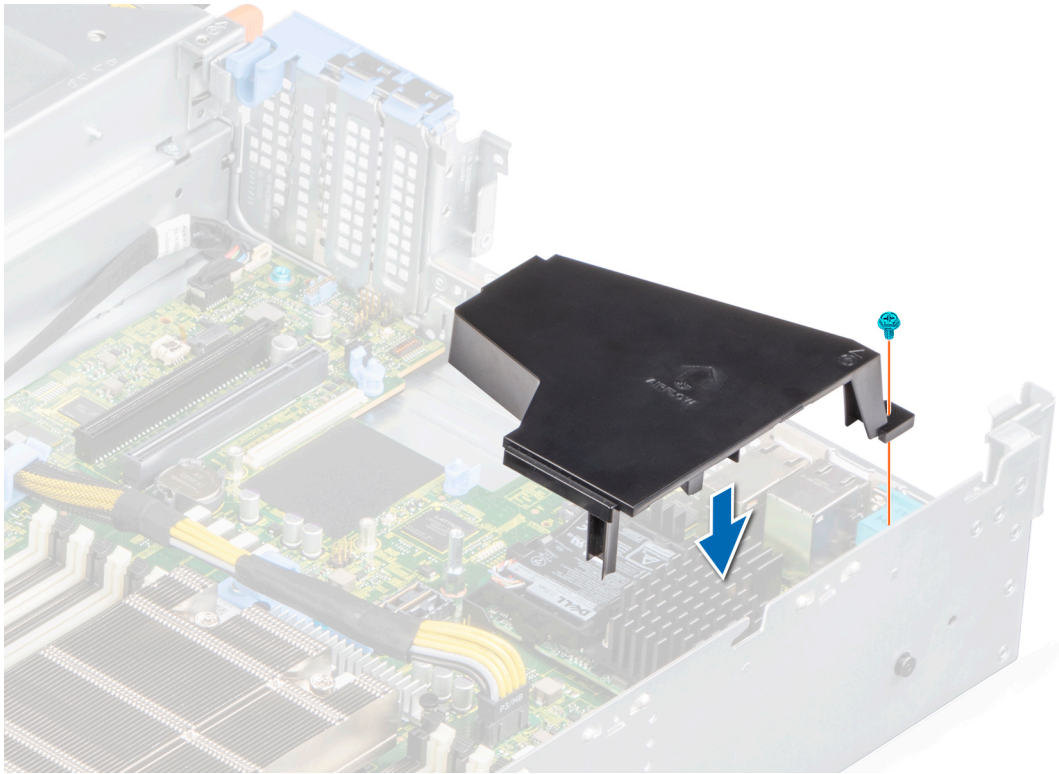


Figure 132. Installing the mini PERC card air shroud

Next steps

1. If removed, [replace the expansion card riser](#).
2. If removed, [replace the rear drive cage](#).
3. [Install the air shroud](#).
4. Follow the procedure listed in [After working inside your system](#).

Removing the internal mini PERC 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 air shroud](#).
4. If applicable, [remove the rear drive cage](#).
5. If applicable, [remove the expansion card riser](#).
6. [Remove the PERC card air shroud](#).

Steps

1. Disconnect the SAS connector from the backplane.
2. Using a Phillips #1 screwdriver, remove the screws securing the internal mini PERC card.
3. Lift the internal mini PERC card at an angle to disengage it from the PERC slot and remove it from the system.

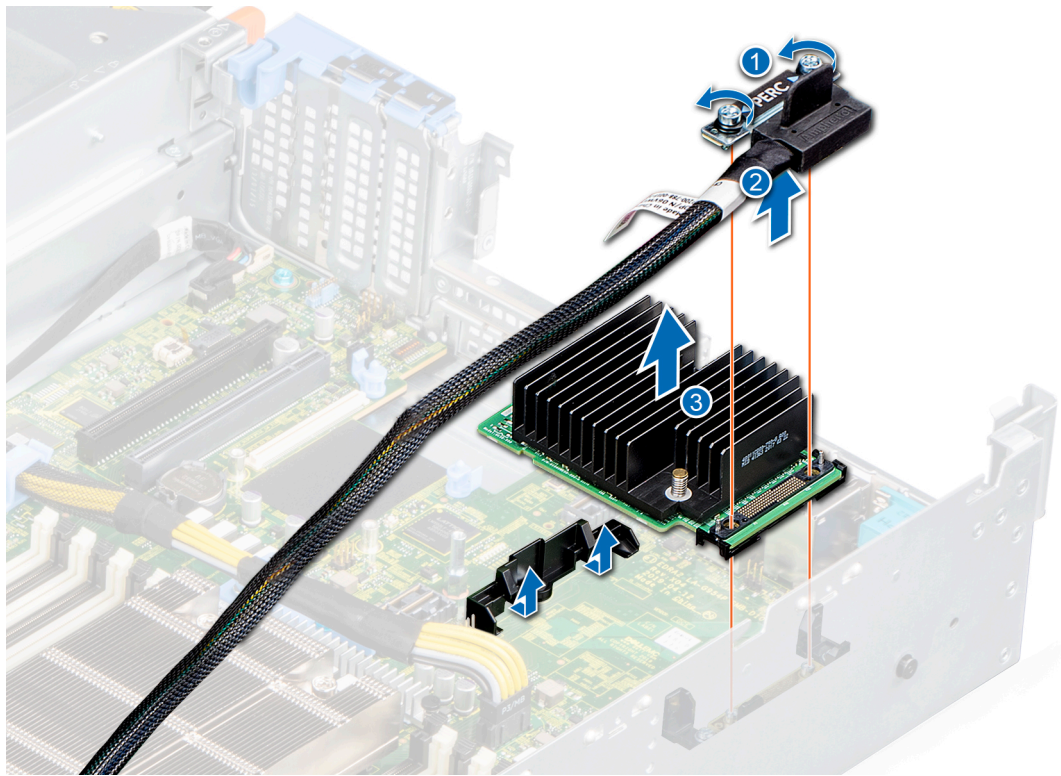


Figure 133. Removing the Internal mini PERC card

Next steps

1. [Replace the internal mini PERC card.](#)

Installing the Internal mini PERC 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 air shroud.](#)
4. If applicable, [remove the rear drive cage.](#)
5. If applicable, [remove the expansion card riser.](#)
6. [Remove the PERC card air shroud.](#)

Steps

1. Align and insert the internal mini PERC card at an angle into the PERC card slot.
2. Tighten the screws to secure the internal mini PERC card to the system.
3. Connect the SAS cable to the backplane.

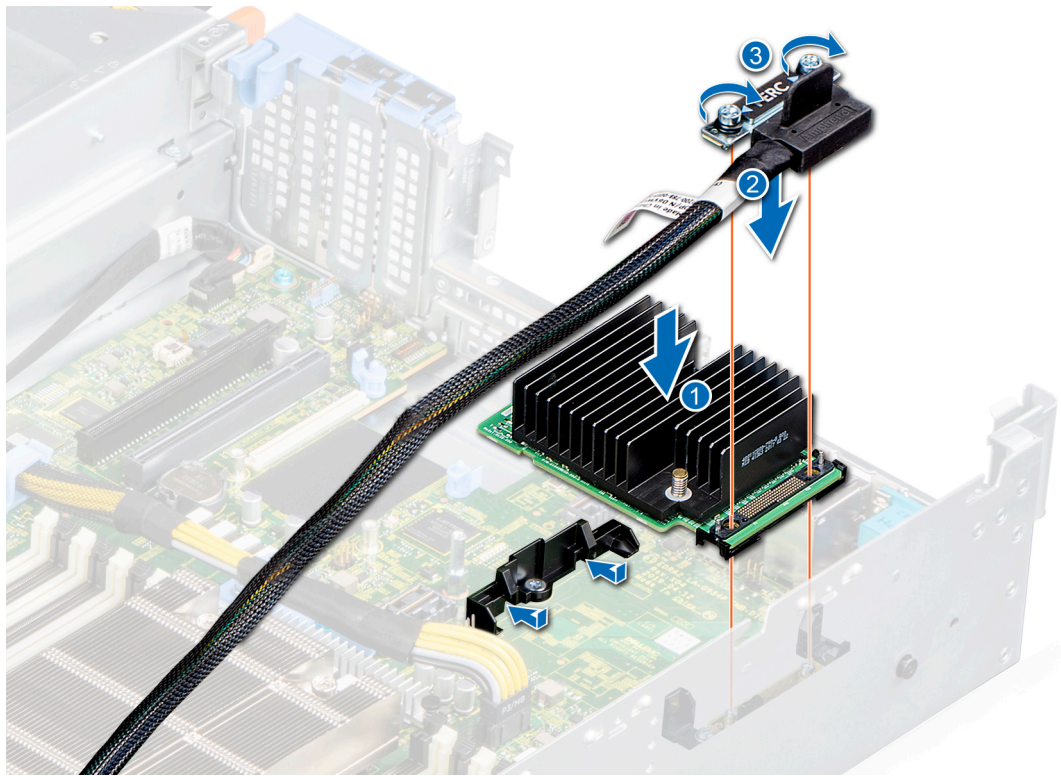


Figure 134. Installing the PERC card

Next steps

1. [Install the air shroud.](#)
2. If removed, [replace the expansion card riser.](#)
3. If removed, [replace the rear drive cage.](#)
4. [Install the PERC card air shroud.](#)
5. Follow the procedure listed in [After working inside your system.](#)

System battery

Replacing the system battery

Prerequisites

NOTE: 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. [Remove the air shroud.](#)
4. Locate the battery socket. For more information, see the System board jumpers and connectors section.

Steps

1. Use a plastic scribe and Press the release latch until the battery pops out.

NOTE: Ensure that the + side of the battery is facing upwards.

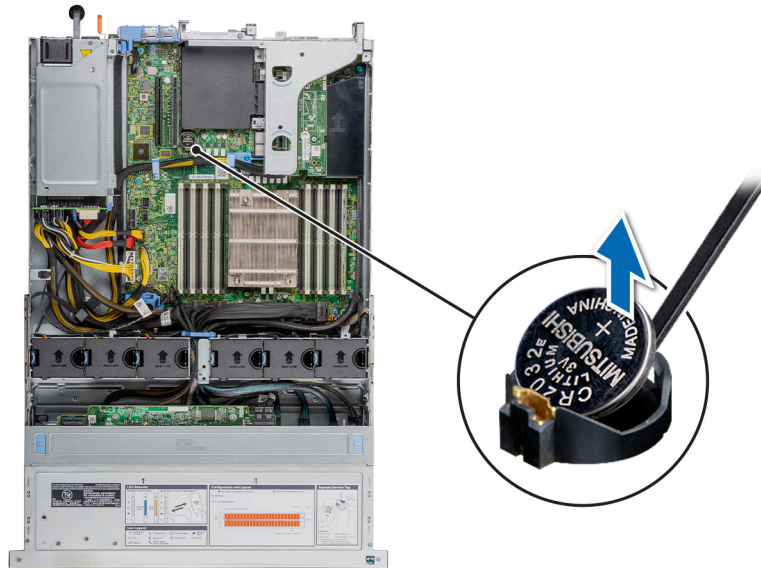


Figure 135. Removing the system battery

2. To install a system battery, press the battery into the connector until it snaps into place.
3. Insert the battery in the battery holder until the battery holder clip snaps into place.

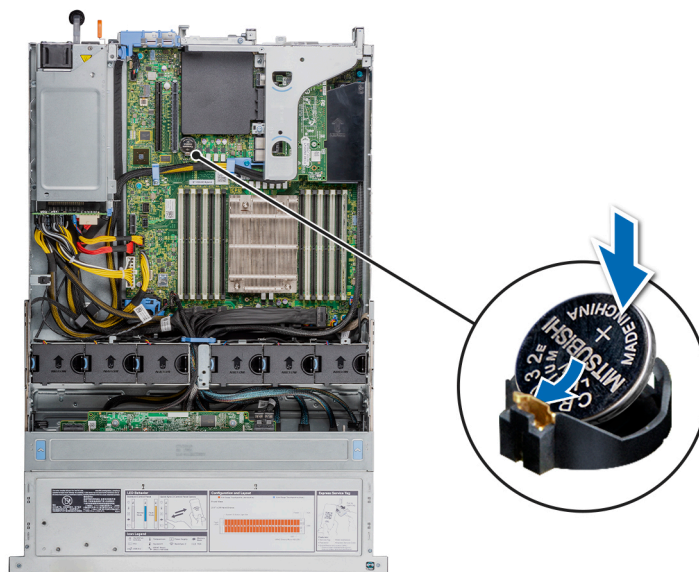


Figure 136. Installing the system battery

Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)
3. 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, remove the system from the enclosure for at least an hour.
 - e. Reinstall the system into the enclosure after an hour.
 - f. Enter the System Setup and if the time and date are still incorrect, see [Getting help](#) section.

Optional internal USB memory key

NOTE: To locate the internal USB port on the system board, see the [System board jumpers and connectors](#) section.

Replacing the optional internal USB memory key

Prerequisites

CAUTION: To avoid interference with other components in the server, the maximum permissible dimensions of the USB memory key: 15.9 mm width x 57.15 mm length x 7.9 mm height.

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 air shroud](#).

Steps

1. Locate the USB port or USB memory key on the system board.
To locate the USB port, see the [System board jumpers and connectors](#) section.
2. If installed, remove the USB memory key from the USB port.

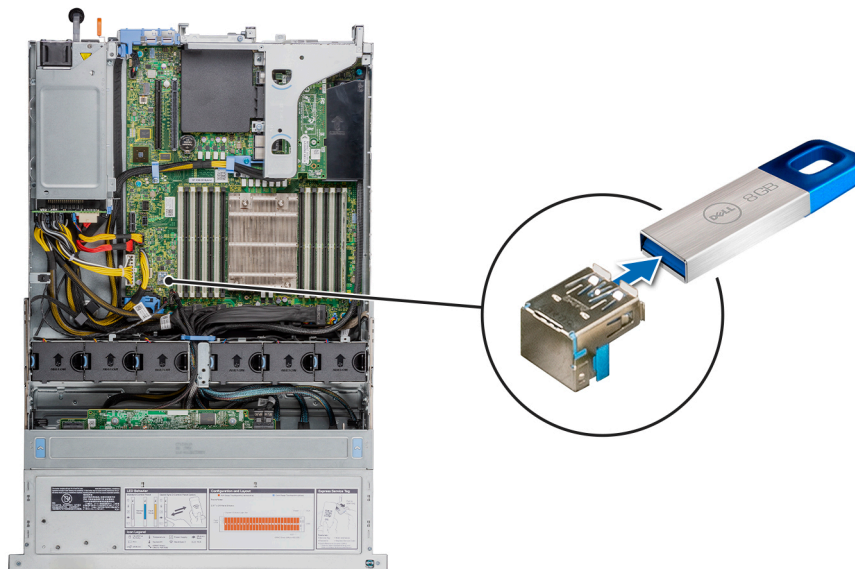


Figure 137. Removing the internal USB memory key

- a. USB memory key
 - b. USB port
3. Insert the replacement USB memory key into the USB port.

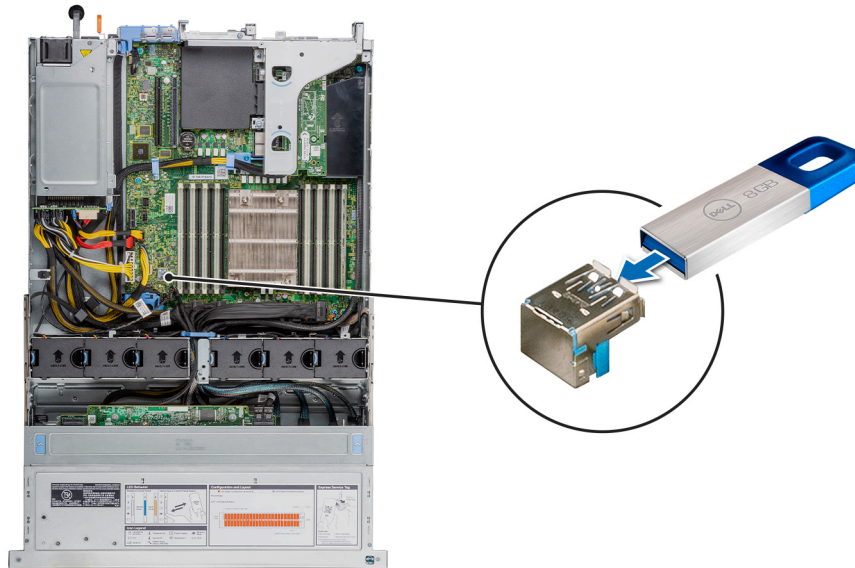


Figure 138. Installing the internal USB memory key

- a. USB memory key
- b. USB port

Next steps

1. [Install the air shroud.](#)
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.

Optional optical drive

Removing the optical drive

The procedure for removing an optical drive and optical drive blank is the same.

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. Follow the procedure listed in the [Before working inside your system.](#)
3. If installed, [remove the front bezel.](#)
4. If applicable, [remove the backplane cover.](#)
5. Disconnect the power and data cables from the connectors on 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. Route these cables properly when you replace them to prevent them from being pinched or crimped.

Steps

1. Press the release tab to release the optical drive.
2. Slide the optical drive out of the optical drive slot.

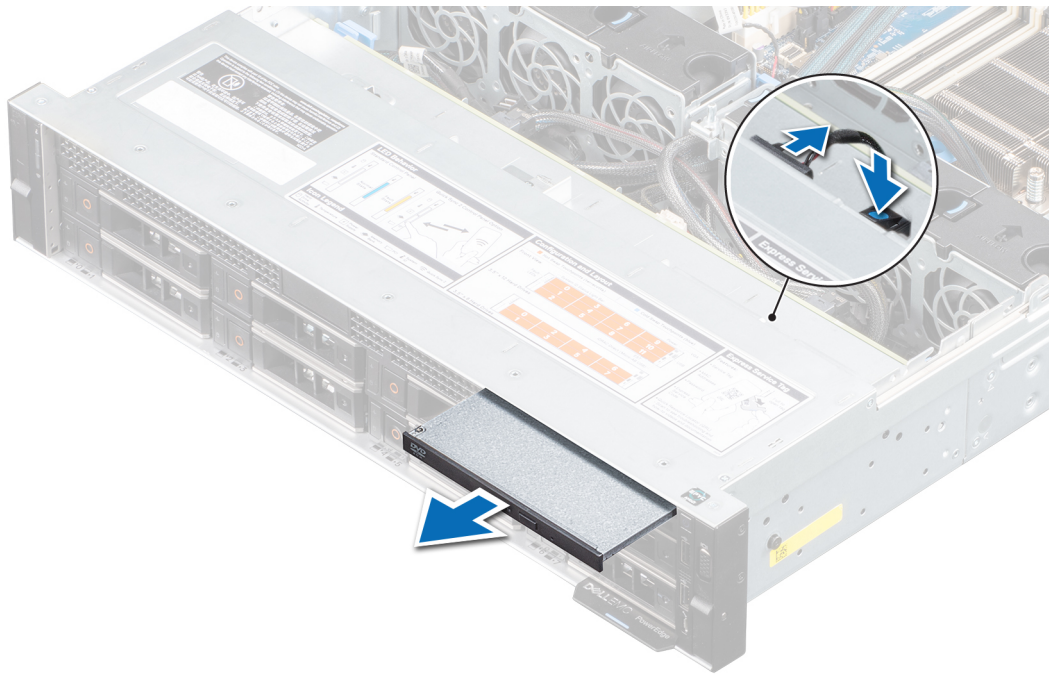


Figure 139. Removing optical drive

3. If you are not installing a new optical drive, install the optical drive blank. The procedure to install the optical drive blank is the same as the optical drive.

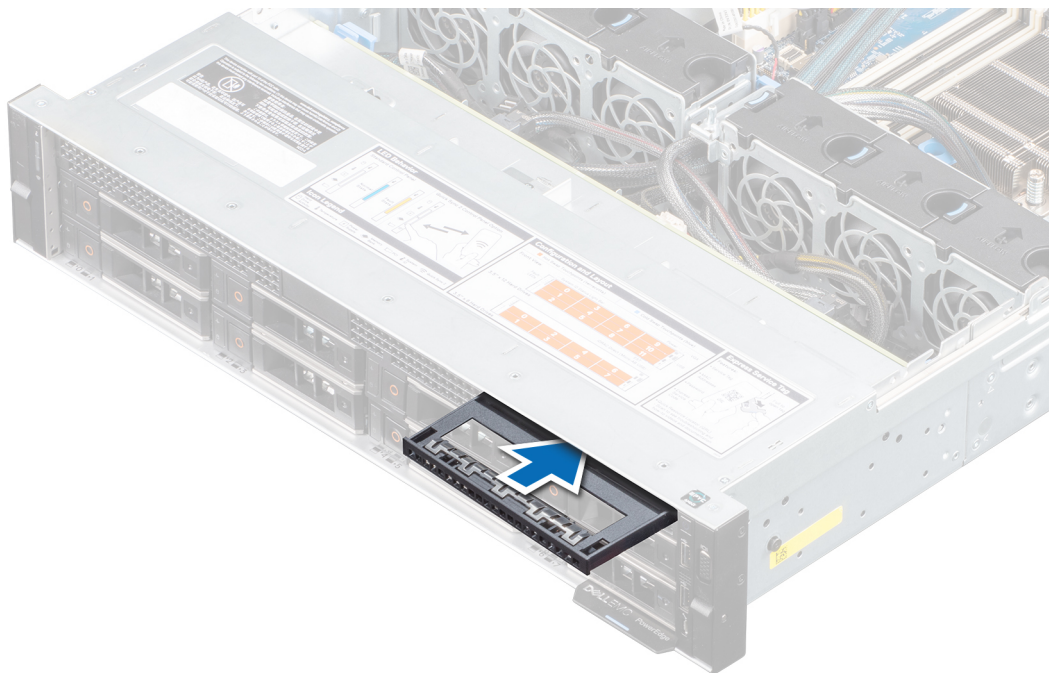


Figure 140. Installing optical drive blank

Next steps

1. [Replace the optical drive.](#)

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

Installing the optional optical drive

The procedure for installing an optical drive and optical drive blank.

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. Follow the procedure listed in the [Before working inside your system](#).
3. If installed, [remove the front bezel](#).
4. If applicable, [remove the backplane cover](#).
5. Disconnect the power and data cables from the connectors on the optical drive.

i **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. Route these cables properly when you replace them to prevent them from being pinched or crimped.

Steps

1. If installed, remove the optical drive blank. The procedure to remove an optical blank is similar to the optical drive.

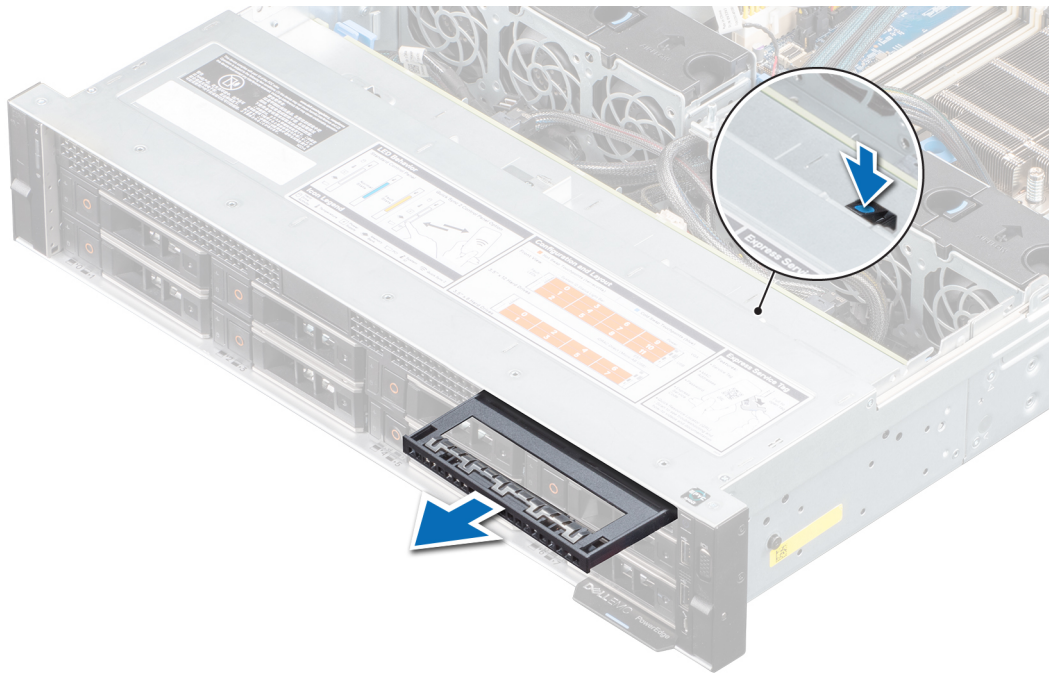


Figure 141. Removing optical blank

2. Align the optical drive with the optical drive slot on the front of the system.
3. Slide in the optical drive until the release tab snaps into place.

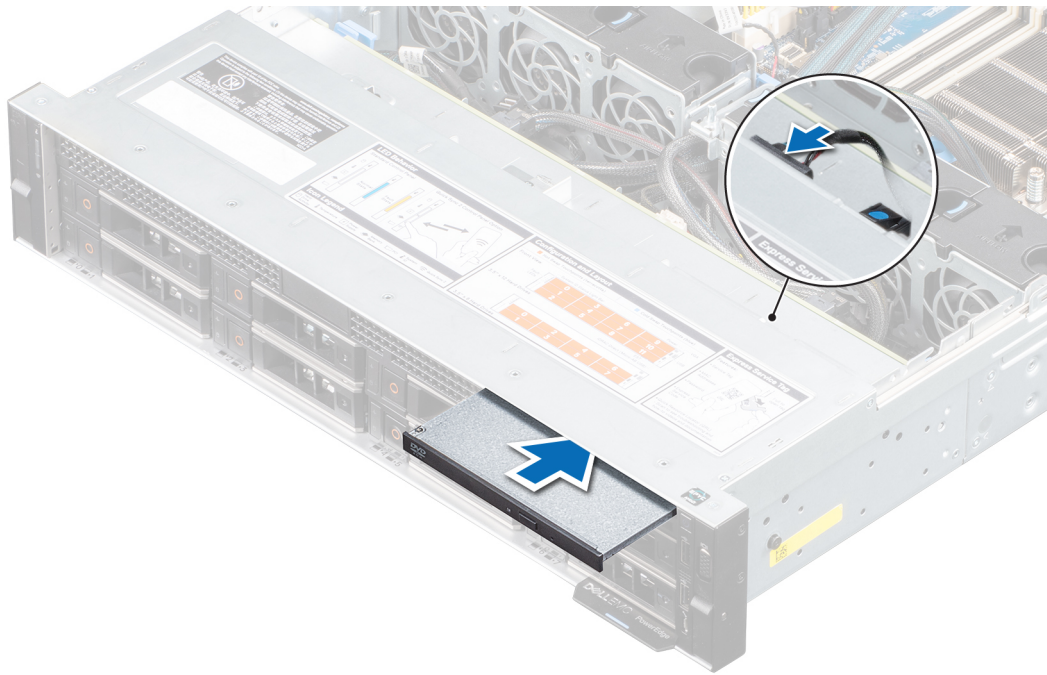


Figure 142. Installing optical drive

Next steps

1. Connect the power and data cables to the connector on the optical drive and the connector on the system board.
i **NOTE:** Route the cable properly on the side of the system to prevent it from being pinched or crimped.
2. If removed, [install the front bezel](#).
3. If applicable, [install the backplane cover](#).
4. Follow the procedure listed in [After working inside your system](#).

Power supply unit

- i** **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 more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at [Lifecycle Controller User's Guide](#)

Object Missing

This object is not available in the repository.

Removing a power supply unit blank

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).

Steps

Pull the blank out of the system.

- ⚠ CAUTION:** To ensure proper system cooling, the power supply unit blank must be installed in the second power supply unit bay in a non-redundant configuration. Remove the power supply unit blank only if you are installing a second power supply unit.



Figure 143. Removing a power supply unit blank

Next steps

1. [Replace the power supply blank](#) or [install the power supply unit](#).

Removing a power supply unit

Prerequisites

CAUTION: The system requires 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 the [Safety instructions](#).
2. Disconnect the power cable from the power outlet and from the PSU you intend to remove.
3. Remove the cable from the strap on the PSU handle.
4. Unlatch and lift the optional cable management arm if it interferes with the PSU removal.

For information about the cable management arm, see the system's rack documentation at .

Steps

Press the release latch, and holding the PSU handle slide the PSU out of the PSU bay.

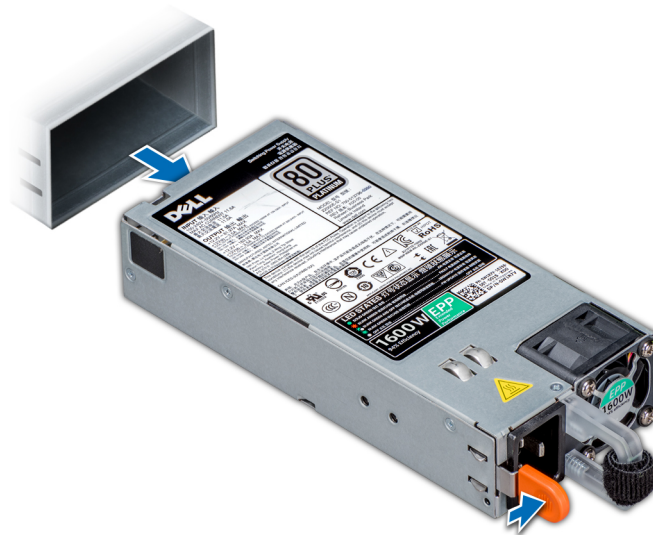


Figure 144. Removing a power supply unit

Next steps

1. [Replace the power supply units](#) or [Install the PSU blank](#).

Installing a power supply unit

Prerequisites

1. Follow the safety guidelines listed in the [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.

i **NOTE:** The maximum output power (shown in watts) is listed on the PSU label.

3. [Remove the PSU blank](#).

Steps

Slide the PSU into the PSU bay until the release latch snaps into place.

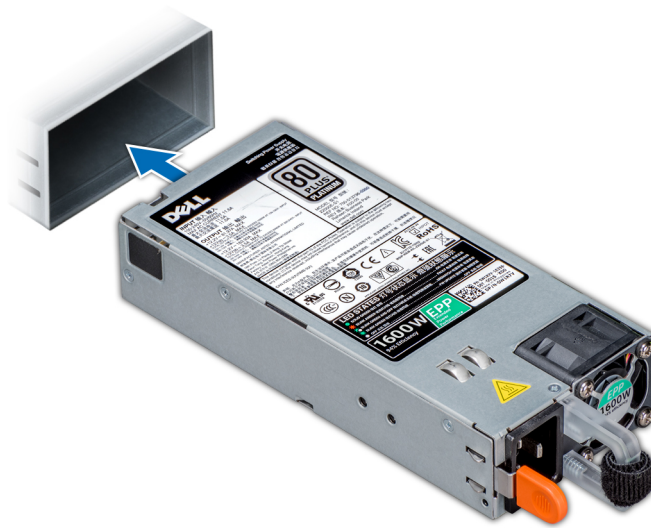


Figure 145. Installing a power supply unit

Next steps

1. If you have unlatched the cable management arm, relatch it. For information about the cable management arm, see the system's rack documentation at .
2. Connect the power cable to the PSU, and plug the cable into a power outlet.

i **NOTE:** When connecting the power cable to the PSU, secure the cable to the PSU with the strap.

i **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. The PSU status indicator turns green to indicate that the PSU is functioning properly.

i **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 more information about the Part replacement configuration, see the *Lifecycle Controller User's Guide* at

Installing a power supply unit blank

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions](#).
2. [Remove the power supply unit](#).

Steps

Align the PSU blank with the PSU bay and push it into the PSU bay until it clicks into place.



Figure 146. Installing a power supply unit blank

Power interposer board

Removing the power interposer board

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 power supply units](#).
4. [Remove the air shroud](#).

Steps

1. Disconnect all the cables from the system board and the backplane.

NOTE: Observe the routing of the cable as you remove it from the system.

2. Using a Phillips #2 screwdriver, remove the screws securing the power interposer board (PIB) to the chassis.
3. Press the blue retention tab and lift the PIB at an angle to disengage it from the hooks on the PSU cage.
4. Remove the PIB from the system.

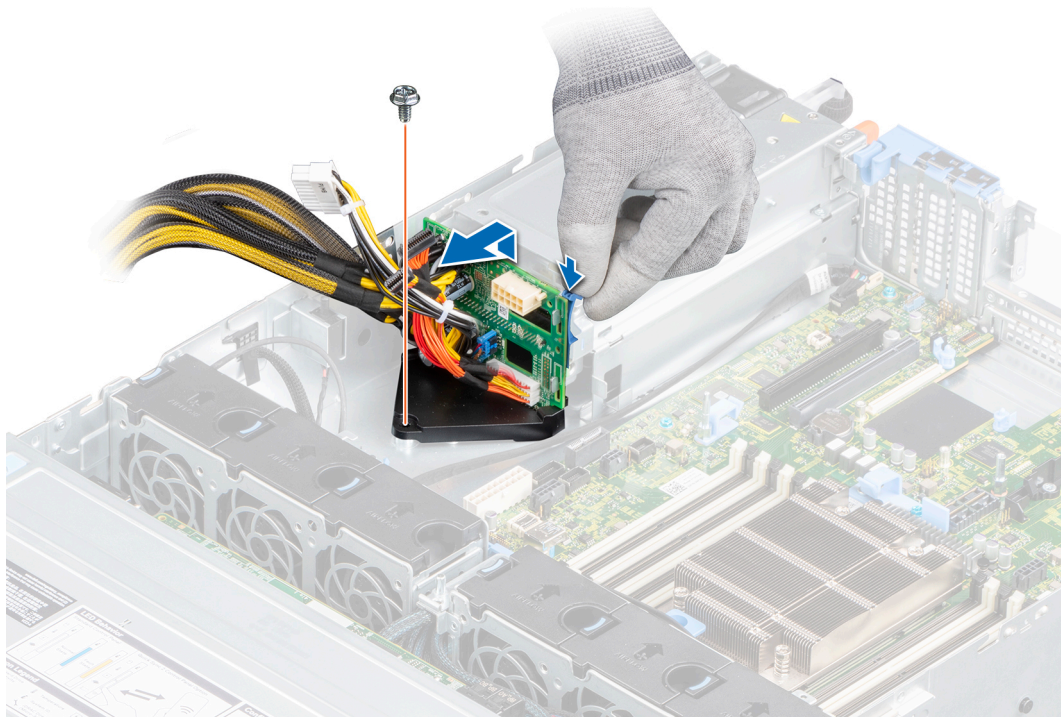


Figure 147. Removing the power interposer board

Next steps

1. [Replace the power interposer board.](#)

Installing the power interposer board

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 power supply units.](#)
4. [Remove the air shroud.](#)

Steps

1. Align the slots on the power interposer board (PIB) with the hooks on the PSU cage and press the PIB until the blue retention tab clicks into place.
2. Using a Phillips #2 screwdriver, replace the screw that secures the PIB to the chassis.
3. Connect the cables to the system board and the drive backplane.

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

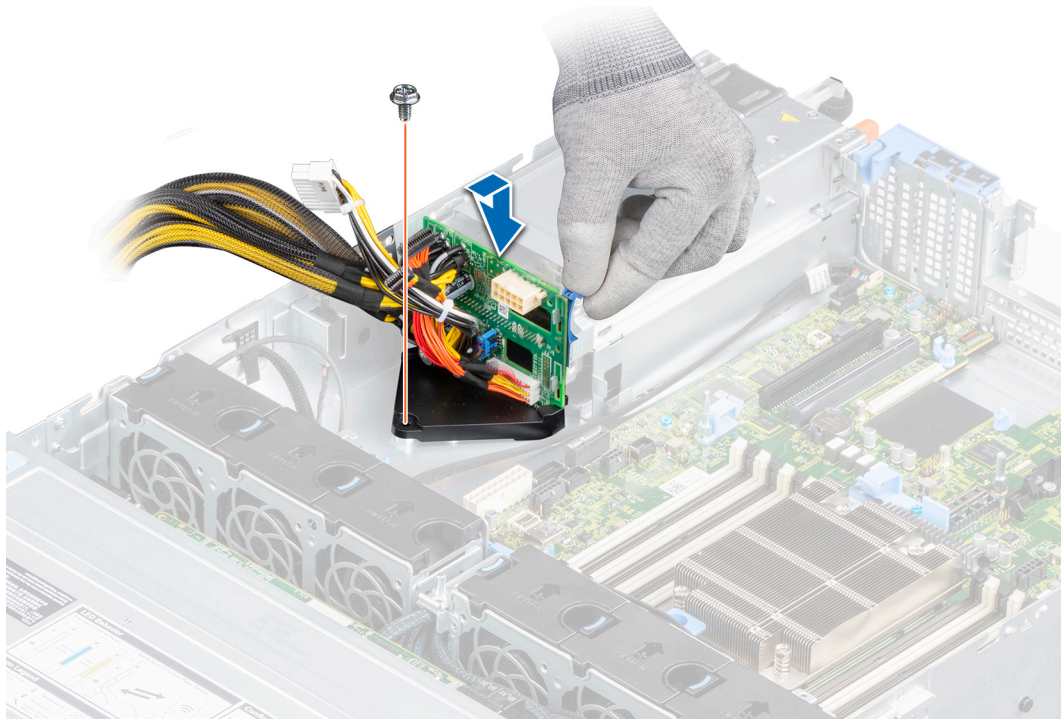


Figure 148. Installing the power interposer board


Next steps


1. [Install the air shroud.](#)
2. [Install the power supply units.](#)
3. Follow the procedure listed in [After working inside your system](#).

System board

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. [Expansion cards](#)
 - c. [Expansion card riser](#)
 - d. [Internal mini PERC card](#)
 - e. If applicable, [IDSDM module](#)
 - f. If applicable, [internal USB](#)
 - g. [Memory modules](#)
 - h. [Processor](#)
 - i. [Heat sink](#)
 - j. [LOM riser card](#)
 - k. If applicable, [rear drive cage](#)
 - l. [Trusted Platform Module](#)
 - m. Disconnect the fan cables
 - n.  **CAUTION:** To prevent damage to the processor socket when replacing a faulty system board, ensure that you cover the processor socket with the processor dust cover.
 - o. Disconnect all the cables from the system board.

 **CAUTION:** Take care not to damage the system identification button while removing the system board from the system.

Steps

1. Using a Phillips #2 screwdriver, remove the screws securing the system board to the chassis.

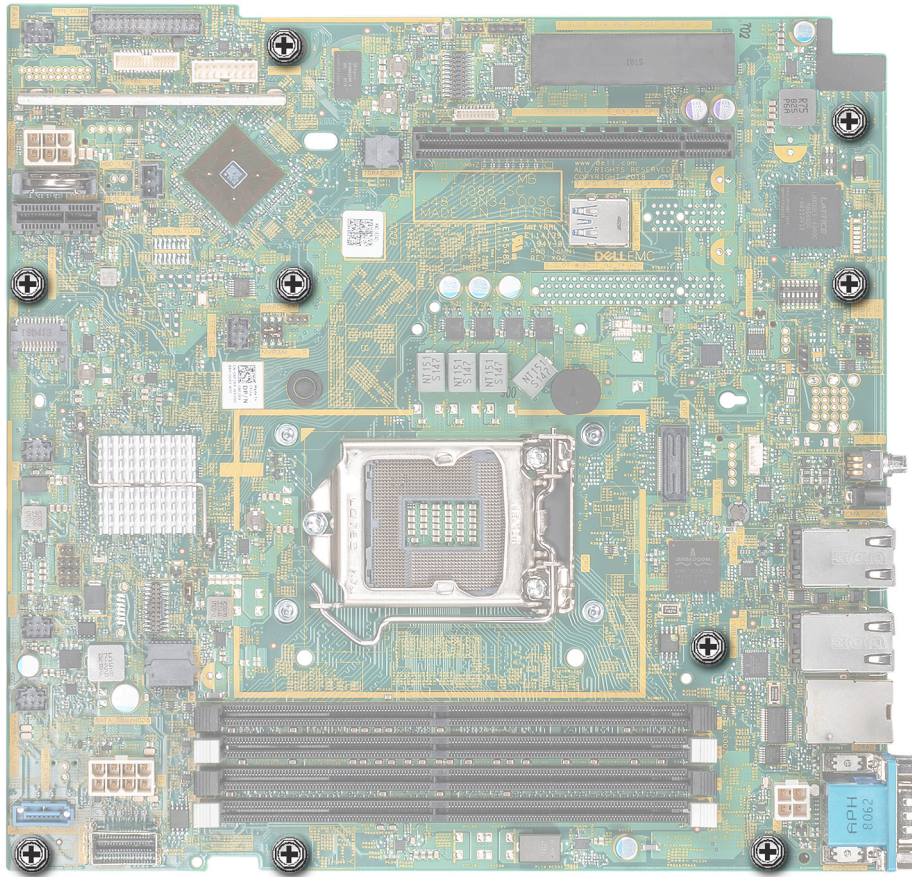


Figure 149. System board screws

2. Holding the system board holder, slightly lift the system board and slide it towards the front of the chassis.
3. Lift the system board out of the chassis.

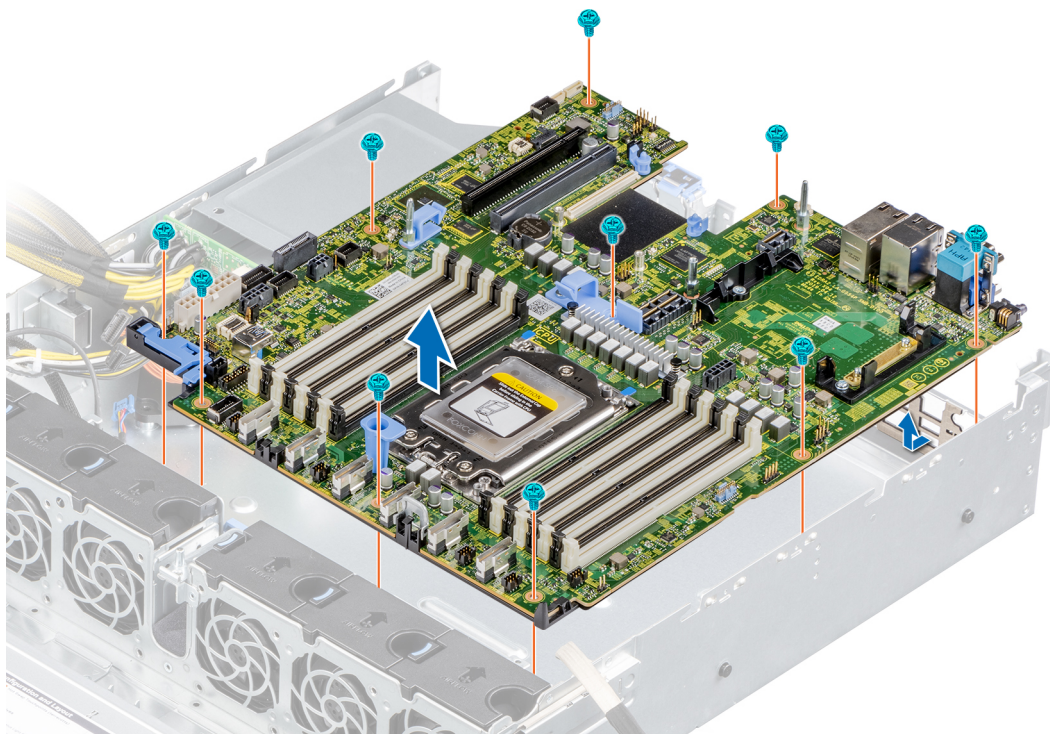


Figure 150. Removing the system board

Next steps

1. [Replace the system board.](#)

Installing the system board

Prerequisites

i **NOTE:** Before replacing the system board, replace the old iDRAC MAC address label in the Information 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 the [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.

i **NOTE:** Do not lift the system board by holding a memory module, processor, or other components.

⚠ **CAUTION:** Take care not to damage the system identification button while placing the system board into the chassis.

2. Holding the system board holder, lower the system board it into the system.
3. Incline the system board at an angle and align the connectors with the slots on the rear of the chassis.
4. Slide the system board towards the rear of the chassis until the connectors are firmly seated in the slots.

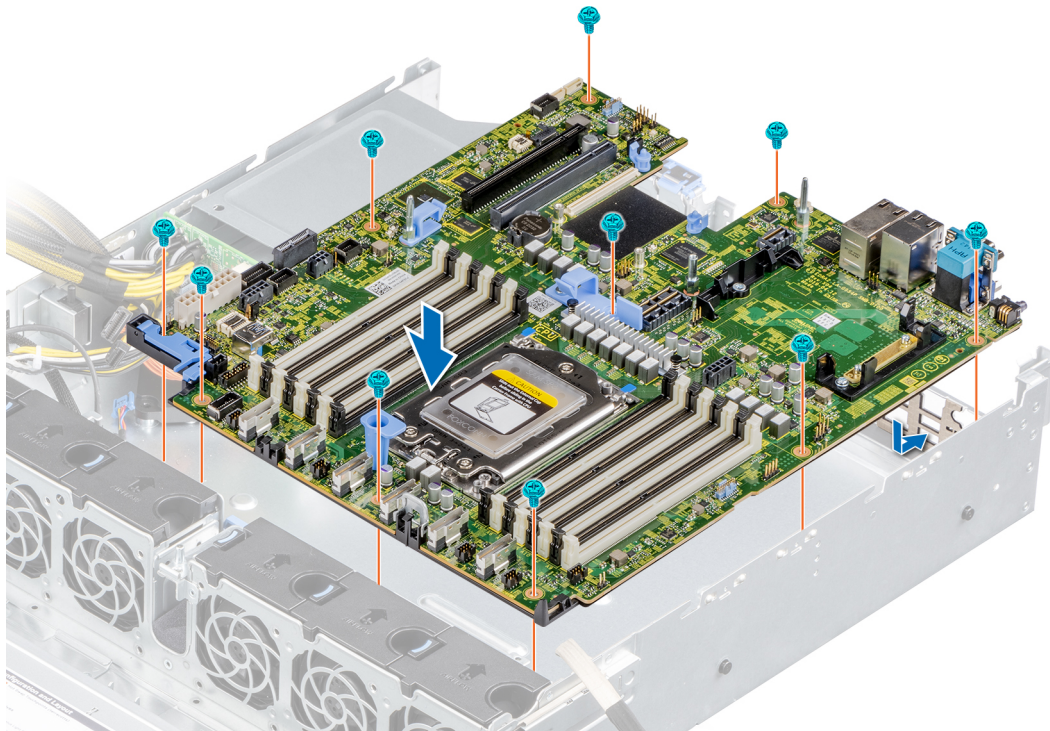


Figure 151. Installing the system board

5. Using a Phillips #2 screwdriver, fasten the screws that secure the system board to the chassis.

Next steps

1. Replace the following:

- a. [Trusted platform module](#)

i **NOTE:** The TPM Module must be replaced only while installing new system board.

- b. [Internal mini PERC card](#)

- c. If applicable, [iDSDM module](#)
- d. [Heat sink](#)
- e. [Processor](#)
- f. [Expansion cards](#)
- g. [Expansion card riser](#)
- h. If applicable, [internal USB](#)
- i. Connect the fan cables
- j. [LOM riser card](#)
- k. [Memory modules](#)
- l. [Air shroud](#)
- m. If applicable, [rear drive cage](#)
- n. Reconnect the 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.

2. Follow the procedure listed in [After working inside your system](#).
3. Power on the system.
4. Ensure that you perform the following steps:
 - a. Use the Easy Restore feature to restore the Service Tag. For more information, see the Easy restore section.
 - b. If the Service Tag is not backed up in the backup flash device, enter the Service Tag manually. For more information, see the [Restoring the Service Tag by using Easy Restore](#) section.
 - c. Update the BIOS and iDRAC versions.
 - d. Re-enable the Trusted Platform Module (TPM). See the [Reenabling the TPM for users](#) section.
5. If you are not using Easy restore, import your new or existing iDRAC Enterprise license. For more information, see the *Integrated Dell Remote Access Controller User's Guide*, at .
6. Update the BIOS version.

NOTE:

- The RACADM command `RACADM sslresetcfg` is used to generate a new SSL certificate with service tag providing the unique Common Name (CN). If the certificate is not generated at time of service, inform the customer or technical support so they can follow up.
- RACADM must be installed. If RACADM is not installed, download and install the [Dell DRAC Tools - Windows only](#). For more information about RACADM Command Line Interface, see the [RACADM Command Line Interface for DRAC](#) section.

7. Reenable the Trusted Platform Module (TPM).
8. Turn off/exit manufacturing mode.
9. Let the system boot.

NOTE: If this system board replacement is for an OEM-branded product, see the reference material link below:

- Internal link: [PowerEdge OEM Branding > Update the System Board for OEM Branding](#)
- External link: [PowerEdge OEM Branding > Update the System Board for OEM Branding](#)

NOTE: If this system board replacement is for a Dell-branded product with a Windows embedded operating system, do not exit manufacturing mode before you install the Dell Branded Embedded (DBE) Module.

NOTE: If you are unable to access the above link, log on to Oracle Knowledge first, then see [SLN294158](#).

NOTE: If this replacement is a non-OEM system board, or if you have already installed the proper Identity Module: At the prompt press <A> to turn off manufacturing mode. For more information about manufacturing mode, see the [Troubleshooting Manufacturing Mode](#) section or consult Dell technical support for further assistance.

Object Missing

This object is not available in the repository.

Trusted Platform Module


Upgrading the Trusted Platform Module

Prerequisites

NOTE:

- Ensure that your operating system supports the version of the TPM module being installed.
- Ensure that you download and install the latest BIOS firmware on your system.
- Ensure that the BIOS is configured to enable UEFI boot mode.

About this task

 **CAUTION:** Once the TPM plug-in module is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, the removed TPM cannot be reinstalled or installed on another system board.

Removing the TPM

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

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 152. Installing the TPM

Initializing TPM for users

Steps

1. Initialize the TPM.
For more information, see [Initializing the TPM for users](#).
2. The **TPM Status** changes to **Enabled, Activated**.

Initializing the TPM 1.2 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 with Preboot Measurements**.
4. From the **TPM Command** option, select **Activate**.
5. Save the settings.
6. Restart your system.

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.

Control panel

Removing the left control panel

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 air shroud](#).



NOTE: Ensure that you note the routing of the cables as you remove them from the system board. You must route the cables properly when you replace them to prevent the cables from being pinched or crimped.

Steps

1. Disconnect the left control panel cable from the system board connector.
2. Using a Phillips #1 screwdriver, remove the screws that secure the left control panel assembly to the chassis.
3. Hold the left control panel assembly and remove it from the system.

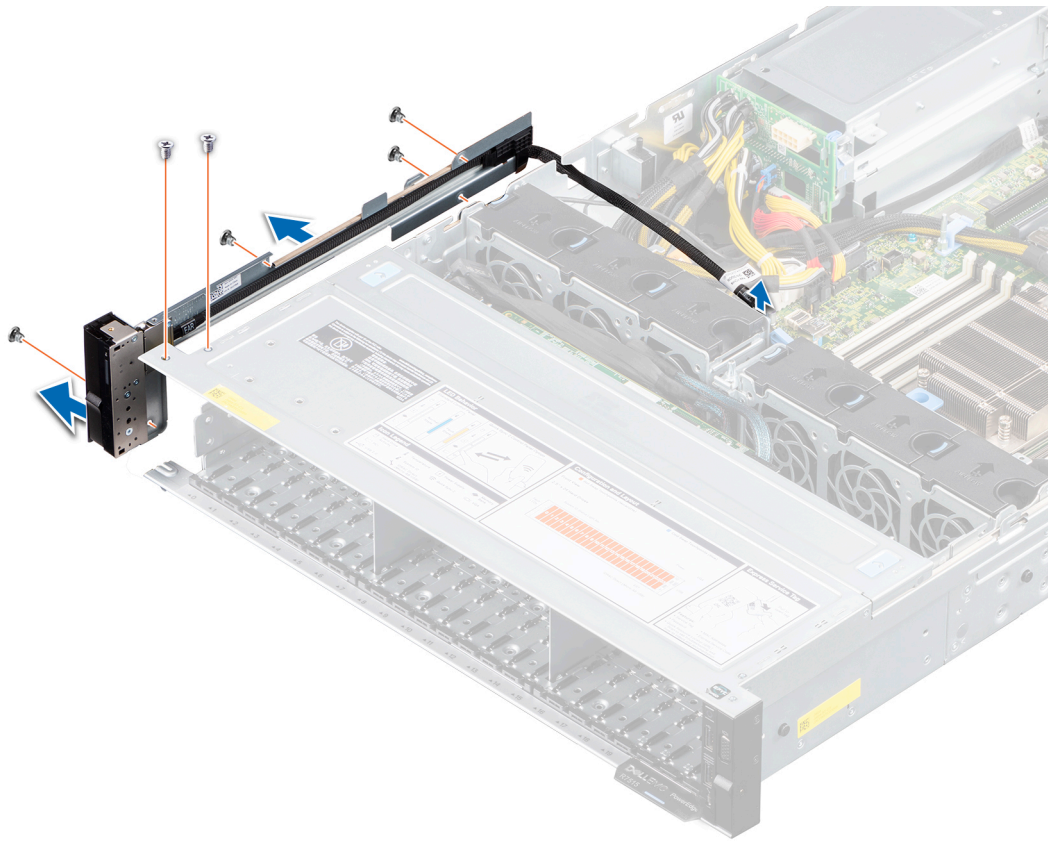


Figure 153. Removing the left control panel

Next steps

1. [Replace the left control panel.](#)

Installing the left control panel

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 air shroud.](#)

Steps

1. Route the left control panel cable through the chassis sidewall.

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

2. Align and insert the tabs on the left control panel assembly into the slots on the chassis.
3. Using a Phillips #1 screwdriver, replace the screws to secure the left control panel assembly to the chassis.
4. Connect the left control panel cable to the connector on the system board.

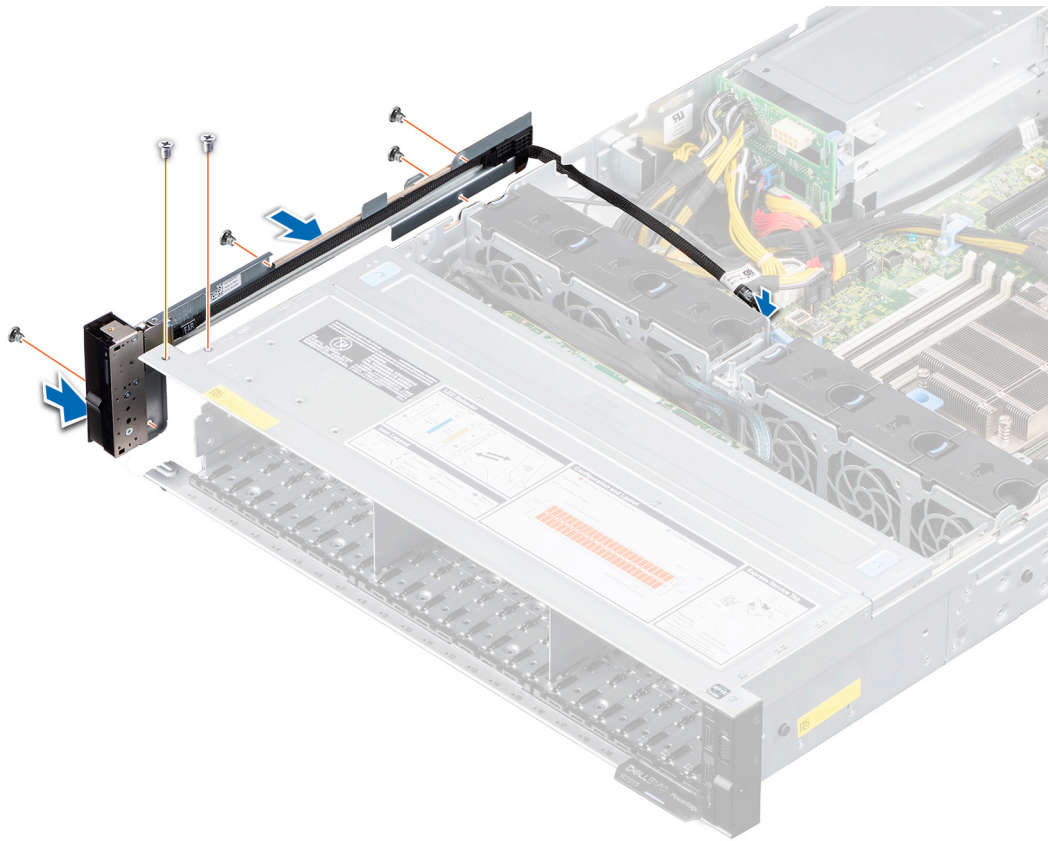


Figure 154. Installing the left control panel

Next steps

1. [Install the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

Removing the right control panel

Prerequisites

1. Follow the safety guidelines listed in the [Safety instructions.](#)
2. Follow the procedure listed in the [Before working inside your system.](#)
- NOTE:** Ensure that you note the routing of the cables as you remove them from the system board. You must route the cables properly when you replace them to prevent the cables from being pinched or crimped.
3. [Remove the air shroud.](#)

Steps

1. Disconnect the right control panel cable from the connector on the system board.
2. Open the blue cable retention latch and disconnect the VGA cable from the connector on the system board.
3. Using a Phillips #1 screwdriver, remove the screws that secure the right control panel assembly.
4. Hold the right control panel assembly and remove it from the system.

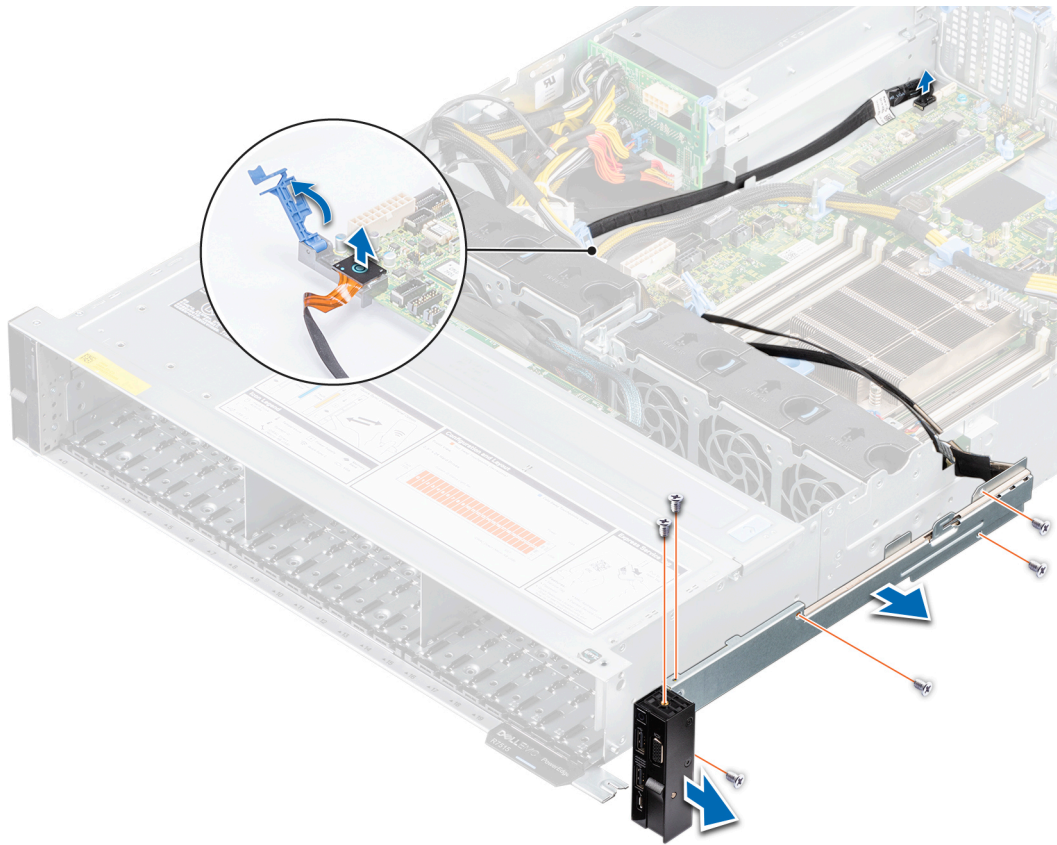


Figure 155. Removing the right control panel

Next steps

1. [Replace the right control panel.](#)

Installing the right control panel

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 air shroud.](#)

Steps

1. Route the right control panel cable and the VGA cable through the chassis sidewall.

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

2. Align and insert the tabs on the right control panel assembly into the slots on the chassis.
3. Using a Phillips #1 screwdriver, replace the screws to secure the right control panel assembly to the chassis.
4. Connect the right control panel cable to the connector on the system board.

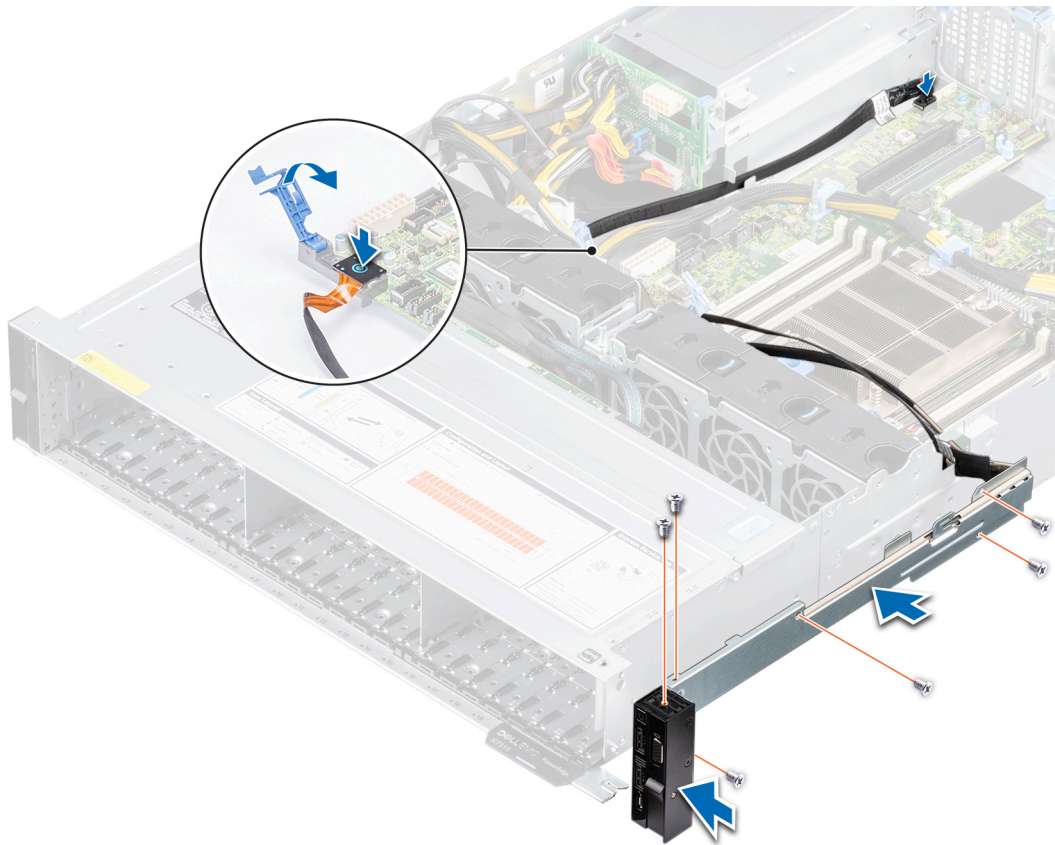


Figure 156. Installing the right control panel

5. Connect the VGA cable to the connector on the system board and close the blue cable retention latch.

Next steps

1. [Replace the air shroud.](#)
2. Follow the procedure listed in [After working inside your system.](#)

Updating BIOS

About this task

To update the BIOS, perform the following steps:

Steps

1. Copy the BIOS update file on a USB device.
2. Plug in the USB device into any of the USB ports on your system.
3. Power on your system.
4. While booting, press **F11** to enter the **Boot Manager**.
5. Go to **System Utilities** → **BIOS Update File Explorer**, and select the plugged in USB device.
6. From the **BIOS Update File Explorer**, select the **BIOS update file**.
The **BIOS Update Utility** with the current and new version of BIOS is displayed.
7. Select **Continue BIOS Update** to install the BIOS update.

Installation

Installing the system requires information about the following topics:

- Placemat

- Initial system setup and configuration

Placemat

The *Service Information Label* and *Getting Started Guide* documents provide helpful diagrams on setting up the system.

- [System Information Label](#)
- [Getting Started Guide](#)

Rack, Rails and Cable Management

For more information regarding mounting features and key dimensions of the rack rails for mounting the system, refer to [Dell EMC Enterprise Systems Rail Sizing and Rack Compatibility Matrix](#).

Rails Information

The rail offerings for the PowerEdge R7515 consist of two general types: sliding and static.

Sliding rails features summary

The sliding rails (two varieties are offered) allow the system to be fully extended out of the rack for service. They are available with or without the optional cable management arm (CMA).

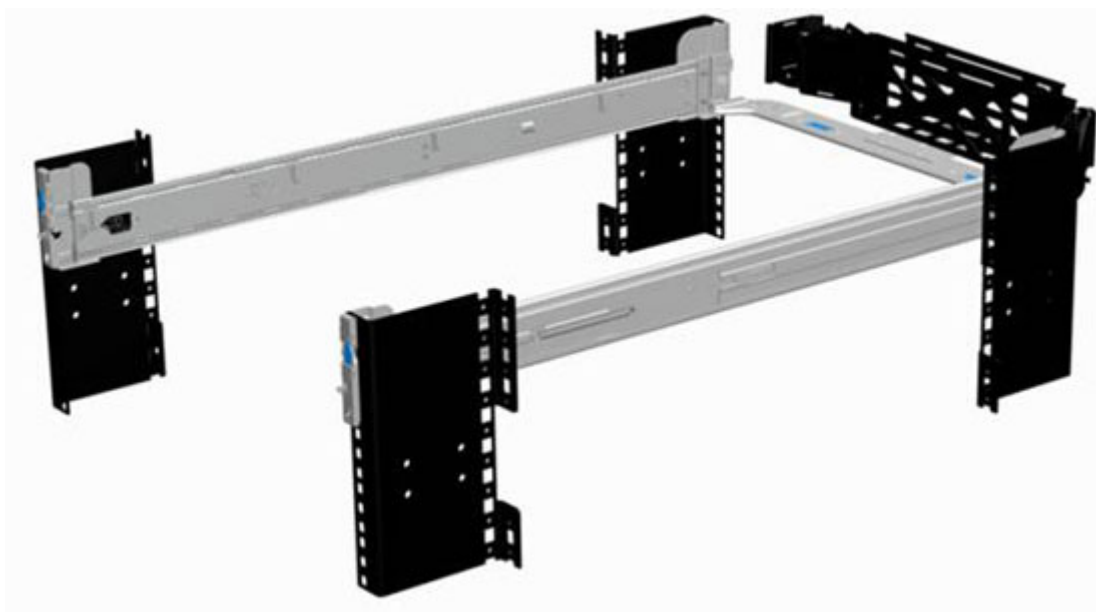


Figure 157. Sliding rails with optional CMA

ReadyRails-Sliding rails for 4-post racks

- Supports Drop-in Installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of the Dell racks.
- Support for tooled installation in 19" EIA-310-E compliant threaded hole 4-post racks.
- Supports full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).

NOTE: For situations where CMA support is not required, the outer CMA mounting brackets can be removed from the sliding rails to reduce the overall length of the rails and eliminate potential interferences with rear-mounted PSUs or the rack rear door.

Stab-in/Drop-in sliding rails for 4-post racks

- Supports drop-in or stab-in installation of the chassis to the rails.

- Support for tool-less installation in 19" EIA-310-E compliant square, unthreaded round hole racks including all generations of the Dell racks. Also supports tool-less installation in threaded round hole 4-post racks.
- Support for tool-less installation on Dell EMC Titan or Titan-D rack as rails align with bezels on the system.
- Supports full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).

Static rails

The static rails offer a greater adjustability range and a smaller overall mounting footprint than the sliding rails. This is because of their reduced complexity and lack of need for CMA support.

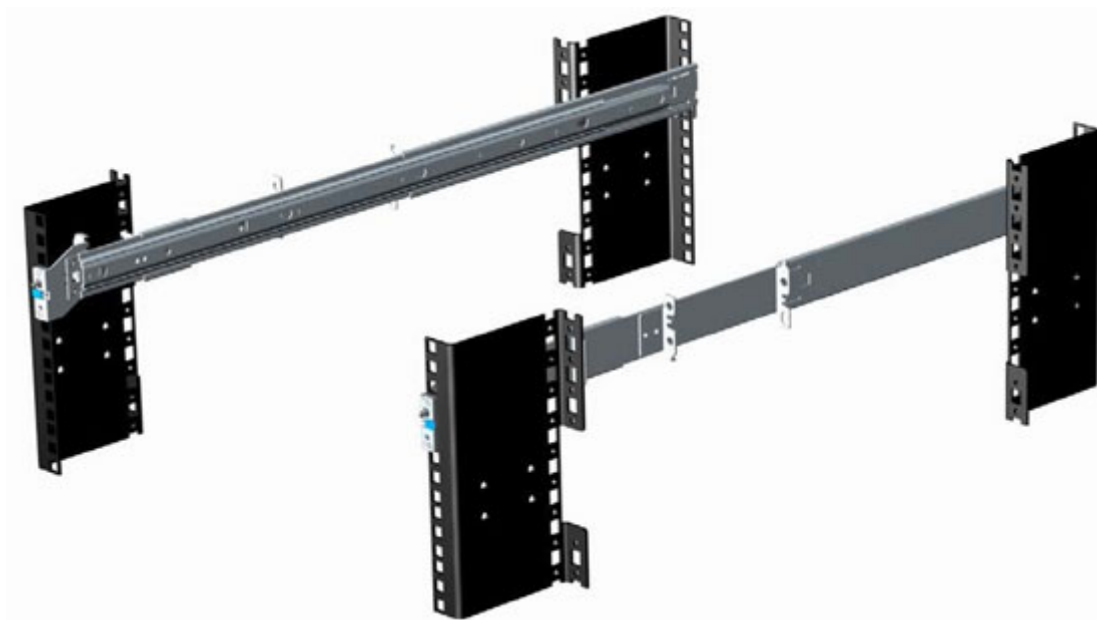


Figure 158. Static rails

Static rails features summary

Static Rails for 4-post & 2-post Racks:

- Supports Stab-in installation of the chassis to the rails.
- Supports tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks.
- Support for tooled installation in 19" EIA-310-E compliant threaded hole 4-post and 2-post racks.
- Support for tooled installation on Dell EMC Titan or Titan-D rack for bezel alignment with the system.

NOTE:

- **Screws are not included with the static rail kit since racks are offered with various thread types. You must provide the screws for mounting static rails in racks with threaded mounting flanges.**
- **Screw head diameter should be 10 mm or less.**

2-Post racks installation

If installing to 2-Post (Telco) racks, the ReadyRails Static rails (B4) must be used. Both sliding rails support mounting in 4-post racks only.



Figure 159. Static rails in 2-post center mount configuration

Installation in the Dell EMC Titan or Titan-D racks

If installing to Titan or Titan-D racks, for tool-less installation, the Stab-in/Drop-in Sliding rails (B13) must be used. This rail collapses down sufficiently to fit in racks with mounting flanges spaced about 24 inches apart from front to back. The Stab-in/Drop-in Sliding rail allows bezels of the servers and storage systems to be in alignment when installed in these racks. For Tool-installation, Stab-in static rails (B4) must be used for bezel alignment with storage systems.

System-to-Rail Installation Method

If the customer prefers to use the stab-in installation method for installing their systems to the rails, the Stab-in/Drop-in Sliding rails(B13) or the ReadyRails Static rail (B4) must be selected.

NOTE: ReadyRails Sliding rails (B6) are drop-in only.

Table 59. Static, Sliding, or Stab-in/Drop-in sliding rails

Rail identifier	Rail type	Installation method	Supported rack types					
			Dell EMC Titan or Titan-D Racks	4-Post			2-Post	
				Square	Round	Thread	Flush	Center
B6	Ready Rails Sliding	Drop-in	X	√	√	√ *	X	X
B13	Stab-in/Drop-in Sliding	Stab-in/Drop-in	√	√	√	√	X	X
B4	Ready Rails Static	Stab-in	X	√	√	√ *	√ *	√

NOTE: No screws are required for the Stab-in/Drop-in Sliding (B13) rails when mounting the rails to the racks

NOTE: Screws are not included in either kit as threaded racks are offered with various thread designations. Users must therefore provide their own screws when mounting the rails in threaded racks.

NOTE: Screw head diameter for the sliding rails must be 10 mm or less.

Refer to the [Dell EMC Enterprise Systems Rail Sizing and Rack Compatibility Matrix](#). for information regarding:

- Specific details about rail types and their functionalities
- Rail adjustability ranges for various rack mounting flange types
- Rail depth with and without cable management accessories
- Rack types supported for various rack mounting flange types

Key factors governing proper rail selection include the following:

- Spacing between the front and rear mounting flanges of the rack
- Type and location of any equipment mounted in the back of the rack such as power interposer units (PSUs)
- Overall depth of the rack

Table 60. Rail Adjustability Range and Rail Depth

Rail Identifier	Rail Type	Rail Adjustability Range (mm)*						Rail Depth (mm)+	
		Square		Round		Threaded		Without CMA	With CMA
		Min	Max	Min	Max	Min	Max		
B6	Ready Rails Sliding	676	868	662	861	676	883	714	845
B13	Stab-in/Drop-in Sliding	603	915	603	915	603	915	714	845
B4	Ready Rails Static	608	879	594	872	604	890	622	N/A

* Values represent the distance between the front and rear mounting flanges on the rack

+ Measured from the front surface of the front rack mounting flange

NOTE: For the ReadyRails Sliding rails(B6) and ReadyRails Static rails (B4), the adjustment range of the rails is a function of the type of rack in which they are being mounted. The Min/Max values listed above represent the allowable distance between the front and rear mounting flanges in the rack. Rail depth without the CMA represents the minimum depth of the rail with the outer CMA brackets removed (if applicable) as measured from the front mounting flanges of the rack.

Cable management arm (CMA)

The optional cable management arm (CMA) organizes and secures the cords and cables exiting the back of the systems. It unfolds to allow the systems to extend out of the rack without having to detach the cables. Some key features of the CMA include:

- Large U-shaped baskets to support dense cable loads.
- Open vent pattern for optimal airflow.
- Ability to be mounted on either side by simply swinging the spring-loaded brackets from one side to the other.
- Utilizes hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling.
- Includes a low-profile fixed tray to both support and retain the CMA in its fully closed position.
- Both the CMA and the tray mount without the use of tools via simple and intuitive snap-in designs.

The CMA can be mounted to either side of the sliding rails without the use of tools or the need for conversion. However, it is recommended that it be mounted on the side opposite to the power supplies to allow easier access to the power supplies and rear drives (if applicable) for service or replacement.

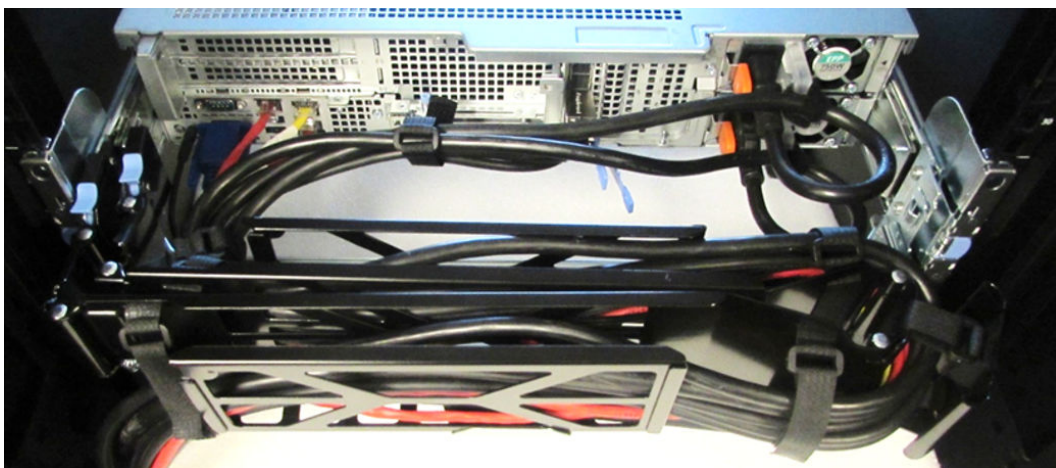


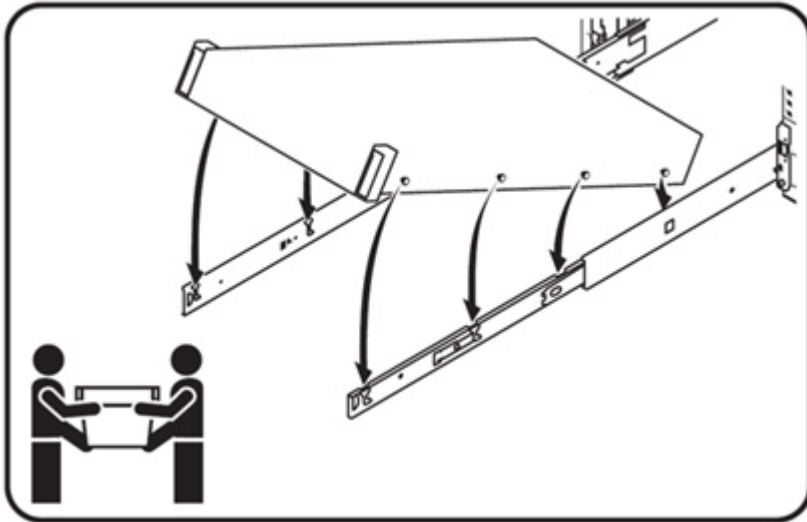
Figure 160. Sliding rails with CMA

Rack Installation

The PowerEdge R7515 offers two different varieties of sliding rails: ReadyRail Sliding rails (B6), and combination Stab-in/Drop-in Sliding rails (B13). Only one variety of static rail is offered: ReadyRails Static rails (B4).

A "drop-in" design means that the system is installed vertically into the rails by inserting the standoffs on the sides of the system into the "J-slots" in the inner rail members with the rails in the fully extended position. The recommended method of installation is to first insert the rear standoffs on the system into the rear J-slots on the rails to free up a hand and then rotate the system down into the remaining J-slots while using the free hand to hold the rail against the side of the system.

A "stab-in" design means that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack. For 2U systems, it is recommended that two people perform this operation.



NOTE: The 2U system requires two people for installation due to its heavier weight.

Installing system into the rack (option A: Drop-In)

1. Pull the inner rails out of the rack until they lock into place.

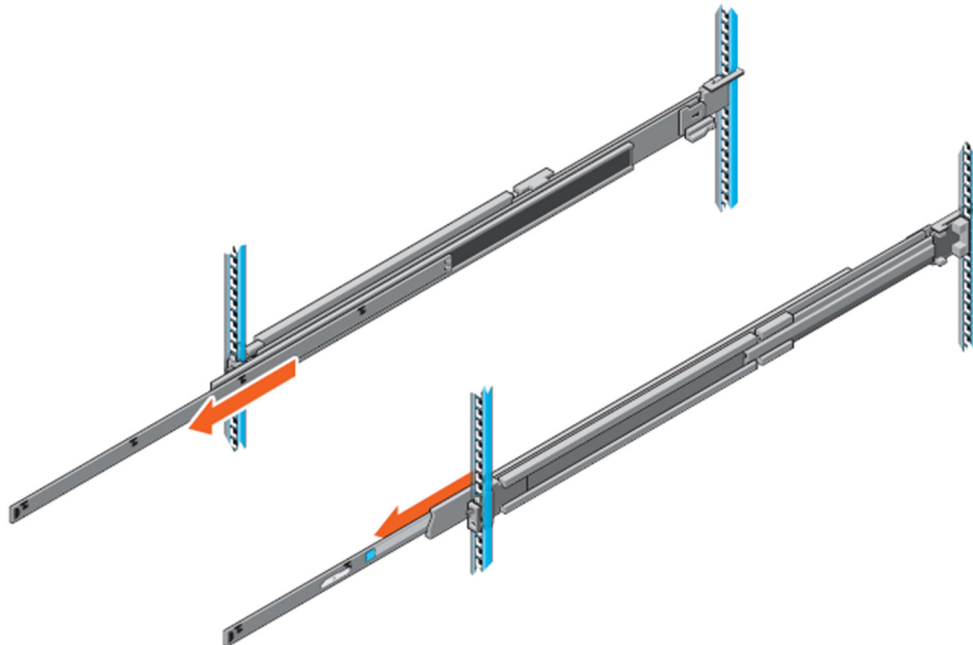


Figure 161. Pull out inner rail

2. Locate the rear rail standoff on each side of the system and lower them into the rear J-slots on the slide assemblies.
3. Rotate the system downward until all the rail standoffs are seated in the J-slots.

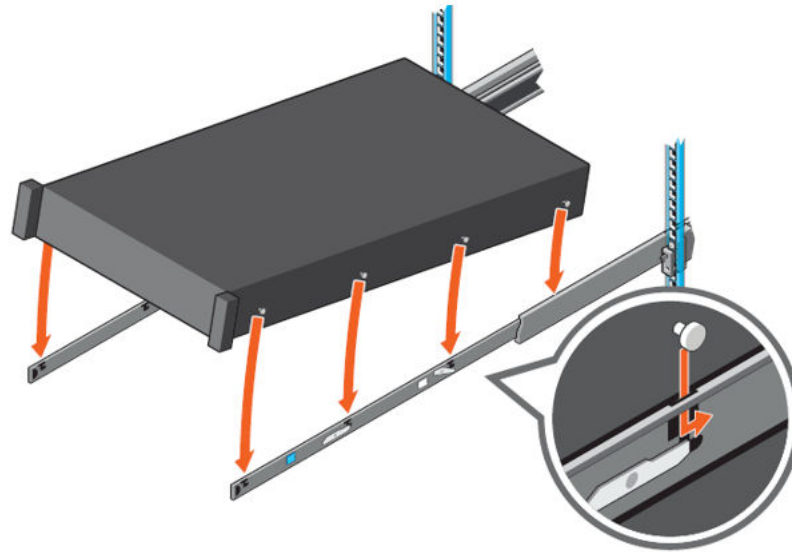


Figure 162. Rail standoffs seated in J-slots

4. Push the system inward until the lock levers click into place.
5. Pull the blue slide release lock tabs forward or backward on both rails and slide the system into the rack until the system is in the rack.

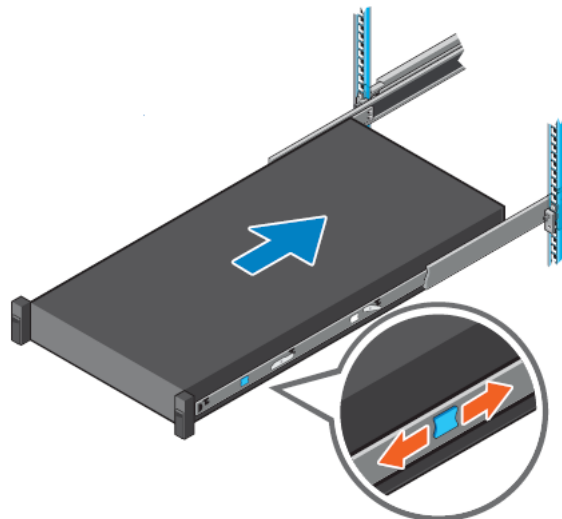


Figure 163. Slide system into the rack

Installing the system into the rack (option B: Stab-In)

1. Pull the intermediate rails out of the rack until they lock into place.
2. Release the inner rail lock by pulling forward on the white tabs and sliding the inner rail out of the intermediate rails.

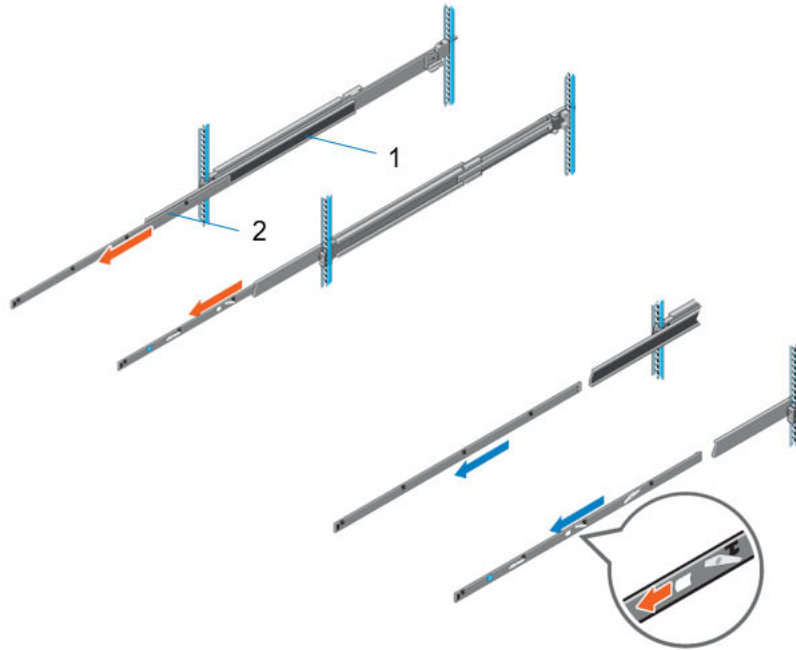


Figure 164. Pull out the intermediate rail

Table 61. Rail component

Number	Component
1	Intermediate rail
2	Inner rail

3. Attach the inner rails to the sides of the system by aligning the J-slots on the rail with the standoffs on the system and sliding forward on the system until they lock into place.

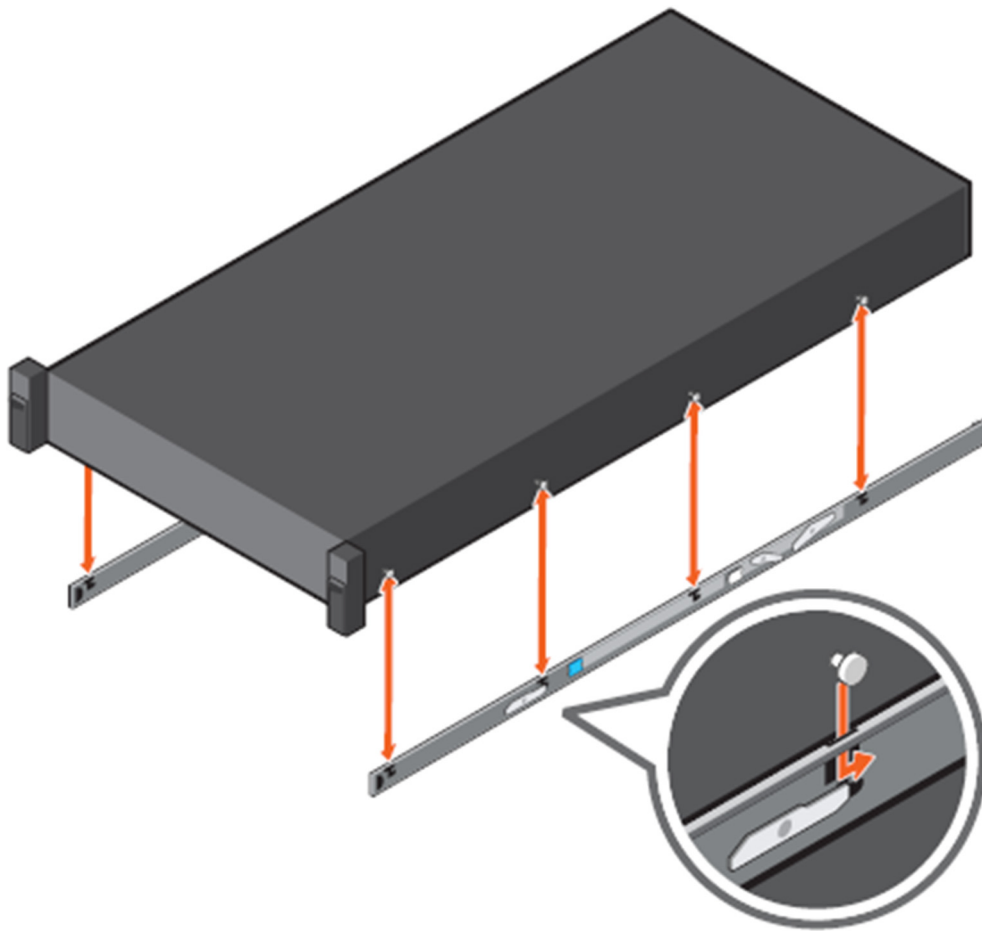


Figure 165. Attach the inner rails to the system

4. With the intermediate rails extended, install the system into the extended rails.

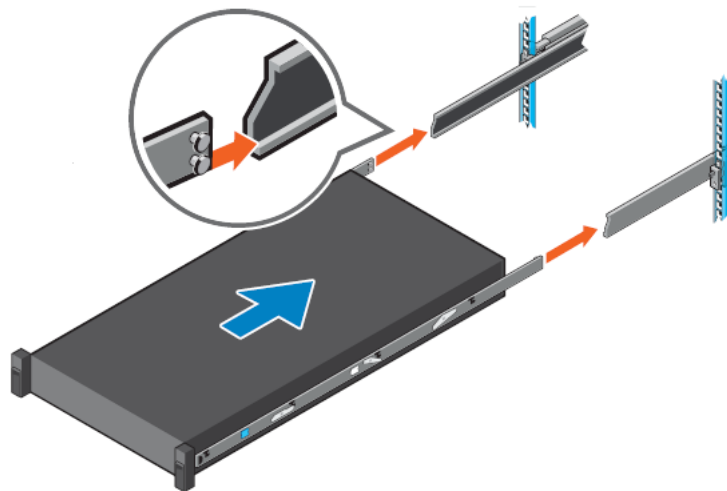


Figure 166. Install system into the extended rails

5. Pull the blue slide release lock tabs forward or backward on both the rails, and slide the system into the rack.

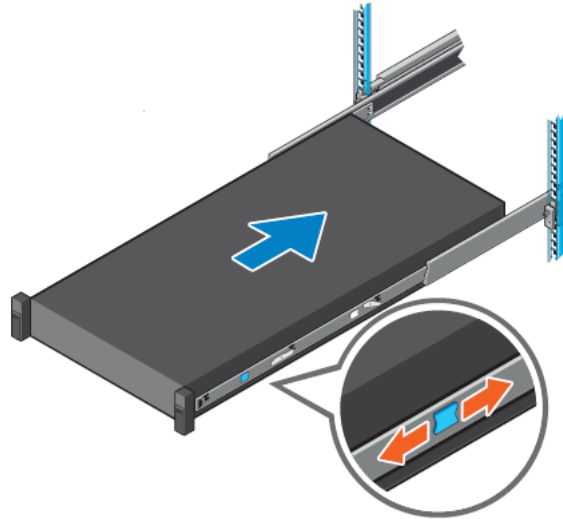


Figure 167. Slide system into the rack

Initial system setup and configuration for PowerEdge R7515

This section describes the tasks for initial setup and configuration of the Dell EMC system. The sections provide general steps that you must complete to set up the system and the reference guides for detailed information.

Setting up the system

Perform the following steps to set up the system:

Steps

1. Unpack the system.
2. Install the system into the rack. For more information about installing the system into the rack, see the *Rail Installation Guide* on the product page at [.](#)
3. Connect the peripherals to the system and the system to the electrical outlet.
4. Power on the system by pressing the power button.

For more information about setting up the system, see the *Getting Started Guide* that is shipped with your 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 EMC 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 it at the time of purchase.

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

Table 62. Interfaces to set up iDRAC IP address

Interface	Documentation links
iDRAC Settings utility	<i>Integrated Dell Remote Access Controller User's Guide</i> at or for system specific <i>Integrated Dell Remote Access Controller User's Guide</i> , go to > Product Support page of your system > Manuals & documents .  NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article .
OpenManage Deployment Toolkit	<i>OpenManage Deployment Toolkit User's Guide</i> at .
Lifecycle Controller	<i>Lifecycle Controller User's Guide</i> at or for system specific <i>Lifecycle Controller User's Guide</i> , go to > Product Support page of your system > Manuals & documents .  NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article .
Server LCD panel	LCD panel section.
iDRAC Direct and Quick Sync 2 (optional)	<i>Integrated Dell Remote Access Controller User's Guide</i> at or for system specific <i>Integrated Dell Remote Access Controller User's Guide</i> , go to > Product Support page of your system > Manuals & documents .  NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article .

 **NOTE: To access iDRAC, ensure that you connect the ethernet cable to the iDRAC9 dedicated network port or use iDRAC Direct port by using the USB cable. You can also access iDRAC through the shared LOM mode, if you have opted for a system that has the shared LOM mode enabled.**

Options to log in to iDRAC

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


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, enter the iDRAC secure default password available on back side of the Information Tag. If you have not opted for secure default access to iDRAC, enter the default user name and password – root and calvin. You can also log in by using your Single Sign-On or Smart Card.

 **NOTE: Ensure that you change the default user name 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* at .

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

You can also access iDRAC using command-line protocol - RACADM. For more information, see the *iDRAC with Lifecycle Controller RACADM CLI Guide* available at

You can also access iDRAC using automation tool - Redfish API. For more information, see the *iDRAC9 with Lifecycle Controller Redfish API Guide* available at

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 following resources. For information about how to install the operating system, see the documentation links provided in the table.

Table 63. Resources to install the operating system

Resource	Documentation links
iDRAC	<i>Integrated Dell Remote Access Controller User's Guide</i> at or for system specific <i>Integrated Dell Remote Access Controller User's Guide</i> , go to > Product Support page of your system > Manuals & documents . <i>i</i> NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at .
Lifecycle Controller	<i>Lifecycle Controller User's Guide</i> at or for system specific <i>Lifecycle Controller User's Guide</i> , go to > Product Support page of your system > Manuals & documents . <i>i</i> NOTE: To determine the most recent iDRAC release for your platform and for latest documentation version, see KB article at .
OpenManage Deployment Toolkit	
Dell certified VMware ESXi	

i **NOTE: For more information about Installation and How-to videos for supported operating systems on PowerEdge systems see, [Supported Operating Systems for Dell EMC PowerEdge systems](#).**

Options to download firmware

You can download firmware from Dell support site. For information, 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.

Table 64. Options to download firmware

Option	Documentation link
Using Dell Remote Access Controller Lifecycle Controller (iDRAC with LC)	
Using Dell Repository Manager (DRM)	
Using Dell OpenManage Essentials (OME)	
Using Dell Server Update Utility (SUU)	
Using Dell OpenManage Deployment Toolkit (DTK)	
Using iDRAC virtual media	

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.

Table 65. Options to download and install OS drivers

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


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 .
2. Enter the Service Tag of the system in the **Enter a Dell Service Tag, Dell EMC Product ID or Model** field, and then press Enter.
 **NOTE: If you do not have the Service Tag, select Detect PC to automatically detect the Service Tag, or 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.

Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) located on the information tag on the frontrear of the R7515 system, to access information about Dell EMC PowerEdge R7515. The QRL is located on the top of the system cover.

Prerequisites

Ensure that your smartphone or tablet has the QR code scanner installed.

The QRL includes the following information about your system:

- How-to videos
- Reference materials, including the Installation and Service Manual, LCD diagnostics, 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 assistance and sales teams

Steps

1. Go to and navigate to your specific product or
2. Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code on your system or in the Quick Resource Locator section.

Quick Resource Locator for PowerEdge R7515 system



Figure 168. Quick Resource Locator for PowerEdge R7515 system

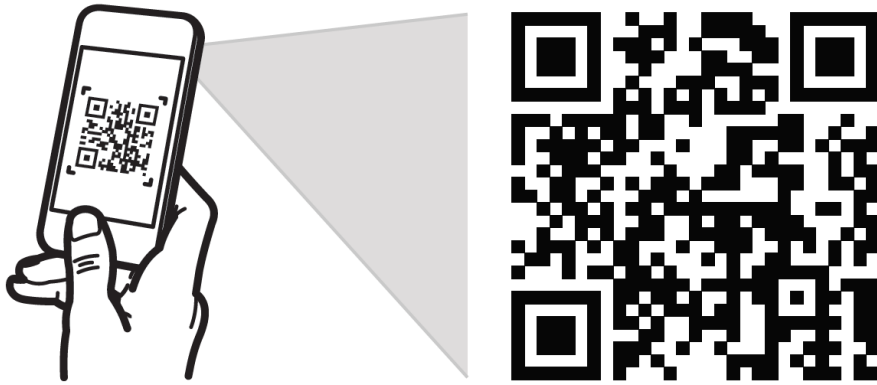


Figure 169. Quick Resource Locator for PowerEdge R7515 system



Figure 170. Quick Resource Locator for PowerEdge R7515 system

Quick Resource Locator



Dell.com/QRL/Server/PEC6525

Figure 171. Quick Resource Locator for PowerEdge R7515 system

Technology and components

The following sections contain information about the technology and components in the Dell EMC PowerEdge system.

iDRAC9

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

iDRAC with Lifecycle Controller technology is part of a larger data center solution that helps keep business critical applications and workloads available always. The technology allows administrators to deploy, monitor, manage, configure, update, troubleshoot and remediate Dell system from any location, and without the use of agents. It accomplishes this regardless of operating system or hypervisor presence or state.

iDRAC9 is available in the following variants:

- **iDRAC9 Basic** - available by default on all 200-500 series of rack or tower systems.
- **iDRAC9 Express** - available by default on all 600 and higher series of rack or tower systems, and all sled systems.
- **iDRAC9 Enterprise** - available on all system models.

For more information, see the *Integrated Dell Remote Access Controller User's Guide* at .

iDRAC9 - New features

The following list contains the key new features available on iDRAC9:

- Added support for Redfish 2016.R1 and .R2, a RESTful Application Programming Interface (API), which is standardized by the Distributed Management Task Force (DMTF). It provides a scalable and secure systems management interface.
- Enhanced iDRAC RESTful API support for Server Configuration Profiles with access via local file streaming and via HTTP/S file transfer.
- Added Server Configuration Profile support for firmware repository-based updates and JSON file format.
- Export and import Server Configuration Profiles from the iDRAC GUI.
- Quick Sync 2 replaces Quick Sync NFC (Near Field Communication) with BLE (Bluetooth Low Energy) and Wi-Fi for high throughput. Supports iDRAC GUI and Virtual Console access.
- Added support for HTTP/HTTPS file transfers
- Added support for WSman streaming for Server Configuration Profiles.
- Added new feature Group Manager. All iDRACs in the same subnet can be grouped together and the systems can be grouped and managed by one master iDRAC of the group.
- Added Security Banner for GUI login page.
- Multi Vector Cooling for better air flow cooling of 3rd party PCIe cards.
- DHCP is the default iDRAC IP address (static was the default on previous generations).
- Default password is randomly generated and printed on the pull out information tag, unless the legacy "root/calvin" was ordered from the factory.
- iDRAC Direct USBiDRAC Direct (Micro-AB USB) on the front of the server is now a Micro B slot, and is hard wired to iDRAC only for increased security.
- Added new System Lockdown feature to restrict use of Dell tools to make changes to BIOS, iDRAC, firmware, and so on.
- iDRAC Service Module (iSM) is pre-installed on the iDRAC and can be surfaced to the OS; nothing to download.
- SupportAssist can be set up through the iDRAC for 1x1 'phone home' service to Dell Support.
- SupportAssist Collector now includes iDRAC core dumps, hardware crash dumps, and ESXi logs.
- SupportAssist viewer - option to export HTML5 formatted report for customer viewing by standard web browsers.
- Full HTML5 web interface for faster page loading and ease of use.
- BIOS configuration in the iDRAC GUI.
- Expanded storage functions via iDRAC, such as Online Capacity Expansion (OCE) and RAID Level Migration (RLM) without the use of agents, using GUI or CLI.

- Improved add/delete of iDRAC Users.
- Streamlined alerts configuration.
- Added Power Control and Next Boot options in HTML5 vConsole.
- Added feature Connection View provide the switch and port for iDRAC, LOM's and Dell supported PCIe cards.
- Internal 16 GB vFlash card (optional).
- Bezel with LCD panel (optional).

For more information on iDRAC, see the Integrated Dell Remote Access Controller User's Guide and Release Notes at .

Dell Lifecycle Controller

 **NOTE:** This is an overview of the Lifecycle Controller. For more information about Dell LifeCycle Controller, see .

iDRAC9 with Lifecycle Controller

Dell Lifecycle Controller provides advanced embedded systems management to perform systems management tasks such as deploy, configure, update, maintain, and diagnose by using a graphical user interface (GUI). It is delivered as part of integrated Dell Remote Access Controller (iDRAC) out-of-band solution and embedded Unified Extensible Firmware Interface (UEFI) applications in the latest Dell systems. iDRAC works with the UEFI firmware to access and manage every aspect of the hardware, including component and subsystem management that is beyond the traditional Baseboard Management Controller (BMC) capabilities.

Benefits of using iDRAC with Lifecycle Controller

The benefits of using iDRAC with Lifecycle Controller include:

- Increased availability—Early notification of potential or actual failures that help prevent a system failure or reduce recovery time after failure.
- Improved productivity and lower Total Cost of Ownership (TCO) — Extending the reach of administrators to larger numbers of distant systems can make the IT staff more productive while driving down operational costs such as travel.
- Secure environment—By providing secure access to remote systems, administrators can perform critical management functions while maintaining system and network security.
- Enhanced embedded management through Lifecycle Controller — Lifecycle Controller provides deployment and simplified serviceability through Lifecycle Controller GUI for local deployment and remote services (Redfish, RACADM, and WS-Man) interfaces for remote deployment integrated with Dell OpenManage Essentials and partner consoles.

Key features of iDRAC

The key features of Lifecycle Controller are:

- Provisioning — Entire pre-operating system configuration from a unified interface.
- Deploying — Simplified OS installation with the embedded drivers on Lifecycle Controller. Unattended installation mode is available for Microsoft Windows and Red Hat Enterprise Linux (RHEL) 7 operating systems.
- Download drivers for OS installation from one of the following sources:
 - downloads.dell.com
 - *Dell Lifecycle Controller OS Driver Packs* DVD for Windows and Linux
- Patching or updating — Operating system diagnostics, and reduced maintenance downtime with direct access to updates from downloads.Dell.com. It simplifies firmware updates by maintaining a working version for rollback.
- Servicing — Continuous availability of diagnostics without depending on a drive. Ability to automatically update firmware while replacing components such as a PowerEdge Storage Controller (PERC), NIC, and power supply unit. Support for VLAN in network configuration.
- System erase — Deletes the system and storage-related data on selected components of a system. You can delete information pertaining to BIOS, Lifecycle Controller logs, iDRAC settings, and storage components on the system. However, you cannot delete the iDRAC license information.
- Security — Supports local key encryption.
- Restoring the server — Back up the system profile, including RAID configuration, and restore the system to a previously known state. Importing a server license, firmware rollback, and restoring system configuration if there is system board replacement.
- Easy Restore — Automatically restore hardware configuration and license information after a system board replacement
- SupportAssist Collection — Gathers all hardware logs, OS logs, and inventory information required for technical support.

- Lifecycle Controller logs for troubleshooting.
- Hardware inventory — Provides information about the current and factory system configuration.

Starting Lifecycle Controller

To start Lifecycle Controller, restart the system, press **<F10>** during POST, and select Lifecycle Controller from the list displayed. When Lifecycle Controller starts for the first time, the Settings wizard is displayed. Use the wizard to configure the preferred language and network settings.

Processors

Processor features

The new AMD EPYC processor provides more cores, I/O capacity, and memory capacity. The AMD EPYC processor adds new features including:

- Highly scalable 64-core System on Chip (SoC) design, with support for two high performance threads per core.
- 14nm process technology.
- Industry leading memory bandwidth, 8-channels of memory. The single socket system supports up to 16 DDR4 DIMMs, delivering up to 128 GB memory capacity.
- The processor is a complete SoC with fully integrated, high speed I/O supporting 128 lanes of PCIe Gen3 and PCIe Gen4, negating the need for a separate chipset.
- A highly optimized cache structure for high performance and energy efficient compute.
- Dedicated security hardware.

Supported processors

Table 66. Supported Processors for R7515

Processor	Frequency (GHz)	Cores/Threads	Cache (MB)	xGMI (GT/s)	Max Memory Speed (MT/s)	Turbo	TDP (W)
7742	2.25	64/128	256	16	3200	Yes	225
7702P	2	64/128	256	16	3200	Yes	200
7542	2.9	32/64	128	16	3200	Yes	225
7502P	2.5	32/64	128	16	3200	Yes	180
7452	2.35	32/64	128	16	3200	Yes	155
7402P	2.8	24/48	128	16	3200	Yes	180
7352	2.3	24/48	128	16	3200	Yes	155
7302P	3	16/32	128	16	3200	Yes	155
7262	3.2	8/16	128	16	3200	Yes	155

System memory guidelines

The PowerEdge R7515 system supports DDR4 registered DIMMs (RDIMMs) and load reduced DIMMs (LRDIMMs). System memory holds the instructions that are executed by the processor.

Your system memory is organized into eight channels per processor (two memory sockets per channel) for a total of 16 memory sockets per processor. In each channel, the 1st socket is marked white and the 2nd socket black.

Memory channels are organized as follows:

Table 67. Memory channels

Processor	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F	Channel G	Channel H
AMD Processor	Slots 6 and 12	Slots 5 and 11	Slots 2 and 10	Slots 1 and 9	Slots 8 and 16	Slots 7 and 15	Slots 4 and 14	Slots 3 and 13

Table 68. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed	
				1 DIMMs per Channel (DPC)	2 DIMMs per Channel (DPC)
RDIMM	1R	8 GB	DDR4 (1.2V), 3200 MT/s	3200 MT/s	2933 MT/s
	2R	16 GB, 32 GB, 64 GB	DDR4 (1.2V), 3200 MT/s	3200 MT/s	2933 MT/s
LRDIMM	8R	128 GB	DDR4 (1.2V), 2666 MT/s	2666 MT/s	2666 MT/s

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 configurations fail to observe these guidelines, your system might not boot, stop responding during memory configuration, or operate with reduced memory. This section provides information on the memory population rules and about the non-uniform memory access (NUMA) for single or dual processor system.

The memory bus may operate at speeds of 3200 MT/s, 2933 MT/s, or 2666 MT/s depending on the following factors:

- System profile selected (for example, Performance Optimized, 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.

The system supports Flexible Memory Configuration, enabling the system to be configured and run in any valid chipset architectural configuration. The following are the recommended guidelines for installing memory modules:

- All DIMMs must be DDR4.
- Mixing of memory module capacities in a system is not supported.
- 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 A16 are available.
 - For single-processor systems, sockets A1 to A8 are available.
 - In Optimizer Mode, the DRAM controllers operate independently in the 64-bit mode and provide optimized memory performance.

Table 69. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Odd amount of DIMMs per processor allowed.

Table 70. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	Odd amount of DIMMs per processor allowed.

Processor	Configuration	Memory population	Memory population information
Dual processor (Start with processor1. Processor 1 and processor 2 population should match)	Optimizer (Independent channel) population order	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{6} A{6}, B{6}	<p>Odd amount of DIMMs per processor allowed.</p> <p>i NOTE: Odd number of DIMMs will result in unbalanced memory configurations, which in turn will result in performance loss. It is recommended to populate all memory channels identically with identical electrical specification DIMMs for best performance.</p> <p>Optimizer population order is not traditional for 8 and 16 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> For 8 DIMMs: A1, A2, A4, A5, B1, B2, B4, B5 For 16 DIMMs: A1, A2, A4, A5, A7, A8, A10, A11, B1, B2, B4, B5, B7, B8, B10, B11

Table 71. Memory population rules

Processor	Configuration	Memory population	Memory population information
Single processor	Optimizer (Independent channel) population order	A{1}, A{2}, A{3}, A{4}, A{5}, A{6}, A{7}, A{8}	<p>Odd amount of DIMMs per processor allowed.</p>
Dual processor (Start with processor1. Processor 1 and processor 2 population should match)	Optimizer (Independent channel) population order	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}	<p>Odd amount of DIMMs per processor allowed.</p> <p>i NOTE: Odd number of DIMMs will result in unbalanced memory configurations, which in turn will result in performance loss. It is recommended to populate all memory channels identically with identical electrical specification DIMMs for best performance.</p> <p>Optimizer population order is not traditional for 8 and 16 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> For 8 DIMMs: A{6}, A{5}, A{2}, A{1}, A{8}, A{7}, A{4}, A{3}

Processor	Configuration	Memory population	Memory population information
			<ul style="list-style-type: none"> For 16 DIMMs: A{6}, B{6} A{5}, B{5} A{2}, B{2} A{1}, B{1}, A{8}, B{8}, A{7}, B{7}, A{4}, B{4} A{3}, B{3}

- For dual-processor systems, sockets A1 to A16 and sockets B1 to B16 are available.
- For dual-processor systems, sockets A1 to A8 and sockets B1 to B8 are available.
- Populate all the sockets with white release tabs first, followed by the black release tabs.
- In a dual-processor configuration, the memory configuration for each processor must be identical.

For example, if you populate socket A1 for processor 1, then populate socket B1 for processor 2, and so on.

- Unbalanced or odd memory configuration results in a performance loss and system may not identify the memory modules being installed, so always populate memory channels identically with identical electrical specification DIMMs for best performance.
- Minimum recommended configuration is to populate four identical electrical specifications memory modules per processor. AMD recommends limiting processors in that system to 32 cores or less.
- Populate eight identical electrical specification memory modules per processor (one DIMM per channel) at a time to maximize performance.

Non-uniform memory access (NUMA)

Non-uniform memory access (NUMA) is a memory design used in multi-processing, where the memory access time depends on the memory location relative to the processor. In NUMA, a processor can access its own local memory faster than the non-local memory.

NUMA nodes per socket (NPS)

NUMA nodes per socket (NPS) is a new feature added that allows you to configure the memory NUMA domains per socket. The configuration can consist of one whole domain (NPS1), two domains (NPS2), or four domains (NPS4). In the case of a two-socket platform, an additional NPS profile is available to have whole system memory to be mapped as single NUMA domain (NPS0).

In the processors, each physical processor package contains multiple processor cores that are grouped together into core complexes and core complex dies. A core complex (CCX) consists of maximum four processor cores and an L3 cache memory. A core complex die (CCD) contains two CCXs. The physical processor package contains maximum eight core CCDs. A max CCD x CCX x Core processor will have 64 cores. The BIOS setup allows for the selection of an NPS profile based on down core profile and by processor SKU.

Table 72. NPS options per processor SKU or down core configuration

Cores	CCDs x CCXs x Cores/CCX	NPSx options - Single processor
64	8x2x4	4, 2, 1
48	6x2x4	2, 1
32	4x2x4	4, 2, 1
24	3x2x4	1
16	2x2x4	2, 1
16	4x2x2	4, 2, 1
8	4x2x1	4, 2, 1
8	2x2x2	2, 1

Table 73. NPS options per processor SKU or down core configuration

Cores	CCDs x CCXs x Cores/CCX	NPSx options - Single processor	NPSx options - Dual processor
64	8x2x4	4, 2, 1	4, 2, 1, 0
48	6x2x4	2, 1	2, 1, 0
32	4x2x4	4, 2, 1	4, 2, 1, 0
24	3x2x4	1	1, 0
16	2x2x4	2, 1	2, 1, 0
16	4x2x2	4, 2, 1	4, 2, 1, 0

Cores	CCDs x CCXs x Cores/CCX	NPSx options - Single processor	NPSx options - Dual processor
8	4x2x1	4, 2, 1	4, 2, 1, 0
8	2x2x2	2, 1	2, 1, 0

NOTE: If the system configuration does not support an NPS profile, the options are not displayed until the configuration changes.

NOTE: If there is a memory training failure, configuration change, or processor swap that no longer supports a specific NPS profile, an error message is displayed at the end of POST and logged in the LifeCycle Controller.

Interleaving option

Based on the NPSx selection, the AMD Platform Security Processor (PSP) firmware selects the corresponding preferred memory interleaving. If the memory configuration does not allow the preferred option (Example: a channel is not populated or one or more DIMMs on a channel does not initialize or train properly), the pre-BIOS firmware selects the corresponding alternate memory interleaving option.

Table 74. Interleaving Options Based on NPSx

NPSx	Preferred	Alternate
4	2-channel	None
2	4-channel	2-channel
1	8-channel	4-channel, 2-channel

Table 75. Interleaving Options Based on NPSx

NPSx	Preferred	Alternate
4	2-channel	None
2	4-channel	2-channel
1	8-channel	4-channel, 2-channel
0	16-channel (dual processor)	2-channel

Two channel interleaving (per quadrant) - NPS4 and fallback for NPS2/1/0

- This interleaves two channels in each quadrant.
- Does not require the memory to be equal on both channels of a quadrant. Any non-symmetrical DIMM is stacked on top.
- Any quadrant where one of the two channels is not populated is not interleaved.
- There is no alternate, as all configurations can be mapped into this mode.

Four channel interleaving (per half-socket) - NPS2

- This interleaves the four channels on the left or right half of a socket. As an alternative option from NPS1 only, the four channels {CS A, B, C, D} may be interleaved.
- Requires all four channels to be populated with equal size memory.
- There is no requirement that the two halves have equal size memory with respect to each other.
- The system has support for one half to have no memory.
- In a dual processor system:
 - There is no requirement that both sockets have the same number of halves populated.
 - There is no requirement that each of the four halves has the same amount of memory with respect to each other.
 - The system allows for one of the sockets to have no memory.

Eight channel interleaving (per socket) - NPS1

- This interleaves eight channels in a socket.
- **NOTE:** {CS A, B, C, D} and {CS E, F, G, H} is only recommended as a memory population if all eight channels are populated as NPS2.
- **NOTE:** It is recommended that all channels must be populated (CS A, B, C, D, E, F, G, H) for NPS1, but NPS1 does support a 4 channel configuration of (CS C, D, G, H) but does not have optimal performance.
- Requires all populated channels in a socket to have equal size memory.
- In a dual processor system:

- There is no requirements for both sockets to have equal size memory.
- If both sockets have memory the interleaving mode must be the same for both sockets.
- The system allows for one of the sockets to have no memory.
- Single processor system creates a single NUMA node for the system, the SRAT and SLIT table are not required.

Socket interleaving (dual processor only) - NPS0

- This interleaves all 16 channels (eight per socket) in a dual processor system.
- Requires all channels in the system to be populated with equal size memory.
- Creates a single NUMA node for the system, the SRAT and SLIT table are not required.

CCX/Last-Level Cache (LLC) as NUMA domains

In addition to selecting the number of NUMA domains via NPS option, the processor allows for making memory per CCX as NUMA domain. In the processor each CCD has a maximum of two CCXs with each CCX having a shared last-level cache (LLC, or L3 cache) for all cores. The CCX as NUMA domain option allows for each LLC to be configured as a NUMA domain so that for certain workloads pinning execution to a single NUMA domain can be done.

The total amount of memory for each default NUMA node is divided by the number of CCXs within each CCD and distributed equally to each new per-CCX. The max number of NUMA domains generated will based on how many CCD and CCX are fused for that processor SKU.

Storage

The PowerEdge R7515 system supports SAS, SATA, Nearline SAS drives/SSD drives.

Supported drives

Table 76. Supported drives - SAS and SATA or SSD

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5-inch	SAS	12 Gb	10 K	300 GB, 600 GB, 1.2 TB, 1.8 TB, 1.2 TB (SED/FIPS), 2.4 TB, 2.4 TB (SED/FIPS)
	SATA	6 Gb	7.2 K	1 TB, 2 TB
	SATA SSD (M.2)	6 Gb	N/A	120 GB, 240 GB
	SAS SSD	12 Gb	N/A	400 GB, 800 GB, 960 GB, 1.633 TB, 1.92 TB, 3.2 TB, 3.840 TB, 1.92 TB (SED/FIPS)
	SATA SSD	6 Gb	N/A	120 GB, 200 GB, 240 GB, 300 GB, 400 GB, 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, 3.84 TB
	SAS	12 Gb	15 K	300 GB, 600 GB, 900 GB
	SAS	12 Gb	7.2 K	1 TB, 2 TB, 4 TB, 6 TB, 8 TB, 10 TB, 2 TB (SED/FIPS)
3.5-inch	SATA	6 Gb	7.2 K	1 TB, 2 TB, 4 TB, 6 TB, 8 TB, 10 TB
	SAS	12 Gb	7.2 K	1 TB, 2 TB, 4 TB, 8 TB, 10 TB, 4 TB (SED FIPS), 8 TB (SED FIPS)

Boot Optimized Storage Subsystem

The Boot Optimized Storage Subsystem (BOSS) is offered as a means of booting PowerEdge systems to a full OS mode when,

- Target OS is a full OS and not hypervisor that may be supported best by IDSDM
- You do not wish to trade off standard hot plug drive slots for OS install

The RAID controller on the BOSS card has limited set of features. This RAID controller presents the M.2 SATA SSDs as either a non-RAID volume or as a single RAID volume.

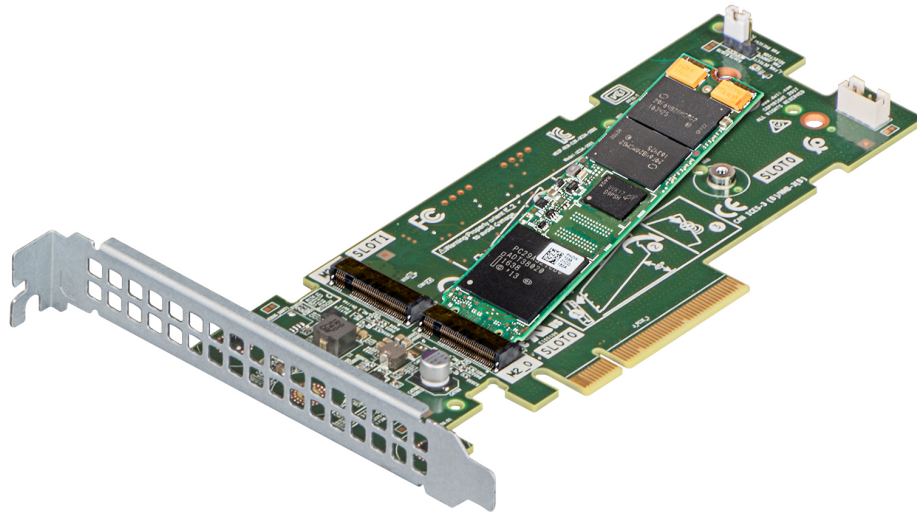


Figure 172. Boot Optimized Storage Subsystem (BOSS)

Table 77. BOSS features

Function or feature	Supported
Stripe size supported	64K
Configuration (HII)	Yes
Full initialization	No
Fast initialization	Yes NOTE: By default, fast initialization is performed when you create a virtual disk.
Background initialization	No
RAID 0	No
RAID 1	Yes
Single non-RAID	Yes
Dual non-RAID	Yes
Degraded RAID1 and non-RAID	No
Foreign import	Yes
Consistency check	No
Patrol read	No
Load balance	N/A
Rebuild	Yes NOTE: You must manually start the rebuild process using HII or using the Marvell CLI.
Auto-rebuild	Yes NOTE: Auto-rebuild is performed when the system is powered on only if there is a surviving native virtual disk and another physical disk is present.
Hot spare	No
Change rebuild priority/rate	No
Virtual disk write back/read ahead cache	No

Function or feature	Supported
	① NOTE: BOSS controller does not support controller cache.
Battery support	N/A ① NOTE: BOSS controller does not support a battery.
Non-RAID disk cache policy	Yes ① NOTE: OS controlled/Device defaults.
SMART Info	Yes ① NOTE: Use the Marvell CLI to retrieve the SMART information from the drives.
Physical disk hot swap	No
Virtual disk expansion	No
Virtual disk slicing	No
Virtual disk migration	Yes ① NOTE: On new controller, virtual disk must be Imported from HII before presented to OS.
Split mirror	No ① NOTE: System required to shutdown and migrate one physical disk to another system and continue rebuild.
Non-RAID migration	Yes
BIOS configuration utility (Ctrl-M)	No
Add on driver for data path (OS device driver)	No ① NOTE: Console Windows driver or Linux library is required for management purposes only.
4K native drive support	No
TRIM and UNMAP virtual disk	No
TRIM and UNMAP Non-RAID physical disk	Yes
Self-encrypting drives(SED) support	No
Cryptographic erase (sanitize)	Yes ① NOTE: If drive supports SANITIZE Crypto Erase. No other encryption support from controller or drive.

PERC Controller

The Dell PERC (PowerEdge RAID Controller) family of enterprise-class controllers is designed for enhanced performance, increased reliability and fault tolerance, and simplified management - providing a powerful, easy-to-manage way to create a robust infrastructure and help maximize system uptime.

Dell's RAID controller options offer performance improvements, including the Mini PERC solution. Mini PERC provides a base RAID hardware controller without consuming a PCIe slot by using a small form factor and high-density connector to the system board.

The new PERC controller offerings apply heavily on previous generation PERC family.

Table 78. PERC series controller offerings

Performance level	Description
Entry	S150 (SATA)
Value	HBA330, PERC H330, PERC H730P, 12Gbps SAS HBA (External)

Performance level	Description
Value Performance	PERC H740P
Premium Performance	H840

Power supply

Your system supports one of the following:

- Two 1600 W, 1100 W, 750 W, or 495 W AC PSUs
- Two 1100 W or 750 W Mixed Mode HVDC PSUs

NOTE: For more information, see the **Technical specifications** section.

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. Mixing PSUs will result in mismatch condition or failure to turn the system on.

NOTE: When two identical PSUs are installed, power supply redundancy (1+1 – with redundancy or 2+0 – without redundancy) is configured in system BIOS. In redundant mode, power is supplied to the system equally from both PSUs when Hot Spare is disabled. When Hot Spare is enabled, one of the PSUs is put into the sleep mode when system utilization is low in order to maximize efficiency.

NOTE: If two PSUs are used, they must be of the same maximum output power.

Hot spare feature

Your system supports the hot spare feature that significantly reduces the power overhead associated with 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 .

IDSDM module

The PowerEdge R7515 system supports optional Internal Dual SD module (IDSDM) module.

The module supports two microSD cards for IDSDM.

Table 79. Supported microSD card storage capacity

IDSDM card
<ul style="list-style-type: none"> • 16 GB • 32 GB • 64 GB

NOTE: There are two dip switches on the IDSDM for write-protection.

NOTE: One IDSDM card slot is dedicated for redundancy.

NOTE: Use Dell EMC branded microSD cards that are associated with the IDSDM configured systems.

Drive backplane

Depending on your system configuration, the drive backplanes supported in PowerEdge R7515 are listed here:

- 3.5 inch (x8) SAS, SATA backplane
- 3.5 inch (x12) SAS or SATA backplane and 3.5 inch (x2) SAS or SATA backplane (rear)
- 2.5 inch (x12) SAS or SATA + 2.5 inch (x12) NVMe backplane
- 2.5 inch (x24) SAS or SATA backplane
- 2.5 inch (x24) NVMe backplane
- 2.5 inch (x8) SAS or SATA + 2.5 inch (x16) NVMe backplane

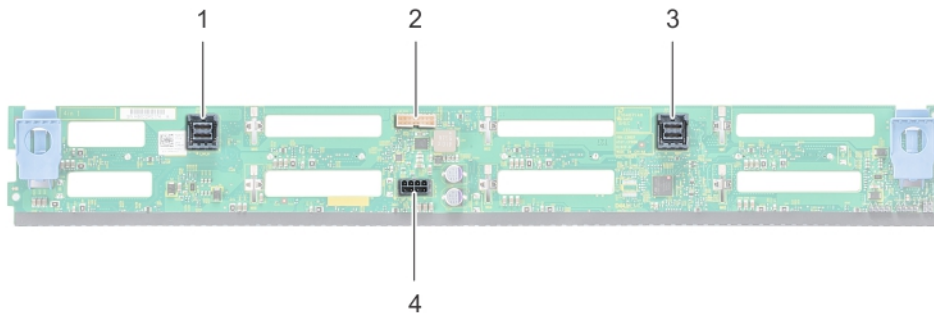


Figure 173. 8 X 3.5 inch drive backplane

- | | |
|-------------------------------|---------------------|
| 1. SAS/SATA B cable connector | 2. Signal connector |
| 3. SAS/SATA A cable connector | 4. Power connector |

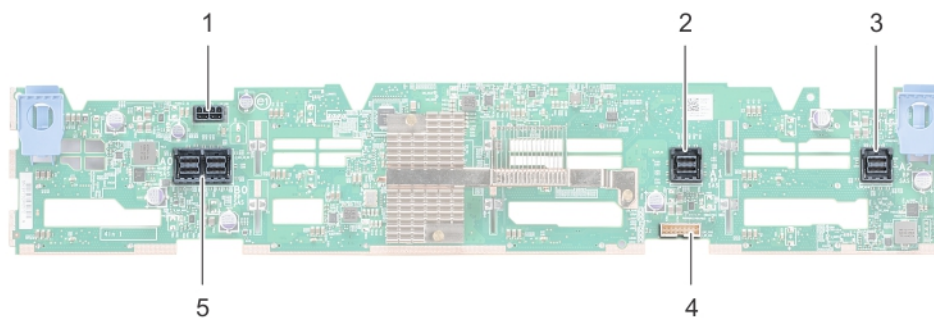


Figure 174. 12 X 3.5 inch drive backplane

- | | |
|-----------------------------|-------------------------------|
| 1. Power cable connector | 2. SAS/SATA cable connector |
| 3. SAS/SATA cable connector | 4. Backplane signal connector |
| 5. SAS cable connector | |

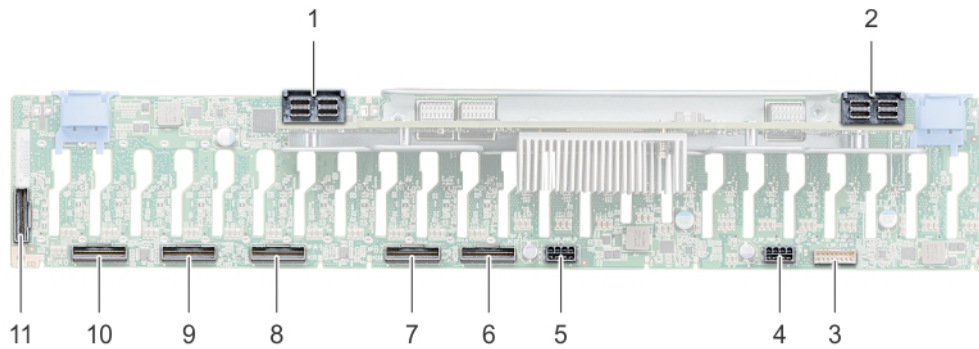


Figure 175. 24 X 2.5 inch drive backplane

- | | |
|---------------------------------|---------------------------------|
| 1. SAS cable connector | 2. SAS cable connector |
| 3. Signal cable connector | 4. Power cable connector |
| 5. Power cable connector | 6. Signal cable (A2)connector |
| 7. Signal cable (B2) connector | 8. Signal cable (A1) connector |
| 9. Signal cable (B1) connector | 10. Signal cable (A0) connector |
| 11. Signal cable (B0) connector | |

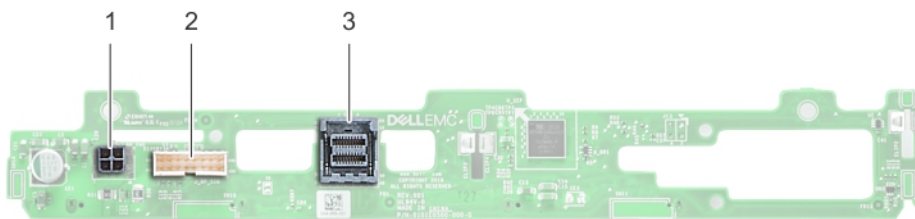


Figure 176. 2 x 3.5 inch drive backplane (rear)

1. Power connector
2. Signal connector
3. SAS cable connector

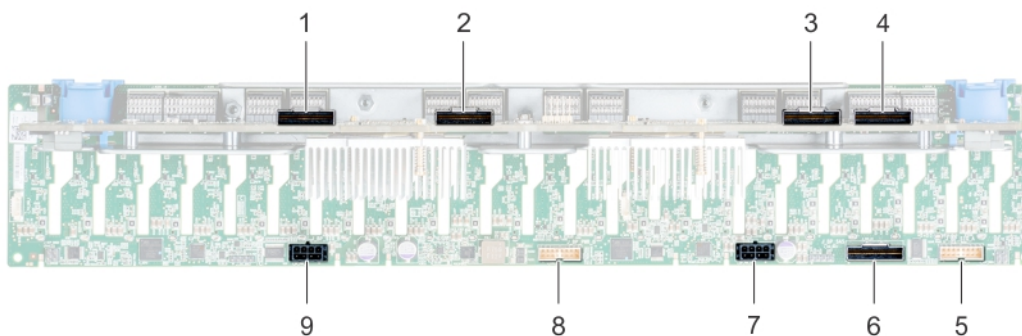


Figure 177. 24 x 2.5 inch NVMe drive backplane

- | | |
|--|--|
| 1. Expander board connector B1 (PE1_B) | 2. Expander board connector A1 (PE1_A) |
| 3. Expander board connector B2 (PE2_B) | 4. Expander board connector A2 (PE2_A) |
| 5. signal connector (J_SIG_A1) | 6. SAS connector (J_BP_SAS) |
| 7. power connector (J_BP_PWR_A1) | 8. signal connector (J_SIG_A2) |
| 9. power connector (J_BP_PWR_A2) | |

Cable routing

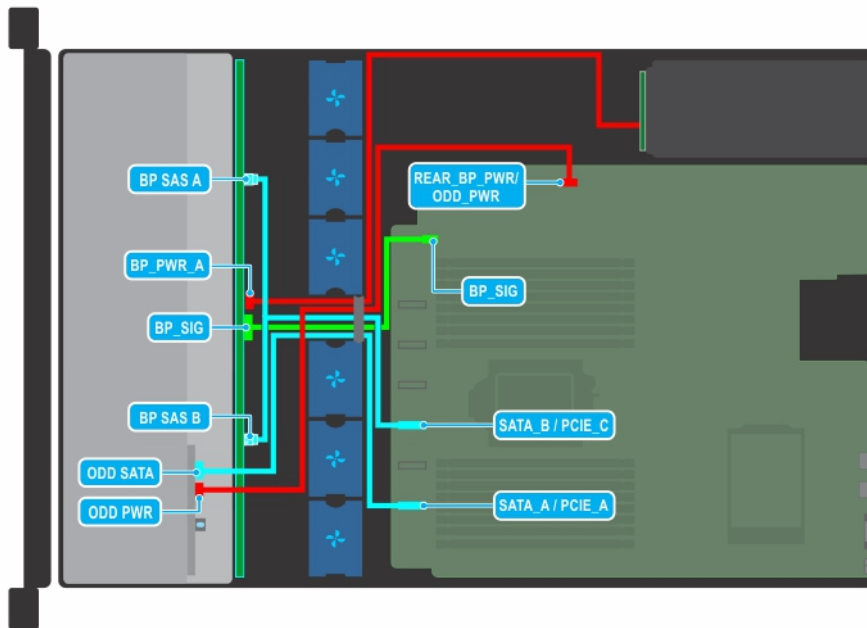


Figure 178. Cable routing - 8 x 3.5 inch drive backplane with ODD

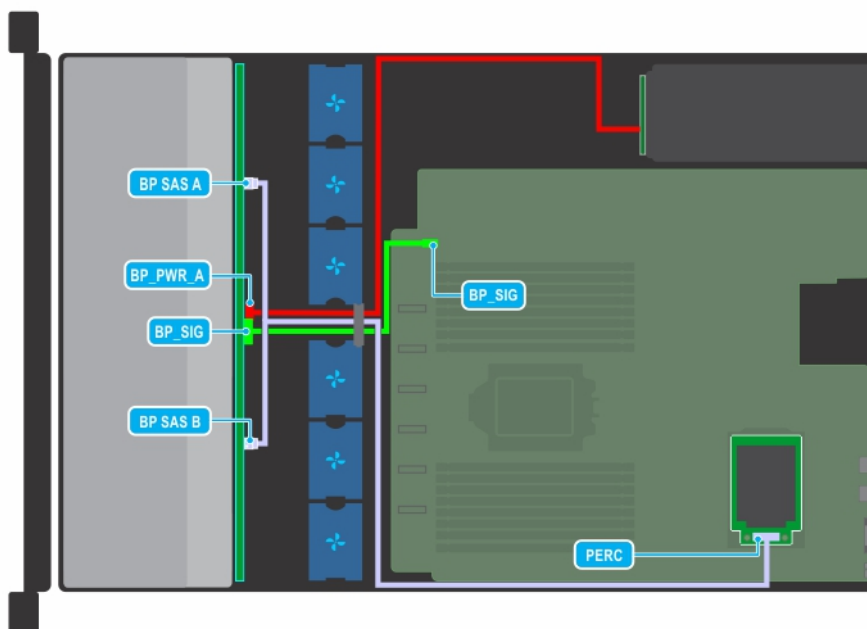


Figure 179. Cable routing - 8 x 3.5 inch drive backplane with mini PERC card

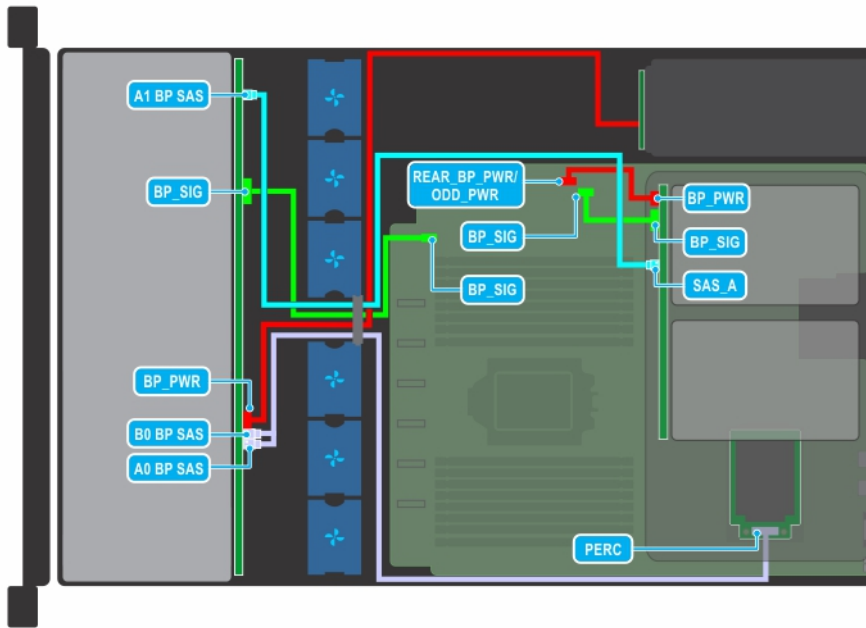


Figure 180. Cable routing - 12 x 3.5 inch drive backplane with 2 x 3.5 inch rear drive backplane

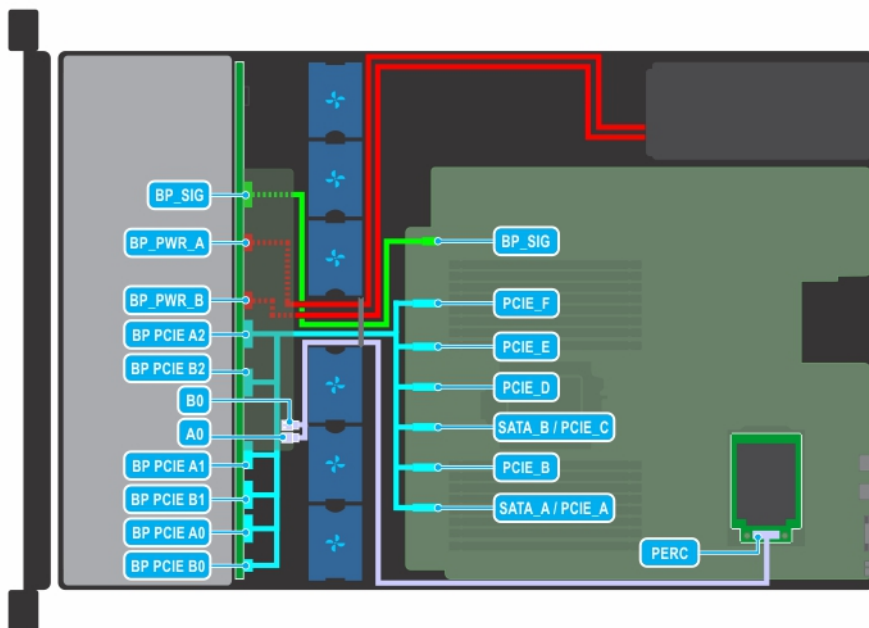


Figure 181. Cable routing - 12 x 2.5 inch SAS drive + 12 x 2.5 inch NVMe drive backplane

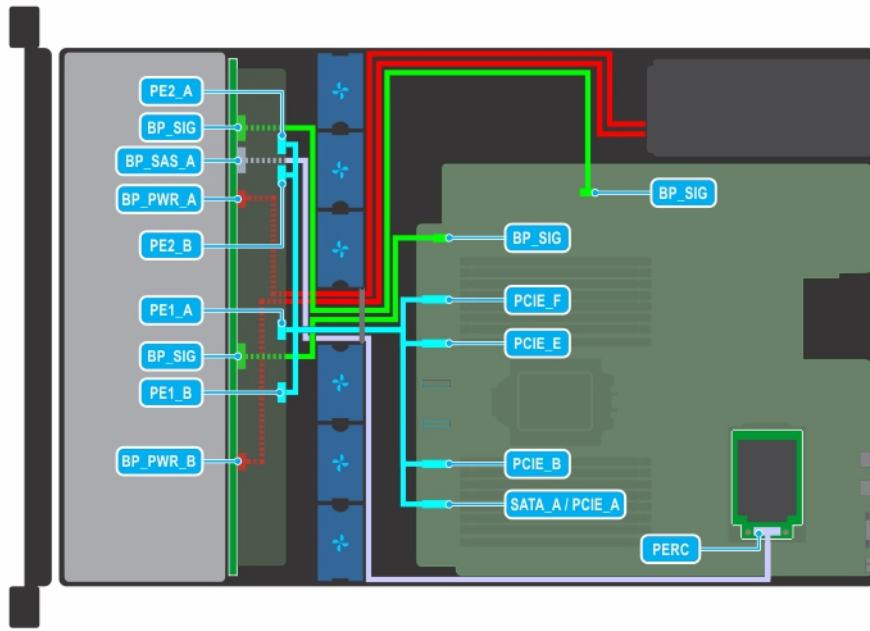


Figure 182. Cable routing - 24 x 2.5 inch NVMe drive backplane

Expansion card installation guidelines

The following table describes the supported expansion cards:

Table 80. Expansion card riser configurations

Expansion card riser	PCIe slots on the riser	Processor connection	Height	Length	Slot width
Riser-1B (2U riser)	Slot 2	Processor 1	Full Height	Full Length	x16
Riser-1B (2U riser)	Slot 3	Processor 1	Full Height	Full Length	x16
Riser-1A (low profile riser right)	Slot 2	Processor 1	Low Profile	Half Length	x16
Riser-2 (low profile riser left)	Slot 3	Processor 1	Low Profile	Half Length	x16

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 81. Riser configurations: No riser - CPU

Card Type	Slot Priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L (FXN)	1	1
LOM riser ; 2x10G BCM57416 (BASeT/SFP+) (FXN)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
GPU: Nvidia T4 16GB	4, 5	2
PCIe SSD PCIe Card (SAMSUNG)	4, 5	2

Card Type	Slot Priority	Maximum number of cards
HBA: FC32 (Emulex)	4, 5	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	4, 5	2
NIC: 100Gb (Mellanox)	4, 5	2
HBA: FC16 (Emulex, QLogic)	4, 5	2
NIC: 10Gb (Intel/Broadcom)	4, 5	2
NIC: 1Gb (Broadcom/Intel)	4, 5	2
PERC 10: External Adapter (Dell)	4, 5	1
HBA: External Adapter (Dell)	4, 5	1
Internal Storage (Dell)	4, 5	1
PERC 10: Mini mono/PERC 9: Mini mono/ HBA: Mini mono (Dell)	Integrated Slot	1

Table 82. Riser configurations: Riser 1A + Riser 2 - CPU

Card type	Slot priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L	1	1
LOM riser ; 2x10G BCM57416 (BAsE/T/SFP +)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
GPU: Nvidia T4 16GB	2, 3	2
PCIe SSD PCIe Card (Samsung)	2, 3	2
HBA: FC32 (Emulex)	2, 3	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/ Solarflare/Marvell)	2, 3	2
NIC: 100Gb (Mellanox)	2, 3	2
HBA: FC16 (Emulex/QLogic)	2, 3	2
NIC: 10Gb (Intel/Broadcom/Mellanox)	2, 3	2
NIC: 1Gb (Broadcom/Intel)	2, 3	2
PERC 10: External Adapter (Dell)	2, 3	1
HBA: External Adapter (Dell)	2, 3	1
Internal Storage (Dell)	2, 3	1
PERC 10: Mini mono/PERC 9: Mini mono/ HBA: Mini mono (Dell)	Integrated Slot	1

Table 83. Riser configurations: Riser 1B - CPU

Card type	Slot priority	Maximum number of cards
LOM riser ; 2x1G BCM5720L	1	1
LOM riser ; 2x10G BCM57416 (BAsE/T/SFP +)	1	1
LOM riser ; 2x25G (Broadcom)	1	1
FPGA: XILINX FH	3	1
GPU: Nvidia T4 16GB	2, 3	2
NIC: 100Gb (Mellanox)	2, 3	2
HBA: FC32 (Emulex)	2, 3	2

Card type	Slot priority	Maximum number of cards
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	2, 3	2
HBA: FC16 (Emulex/QLogic)	2, 3	2
NIC: 10Gb (Intel/Broadcom/QLogic/Marvell)	2, 3	2
NIC: 1Gb (Broadcom/Intel)	2, 3	2
PERC 10: External Adapter (Dell)	2, 3	2
HBA: External Adapter (Dell)	2, 3	1
Internal Storage FH (Dell)	2, 3	1
PCIe SSD PCIe Card (SAMSUNG/Intel)	2, 3, 4, 5	4
HBA: FC32 (Emulex)	4, 5	2
NIC: 100Gb (Mellanox)	4, 5	2
GPU: Nvidia T4 16GB	4, 5	2
NIC: 25Gb (Broadcom/Mellanox/QLogic/Solarflare/Marvell)	4, 5	2
HBA: FC16 (Emulex/Qlogic)	4, 5	2
NIC: 10Gb (Intel/Broadcom)	4, 5	2
HBA: FC16 (Emulex/QLogic)	4, 5	2
NIC: 1Gb (Broadcom/Intel)	4, 5	2
NIC: 10Gb (Intel/Broadcom/QLogic/Marvell)	4, 5	2
PERC 10: External Adapter (Dell)	4, 5	1
HBA: External Adapter (Dell)	4, 5	1
Internal Storage FH (Dell)	4, 5	1
PERC 10: Mini mono/PERC 9: Mini mono/HBA: Mini mono (Dell)	Integrated Slot	1

LOM riser card

The PowerEdge system offers balanced, scalable I/O capabilities, including integrated PCIe 3.0-capable expansion slots. Dell's LOM riser card, Dell Select Network Adapters, let you choose the right network fabric without using up a valuable PCI slot. Pick the speed, technology, vendor, and other options, such as switch-independent partitioning, and share and manage bandwidth on 10 GbE connections.

The PowerEdge R6515 system supports two Network Interface Controller (NIC) ports on the back panel, which are available in the following configurations:

- 2 x 1 GbE
- 2 x 10 GbE
- 2 x 10Gb SPF+
- 2 x 25Gb SPF+

Table 84. Optional add-in PCIe expansion NIC for R6515

Type	Adapter
NIC	<ul style="list-style-type: none"> • BCM5720L • BCM57416 • 2 x 1 Gb BASE-T • 2 x 10 Gb BASE-T • 2 x 10 Gb SFP+

Type	Adapter
	<ul style="list-style-type: none"> 2 x 25Gb SPF+ (BRCM)

System fan

The PowerEdge R7515 system supports up to six standard fans. Each fan has a single wire harness that plugs into the fan connectors on the system board (Fan 1 through Fan 6).

Features of the cooling fans:

- Cooling fans are labeled FAN 1 through FAN 6.
- All cooling fans are cabled.
- All cooling fans have the same part number.
- The cooling fan labels are printed on the fan cage.

Table 85. Fans required for front storage and PSU

Front storage	PSU type	Processor count	Fan1	Fan2	Fan3	Fan4	Fan5	Fan6
8 x 3.5-inches or 12 x 3.5-inches or 24 x 3.5-inches	Redundant PSUs only	1	Required	Required	Required	Required	Required	Required

Video specifications

The PowerEdge R7515 system supports integrated Matrox G200eR2 graphics controller with 16 MB of video frame buffer.

Table 86. Supported front 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
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32

Table 87. Supported rear 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
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

Trusted platform module

The Trusted Platform Module (TPM) is used to generate and store keys, protect or authenticate passwords, and create and store digital certificates. TPM can also be used to enable the BitLocker drive encryption feature in Windows Server 2012/2016. Intel Trusted Execution Technology (TXT) and Microsoft Platforms Assurance features are supported.

In the 14th generation systems, the TPM chip is installed on the Plug-in Module (PIM) and bound only to one system board.

The system board has a connector for the plug-in module, and it is factory-installed.

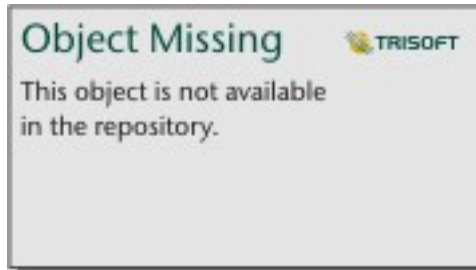


Figure 183. Trusted platform module

You can order the system with the following TPM configurations:

- No TPM
- TPM 1.2 Nuvoton FIPS-CC-TCG
- TPM TPM 2.0 Nuvoton FIPS-CC-TCG
- TPM 2.0 NationZ

NOTE: In a scenario where both the control panel and system board are dispatched, Dell recommends you to replace the control panel first and try to turn on the server to complete the Easy Restore process (Service Tag, licenses, copy to the new control panel). Replace the system board.

System board block diagram

The following diagram shows the system board block diagram for PowerEdge R7515:

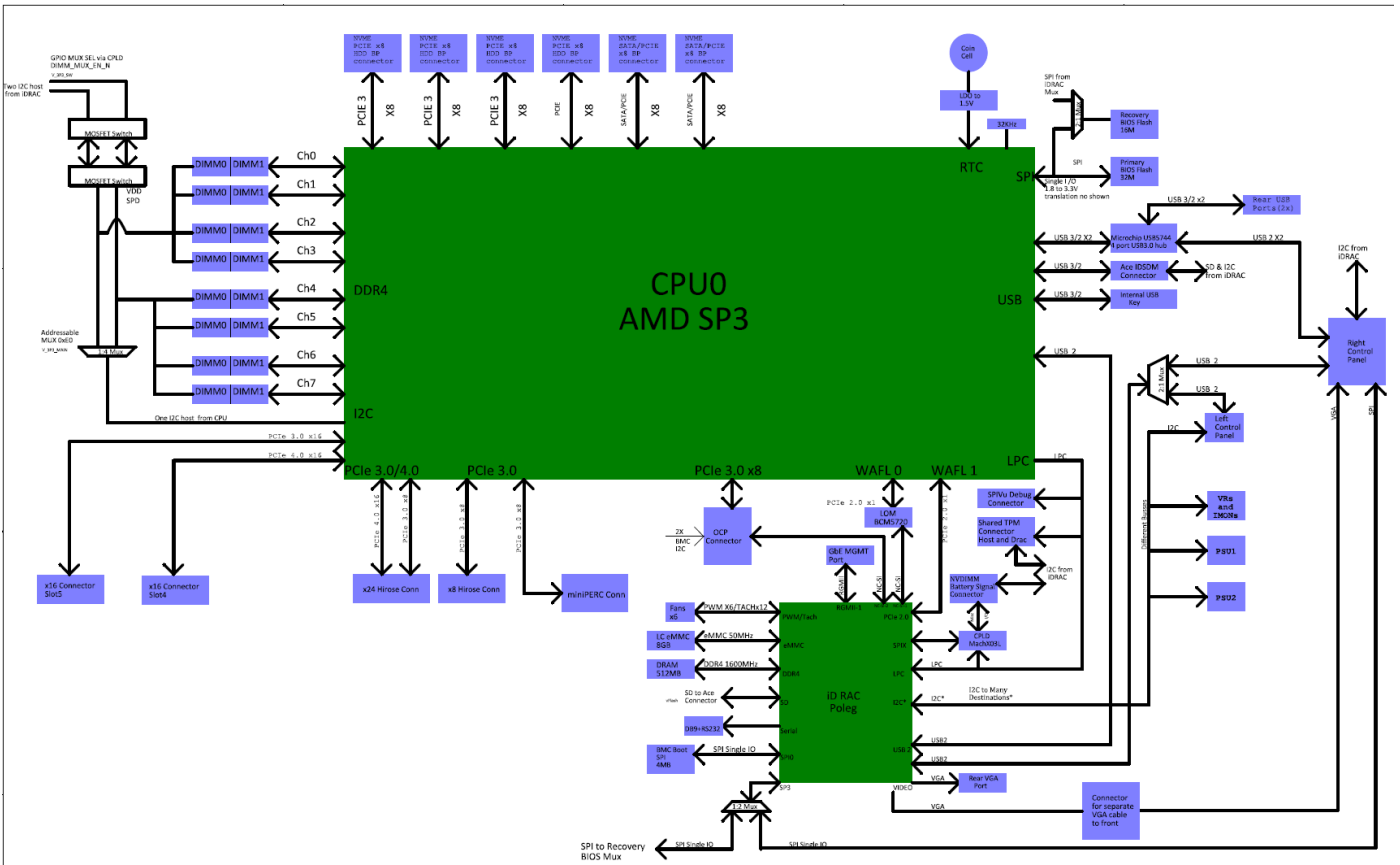


Figure 184. System board block diagram

BIOS and UEFI Pre-operating system management applications for PowerEdge R7515

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)

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 **Configuration**, and click **BIOS Settings**.
- Text browser — The browser is enabled by using 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 **System Setup Main Menu** screen details are described as follows:

Table 88. 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 <i>Integrated Dell Remote Access Controller User's Guide</i> at .
Device Settings	Enabled you to configure device settings for devices such as storage controllers or network cards.

System BIOS

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

Table 89. 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 integrated 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 90. System Information details

Option	Description
System Model Name	Specifies the system model name.
System BIOS Version	Specifies the BIOS version installed on the system.
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.
AGESA Version	Specifies the AGESA reference code version.
SMU Version	Specifies the SMU firmware version.

Option	Description
DXIO Version	Specifies the DXIO firmware version.

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 91. Memory Settings details

Option	Description
System Memory Size	Specifies the memory size in the system.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the system memory speed.
System Memory Voltage	Specifies the system memory voltage.
Video Memory	Specifies the amount of 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	Specifies the memory operating mode. The option is available and is set to Optimizer Mode , by default.
Current State of Memory Operating Mode	Specifies the current state of the memory operating mode.
Opportunistic Self-Refresh	Enables or disables opportunistic self-refresh feature. This option is set to Disabled by default.

Table 92. Memory Settings details

Option	Description
System Memory Size	Specifies the memory size in the system.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the system memory speed.
System Memory Voltage	Specifies the system memory voltage.
Video Memory	Specifies the amount of 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	Specifies the memory operating mode. The option is available and is set to Optimizer Mode , by default.
Opportunistic Self-Refresh	Enables or disables opportunistic self-refresh feature. This option is set to Disabled by default.

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 93. 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


Option	Description
	one logical processor per core. This option is set to Enabled by default.
Virtualization Technology	Enables or disables the virtualization technology for the processor. This option is set to Enabled by default.
IOMMU Support	Enable or Disable IOMMU support. It is required to create IVRS ACPI table. This option is set to Enabled by default.
L1 Stream HW Prefetcher	Enables or disables the L1 stream hardware prefetcher. This option is set to Enabled by default.
L2 Stream HW Prefetcher	Enables or disables the L2 stream hardware prefetcher. This option is set to Enabled by default.
MADT Core Enumeration	Specifies the MADT Core Enumeration. This option is set to Linear by default.
NUMA Nodes Per Socket	Specifies the number of NUMA nodes per socket. This option is set to 1 by default.
CCX as NUMA Domain	Enables or disables the CCX as NUMA Domain. This option is set to Disabled by default.
Minimum SEV-ES ASID	Determines the number of Secure Encrypted Virtualization ES and non ES available Address Space IDs. This option is set to 1 by default.
x2APIC Mode	Enable or disable x2APIC mode. This option is set to Enabled by default.
Number of CCDs per Processor	Controls the number of enabled CCDs in each processor. This option is set to All by default.
Number of Cores per CCD	specifies the number of cores per CCD. This option is set to All by default.
Processor Core Speed	Specifies the maximum core frequency of the processor.
Processor n	 NOTE: Depending on the number of CPUs, there might be up to n processors listed.

Table 94. Processor details

ABC	XYZ
Family-Model-Stepping	Specifies the family, model, and stepping of the processor as defined by AMD.
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	Enables number of CCXs per CCD. This option is set to All by default.

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 95. 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: <ol style="list-style-type: none"> You might also need to change the Boot Mode setting to UEFI. Otherwise, you should set the field to Non-RAID mode. 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 set to Disabled by default.								
Port n	Sets the drive type of the selected device. For AHCI Mode or RAID Mode , BIOS support is always enabled. Table 96. Port n <table border="1"> <thead> <tr> <th>Options</th> <th>Descriptions</th> </tr> </thead> <tbody> <tr> <td>Model</td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td>Drive Type</td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td>Capacity</td> <td>Specifies the total capacity of the drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </table>	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.
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. The option is set to **Non-RAID** mode 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.

- **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 97. 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.

Option	Description						
	<p> CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.</p> <p> NOTE: Setting this field to UEFI disables the BIOS Boot Settings menu.</p>						
Boot Sequence Retry	Enables or disables the Boot Sequence Retry feature. If this option is set to Enabled and the system fails to boot, the system re-attempts the boot sequence after 30 seconds. 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.						
UEFI Boot Settings	<p>Specifies the UEFI boot sequence. Enables or disables UEFI Boot options.</p> <p> NOTE: This option control the UEFI boot order. The first option in the list will be attempted first.</p> <p>Table 98. UEFI Boot Settings</p> <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>UEFI Boot Sequence</td> <td>Enables you to change the boot device order.</td> </tr> <tr> <td>Boot Options Enable/Disable</td> <td>Enables you to select the enabled or disabled boot devices</td> </tr> </tbody> </table>	Option	Description	UEFI Boot Sequence	Enables you to change the boot device order.	Boot Options Enable/Disable	Enables you to select the enabled or disabled boot devices
Option	Description						
UEFI Boot Sequence	Enables you to change the boot device order.						
Boot Options 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 .

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:** For information about Linux network performance settings, see the *Linux Network Tuning Guide for AMD EPYC Processor Based Servers* at [AMD.com](https://www.amd.com).

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

Table 99. Network Settings details

Option	Description
UEFI PXE Settings	Enables you to control the configuration of the UEFI PXE device.
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.

Table 100. 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 Enable or Disable . This option is set to Disable by default.
Vlan ID	Shows the Vlan ID for the PXE device
Vlan Priority	Shows the Vlan Priority for the PXE device.

Table 101. 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 Enable 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 Enable by default.

Option	Description
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.
URI	Obtain URI from the DHCP server if not specified

Table 102. UEFI iSCSI Settings screen details

Option	Description
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.


Table 103. iSCSI Device1 Settings screen details

Option	Description
Connection 1	Enables or disables the iSCSI connection. This option is set to Disable by default.
Connection 2	Enables or disables the iSCSI connection. This option is set to Disable 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.

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 104. Integrated Devices details

Option	Description
User Accessible USB Ports	<p>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 All Ports Off (Dynamic) disables all front and back USB ports during POST. This option is set to All Ports On by default.</p> <p>When user accessible USB ports is set to All Ports Off (Dynamic) the Enable Front Ports Only option is enabled.</p> <ul style="list-style-type: none"> • Enable Front Ports Only: Enables or disables the front USB ports during the OS runtime. <p>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.</p>
Internal USBSD card Port	Enables or disables the Internal USBSD card Port . This option is set to On or Off . This option is set to On by default.
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 RAID Controller	Enables or disables the integrated RAID controller. This option is set to Enabled by default.
Embedded NIC1 and NIC2 Embedded NIC1	<p> NOTE: The Embedded NIC1 and NIC2 Embedded NIC1 options are only available on systems that do not have Integrated Network Card 1.</p> <p>Enables or disables the Embedded NIC1 and NIC2 Embedded NIC1 options. If set to Disabled (OS), the NIC may still be available for shared network access by the</p>

Option	Description
	<p>embedded management controller. The Embedded NIC1 and NIC2Embedded NIC1 options are only available on systems that do not have Integrated Network Cards. The Embedded NIC1 and NIC2Embedded NIC1 option is mutually exclusive with the Integrated Network Card 1 option. Configure the Embedded NIC1 and NIC2Embedded NIC1 option by using the NIC management utilities of the system.</p>
Embedded Video Controller	<p>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 will be used as the primary display. BIOS will output displays to both the primary add-in video and the embedded video during POST and pre-boot environment. The embedded video will then be disabled right before the operating system boots. This option is set to Enabled by default.</p> <p>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 re-arrange the cards in the slots in order to control which card is the primary video.</p>
Current State of Embedded Video Controller	<p>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.</p>
Pcie Preferred IO Device	<p>When set to Enabled, you can provide the Bus/device/function address (in decimal) to choose end device for preferred IO device. This option is set to Disabled by default.</p>
SR-IOV Global Enable	<p>Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to Disabled by default.</p>
Internal SD Card Port	<p>Enables or disables the internal SD card port of the Internal Dual SD Module (IDSMD). This option is set to On by default.</p>
Internal SD Card Redundancy	<p>Configures the redundancy mode of the Internal Dual SD Module (IDSMD). When set to Mirror Mode, data is written on both SD cards. After failure of either card and replacement of the failed card, the data of the active card is copied to the offline card during the system boot.</p> <p>When Internal SD Card Redundancy is set to Disabled, only the primary SD card is visible to the OS. This option is set to Mirror by default.</p>
Internal SD Primary Card	<p>By default, the primary SD card is selected to be SD Card 1. If SD Card 1 is not present, then the controller selects SD Card 2 to be the primary SD card. This option is set to SD Card 1 by default.</p>
OS Watchdog Timer	<p>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 system initializes the timer. When this option is set to Disabled (the default), the timer does not have any effect on the system.</p>
Memory Mapped I/O Limit	<p>Controls where MMIO is mapped. The 1 TB option is designed for specific OS which cannot support MMIO over 1 TB. This option is set to 8 TB by default. The default option is the maximum address that the system supports and recommended in most cases.</p>
Slot Disablement	<p>Enables or 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.</p> <p>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.</p>

Option	Description
Slot Bifurcation	<p>Auto Discovery Bifurcation Settings allows Platform Default Bifurcation and Manual bifurcation Control.</p> <p>The default is set to Platform Default Bifurcation. The slot bifurcation field is accessible when set to Manual bifurcation Control and is grayed out when set to Platform Default Bifurcation.</p>

Serial Communication

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


Table 105. Serial Communication details

Option	Description
Serial Communication	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. This option is set to Auto by default.
Serial Port Address	<p>Enables you to set the port address for serial devices. This option is set to Serial Device1=COM2, Serial Device 2=COM1 by default. This field sets the serial port address to either COM1 or COM2 (COM1=0x3F8, COM2=0x2F8).</p> <p>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.</p> <p>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 the serial MUX setting to the default setting of Serial Device 1.</p>
External Serial Connector	<p>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.</p> <p>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.</p> <p>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.</p>
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 106. System Profile Settings details

Option	Description
System Profile	Sets the system profile. If you set the System Profile option to a mode other than Custom , 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 (OS) by default. Other options include Performance and Custom .  NOTE: All the parameters on the system profile setting screen are available only when the System Profile option is set to Custom.
CPU Power Management	Sets the CPU power management. This option is set to OS DBPM by default. Other option includes Maximum Performance .
Memory Frequency	Sets the speed of the system memory. You can select Maximum Performance 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.
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.
Write Data CRC	When set to Enabled , DDR4 data bus issues are detected and corrected during 'write' operations. Two extra cycles are required for CRC bit generation which impacts the performance. Read-only unless System Profile is set to Custom . This option is set to Disabled 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.
PCI ASPM L1 Link Power Management	Enables or disables the PCI ASPM L1 Link Power Management. This option is set to Enabled by default.
Determinism Slider	Set the system determinism by Power Determinism or Performance Determinism . This option is set to Power Determinism by default.
Efficiency Optimized Mode	Efficiency Optimized Mode maximizes Performance-per-Watt by opportunistically reducing frequency/power. Enables or disables the Efficiency Optimized Mode.


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 107. 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.
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.

Table 108. TPM 1.2 security information

Option	Description
TPM Security	 NOTE: The TPM menu is available only when the TPM module is installed.

Option	Description
	<p>Enables you to control the reporting mode of the TPM. The TPM Security option is set to Off by default. You can only modify the TPM Status, and TPM Activation if the TPM Status field is set to either On with Pre-boot Measurements or On without Pre-boot Measurements.</p> <p>When TPM 1.2 is installed, the TPM Security option is set to Off, On with Pre-boot Measurements, or On without Pre-boot Measurements.</p> <p>When TPM 2.0 is installed, the TPM Security option is set to On or Off. This option is set to Off by default.</p>
TPM Information	Changes the operational state of the TPM. This option is set to No Change by default.
TPM Firmware	Indicates the firmware version of the TPM.
TPM Status	Specifies the TPM status.
TPM Command	Controls the Trusted Platform Module (TPM). When set to None , no command is sent to the TPM. When set to Activate , the TPM is enabled and activated. When set to Deactivate , the TPM is disabled and deactivated. When set to Clear , all the contents of the TPM are cleared. This option is set to None by default.

Table 109. TPM 2.0 security information

Option	Description
TPM Information	Changes the operational state of the TPM. This option is set to No Change by default.
TPM Firmware	Indicates the firmware version of the TPM.
TPM Hierarchy	<p>Enables, disables, or clears the storage and endorsement hierarchies. When set to Enabled, the storage and endorsement hierarchies can be used.</p> <p>When set to Disabled, the storage and endorsement hierarchies cannot be used.</p> <p>When set to Clear, the storage and endorsement hierarchies are cleared of any values, and then reset to Enabled.</p>

Table 110. System Security details

Option	Description
Power Button	Enables or disables the power button on the front of the system. This option is set to Enabled 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.
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.
User Defined Delay (60 s to 600 s)	Sets the User Defined Delay option when the User Defined option for AC Power Recovery Delay is selected.
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.
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	When Secure Boot policy is set to Standard , the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to Custom , the BIOS uses the user-defined key and certificates. Secure Boot policy is set to Standard by default.
Secure Boot Mode	<p>Configures how the BIOS uses the Secure Boot Policy Objects (PK, KEK, db, dbx).</p> <p>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.</p>

Option	Description								
	<p>Table 111. Secure Boot Mode</p> <table border="1"> <thead> <tr> <th>Options</th> <th>Descriptions</th> </tr> </thead> <tbody> <tr> <td>User Mode</td> <td>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.</td> </tr> <tr> <td>Deployed Mode</td> <td>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.</td> </tr> <tr> <td>Audit Mode</td> <td>In Audit mode, PK is not present. The BIOS does not authenticate programmatic updates 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 or fail verification. Audit Mode is useful for programmatic determination of a working set of policy objects.</td> </tr> </tbody> </table>	Options	Descriptions	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.	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.	Audit Mode	In Audit mode , PK is not present. The BIOS does not authenticate programmatic updates 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 or fail verification. Audit Mode is useful for programmatic determination of a working set of policy objects.
Options	Descriptions								
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.								
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.								
Audit Mode	In Audit mode , PK is not present. The BIOS does not authenticate programmatic updates 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 or fail verification. Audit Mode is useful for programmatic determination of a working set of policy objects.								
Secure Boot Policy Summary	Specifies the list of certificates and hashes that secure boot uses to authenticate images.								
Secure Boot Custom Policy Settings	Configures the Secure Boot Custom Policy. To enable this option, set the Secure Boot Policy to Custom option.								

Table 112. System Security details

Option	Description				
Power Button	Enables or disables the power button on the front of the system. This option is set to Enabled 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.				
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.				
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	When Secure Boot policy is set to Standard , the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to Custom , the BIOS uses the user-defined key and certificates. Secure Boot policy is set to Standard by default.				
Secure Boot Mode	<p>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.</p> <p>Table 113. Secure Boot Mode</p> <table border="1"> <thead> <tr> <th>Options</th> <th>Descriptions</th> </tr> </thead> <tbody> <tr> <td>User Mode</td> <td>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.</td> </tr> </tbody> </table>	Options	Descriptions	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.
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Options	Descriptions										
Deployed Mode	<p>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.</p> <p>Deployed Mode restricts the programmatic mode transitions.</p>										
Audit Mode	<p>In Audit mode, PK is not present. The BIOS does not authenticate programmatic updates 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 or fail verification.</p> <p>Audit Mode is useful for programmatic determination of a working set of policy objects.</p>										
Authorize Device Firmware	Specifies the status of the device firmware.										
Secure Boot Policy Summary	<p>Specifies the list of certificates and hashes that secure boot uses to authenticate images.</p> <p>Table 114. Secure Boot Custom Policy Settings screen</p> <table border="1"> <thead> <tr> <th>Options</th> <th>Descriptions</th> </tr> </thead> <tbody> <tr> <td>Platform Key</td> <td>Imports, exports, deletes, or restores the platform key (PK).</td> </tr> <tr> <td>Key Exchange Key Database</td> <td>Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.</td> </tr> <tr> <td>Authorized Signature Database</td> <td>Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).</td> </tr> <tr> <td>Forbidden Signature Database</td> <td>Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).</td> </tr> </tbody> </table>	Options	Descriptions	Platform Key	Imports, exports, deletes, or restores the platform key (PK).	Key Exchange Key Database	Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.	Authorized Signature Database	Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).	Forbidden Signature Database	Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).
Options	Descriptions										
Platform Key	Imports, exports, deletes, or restores the platform key (PK).										
Key Exchange Key Database	Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.										
Authorized Signature Database	Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).										
Forbidden Signature Database	Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).										

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 System board jumper settings section.

i **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.
- The password can contain the numbers 0 through 9.
- Only the following special characters are allowed: space, ("), (+), (,), (-), (.), (/), (:), ([), (\), (]), (').

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.
```

```
Password Invalid. Number of unsuccessful password attempts: <x> Maximum number of password attempts exceeded. System halted.
```

Even after you turn 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 115. Redundant OS Control details

Option	Description
Redundant OS Location	<p>Enables you to select a backup disk from the following devices:</p> <ul style="list-style-type: none"> • None • IDSDM • SATA Ports in AHCI mode • BOSS PCIe Cards (Internal M.2 Drives) • Internal USB <p>NOTE: RAID configurations and NVMe cards not are included as BIOS does not have the ability to distinguish between individual drives in those configurations.</p>
Redundant OS State	<p>NOTE: This option is disabled if Redundant OS Location is set to None.</p> <p>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.</p> <p>NOTE: BIOS will disable the device in hardware, so it cannot be accessed by the OS.</p>
Redundant OS Boot	<p>NOTE: This option is disabled if Redundant OS Location is set to None or if Redundant OS State is set to Hidden.</p> <p>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 Enabled by default.</p>

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 116. 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.

Option	Description
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. i 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	Enables or disables the Load Legacy Video Option ROM option. This option is set to Disabled by default.
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.

Table 117. Miscellaneous Settings details

Option	Description
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. i 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	Enables or disables the Load Legacy Video Option ROM option. This option is set to Disabled by default.
In-System Characterization	Enables or disables the In-System Characterization. The option is set to Enabled by default.
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 utility

The iDRAC settings utility 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 utility.

i | **NOTE: Accessing some of the features on the iDRAC settings utility needs the iDRAC Enterprise License upgrade.**

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

Device Settings

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

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 .

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 118. 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 Boot Menu	Enables you to access boot menu, where you can select a one-time boot device to boot from.
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.

Troubleshooting your system

Safety first — for you and your system

OSTRZEŻENIE 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.

- UWAGA** Dell EMC has optimized your appliance and recommends that you do not change any of these settings.
- UWAGA** Solution validation was performed by using the factory shipped hardware configuration.
- UWAGA** For troubleshooting information about the M1000e enclosure components, see “Troubleshooting The Enclosure” in the *Dell PowerEdge M1000e Enclosure Owner's Manual* at Dell.com/poweredgemanuals.
- UWAGA** For troubleshooting information about the PowerEdge VRTX enclosure components, see *Dell PowerEdge VRTX Enclosure Owner's Manual* at Dell.com/poweredgemanuals.
- UWAGA** This chapter provides troubleshooting information for the VRTX enclosure only. For troubleshooting information on the server modules, see the server module documentation at Dell.com/poweredgemanuals.
- UWAGA** This chapter provides troubleshooting information for the PowerEdge FX2 and FX2s enclosures only. For troubleshooting information on the sleds, see the sled documentation at Dell.com/poweredgemanuals.
- UWAGA** For troubleshooting information about the PowerEdge FX2 enclosure components, see the *Dell PowerEdge FX2 and FX2s Enclosure Owner's Manual* at Dell.com/poweredgemanuals.

Minimum to POST

Minimum Components

The minimum components to allow the C4140 system to complete POST are as follows:

- System board
- Power supply
- One processor (CPU) in socket CPU1
- One Memory Module (DIMM) installed in socket A1
- One PSU, minimum required is a 2000 W PSU
- All eight fans
- Control panel
- Control panel cable

Minimum configuration to POST

The components mentioned below are the minimum configuration to POST:

- MX740c single-width compute sled (with backplane, cables)
 - System board
 - iDRAC card
 - One processor CPU1
 - One memory module (DIMM) installed in the socket A1

- MX7000 chassis (Enclosure controller/Management Service Module, fans, PSU)
- MX840c double-width compute sled (with backplane, cables)
 - System board
 - PEM
 - iDRAC card
 - Two processors in CPU1 and CPU2
 - One memory module (DIMM) each installed in the sockets A1 and B1
- MX7000 chassis (Enclosure controller/Management Service Module, fans, PSU)

Minimum configuration to POST

The components mentioned below are the minimum configuration to POST:

- Two power supply units
- One compute sled
- One input output module
- One management module
- Four front cooling fans
- Five rear cooling fans

Minimum configuration to POST

The components mentioned below are the minimum configuration to POST:

- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- Right control panel and cable (for power button functionality)
- System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- Right control panel and cable (for power button functionality)
- PDB/PIB and cable
- System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- One power supply unit and PIB (with 2 power + 1 sideband cables)
- PDB/PIB and cable
- System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- System board
- PDB and cable
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1

- One power supply unit
- System board
- C6400 chassis (backplane board, link board, CM board, mid board, PIB board, cables)
- C6420 sled
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit
- System board
- C6400 chassis (backplane board, link board, CM board, mid board, PIB board, cables)
- C6525 sled
- Two processor configurations:
 - One processor in socket CPU1
 - One memory module (DIMM) on channel A1 for CPU1
 - One power supply unit
 - Right control panel and cable (for power button functionality)
 - System board
- Four processor configurations:
 - Four processors in socket CPU1, CPU2, CPU3, and CPU4
 - One memory module (DIMM) on each channel A1, B1, C1, D1 for CPU1, CPU2, CPU3, and CPU4
 - PEM
 - Two PEM power boards
 - One power supply unit
 - Right control panel and cable (for power button functionality)
 - System board
- One processor (CPU) in socket CPU1
- One memory module (DIMM) in socket A1
- One power supply unit (minimum required is a 2000 W)
- Right control panel and cable (for power button functionality)
- System board
- Two same processor (Skylake/Cascade lake) in socket CPU1 and CPU2
- One memory module (RDIMM/LRDIMM) in socket A1
- One power supply unit
- PIB and cable (4 power + 2 side band connect to MB)
- System board
- Chassis with Control Panel and cable (to power system on)
- One processor (CPU) in socket CPU
- One memory module (DIMM) in socket A1
- One power supply unit
- Right control panel and cable (for power button functionality)
- System board
- PDB/PIB and cable
- One power supply unit
- One processor (CPU) in socket CPU
- One memory module (DIMM) in socket A1
- One power supply unit
- Right control panel and cable (for power button functionality)
- System board
- Processor
- One memory module (DIMM) in socket A1
- One power supply unit
- System board
- Processor
- One memory module (DIMM) in socket A1
- One power supply unit

- System board
- PDB and cable
- Processor
- One memory module (DIMM) in socket A1
- One power supply unit
- System board
- PIB and cable

Troubleshooting system startup failure

If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system stops responding. To avoid this issue, you must boot to the same boot mode in which you installed the operating system.

For all other startup issues, note the system messages that appear on the screen.

 **UWAGA** By default, set this appliance to BIOS boot mode.

Troubleshooting external connections

Before troubleshooting any external devices, ensure that all external cables are securely attached to the external connectors on your system.

- Compare the technical specification of the system with the external device to check the compatibility.
- Check the external device functionality with some other similar system so that we are sure that the device is working fine.
- Check any other similar external device with this system so that we are sure that the system port is working fine.

For any further queries contact, .

Troubleshooting the video subsystem

Prerequisites

 **NOTE:** Ensure the Local Server Video Enabled option is selected in the iDRAC Graphical User Interface (GUI), under Virtual Console. If this option is not selected, local video is disabled.

Steps

1. Check the cable connections (power and display) to the monitor.
2. Check the video interface cabling from the system to the monitor.
3. Run the LCD Built-in Self Test (BIST).

Results

If the tests run successfully, the problem is not related to video hardware.

Next steps

If the tests fail, see the Getting help section.

Troubleshooting a USB device

Prerequisites

 **NOTE:** Follow steps 1 to 6 to troubleshoot a USB keyboard or mouse. For other USB devices, go to step 7.

 **NOTE:** Follow steps 1 to 5 to troubleshoot a USB keyboard or mouse. For other USB devices, go to step 6.

 **NOTE:** The sled has a single USB port that can be expanded by using a USB hub.

Steps

1. Disconnect the keyboard and/or mouse cables from the system and reconnect them.
2. If the problem persists, connect the keyboard and/or mouse to another USB port on the system.
3. If the problem is resolved, restart the system, enter System Setup, and check if the non-functioning USB ports are enabled.

 **NOTE: Older operating systems may not support USB 3.0.**

4. Check if USB 3.0 is enabled in System Setup. If enabled, disable it and see if the issue is resolved.
5. In **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
6. If the problem is not resolved, replace the keyboard and/or mouse with a known working keyboard or mouse.
If the problem is not resolved, proceed to step 7step 6 to troubleshoot other USB devices attached to the system.
If the problem is not resolved, proceed to troubleshoot other USB devices attached to the system.
7. Turn off all attached USB devices, and disconnect them from the system.
8. Restart the system.
9. If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.
10. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.
11. If the system is not accessible, reset the NVRAM_CLR jumper inside your system and restore the BIOS to the default settings. See the System board jumper setting section
12. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
13. Reconnect and turn on each USB device one at a time.
14. If a USB device causes the same problem, turn off the device, replace the USB cable with a known good cable, and turn on the device.

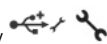
Next steps

If all troubleshooting fails, see the Getting help section.

Troubleshooting iDRAC Direct - USB XML configuration

For information about USB storage device and system configuration, see *Integrated Dell Remote Access Controller User's Guide* at

Kroki

1. Ensure that your USB storage device is connected to the front USB Management Port, identified by  icon.
2. Ensure that your USB storage device is configured with an NTFS or an FAT32 file system with only one partition.
3. Verify that the USB storage device is configured correctly. For more information about configuring the USB storage device, see *Integrated Dell Remote Access Controller User's Guide* at
4. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
5. Ensure that the **iDRAC Managed: USB XML Configuration** option is either **Enabled** or **Enabled only when the server has default credential settings**.
6. Remove and reinsert the USB storage device.
7. If import operation does not work, try with a different USB storage device.


Kolejne kroki

If all troubleshooting fails, see the Getting help section.

Troubleshooting iDRAC Direct - Laptop connection

For information about USB laptop connection and system configuration, see the *Integrated Dell Remote Access Controller User's Guide* at .

Kroki

1. Ensure that your laptop is connected to the front USB Management Port, identified by  icon with a USB Type A/A cable.
2. On the **iDRAC Settings Utility** screen, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
3. If the laptop is running Windows operating system, ensure that the iDRAC Virtual USB NIC device driver is installed.
4. If the driver is installed, ensure that you are not connected to any network through WiFi or cabled ethernet, as iDRAC Direct uses a non-routable address.

Kolejne kroki

If all troubleshooting fails, see the Getting help section.

Troubleshooting a serial input and output device

Wymagania

 **UWAGA** The PowerEdge C6320p, does not have a 9-pin serial port, instead uses a micro-USB port for serial I/O

Kroki

1. Turn off the system and any peripheral devices connected to the serial port.
2. Swap the serial interface cable with a known working cable, and turn on the system and the I/O serial device.
If the problem is resolved, replace the interface cable with a known working cable.
3. Turn off the system and the I/O serial device, and swap the serial device with a compatible device.
4. Turn on the system and the I/O serial device.

Kolejne kroki

If the problem persists, see the Getting help section.

Troubleshooting a NIC

Kroki

1. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section for the available diagnostic tests.
2. Restart the system and check for any system messages pertaining to the NIC controller.
3. Check the appropriate indicator on the NIC connector:
 - If the link indicator does not glow, the cable connected might be disengaged.
 - If the activity indicator does not glow, the network driver files might be damaged or missing.
Install or replace the drivers as necessary. For more information, see the NIC documentation.
 - Try another known good network cable.
 - If the problem persists, use another connector on the switch or hub.
4. Ensure that the appropriate drivers are installed and the protocols are bound. For more information, see the NIC documentation.
5. Enter System Setup and confirm that the NIC port is enabled on the **Integrated Devices** screen.
6. Enter System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.
7. Ensure that all the NICs, hubs, and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.

8. Ensure that all the NICs and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
9. Ensure that all the NIC and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
10. Ensure that all network cables are of the proper type and do not exceed the maximum length.



UWAGA The LOM (Broadcom 57416) is compatible with 10GBASE-T IEEE 802.3an and 1000 BASE-T IEEE 802.3ab. There is no 10/100 BASE-T support.

Kolejne kroki

If the problem persists, see the Getting help section.

Troubleshooting a wet system

Wymagania

OSTRZEŻENIE 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.

Kroki

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Remove the following components (if installed) from the system:
 - Power supply unit(s)
 - Optical drive
 - Hard drives
 - Hard drive backplane
 - USB memory key
 - Hard drive tray
 - Cooling shroud
 - Expansion card risers (if installed)
 - Expansion cards
 - Cooling fan assembly (if installed)
 - Cooling fan(s)
 - Memory modules
 - Processor(s) and heat sink(s)
 - Processor and heat sink module
 - System board
 - Mezzanine card
 - Power distribution boards
 - Midplanes
4. Let the system dry thoroughly for at least 24 hours.
5. Reinstall the components you removed in step 3 except the expansion cards.
6. Install the system cover.
7. Turn on the system and attached peripherals.

If the problem persists, see the Getting help section.

8. If the system starts properly, turn off the system, and reinstall all the expansion cards that you removed.
9. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Kolejne kroki

If the tests fail, see the Getting help section.

Troubleshooting a damaged system

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. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Ensure that the following components are properly installed:
 - cooling shroud
 - expansion card risers (if installed)
 - expansion cards
 - power supply unit(s)
 - cooling fan assembly (if installed)
 - cooling fan(s)
 - processor(s) and heat sink(s)
 - memory modules
 - drive carriers or cage
 - drive backplane
4. Ensure that all cables are properly connected.
5. Install the system cover.
6. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Troubleshooting the system battery

Wymagania

⚠ OSTRZEŻENIE 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.

ⓘ UWAGA If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose the system configuration information. This situation is caused by a defective battery.

ⓘ UWAGA Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time set in System Setup, the problem may be caused by a software, rather than by a defective battery.

Kroki

1. Re-enter the time and date in System Setup.
2. Turn off the system, and disconnect it from the electrical outlet for at least an hour.
3. Reconnect the system to the electrical outlet, and turn on the system.
4. Enter System Setup.

If the date and time displayed in System Setup are not correct, check the System Error Log (SEL) for system battery messages.

Kolejne kroki

If the problem persists, see the Getting help section.

Troubleshooting power supply units

Wymagania

OSTRZEŻENIE 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.

The following sections provide information on troubleshooting power source and power supply units problems.

Troubleshooting power source problems

Kroki

1. Press the power button to ensure that your system is turned on. If the power indicator does not glow when the power button is pressed, press the power button firmly.
2. Plug in another working power supply unit to ensure that the system board is not faulty.
3. Ensure that no loose connections exist.
For example, loose power cables.
4. Ensure that the power source meets applicable standards.
5. Ensure that there are no short circuits.
6. Have a qualified electrician check the line voltage to ensure that it meets the needed specifications.

Wyniki

UWAGA Some power supply units require 200-240V AC to deliver their rated capacity. For more information, see the system Technical Specifications section in the Installation and Service Manual available at .

Troubleshooting power supply unit problems

Steps

1. Ensure that no loose connections exist.
For example, loose power cables.
2. Ensure that the power supply handle LED indicates that the power supply is working properly.
3. Ensure that the power supply unit LED indicates that the power supply is working properly.
4. If you have recently upgraded your system, ensure that the power supply unit has enough power to support the new system.
5. If you have a redundant power supply configuration, ensure that both the power supply units are of the same type and wattage.
If the LED You may have to upgrade to a higher wattage power supply unit.
6. Ensure that you use only power supply units with the Extended Power Performance (EPP) label on the back.
7. Reseat the power supply unit.

NOTE: After installing a power supply unit, allow several seconds for the system to recognize the power supply unit and determine if it is working properly.

If the problem persists, see the Getting help section.

Troubleshooting cooling problems

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.

Ensure that the following conditions exist:

- System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is not removed.
- System cover, cooling shroud, PCIe shroud, GPU blanks, PSU blank in PSU slot 2 if hard drive cage is not installed, uSATA SSD blanks if uSATA SSDs are not installed, memory module blank, or back-filler bracket is not removed.
- Ambient temperature is not higher than the system specific ambient temperature.
- Ambient air temperature is 25°C or less depending on the system configuration.
- External airflow is not obstructed.
- A cooling fan is not removed or has not failed.
- The expansion card installation guidelines have been followed.

Additional cooling can be added by one of the following methods:

From the iDRAC web GUI click **Hardware > Fans > Setup**:

1. **Thermal Profile** – is a drop-down list containing different thermal profile options.
2. **Minimum Fan Speed in PWM (% of Max)** – option button to select "Default" or "Custom" fan speed options.

From the iDRAC web GUI:

1. Click **Hardware > Fans > Setup**.
2. From the **Fan Speed Offset** drop-down list, select the cooling level required or set the minimum fan speed to a custom value.

From F2 System Setup:

1. Select **iDRAC Settings > Thermal**, and set a higher fan speed from the fan speed offset or minimum fan speed.

From RACADM commands:

1. Run the command `racadm help system.thermalsettings`

For more information, see *Integrated Dell Remote Access User's Guide* at

Troubleshooting cooling fans

Wymagania

OSTRZEŻENIE 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.

UWAGA The fan number is referenced by the management software of the system. In the event of a problem with a particular fan, you can easily identify and replace it by noting down the fan numbers on the cooling fan assembly.

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

Kroki

1. Remove the system cover (front and back).

UWAGA Do not operate the system without the system cover. This can result in overheating and cause component damage.

2. Reseat the fan or the fan's power cable.
3. Install the system cover (front and back).
4. Restart the system.

Kolejne kroki

1. Follow the procedure listed in the After working inside your system section.
2. If the problem persists, see the Getting help section.

Troubleshooting system memory

Wymagania

OSTRZEŻENIE 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.

Kroki

1. If the system is operational, run the appropriate diagnostic test. See the Using system diagnostics section for the available diagnostic tests.

If the diagnostic tests indicate a fault, follow the corrective actions provided by the diagnostic tests.

2. If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least for 10 seconds, and then reconnect the system to the power source.
3. Turn on the system and attached peripherals, and note the messages on the screen.

If an error message is displayed indicating a fault with a specific memory module, go to step 12.

4. Enter System Setup, and check the system memory setting. Make any changes to the memory settings, if needed.

If the memory settings match the installed memory but the problem still persists, go to step 12.

5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Remove the system cover.
7. Remove the sled from the chassis.
8. Check the memory channels and ensure that they are populated correctly.

UWAGA See the system event log or system messages for the location of the failed memory module. Reinstall the memory device.

9. Reseat the memory modules in their sockets.
10. Install the system cover.
11. Enter System Setup and check the system memory setting.
If the problem is not resolved, proceed with step 11.
12. Remove the system cover.
13. If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module with a known working memory module.
14. To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity.
If an error message is displayed on the screen, this may indicate a problem with the installed DIMM type(s), incorrect DIMM installation, or defective DIMM(s). Follow the on-screen instructions to resolve the problem.
15. Install the system cover.
16. As the system boots, observe any error message that is displayed and the diagnostic indicators on the front of the system.
17. If the memory problem persists, repeat step 12 through step 15 for each memory module installed.

Kolejne kroki

If the problem persists, see the Getting help section.

Troubleshooting an internal USB key

Wymagania

OSTRZEŻENIE 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.

Kroki

1. Enter System Setup and ensure that the **USB key port** is enabled on the **Integrated Devices** screen.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Locate the USB key and reseal it.
5. Install the system cover.
6. Turn on the system and attached peripherals, and check if the USB key is functioning.
7. If the problem is not resolved, repeat step 2 and step 3.
8. Insert a known working USB key.
9. Install the system cover.

Kolejne kroki



If the problem persists, see the Getting help section.


Troubleshooting a micro SD card

Wymagania

-  **UWAGA** Certain micro SD cards have a physical write-protect switch on the card. If the write-protect switch is turned on, the micro SD card is not writable.


Kroki

1. Enter System Setup, and ensure that the **Internal SD Card Port** is enabled.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
 -  **UWAGA** When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next restart, the system displayed a message indicating the failure. If redundancy is enabled at the time of SD card failure, a critical alert will be logged and chassis health will degrade.
4. Remove the sled from the enclosure.
 -  **UWAGA** When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next restart, the system displayed a message indicating the failure.
5. Replace the failed micro SD card with a new micro SD card.
6. Install the system cover.
7. Install the sled into the enclosure
8. Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
9. Enter System Setup, and ensure that the **Internal SD Card Port** and **Internal SD Card Redundancy** modes are set to the needed modes.

Verify that the correct SD slot is set as **Primary SD Card**.
10. Enter System Setup, and ensure that the **Internal SD Card Port** mode is enabled.
11. Check if the micro SD card is functioning properly.
12. If the **Internal SD Card Redundancy** option is set to **Enabled** at the time of the SD card failure, the system prompts you to perform a rebuild.
 -  **UWAGA** The rebuild is always sourced from the primary SD card to the secondary SD card.

Troubleshooting an optical drive

Wymagania

-  **OSTRZEŻENIE** 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.

Kroki

1. Try using a different CD or DVD.
2. If the problem is not resolved, enter System Setup and ensure that the integrated SATA controller and the drive's SATA port are enabled.
3. Run the appropriate diagnostic test.
4. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
5. If installed, remove the bezel.
6. Remove the system cover.
7. Ensure that the interface cable is securely connected to the optical drive and to the controller.
8. Ensure that a power cable is properly connected to the drive.
9. Install the system cover.


Kolejne kroki

If the problem persists, see the Getting help section.

Troubleshooting a drive or SSD

Prerequisites

 **CAUTION:** This troubleshooting procedure can erase data stored on the drive. Before you proceed, back up all files on the drive.

 **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:** Ensure that the sleds internal SATA cables are connected correctly.

Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
Depending on the results of the diagnostics test, proceed as required through the following steps.
2. If your system has a RAID controller and your drives are configured in a RAID array, perform the following steps:
 - a) Restart the system and press F10 during system startup to run the Dell Lifecycle Controller, and then run the Hardware Configuration wizard to check the RAID configuration.
See the Dell Lifecycle Controller documentation or online help for information about RAID configuration.
 - b) Ensure that the drives are configured correctly for the RAID array.
 - c) Take the drive offline and reseal the drive.
 - d) Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the needed device drivers for your controller card are installed and are configured correctly. For more information, see the operating system documentation.
4. Restart the system and enter the System Setup.
5. Verify that the controller is enabled and the drives are displayed in the System Setup.

Next steps

If the problem persists, see the Getting help section.

Troubleshooting a storage controller

OSTRZEŻENIE 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.

UWAGA When troubleshooting a controller, see the documentation for your operating system and the controller.

UWAGA When troubleshooting a HBA 330 controller, see the documentation for your operating system and the controller.

UWAGA When troubleshooting a SAS controller, see the documentation for your operating system and the controller.

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Verify that the installed expansion cards are compliant with the expansion card installation guidelines.
5. Ensure that each expansion card is firmly seated in its connector.
6. Install the system cover.
7. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
8. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
9. Remove the system cover.
10. Remove all expansion cards installed in the system.
11. Install the system cover.
12. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
13. Run the appropriate diagnostic test. See the Using system diagnostics section.

If the tests fail, see the Getting help section.

14. For each expansion card you removed in step 10, perform the following steps:
 - a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 - b. Remove the system cover.
 - c. Reinstall one of the expansion cards.
 - d. Install the system cover.
 - e. Run the appropriate diagnostic test. See the Using system diagnostics section.

If the problem persists, see the Getting help section.

Troubleshooting expansion cards

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.

NOTE: When troubleshooting an expansion card, you also have to see the documentation for your operating system and the expansion card.

Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Remove the sled from the enclosure.
5. Ensure that each expansion card is firmly seated in its connector.
6. Install the sled into the enclosure.

7. Install the system cover.
8. Turn on the system and attached peripherals.
9. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
10. Remove the system cover.
11. Remove the sled from the enclosure.
12. Remove all expansion cards installed in the system.
13. Remove all expansion cards installed in the sled.
14. Install the sled into the enclosure.
15. Install the system cover.
16. Run the appropriate diagnostic test. See the Using system diagnostics section.

If the tests fail, see the Getting help section.


17. For each expansion card you removed in step 8, perform the following steps:
 - a) Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 - b) Remove the system cover.
 - c) Remove the sled from the enclosure.
 - d) Reinstall one of the expansion cards.
 - e) Install the system cover.
 - f) Install the sled into the enclosure.
 - g) Run the appropriate diagnostic test. See the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Troubleshooting processors

Wymagania

 **OSTRZEŻENIE** 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.

Kroki

1. Run the appropriate diagnostics test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Remove the sled from the enclosure.
5. Ensure that the processor and heat sink module are properly installed.
6. Install the sled into the enclosure.
7. Install the system cover.
8. Run the appropriate diagnostic test. See the Using system diagnostics section.
9. If the problem persists, see the Getting help section.

Troubleshooting Manufacturing Mode

The system should remain in manufacturing mode until all service has been completed. After the system board has been replaced, the following message may be displayed upon boot:

```
F2 = System Setup
F10 = Lifecycle Controller
F11 = BIOS Boot Manager
Attempting PXE Boot

BIOS MANUFACTURING MODE detected.
Press <A> to abort, <M> to continue.....
BIOS MANUFACTURING MODE detected.
MANUFACTURING MODE will be cleared before the next boot.
System reboot required for normal operation.
```

```
*** MANUFACTURING MODE ACTIVE ***

Press Alt-F to return the system to normal running mode.
```

Figure 185. Troubleshooting Manufacturing Mode

If you see the BIOS MANUFACTURING MODE detected message, the replacement motherboard is in manufacturing mode. Do not exit manufacturing mode before you install the Identity Module if this system board replacement is for an OEM-branded product. Refer to the **PowerEdge OEM Branding** reference guide below for more information:

Internal Link: [PowerEdge OEM Branding](#)

External Link: [PowerEdge OEM Branding](#)

If this replacement is for a non-OEM system board or if you have already installed the proper Identity Module, at the prompt press **<A><Alt> + <F>** to turn off manufacturing mode.

The following message indicates that manufacturing mode has been successfully cleared:

```
MANUFACTURING MODE will be cleared before the next boot.
System reboot required for normal operation.
```

Reboot the system and verify that the BIOS MANUFACTURING MODE detected message is not displayed.

System messages

PowerEdge R7515 technical specifications

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

System dimensions

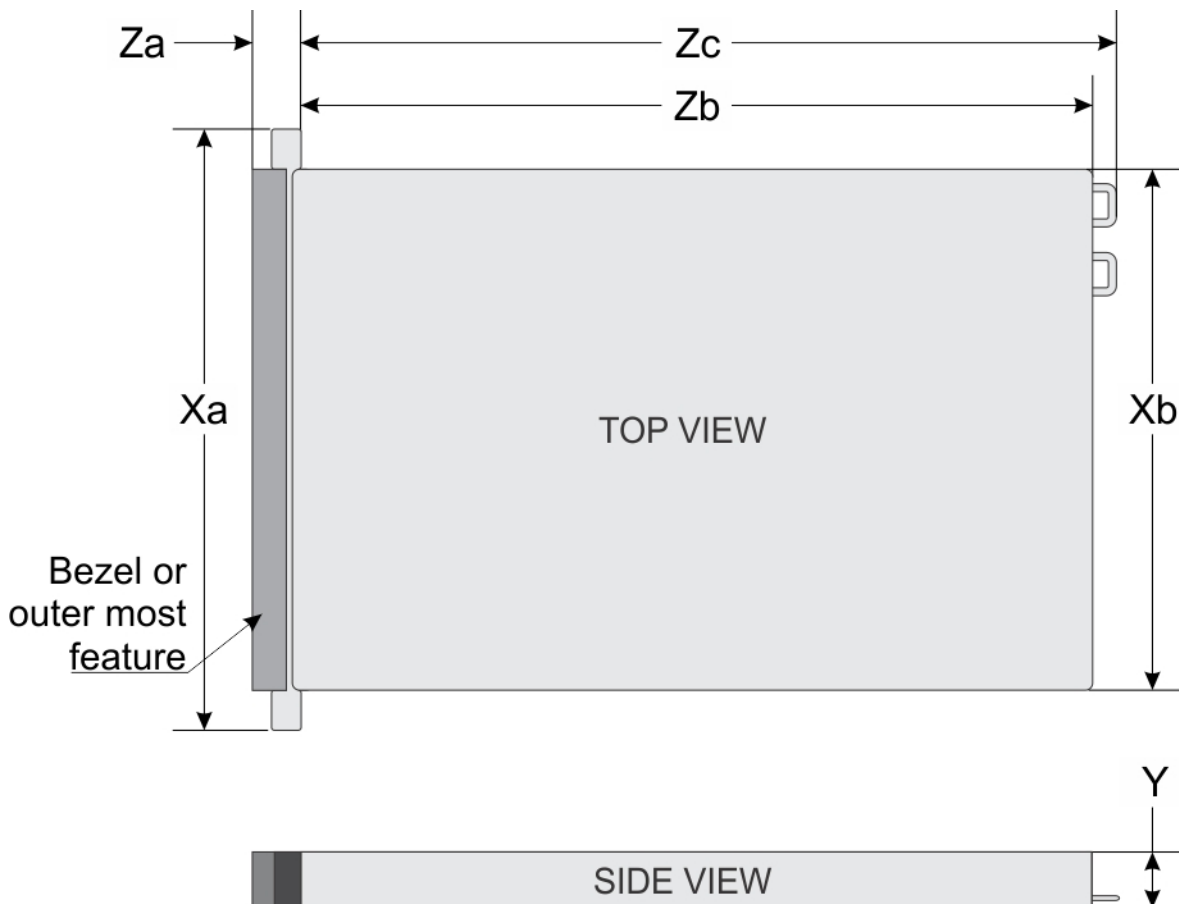


Figure 186. Dimensions of the PowerEdge R7515 system

Table 119. PowerEdge R7515 system dimensions

Xa	Xb	Y	Za (with bezel)	Za (without bezel)	Zb*	Zc
482 mm (18.97 inches)	434 mm (17.08 inches)	86.8 mm (3.41 inches)	35.84 mm (1.41 inches)	22 mm (0.87 inches)	647.07 mm (25.47 inches)	681.755 mm (26.84 inches)

Chassis weight

Table 120. Chassis weight

System	Maximum weight (with all drives)
8 x 3.5-inch	23.78 kg (52.42 lb)
12 x 3.5-inch	25.68 kg (56.61 lb)
12 x 3.5-inch + 2 x 3.5-inch (rear)	27.3 kg (60.18 lb)
24 x 2.5-inch	23.72 kg (52.29 lb)

Processor specifications

Table 121. PowerEdge R7515 processor specifications

Supported processor	Number of processors supported
AMD EPYC 7002 series processor	One

PSU specifications

The PowerEdge R7515 system supports the following AC or DC power supply units (PSU):

Table 122. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage
1600 W AC	Platinum	6000 BTU/hr	50/60 Hz	100—240 V AC, autoranging
1100 W DC	NA	4416 BTU/hr	NA	-48 — -60 V DC
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100—240 V AC, autoranging
1100 W HVDC	Platinum	4100 BTU/hr	50/60 Hz	100—240 V AC, autoranging
	NA	4100 BTU/hr	NA	200—380 V DC, autoranging
750 W AC	Platinum	2891 BTU/hr	50/60 Hz	100—240 V AC, autoranging
750 W HVDC	Platinum	2891 BTU/hr	50/60 Hz	100—240 V AC, autoranging
	Platinum	2891 BTU/hr	NA	240 V DC
750 W AC	Titanium	2843 BTU/hr	50/60 Hz	200—240 V AC, autoranging
495 W AC	Platinum	1908 BTU/hr	50/60 Hz	100—240 V AC, autoranging

- 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:** Heat dissipation is calculated using the PSU wattage rating.
- NOTE:** This system is also designed to connect to the IT power systems with a phase-to-phase voltage not exceeding 230 V.
- NOTE:** If a system with 1600 W AC PSU operates at low line 100-120 V AC, then the power rating per PSU is derated to 800 W.
- NOTE:** If a system with 1100 W AC PSU or 1100 W mixed mode PSU operates at low line 100-120 V AC, and then the power rating per PSU is derated to 1050 W.

Supported operating systems

The PowerEdge R7515 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 on the specific versions and additions, see <https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r6515><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r6525><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-r7515><https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-c6525>.

Cooling fans specifications

The PowerEdge R7515 system supports both the Standard fan (STD fan) and High Performance fan (HPR fan) and requires all six fans to be installed.

NOTE: Mixing of STD and HPR fans is not supported.

NOTE: The STD and HPR fans installation depends on the system configuration. For more information about the fan support configuration or matrix, see [Thermal restriction matrix](#).

System battery specifications

The PowerEdge R7515 system supports CR 2032 3.0-V lithium coin cell system battery.

Expansion card riser specifications

The PowerEdge R7515 system supports PCI Express (PCIe) Gen3/Gen4 expansion cards. This system supports low profile, full height, and 1U/2U expansion card risers.

Table 123. Expansion card riser configurations

Expansion card riser	PCIe slots on the riser	Processor connection	Height	Length	Slot width
Riser-1B (2U riser)	Slot 2	Processor 1	Full Height	Full Length	x16 (Gen 3)
Riser-1B (2U riser)	Slot 3	Processor 1	Full Height	Full Length	x16 (Gen 4)
Riser-1A (1U right riser with rear drives configuration)	Slot 2	Processor 1	Low Profile	Half Length	x16 (Gen 3)
Riser- 2 (1U left riser with rear drives configuration)	Slot 3	Processor 1	Low Profile	Half Length	x16 (Gen 4)

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

Memory specifications

The PowerEdge R7515 system supports the following memory specifications for optimized operation.

Table 124. Memory specifications

DIMM type	DIMM rank	DIMM capacity	Minimum RAM	Maximum RAM
RDIMM	Single rank	8 GB	8 GB	128 GB
	Dual rank	16 GB	16 GB	256 GB
		32 GB	32 GB	512 GB
		64 GB	64 GB	1 TB
3DS LRDIMM	Octa rank	128 GB	128 GB	2 TB

Table 125. Memory module sockets

Memory module sockets	Speed
Sixteen 288-pin	3200 MT/s, 2933 MT/s, 2666 MT/s

Storage controller specifications

The PowerEdge R7515 system supports the following controller cards:

Table 126. PowerEdge R7515 system controller cards

Internal controllers	External controllers
<ul style="list-style-type: none"> · PERC H740P · PERC H730P · PERC H330 · HBA330 · S150 · Boot Optimized Storage Subsystem (BOSS-S1): HWRAID 2 x M.2 SSDs 	<ul style="list-style-type: none"> · 12 Gbps SAS Ext. HBA · H840

Drive specifications

Drives

The PowerEdge R7515 system supports:

- Up to 8 x 3.5 inch (SAS, SATA or SSD) front accessible drives in slots 0 to 7
- Up to 12 x 3.5 inch (SAS, SATA or SSD) front accessible drives in slots 0 to 11
- Up to 12 x 3.5 inch (SAS, SATA or SSD) front accessible drives in slots 0 to 11 + up to 2 x 3.5 inch (SAS, SATA or SSD) rear accessible drives in slots 12 to 13
- Up to 24 x 2.5 inch (SAS, SATA or SSD) front accessible drives in slots 0 to 23
- Up to 12 x 2.5 inch (SAS, SATA or SSD) front accessible drives in slots 0 to 11 and up to 12 x 2.5 inch NVMe drives in 12 universal slots 12 to 23
- Up to 24 x 2.5 inch NVMe drives in bay 0 (slot 0 to 11) and bay 1 (slots 0 to 11)
- Up to 8 x 2.5 inch (SAS, SATA or SSD) front accessible drives in Universal slots 0 to 7 (Bay 0) and up to 16 x 2.5 inch NVMe drives in bay 0 (slots 8 to 11) and bay 1 (slots 0 to 11)

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.com/support](https://www.dell.com/support) > Browse all Products > Data Center Infrastructure > Storage Adapters & Controllers > Dell PowerEdge Express Flash NVMe PCIe SSD > Documentation > Manuals and Documents.

Backplane:

- 8 x 3.5-inch SAS, SATA drives
- 24 x 2.5-inch SAS, SATA drives
- 24 x 2.5-inch NVMe drives
- 12 x 3.5-inch SAS, SATA drives and 2 x 3.5-inch SAS, SATA drives

- 12 x 2.5-inch SAS, SATA drives and 12 x 2.5-inch NVMe drives
- 8 x 2.5-inch SAS, SATA drives and 16 x 2.5-inch NVMe drives

Optical drives

The PowerEdge R7515 system supports the following optical drives:

Table 127. Supported optical drive type

Supported drive type	Supported number of drives
Dedicated SATA DVD-ROM drive or DVD +/-RW drive	One

Ports and connectors specifications

USB ports specifications

Table 128. PowerEdge R7515 system USB specifications

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB 2.0-compliant port	Two	USB 3.0-compliant ports	Two	Internal USB 3.0-compliant port	One
Micro USB 2.0-compliant port for iDRAC Direct	One				

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

NIC ports specifications

The PowerEdge R7515 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports that are located on the back panel. The system also supports LAN on Motherboard (LOM) on an optional riser card.

You can install one LOM riser card. The supported LOM riser options are:

- 2 x 1 Gb Base-T
- 2 x 10Gb Base-T
- 2 x 10Gb SPF+
- 2 x 25Gb SPF+

NOTE:

- You can install up to two PCIe add-on NIC cards.
- For information about Linux network performance settings, see the *Linux Network Tuning Guide for AMD EPYC Processor Based Servers* at [AMD.com](https://www.amd.com)

Serial connector specifications

The serial connector connects a serial device to the system. The PowerEdge R7515 system supports one serial connector on the back panel, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant.

VGA ports specifications

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The PowerEdge R7515 system supports two 15-pin VGA ports one each on the front and back panels.

IDSDM module

The PowerEdge R7515 system supports optional Internal Dual SD module (IDSMD) module.

The module supports two microSD cards. The supported microSD card storage capacities are mentioned below:

- 16 GB
- 32 GB
- 64 GB

NOTE: There are two dip switches on the IDSMD for write-protection.

NOTE: One IDSMD card slot is dedicated for redundancy.

NOTE: Use Dell EMC branded microSD cards that are associated with the IDSMD configured systems.

Video specifications

The PowerEdge R7515 system supports Matrox G200eR2 graphics card with 16 MB capacity.

NOTE: 1920 x 1080 and 1920 x 1200 resolutions are only supported in reduced blanking mode.

Table 129. Supported front 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
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32

Table 130. Supported rear 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
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

The following sections contain information about the environmental specifications of the system.

NOTE:

Operational climatic range category A2

Table 131. Operational climatic range category A2

Allowable continuous operations	
Temperature ranges for altitude ≤ 900 meters ($\leq 2,953$ feet)	10 to 35°C (50 to 95°F) with no direct sunlight on the platform
Humidity percent ranges (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 meters (1.8°F/984 feet) above 900 meters (2,953 feet)

Operational climatic range category A3

Table 132. Operational climatic range category A3

Allowable continuous operations	
Temperature ranges for altitude ≤ 900 meters ($\leq 2,953$ feet)	5 to 40°C (41 to 104°F) with no direct sunlight on the platform
Humidity percent ranges (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 meters (1.8°F/574 feet) above 900 meters (2,953 feet)

Thermal restriction for ASHRAE A3/Fresh air environment (UI)

- Redundant power supply configuration is required with both PSUs populated.
- LRDIMM is not supported.
- CPU TDP equal or greater than 180W are not supported.
- 128 GB or greater capacity DIMMs are not supported.
- Non-Dell qualified peripheral cards greater than 25 W are not supported.
- Any type of GPGPU card is not supported.
- PCIe SSD is not supported.
- Rear drive configuration is not supported.

Operational climatic range category A4

Table 133. Operational climatic range category A4

Allowable continuous operations	
Temperature ranges for altitude ≤ 900 meters ($\leq 2,953$ feet)	5 to 45°C (41 to 113°F) with no direct sunlight on the platform
Humidity percent ranges (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 meters (1.8°F/410 feet) above 900 meters (2,953 feet)

Shared requirements across all categories

Table 134. Shared requirements across all categories

Allowable 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 (9°F in 15 minutes), 5°C in an hour* (9°F in an hour) for tape hardware
Non-operational temperature limits	-40 to 65°C (-40 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)

*: Per ASHRAE thermal guidelines, these are not instantaneous rates of temperature change.

Table 135. Maximum vibration specifications

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

Table 136. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	24 executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms. (4 pulse on each side of the system)
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.

Thermal restriction matrix

Table 137. Label references

Label references	
STD	Standard
HPR	High Performance
HSK	Heat sink
LP	Low Profile (Riser)
FH	Full Height (Riser)
DW	Double Wide (Xilinx FPGA accelerator)

Table 138. Thermal restriction matrix

Drive Configuration type	8x3.5-inch drives		12x3.5-inch drives		24x2.5-inch drives		12x2.5-inch drives SAS + 12x2.5-inch drives NVMe		24x2.5-inch drives NVMe	
	2LP+2FH	2LP+2FH	Rear 2x3.5-inch drives SAS	2LP+2FH	2LP+1DW	2LP+2FH	2LP+1DW	2LP+2FH	2LP+1DW	
Rear Configuration	2LP+2FH	2LP+2FH	Rear 2x3.5-inch drives SAS	2LP+2FH	2LP+1DW	2LP+2FH	2LP+1DW	2LP+2FH	2LP+1DW	
Ambient temperature	Up to 35°C	Up to 35°C	Up to 35°C	Up to 35°C	Up to 30°C	Up to 35°C	Up to 30°C	Up to 35°C	Up to 30°C	

Drive Configuration type		8x3.5-inch drives	12x3.5-inch drives	12x3.5-inch drives	24x2.5-inch drives		12x2.5-inch drives SAS + 12x2.5-inch drives NVMe		24x2.5-inch drives NVMe	
TDP (W)	120	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	155	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	170	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	180	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	200	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	STD Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	225	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	240	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 2U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
Double Wide FPGA		No	No	Not supported	No	Yes	No	Yes	No	Yes

Table 139. Thermal restriction matrix for T4 GPU Card

Drive Configuration type		8x3.5-inch drives	12x3.5-inch drives	12x3.5-inch drives	24x2.5-inch drives	12x2.5-inch drives SAS + 12x2.5-inch drives NVMe	24x2.5-inch drives NVMe
Rear Configuration		2LP+2FH	2LP+2FH	Rear 2x3.5-inch drives SAS	2LP+2FH	2LP+2FH	2LP+2FH
Ambient temperature		Up to 30°C	Up to 30°C	Up to 30°C	Up to 30°C	Up to 30°C	Up to 30°C
Slot Combination	Slot2	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot3	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot4	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot5	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot2/Slot3	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot4/Slot5	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK
	Slot2/Slot3 Slot4/Slot5	HPR Fan 1U HPR HSK	N/A	N/A	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK	HPR Fan 1U HPR HSK

Table 140. CPU support matrix

Processor	TDP (W)	cTDPMax (W)	Cores	Fan type	Fan type (8x3.5-inch/24x2.5-inch)*	HSK Type**	ASHRAE A3 support
7742	225	240	64	HPR Fan	HPR Fan	1U HPR	No
7642	225	240	48	HPR Fan	HPR Fan	1U HPR	No
7542	225	240	32	HPR Fan	HPR Fan	1U HPR	No
7702	200	200	64	HPR Fan	STD Fan	1U HPR	No
7552	200	200	48	HPR Fan	STD Fan	1U HPR	No
7502	180	200	32	HPR Fan	STD Fan	1U HPR	No
7402	180	200	24	HPR Fan	STD Fan	1U HPR	No
7452	155	180	32	HPR Fan	STD Fan	1U HPR	Yes
7352	155	180	24	HPR Fan	STD Fan	1U HPR	Yes
7302	155	180	16	HPR Fan	STD Fan	1U HPR	Yes
7262	155	180	8	HPR Fan	STD Fan	1U HPR	Yes
7282	120	150	16	HPR Fan	STD Fan	1U HPR	Yes
7272	120	150	12	HPR Fan	STD Fan	1U HPR	Yes
7252	120	150	8	HPR Fan	STD Fan	1U HPR	Yes

*Except for 8x3.5-inch/24x2.5-inch(without NVME), all other configurations have only high performance fan type.

**Only 12X3.5" with rear drives systems use 2U high performance heat sinks.

Other thermal restrictions

- Mellanox CX5 with QSFP28 is restricted to slot4 and slot5 in no rear drive configuration. Non Dell qualified cables are not supported.
- Mellanox CX6 with QSFP56 (Mellanox MFS1S00) is restricted to slot4 and slot5 in no rear drive configuration. Non Dell qualified cables are not supported.
- Solarflare XtremeScale X2522-25G Adapter is restricted to slot4 and slot5 in no rear drive configuration.
- 750GB PCIe SSD Adapter (P4800) by Intel is restricted to slot4 and slot5 in no rear drive configuration.
- Broadcom 57414 is not supported with 128GLRDIMM or higher on 12x3.5-inch drives configuration.

Standard operating temperature

Table 141. Standard operating temperature specifications

Standard operating temperature	Specifications
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.

Expanded operating temperature

Table 142. Expanded operating temperature specifications

Expanded operating temperature	Specifications
Continuous operation	5°C–40°C at 5% to 85% RH with 29°C dew point. NOTE: Outside the standard operating temperature (10°C–35°C), the system can operate continuously in temperatures as low as 5°C and as high as 40°C.

Expanded operating temperature	Specifications
	For temperatures 35°C– 40°C, derate maximum allowable temperature by 1°C per 175 m (1°F per 319 ft) above 950 m (3,117 ft).
≤ 1% of annual operating hours	<p>-5°C–45°C at 5% to 90% RH with 29°C dew point.</p> <p>NOTE: Outside the standard operating temperature (10°C–35°C), the system can operate down to -5°C or up to 45°C for a maximum of 1% of its annual operating hours.</p> <p>For temperatures 40°C– 45°C, derate maximum allowable temperature by 1°C per 125 m (1°F per 228 ft) above 950 m (3,117 ft).</p>

NOTE: When operating in the expanded temperature range, the performance of the system may be impacted.

NOTE: When operating in the expanded temperature range, ambient temperature warnings may be reported on the System Event Log.

Expanded operating temperature restrictions

- Do not perform a cold startup below 5°C.
- The operating temperature specified is for a maximum altitude of 3050 m (10,000 ft).
- Redundant power supply configuration is required with both PSUs populated.
- PCIe SSD is not supported.
- 128GB and higher capacity DIMM is not supported.
- GPGPU card is not supported.
- CPUs with TDP >= 200W are not supported.
- Non-Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- Rear drive configuration is not supported.

Particulate and gaseous contamination specifications

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

Table 143. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	<p>Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.</p> <p>NOTE: This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor.</p> <p>NOTE: Air entering the data center must have MERV11 or MERV13 filtration.</p> <p>NOTE: Air filtering can also be accomplished by filtering room air with MERV8 filter per ANSI/ASHRAE Standard 127</p>
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles.

Particulate contamination	Specifications
	<p>i NOTE: This condition applies to data center and non-data center environments.</p> <p>i NOTE: Common sources of conductive dust include manufacturing processes, and zinc whiskers from the plating on the bottom of raised floor tiles</p>
Corrosive dust	<ul style="list-style-type: none"> • Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. <p>i NOTE: This condition applies to data center and non-data center environments.</p>

Table 144. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper Coupon Corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-2013
Silver Coupon Corrosion rate	<200 Å/month as defined by ANSI/ISA71.04-2013

i | **NOTE:** Maximum corrosive contaminant levels measured at ≤50% relative humidity.

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 EMC 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.
 3. On the Product Support page, click **Manuals & documents**.
- Using search engines:
 - Type the name and version of the document in the search box.

NOTE: To locate the product name and model, see the front of your system.

Table 145. Additional documentation resources for your system

Task	Document	Location
Setting up your system	<p>For more information about installing and securing the system into a rack, see the Rail Installation Guide included with your rail solution.</p> <p>For information about setting up your system, see the <i>Getting Started Guide</i> document that is shipped with your system.</p>	
Configuring your system	<p>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.</p> <p>For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC.</p> <p>For information about Redfish and its protocol, supported schema, and Redfish Eventing implemented in iDRAC, see the Redfish API Guide.</p> <p>For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide.</p> <p>For information about Intel QuickAssist Technology, see the Integrated Dell Remote Access Controller User's Guide.</p>	
	<p>For information about earlier versions of the iDRAC documents.</p> <p>To identify the version of iDRAC available on your system, on the iDRAC web interface, click ? > About.</p>	
	For information about installing the operating system, see the operating system documentation.	
	For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.	

Task	Document	Location
Managing your system	For information about systems management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.	
	For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	
	For information about installing, using, and troubleshooting Dell OpenManage Essentials, see the Dell OpenManage Essentials User's Guide.	
	For information about installing and using Dell SupportAssist, see the Dell EMC SupportAssist Enterprise User's Guide.	
	For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.	
Working with the Dell PowerEdge RAID controllers	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.	
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 Error Code Lookup.	
Troubleshooting your system	For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.	

Document history

Table 146. Document history

Document History		
Date:	Owner:	Page
Requested By	Reviewed By	Approved By
Change		
Date: 2019-09-18	Owner: IDD InfoDev - Mohammed Samruddin	Page: All
Requested By: GDS and Tech support	Reviewed By:	Approved By: <i>Document Development Manager, InfoDev - George Cherian</i>
Changes:		