

# Dell EMC XC940 XC Series Appliance and XC Core System

Installation and Service Manual

## Notes, cautions, and warnings

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

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

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

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# Dell EMC XC940 XC Series Appliance and XC Core System overview

**NOTE:** The information in this document applies to both Dell EMC XC940 Series Appliances, and Dell EMC XC Core System offering. Sections or information that apply to only one of the offerings (XC Series or XC Core) will be called out explicitly.

The Dell EMC XC940 XC Series Appliance and XC Core system is a 3U rack system, which is available in the following configuration:

**Table 1. Dell EMC XC940 XC Series Appliance and XC Core System configurations**

Configurations	Specifications
24-drive bay system (with PEM)	<ul style="list-style-type: none"> <li>Four Intel Xeon scalable family processors</li> <li>48 DIMM slots supporting up to 6 TB of memory</li> <li>Up to two AC or DC power supply units (PSUs)</li> <li>24 hard drives or SSDs</li> </ul>

**NOTE:** The Dell EMC XC940 XC Series Appliance and XC Core System supports hot swappable hard drives.

Topics:

- Front view of the system
- Back view of the system
- Drive indicator codes
- Locating the Service Tag of your system

## Front view of the system

You can access the following components from the front of the system:

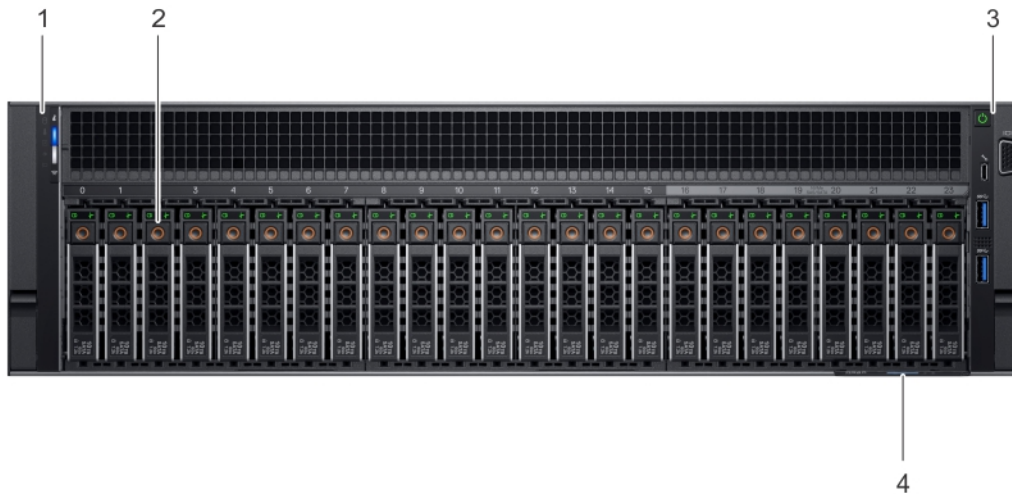


Figure 1. Front view of 24 x 2.5 inch hard drive system

Table 2. Features available on the front of the system

Item	Component	Icon	Description
1	Left control panel	N/A	Contains the system health and system ID, status LED, and the iDRAC Quick Sync 2 (wireless) indicator.  <b>NOTE: The iDRAC Quick Sync 2 indicator is available only on certain configurations.</b>
2	Hard-drive slots	N/A	Enable you to install drives that are supported on your system. For more information about drives, see <a href="#">Technical specifications</a> .
3	Right control panel	N/A	Contains the power button, VGA port, iDRAC Direct port and USB ports.
4	Information tag	N/A	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 secure default access to iDRAC, the Information tag also contains the iDRAC secure default password.

## Left control panel view

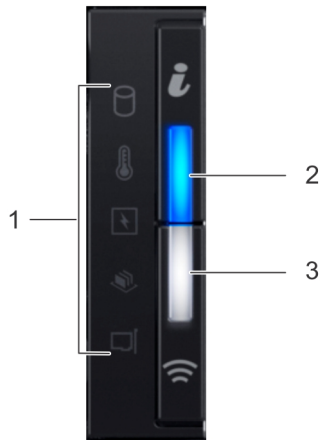


Figure 2. Left control panel view

Table 3. Left control panel features





Item	Indicator	Icon	Description
1	Status LED indicators	N/A	Indicate the status of the system. For more information, see <a href="#">Status LED indicators</a> .
2	System health and system ID indicator		Indicates the system health. For more information, see <a href="#">System health and system ID indicator codes</a> .
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 <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a> .

## Status LED indicators

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

Table 4. 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"> <li>Check the System Event Log to determine if the drive has an error.</li> <li>Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics (ePSA).</li> </ul>

Icon	Description	Condition	Corrective action
	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).	<ul style="list-style-type: none"> <li>If the drives are configured in a RAID array, restart the system, and enter the host adapter configuration utility program.</li> </ul> <p>Ensure that none of the following conditions exist:</p> <ul style="list-style-type: none"> <li>A cooling fan has been removed or has failed.</li> <li>System cover, air shroud, memory module blank, or back filler bracket is removed.</li> <li>Ambient temperature is too high.</li> <li>External airflow is obstructed.</li> </ul> <p>If the problem persists, see <a href="#">Getting help</a></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 <a href="#">Getting help</a>.</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 <a href="#">Getting help</a>.</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 <a href="#">Getting help</a>.</p>
			<p><b>NOTE:</b> For more information about the supported PCIe cards, see <a href="#">Expansion card installation guidelines</a>.</p>

## System health and system ID indicator codes

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



Figure 3. System health and system ID indicator

Table 5. System health and system ID indicator codes

System health and system ID indicator code	Condition
Solid blue	Indicates that the system is turned on, system 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.

## System health and system ID indicator code

## Condition

Solid amber

Indicates that the system is in fail-safe mode. If the problem persists, see [Getting help](#).

Blinking amber

Indicates that the system is experiencing a fault. Check the System Event Log or the LCD panel, if available on the bezel, for specific error messages.

## iDRAC Quick Sync 2 indicator codes

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



Figure 4. iDRAC Quick Sync 2 indicators

Table 6. 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 turned off. Press the iDRAC Quick Sync 2 button to turn on iDRAC Quick Sync 2.	If the LED fails to turn on, reseal the left control panel flex cable and check. If the problem persists, see <a href="#">Getting help</a> .
Solid white	Indicates that iDRAC Quick Sync 2 is ready to communicate. Press the iDRAC Quick Sync 2 button to turn off.	If the LED fails to turn off, restart the system. If the problem persists, see <a href="#">Getting help</a> .
Blinks white rapidly	Indicates data transfer activity.	If the indicator continues to blink indefinitely, see <a href="#">Getting help</a> .
Blinks white slowly	Indicates that firmware update is in progress.	If the indicator continues to blink indefinitely, see <a href="#">Getting help</a> .
Blinks white five times rapidly and then turns 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 <a href="#">Getting help</a> . For more information, see <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="https://Dell.com/idracmanuals">Dell.com/idracmanuals</a> .
Solid amber	Indicates that the system is in fail-safe mode.	Restart the system. If the problem persists, see <a href="#">Getting help</a> .
Blinking amber	Indicates that the iDRAC Quick Sync 2 feature is not responding properly.	Restart the system. If the problem persists, see <a href="#">Getting help</a> .

# Right control panel



Figure 5. Right control panel

Table 7. Right control panel

Item	Button or port	Icon	Description
1	Power button		Indicates if the system is turned on or off. Press the power button to manually turn on or off the system.  <b>NOTE: Press the power button to gracefully shut down an ACPI-compliant operating system.</b>
2	iDRAC Direct port		The iDRAC Direct port is micro USB 2.0-compliant. This port enables you to access the iDRAC Direct features. For more information, see the <i>Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a> .
3	USB ports		The USB ports are 9-pin, USB 3.0-compliant. These ports enable you to connect USB devices to the system.
4	VGA port		Enables you to connect a display device to the system. For more information, see <a href="#">Technical specifications</a> .

## iDRAC Direct LED indicator codes

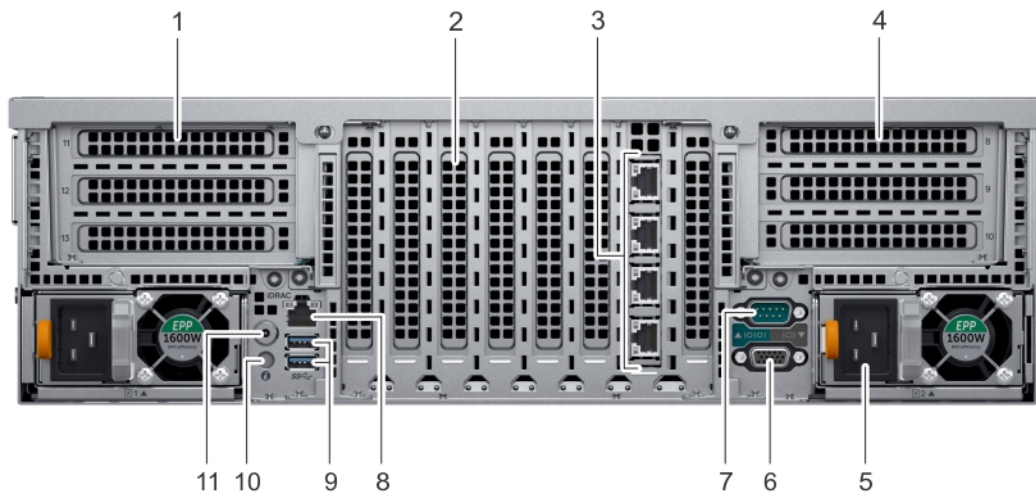
The iDRAC Direct LED indicator lights up to indicate that the port is connected and is being used as a part of the iDRAC subsystem. You can configure iDRAC Direct by using a USB to micro USB (type AB) cable, which you can connect to your laptop or tablet. The following table describes iDRAC Direct activity when the iDRAC Direct port is active:

**Table 8. iDRAC Direct LED indicator codes**

iDRAC Direct LED indicator code	Condition
Solid green for two seconds	Indicates that the laptop or tablet is connected.
Flashing green (on for two seconds and off for two seconds)	Indicates that the laptop or tablet connected is recognized.
Turns off	Indicates that the laptop or tablet is unplugged.



## Back view of the system

You can access the following components from the back of the system:



**Figure 6. Back view features**

**Table 9. Features available on the back of the system**

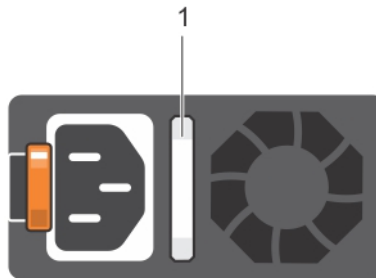
Item	Slot, button, or connector	Icon	Description
1	expansion card riser (right)	N/A	The expansion card riser (right) supports up to three full-height PCI Express expansion cards. For more information, see <a href="#">Expansion card installation guidelines</a> .
2	expansion card slot	N/A	The expansion slots on the system board supports full-height half-length PCI Express expansion cards.
3	NIC port (4)		The NIC ports that are integrated on the network daughter card (NDC) provide network connectivity. For more information about the supported configurations, see <a href="#">Technical specifications</a> .
4	expansion card riser (left)	N/A	The expansion card riser (left) supports up to three full-height PCI Express expansion cards. For more information, see <a href="#">Expansion card installation guidelines</a> .
5	Power supply unit (2)		For more information, see <a href="#">Technical specifications</a> .



# Power supply unit indicator codes

AC power supply units (PSUs) have an illuminated translucent handle that serves as an indicator. The DC PSUs have an LED that serves as an indicator.

The indicator shows whether power is present or if a power fault has occurred.

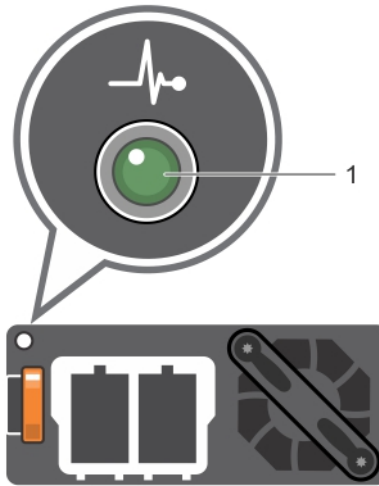


**Figure 8. AC PSU status indicator**

1 AC PSU status indicator/handle

**Table 11. AC PSU status indicator codes**

Power indicator codes	Condition
Green	A valid power source is connected to the PSU and the PSU is operational.
Blinking amber	Indicates a problem with the PSU.
Not illuminated	Power is not connected to the PSU.
Blinking green	When the firmware of the PSU is being updated, the PSU handle blinks green. <ul style="list-style-type: none"> <li>⚠ <b>CAUTION: Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs do not function.</b></li> </ul>
Blinking green and turns off	When hot-plugging a PSU, the PSU handle blinks green five times at a rate of 4 Hz and turns off. This indicates a PSU mismatch with respect to efficiency, feature set, health status, or supported voltage. <ul style="list-style-type: none"> <li>⚠ <b>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 XC Series Appliance and XC Core System is not supported, even if the PSUs have the same power rating. This results in a PSU mismatch condition or failure to turn the system on.</b></li> <li>⚠ <b>CAUTION: When correcting a PSU mismatch, replace only the PSU with the blinking indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a high output configuration to a low output configuration or vice versa, you must turn off the system.</b></li> <li>⚠ <b>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.</b></li> <li>⚠ <b>CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.</b></li> <li>⚠ <b>CAUTION: Combining AC and DC PSUs is not supported and triggers a mismatch.</b></li> </ul>



**Figure 9. DC PSU status indicator**

1 DC PSU status indicator

**Table 12. DC PSU status indicator codes**

Power indicator codes	Condition
Green	A valid power source is connected to the PSU and the PSU is operational.
Blinking amber	Indicates a problem with the PSU.
Not illuminated	Power is not connected to the PSU.
Blinking green	When hot-plugging a PSU, the PSU indicator blinks green. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, or supported voltage.
	<p>⚠ <b>CAUTION:</b> 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 XC Series Appliance and XC Core System is not supported, even if the PSUs have the same power rating. This results in a PSU mismatch condition or failure to turn the system on.</p> <p>⚠ <b>CAUTION:</b> When correcting a PSU mismatch, replace only the PSU with the blinking indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must turn off the system.</p> <p>⚠ <b>CAUTION:</b> If two PSUs are used, they must be of the same type and have the same maximum output power.</p> <p>⚠ <b>CAUTION:</b> Combining AC and DC PSUs is not supported and triggers a mismatch.</p>

# Drive indicator codes

Each drive carrier has an activity LED indicator and a status LED indicator. The indicators provide information about the current status of the drive. The activity LED indicator indicates whether the drive is currently in use or not. The status LED indicator indicates the power condition of the drive.

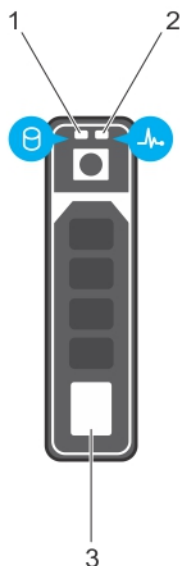


Figure 10. Drive indicators

- 1 Drive activity LED indicator
- 2 Drive status LED indicator
- 3 Drive

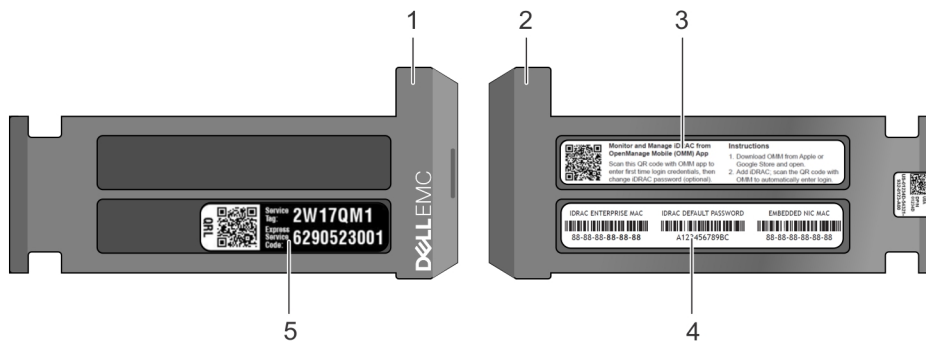
**NOTE:** If the drive is in the Advanced Host Controller Interface (AHCI) mode, the status LED indicator does not turn on.

Table 13. Drive indicator codes

Drive status indicator code	Condition
Flashes green twice per second	Identifying drive or preparing for removal.
Off	Drive ready for removal.
	<b>NOTE:</b> The drive status indicator remains off until all drives are initialized after the system is turned on. Drives are not ready for removal during this time.
Flashes green, amber, and then turns off	Predicted drive failure.
Flashes amber four times per second	Drive failed.
Flashes green slowly	Drive rebuilding.
Solid green	Drive online.
Flashes green for three seconds, amber for three seconds, and then turns off after six seconds	Rebuild stopped.

# Locating the Service Tag of your system

You can identify your system using the unique Express Service Code and Service Tag. Pull out the information tag in front of the system to view the Express Service Code and Service Tag. Alternatively, the information may be on a sticker on the chassis of the system. The mini Enterprise Service Tag (EST) is found on the back of the system. This information is used by Dell EMC to route support calls to the appropriate personnel.



**Figure 11. Locating Service Tag of your system**

- |   |                               |   |   |
|---|-------------------------------|---|---|
| 1 | information tag (front view)  | 2 | information tag (back view)                       |
| 3 | OpenManage Mobile (OMM) label | 4 | iDRAC MAC address and iDRAC secure password label |
| 5 | Service Tag                   |   |   |

## Documentation resources

Dell EMC documentation is either included with your shipment or available at the Dell website at [Dell.com/XCSeriesmanuals](https://Dell.com/XCSeriesmanuals).

Dell EMC documentation for Dell EMC iDRAC is available at [Dell.com/idracmanuals](https://Dell.com/idracmanuals).

To access the Dell EMC documentation:

- 1 On the Dell EMC Support page, in the **Enter a Service Tag, Serial Number, Service Request, Model, or Keyword** box, type the Service Tag of your Dell EMC appliance, and then click **Submit**.

**NOTE:** If you do not have a Service Tag, select **Detect My Product** to enable the system to automatically detect your Service Tag, or select **Browse all products** to select your product from the **All product** page.

- 2 On the **Product Support** page, click **Manuals & documents** and select the documentation you require.

**Table 14. Reference documentation for Dell EMC XC940 Series Hyper-converged Appliance**

To learn about...	See...
Set up instructions of your Dell EMC XC940 Series, including the technical specifications	<i>Dell EMC XC940 Series Hyper-Converged Appliance Getting Started Guide</i>
Hardware details of your Dell EMC XC940 Series	<i>Dell EMC XC940 Series Hyper-Converged Appliance Installation and Service Manual</i>
How to install your Dell EMC XC940 Series in a rack	<i>Rail Installation Guide</i>
How to deploy and set up this solution	<i>Dell EMC XC940 Series Hyper-Converged Appliance Solutions Guide</i>
ESXi Best Practices Guide	<i>Best Practices for Deploying ESXi on an XC Series Appliance</i>
Windows Hyper-V Best Practices Guide	<i>Best Practices for Deploying Windows Hyper-V on an XC Series Appliance</i>
Known issues and workarounds	<i>Release Notes for XC Series Hyper-Converged Appliances</i>
Support Matrix	<i>Dell EMC XC940 Series Hyper-Converged Appliance Support Matrix</i>
Troubleshooting your system	Troubleshooting Guide at <a href="https://Dell.com/poweredgemanuals">Dell.com/poweredgemanuals</a>
End User License Agreement	<i>EULA</i>

# Technical specifications

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

Topics:

- System dimensions
- System weight
- Processor specifications
- PSU specifications
- System battery specifications
- Expansion bus specifications
- Memory specifications
- Storage controller specifications
- Remote management port specifications
- Drive specifications
- Ports and connectors specifications
- Video specifications
- Environmental specifications

## System dimensions

This section describes the physical dimensions of the system.

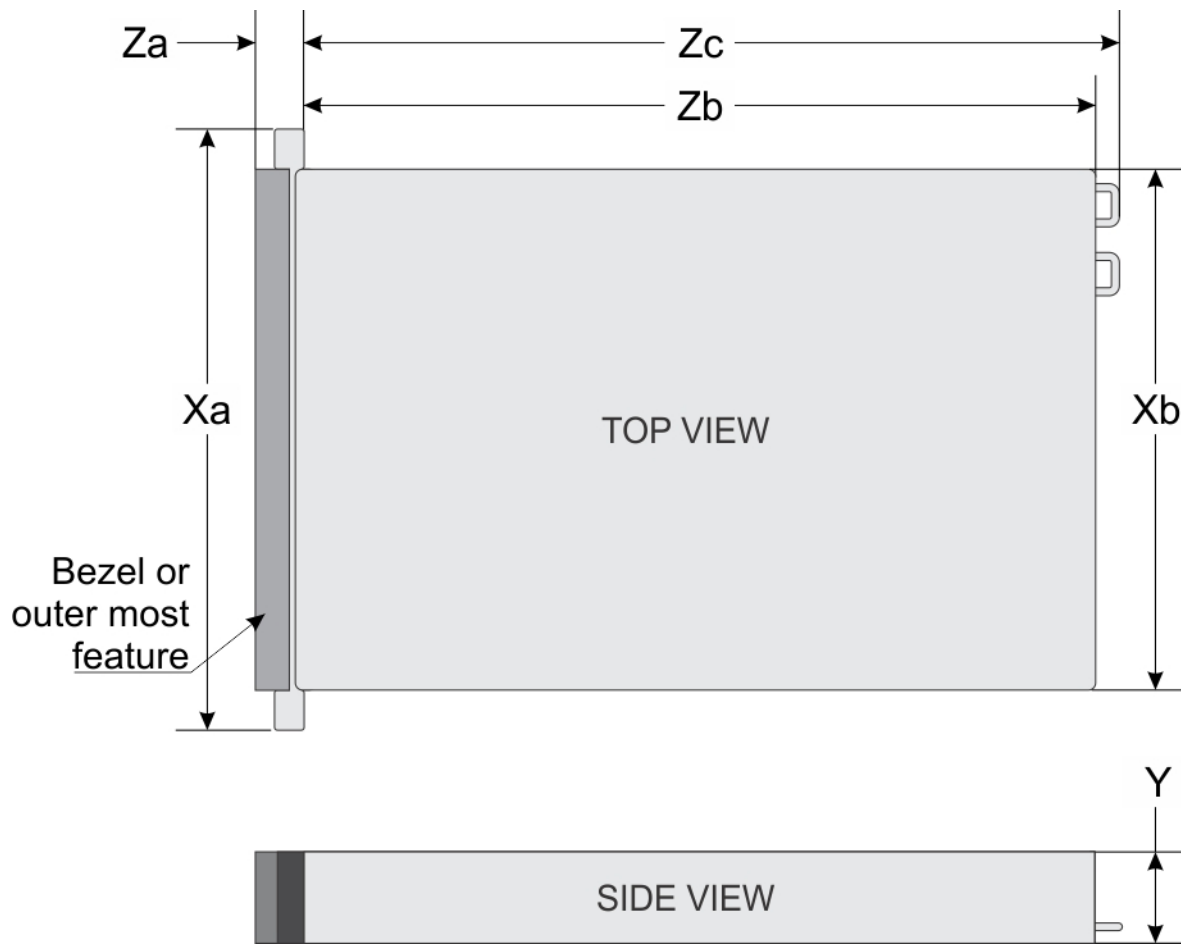


Figure 12. System dimensions of XC940 Series system

Table 15. System dimensions of XC940 Series system

system	Xa	Xb	Y	Za (with bezel)	Za (without bezel)	Zb	Zc
XC940 Series system	482.0 mm (18.9 inches)	434.0 mm (17.08 inches)	130.3 mm (5.13 inches)	35.0 mm (1.37 inches)	22.0 mm (0.86 inches)	726.2 mm (28.59 inches)	777.046 mm (30.59 inches)

## System weight

Table 16. System weight of XC940 Series system

System	Maximum weight (with all hard drives/SSDs)
XC940 Series system	49.9 kg (110.01 lb)

## Processor specifications

The XC940 Series system supports four Intel Xeon scalable family processors.

# PSU specifications

The XC940 Series system supports up to two AC or DC power supply units (PSUs).

**Table 17. PSU specifications**

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	Power rating	Current
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100–120 V AC, autoranging 200–240 V AC, autoranging	derated to 1050 W 1100 W	12 A–6.5 A
1100 W DC	N/A	4416 BTU/hr	N/A	–(48–60) V DC, autoranging	1100 W	32 A
1100 W Mixed Mode HVDC (for China and Japan only)	Platinum	4100 BTU/hr	50/60 Hz	100–120 V AC, autoranging	derated to 1050 W	12 A–6.5 A
	N/A	4100 BTU/hr	N/A	200–380 V DC, autoranging	1100 W	6.4 A–3.2 A
1600 W AC	Platinum	6000 BTU/hr	50/60 Hz	100–120 V AC, autoranging 200–240 V AC, autoranging	derated to 800 W 1600 W	10 A
2000 W AC	Platinum	7500 BTU/hr	50/60 Hz	100–120 V AC, autoranging 200–240 V AC, autoranging	derated to 1000 W 2000 W	11.5 A
2400 W AC	Platinum	9000 BTU/hr	50/60 Hz	100–120 V AC, autoranging 200–240 V AC, autoranging	derated to 1400 W 2400 W	16 A

**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 240 V.

**NOTE:** PSUs rated for 1600 W and higher require high-line voltage (200–240 V) to supply their rated capacity.

## System battery specifications

The XC940 Series system supports CR 2032 3.0-V lithium coin cell system battery.

## Expansion bus specifications

The XC940 Series system supports PCI express (PCIe) generation 3 expansion cards, which you can install on the expansion slots available on the system board. If you are using XC940 Series system with four processor configuration, then you can also install the cards by using the expansion card riser. This system supports up to two expansion card risers. The following table provides the expansion card riser specifications:

**Table 18. Expansion card slots supported on the system board**

PCIe slot on the system board	Processor connection	PCIe slots on system board (Height)	PCIe slots on system board (length)	Link width	Slot width
Slot 1	Processor 1	full height	half length	x8	x16
Slot 2	Processor 1	full height	half length	x16	x16
Slot 3	Processor 1	full height	half length	x16	x16
Slot 4	Processor 2	full height	half length	x16	x16
Slot 5	Processor 2	full height	half length	x8	x16
Slot 6	Processor 2	full height	half length	x8	x16
Slot 7	Processor 2	full height	half length	x16	x16

**Table 19. Expansion card riser configurations**

Riser	PCIe slot on the expansion card riser	Processor connection	PCIe slots on riser (Height)	PCIe slots on riser (length)	Link width	Slot width
	Slot 8	Processor 3	full height	3/4 length	x16	x16
Riser 2 (IO_RISER2)	Slot 9	Processor 3	full height	half length	x16	x16
	Slot 10	Processor 3	full height	half length	x16	x16
	Slot 11	Processor 4	full height	3/4 length	x16	x16
Riser 3 (IO_RISER3)	Slot 12	Processor 4	full height	half length	x16	x16
	Slot 13	Processor 4	full height	half length	x16	x16

## Memory specifications

**Table 20. Memory specifications**

DIMM type	DIMM rank	DIMM capacity	Quad processors	
			Minimum RAM	Maximum RAM
LRDIMM	Octal Rank	128 GB	512 GB	6,144 GB
LRDIMM	Quad Rank	64 GB	256 GB	3,072 GB
RDIMM	Dual Rank	32 GB	128 GB	1,536 GB
RDIMM	Dual Rank	16 GB	64 GB	768 GB
RDIMM	Single Rank	8 GB	32 GB	384 GB

## Storage controller specifications

The XC940 Series system supports HBA330 adapter.

# Remote management port specifications

The XC940 Series system supports one dedicated 1Gbe Ethernet port with optional card and up to two optional shared NIC ports.

## Drive specifications

### Hard drives

The XC940 Series system supports up to twenty four 2.5-inch, internal, hot swappable SAS or SATA SSDs/hard drives.

## Ports and connectors specifications

### USB ports

The XC940 Series system supports:

- Two USB 3.0-compliant ports on the front panel
- Two USB 3.0-compliant ports on the back panel
- One USB 3.0-compliant internal port

### NIC ports

The XC940 Series system supports up to four NDC ports on the back panel, which are available in the following configurations:

- Four RJ-45 ports that support 10, 100, and 1000 Mbps
- Four RJ-45 ports that support 100 M, 1 G and 10 Gbps
- Four RJ-45 ports, where two ports support maximum of 10 G and the other two ports maximum of 1 G
- Two RJ-45 ports that support up to 1 Gbps and 2 SFP+ ports that support up to 10 Gbps
- Four SFP+ ports that support up to 10 Gbps
- Two SFP28 ports that support up to 25 Gbps

### Serial port

The XC940 Series system supports one serial port on the back panel, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant.

### VGA ports

The XC940 Series system supports two 15-pin VGA ports. One of the VGA ports is located on the front of the system and the other port is on the back of the system.

# Video specifications

The XC940 Series system supports integrated Matrix G200eW3 graphics controller with 16 MB of video frame buffer.

**Table 21. Resolution information for video modes**

Resolution	Refresh rate (Hz)
1024 x 768	60
1280 x 800	60
1280 x 1024	60
1360 x 768	60
1440 x 900	60
1600 x 900	60 (RB)
1600 x 1200	60
1680 x 1050	60 (RB)
1920 x 1080	60
1920 x 1200	60

# Environmental specifications

**NOTE:** For additional information about environmental measurements for specific system configurations, see [Dell.com/environmental\\_datasheets](http://Dell.com/environmental_datasheets).

**Table 22. Temperature specifications**

Temperature	Specifications
Storage	–40°C to 65°C (–40°F to 149°F)
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.
Maximum temperature gradient (operating and storage)	20°C/h (68°F/h)

**Table 23. Relative humidity specifications**

Relative humidity	Specifications
Storage	5% to 95% RH with 33°C (91°F) maximum dew point. Atmosphere must be non-condensing at all times.
Operating	10% to 80% relative humidity with 26°C (78.8°F) maximum dew point.

**Table 24. Maximum vibration specifications**

Maximum vibration	Specifications
Operating	0.26 G <sub>rms</sub> at 5 Hz to 350 Hz (all operation orientations).
Storage	1.87 G <sub>rms</sub> at 10 Hz to 500 Hz for 15 min (all six sides tested).

**Table 25. Maximum shock specifications**

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

**Table 26. Maximum altitude specifications**

Maximum altitude	Specifications
Operating	3048 m (10,000 ft)
Storage	12,000 m (39,370 ft)

**Table 27. Operating temperature de-rating specifications**

Operating temperature de-rating	Specifications
Up to 35°C (95°F)	Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3,117 ft).
35°C to 40°C (95°F to 104°F)	Maximum temperature is reduced by 1°C/175 m (1°F/319 ft) above 950 m (3,117 ft).
40°C to 45°C (104°F to 113°F)	Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3,117 ft).

## Particulate and gaseous contamination specifications

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

**Table 28. Particulate contamination specifications**

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.  <b>NOTE:</b> 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.  <b>NOTE:</b> Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles.  <b>NOTE:</b> This condition applies to data center and non-data center environments.

Particulate contamination	Specifications
Corrosive dust	<ul style="list-style-type: none"> <li>Air must be free of corrosive dust.</li> <li>Residual dust present in the air must have a deliquescent point less than 60% relative humidity.</li> </ul> <p><b>NOTE:</b> This condition applies to data center and non-data center environments.</p>

**Table 29. Gaseous contamination specifications**

Gaseous contamination	Specifications
Copper coupon corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-1985.
Silver coupon corrosion rate	<200 Å/month as defined by AHSRAE TC9.9.

**NOTE:** Maximum corrosive contaminant levels measured at ≤50% relative humidity.

## Standard operating temperature

**Table 30. 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.
Humidity percentage range	10% to 80% Relative Humidity with 26°C (78.8°F) maximum dew point.

## Expanded operating temperature

**Table 31. Expanded operating temperature specifications**

Expanded operating temperature	Specifications
Less than or equal to 10% of annual operating hours	<p>5°C to 40°C at 5% to 85% RH with 29°C dew point.</p> <p><b>NOTE:</b> Outside the standard operating temperature (10°C to 35°C), the system can operate continuously in temperatures as low as 5°C and as high as 40°C.</p> <p>For temperatures between 35°C and 40°C, derate maximum allowable dry bulb temperature by 1°C per 175 m above 950 m (1°F per 319 ft).</p>
Less than or equal to 1% of annual operating hours	<p>–5°C to 45°C at 5% to 90% RH with 29°C dew point.</p> <p><b>NOTE:</b> Outside the standard operating temperature (10°C to 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 between 40°C and 45°C, derate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft).</p>

**NOTE:** When operating in the expanded temperature range, system performance may be impacted.

**NOTE:** When operating in the expanded temperature range, ambient temperature warnings may be reported on the LCD panel and in 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).
- 150 W/8 core or higher wattage processor [Thermal Design Power (TDP)>165 W] is not supported.
- Redundant power supply unit is required.
- Non-Dell EMC qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- NVMe drives are not supported.

## Thermal restrictions

The following table lists the configuration required for efficient cooling:

**Table 32. Thermal restriction for efficient cooling**

Configuration	Number of processors	Heatsink	Processor blank	DIMM blanks	Fan
Twenty four 2.5 inch hard drive system	2	Two standard heat sinks for CPU < 165W	Not required	12	eight standard fans
	4	Two heat sinks for CPU $\geq$ 165 W			
		Four standard heat sinks for CPU < 165 W	Not required	24	eight standard fans
		Four heat sinks for CPU $\geq$ 165 W			

**Table 33. NIC card slot restrictions**

Configuration	Slot restriction	Ambient restriction
Twenty four 2.5-inch hard drive system	Slots 1, 5, and 6 do not support NIC cards	35°C

# Initial system setup and configuration

**NOTE:** NVMe drive slots are 20, 21, 22, and 23.

Drive slot numbering is 0 relative for chassis. All NVMe drives are installed in the last slots. Maximum of four NVMe drives are supported.

Topics:

- [Setting up your system](#)
- [iDRAC configuration](#)
- [Methods to download firmware and drivers](#)
- [Downloading drivers and firmware](#)

## Setting up your system

Complete the following steps to set up your system:

- 1 Unpack the system.
- 2 Install the system into the rack. For more information about installing the system into the rack, see *Rail Installation Guide* at [Dell.com/XCSeriesmanuals](https://www.dell.com/support/manuals).
- 3 Connect the peripherals to the system.
- 4 Connect the system to its electrical outlet.
- 5 Turn the system on by pressing the power button or by using iDRAC.
- 6 Turn on the attached peripherals.

For more information about setting up your system, see the *Getting Started Guide* that shipped with your system.

## iDRAC configuration

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

## Options to set up iDRAC IP address

You must configure the initial network settings based on your network infrastructure to enable the communication to and from iDRAC.

You must use the default iDRAC IP address 192.168.0.120 to configure the initial network settings, including setting up DHCP or a static IP for iDRAC. You can set up the IP address by using one of the following interfaces:

Interfaces	Document/Section
iDRAC Settings utility	See <i>Dell Integrated Dell Remote Access Controller User's Guide</i> at <a href="https://www.dell.com/support/manuals">Dell.com/idracmanuals</a>
Dell Lifecycle Controller	See <i>Dell Lifecycle Controller User's Guide</i> at <a href="https://www.dell.com/support/manuals">Dell.com/idracmanuals</a>

Interfaces	Document/Section
iDRAC Direct and Quick Sync 2 (optional)	See <i>Dell Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>

**NOTE:** To access iDRAC, ensure that you connect the Ethernet cable to the iDRAC direct port. You can also access iDRAC through the shared LOM mode, if you have opted for a system that has the shared LOM mode enabled.

## Log in to iDRAC

You can log in to iDRAC as:

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

**NOTE:** You must have the iDRAC credentials to log in to iDRAC.

**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 [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

You can also access iDRAC by using RACADM. For more information, see the *RACADM Command Line Interface Reference Guide* at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Methods to download firmware and drivers

You can download the firmware and drivers by using any of the following methods:

**Table 34. Firmware and drivers**

Methods	Location
From the Dell Support site	<a href="http://Dell.com/support/home">Dell.com/support/home</a>
Using Dell Remote Access Controller Lifecycle Controller (iDRAC with LC)	<a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>

## Downloading drivers and firmware

Dell EMC recommends that you download and install the latest BIOS, drivers, and systems management firmware on your system.

### Prerequisite

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

### Steps

- 1 Go to [Dell.com/support/drivers](http://Dell.com/support/drivers).
- 2 In the **Drivers & Downloads** section, type the Service Tag of your system in the **Enter a Service Tag or product ID** box, and then click **Submit**.

**NOTE:** If you do not have the Service Tag, select **Detect Product** to allow the system to automatically detect your Service Tag, or click **View products**, and navigate to your product.

- 3 Click **Drivers & Downloads**.  
The drivers that are applicable to your selection are displayed.

- 4 Download the drivers to a USB drive, CD, or DVD.

# Pre-operating system management applications

Dell EMC recommends that you do not change any of the factory settings. XC Series Appliance and XC Core System settings are configured at the factory.

Topics:

- [Options to manage the pre-operating system applications](#)
- [System Setup](#)
- [Dell Lifecycle Controller](#)
- [Boot Manager](#)
- [PXE boot](#)

## Options to manage the pre-operating system applications

Your system has the following options to manage the pre-operating system applications:

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

## System Setup

By using the **System Setup** screen, you can configure the BIOS settings, iDRAC settings, and device settings of your system.

**NOTE:** Help text for the selected field is displayed in the graphical browser by default. To view the help text in the text browser, press F1.

You can access system setup by using two methods:

- Standard graphical browser—The browser is enabled by default.
- Text browser—The browser is enabled by using Console Redirection.

## Viewing System Setup

To view the **System Setup** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

```
F2 = System Setup
```

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

# System Setup details

The **System Setup Main Menu** screen details are explained as follows:

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

Option	Description
<b>System BIOS</b>	Enables you to configure BIOS settings.
<b>iDRAC Settings</b>	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 <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a> .
<b>Device Settings</b>	Enables you to configure device settings.

## System BIOS

You can use the **System BIOS** screen to edit specific functions such as boot order, system password, setup password, PCIe NVMe RAID mode, and set the SATA enable or disable USB ports.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Viewing System BIOS

To view the **System BIOS** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.

## System BIOS Settings details

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The **System BIOS Settings** screen details are explained as follows:

Option	Description
<b>System Information</b>	Specifies information about the system such as the system model name, BIOS version, and Service Tag.
<b>Memory Settings</b>	Specifies information and options related to the installed memory.
<b>Processor Settings</b>	Specifies information and options related to the processor such as speed and cache size.
<b>SATA Settings</b>	Specifies options to enable or disable the integrated SATA controller and ports.

Option	Description
<b>NVMe Settings</b>	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 this field and the <b>Embedded SATA</b> field on the <b>SATA Settings</b> menu to <b>RAID</b> mode. You might also need to change the <b>Boot Mode</b> setting to <b>UEFI</b> . Otherwise, you should set this field to <b>Non-RAID</b> mode.
<b>Boot Settings</b>	Allows you to set the boot mode — BIOS or UEFI.
<b>Network Settings</b>	Specifies options to manage the UEFI network settings and boot protocols. Legacy network settings are managed from the <b>Device Settings</b> menu.
<b>Integrated Devices</b>	Specifies options to manage integrated device controllers and ports, specifies related features and options.
<b>Serial Communication</b>	Specifies options to manage the serial ports, related features and options.
<b>System Profile Settings</b>	Specifies options to change the processor power management settings, memory frequency.
<b>System Security</b>	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.
<b>Redundant OS Settings</b>	Specifies the options to configure the Redundant OS settings.
<b>Miscellaneous Settings</b>	Specifies options to change the system date and time.

## System Information


You can use the **System Information** screen to view system properties such as Service Tag, system model name, and the BIOS version.

 **NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Viewing System Information

To view the **System Information** screen, perform the following steps:

- 1 Turn on, or restart your system.
  - 2 Press F2 immediately after you see the following message:  

```
F2 = System Setup
```
-  **NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.
- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
  - 4 On the **System BIOS** screen, click **System Information**.

## System Information details

 **NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The **System Information** screen details are explained as follows:

Option	Description
<b>System Model Name</b>	Specifies the system model name.

Option	Description
<b>System BIOS Version</b>	Specifies the BIOS version installed on the system.
<b>System Management Engine Version</b>	Specifies the current version of the Management Engine firmware.
<b>System Service Tag</b>	Specifies the system Service Tag.
<b>System Manufacturer</b>	Specifies the name of the system manufacturer.
<b>System Manufacturer Contact Information</b>	Specifies the contact information of the system manufacturer.
<b>System CPLD Version</b>	Specifies the current version of the system complex programmable logic device (CPLD) firmware.
<b>UEFI Compliance Version</b>	Specifies the UEFI compliance level of the system firmware.

## Memory Settings

You can use the **Memory Settings** screen to view all the memory settings and enable or disable specific memory functions, such as system memory testing and node interleaving.

 **NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Viewing Memory Settings

To view the **Memory Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  

```
F2 = System Setup
```
- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Memory Settings**.

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

## Memory Settings details

The **Memory Settings** screen details are explained as follows:

Option	Description
<b>System Memory Size</b>	Specifies the memory size in the system.
<b>System Memory Type</b>	Specifies the type of memory installed in the system.
<b>System Memory Speed</b>	Specifies the system memory speed.

Option	Description
<b>System Memory Voltage</b>	Specifies the system memory voltage.
<b>Video Memory</b>	Specifies the amount of video memory.
<b>System Memory Testing</b>	Specifies whether the system memory tests are run during system boot. Options are <b>Enabled</b> and <b>Disabled</b> . This option is set to <b>Disabled</b> by default.
<b>Memory Operating Mode</b>	<p>Specifies the memory operating mode. The options available are <b>Optimizer Mode</b>, <b>Single Rank Spare Mode</b>, <b>Multi Rank Spare Mode</b>, <b>Mirror Mode</b>, and <b>Dell Fault Resilient Mode</b>. This option is set to <b>Optimizer Mode</b> by default.</p> <p><b>NOTE:</b> The Memory Operating Mode option can have different default and available options based on the memory configuration of your system.</p> <p><b>NOTE:</b> The Dell Fault Resilient Mode option establishes an area of memory that is fault resilient. This mode can be used by an operating system that supports the feature to load critical applications or enables the operating system kernel to maximize system availability.</p>
<b>Current State of Memory Operating Mode</b>	Specifies the current state of the memory operating mode.
<b>Node Interleaving</b>	Specifies if Non-Uniform Memory Architecture (NUMA) is supported. If this field is set to <b>Enabled</b> , memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to <b>Disabled</b> , the system supports NUMA (asymmetric) memory configurations. This option is set to <b>Disabled</b> by default.
<b>Opportunistic Self-Refresh</b>	Enables or disables opportunistic self-refresh feature. This option is set to <b>Disabled</b> by default.

## Processor Settings

You can use the **Processor Settings** screen to view the processor settings, and perform specific functions such as enabling virtualization technology, hardware prefetcher, logical processor idling, and opportunistic self-refresh.

### Viewing Processor Settings

To view the **Processor Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:



F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Processor Settings**.

### Processor Settings details

The **Processor Settings** screen details are explained as follows:

Option	Description
<b>Logical Processor</b>	Enables or disables the logical processors and displays the number of logical processors. If this option is set to <b>Enabled</b> , the BIOS displays all the logical processors. If this option is set to <b>Disabled</b> , the BIOS displays only one logical processor per core. This option is set to <b>Enabled</b> by default.
<b>CPU Interconnect Speed</b>	<p>Enables you to govern the frequency of the communication links among the CPUs in the system.</p> <p> <b>NOTE: The standard and basic bin processors support lower link frequencies.</b></p> <p>The options available are <b>Maximum data rate, 10.4 GT/s</b>, and <b>9.6 GT/s</b>. This option is set to <b>Maximum data rate</b> by default.</p> <p>Maximum data rate indicates that the BIOS runs the communication links at the maximum frequency supported by the processors. You can also select specific frequencies that the processors support, which can vary.</p> <p>For best performance, you should select <b>Maximum data rate</b>. Any reduction in the communication link frequency affects the performance of non-local memory accesses and cache coherency traffic. In addition, it can slow access to non-local I/O devices from a particular CPU.</p> <p>However, if power saving considerations outweigh performance, you might want to reduce the frequency of the CPU communication links. If you do this, you should localize memory and I/O accesses to the nearest NUMA node to minimize the impact to system performance.</p>
<b>Virtualization Technology</b>	Enables you to control the QuickPath Interconnect data rate settings.
<b>Adjacent Cache Line Prefetch</b>	Optimizes the system for applications that need high utilization of sequential memory access. This option is set to <b>Enabled</b> by default. You can disable this option for applications that need high utilization of random memory access.
<b>Hardware Prefetcher</b>	Enables or disables the hardware prefetcher. This option is set to <b>Enabled</b> by default.
<b>DCU Streamer Prefetcher</b>	Enables or disables the Data Cache Unit (DCU) streamer prefetcher. This option is set to <b>Enabled</b> by default.
<b>DCU IP Prefetcher</b>	Enables or disables the Data Cache Unit (DCU) IP prefetcher. This option is set to <b>Enabled</b> by default.
<b>Sub NUMA Cluster</b>	Enables or disables the Sub NUMA Cluster. This option is set to <b>Disabled</b> by default.
<b>Logical Processor Idling</b>	Enables you to improve the energy efficiency of a system. It uses the operating system core parking algorithm and parks some of the logical processors in the system which in turn allows the corresponding processor cores to transition into a lower power idle state. This option can only be enabled if the operating system supports it. It is set to <b>Disabled</b> by default.
<b>X2APIC Mode</b>	Enables or disables the X2APIC mode. This option is set to <b>Disabled</b> by default.
<b>Dell Controlled Turbo</b>	Controls the turbo engagement. Enable this option only when <b>System Profile</b> is set to <b>Disabled</b> .
<b>Number of Cores per Processor</b>	Controls the number of enabled cores in each processor. This option is set to <b>All</b> by default.
<b>Processor Core Speed</b>	Specifies the maximum core frequency of the processor.
<b>Processor n</b>	<p> <b>NOTE: Depending on the number of processors, there might be up to four processors listed.</b></p> <p>The following settings are displayed for each processor installed in the system:</p>

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

## SATA Settings

You can use the **SATA Settings** screen to view the SATA settings of SATA devices and enable SATA on your system.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Viewing SATA Settings

To view the **SATA Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  

```
F2 = System Setup
```
- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **SATA Settings**.

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

## SATA Settings details

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The **SATA Settings** screen details are explained as follows:

Option	Description
<b>Embedded SATA</b>	Enables the embedded SATA option to be set to <b>AHCI</b> , or <b>RAID</b> modes. This option is set to <b>AHCI</b> by default.
<b>Security Freeze Lock</b>	Sends <b>Security Freeze Lock</b> command to the embedded SATA drives during POST. This option is applicable only for ATA and AHCI mode. This option is set to <b>Enable</b> by default.
<b>Write Cache</b>	Enables or disables the command for the embedded SATA drives during POST. This option is set to <b>Disable</b> by default.
<b>Port A</b>	Sets the drive type of the selected device. For the <b>Embedded SATA settings</b> in <b>ATA</b> mode, set this field to <b>Auto</b> to enable BIOS support. Set it to <b>OFF</b> to turn off BIOS support. For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.
<b>Option</b>	<b>Description</b>
<b>Model</b>	Specifies the drive model of the selected device.

<b>Option</b>	<table border="0"> <tr> <td style="vertical-align: top;"><b>Description</b></td> <td></td> </tr> <tr> <td style="vertical-align: top;"><b>Option</b></td> <td style="vertical-align: top;"><b>Description</b></td> </tr> <tr> <td style="vertical-align: top;"><b>Drive Type</b></td> <td style="vertical-align: top;">Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td style="vertical-align: top;"><b>Capacity</b></td> <td style="vertical-align: top;">Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </table>	<b>Description</b>		<b>Option</b>	<b>Description</b>	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
<b>Description</b>									
<b>Option</b>	<b>Description</b>								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port B</b>	<p>Sets the drive type of the selected device. For the <b>Embedded SATA settings</b> in <b>ATA</b> mode, set this field to <b>Auto</b> to enable BIOS support. Set it to <b>OFF</b> to turn off BIOS support.</p> <p>For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.</p> <table border="0"> <tr> <td style="vertical-align: top;"><b>Option</b></td> <td style="vertical-align: top;"><b>Description</b></td> </tr> <tr> <td style="vertical-align: top;"><b>Model</b></td> <td style="vertical-align: top;">Specifies the drive model of the selected device.</td> </tr> <tr> <td style="vertical-align: top;"><b>Drive Type</b></td> <td style="vertical-align: top;">Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td style="vertical-align: top;"><b>Capacity</b></td> <td style="vertical-align: top;">Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </table>	<b>Option</b>	<b>Description</b>	<b>Model</b>	Specifies the drive model of the selected device.	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
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<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port C</b>	<p>Sets the drive type of the selected device. For the <b>Embedded SATA settings</b> in <b>ATA</b> mode, set this field to <b>Auto</b> to enable BIOS support. Set it to <b>OFF</b> to turn off BIOS support.</p> <p>For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.</p> <table border="0"> <tr> <td style="vertical-align: top;"><b>Option</b></td> <td style="vertical-align: top;"><b>Description</b></td> </tr> <tr> <td style="vertical-align: top;"><b>Model</b></td> <td style="vertical-align: top;">Specifies the drive model of the selected device.</td> </tr> <tr> <td style="vertical-align: top;"><b>Drive Type</b></td> <td style="vertical-align: top;">Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td style="vertical-align: top;"><b>Capacity</b></td> <td style="vertical-align: top;">Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </table>	<b>Option</b>	<b>Description</b>	<b>Model</b>	Specifies the drive model of the selected device.	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
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<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port D</b>	<p>Sets the drive type of the selected device. For the <b>Embedded SATA settings</b> in <b>ATA</b> mode, set this field to <b>Auto</b> to enable BIOS support. Set it to <b>OFF</b> to turn off BIOS support.</p> <p>For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.</p> <table border="0"> <tr> <td style="vertical-align: top;"><b>Option</b></td> <td style="vertical-align: top;"><b>Description</b></td> </tr> <tr> <td style="vertical-align: top;"><b>Model</b></td> <td style="vertical-align: top;">Specifies the drive model of the selected device.</td> </tr> <tr> <td style="vertical-align: top;"><b>Drive Type</b></td> <td style="vertical-align: top;">Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td style="vertical-align: top;"><b>Capacity</b></td> <td style="vertical-align: top;">Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </table>	<b>Option</b>	<b>Description</b>	<b>Model</b>	Specifies the drive model of the selected device.	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
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<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								

## NVMe Settings

**NOTE:** The XC Series Appliance and XC Core System does not support the NVMe drives with RAID.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The NVMe settings enable you to set the NVMe drives to either **RAID** mode or **Non-RAID** mode.

**NOTE:** To configure these drives as RAID drives, you must set the NVMe drives and the Embedded SATA option in the SATA Settings menu to RAID mode. If not, you must set this field to Non-RAID mode.

## Viewing NVMe Settings

To view the **NVMe Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **NVMe Settings**.

## NVMe Settings details

**NOTE:** The XC Series Appliance and XC Core System does not support the NVMe drives with RAID.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The NVMe Settings screen details are explained as follows:

Option	Description
<b>NVMe Mode</b>	Enables you to set the NVMe mode. This option is set to <b>Non RAID</b> 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.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

- **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, also 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 hard drive partitions larger than 2 TB.
  - Enhanced security (e.g., UEFI Secure Boot).
  - Faster boot time.
- **BIOS:** The **BIOS Boot Mode** is the legacy boot mode. It is maintained for backward compatibility.

## Viewing Boot Settings

To view the **Boot Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Boot Settings**.

## Boot Settings details

**NOTE:** The NVDIMM-N, RAID or UEFI settings are not supported.

The **Boot Settings** screen details are explained as follows:

Option	Description
<b>Boot Mode</b>	<p>Enables you to set the boot mode of the system.</p> <p><b>CAUTION:</b> Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.</p> <p>If the operating system supports <b>UEFI</b>, you can set this option to <b>UEFI</b>. Setting this field to <b>BIOS</b> allows compatibility with non-UEFI operating systems. This option is set to <b>BIOS</b> by default.</p> <p><b>NOTE:</b> Setting this field to UEFI disables the BIOS Boot Settings menu.</p>
<b>Boot Sequence Retry</b>	<p>Enables or disables the <b>Boot Sequence Retry</b> feature. If this option is set to <b>Enabled</b> and the system fails to boot, the system re-attempts the boot sequence after 30 seconds. This option is set to <b>Enabled</b> by default.</p>
<b>Hard-Disk Failover</b>	<p>Specifies the hard drive that is booted in the event of a hard drive failure. The devices are selected in the <b>Hard-Disk Drive Sequence</b> on the <b>Boot Option Setting</b> menu. When this option is set to <b>Disabled</b>, only the first hard drive in the list is attempted to boot. When this option is set to <b>Enabled</b>, all hard drives are attempted to boot in the order selected in the <b>Hard-Disk Drive Sequence</b>. This option is not enabled for <b>UEFI Boot Mode</b>. This option is set to <b>Disabled</b> by default.</p>
<b>Boot Option Settings</b>	<p>Configures the boot sequence and the boot devices.</p>
<b>BIOS Boot Settings</b>	<p>Enables or disables BIOS boot options.</p> <p><b>NOTE:</b> This option is enabled only if the boot mode is BIOS.</p>
<b>UEFI Boot Settings</b>	<p>Enables or disables UEFI Boot options.</p> <p>The Boot options include <b>IPv4 PXE</b> and <b>IPv6 PXE</b>. This option is set to <b>IPv4</b> by default.</p> <p><b>NOTE:</b> This option is enabled only if the boot mode is set to UEFI.</p>

## Integrated Devices

You can use the **Integrated Devices** screen to view and configure the settings of all integrated devices including the video controller, integrated RAID controller, and the USB ports.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Viewing Integrated Devices

To view the **Integrated Devices** screen, perform the following steps:

### About this task

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Steps

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  
F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Integrated Devices**.

## Integrated Devices details

The **Integrated Devices** screen details are explained as follows:

Option	Description
<b>User Accessible USB Ports</b>	Enables or disables the USB ports. Selecting <b>All Ports Off</b> disables all USB ports. The USB keyboard and mouse operate during boot process in certain operating systems. After the boot process is complete, the USB keyboard and mouse do not work if the ports are disabled. This option is set to <b>All Ports On</b> by default.
<b>Internal USB Port</b>	Enables or disables the internal USB port. This option is set to <b>On</b> or <b>Off</b> . This option is set to <b>On</b> by default. <b>NOTE:</b> The Internal SD Card Port on the PCIe riser is controlled by Internal USB Port.
<b>iDRAC Direct USB Port</b>	The iDRAC Direct USB port is managed by iDRAC exclusively with no host visibility. This option is set to <b>ON</b> or <b>OFF</b> . When set to <b>OFF</b> , iDRAC does not detect any USB devices installed in this managed port. This option is set to <b>On</b> by default.
<b>Embedded NIC1</b>	Enables or disables the Embedded NIC1 port. The option is set to <b>Enabled</b> by default.
<b>I/OAT DMA Engine</b>	Enables or disables the I/O Acceleration Technology (I/OAT) option. I/OAT is a set of DMA features designed to accelerate network traffic and lower CPU utilization. Enable only if the hardware and software support the feature. This option is set to <b>Disabled</b> by default.
<b>Embedded Video Controller</b>	Enables or disables the use of Embedded Video Controller as the primary display. When set to <b>Enabled</b> , the Embedded Video Controller will be the primary display even if add-in graphic cards are installed. When set to <b>Disabled</b> , 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 <b>Enabled</b> by default. <b>NOTE:</b> 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.
<b>Current State of Embedded Video Controller</b>	Displays the current state of the embedded video controller. The <b>Current State of Embedded Video Controller</b> 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 <b>Embedded Video Controller</b> setting is set to <b>Disabled</b> .
<b>SR-IOV Global Enable</b>	Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to <b>Enabled</b> by default.
<b>Internal SD Card Port</b>	Enables or disables the internal SD card port of the Internal Dual SD Module (IDSMD). This option is set to <b>On</b> by default.
<b>Internal SD Card Redundancy</b>	Configures the redundancy mode of the Internal Dual SD Module (IDSMD). When set to <b>Mirror</b> 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. When <b>Internal SD Card Redundancy</b> is set to <b>Disabled</b> , only the primary SD card is visible to the OS. This option is set to <b>Disabled</b> by default.

Option	Description
<b>Internal SD Primary Card</b>	When <b>Redundancy</b> is set to <b>Disabled</b> , either one of the SD card can be selected to present itself as mass storage device by setting it to be primary card. By default primary SD card is selected to be SD Card 1. If microSD Card 1 is not present, then the controller selects the SD Card 2 as the primary card.
<b>OS Watchdog Timer</b>	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to <b>Enabled</b> , the operating system initializes the timer. When this option is set to <b>Disabled</b> (the default), the timer does not have any effect on the system.
<b>Memory Mapped I/O above 4 GB</b>	Enables or disables the support for the PCIe devices that require large amount of memory. Enable this option only for 64-bit operating systems. This option is set to <b>Enabled</b> by default.
<b>Memory Mapped I/O above Base</b>	When set to <b>12 TB</b> , the system maps the MMIO base to 12 TB. Enable this option for an OS that requires 44 bit PCIe addressing. When set to <b>512 GB</b> , the system maps the MMIO base to 512 GB, and reduces the maximum support for memory to less than 512 GB. Enable this option only for the 4 GPU DGMA issue. This option is set to <b>56 TB</b> by default.
<b>Slot Disablement</b>	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.

**Table 35. Slot Disablement**

Option	Description
<b>Slot 1</b>	Enables or disables the PCIe slot 1. This option is set to <b>Enabled</b> by default.
<b>Slot 3</b>	Enables or disables or only the boot driver is disabled for the PCIe slot 3. This option is set to <b>Enabled</b> by default.
<b>Slot 4</b>	Enables or disables or only the boot driver is disabled for the PCIe slot 4. This option is set to <b>Enabled</b> by default.
<b>Slot 5</b>	Enables or disables or only the boot driver is disabled for the PCIe slot 5. This option is set to <b>Enabled</b> by default.
<b>Slot 6</b>	Enables or disables or only the boot driver is disabled for the PCIe slot 6. This option is set to <b>Enabled</b> by default.

**Slot Bifurcation** Allows **Platform Default Bifurcation**, **Auto discovery of Bifurcation** and **Manual bifurcation Control**. 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** or **Auto discovery of Bifurcation**.

**Table 36. Slot Bifurcation**

Option	Description
<b>Slot 1 Bifurcation</b>	X4 or X8 or X4X4X4X8 or X8X4X4 Bifurcation
<b>Slot 3 Bifurcation</b>	X4 or X8 or X4X4X4X8 or X8X4X4 Bifurcation
<b>Slot 4 Bifurcation</b>	X16 or X4 or X8 or X4X4X4X8 or X8X4X4 Bifurcation
<b>Slot 5 Bifurcation</b>	X4 Bifurcation or X8 Bifurcation

# Serial Communication

You can use the **Serial Communication** screen to view the properties of the serial communication port.

## Viewing Serial Communication

To view the **Serial Communication** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  
`F2 = System Setup`
- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Serial Communication**.

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

## Serial Communication details

The **Serial Communication** screen details are explained as follows:

Option	Description
<b>Serial Port Address</b>	Enables you to set the port address for serial devices. This field sets the serial port address to either COM1 or COM2 (COM1=0x3F8, COM2=0x2F8). This option is set to <b>Serial Device1=COM2 or Serial Device 2=COM1</b> by default. <b>NOTE:</b> 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. <b>NOTE:</b> 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.
<b>Failsafe Baud Rate</b>	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 is not changed. This option is set to <b>115200</b> by default.
<b>Remote Terminal Type</b>	Sets the remote console terminal type. This option is set to <b>VT100/VT220</b> by default.
<b>Redirection After Boot</b>	Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to <b>Enabled</b> by default.

# System Profile Settings

You can use the **System Profile Settings** screen to enable specific system performance settings such as power management.

## Viewing System Profile Settings

To view the **System Profile Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

F2 = System Setup

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **System Profile Settings**.

## System Profile Settings details

The **System Profile Settings** screen details are explained as follows:

Option	Description
<b>System Profile</b>	Sets the system profile. If you set the System Profile option to a mode other than <b>Custom</b> , the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to <b>Custom</b> . This option is set to <b>Performance Per Watt Optimized (DAPC)</b> by default. DAPC is Dell Active Power Controller. Other options include <b>Performance Per Watt (OS)</b> , <b>Performance Per Watt (HWPM)</b> , <b>Performance</b> , and <b>Workstation Performance</b> . <b>NOTE:</b> All the parameters on the system profile setting screen are available only when the System Profile option is set to Custom.
<b>CPU Power Management</b>	Sets the CPU power management. This option is set to <b>System DBPM (DAPC)</b> by default. DBPM is Demand-Based Power Management. Other options include <b>OS DBPM</b> , <b>Maximum Performance</b> , and <b>Hardware P States</b> .
<b>Memory Frequency</b>	Sets the speed of the system memory. You can select <b>Maximum Performance</b> , <b>Maximum Reliability</b> , or a specific speed. This option is set to <b>Maximum Performance</b> by default.
<b>Turbo Boost</b>	Enables or disables the processor to operate in the turbo boost mode. This option is set to <b>Enabled</b> by default.
<b>C1E</b>	Enables or disables the processor to switch to a minimum performance state when it is idle. This option is set to <b>Disabled</b> by default.
<b>C States</b>	Enables or disables the processor to operate in all available power states. This option is set to <b>Enabled</b> by default.
<b>Write Data CRC</b>	Enables or disables the Write Data CRC. This option is set to <b>Enabled</b> by default.
<b>Collaborative CPU Performance Control</b>	Enables or disables the CPU power management option. When set to <b>Enabled</b> , the CPU power management is controlled by the OS DBPM and the System DBPM (DAPC). This option is set to <b>Disabled</b> by default.
<b>Memory Patrol Scrub</b>	Sets the memory patrol scrub frequency. This option is set to <b>Standard</b> by default.
<b>Memory Refresh Rate</b>	Sets the memory refresh rate to either 1x or 2x. This option is set to <b>1x</b> by default.
<b>Uncore Frequency</b>	Enables you to select the <b>Processor Uncore Frequency</b> option.


Option	Description
	<b>Dynamic mode</b> enables the processor to optimize power resources across the cores and uncore during runtime. The optimization of the uncore frequency to either save power or optimize performance is influenced by the setting of the <b>Energy Efficiency Policy</b> option.
<b>Energy Efficient Policy</b>	Enables you to select the <b>Energy Efficient Policy</b> option. The CPU uses the setting to manipulate the internal behavior of the processor and determines whether to target higher performance or better power savings.
<b>Number of Turbo Boost Enabled Cores for Processor 1</b>	<p><b>NOTE:</b> If there are two processors installed in the system, you will see an entry for <b>Number of Turbo Boost Enabled Cores for Processor 2</b>.</p> <p>Controls the number of turbo boost enabled cores for Processor 1. The maximum number of cores is enabled by default.</p>
<b>Monitor/Mwait</b>	<p>Enables the Monitor/Mwait instructions in the processor. This option is set to <b>Enabled</b> for all system profiles, except <b>Custom</b> by default.</p> <p><b>NOTE:</b> This option can be disabled only if the <b>C States</b> option in the <b>Custom mode</b> is set to <b>disabled</b>.</p> <p><b>NOTE:</b> When <b>C States</b> is set to <b>Enabled</b> in the <b>Custom mode</b>, changing the <b>Monitor/Mwait</b> setting does not impact the system power or performance.</p>
<b>CPU Interconnect Bus Link Power Management</b>	Enables or disables the CPU Interconnect Bus Link Power Management. This option is set to <b>Enabled</b> by default.
<b>PCI ASPM L1 Link Power Management</b>	Enables or disables the PCI ASPM L1 Link Power Management. This option is set to <b>Enabled</b> by default.

## System Security

You can use the **System Security** screen to perform specific functions such as setting the system password, setup password and disabling the power button.

## Viewing System Security

To view the **System Security** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **System Security**.

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

## System Security Settings details

The **System Security Settings** screen details are explained as follows:

Option	Description
<b>In-Band Manageability Interface</b>	<p>When set to Disabled, this setting will hide the Management Engine's (ME), HECI devices, and the system's IPMI devices from the operating system. This prevents the operating system from changing the ME power capping settings, and blocks access to all in-band management tools. All management should be managed through out-of-band. This option is set to <b>Enabled</b> by default.</p> <p> <b>NOTE: BIOS update requires HECI devices to be operational and DUP updates require IPMI interface to be operational. This setting needs to be set to Enabled to avoid updating errors.</b></p>
<b>Intel(R) AES-NI</b>	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 <b>Enabled</b> by default.
<b>System Password</b>	Sets the system password. This option is set to <b>Enabled</b> by default and is read-only if the password jumper is not installed in the system.
<b>Setup Password</b>	Sets the setup password. This option is read-only if the password jumper is not installed in the system.
<b>Password Status</b>	Locks the system password. This option is set to <b>Unlocked</b> by default.
<b>TPM Security</b>	<p> <b>NOTE: The TPM menu is available only when the TPM module is installed.</b></p> <p>Enables you to control the reporting mode of the TPM. The <b>TPM Security</b> option is set to <b>Off</b> by default. You can only modify the TPM Status, TPM Activation, and the Intel TXT fields if the <b>TPM Status</b> field is set to either <b>On with Pre-boot Measurements</b> or <b>On without Pre-boot Measurements</b>.</p>
<b>TPM Information</b>	Changes the operational state of the TPM. This option is set to <b>No Change</b> by default.
<b>TPM Status</b>	Specifies the TPM status.
<b>TPM Command</b>	<p>Controls the Trusted Platform Module (TPM). When set to <b>None</b>, no command is sent to the TPM. When set to <b>Activate</b>, the TPM is enabled and activated. When set to <b>Deactivate</b>, the TPM is disabled and deactivated. When set to <b>Clear</b>, all the contents of the TPM are cleared. This option is set to <b>None</b> by default.</p> <p> <b>CAUTION: Clearing the TPM results in the loss of all keys in the TPM. The loss of TPM keys may affect booting to the operating system.</b></p> <p>This field is read-only when <b>TPM Security</b> is set to <b>Off</b>. The action requires an additional reboot before it can take effect.</p>
<b>Intel(R) TXT</b>	Enables or disables the Intel Trusted Execution Technology (TXT) option. To enable the <b>Intel TXT</b> option, virtualization technology and TPM Security must be enabled with Pre-boot measurements. This option is set to <b>Off</b> by default.
<b>Power Button</b>	Enables or disables the power button on the front of the system. This option is set to <b>Enabled</b> by default.
<b>AC Power Recovery</b>	Sets how the system behaves after AC power is restored to the system. This option is set to <b>Last</b> by default.
<b>AC Power Recovery Delay</b>	Sets the time delay for the system to power up after AC power is restored to the system. This option is set to <b>Immediate</b> by default.
<b>User Defined Delay (60 s to 240 s)</b>	Sets the <b>User Defined Delay</b> option when the <b>User Defined</b> option for <b>AC Power Recovery Delay</b> is selected.
<b>UEFI Variable Access</b>	Provides varying degrees of securing UEFI variables. When set to <b>Standard</b> (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to <b>Controlled</b> , 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.
<b>Secure Boot</b>	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 <b>Disabled</b> by default.
<b>Secure Boot Policy</b>	When Secure Boot policy is set to <b>Standard</b> , the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to <b>Custom</b> , the BIOS uses the user-defined key and certificates. Secure Boot policy is set to <b>Standard</b> by default.
<b>Secure Boot Mode</b>	<p>Configures how the BIOS uses the Secure Boot Policy Objects (PK, KEK, db, dbx).</p> <p>If the current mode is set to <b>Deployed Mode</b>, the available options are <b>User Mode</b> and <b>Deployed Mode</b>. If the current mode is set to <b>User Mode</b>, the available options are <b>User Mode</b>, <b>Audit Mode</b>, and <b>Deployed Mode</b>.</p>

Option	Description								
	<table border="1"> <thead> <tr> <th>Options</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>User Mode</b></td> <td> <p>In <b>User Mode</b>, PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects.</p> <p>The BIOS allows unauthenticated programmatic transitions between modes.</p> </td> </tr> <tr> <td><b>Audit Mode</b></td> <td> <p>In <b>Audit mode</b>, PK is not present. The BIOS does not authenticate programmatic updates to the policy objects, and transitions between modes.</p> <p><b>Audit Mode</b> is useful for programmatically determining a working set of policy objects.</p> <p>BIOS performs signature verification on pre-boot images and logs results in the image Execution Information Table, but executes the images whether they pass or fail verification.</p> </td> </tr> <tr> <td><b>Deployed Mode</b></td> <td> <p><b>Deployed Mode</b> is the most secure mode. In <b>Deployed Mode</b>, PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects.</p> <p><b>Deployed Mode</b> restricts the programmatic mode transitions.</p> </td> </tr> </tbody> </table>	Options	Description	<b>User Mode</b>	<p>In <b>User Mode</b>, PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects.</p> <p>The BIOS allows unauthenticated programmatic transitions between modes.</p>	<b>Audit Mode</b>	<p>In <b>Audit mode</b>, PK is not present. The BIOS does not authenticate programmatic updates to the policy objects, and transitions between modes.</p> <p><b>Audit Mode</b> is useful for programmatically determining a working set of policy objects.</p> <p>BIOS performs signature verification on pre-boot images and logs results in the image Execution Information Table, but executes the images whether they pass or fail verification.</p>	<b>Deployed Mode</b>	<p><b>Deployed Mode</b> is the most secure mode. In <b>Deployed Mode</b>, PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects.</p> <p><b>Deployed Mode</b> restricts the programmatic mode transitions.</p>
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<b>Secure Boot Policy Summary</b>	Specifies the list of certificates and hashes that secure boot uses to authenticate images.								
<b>Secure Boot Custom Policy Settings</b>	Configures the Secure Boot Custom Policy. To enable this option, set the Secure Boot Policy to <b>Custom</b> option.								

## Creating a system and setup password

### Prerequisite

Ensure that the password jumper is enabled. The password jumper enables or disables the system password and setup password features. For more information, see [System board jumpers and connectors](#).

**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

- To enter System Setup, press F2 immediately after turning on or rebooting your system.
- On the **System Setup Main Menu** screen, click **System BIOS > System Security**.
- On the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
- In the **System Password** field, type your system password, and press Enter or Tab.
 

Use the following guidelines to assign the system password: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.
- Reenter the system password, and click **OK**.
- 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 step

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

### Prerequisite

**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 [System Security Settings details](#).
- 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

You can use the **Redundant OS Control** screen to set the redundant OS info for redundant OS control. It enables you to set up a physical recovery disk on your system.

## Viewing Redundant OS Control

To view the **Redundant OS Control** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:

```
F2 = System Setup
```

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

- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Redundant OS Control**.

## Redundant OS Control screen details

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The **Redundant OS Control** screen details are explained as follows:

Option	Description
<b>Redundant OS Location</b>	Enables you to select a backup disk from the following devices: <ul style="list-style-type: none"><li>• <b>None</b></li><li>• <b>IDSDM</b></li><li>• <b>SATA Ports in AHCI mode</b></li><li>• <b>BOSS PCIe Cards (Internal M.2 Drives)</b></li><li>• <b>Internal USB</b></li></ul>

**NOTE:** RAID configurations and NVMe cards are not included as BIOS does not have the ability to distinguish between individual drives in those configurations.

Option	Description
<b>Redundant OS State</b>	<p><b>NOTE:</b> This option is disabled if <b>Redundant OS Location</b> is set to <b>None</b>.</p> <p>When set to <b>Visible</b>, the backup disk is visible to the boot list and OS. When set to <b>Hidden</b>, the backup disk is disabled and is not visible to the boot list and OS. This option is set to <b>Visible</b> by default.</p> <p><b>NOTE:</b> BIOS disables the device in hardware, so it cannot be accessed by the OS.</p>
<b>Redundant OS Boot</b>	<p><b>NOTE:</b> This option is disabled if <b>Redundant OS Location</b> is set to <b>None</b> or if <b>Redundant OS State</b> is set to <b>Hidden</b>.</p> <p>When set to <b>Enabled</b>, BIOS boots to the device specified in <b>Redundant OS Location</b>. When set to <b>Disabled</b>, BIOS preserves the current boot list settings. This option is set to <b>Enabled</b> by default.</p>

## Miscellaneous Settings

You can use the **Miscellaneous Settings** screen to perform specific functions such as updating the asset tag and changing the system date and time.

### Viewing Miscellaneous Settings

To view the **Miscellaneous Settings** screen, perform the following steps:

- 1 Turn on, or restart your system.
- 2 Press F2 immediately after you see the following message:  

```
F2 = System Setup
```

**NOTE:** If your operating system begins to load before you press F2, wait for the system to finish booting, and then restart your system and try again.
- 3 On the **System Setup Main Menu** screen, click **System BIOS**.
- 4 On the **System BIOS** screen, click **Miscellaneous Settings**.

### Miscellaneous Settings details

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

The **Miscellaneous Settings** screen details are explained as follows:

Option	Description
<b>System Time</b>	Enables you to set the time on the system.
<b>System Date</b>	Enables you to set the date on the system.
<b>Asset Tag</b>	Specifies the asset tag and enables you to modify it for security and tracking purposes.
<b>Keyboard NumLock</b>	Enables you to set whether the system boots with the NumLock enabled or disabled. This option is set to <b>On</b> by default.  <b>NOTE:</b> This option does not apply to 84-key keyboards.
<b>F1/F2 Prompt on Error</b>	Enables or disables the F1/F2 prompt on error. This option is set to <b>Enabled</b> by default. The F1/F2 prompt also includes keyboard errors.

Option	Description
<b>Load Legacy Video Option ROM</b>	Enables you to determine whether the system BIOS loads the legacy video (INT 10H) option ROM from the video controller. Selecting <b>Enabled</b> in the operating system does not support UEFI video output standards. This field is available only for UEFI boot mode. You cannot set the option to <b>Enabled</b> if <b>UEFI Secure Boot</b> mode is enabled.
<b>Dell Wyse P25/P45 BIOS Access</b>	Enables or disables the Dell Wyse P25/P45 BIOS Access. This option is set to <b>Enabled</b> by default.
<b>Power Cycle Request</b>	Enables or disables the Power Cycle Request. This option is set to <b>None</b> 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.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

**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 [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Device Settings

**Device Settings** enables you to configure device parameters.

## 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.

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

## Embedded systems management

The Dell Lifecycle Controller provides advanced embedded systems management throughout the system's lifecycle. The Dell Lifecycle Controller can be started during the boot sequence and can function 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 [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Boot Manager

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

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

# Viewing Boot Manager

## About this task

To enter Boot Manager:

### Steps

- 1 Turn on, or restart your system.
- 2 Press F11 when you see the following message:  
F11 = Boot Manager

If your operating system begins to load before you press F11, allow the system to complete the booting, and then restart your system and try again.

## Boot Manager main menu

**NOTE:** The XC Series Appliance and XC Core System does not support the NVDIMM-N, RAID, or UEFI settings.

Menu item	Description
<b>Continue Normal Boot</b>	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.
<b>One-shot Boot Menu</b>	Enables you to access boot menu, where you can select a one-time boot device to boot from.
<b>Launch System Setup</b>	Enables you to access System Setup.
<b>Launch Lifecycle Controller</b>	Exits the Boot Manager and invokes the Dell Lifecycle Controller program.
<b>System Utilities</b>	Enables you to launch System Utilities menu such as System Diagnostics and UEFI shell.

## One-shot BIOS boot menu

**One-shot BIOS boot menu** enables you to select a boot device to boot from.

## System Utilities

**System Utilities** contains the following utilities that can be launched:

- 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 allow managing of network devices.

# Installing and removing system components

This section provides information about installing and removing the XC940 Series components.

Topics:

- Safety instructions
- Before working inside your system
- After working inside your system
- Recommended tools
- Optional front bezel
- System cover
- Inside the system
- Air shroud
- Cooling fans
- Fan cage
- Intrusion switch
- Drives
- Hard drive backplane
- System memory
- Expansion cards and expansion card risers
- Network daughter card
- Storage controller card
- IDSDM
- Power supply unit
- System battery
- Trusted Platform Module

## Safety instructions

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

# Before working inside your system

## Prerequisite

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

## Steps

- 1 Turn off the system, including all attached peripherals.
- 2 Disconnect the system from the electrical outlet and disconnect the peripherals.
- 3 Remove the system cover.

# After working inside your system

## Prerequisite

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

## Steps

- 1 Install the system cover.
- 2 Reconnect the peripherals and connect the system to the electrical outlet.
- 3 Turn on the attached peripherals and then turn 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 #T30 screwdriver
- Torx #T8 screwdriver
- Wrist grounding strap

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

# Optional front bezel

The front bezel is attached to the front of the system to prevent unauthorized access to the system peripherals. The front bezel can be locked for additional security.

# Removing the optional front bezel

## Prerequisite

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

## Steps

- 1 Unlock the bezel by using the bezel key.
- 2 Press the release button, and pull the left end of the bezel.
- 3 Unhook the right end, and remove the bezel.

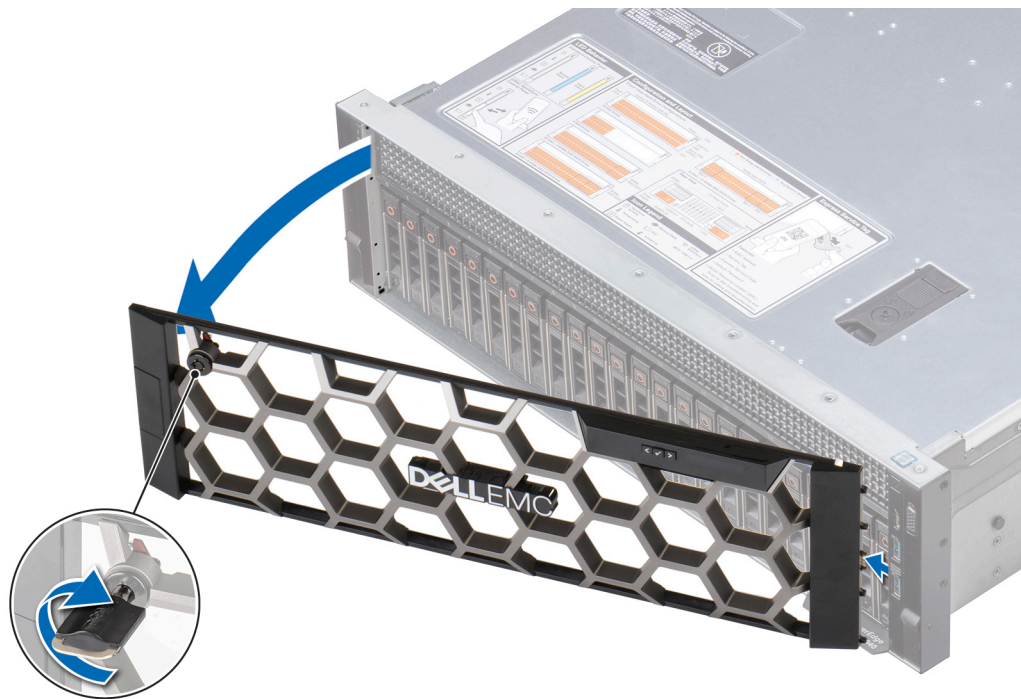


Figure 13. Removing the optional front bezel with the LCD panel

## Installing the optional front bezel

### Prerequisite

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

### Steps

- 1 Locate and remove the bezel key.
  - ⓘ **NOTE: The bezel key is part of the LCD bezel package.**
- 2 Align and insert the right end of the bezel onto the system.
- 3 Press the release button and fit the left end of the bezel onto the system.
- 4 Lock the bezel by using the key.

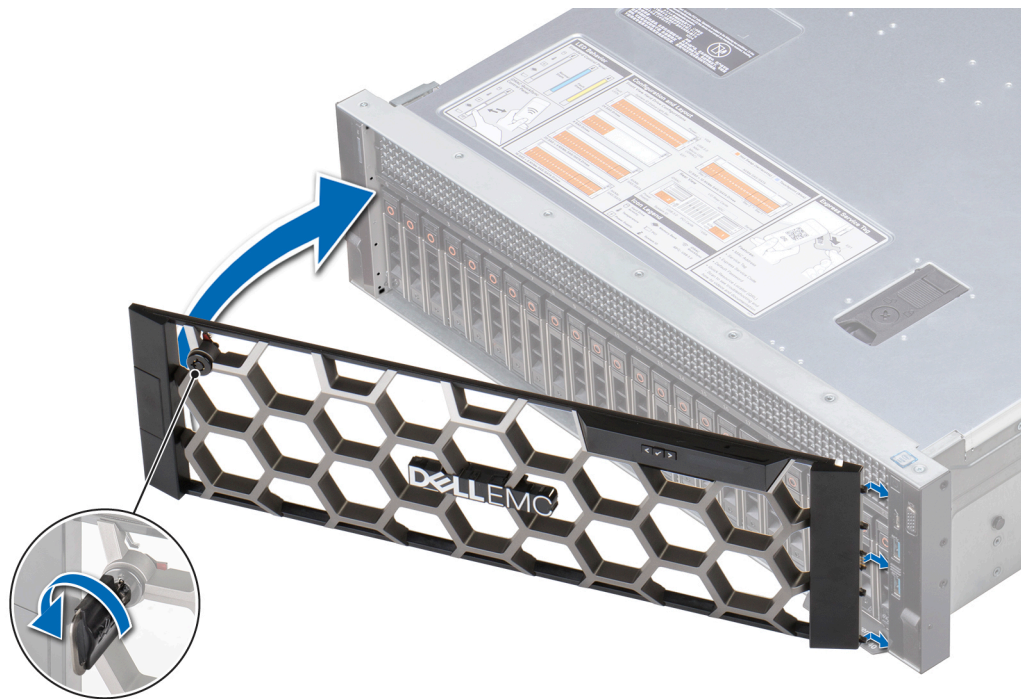


Figure 14. Installing the optional front bezel with the LCD panel

## System cover

System cover provides security for the entire system and also helps in maintaining proper air flow inside the system.

## Removing the system cover

### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Turn off the system, including any attached peripherals.
- 3 Disconnect the system from the electrical outlet and disconnect the peripherals.

### Steps

- 1 Using a 1/4 inch flat head or a Phillips #2 screwdriver, rotate the latch release lock counter clockwise to the unlocked position.
- 2 Lift the latch till the system cover slides back and the tabs on the system cover disengage from the guide slots on the system.
- 3 Hold the cover on both sides, and lift the cover away from the system.



Figure 15. Removing the system cover

## Installing the system cover

### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Ensure that all internal cables are routed correctly and connected, 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 system.
- 2 Push the system cover latch down.  
The system cover slides forward, the tabs on the system cover engage with the guide slots on the system and the system cover latch locks into place.
- 3 Using a 1/4 inch flat head or Phillips #2 screwdriver, rotate the latch release lock clockwise to the locked position.



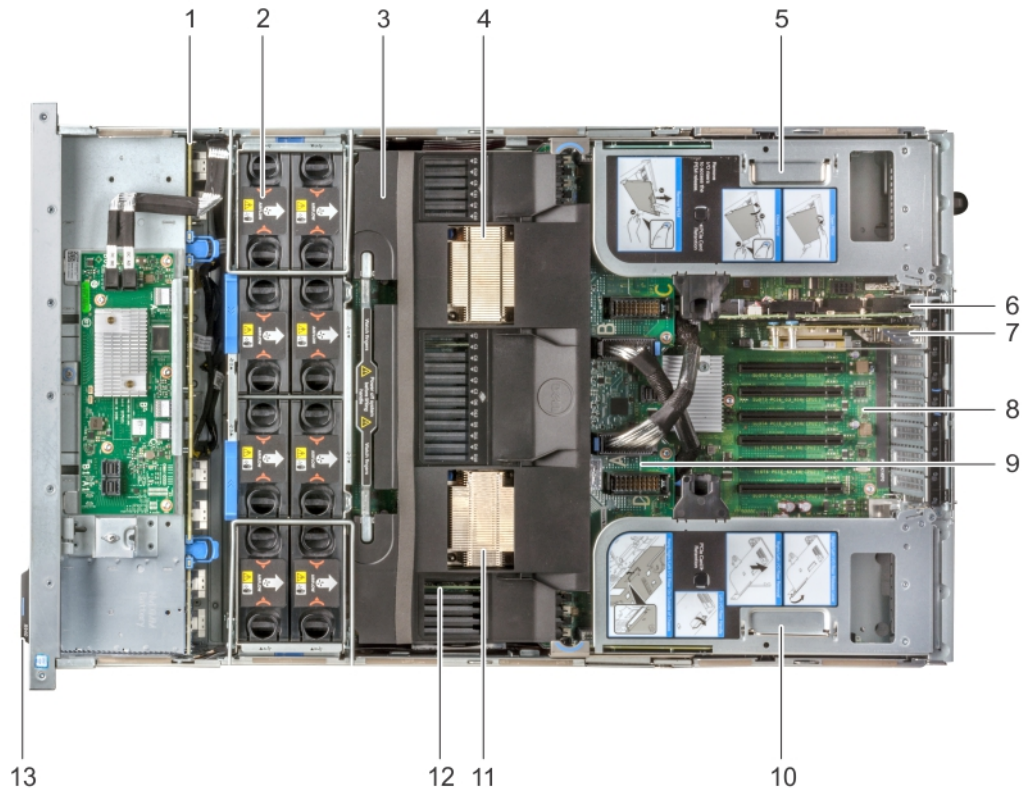
Figure 16. Installing the system cover

#### Next steps

- 1 Reconnect the peripherals and connect the system to the electrical outlet.
- 2 Turn on the system, including any attached peripherals.

## Inside the system

**⚠ 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.



**Figure 17. Inside the system — Four processor system with processor expansion module (PEM)**

- |    |  |    |                            |
|----|--|----|----------------------------|
| 1  | hard drive/SSD backplane with expander board | 2  | cooling fan (8)            |
| 3  | air shroud                                   | 4  | heat sink (CPU3)           |
| 5  | left expansion card riser                    | 6  | storage controller card    |
| 7  | network daughter card riser                  | 8  | system board               |
| 9  | processor expansion module (PEM)             | 10 | right expansion card riser |
| 11 | heat sink (CPU4)                             | 12 | memory module (48)         |
| 13 | information tag                              |    |                            |

## Air shroud

The air shroud directs the airflow across the entire system. Air shroud prevents the system from overheating and is used to maintain uniform airflow inside the system.

## Removing the air shroud

### Prerequisites

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

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

## Step

To remove the air shroud from a four processor configuration system:

- Remove the expansion card risers. See [Removing the expansion card riser](#).
- Hook the expansion card riser on the side of the system by using the I/O riser handle on the expansion card riser.

**CAUTION:** To avoid damage to the PCIe cables connected to the NVMe cards installed in the expansion card riser, ensure that you hook the riser to the system using the I/O riser handle.

- Hold the shroud at both ends and lift it away from the system.

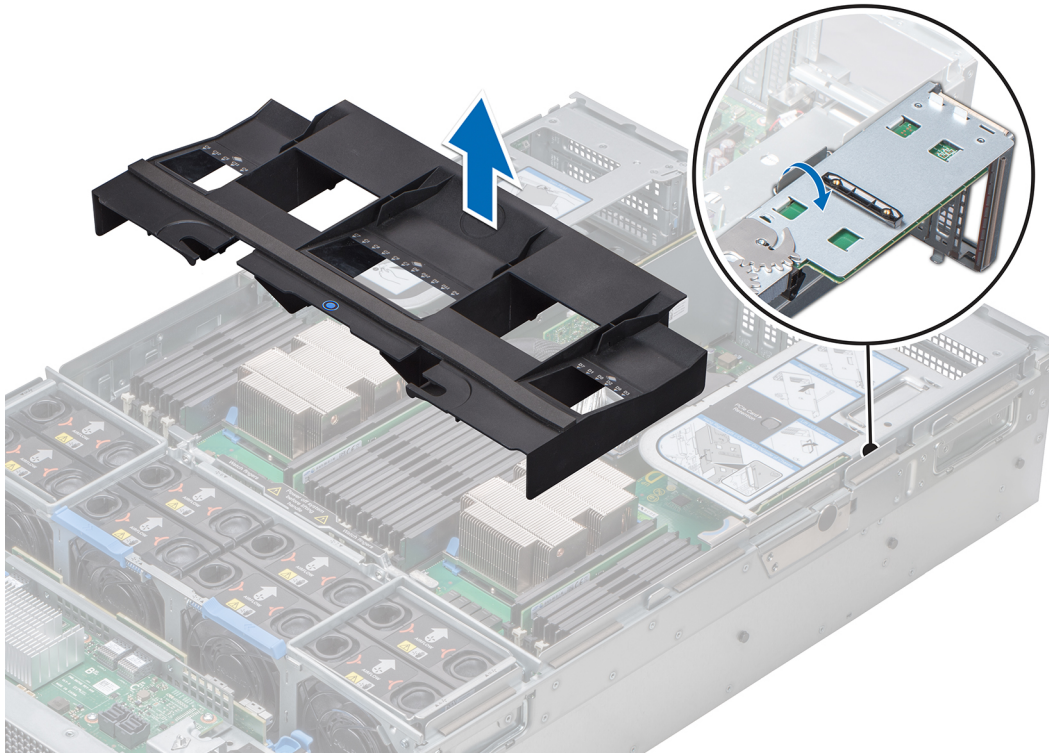


Figure 18. Removing the air shroud — Four processor system

## Next step

Install the [air shroud](#).

# Installing the air shroud

## Prerequisite

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

## Step

To install the air shroud in a four processor configuration system:

- Align the slots on the air shroud with the tabs on the processor expansion module (PEM) handle.
- Lower the air shroud into the system until it is firmly seated.  
When firmly seated, the memory socket numbers marked on the air shroud align with the memory sockets on the PEM.
- Press the blue touch point to ensure that the air shroud is seated firmly.
- Unhook the expansion card riser from the side of the system.
- Install the expansion card risers. See [Installing the expansion card riser](#).

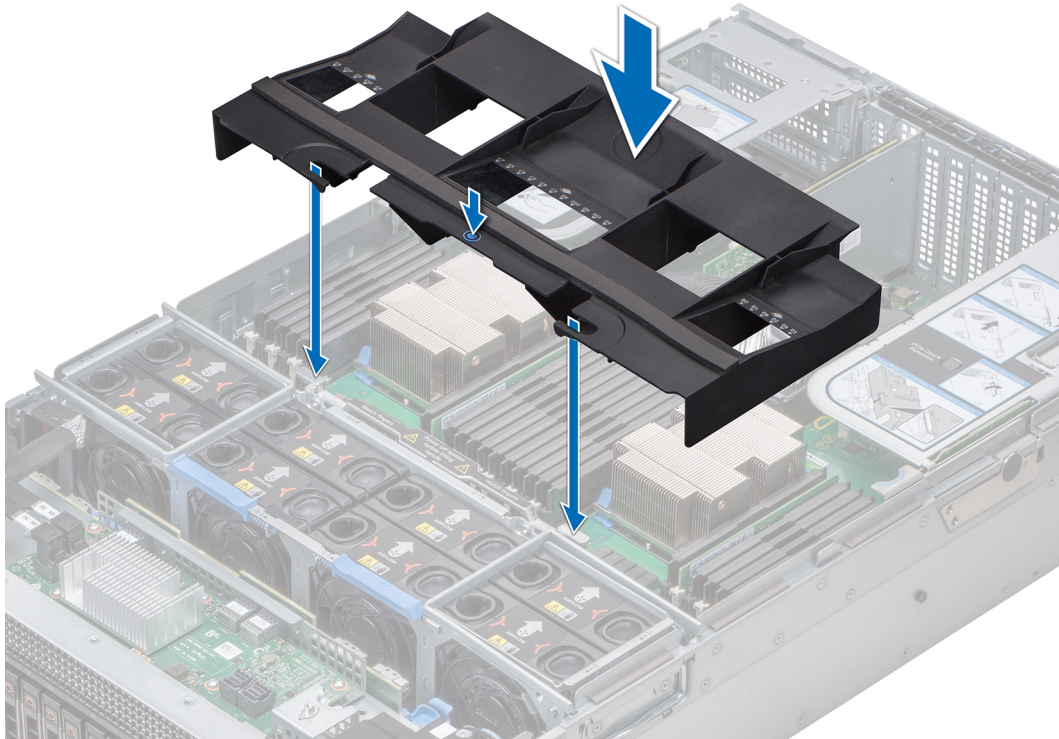


Figure 19. Installing the air shroud — Four processor system

#### Next step

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

## Cooling fans

The cooling fans are integrated into the system to dissipate the heat generated by the functioning of the system. These fans provide cooling for the processors, expansion cards, and memory modules.

**NOTE:** Your system supports up to eight standard or high performance hot swappable cooling fans.

## Removing the cooling fan

#### Prerequisites

**WARNING:** Do not drop the fan into the fan cage while removing or installing the fan as this may cause damage to the connectors on the fan tray. Exercise utmost care while removing or installing cooling fans.

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Remove the system cover.

#### Step

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

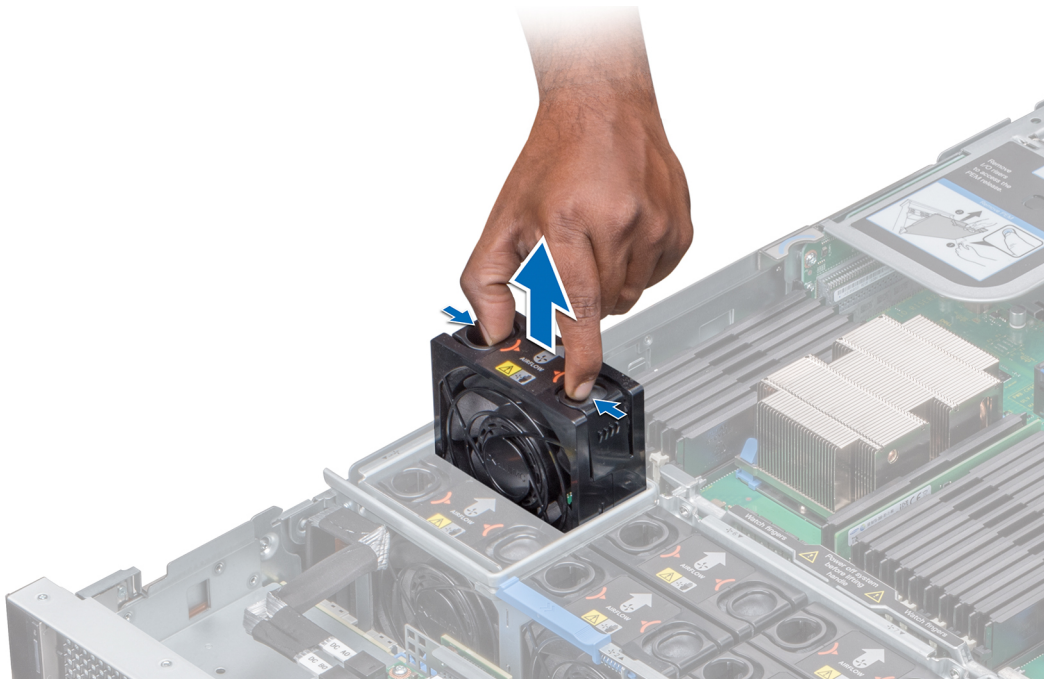


Figure 20. Removing the cooling fan

#### Next step

If applicable, install the cooling fan.

## Installing the cooling fan

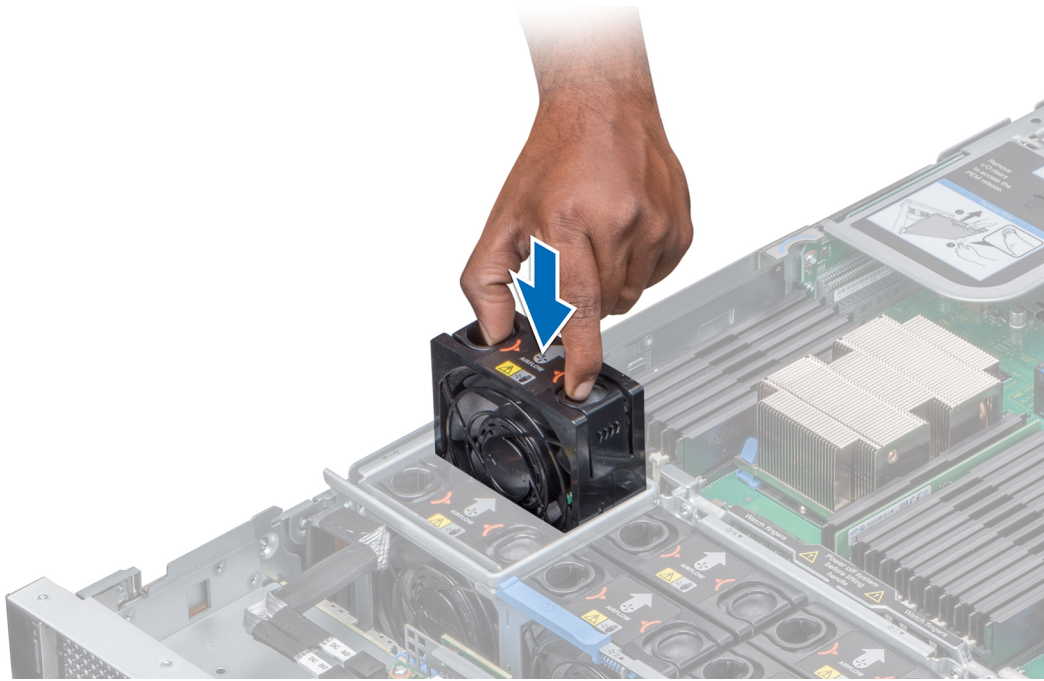
#### Prerequisite

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

**⚠ WARNING:** Do not drop the fan into the fan cage while removing or installing the fan as this may cause damage to the connectors on the fan tray. Exercise utmost care while removing or installing cooling fans.

#### Steps

- 1 Holding the release tabs, insert the cooling fan into the fan cage with the arrow marked on the fan pointing towards the back of the system.
- 2 Lower the cooling fan to connect the connector on the fan to the connector on the fan tray.



**Figure 21. Installing the cooling fan**

#### **Next step**

- 1 Install the system cover.

## **Fan cage**

The sections below contains information about the removal and installation of the fan cage and the fan tray.

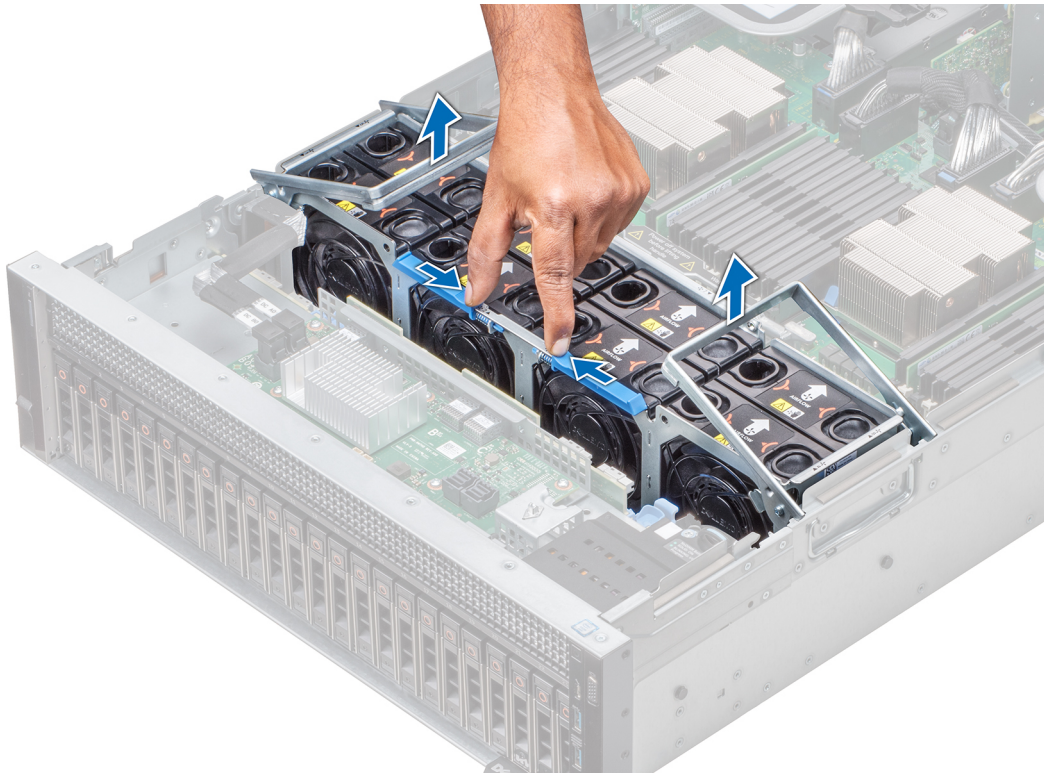
## **Removing the fan cage**

#### **Prerequisites**

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

#### **Steps**

- 1 Slide the fan cage locks in the direction of the arrow indicated on the locks.
- 2 Hold the cage handle and lift the cage out of the fan tray.



**Figure 22. Removing the fan cage**

**Next step**

If applicable, install the fan cage.

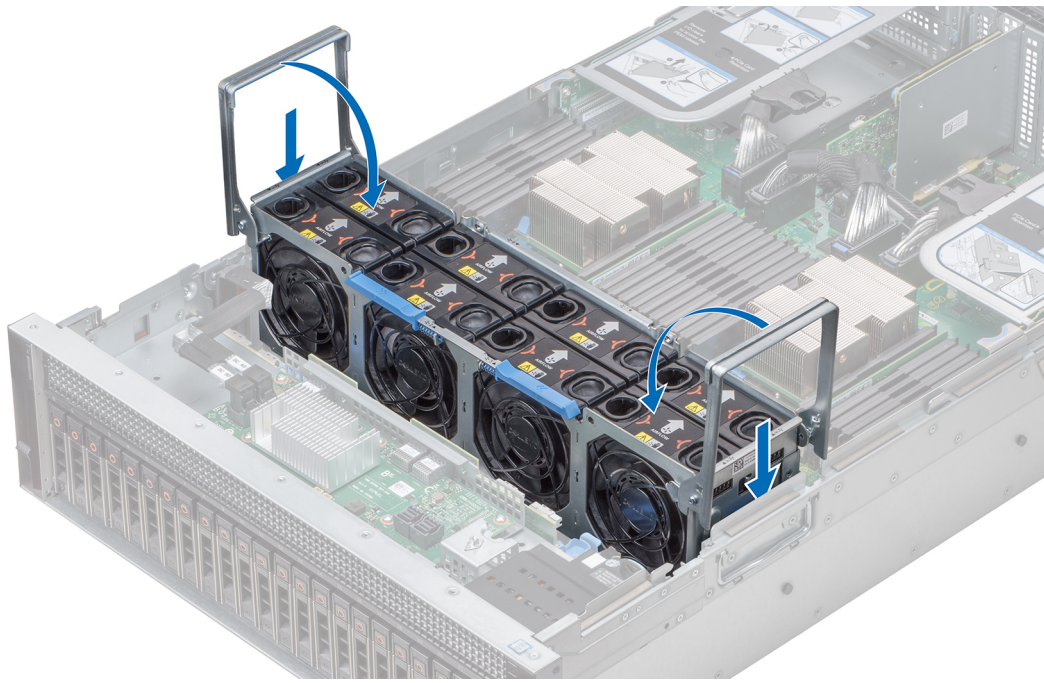
## Installing the fan cage

**Prerequisite**

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

**Steps**

- 1 Holding the cage handles, lower the cage into the fan tray.
- 2 Lower the cage handles until the handles lock into place.



**Figure 23. Installing the fan cage**

#### **Next step**

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

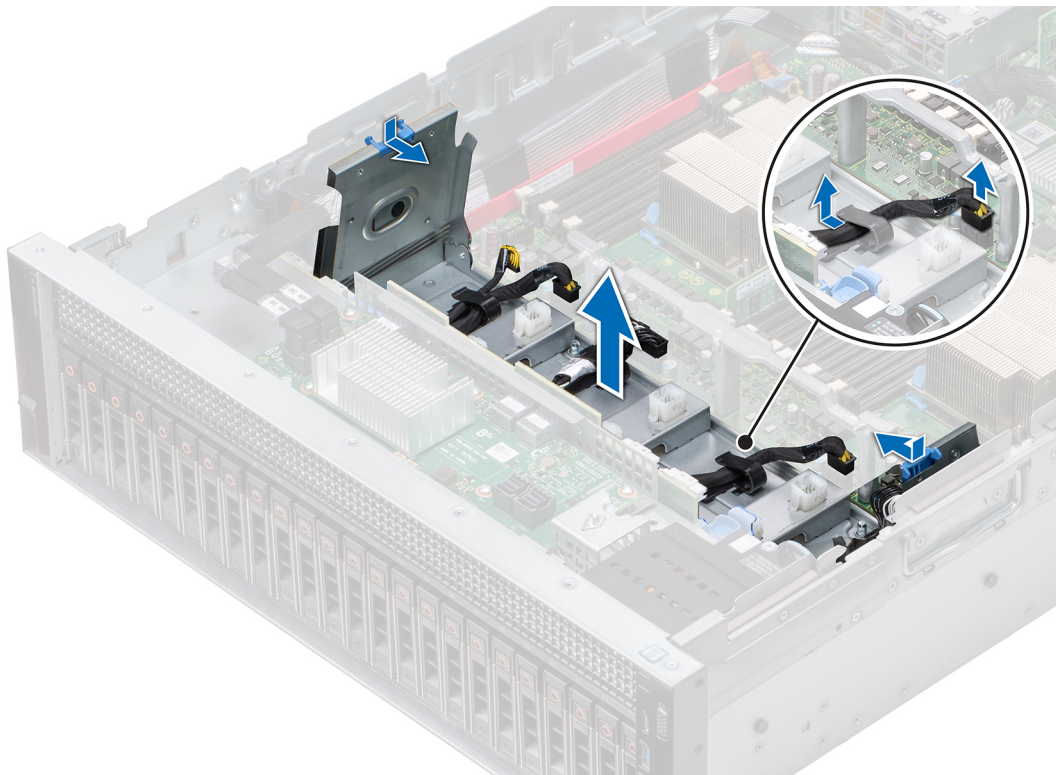
## **Removing the fan tray**

#### **Prerequisites**

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Remove the [air shroud](#).
- 4 Remove the [fan cage](#).
- 5 If installed, remove the [expansion card riser](#).
- 6 If applicable, lift the PEM by using the PEM handle until the PEM is in an upright position.
- 7 Release the backplane and fan power cables from the cable clips on the fan tray and disconnect the power cables from the connectors on the system board.

#### **Steps**

- 1 Press the blue release tabs on the side of the fan tray to unlock the tray.
- 2 Holding the fan tray lift the tray out of the system.



**Figure 24. Removing the fan tray**

**Next step**

If applicable, install the [fan tray](#).

## Installing the fan tray

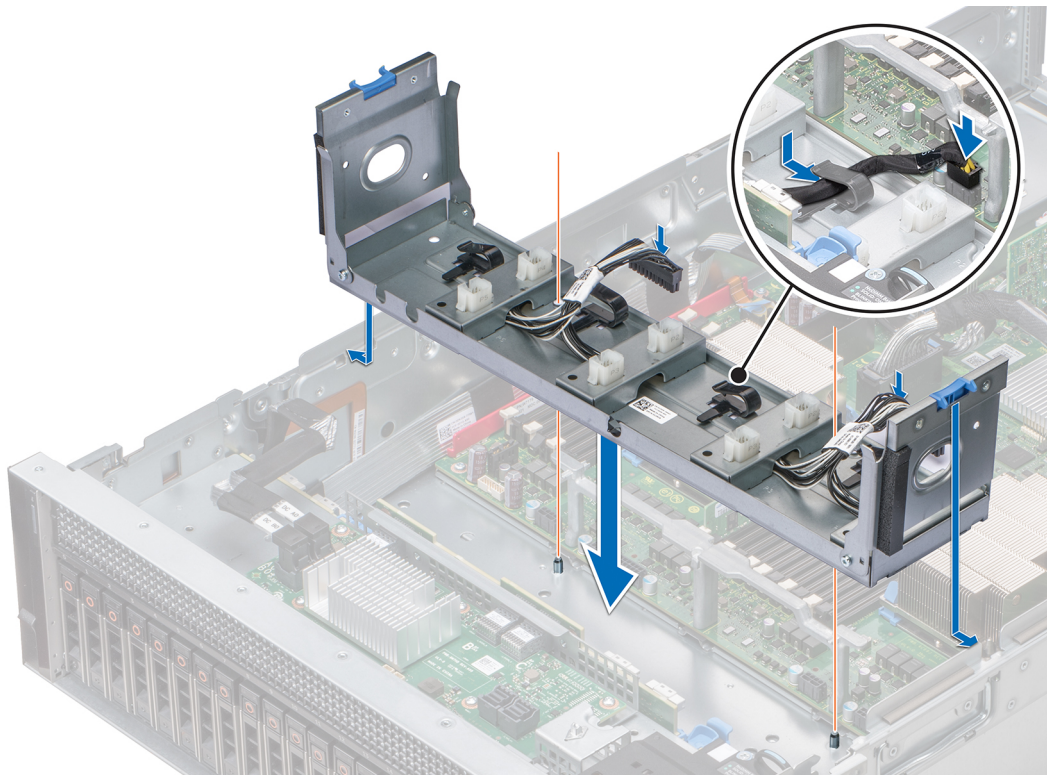
**Prerequisite**

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

**Steps**

- 1 Holding the fan tray, align the slots on the fan tray with the standoffs on the system.
- 2 Lower the fan tray into the system until the slots on the fan tray engage with the standoffs on the system.
- 3 Press the blue release tabs on the side of fan tray towards the side of the system until the tabs click in place.

**NOTE:** Ensure that you route the cables correctly against the side of the system.



**Figure 25. Installing the fan tray**

### Next steps

- 1 Route the fan power cables and the backplane cables through the cable clips on the fan tray and connect the cables to the connectors on the system board.
- 2 If applicable, lower the PEM by using PEM handle until the PEM clicks in place.
- 3 If removed, install the expansion card risers.
- 4 Install the [fan cage](#).
- 5 Install the [air shroud](#).
- 6 Follow the procedure listed in [After working inside your system](#).

## Intrusion switch

The chassis intrusion detection switch detects any intrusion into the system and creates a log entry in the system event log (SEL). This switch is activated when the cover of your system is removed.

## Removing an intrusion switch

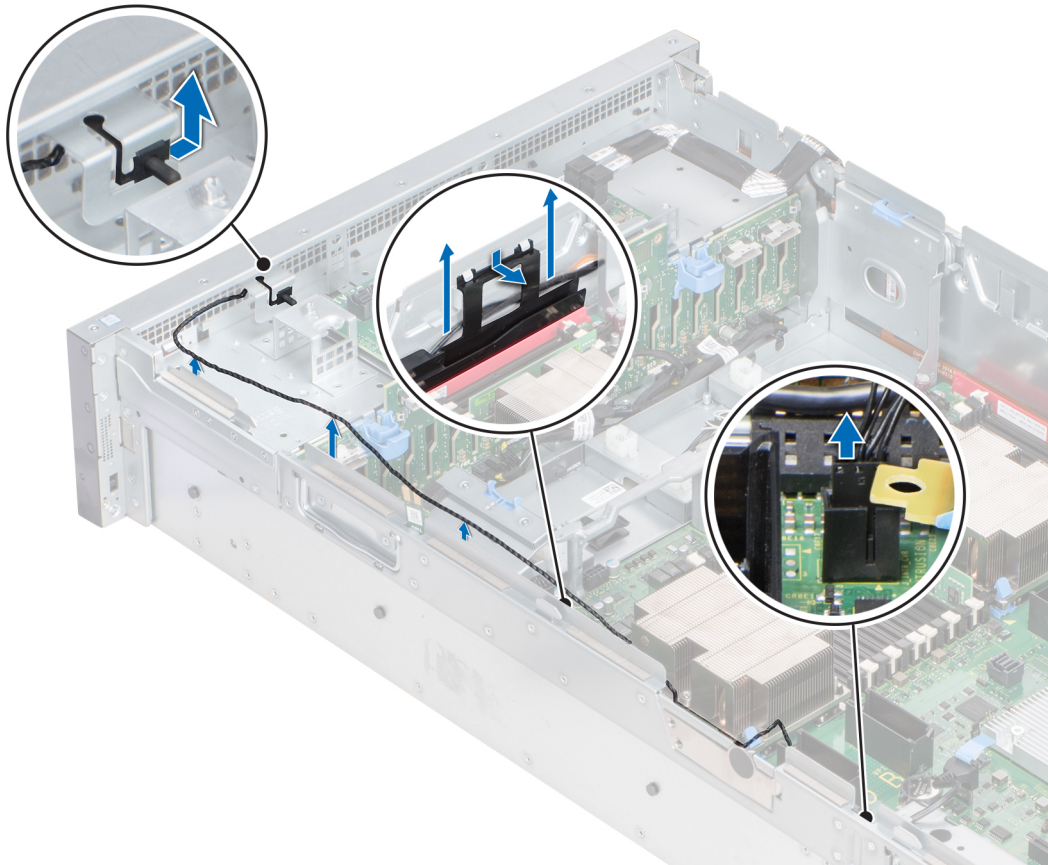
### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Remove the [fan cage](#).
- 4 Remove the [air shroud](#).
- 5 If applicable, remove the [Removing the expansion card riser](#).

- 6 Press the blue release tabs on the fan tray and lower the sides of the tray.
- 7 Disconnect the cable connected to the intrusion switch connector (INTRUSION) on the system board.

### Steps

- 1 Press the cable management bracket down until the tabs on the bracket disengage from the slots on the side of the system.
- 2 Lift the cable management bracket out of the system.
- 3 Press the tab on the intrusion switch cable connector and disconnect the cable connected to the intrusion switch connector (INTRUSION) on the system board.
- 4 Remove the cables routed through the cable routing hooks on the right side of the system.
- 5 Push the intrusion switch out of the intrusion switch slot.



**Figure 26. Removing an intrusion switch**

### Next step

Install an [intrusion switch](#).

## Installing an intrusion switch

### Prerequisite

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

### Steps

- 1 Slide the intrusion switch into the intrusion switch slot.
- 2 Route the cables through the cable routing hooks on the side of the system.
- 3 Lower the cable management bracket into the system.

- 4 Press the bracket and insert the tabs on the bracket into the slots on the right side of the system.
- 5 Connect the cable to the connector (INTRUSION) on the system board.

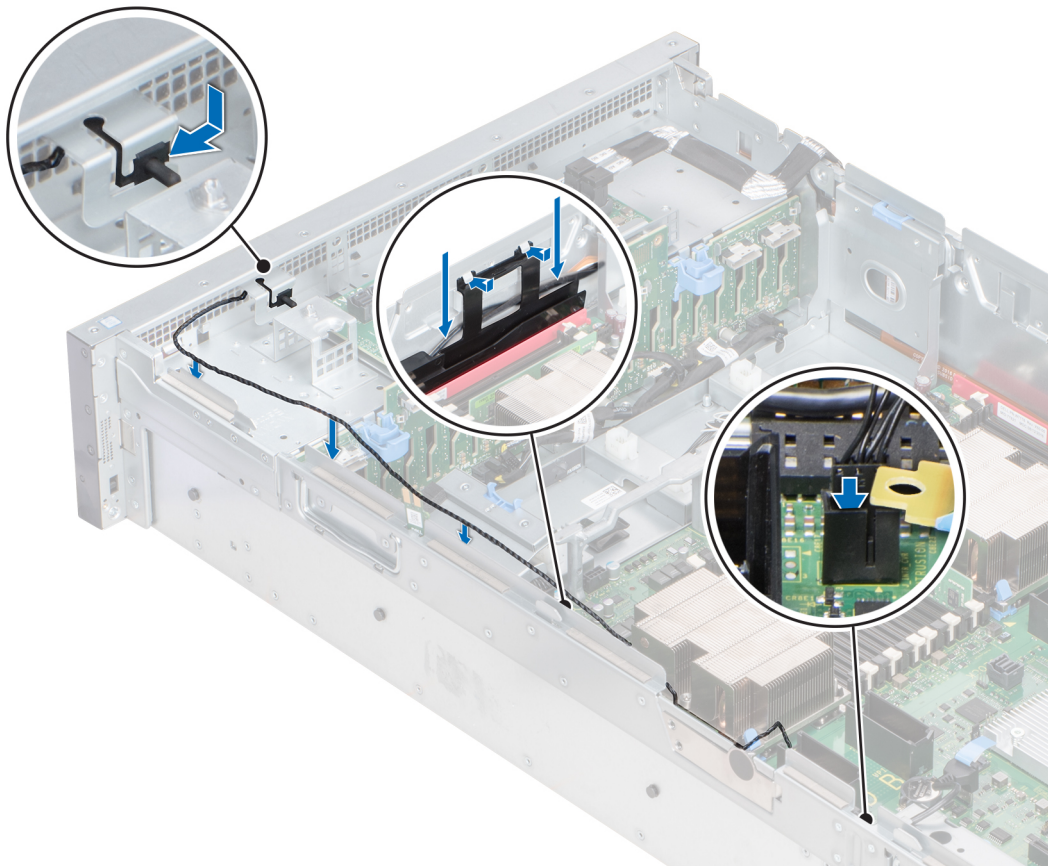


Figure 27. Installing an intrusion switch

### Next steps

- 1 Lift the sides of the fan tray until the blue release tabs click in place.
- 2 If applicable, install the [expansion card risers](#).
- 3 Install the [air shroud](#).
- 4 Install the [fan cage](#).
- 5 Follow the procedure listed in [After working inside your system](#).

## Drives

Drives are supplied in hot swappable drive carriers that fit in the drive slots.

**⚠ 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.

**⚠ CAUTION:** Do not turn off or restart your system while a drive is being formatted. Doing so can cause a drive failure.

When you format a drive, allow enough time for the formatting to complete. Be aware that high-capacity drives can take a long time to format.

This section contains information about the removal and installation of the hard-drive blank, hot-swappable hard drive, the removal and installation of the hard drive from the hard-drive carrier.

# Removing a drive blank

## Prerequisites

- 1 Follow the safety guidelines listed in [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 XC Series Appliance and XC Core System is not supported.

## Step

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

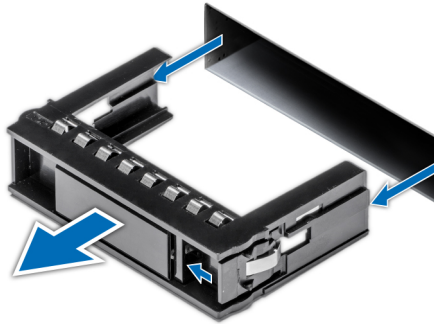


Figure 28. Removing a drive blank

## Next steps

- 1 Follow the procedure listed in [After working inside your system](#).
- 2 Install a drive or a drive blank.

# Installing a drive blank

The procedure for installing 2.5 inch and 3.5 inch drive blanks is identical.

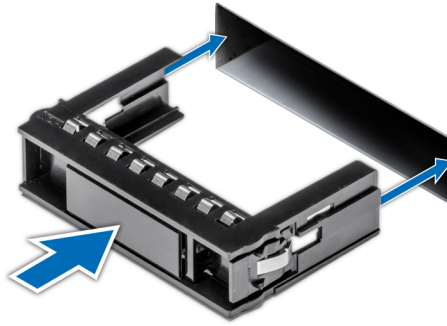
## Prerequisite

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

**△ | CAUTION:** Mixing drive blanks from previous generations of XC Series Appliance and XC Core System is not supported.

## About this task

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



**Figure 29. Installing a drive blank**

**Next step**

If removed, install the front bezel.

## Removing a drive carrier

**Prerequisites**

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 If applicable, remove the front bezel.
- 3 Using the management software, prepare the drive for removal.

If the drive is online, the green activity or fault indicator flashes while the drive is turning off. When the drive indicators are off, the drive is ready for removal. For more information, see the 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: Mixing drives from previous generations of XC Series Appliance and XC Core System is not supported.**

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

**Steps**

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



Figure 30. Removing a drive carrier

#### Next steps

- 1 Follow the procedure listed in [After working inside your system](#).
- 2 Install a drive carrier.
- 3 If you are not replacing the drive immediately, insert a drive blank in the empty drive slot to maintain proper system cooling.

## Installing a drive carrier

#### Prerequisites

- ⚠ **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:** Mixing drives from previous generations of XC Series Appliance and XC Core System is not supported.
- ⚠ **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.

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 If applicable, remove the drive blank.

#### Steps

- 1 Press the release button on the front of the drive carrier to open the release handle.
- 2 Insert the drive carrier into the drive slot and slide until the drive connects with the backplane.
- 3 Close the drive carrier release handle to lock the drive in place.



**Figure 31. Installing a drive carrier**

**Next step**

If applicable, install the front bezel.

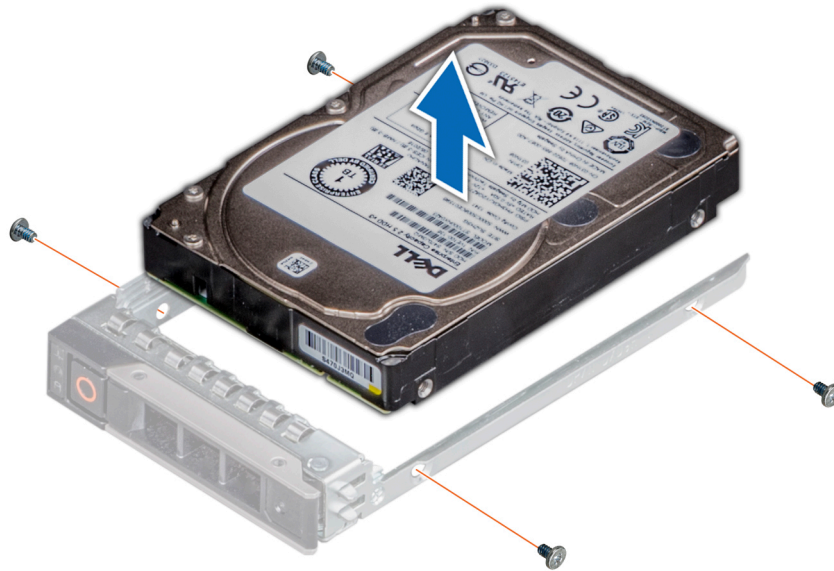
## Removing the drive from the drive carrier

**Prerequisite**

**⚠ CAUTION:** Mixing drives from previous generations of XC Series Appliance and XC Core System is not supported.

**Steps**

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



**Figure 32. Removing the drive from the drive carrier**

**Next step**

If applicable, install the drive into the drive carrier.

## Installing a drive into the drive carrier

**Prerequisites**

**⚠ CAUTION:** Mixing drive carriers from other generations of XC Series Appliance and XC Core System is not supported.

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

**Steps**

- 1 Insert the drive into the drive carrier with the connector end of the drive towards the back of the carrier.
- 2 Align the screw holes on the drive with the screws holes on the drive carrier.  
When aligned correctly, the back of the drive is flush with the back of the drive carrier.
- 3 Using the Phillips #1 screwdriver, secure the drive to the drive carrier with screws.



Figure 33. Installing a drive into the drive carrier

## Hard drive backplane

**NOTE:** NVMe drive slots are 20, 21, 22, and 23.

Drive slot numbering is 0 relative for chassis. All NVMe drives are installed in the last slots. Maximum of four NVMe drives are supported.

Your system supports 2.5 inch (x24) SAS/SATA backplane.

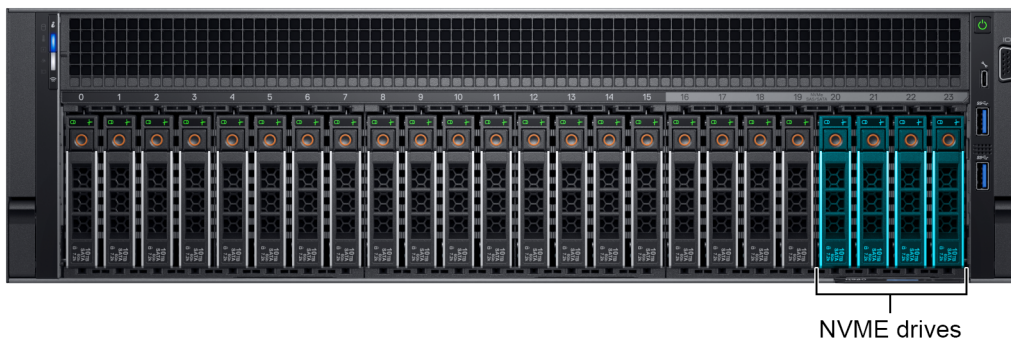


Figure 34. XC940-24

The settings for XC940-24 are listed here:

Table 37. Settings for XC940-24

Name	State	Slot Number	Size	Security Status	Bus Protocol	Media Type
PCIe SSD in Slot 20 in Bay 1	Ready	20	1490.42 GB	Not Applicable	PCIe	SSD
PCIe SSD in Slot 21 in Bay 1	Ready	21	1490.42 GB	Not Applicable	PCIe	SSD

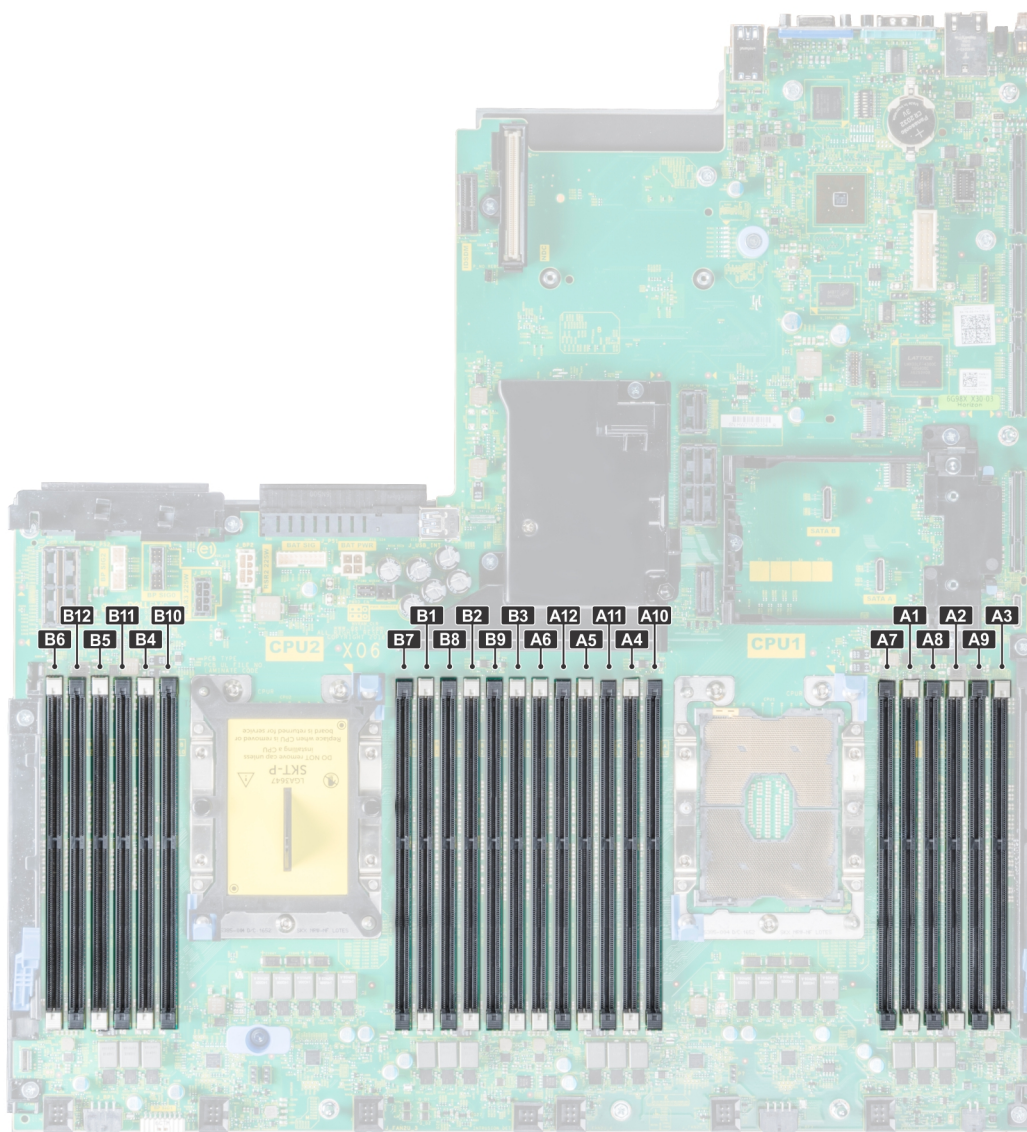
Name	State	Slot Number	Size	Security Status	Bus Protocol	Media Type
PCIe SSD in Slot 22 in Bay 1	Ready	22	1490.42 GB	Not Applicable	PCIe	SSD
PCIe SSD in Slot 23 in Bay 1	Ready	23	1490.42 GB	Not Applicable	PCIe	SSD

## System memory

### System memory guidelines

The system support DDR4 Registered DIMMs (RDIMMs), Load Reduced DIMMs (LRDIMMs), and Non-Volatile DIMMs (NVDIMM-Ns). System memory holds the instructions that are executed by the processor.

Your system contains 24 memory sockets split into two sets of 12 sockets, one set per processor. Each 12-socket set is organized into six channels. Six memory channels are allocated to each processor. In each channel, the release tabs of the first socket are marked white, and the second socket black.



**Figure 35. Memory socket locations**

Memory channels are organized as follows:

**Table 38. Memory channels**

Processor	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5
Processor 1	Slots A1 and A7	Slots A2 and A8	Slots A3 and A9	Slots A4 and A10	Slots A5 and A11	Slots A6 and A12
Processor 2	Slots B1 and B7	Slots B2 and B8	Slots B3 and B9	Slots B4 and B10	Slots B5 and B11	Slots B6 and B12

# 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.

Memory bus operating frequency can be 2666 MT/s, 2400 MT/s, or 2133 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.
- RDIMMs and LRDIMMs must not be mixed.
- NVDIMMs and LRDIMMs must not be mixed.
- NVDIMMs and RDIMMs can be mixed.
- 64 GB LRDIMMs that are DDP (Dual Die Package) LRDIMMs must not be mixed with 128 GB LRDIMMs that are TSV (Through Silicon Via/3DS) LRDIMMs.
- x4 and x8 DRAM based memory modules can be mixed.
- Up to two RDIMMs can be populated per channel regardless of rank count.
- Up to two LRDIMMs can be populated per channel regardless of rank count.
- A maximum of two different ranked DIMMs can be populated in a channel regardless of rank count.
- If memory modules with different speeds are installed, they will 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 A12 are available.
  - For dual-processor systems, sockets A1 to A12 and sockets B1 to B12 are available.
  - For quad-processor systems, sockets A1 to A12, sockets B1 to B12, sockets C1 to C12, and sockets D1 to D12 are available.
- For single-processor systems, sockets A1 to A12 are available.
- For dual-processor systems, sockets A1 to A12 and sockets B1 to B12 are available.
- Populate all the sockets with white release tabs first, followed by the black release tabs.
- When mixing memory modules with different capacities, populate the sockets with memory modules with the highest capacity first. For example, if you want to mix 8 GB and 16 GB memory modules, populate 16 GB memory modules in the sockets with white release tabs and 8 GB memory modules in the sockets with black release tabs.
- Memory modules of different capacities can be mixed provided other memory population rules are followed. For example, 8 GB and 16 GB memory modules can be mixed.
- 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.
- Mixing of more than two memory module capacities in a system is not supported.
- Unbalanced memory configurations will result in a performance loss so always populate memory channels identically with identical DIMMs for best performance.
- Populate six identical memory modules per processor (one DIMM per channel) at a time to maximize performance.

DIMM population update for Performance Optimized mode with quantity of 4 and 8 DIMMs per processor.

- When the DIMM quantity is 4, the population is slot 1, 2, 4, 5.

- When the DIMM quantity is 8, the population is slot 1, 2, 4, 5, 7, 8, 10, 11.

## Mode-specific guidelines

The configurations allowed depend on the memory mode selected in the System BIOS.

**Table 39. Memory operating modes**

Memory Operating Mode	Description
<b>Optimizer Mode</b>	The <b>Optimizer Mode</b> if enabled, the DRAM controllers operate independently in the 64-bit mode and provide optimized memory performance.
<b>Mirror Mode</b>	The <b>Mirror Mode</b> if enabled, the system maintains two identical copies of data in memory, and the total available system memory is one half of the total installed physical memory. Half of the installed memory is used to mirror the active memory modules. This feature provides maximum reliability and enables the system to continue running even during a catastrophic memory failure by switching over to the mirrored copy. The installation guidelines to enable Mirror Mode require that the memory modules be identical in size, speed, and technology, and they must be populated in sets of 6 per processor.
<b>Single Rank Spare Mode</b>	<b>Single Rank Spare Mode</b> allocates one rank per channel as a spare. If excessive correctable errors occur in a rank or channel, while the operating system is running, they are moved to the spare area to prevent errors from causing an uncorrectable failure. Requires two or more ranks to be populated in each channel.
<b>Multi Rank Spare Mode</b>	<p><b>Multi Rank Spare Mode</b> allocates two ranks per channel as a spare. If excessive correctable errors occur in a rank or channel, while the operating system is running, they are moved to the spare area to prevent errors from causing an uncorrectable failure. Requires three or more ranks to be populated in each channel.</p> <p>With single rank memory sparing enabled, the system memory available to the operating system is reduced by one rank per channel.</p> <p>For example, in a dual-processor configuration with 24x 16 GB dual-rank memory modules, the available system memory is: <math>\frac{3}{4}</math> (ranks/channel) <math>\times</math> 24 (memory modules) <math>\times</math> 16 GB = 288 GB, and not 24 (memory modules) <math>\times</math> 16 GB = 384 GB.</p> <p>For multi rank sparing, the multiplier changes to <math>\frac{1}{2}</math> (ranks/channel).</p> <p><b>NOTE:</b> To use memory sparing, this feature must be enabled in the BIOS menu of System Setup.</p> <p><b>NOTE:</b> Memory sparing does not offer protection against a multi-bit uncorrectable error.</p>
<b>Dell Fault Resilient Mode</b>	The <b>Dell Fault Resilient Mode</b> if enabled, the BIOS creates an area of memory that is fault resilient. This mode can be used by an OS that supports the feature to load critical applications or enables the OS kernel to maximize system availability.

# Optimizer Mode

This mode supports Single Device Data Correction (SDDC) only for memory modules that use x4 device width. It does not impose any specific slot population requirements.

- Dual processor: Populate the slots in round robin sequence starting with processor 1.

① | **NOTE: Processor 1 and processor 2 population should match.**

- Quad processor: Populate the slots in round robin sequence starting with processor 1.

① | **NOTE: Processor 1, processor 2, processor 3, and processor 4 population should match.**

**Table 40. 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	<ul style="list-style-type: none"> <li>• DIMMs must be populated in the order specified.</li> <li>• Odd number of DIMM population is allowed</li> </ul> <p>①   <b>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 DIMMs for best performance.</b></p> <ul style="list-style-type: none"> <li>• Optimizer population order is not traditional for 4 and 8 DIMM installations of single processor.                             <ul style="list-style-type: none"> <li>– For 4 DIMMs: A1, A2, A4, A5</li> <li>– For 8 DIMMs: A1, A2, A4, A5, A7, A8, A10, A11</li> </ul> </li> </ul>
	Mirror population order	{1, 2, 3, 4, 5, 6} {7, 8, 9, 10, 11, 12}	Mirroring is supported with 6 or 12 DIMMs per processor.
	Single rank sparing population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	<ul style="list-style-type: none"> <li>• DIMMs must be populated in the order specified.</li> <li>• Requires two ranks or more per channel.</li> </ul>
	Multi rank sparing population order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	<ul style="list-style-type: none"> <li>• DIMMs must be populated in the order specified.</li> <li>• Requires three ranks or more per channel.</li> </ul>
	Fault resilient population order	{1, 2, 3, 4, 5, 6} {7, 8, 9, 10, 11, 12}	Supported with 6 or 12 DIMMs per processor.
Dual processor (Start with processor1. processor1 and processor 2 population should match)	Optimized (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}	<p>Odd number of DIMM population per processor is allowed.</p> <p>①   <b>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 DIMMs for best performance.</b></p>

Processor	Configuration	Memory population	Memory population information
			<p>Optimizer population order is not traditional for 8 and 16 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> <li>For 8 DIMMs: A1, A2, A4, A5, B1, B2, B4, B5</li> <li>For 16 DIMMs: A1, A2, A4, A5, A7, A8, A10, A11 B1, B2, B4, B5, B7, B8, B10, B11</li> </ul>
	Mirroring population order	A{1, 2, 3, 4, 5, 6}, B{1, 2, 3, 4, 5, 6}, A{7, 8, 9, 10, 11, 12}, B{7, 8, 9, 10, 11, 12}	Mirroring is supported with 6 or 12 DIMMs per processor.
	Single rank sparing 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}	<ul style="list-style-type: none"> <li>DIMMs must be populated in the order specified.</li> <li>Requires two ranks or more per channel.</li> </ul>
	Multi rank sparing 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}	<ul style="list-style-type: none"> <li>DIMMs must be populated in the order specified.</li> <li>Requires three ranks or more per channel.</li> </ul>
	Fault resilient population order	A{1, 2, 3, 4, 5, 6}, B{1, 2, 3, 4, 5, 6}, A{7, 8, 9, 10, 11, 12}, B{7, 8, 9, 10, 11, 12}	Supported with 6 or 12 DIMMs per processor.
Quad processor (Starting with processor 1, and processor 1, processor 2, processor 3, and processor 4 population should match)	Optimized population order (Independent channel)	A{1}, B{1}, C{1}, D{1}, A{2}, B{2}, C{2}, D{2}, A{3}, B{3}, C{3}, D{3}, A{4}, B{4}, C{4}, D{4}	<p>Odd number of DIMM population per processor is allowed.</p> <p><b>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 DIMMs for best performance.</b></p> <p>Optimizer population order is not traditional for 16 and 32 DIMMs installations for dual processor.</p> <ul style="list-style-type: none"> <li>For 16 DIMMs: A1, A2, A4, A5, B1, B2, B4, B5, C1, C2, C4, C5, D1, D2, D4, D5</li> <li>For 32 DIMMs: A1, A2, A4, A5, A7, A8, A10, A11, B1, B2, B4, B5, B7, B8, B10, B11 C1, C2, C4, C5, C7, C8, C10, C11 D1, D2, D4, D5, D7, D8, D10, D11</li> </ul>

Processor	Configuration	Memory population	Memory population information
	Mirroring population order	A{1, 2, 3, 4, 5, 6}, B{1, 2, 3, 4, 5, 6}, C{1, 2, 3, 4, 5, 6}, D{1, 2, 3, 4, 5, 6} A{7, 8, 9, 10, 11, 12}, B{7, 8, 9, 10, 11, 12}, C{7, 8, 9, 10, 11, 12}, D{7, 8, 9, 10, 11, 12}	Mirroring is supported with 6 or 12 DIMM slots per processor.
	Single rank sparing population order	A{1}, B{1}, C{1}, D{1}, A{2}, B{2}, C{2}, D{2}, A{3}, B{3}, C{3}, D{3}, A{4}, B{4}, C{4}, D{4}	<ul style="list-style-type: none"> <li>• DIMMs must be populated in the order specified.</li> <li>• Requires two ranks or more per channel.</li> </ul>
	Multi rank spare population order	A{1}, B{1}, C{1}, D{1}, A{2}, B{2}, C{2}, D{2}, A{3}, B{3}, C{3}, D{3}, A{4}, B{4}, C{4}, D{4}	<ul style="list-style-type: none"> <li>• DIMMs must be populated in the order specified.</li> <li>• Requires three ranks or more per channel.</li> </ul>
	Fault resilient population order	A{1, 2, 3, 4, 5, 6}, B{1, 2, 3, 4, 5, 6}, C{1, 2, 3, 4, 5, 6}, D{1, 2, 3, 4, 5, 6} A{7, 8, 9, 10, 11, 12}, B{7, 8, 9, 10, 11, 12}, C{7, 8, 9, 10, 11, 12}, D{7, 8, 9, 10, 11, 12}	Supported with 6 or 12 DIMM slots per processor.

## Removing a memory module

Follow the below procedure for removing a DIMM module:

### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 If applicable, remove the air shroud.

**⚠ WARNING:** Allow the memory modules to cool after you power off the system. Handle the memory modules by the card edges and avoid touching the components or metallic contacts on the memory module.

**⚠ CAUTION:** To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. Remove memory module blanks only if you intend to install memory modules in those sockets.

### 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 Push the ejectors outward on both ends of the memory module socket to release the memory module from the socket.
- 3 Lift and remove the memory module from the system.

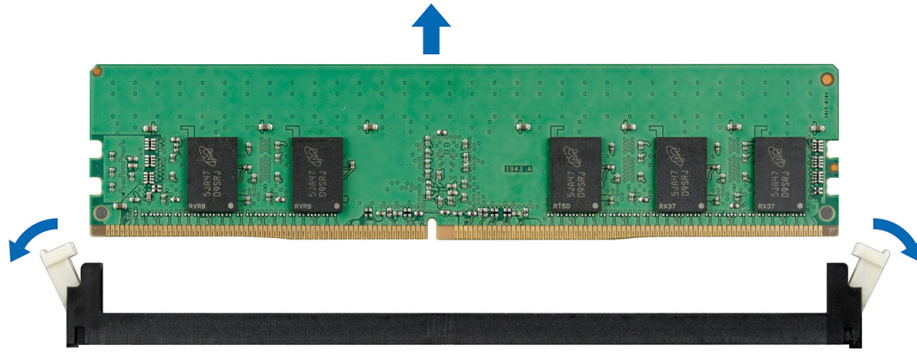


Figure 36. Removing a memory module

### Next steps

- 1 Install the memory module.
- 2 If you are removing the memory module permanently, install a memory module blank. The procedure to install a memory module blank is similar to that of the memory module.

## Installing a memory module

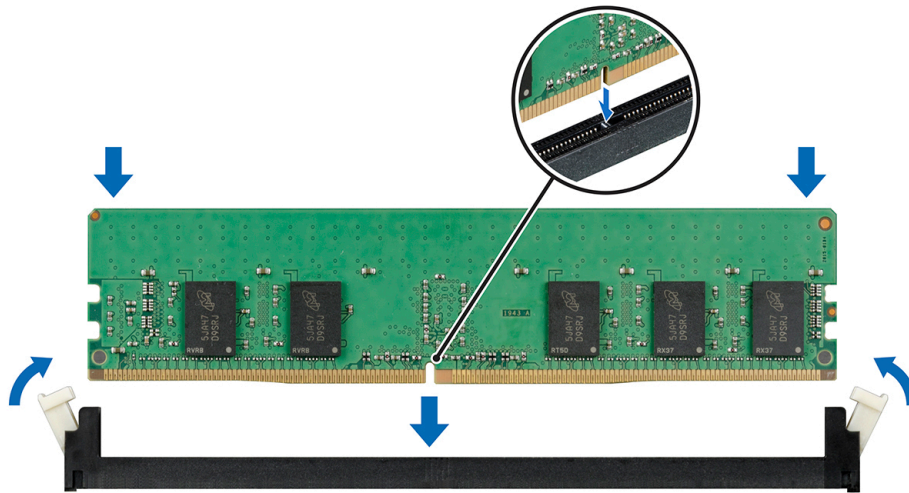
### Prerequisite

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

- ⚠ **CAUTION:** To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. Remove memory module blanks only if you intend to install memory modules in those sockets.

### 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.
  - ⚠ **CAUTION:** To prevent damage to the memory module or the memory module socket during installation, do not bend or flex the memory module. You must insert both ends of the memory module simultaneously.
- 2 Open the ejectors on the memory module socket outward to allow the memory module to be inserted into the socket.
- 3 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:** Do not apply pressure at the center of the memory module; apply pressure at both ends of the memory module evenly.
  - ℹ **NOTE:** The memory module socket has an alignment key that enables you to install the memory module in the socket in only one orientation.
- 4 Press the memory module with your thumbs until the socket levers firmly click into place.



**Figure 37. Installing a memory module**

**Next steps**

- 1 Install the air shroud.
- 2 Follow the procedure listed in [After working inside your system](#).
- 3 To verify if the memory module has been installed properly, press F2 and navigate to **System Setup Main Menu > System BIOS > Memory Settings**. In the **Memory Settings** screen, the System Memory Size must reflect the updated capacity of the installed memory.
- 4 If the value is incorrect, one or more of the memory modules may not be installed properly. Ensure that the memory module is firmly seated in the memory module socket.
- 5 Run the system memory test in system diagnostics.

## Expansion cards and expansion card risers

An expansion card in the system is an add-on card that can be inserted into an expansion slot on the system board or a slot on a riser card to add enhanced functionality to the system through the expansion bus.

**NOTE:** A System Event Log (SEL) event is logged if an expansion card riser is not supported or missing. It does not prevent your system from turning on. However, if F1/F2 pause occurs and an error message is displayed.

## Expansion card installation guidelines

Depending on your system configuration, the following PCI Express (PCIe) generation 3 expansion cards are supported:

**Table 41. Expansion card riser configurations**

Riser	PCIe slot on the expansion card riser	Processor connection	PCIe slots on riser (Height)	PCIe slots on riser (length)	Link width	Slot width
	Slot 8	Processor 3	full height	3/4 length	x16	x16
Riser 2 (IO_RISER2)	Slot 9	Processor 3	full height	half length	x16	x16
	Slot 10	Processor 3	full height	half length	x16	x16
Riser 3 (IO_RISER3)	Slot 11	Processor 4	full height	3/4 length	x16	x16

Riser	PCIe slot on the expansion card riser	Processor connection	PCIe slots on riser (Height)	PCIe slots on riser (length)	Link width	Slot width
	Slot 12	Processor 4	full height	half length	x16	x16
	Slot 13	Processor 4	full height	half length	x16	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.

**Table 42. Expansion card installation order — Four processor configuration**

Card type	Slot priority	Maximum number of cards
Internal storage adapter	1, 6	2
HBA 330	1	1
PCIe extender card	11, 12, 8	3
25 GB NIC (Mellanox)	11, 8, 3, 4, 12, 9, 2, 10, 13, 7, 6, 1, 5	8
1 GB NIC (Intel)	5, 1, 6, 11, 2, 4, 9, 12, 3, 10, 13	11
10 GB NIC dual port (Intel)	5, 1, 6, 11, 2, 4, 9, 12, 3, 10, 13	11
10 GB NIC SFP+ dual port (Mellanox)	11, 8, 3, 4, 12, 9, 2, 10, 13, 7, 6, 1, 5	8
10 GB NIC SFP+ (Intel)	5, 1, 6, 8, 11, 2, 4, 9, 12, 3, 7, 10, 13	13
10 GB NIC Quad port (Intel)	11, 10, 2, 4	4

## Removing the expansion card riser

### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Disconnect any cables connected to the expansion card.

### Steps

- 1 Lift the release lever until the connector on the riser disconnects from the connector on the processor expansion module (PEM).
- 2 Lift the riser away from the system.

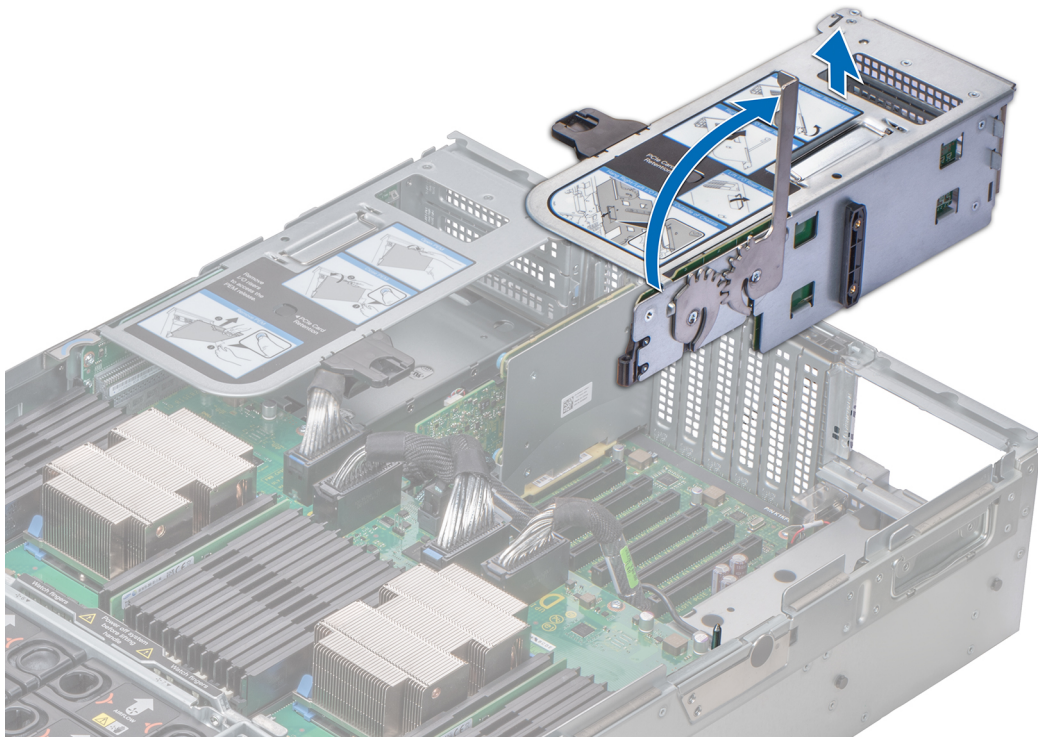


Figure 38. Removing expansion card riser (right)

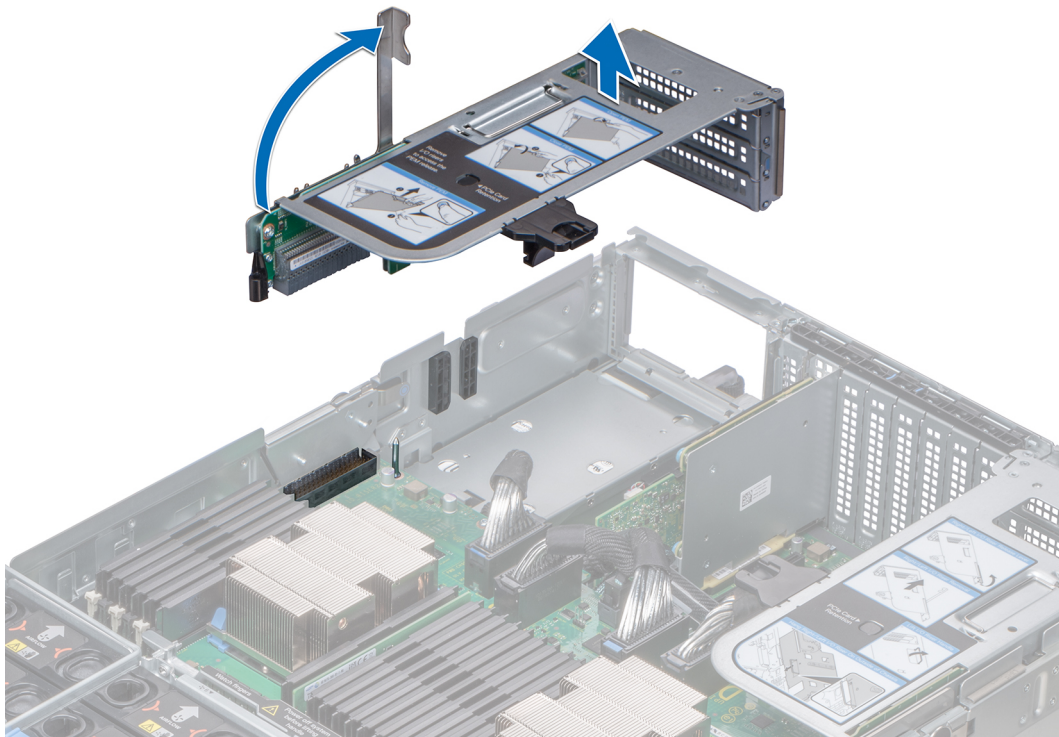


Figure 39. Removing expansion card riser (left)

### Next step

Install the expansion card riser.

## Installing the expansion card riser

### Prerequisite

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

### Steps

- 1 Align the guide rail on the side of the riser with the slot on the side of the chassis and lower the riser into the system.
- 2 Lower the release lever until the connector on the riser connects with the connector on the processor expansion module (PEM).

**CAUTION:** To avoid damage to the connectors on the PEM, you must only use the release levers to seat the expansion card risers firmly on the PEM.

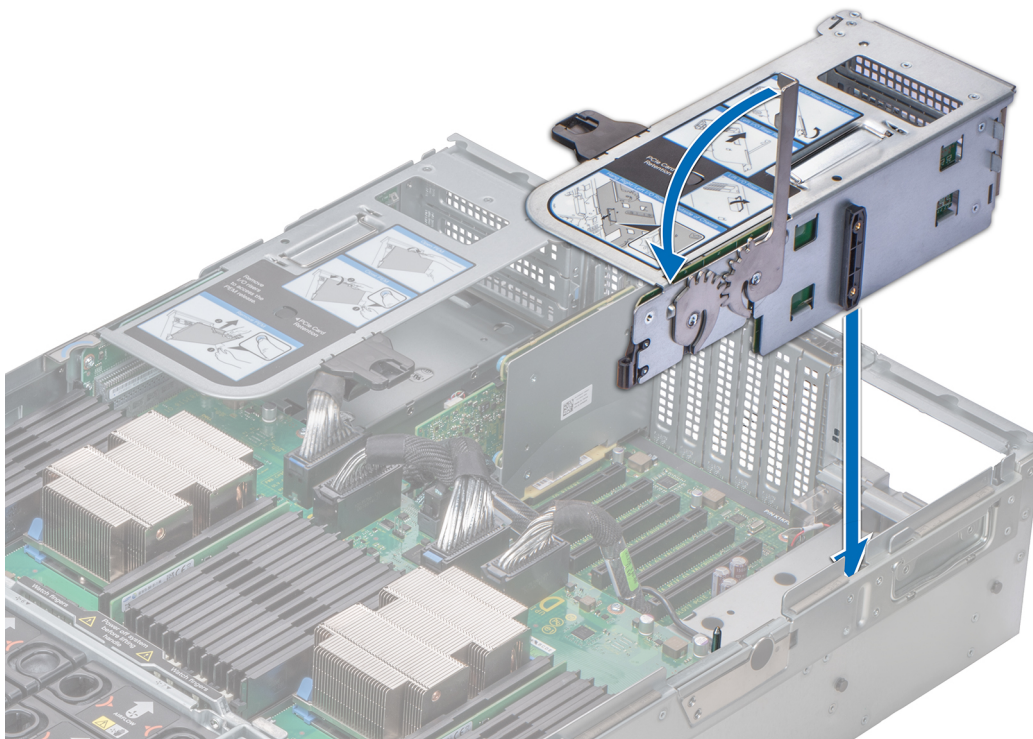


Figure 40. Installing expansion card riser (right)

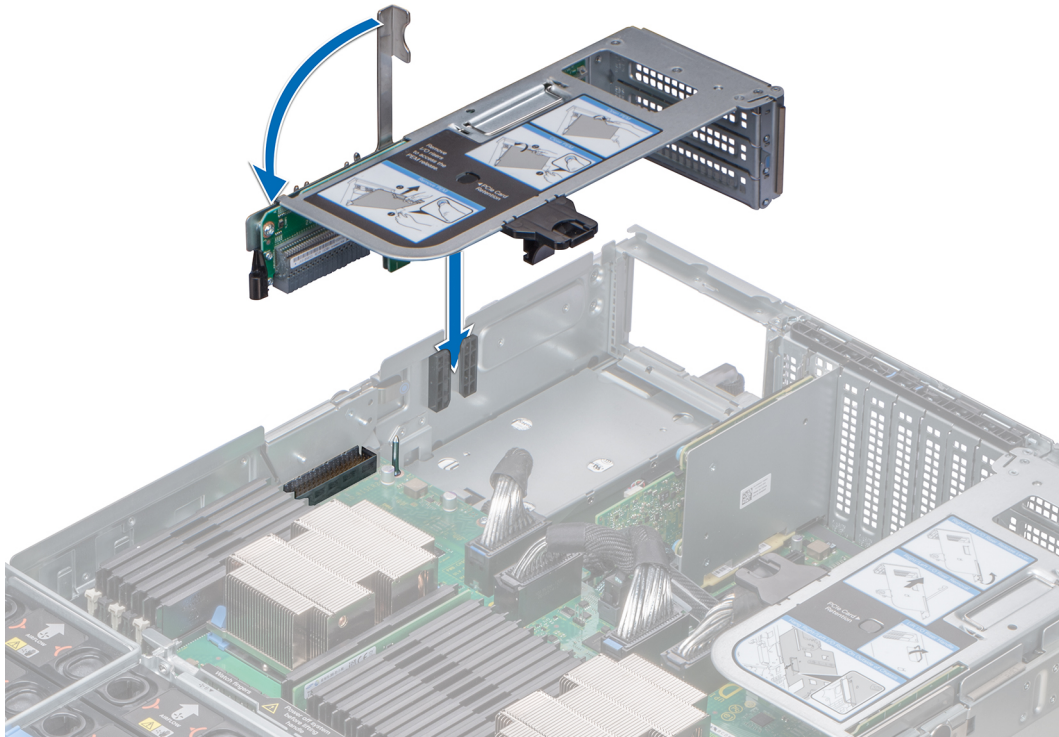


Figure 41. Installing expansion card riser (left)

#### Next steps

- 1 Connect the cables to the expansion card.
- 2 Follow the procedure listed in [After working inside your system](#).

## Removing the expansion card from expansion card riser

#### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Disconnect the cables from the expansion card.
- 4 Remove the expansion card riser.

#### Steps

- 1 Press the black tab on the expansion card riser and slide the PCIe retention bracket up.

**NOTE:** This step is applicable only if you are removing the expansion cards from the slots 12 and 13 of Riser 3 (IO\_RISER3) and slots 9 and 10 of Riser 2 (IO\_RISER2).

- 2 Lift the PCIe card latch.
- 3 Hold the expansion card by its edges, and lift the card out until the connector on the card disconnects from the connector on the riser.

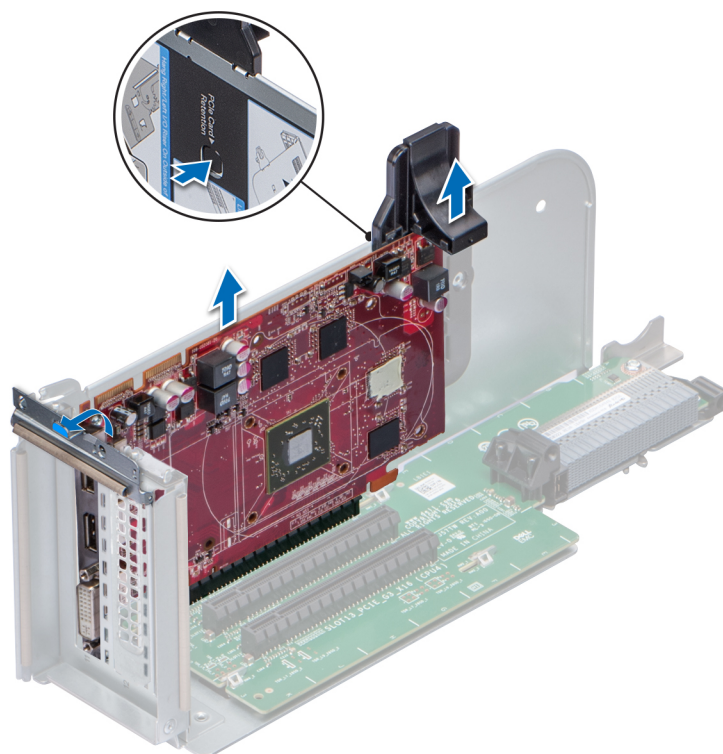


Figure 42. Removing the expansion card from expansion card riser

#### Next steps

- 1 Install the expansion card into expansion card riser.
- 2 If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and lower the PCIe card latch to lock the bracket in place.

**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.

## Installing expansion card into expansion card riser

#### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 If installing a new expansion card, unpack it and prepare the card for installation.

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

#### Steps

- 1 If installed, remove the filler bracket.

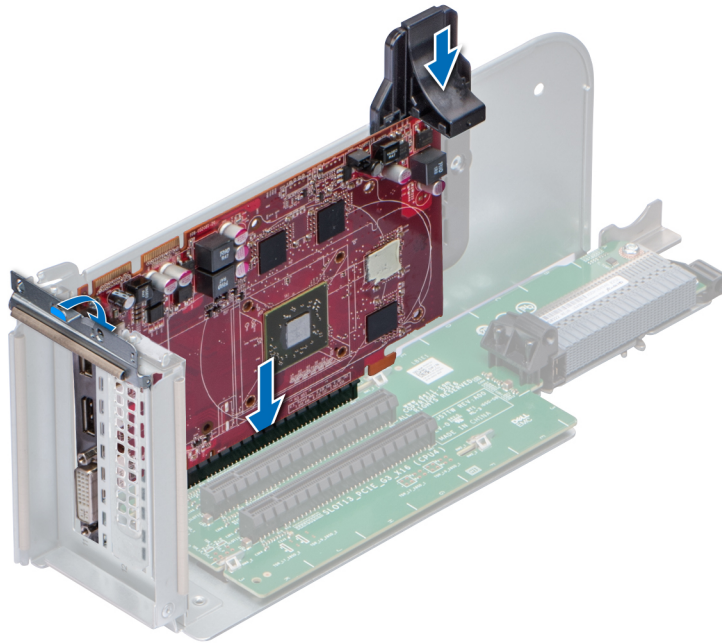
**NOTE:** Store the filler bracket for future use. Filler brackets must be installed in empty expansion card slots to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

- 2 Holding the expansion card by its edges, position the card so that the connector on the card aligns with the connector on the riser.
- 3 Insert the connector on the card into the connector on the riser until the card is fully seated.

- Slide the PCIe retention bracket down to hold the card in place.

**NOTE:** This step is applicable only if you are installing the expansion cards in the slots 12 and 13 of Riser 3 (IO\_RISER3) and slots 9 and 10 of Riser 2 (IO\_RISER2).

- Close the PCIe card latch.



**Figure 43. Installing the expansion card into expansion card riser**

#### Next steps

- Install the [expansion card risers](#).
- Connect the cables to the expansion card.
- Follow the procedure listed in [After working inside your system](#).

## Network daughter card

The network daughter card (NDC) is a small, removable mezzanine card, which provides the flexibility of selecting different connectivity options.

## Removing the NDC riser

#### Prerequisites

- Follow the safety guidelines listed in [Safety instructions](#).
- Follow the procedure listed in [Before working inside your system](#).
- Disconnect the cables connected to the Network Daughter Card (NDC) riser.

## Steps

- 1 Slide the riser retention bracket to unlock the NDC riser.
- 2 Hold the NDC riser by its edges, and pull the NDC riser until the card edge connector disengages from the connector on the system board.
- 3 Lift the NDC riser from the system.

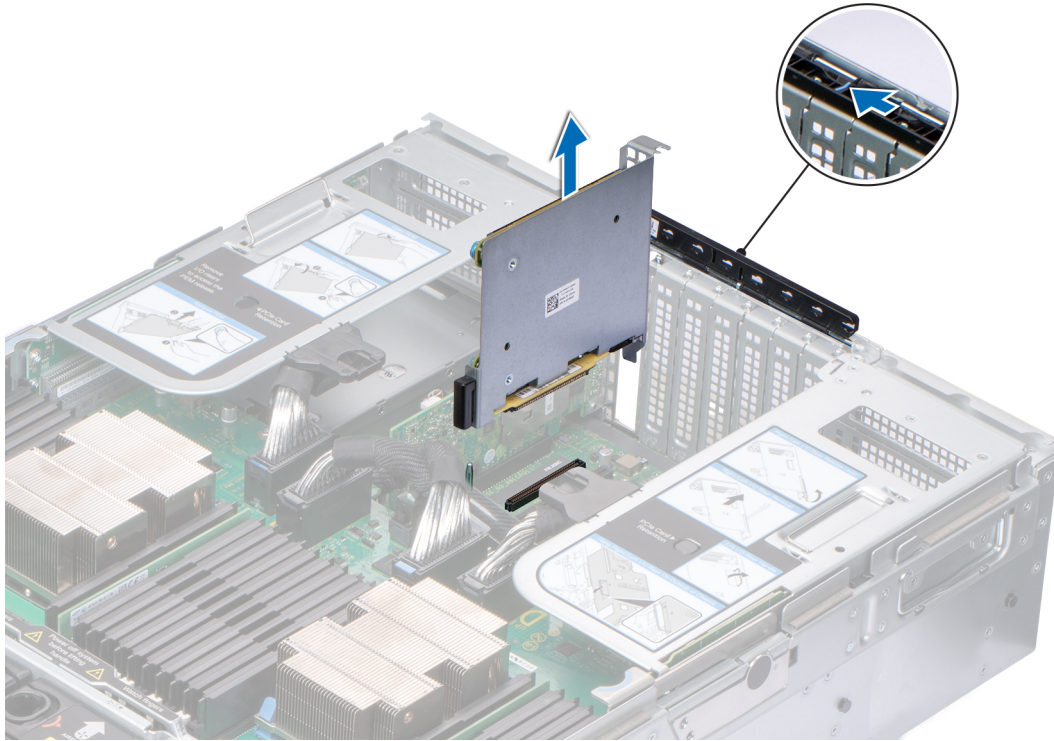


Figure 44. Removing the NDC riser

## Next step

- 1 Install the NDC riser.

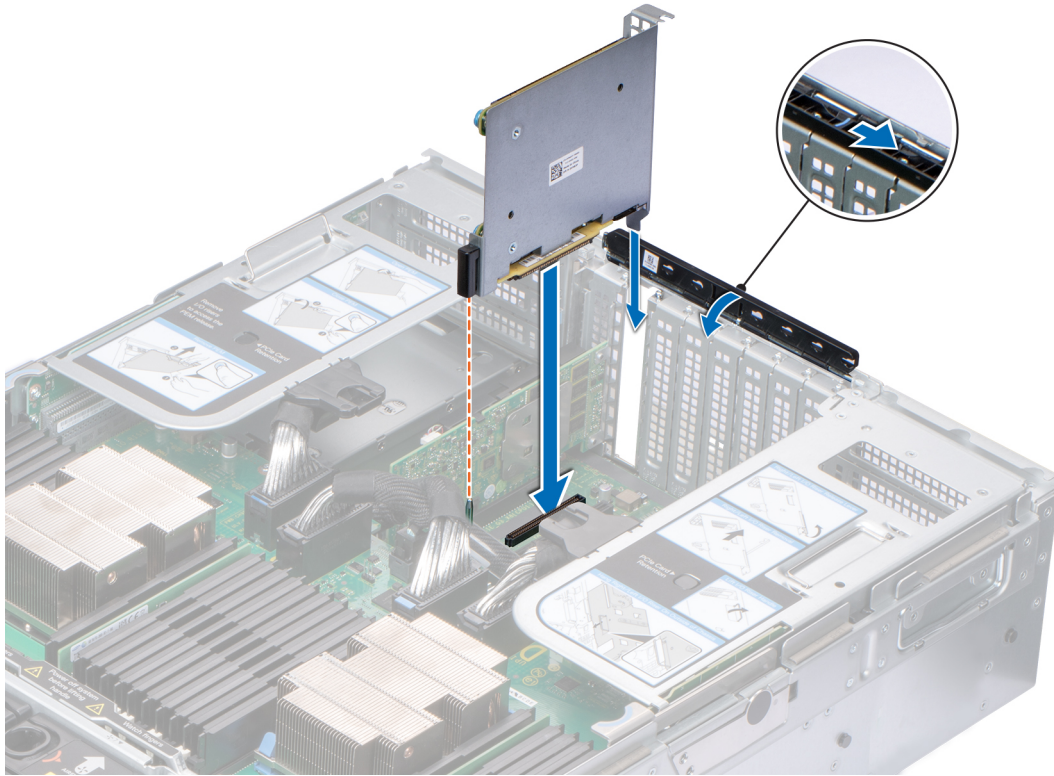
# Installing the NDC riser

## Prerequisite

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

## Steps

- 1 Hold the Network Daughter Card (NDC) riser by its edges and align the connector on the NDC riser and guide pin on the system board.
- 2 Insert the NDC riser until the card is fully seated.
- 3 Close the riser retention bracket and slide the bracket to lock the NDC riser.



**Figure 45. Install the NDC riser**

#### **Next steps**

- 1 Connect the cables to the NDC riser.
- 2 Follow the procedure listed in [After working inside your system](#).

## **Storage controller card**

The storage controller card is installed on the expansion card slot on the system board, which provides the integrated storage subsystem for your system's internal hard drives. The controller supports SAS and SATA hard drives and also enables you to set up the hard drives in RAID configurations as supported by the version of the storage controller included with your system.

## **Removing the storage controller card**

#### **Prerequisites**

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Remove the Network Daughter Card (NDC) riser.

#### **Steps**

- 1 Slide the riser retention bracket to unlock the storage controller card.
- 2 Hold the storage controller card by its edges and lift to remove it from the connector on the system board.
- 3 Press the release tab on the SAS cable connector to disconnect the cable from the storage controller card.

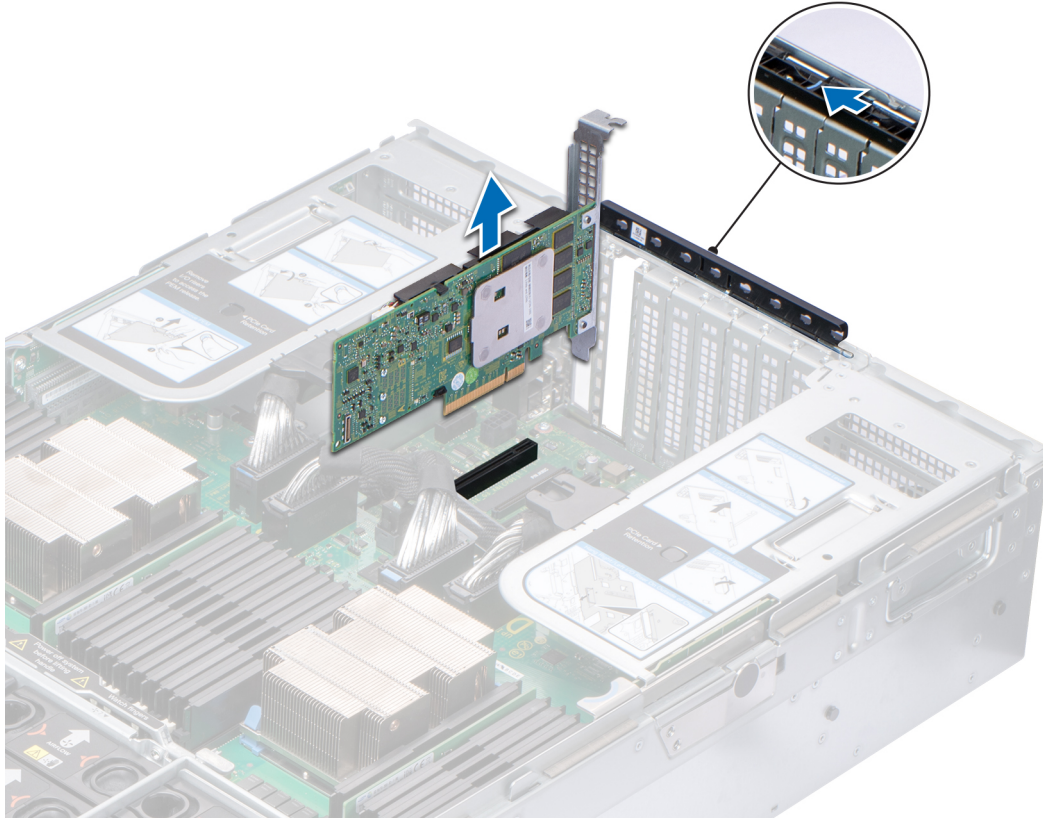


Figure 46. Removing the storage controller card

### Next step

- 1 Install the storage controller card.

## Installing the storage controller card

### Prerequisite

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

### Steps

- 1 Connect the SAS cables to the card.

**NOTE:** Ensure that you use the labels on the cable to connect the cables to the correct connectors. The cable does not function properly if reversed.

- 2 Hold the storage controller card by its edges, and align the connector on the card with the connector on the system board.
- 3 Lower the card into the system until the card is firmly seated.
- 4 Route the SAS cable through the channel on the inner side of the chassis.
- 5 Connect the SAS cables from the storage controller card to the connectors on hard drive backplane.
- 6 Close the riser retention bracket and slide the bracket to lock the storage controller card.

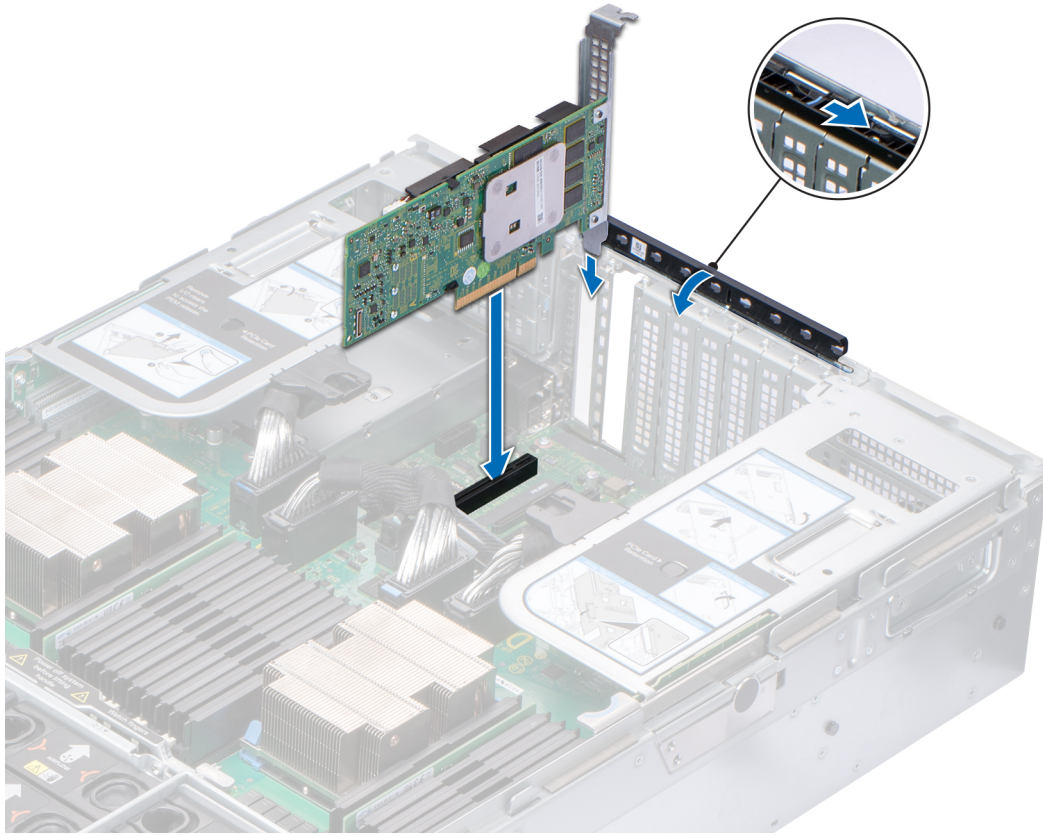


Figure 47. Installing the storage controller card

#### Next steps

- 1 Install the NDC riser.
- 2 Follow the procedure listed in [After working inside your system](#).

## IDSDM

The following section describes the process of removing and installing the micro SD card and IDSDM card:

## Removing the microSD card

#### Prerequisites

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

#### Steps

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

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

### Next steps

- 1 Follow the procedure listed in [After working inside your system](#).
- 2 Install a microSD card.

## Installing the microSD card

### Prerequisites

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

**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. Orient the microSD card appropriately and insert the contact-pin end of the card into the slot. To locate the IDSDM, see [System board jumpers and connectors](#).

**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.

### Next step

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

## Removing the optional IDSDM

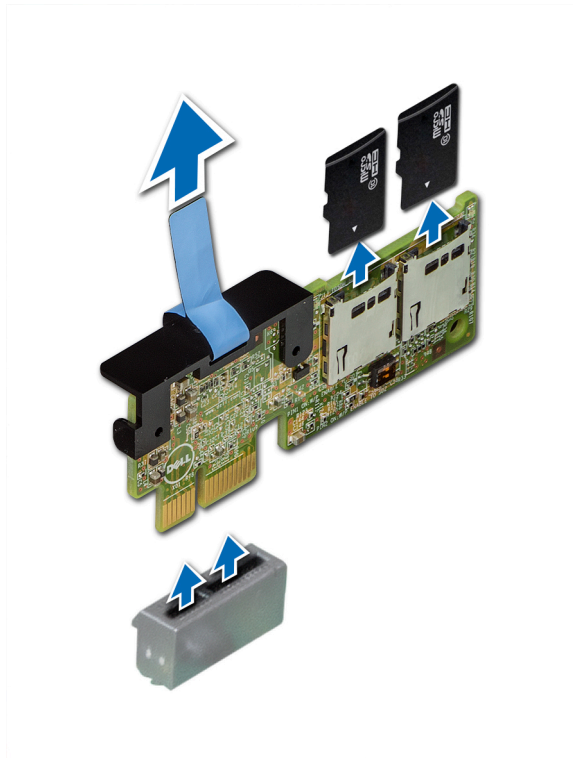
### Prerequisites

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 If you are replacing the IDSDM card, remove the microSD cards.

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

### Steps

- 1 Locate the IDSDM connector on the system board.  
To locate IDSDM connector, see [System board jumpers and connectors](#).
- 2 Holding the pull tab, lift the IDSDM card out of the system.



**Figure 48. Removing the optional IDSDM card**

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

**Next step**

Install the optional IDSDM card.

## Installing the optional IDSDM

**Prerequisite**

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

**Steps**

- 1 Locate the IDSDM connector on the system board.  
To locate IDSDM connector, see [System board jumpers and connectors](#).
- 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.

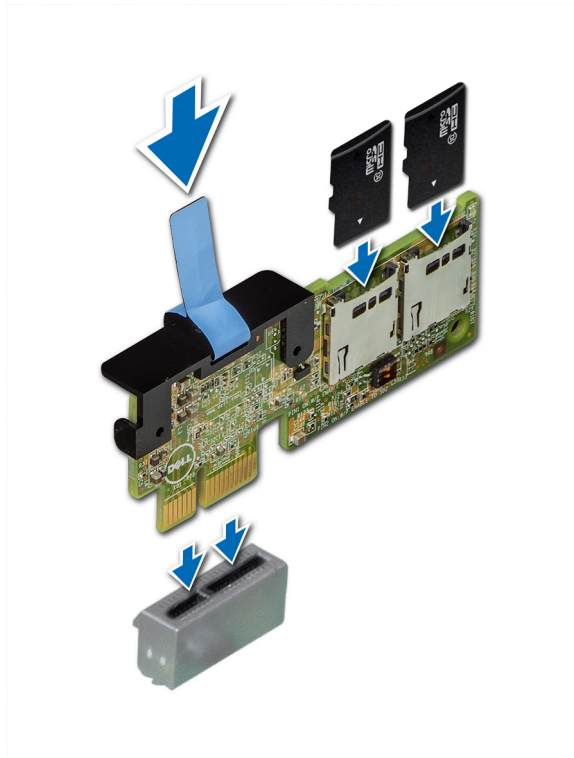


Figure 49. Installing optional IDSDM card

#### Next steps

- 1 Install the microSD cards.
  - ① **NOTE:** Reinstall the microSD cards into the same slots based on the labels you had marked on the cards during removal.
- 2 Follow the procedure listed in [After working inside your system](#).

## Power supply unit

The power supply unit (PSU) is an internal hardware component which supplies power to the components in the system.

Your system supports one of the following:

- Two 2400 W, 2000 W, 1600 W, or 1100 W AC power supply units (PSUs)
- Two 1100 W DC PSUs
- Two 1100 W Mixed Mode HVDC PSUs

① **NOTE:** The XC940 Series system supports hot swappable PSUs. 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 XC Series Appliance and XC Core System is not supported, even if the PSUs have the same power rating. This results in a PSU mismatch condition or failure to turn the system on.

① **NOTE:** Titanium PSU is nominally rated for 200 V AC to 240 V AC input only.

① **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 [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Removing a power supply unit

The procedure for removing AC and DC PSUs is identical.

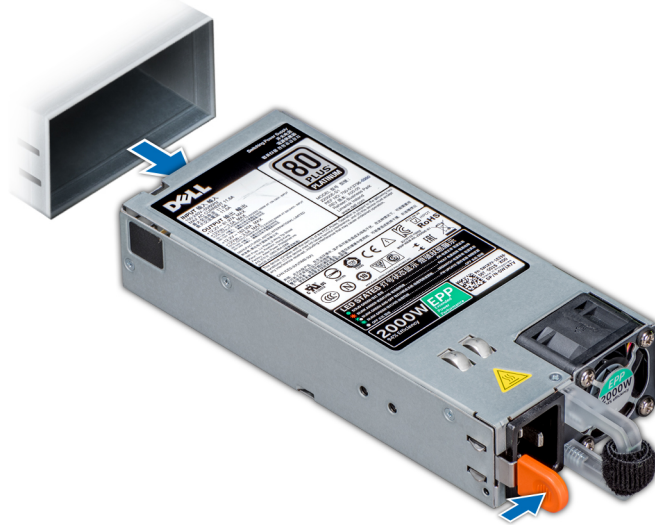
### Prerequisites

 **CAUTION:** The system needs one power supply unit (PSU) for normal operation. On a power-redundant system, remove and replace only one PSU at a time in a system that is powered on.

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Disconnect the power cable from the power source and from the PSU you intend to remove, and then remove the cable from the strap on the PSU handle.
- 3 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 [Dell.com/XCSeriesmanuals](http://Dell.com/XCSeriesmanuals).

### Step

Press the orange release latch and slide the PSU out of the system by using the PSU handle.



**Figure 50. Removing a power supply unit**

**Next step**

Install the PSU.

## Installing a power supply unit

The procedure for installing AC and DC PSUs is identical.

**Prerequisites**

- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 For systems that support redundant PSU, ensure that both the PSUs are of the same type and have the same maximum output power.

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

**Step**

Slide the PSU into the system until the PSU is fully seated and the release latch snaps into place.

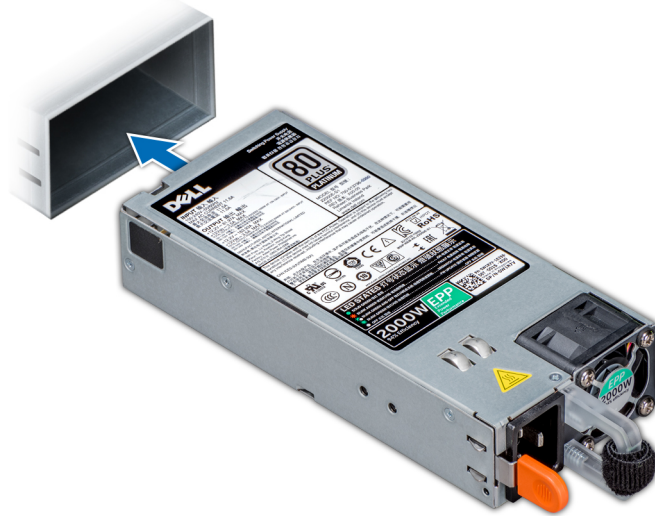


Figure 51. Installing a power supply unit

#### 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 [Dell.com/XCseriesmanuals](http://Dell.com/XCseriesmanuals).
- 2 Connect the power cable to the PSU, and plug the cable into a power outlet.

⚠ **CAUTION:** When connecting the power cable to the PSU, secure the cable to the PSU with the strap.

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. Wait until the new PSU is discovered and enabled before you remove the other PSU. The PSU status indicator turns green to signify that the PSU is functioning properly.

## Wiring instructions for a DC power supply unit

Your system supports up to two  $-(48-60)$  V DC power supply units (PSUs).

ℹ **NOTE:** For equipment using  $-(48-60)$  V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Only the licensed or certified electricians should perform these procedure. Read and follow all safety instructions that came with the product.

⚠ **CAUTION:** Wire the unit with copper only, unless otherwise specified, use only 10 American Wire Gauge (AWG) wire rated minimum  $90^{\circ}\text{C}$  for source and return. Protect the  $-(48-60)$  V DC (1 wire) with a branch circuit over-current protection rated 50 A for DC with a high interrupt current rating.

⚠ **CAUTION:** Connect the equipment to a  $-(48-60)$  V DC supply source that is electrically isolated from the AC source (reliably grounded  $-(48-60)$  V DC SELV source). Ensure that the  $-(48-60)$  V DC source is efficiently secured to earth (ground).

ℹ **NOTE:** A readily accessible disconnect device that is suitably approved and rated shall be incorporated in the field wiring.

## Input requirements

- Supply voltage: –(48–60) V DC
- Current consumption: 32 A (maximum)

## Kit contents

- Dell part number 6RYJ9 terminal block or equivalent (1)
- #6-32 nut equipped with lock washer (1)

## Required tools

Wire-stripper pliers capable of removing insulation from size 10 AWG solid or stranded, insulated copper wire.

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

## Required wires

- One UL 10 AWG, 2 m maximum (stranded) black wire [–(48–60) V DC].
- One UL 10 AWG, 2 m maximum (stranded) red wire (V DC return).
- One UL 10 AWG, 2 m maximum, green with a yellow stripe, stranded wire (safety ground).


## System battery

The system battery is used for low-level system functions such as powering the real-time and date settings of the system.

This section contains information about replacing the system battery.

## Replacing the system battery

### Prerequisites

 **WARNING:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. For more information, see the safety information that shipped with your system.

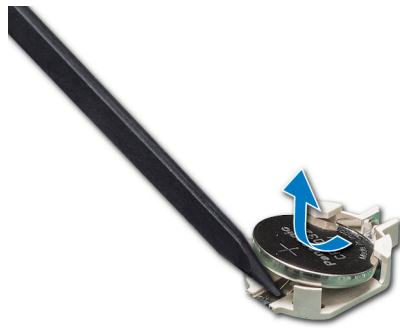
- 1 Follow the safety guidelines listed in [Safety instructions](#).
- 2 Follow the procedure listed in [Before working inside your system](#).
- 3 Remove the air shroud.
- 4 If applicable, disconnect the power or data cables from expansion card(s).
- 5 If applicable, remove the expansion card risers.
- 6 If applicable, remove the PEM.

### Steps

- 1 Locate the battery socket. For more information on locating the system battery, see [System board jumpers and connectors](#).

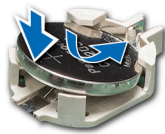
 **CAUTION:** To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

- 2 Use a plastic scribe to pry out the system battery as shown in the illustration below.



**Figure 52. Removing the system battery**

- 3 To install a new system battery, hold the battery with the positive side facing up and slide it under the securing tabs.
- 4 Press the battery into the connector until it snaps into place.



**Figure 53. Installing the system battery**

#### Next steps

- 1 If applicable, install the PEM.
- 2 If applicable, install the expansion card risers.
- 3 If applicable, connect the cables to the expansion card(s).
- 4 Install the air shroud.
- 5 Follow the procedure listed in [After working inside your system](#).
- 6 While booting, press F2 to enter the System Setup and ensure that the battery is operating properly.
- 7 Enter the correct time and date in the System Setup **Time** and **Date** fields.
- 8 Exit the System Setup.

## Entering the system Service Tag by using System Setup

You can use System Setup to enter the Service Tag.

- 1 Turn on the system.
- 2 Press F2 to enter System Setup.
- 3 Click **Service Tag Settings**.
- 4 Enter the Service Tag.

**NOTE:** You can enter the Service Tag only when the Service Tag field is empty. Ensure that you enter the correct Service Tag. After the Service Tag is entered, it cannot be updated or changed.

- 5 Click **Ok**.
- 6 Import your new or existing iDRAC Enterprise license.

For more information, see the *Integrated Dell Remote Access Controller User's Guide* at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

# Trusted Platform Module

Trusted Platform Module (TPM) is a dedicated microprocessor designed to secure hardware by integrating cryptographic keys into devices. Software can use a TPM to authenticate hardware devices. Because each TPM chip has a unique and secret RSA key which is embedded during the manufacture of the TPM, it is capable of performing platform authentication operation.

This section contains information about installing the TPM, and initializing the TPM for Intel TXT users.

## Upgrading the Trusted Platform Module

### Prerequisites

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

### 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:** 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. Work with the customer to create and safely store this recovery key. When replacing 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 hard drives.

**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.

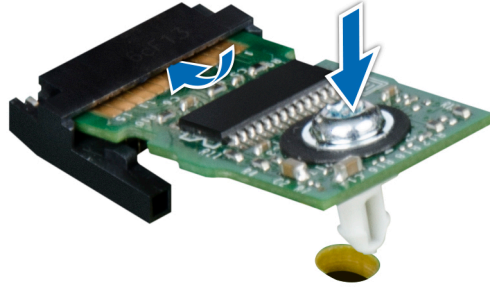
## Removing the TPM

- 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.



**Figure 54. Installing the TPM**

#### **Next steps**

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

## **Initializing the TPM 1.2 for TXT users**

- 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 Pre-boot Measurements**.
- 4 From the **TPM Command** option, select **Activate**.
- 5 Save the settings.
- 6 Restart your system.
- 7 Enter **System Setup** again.
- 8 On the **System Setup Main Menu** screen, click **System BIOS > System Security Settings**.
- 9 From the **Intel TXT** option, select **On**.

## **Initializing the TPM 2.0 for TXT users**

- 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.
- 6 Enter **System Setup** again.
- 7 On the **System Setup Main Menu** screen, click **System BIOS > System Security Settings**.
- 8 Select the **TPM Advanced Settings** option.
- 9 From the **TPM2 Algorithm Selection** option, select **SHA256**, then go back to **System Security Settings** screen.
- 10 On the **System Security Settings** screen, from the **Intel TXT** option, select **On**.
- 11 Save the settings.
- 12 Restart your system.

# Using system diagnostics

If you experience a problem with your system, run the system diagnostics before contacting Dell for technical assistance. The purpose of running system diagnostics is to test your system hardware without using additional equipment or risking data loss. If you are unable to fix the problem yourself, service and support personnel can use the diagnostics results to help you solve the problem.

## 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 provides 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 problems encountered during testing

## Running the Embedded System Diagnostics from Boot Manager

Run the Embedded System Diagnostics (ePSA) if your system does not boot.

- 1 When the system is booting, press F11.
- 2 Use the up arrow and down arrow keys to select **System Utilities > Launch Diagnostics**.
- 3 Alternatively, when the system is booting, press F10, select **Hardware Diagnostics > Run Hardware Diagnostics**.

The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

## Running the Embedded System Diagnostics from the Dell Lifecycle Controller

- 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.

## System diagnostic controls

Menu	Description
<b>Configuration</b>	Displays the configuration and status information of all detected devices.
<b>Results</b>	Displays the results of all tests that are run.
<b>System health</b>	Provides the current overview of the system performance.
<b>Event log</b>	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.

# Jumpers and connectors

This topic provides specific information about the jumpers. It also provides some basic information about jumpers and switches and describes the connectors on the various boards in the system. Jumpers on the system board help to disable the system and setup passwords. You must know the connectors on the system board to install components and cables correctly.

Topics:

- [System board connectors](#)
- [System board jumper settings](#)
- [Disabling forgotten password](#)

# System board connectors

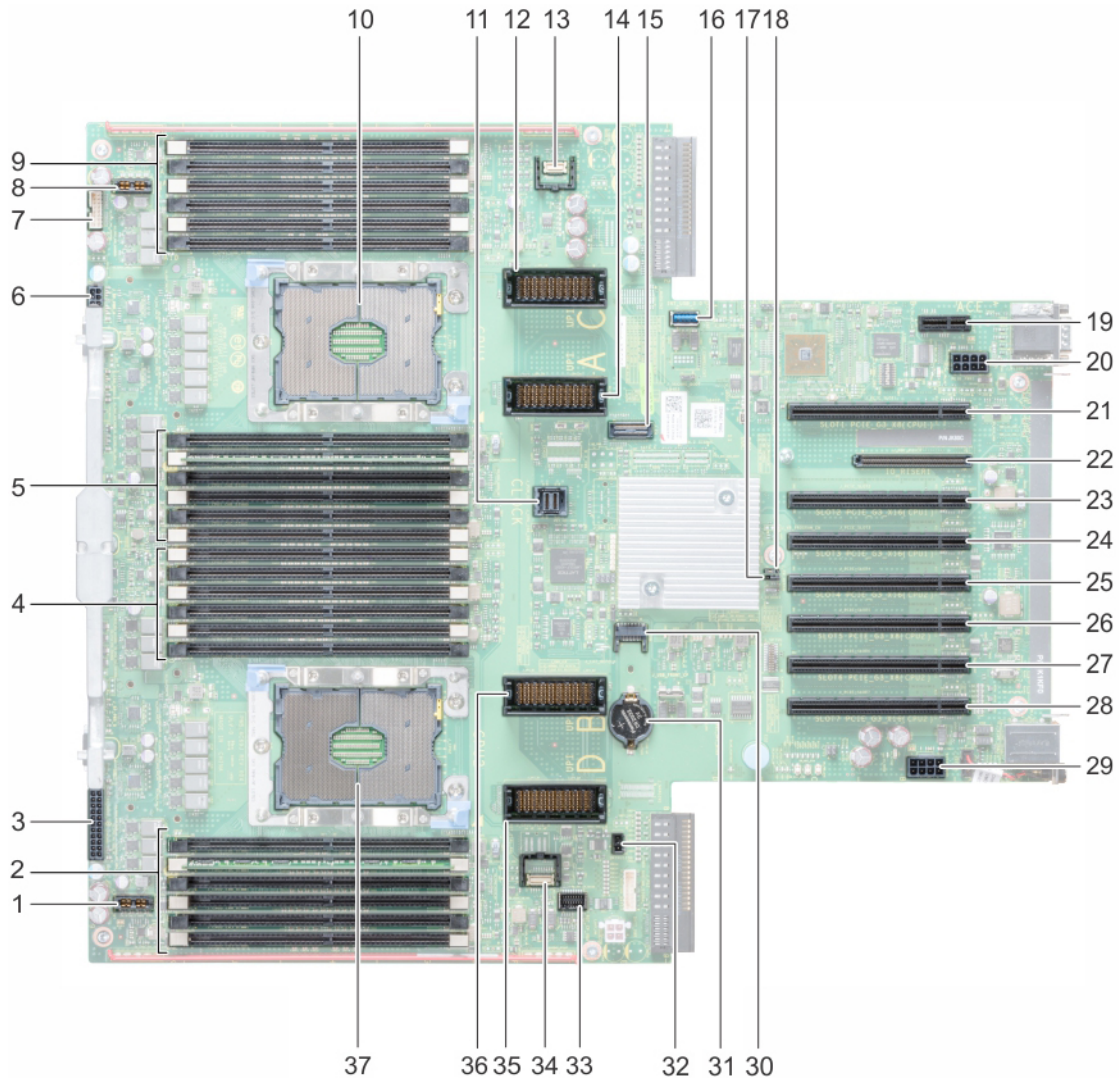
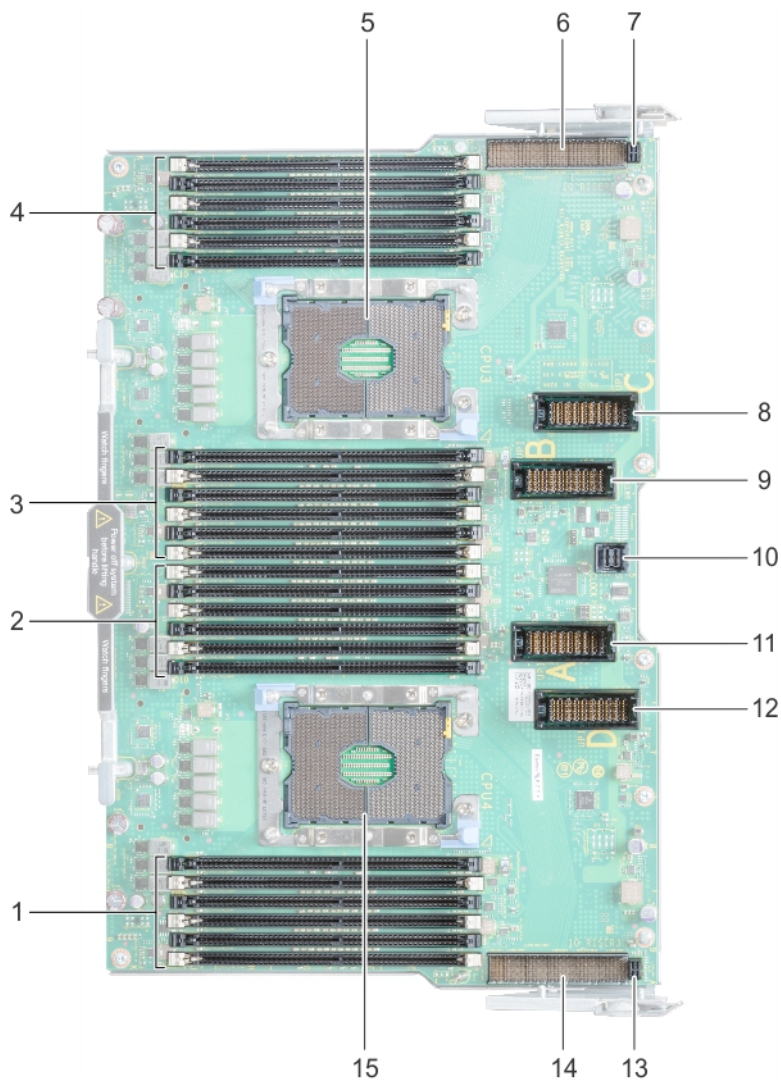


Figure 55. System board jumpers and connectors

Table 43. System board jumpers and connectors

Item	Connector	Description
1	J_PEM_PWR_R	Right PEM power board connector
2	B7, B1, B8, B2, B9, B3	Memory module sockets
3	FAN_MOD2	Fan module cable connector
4	B6, B12, B5, B11, B4, B10	Memory module sockets
5	A7, A1, A8, A2, A9, A3	Memory module sockets
6	J_BP_P1	Backplane 1 power connector
7	J_BP_SIG1	Backplane 1 signal connector

Item	Connector	Description
8	J_PEM_PWR_L	Left PEM power board connector
9	A6, A12, A5, A11, A4, A10	Memory module sockets
10	CPU1	CPU1 processor heat sink module socket
11	J_PEM_CLK	PEM clock connector
12	RM_UPI_C	UPI cable connector "C"
13	LFT_CTRL_PNL	Left control panel connector
14	RM_UPI_A	UPI cable connector "A"
15	J_M.2	SATA M.2 connector
16	INT_USB_3.0	Internal USB 3.0 connector
17	PWRD_EN	Reset BIOS password
18	NVRAM_CLR	Clear NVRAM
19	J_IDSDM	iDSDM
20	PCIE_PWR1	PCIe power connector 1
21	SLOT1 PCIE_G3_X8(CPU1)	PCIe slot 1
22	IO_RISER1	Network daughter card riser connector
23	SLOT2 PCIE_G3_X16(CPU1)	PCIe slot 2
24	SLOT3 PCIE_G3_X16(CPU1)	PCIe slot 3
25	SLOT4 PCIE_G3_X16(CPU2)	PCIe slot 4
26	SLOT5 PCIE_G3_X8(CPU2)	PCIe slot 5
27	SLOT6 PCIE_G3_X8(CPU2)	PCIe slot 6
28	SLOT7 PCIE_G3_X16(CPU2)	PCIe slot 7
29	PCIE_PWR2	PCIe power connector 2
30	J_TPM	Trusted Platform Module (TPM) connector
31	BATTERY	System board battery connector
32	INTRUSION	Intrusion switch connector
33	RM_RGT_CP_GUIDE	VGA to right control panel connector
34	RGT_CTRL_PNL	Right control panel connector
35	RM_UPI_D	UPI cable connector "D"
36	RM_UPI_B	UPI cable connector "B"
37	CPU2	CPU2 processor heat sink module socket



**Figure 56. Processor expansion module (PEM) connectors**

**Table 44. Processor expansion module (PEM) connectors**





Item	Connector	Description
1	D7, D1, D8, D2, D9, D3	Memory module sockets
2	D6, D12, D5, D11, D4, D10	Memory module sockets
3	C7, C1, C8, C2, C9, C3	Memory module sockets
4	C6, C12, C5, C11, C4, C10	Memory module sockets
5	CPU3	CPU3 processor heat sink module socket
6	IO_RISER2	Riser 2 connector
7	J_IORL_PWR	Left expansion card riser power connector
8	RM_UPI_C	UPI cable connector "C"
9	RM_UPI_B	UPI cable connector "B"
10	J_PEM_CLK	PEM clock connector

Item	Connector	Description
11	RM_UPI_A	UPI cable connector "A"
12	RM_UPI_D	UPI cable connector "D"
13	J_IORR_PWR	Right expansion card riser power connector
14	IO_RISER3	Riser 3 connector
15	CPU4	CPU4 processor heat sink module socket

## System board jumper settings

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

**Table 45. System board jumper settings**

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

## Disabling 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.

### Prerequisite

**⚠ 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, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Remove the system cover.
- 3 Move the jumper on the system board jumper from pins 2 and 4 to pins 4 and 6.
- 4 Install the system cover.

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.

**i NOTE:** If you assign a new system and/or setup password with the jumper on pins 4 and 6, the system disables the new password(s) the next time it boots.

- 5 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
- 6 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 7 Remove the system cover.

- 8 Move the jumper on the system board jumper from pins 4 and 6 to pins 2 and 4.
- 9 Install the system cover.
- 10 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
- 11 Assign a new system and/or setup password.

# Getting help

Topics:

- [Contacting Dell](#)
- [Documentation feedback](#)
- [Accessing system information by using QRL](#)
- [Receiving automated support with SupportAssist](#)

## Contacting Dell

Dell EMC provides several online and telephone based support and service options. If you do not have an active internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell EMC product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell EMC for sales, technical assistance, or customer service issues:

- 1 Go to **Dell.com/support**.
- 2 Select your country from the drop-down menu on the lower right corner of the page.
- 3 For customized support:
  - a Enter your system Service Tag in the **Enter your Service Tag** field.
  - b Click **Submit**.The support page that lists the various support categories is displayed.
- 4 For general support:
  - a Select your product category.
  - b Select your product segment.
  - c Select your product.The support page that lists the various support categories is displayed.
- 5 For contact details of Dell EMC Global Technical Support:
  - a Click **Global Technical Support**.
  - b The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell EMC Global Technical Support team.

## Documentation feedback

You can rate the documentation or write your feedback on any of our Dell documentation pages and click **Send Feedback** to send your feedback.

## Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) to get immediate access to the information about your system.

### 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

- Your system service tag to quickly access your specific hardware configuration and warranty information
- A direct link to Dell to contact technical assistance and sales teams

### Steps

- 1 Go to **Dell.com/QRL** and navigate to your specific product or
- 2 Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code on your Dell EMC XC940 Hyper-converged appliance or in the Quick Resource Locator section.

## Quick Resource Locator for XC940 Series system



Figure 57. Quick Resource Locator for XC940 Series system

## Receiving automated support with SupportAssist

Dell SupportAssist is an optional Dell Services offering that automates technical support for your Dell server, storage, and networking devices. By installing and setting up a SupportAssist application in your IT environment, you can receive the following benefits:

- **Automated issue detection** — SupportAssist monitors your Dell devices and automatically detects hardware issues, both proactively and predictively.
- **Automated case creation** — When an issue is detected, SupportAssist automatically opens a support case with Dell Technical Support.
- **Automated diagnostic collection** — SupportAssist automatically collects system state information from your devices and uploads it securely to Dell. This information is used by Dell Technical Support to troubleshoot the issue.
- **Proactive contact** — A Dell Technical Support agent contacts you about the support case and helps you resolve the issue.

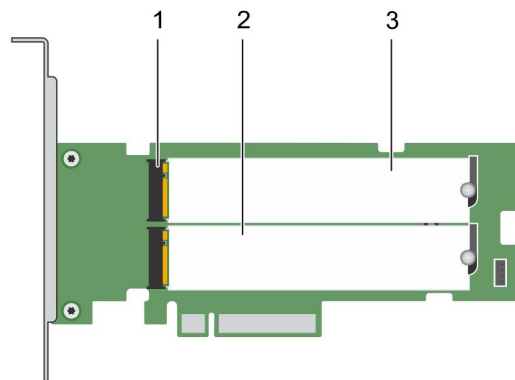
The available benefits vary depending on the Dell Service entitlement purchased for your device. For more information about SupportAssist, go to **Dell.com/SupportAssist**.

## BOSS card

### Introduction to BOSS card

BOSS is a simple RAID solution card designed specifically for booting a system's operating system. The card supports up to two 6 Gbps M.2 SATA drives. The BOSS adapter card has a x8 connector using PCIe gen 2.0 x2 lanes, available only in the low-profile and half-height form factor. The BOSS modular card has a dedicated slot in blade systems.

**NOTE:** There are no status LEDs on the BOSS card.



**Figure 58. Features of BOSS card**

- |   |                          |   |                        |
|---|--------------------------|---|------------------------|
| 1 | SATA drive connector (2) | 2 | 80 mm M.2 SATA drive 1 |
| 3 | 80 mm M.2 SATA drive 2   |   |                        |

### Supported operating systems

The BOSS card supports the following minimum supported versions of operating systems:

- Microsoft Windows Server 2016
- VMware ESXi 6.0 Update 3
- VMware ESXi 6.5

**NOTE:** For the latest list of supported operating systems and driver installation instructions, see the system documentation at [Dell.com/operatingsystemmanuals](http://Dell.com/operatingsystemmanuals). For specific operating system service pack requirements, see the Drivers and Downloads section at [Dell.com/support/manuals](http://Dell.com/support/manuals).

### Supported XC Series Appliance and XC Core System

The following XC Series Appliance and XC Core System support the BOSS adapter card:

- XC640
- XC6420
- XC740xd
- XC940

## BOSS card features

BOSS card supports the following features:

- Foreign Import
- SMART Info
- Auto-Rebuild

### Foreign Import

A virtual disk is considered foreign if it is not native to the adapter.

- A virtual disk is considered native to the adapter if:
  - The virtual disk was created or imported on the adapter.
- A physical disk is considered native to the adapter if:
  - There is no previous virtual disk metadata on the adapter and the physical disk(s) are unconfigured.
  - All configured virtual disk(s) on the physical disk(s) are deleted.

### SMART Info

SMART monitors certain physical aspects of all motors, heads, and physical disk electronics to help detect predictable physical disk failures. Data on SMART-compliant physical disks can be monitored to identify changes in values and determine whether the values are within threshold limits. Many mechanical and electrical failures display some degradation in performance before failure.

A SMART failure is also referred to as predicted failure. There are numerous factors that are predicted physical disk failures, such as a bearing failure, a broken read/write head, and changes in spin-up rate. In addition, there are factors related to read/write surface failure, such as seek error rate and excessive bad sectors.

### Auto-Rebuild

A virtual disk rebuild will begin on system boot automatically if the native virtual disk is degraded and a valid rebuild target is present. A valid rebuild target is any functional drive attached to the BOSS-S1 device which is not part of the native virtual disk and is of equal or greater storage capacity. An auto-rebuild occurs without prompting the user, and any data on the rebuild target is overwritten.

## Deploying the BOSS card

This section provides a set of high-level installation and removal instructions for the BOSS-S1 card.

# Removing the BOSS card

## About this task

**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, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

**NOTE:** It is recommended that you always use a static mat and static strap while working on components inside system.

2 Open the system cover.

3 Locate the BOSS card on the system board.

**CAUTION:** To prevent damage to the card, you must hold the card by its edges only.

4 After ensuring that the PCIe bracket is unobstructed, lift the card to remove it from the connector on the system board.

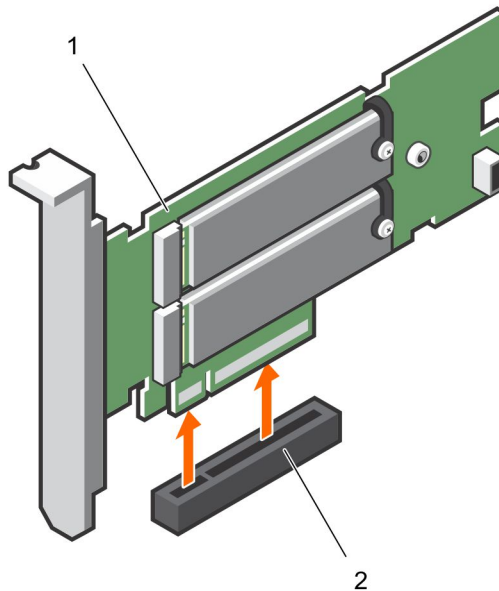


Figure 59. Removing the BOSS card

1 BOSS-S1 card

2 card connector on the system board

# Removing the M.2 SSD module

## About this task

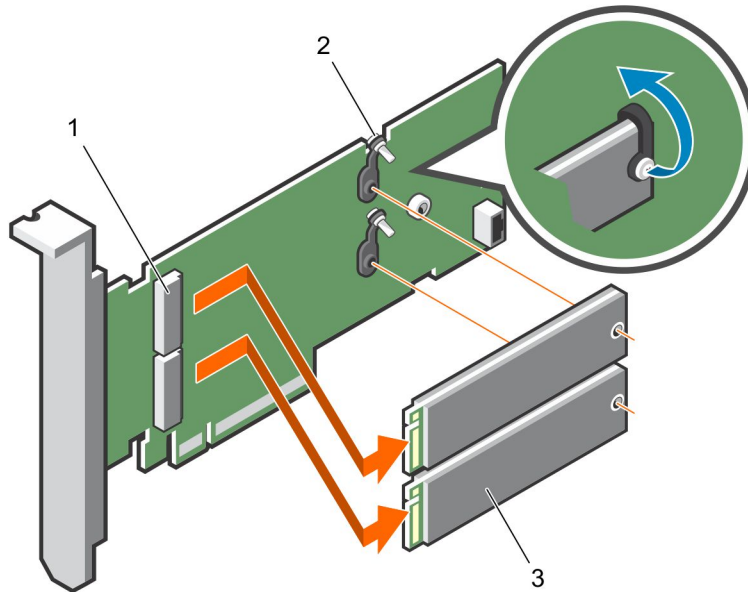
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

## Steps

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.

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

- 2 Open the system cover.
- 3 Remove the card. See [Removing the BOSS card](#).
- 4 Loosen the screws and lift the retention straps that secure the M.2 SSD module on the BOSS card.
- 5 Pull the M.2 SSD module away from the BOSS card.



**Figure 60. Removing the M.2 SSD module**

- |   |                      |   |           |
|---|----------------------|---|-----------|
| 1 | module connector (2) | 2 | screw (2) |
| 3 | module (2)           |   |           |

## Installing the M.2 SSD module

### About this task

**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 Align the M.2 SSD module connectors with the connectors on the BOSS card.
- 2 Align the M.2 SSD module downwards until the module is seated firmly on the card.
- 3 Secure the M.2 SSD module on the BOSS card with the screw.

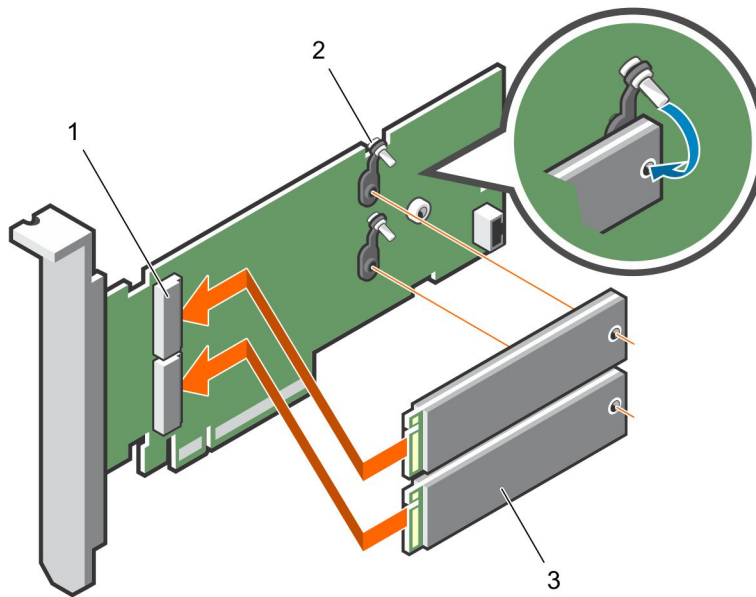


Figure 61. Installing the M.2 SSD module

- |   |                      |   |           |
|---|----------------------|---|-----------|
| 1 | module connector (2) | 2 | screw (2) |
| 3 | module (2)           |   |           |

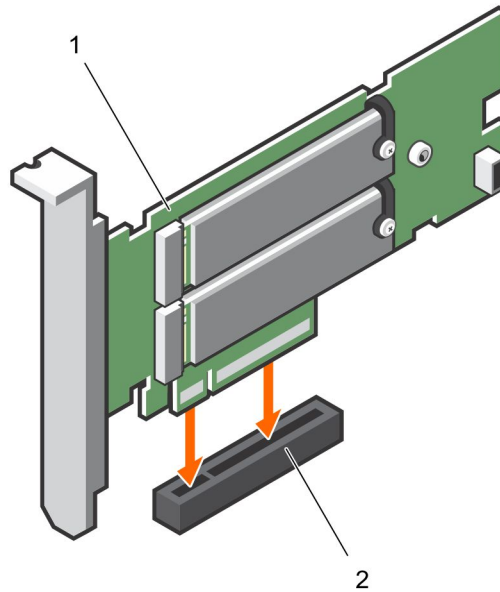
## Installing the BOSS card

### About this task

**⚠ 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, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
  - ⓘ NOTE:** It is recommended that you always use a static mat and static strap while working on components inside the system.
- 2 Open the system cover.
- 3 Hold the card by its edges and align the card connector with the connector on the system board.
  - ⚠ CAUTION:** To prevent damage to the card, you must hold the card by its edges only.
- 4 Press the card-edge down until the card is fully seated.
- 5 Close the system cover.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.



**Figure 62. Installing the BOSS card**

1 BOSS card

2 card connector on the system board

## Driver installation

The BOSS card uses the native AHCI driver of the supported operating systems.

**Windows driver installation** — Dell provides the Dell Update Package (DUP) to update drivers on systems running Windows Server 2012 R2 and newer operating system. DUP is an executable application that updates drivers for specific devices. DUP supports command line interface and silent execution. For more information, see [Dell.com/support](http://Dell.com/support).

① | **NOTE:** For more information about supported drivers, see the [Support Matrix](http://Dell.com/XCseriesmanuals) available at [Dell.com/XCseriesmanuals](http://Dell.com/XCseriesmanuals).

## BOSS troubleshooting

To get help with your Dell EMC BOSS card, you can contact your Dell EMC Technical Service representative or see [Dell.com/support](http://Dell.com/support).

### Physical disks not visible to operating system

- Issue:** One or both physical disks are not appearing for use by an operating system.
- Probable cause:** A physical disk will not be presented to the operating system in the following scenarios:
- There is RAID metadata on the physical disk and no RAID metadata on the controller.
  - The BOSS controller has RAID metadata on it and the physical disks do not have the RAID metadata on it.
- Corrective action:** If the RAID metadata is on the controller, clear the controller configuration.  
If the RAID metadata is on the physical disk, erase the data available in physical disk.
- Alternatively, if you want to keep the RAID drives, see [Virtual disk not visible to operating system](#).

## Virtual disk not visible to operating system

- Issue:** In RAID mode a virtual disk is not appearing for use by an operating system.
- Probable cause:** Virtual disks will not be presented to the system if they are not native to the controller.
- Corrective action:** Import the virtual disk using Hardware-Independent Imaging (HII).

## Drive failure

- Issue:** An installed drive is not listed in the BOSS configuration utility. OpenManage reports **Physical Disk offline** state.
- Probable cause:** Drive is either in failure state or has corrupted firmware.
- Corrective action:** Reseat drive to ensure drive is inserted correctly. If error persists, attempt to update drive firmware using DUP. If error is still present, replace erroneous drive.

## Fault in controller

- Issue:** Controller's UEFI Configuration Utility Menu entry is not appearing.
- Probable cause:** Either a firmware or a hardware fault
- Corrective action:**
- 1 Flash the latest firmware on the BOSS adapter.
  - 2 If the problem persists, shutdown the system, and then unplug the BOSS adapter.
  - 3 Plug the BOSS adapter into the PCIe slot.
  - 4 Boot the system and check the UEFI Configuration Utility Menu again.
- If the problem still persists, see [BOSS card is not detected](#).

**NOTE:** Ensure that the system is completely disconnected from all power sources before making any hardware changes.

**NOTE:** If you replace the SAS HBA330 controller you must update to the latest HBA firmware version.

## BOSS card is not detected

- Issue:** BOSS device is not detected in the system.
- Probable cause:** Hardware fault on the card.
- Corrective action:** Replace the BOSS adapter with a new one.

## Unable to boot to M.2 drive installed in slot 1

- Issue:** When two unconfigured bootable M.2 drives are inserted into the BOSS device, only the slot 0 drive boots.

**Probable cause:** Working as designed, BIOS only allows booting from the first listed boot device (in this case, slot 0) per peripheral controller. This only occurs in legacy BIOS boot mode.

**Corrective action:** Swap the drive in slot 1 to slot 0.

## CLI reports unsupported features

**Issue:** Several commands, options, or other features listed by the Marvell CLI state that they are unsupported when run.

**Probable cause:** CLI shows the same information on all Marvell products, but only implements the functions which are pertinent to that platform or system.

**Corrective action:** Use supported features.