




# Dell DL4300 Appliance Owner's Manual

Regulatory Model: E31S Series  
Regulatory Type: E31S001



# Notes, cautions, and warnings

-  **NOTE:** A NOTE indicates important information that helps you make better use of your computer.
-  **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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# About your Dell DL4300 Appliance

## Supported configurations

Your Dell DL4300 Appliance supports the following configurations:

**Table 1. Standard Edition**

<b>Component</b>	<b>Specification</b>
Processor	Up to two Intel Xeon E5-2640 v4 processor
Hard drives	Up to twelve 3.5-inch hard drives, two 2.5-inch back-accessible hard drives connected to a SATA chipset, and four 3.5-inch hard drives in the middle hard-drive tray.
Memory	4 x 16 GB RDIMM or 8 x 16 GB RDIMM

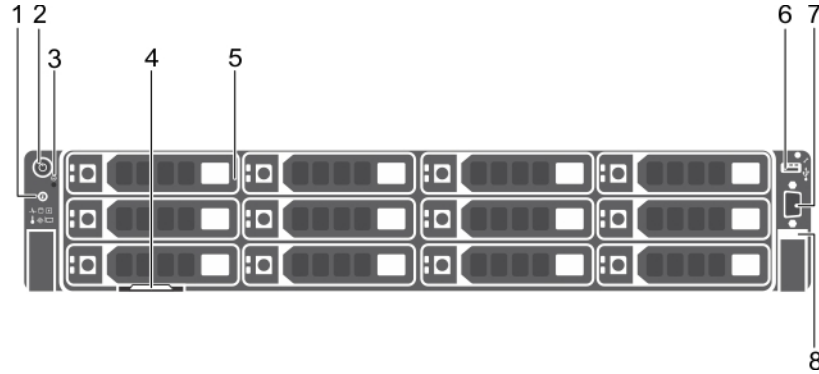
**Table 2. High Capacity Edition**

<b>Component</b>	<b>Specification</b>
Processor	Up to two Intel Xeon E5-2660 v3 processor
Hard drives	Up to twelve 3.5-inch hard drives, two 2.5-inch back-accessible hard drives connected to a SATA chipset, and four 3.5-inch hard drives in the middle hard-drive tray.
Memory	8 x 16 GB RDIMM or 16 x 16 GB RDIMM

## Front panel features and indicators

The front panel provides access to the features available on the front of the server, such as the power button, NMI button, system identification tag, system identification button, and USB and VGA ports. The

diagnostic LEDs or the LCD panel is prominently on the front panel. The hot swappable hard drives are accessible from the front panel.







**Figure 1. Front panel features and indicators (Twelve x 3.5–inch hard drive chassis)**

1. System identification button
2. Power button
3. NMI button
4. Information tag
5. Hard drives
6. USB management port/iDRAC Direct
7. Video connector
8. Quick Sync (optional)

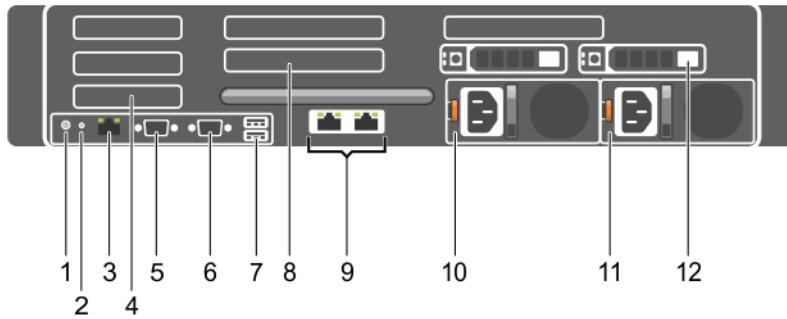
**Table 3. Front panel features**

Item	Indicator, Button, or Connector	Icon	Description
1	System identification button		<p>The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pressed, the system status indicator on the back flashes until one of the buttons is pressed again. Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> <p>To reset the iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.</p>
2	Power button		<p>The power-on indicator lights when the system power is on. The power button controls the power supply output to the system.</p>

Item	Indicator, Button, or Connector	Icon	Description
			 <b>NOTE:</b> On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.
3	NMI button		<p>Used to troubleshoot software and device driver errors when running certain operating systems. This button can be pressed using the end of a paper clip.</p> <p>Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.</p>
4	Information tag		A slide-out label panel which allows you to record system information such as Service Tag, NIC, MAC address, and so on as per your need.
5	Hard drives		Up to twelve 3.5 inch hot-swappable hard drives.
6	USB management port/ iDRAC Direct		The USB management port is USB 2.0 compliant. Enables you to connect USB devices to the system or provides access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at <b>Dell.com/idracmanuals</b> .
7	Video connector		Enables you to connect a display to the system.
8	Quick Sync (optional)		Indicates a Quick Sync enabled system. The Quick Sync feature is optional and needs a Quick Sync bezel. This feature allows management of the system by using mobile devices. This feature aggregates hardware or firmware inventory and various system level diagnostic and error information that can be used in troubleshooting the system. For more information, see the Integrated Dell Remote Access Controller User's Guide at <b>Dell.com/idracmanuals</b> .

## Back panel features and indicators


The back panel provides access to the features available on the back of the server, such as the system identification button, power supply sockets, cable management arm connectors, iDRAC storage media, NIC ports, USB and VGA ports. Most of the expansion card ports can be accessed from the back panel. The hot swappable power supply units, and if installed, the rear accessible hard drives are accessible from the back panel.








**Figure 2. Back panel features and indicators—DL4300**

1. System identification button
2. System identification connector
3. iDRAC8 Enterprise port
4. Half-height PCIe expansion-card slot (3)
5. Serial connector
6. Video connector
7. USB connector (2)
8. Full-height PCIe expansion-card slot (3)
9. Ethernet connector (2)
10. Power supply unit (PSU1)
11. Power supply unit (PSU2)
12. Hard drive (2) (back)

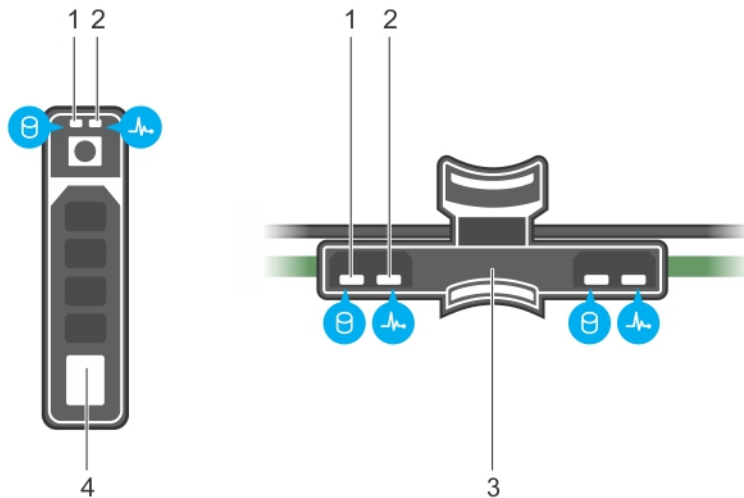
**Table 4. Back panel features and indicators**

Item	Indicator, button, or connector	Icon	Description
1	System identification button		<p>The identification buttons on the front and back panels can be used to locate a particular system within a rack.</p> <p>When one of these buttons is pressed, the system status indicator on the back flashes until one of the buttons is pressed again.</p> <p>Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> <p>To reset iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.</p>
2	System identification connector		Connects the optional system status indicator assembly through the optional cable management arm.

Item	Indicator, button, or connector	Icon	Description
3	iDRAC8 Enterprise port		Dedicated management port.
4	Half-height PCIe expansion-card slot (3)		Allows you to connect up to three half-height PCI Express expansion cards.
5	Serial connector		Allows you to connect a serial device to the system.
6	Video connector		Allows you to connect a VGA display to the system.
7	USB connector (2)		Allows you to connect USB devices to the system. The ports are USB 3.0-compliant.
8	Full-height PCIe expansion-card slot (3)		Allows you to connect up to three full-height PCI Express expansion cards.
9	Ethernet connector (2)		Two integrated one 1 Gbps and 1 Gbps plus one 10 Gbps connector (Standard Edition) or Two 10 Gbps (High Capacity Edition)
10	Power supply unit (PSU1)		1100 W
11	Power supply unit (PSU2)		1100 W
12	Hard drive (2) (back)		Up to two hot-swappable 2.5 inch hard drives.

## Hard drive indicator codes

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



**Figure 3. Hard drive indicators on the hard drive and the hard drive tray backplane**

- |  |                                |
|--|--------------------------------|
| 1. hard drive activity indicator           | 2. hard drive status indicator |
| 3. hard drive backplane on hard drive tray | 4. hard drive                  |

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

**Table 5. Hard drive indicator codes**

Drive-status indicator pattern (RAID only)	Condition
Flashes green twice per second	Identifying drive or preparing for removal.
Off	Drive ready for insertion or removal.
	<b>NOTE:</b> The drive status indicator remains off until all hard drives are initialized after the system is turned on. Drives are not ready for insertion or 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
Steady green	Drive online

Drive-status indicator pattern (RAID only)	Condition
Flashes green for three seconds, amber for three seconds, and then turns off after six seconds	Rebuild stopped

## NIC indicator codes

Each NIC on the back panel has an indicator that provides information about the network activity and link status. The activity LED indicates whether the NIC is currently connected or not. The link LED indicates the speed of the connected network.

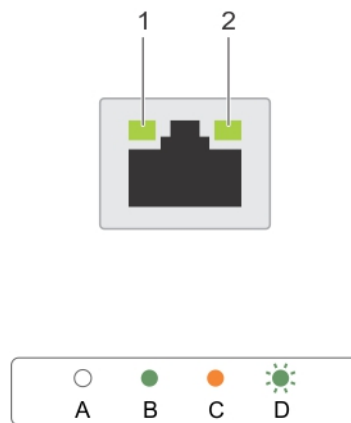


Figure 4. NIC indicators

1. link indicator
2. activity indicator

Table 6. NIC indicators

Convention	Status	Condition
A	Link and activity indicators are off	The NIC is not connected to the network.
B	Link indicator is green	The NIC is connected to a valid network at its maximum port speed (1 Gbps or 10 Gbps).
C	Link indicator is amber	The NIC is connected to a valid network at less than its maximum port speed.
D	Activity indicator is flashing green	Network data is being sent or received.

## Power supply unit indicator codes




AC power supply units (PSUs) have an illuminated translucent handle that serves as an indicator and DC PSUs have an LED that serves as an indicator. The indicator shows whether power is present or a power fault has occurred.







**Figure 5. AC PSU status indicator**


1. AC PSU status indicator/handle


**Table 7. AC PSU status indicators**

Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and the PSU is operational.
B	Flashing green	When the firmware of the PSU is being updated, the PSU handle flashes green.
C	Flashing green and turns off	When hot-adding a PSU, the PSU handle flashes green five times at 4 Hz rate and turns off. This indicates a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. <p> <b>NOTE:</b> Ensure that both the PSUs are of the same capacity.</p> <p> <b>CAUTION:</b> For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back.</p> <p> <b>NOTE:</b> Mixing PSUs from previous generations of Dell PowerEdge servers can result in a PSU mismatch condition or failure to turn the system on.</p>
D	Flashing amber	Indicates a problem with the PSU.



Convention	Power indicator pattern	Condition
		<p> <b>CAUTION:</b> When correcting a PSU mismatch, replace only the PSU with the flashing 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> AC PSUs support both 220 V and 110 V input voltages with the exception of Titanium PSUs, which support only 220 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.</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>
E	Not lit	Power is not connected.




## Diagnostic indicators on the front panel

 **NOTE:** The diagnostic indicators are not present if the system is equipped with an LCD display.

 **NOTE:** No diagnostic indicators are lit when the system is turned off. To start the system, plug it into a working power source and press the power button.

**Table 8. Diagnostic indicators**

Icon	Description	Condition	Corrective action
	Health indicator	<p>The indicator turns solid blue if the system is in good health.</p> <p>The indicator flashes amber:</p> <ul style="list-style-type: none"> <li>When the system is turned on.</li> <li>When the system is in standby.</li> <li>If any error condition exists. For example, a failed fan, PSU, or a hard drive.</li> </ul>	<p>None required.</p> <p>Check the System Event Log or system messages for the specific issue. For more information about error messages, see the <i>Dell Event and Error Messages Reference Guide</i> at <a href="https://www.dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a> &gt; <b>OpenManage software</b>.</p> <p>The POST process is interrupted without any video output due to invalid memory configurations. See the Getting help section.</p>
	Hard drive indicator	The indicator flashes amber if there is a hard drive error.	Check the System Event Log to determine the hard drive that has an error. Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics


Icon	Description	Condition	Corrective action
	Electrical indicator	The indicator flashes amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply unit (PSU) or voltage regulator).	(ePSA). If the hard drives are configured in a RAID array, restart the system and enter the host adapter configuration utility program.  Check the System Event Log or system messages for the specific issue. If it is due to a problem with the PSU, check the LED on the PSU. Reseat the PSU. If the problem persists, see the Getting help section.
	Temperature indicator	The indicator flashes amber if the system experiences a thermal error (for example, the ambient temperature is out of range or fan failure).	Ensure that none of the following conditions exist: <ul style="list-style-type: none"> <li>• A cooling fan has been removed or has failed.</li> <li>• System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is removed.</li> <li>• Ambient temperature is too high.</li> <li>• External airflow is obstructed.</li> </ul> See the Getting help section.
	Memory indicator	The indicator flashes amber if a memory error occurs.	Check the system event log or system messages for the location of the failed memory. Reseat the memory module. If the problem persists, see the Getting help section.

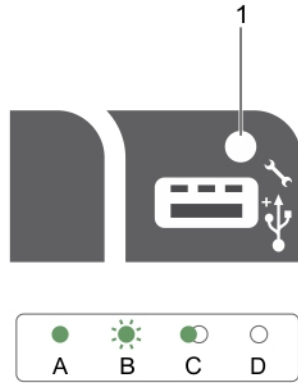
#### Related Links

[Getting help](#)

## 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.

 **NOTE:** The iDRAC Direct LED indicator does not turn on when the USB port is used in the USB mode.



**Figure 6. iDRAC Direct LED indicator**

1. iDRAC Direct status indicator

The iDRAC Direct LED indicator table describes iDRAC Direct activity when configuring iDRAC Direct by using the management port (USB XML Import).

**Table 9. iDRAC Direct LED indicators**

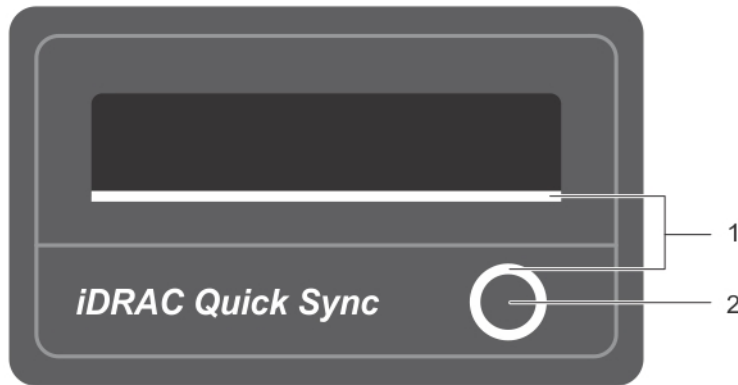
Convention	iDRAC Direct LED indicator pattern	Condition
A	Green	Turns green for a minimum of two seconds to indicate the start and end of a file transfer.
B	Flashing green	Indicates file transfer or any operation tasks.
C	Green and turns off	Indicates that the file transfer is complete.
D	Not lit	Indicates that the USB is ready to be removed or that a task is complete.

The following table describes iDRAC Direct activity when configuring iDRAC Direct by using your laptop and cable (Laptop Connect):

**Table 10. iDRAC Direct LED indicator patterns**

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

## Quick Sync indicator codes



**Figure 7. Quick Sync indicator codes**

1. Quick Sync status indicator
2. Quick Sync activation button

**Table 11. Quick Sync indicator codes**

Power indicator pattern	Condition
Slow flash	Indicates that Quick Sync is waiting to be configured from iDRAC.
Solid	Indicates that Quick Sync is ready to transfer.
Flashes three times rapidly and then turns off	Indicates that the Quick Sync feature is disabled from iDRAC.
Flashes continuously when the mobile device touches the antenna	Indicates data transfer activity.
Flashes rapidly five times and turns off for one second when the activation button is pressed. This pattern is repeated until the activation button is pressed again.	Indicates that the Quick Sync hardware is not responding properly. Reseat the bezel. If the problem persists, see Getting help section.
Off	Indicates that the Quick Sync feature is turned off. Use the activation button to enable it. If pressing the activation button does not turn on the LEDs, it indicates that power is not delivered to the Quick Sync bezel.

**NOTE:** For security purposes, Quick Sync turns off after 30 seconds of inactivity after the activation button is pressed. After timed-out, the user is expected to press the activation button again to activate Quick Sync.

## Related Links

[Getting help](#)

## Documentation matrix

This section provides information about the documentation resources for your system.

**Table 12. Documentation resources for system**

Task	Document	Location
Setting up your system	For information about installing the system into a rack, see the Rack documentation included with your rack solution.	<a href="http://Dell.com/poweredgemanuals">Dell.com/poweredgemanuals</a>
	For information about turning on the system and the technical specifications of your system, see the <i>Getting Started With Your System</i> that shipped with your system.	<a href="http://Dell.com/support/home">Dell.com/support/home</a>
Configuring your system	For information about deploying your system, see the <i>Dell DL4300 Deployment Guide</i> .	<a href="http://Dell.com/support/home">Dell.com/support/home</a>
	For information about iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the <i>Integrated Dell Remote Access Controller User's Guide</i> .	<a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>
	For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM Command Line Reference Guide for iDRAC.	<a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>
	For information about updating drivers and firmware, see the Download firmware and drivers section in this document.	<a href="http://Dell.com/support/drivers">Dell.com/support/drivers</a>
Managing your system	For information about working with your system, see the <i>Dell DL4300 Appliance User's Guide</i> .	<a href="http://Dell.com/support/home">Dell.com/support/home</a>
	For information about supported hardware and software versions for your system, see the <i>Dell DL4300 Appliance Interoperability Guide</i> .	<a href="http://Dell.com/support/home">Dell.com/support/home</a>

Task	Document	Location
	For information about the features of the Dell OpenManage Systems Management, see the <i>Dell OpenManage Systems Management Overview Guide</i> .	<a href="http://Dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a>
	For information about setting up, using, and troubleshooting OpenManage, see the <i>Dell OpenManage Server Administrator User's Guide</i> .	<a href="http://Dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a>
	For information about installing, using, and troubleshooting Dell OpenManage Essentials, see the <i>Dell OpenManage Essentials User's Guide</i> .	<a href="http://Dell.com/openmanagemanuals">Dell.com/openmanagemanuals</a>
	For understanding the features of Dell Lifecycle Controller (LCC), see the <i>Dell Lifecycle Controller User's Guide</i> .	<a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>
Working with Dell PowerEdge RAID controllers	For information about understanding the features of the Dell PowerEdge RAID controllers (PERC) and deploying the PERC cards, see the Storage controller documentation.	<a href="http://Dell.com/storagecontrollermanuals">Dell.com/storagecontrollermanuals</a>
Understanding event and error messages	For information about checking the event and error messages generated by the system firmware and agents that monitor system components, see the <i>Dell Event and Error Messages Reference Guide</i> .	<a href="http://Dell.com/openmanagemanuals/OpenManage_software">Dell.com/openmanagemanuals/OpenManage_software</a>

# Technical specifications

## Dimensions and weight

Physical	Dimensions
Height	8.73 cm (3.44 inch)
Width	48.2 cm (18.98 inch)
Depth	75.58 cm (29.75 inch)
Maximum configuration weight	36.5 kg (80.47 lb) (3.5–inch hard drive systems)
Empty weight	23.2 kg (51.15 lb) (3.5–inch hard drive systems)

## Processor specifications

### Processor Type Specification

Standard Edition	One or two Intel Xeon processors E5-2640 v4 product family
High Capacity Edition	One or two Intel Xeon processors E5-2660 v3 product family


## Expansion bus specifications

The Dell DL4300 system supports PCI express (PCIe) generation 3 expansion cards, which need to be installed on the system board using expansion card risers. This system supports three types of expansion card risers. The following table provides the expansion card riser specifications:

**Table 13. Expansion card riser specifications**

Expansion card riser	PCIe slots on the riser	Height	Length	Link
Riser 1	Slot 1	half-height	low-profile	x8
Riser 1	Slot 2	half-height	low-profile	x8
Riser 1	Slot 3	half-height	low-profile	x8
Riser 2	Slot 4	full-height	full-length	x16
Riser 2	Slot 5	full-height	full-length	x8

Expansion card riser	PCIe slots on the riser	Height	Length	Link
Riser 3 (default)	Slot 6	full-height	full-length	x8
Riser 3	Slot 7	full-height	full-length	x8


 **NOTE:** When using slots 1 through 4 on the riser, ensure that both the processors are installed on the system.


## PSU specifications

Your Dell DL4300 system supports up to two AC redundant power supply units (PSUs).

**Table 14. PSU specifications**

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100–240 V AC, autoranging

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

 **NOTE:** This system is also designed to connect to the IT power systems with a phase to phase voltage not exceeding 230 V.

## System battery specifications

Your Dell DL4300 system supports CR 2032 3.0-V lithium coin cell system battery.

## Memory specifications

The Dell DL4300 system supports DDR4 registered DIMMs (RDIMMs). Supported memory bus frequency is 2133MT/s.

**Table 15. Memory specifications for Standard Capacity Edition**

Memory module sockets	Memory capacity	Minimum RAM	Maximum RAM
Twenty-four 288-pin	4 GB single-ranked or 8 GB dual-ranked RDIMMs	64 GB with a dual processor	Up to 128 GB with a dual processor

**Table 16. Memory specifications for High Capacity Edition**

Memory module sockets	Memory capacity	Minimum RAM	Maximum RAM
Twenty-four 288-pin	16 GB dual-ranked RDIMMs	128 GB with a dual processor	Up to 256 GB with a dual processor

# Drive specifications

## Hard drives

The Dell DL4300 system supports up to twelve 3.5 inch and two 2.5 inch back-accessible and four 3.5 inch (in the hard-drive tray), internal, hot-swappable Nearline SAS drives in hard-drive slots 0 through 11 and 12 through 15.

# Ports and connectors specifications

## USB ports

The Dell DL4300 system supports:

- USB 2.0-compliant ports on the front panel
- USB 3.0-complaint ports on the back panel

The following table provides more information about the USB specifications:

**Table 17. USB specifications**

System	Front panel	Back panel
Dell DL4300 system	One 4-pin, USB 2.0-compliant	Two 4-pin, USB 3.0-compliant

## NIC ports

The Dell DL4300 Standard Edition system supports two Network Interface Controller (NIC) ports on the back panel, which is available in one of the following NIC configurations:

- 1 Gbps
- 1 Gbps plus one 10 Gbps

The DL4300 High Capacity Edition system supports two 10 Gbps Network Interface Controller (NIC) ports on the back panel.

## Serial connector

The serial connector connects a serial device to the system. The Dell DL4300 system supports one serial connector on the back panel, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant.

## VGA ports

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The Dell DL4300 system supports two 15-pin VGA ports on the front and back panels.


## Internal Dual SD Module

The Dell DL4300 system supports one flash memory card slot with the internal SD module.

## Video specifications

Video	Specification
Video type	Matrox G200eR2
Video memory	16 MB

## Environmental specifications

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

**Table 18. 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.
Fresh air	For information about fresh air, see Expanded Operating Temperature section.
Maximum temperature gradient (operating and storage)	20°C/h (68°F/h)

**Table 19. 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 29°C (84.2°F) maximum dew point.

**Table 20. Maximum vibration specifications**

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

**Table 21. Maximum shock specifications**

Maximum vibration	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axes of 40 G for up to 2.3 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 22. Maximum altitude specifications**

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



**Table 23. 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 24. Particulate contamination specifications**

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

Particulate contamination	Specifications
Corrosive dust	<p> <b>NOTE:</b> This condition applies to data center and non-data center environments.</p> <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 25. 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 26. 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.
	 <b>NOTE:</b> The 2.5-inch hard drive chassis supports a maximum of 145 W processors.

## Expanded operating temperature

**Table 27. Expanded operating temperature specifications**


Expanded operating temperature	Specifications
Continuous operation	5°C to 40°C at 5% to 85% RH with 29°C dew point.
	 <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.
	For temperatures between 35°C and 40°C, de-rate maximum allowable temperature by 1°C per 175 m above 950 m (1°F per 319 ft).
≤ 1% of annual operating hours	-5°C to 45°C at 5% to 90% RH with 29°C dew point.

Expanded operating temperature	Specifications
--------------------------------	----------------

 **NOTE:** 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.

For temperatures between 40°C and 45°C, de-rate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft).

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

 **NOTE:** When operating in the expanded temperature range, ambient temperature warnings maybe reported 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).
- 160 W or higher wattage processor is not supported.
- Redundant power supply units are required.
- Non-Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- The 3.5-inch hard drive chassis supports a maximum of 120 W processor.
- The 2.5-inch hard drive chassis supports a maximum of 145 W processor.
- Only SSDs are allowed in the hard drive slots at the back of the 3.5-inch hard drive chassis.
- Mid drive configurations, eight 3.5-inch and eighteen 1.8-inch SSD configurations are not supported.
- GPU is not supported
- Tape backup unit (TBU) is not supported.

# Initial system setup and configuration

## 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 your system *Rack Installation Placemat* at [Dell.com/poweredgemanuals](https://www.dell.com/poweredge/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.

## 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.

### Setting up and configuring the iDRAC IP address

You can set up the Integrated Dell Remote Access Controller (iDRAC) IP address by using one of the following interfaces:

- iDRAC Settings utility.
- Dell Lifecycle Controller.
- Dell Deployment Toolkit.

You can configure iDRAC IP using:

- iDRAC Web Interface.  
For more information, see the *Integrated Dell Remote Access Controller User's Guide*.
- Remote Access Controller Admin (RACADM).  
For more information, see the *RACADM Command Line Interface Reference Guide* and the *Integrated Dell Remote Access Controller User's Guide*.
- Remote Services that includes Web Services Management (WS-Man). For more information, see the *Lifecycle Controller Remote Services Quick Start Guide*.

For more information on setting up and configuring iDRAC, see the *Integrated Dell Remote Access Controller User's Guide* at [Dell.com/idracmanuals](https://www.dell.com/idrac/manuals).

## Log in to iDRAC

You can log in to iDRAC as:

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

The default user name and password are `root` and `calvin`. You can also log in by using Single Sign-On or Smart Card.

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

For more information about logging in to iDRAC and iDRAC licenses, see the *Integrated Dell Remote Access Controller User's Guide* at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Downloading the drivers and firmware


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

### Prerequisites

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. Under the **Drivers & Downloads** section, type the Service Tag of your system in the **Service Tag or Express Service Code** box.

 **NOTE:** If you do not have the Service Tag, select **Detect My Product** to allow the system to automatically detect your Service Tag, or under General support, navigate to your product.

3. Click **Drivers & Downloads**.  
The drivers that are applicable to your selection are displayed.
4. Download the drivers you need to a USB drive, CD, or DVD.

## Methods of installing the operating system

Your DL4300 Appliance is shipped with the operating system pre-installed. If you experience data corruption or hard drive failure, you can recover your appliance configuration using the RASR feature. To reset the Appliance to the factory configuration refer to the Rapid Appliance Self Recovery section in the *Dell DL4300 Appliance Deployment Guide* at [Dell.com/support/home](http://Dell.com/support/home).

## Managing your system remotely

To perform out-of-band systems management by using iDRAC, configure iDRAC for remote accessibility, set up the management station and managed system, and configure the supported web browsers. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

You can also remotely monitor and manage the server by using the Dell OpenManage Server Administrator (OMSA) software and OpenManage Essentials (OME) systems management console. For

more information, see [Dell.com/openmanagemanuals](https://www.dell.com/openmanagemanuals) → **OpenManage Server Administrator** or [Dell.com/openmanagemanuals](https://www.dell.com/openmanagemanuals) → **OpenManage Essentials**.

# Pre-operating system management applications

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

## Options to manage the pre-operating system applications


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

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

## Navigation keys


The navigation keys can help you quickly access the pre-operating system management applications.

**Table 28. Navigation keys**

Key	Description
<Page Up>	Moves to the previous screen.
<Page Down>	Moves to the next screen.
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
<Enter>	Enables you to type a value in the selected field (if applicable) or follow the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
<Tab>	Moves to the next focus area.
	 <b>NOTE:</b> This feature is applicable for the standard graphic browser only.
<Esc>	Moves to the previous page until you view the main screen. Pressing <Esc> in the main screen exits System BIOS or iDRAC Settings/ Device Settings/Service Tag Settings and proceeds with system boot.
<F1>	Displays the System Setup help.

# 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:

Option	Description
<b>System BIOS</b>	Enables you to configure BIOS settings.
<b>iDRAC Settings</b>	Enables you to configure 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.

## Entering System Setup

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

F2 = System Setup

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 BIOS

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

### 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

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.
<b>Boot Settings</b>	Specifies options to specify the boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.
<b>Network Settings</b>	Specifies options to change the network settings.
<b>Integrated Devices</b>	Specifies options to manage integrated device controllers and ports and specify related features and options.
<b>Serial Communication</b>	Specifies options to manage the serial ports and specify related features and options.
<b>System Profile Settings</b>	Specifies options to change the processor power management settings, memory frequency, and so on.
<b>System Security</b>	Specifies options to configure the system security settings, such as system password, setup password, Trusted Platform Module (TPM) security. It also manages the power and NMI buttons on the system.
<b>Miscellaneous Settings</b>	Specifies options to change the system date, time, and so on.


### 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.

## 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

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: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.</b></p> <p>If the operating system supports UEFI, 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 <b>UEFI</b> disables the <b>BIOS Boot Settings</b> menu. Setting this field to <b>BIOS</b> disables the <b>UEFI Boot Settings</b> menu.</p>
<b>Boot Sequence Retry</b>	<p>Enables or disables the Boot Sequence Retry feature. If this option is set to <b>Enabled</b> and the system fails to boot, the system reattempts 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 UEFI Boot Mode.</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. 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 UEFI.</p>


## Choosing the system boot mode

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

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
  - Unified Extensible Firmware Interface (UEFI) boot mode is an enhanced 64-bit boot interface. If you have configured your system to boot to UEFI mode, it replaces the system BIOS.
1. From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.
  2. Select the boot mode you want the system to boot into.

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

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

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

 **NOTE:** For the latest information about supported operating systems, go to [Dell.com/ossupport](http://Dell.com/ossupport).


## Changing the boot order

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

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

## Network Settings


You can use the **Network Settings** screen to modify PXE device settings. The network settings option is available only in the UEFI mode.

 **NOTE:** The BIOS does not control network settings in the BIOS mode. For the BIOS boot mode, the optional Boot ROM of the network controllers handles the network settings.

## Viewing Network Settings

To view the **Network 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 **Network Settings**.

### Network Settings screen details

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

Option	Description
<b>PXE Device n (n = 1 to 4)</b>	Enables or disables the device. When enabled, a UEFI boot option is created for the device.
<b>PXE Device n Settings(n = 1 to 4)</b>	Enables you to control the configuration of the PXE device.

### 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:

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 Security**.

#### System Security Settings details

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


Option	Description
<b>Intel 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>	 <b>NOTE:</b> The TPM menu is available only when the TPM module is installed.  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 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> .
<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.

Option	Description
<b>TPM Command</b>	 <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> Clears all the contents of the TPM. The <b>TPM Clear</b> option is set to <b>No</b> by default.
<b>Intel 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>NMI Button</b>	Enables or disables the NMI button on the front of the system. This option is set to <b>Disabled</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 (60s to 240s)</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 disabled 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 Policy Summary</b>	Specifies the list of certificates and hashes that secure boot uses to authenticate images.

### ***Creating a system and setup password***

#### **Prerequisites**

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

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

#### **Steps**

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

Use the following guidelines to assign the system password:

- A password can have up to 32 characters.
- The password can contain the numbers 0 through 9.
- Only the following special characters are allowed: space, ("), (+), (.), (-), (.), (/), (:), (I), (\), (I), (').


A message prompts you to reenter the system password.

5. Reenter the system password, and click **OK**.
6. In the **Setup Password** field, type your setup password and press Enter or Tab.

A message prompts you to reenter the setup password.

7. Reenter the setup password, and click **OK**.
8. Press Esc to return to the System BIOS screen. Press Esc again.

A message prompts you to save the changes.

 **NOTE:** Password protection does not take effect until the system reboots.

### ***Using your system password to secure your system***


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

#### **Steps**

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


#### **Next steps**

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

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

### ***Deleting or changing system and setup password***

#### **Prerequisites**

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

#### **Steps**

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

### ***Operating with a setup password enabled***


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

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

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

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

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

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


### **System Information**

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

#### ***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***

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

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

Option	Description
<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.

### 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



**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 **Memory Settings**.


### 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.
<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>	Specifies the memory operating mode. The options available are <b>Optimizer Mode</b> , <b>Advanced ECC Mode</b> , <b>Mirror Mode</b> , <b>Spare Mode</b> , <b>Spare with Advanced ECC Mode</b> , <b>Dell Fault Resilient Mode</b> and <b>Dell NUMA Fault Resilient Mode</b> . This option is set to <b>Optimizer Mode</b> by default.



**NOTE:** The **Memory Operating Mode** option can have different default and available options based on the memory configuration of your system.

Option	Description
	 <b>NOTE:</b> The <b>Dell Fault Resilient Mode</b> 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.
<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>Snoop Mode</b>	Specifies the Snoop Mode options. The Snoop Mode options available are <b>Home Snoop</b> , <b>Early Snoop</b> , and <b>Cluster on Die</b> . This option is set to <b>Early Snoop</b> by default. This field is available only when the <b>Node Interleaving</b> is set to <b>Disabled</b> .


## 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, and logical processor idling.

### 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>QPI Speed</b>	Enables you to control QuickPath Interconnect data rate settings.
<b>Alternate RTID (Requestor Transaction ID) Setting</b>	Modifies Requestor Transaction IDs, which are QPI resources. This option is set to <b>Disabled</b> by default.   <b>NOTE:</b> Enabling this option may negatively impact the overall system performance.
<b>Virtualization Technology</b>	Enables or disables the additional hardware capabilities provided for virtualization. This option is set to <b>Enabled</b> by default.
<b>Address Translation Service (ATS)</b>	Defines the Address Translation Cache (ATC) for devices to cache the DMA transactions. This option provides an interface between CPU and DMA Memory

Option	Description
	Management to a chipset's Address Translation and Protection Table to translate DMA addresses to host addresses. This option is set to <b>Enabled</b> by default.
<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>Execute Disable</b>	Enables you to run the disable memory protection technology. This option is set to <b>Enabled</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>Configurable TDP</b>	Enables you to reconfigure the processor Thermal Design Power (TDP) levels during POST based on the power and thermal delivery capabilities of the system. TDP verifies the maximum heat the cooling system is needed to dissipate. This option is set to <b>Nominal</b> by default.   <b>NOTE:</b> This option is only available on certain stock keeping units (SKUs) of the processors.
<b>X2Apic Mode</b>	Enables or disables the X2Apic mode.
<b>Dell Controlled Turbo</b>	Controls the turbo engagement. Enable this option only when <b>System Profile</b> is set to <b>Performance</b> .   <b>NOTE:</b> Depending on the number of installed CPUs, there may be up to four processor listings.
<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 64-bit Support</b>	Specifies if the processor(s) support 64-bit extensions.
<b>Processor Core Speed</b>	Specifies the maximum core frequency of the processor.
<b>Processor 1</b>	 <b>NOTE:</b> Depending on the number of CPUs, there may be up to four processors listed.

The following settings are displayed for each processor installed in the system:

Option	Description
<b>Family-Model-Stepping</b>	Specifies the family, model, and stepping of the processor as defined by Intel.

Option	Description
<b>Option</b>	<b>Description</b>
<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 RAID on your system.

### 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



**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 **SATA Settings**.

### SATA Settings details

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>Off</b> , <b>ATA</b> , <b>AHCI</b> , or <b>RAID</b> modes. This option is set to <b>AHCI</b> by default.
<b>Security Freeze Lock</b>	Sends Security Freeze Lock command to the Embedded SATA drives during POST. This option is applicable only for ATA and AHCI modes.
<b>Write Cache</b>	Enables or disables the command for Embedded SATA drives during POST.
<b>Port A</b>	Sets the drive type of the selected device. For <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.

Option	Description
<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.

## Option

## Description

### Port B

Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

### Option

### Description

#### Model

Specifies the drive model of the selected device.

#### Drive Type

Specifies the type of drive attached to the SATA port.

#### Capacity

Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

### Port C

Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

### Option

### Description

#### Model

Specifies the drive model of the selected device.

#### Drive Type

Specifies the type of drive attached to the SATA port.

#### Capacity

Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

### Port D

Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

### Option

### Description

#### Model

Specifies the drive model of the selected device.

#### Drive Type

Specifies the type of drive attached to the SATA port.

#### Capacity

Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

### Port E

Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support.

For **AHCI** or **RAID** mode, BIOS support is always enabled.

### Option

### Description

#### Model

Specifies the drive model of the selected device.

#### Drive Type

Specifies the type of drive attached to the SATA port.

<b>Option</b>	<b>Description</b>								
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<b>Port F</b>	<p>Sets the drive type of the selected device. For <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>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 G</b>	<p>Sets the drive type of the selected device. For <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>Port H</b>	<p>Sets the drive type of the selected device. For <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>Port I</b>	<p>Sets the drive type of the selected device. For <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>								

<b>Option</b>	<p><b>Description</b></p> <p>For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.</p>								
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<b>Port J</b>	<p>Sets the drive type of the selected device. For <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>								
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## 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.

### Viewing Integrated Devices

To view the **Integrated Devices** 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 **Integrated Devices**.

### Integrated Devices details

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

<b>Option</b>	<b>Description</b>
<b>USB 3.0 Setting</b>	Enables or disables the USB 3.0 support. Enable this option only if your operating system supports USB 3.0. If you disable this option, devices operate at USB 2.0 speed. USB 3.0 is enabled by default.

Option	Description
<b>User Accessible USB Ports</b>	<p>Enables or disables the USB ports. Selecting <b>Only Back Ports On</b> disables the front 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.</p> <p> <b>NOTE:</b> Selecting <b>Only Back Ports On</b> and <b>All Ports Off</b> disables the USB management port and also restricts access to iDRAC features.</p>
<b>Internal USB Port</b>	Enables or disables the internal USB port. This option is set to <b>Enabled</b> by default.
<b>Integrated RAID Controller</b>	Enables or disables the integrated RAID controller. This option is set to <b>Enabled</b> by default.
<b>Integrated Network Card 1</b>	Enables or disables the integrated network card.
<b>Embedded NIC1 and NIC2</b>	<p> <b>NOTE:</b> The Embedded NIC1 and NIC2 options are only available on systems that do not have <b>Integrated Network Card 1</b>.</p> <p>Enables or disables the Embedded NIC1 and NIC2 options. If set to <b>Disabled</b>, the NIC may still be available for shared network access by the embedded management controller. The embedded NIC1 and NIC2 options are only available on systems that do not have Network Daughter Cards (NDCs). The Embedded NIC1 and NIC2 option is mutually exclusive with the Integrated Network Card 1 option. Configure the Embedded NIC1 and NIC2 option by using the NIC management utilities of the system.</p>
<b>I/OAT DMA Engine</b>	Enables or disables the I/OAT option. Enable only if the hardware and software support the feature.
<b>Embedded Video Controller</b>	Enables or disables the <b>Embedded Video Controller</b> option. This option is set to <b>Enabled</b> by default.
<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>Disabled</b> by default.
<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 PCIe devices that need large amounts of memory. This option is set to <b>Enabled</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 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.

## 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







**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 **Serial Communication**.

### Serial Communication details

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

Option	Description
<b>Serial Communication</b>	Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled and the port address can be specified. This option is set to <b>Auto</b> by default.
<b>Serial Port Address</b>	Enables you to set the port address for serial devices. This option is set to <b>Serial Device 1=COM2, 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>External Serial Connector</b>	Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this option.  <b>NOTE:</b> Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.  <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 this 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 must not be changed. This option is set to 115200 by default.

Option	Description
<b>Remote Terminal Type</b>	Sets the remote console terminal type. This option is set to <b>VT 100/VT 220</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 <b>System Profile</b> 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.   <b>NOTE:</b> All the parameters on the system profile setting screen are available only when the <b>System Profile</b> option is set to <b>Custom</b> .
<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.
<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.
<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>Energy Efficient Turbo</b>	Enables or disables the <b>Energy Efficient Turbo</b> option. Energy Efficient Turbo (EET) is a mode of operation where a processor's core frequency is adjusted to be within the turbo range based on workload.
<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>Enabled</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.

Option	Description
<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. Dynamic mode 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>	 <b>NOTE:</b> If there are two processors installed in the system, you see an entry for <b>Number of Turbo Boost Enabled Cores for Processor 2</b> . Controls the number of turbo boost enabled cores for processor 1. The maximum number of cores is enabled by default.
<b>Monitor/Mwait</b>	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.  <b>NOTE:</b> This option can be disabled only if the <b>C States</b> option in the <b>Custom</b> mode is set to <b>disabled</b> .  <b>NOTE:</b> When <b>C States</b> is set to <b>Enabled</b> in the <b>Custom</b> mode, changing the Monitor/Mwait setting does not impact the system power or performance.


## 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

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.
<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>In-System Characterization</b>	Enables or disables <b>In-System Characterization</b> . This option is set to <b>Disabled</b> by default. The two other options are <b>Enabled</b> and <b>Enabled - No Reboot</b> .  <b>NOTE:</b> The default setting for <b>In-System Characterization</b> is subject to change in future BIOS releases.  When enabled, In-System Characterization (ISC) executes during POST upon detecting relevant change(s) in system configuration to optimize system power and performance. ISC takes about 20 seconds to execute, and system reset is needed for ISC results to be applied. The <b>Enabled - No Reboot</b> option executes ISC and continues without applying ISC results until the next time system reset occurs. The <b>Enabled</b> option executes ISC and forces an immediate system reset so that ISC results can be applied. It takes the system longer to be ready due to the forced system reset. When disabled, ISC does not execute.

### 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:** 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).

#### Entering the iDRAC Settings utility

1. Turn on or restart the managed system.
2. Press F2 during Power-on Self-test (POST).

3. On the **System Setup Main Menu** page, click **iDRAC Settings**.  
The **iDRAC Settings** screen is displayed.

### Changing the thermal settings

The iDRAC settings utility enables you to select and customize the thermal control settings for your system.

1. Click **iDRAC Settings** → **Thermal**.
2. Under **SYSTEM THERMAL PROFILE** → **Thermal Profile**, select one of the following options:
  - Default Thermal Profile Settings
  - Maximum Performance (Performance Optimized)
  - Minimum Power (Performance per Watt Optimized)
3. Under **USER COOLING OPTIONS**, set the **Fan Speed Offset**, **Minimum Fan Speed**, and **Custom Minimum Fan Speed**.
4. Click **Back** → **Finish** → **Yes**.

### System Information details

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

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


## Dell Lifecycle Controller

Dell Lifecycle Controller (LC) provides advanced embedded systems management capabilities including system deployment, configuration, update, maintenance, and diagnosis. LC is delivered as part of the

iDRAC out-of-band solution and Dell system embedded Unified Extensible Firmware Interface (UEFI) applications.

## Embedded system management

The Dell Lifecycle Controller provides advanced embedded 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.

### Viewing Boot Manager

To enter **Boot Manager**:

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

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.

# Installing and removing system components

This section provides information about installing and removing the system components.

## 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.
-  **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.
-  **NOTE:** Dell recommends that you always use a static mat and static strap while working on components inside the system.
-  **NOTE:** To ensure proper operation and cooling, all bays in the system and system fans must be populated always with either a component or with a blank.

## Before working inside your system

### Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

### Steps

1. Turn off the system, including any attached peripherals.
2. Disconnect the system from the electrical outlet and disconnect the peripherals.
3. If installed, remove the front bezel.
4. If applicable, remove the system from the rack.  
For more information, see the *Rack Installation* placemat at [Dell.com/poweredgedmanuals](https://Dell.com/poweredgedmanuals).
5. Remove the system cover.

### Related Links

- [Removing the cooling shroud](#)
- [Safety instructions](#)
- [Removing the cooling shroud](#)

## After working inside your system

### Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

### Steps

1. Install the system cover.
2. If applicable, install the system into the rack.  
For more information, see the *Rack Installation* placemat at [Dell.com/poweredgemanuals](https://Dell.com/poweredgemanuals).
3. If removed, install the optional front bezel.
4. Reconnect the peripherals and connect the system to the electrical outlet.
5. Turn on the system, including any attached peripherals.


## Recommended tools

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

- Key to the bezel lock.  
This is needed only if your system includes a bezel.
- Phillips #1 screwdriver
- Phillips #2 screwdriver
- Torx #T6, #T8, #T10, and #T15 screwdrivers
- 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

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

## Front bezel (optional)


The front bezel is attached to the front side of the server and prevents accidents while removing the hard drive or when pressing the reset or power button. The front bezel can also be locked for additional security.

### Removing the optional front bezel

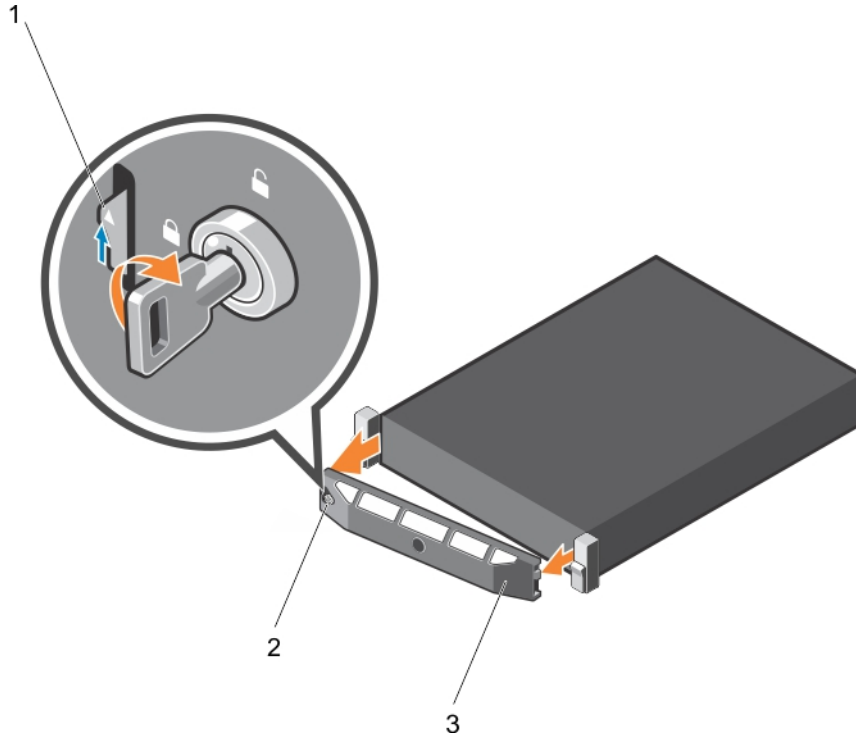
#### Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

#### Steps

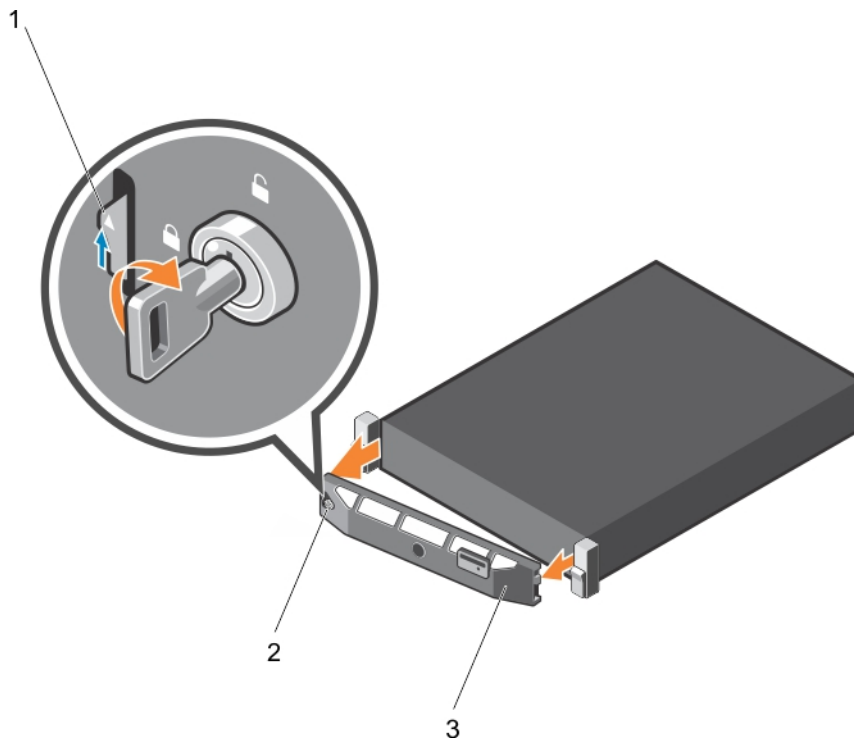
1. Locate and remove the bezel key.  
 **NOTE:** The bezel key is attached to the back of the bezel.
2. Unlock the bezel by using the key.

3. Slide the release latch up and pull the left end of the bezel.
4. Unhook the right end, and remove the bezel.



**Figure 8. Removing the optional front bezel**

- |                  |               |
|------------------|---------------|
| 1. release latch | 2. bezel lock |
| 3. front bezel   |               |



**Figure 9. Removing the optional Quick Sync front bezel**


1. release latch
2. bezel lock
3. Quick Sync bezel

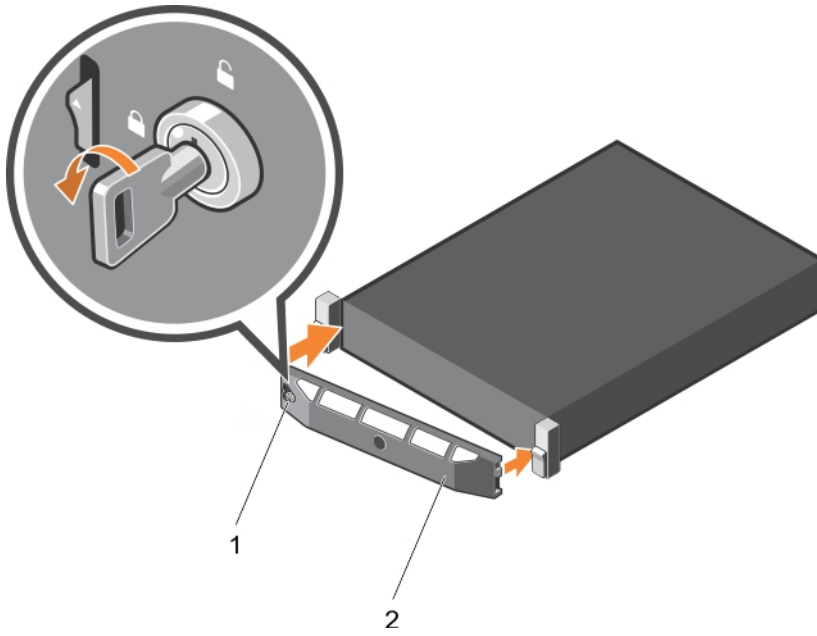
## Installing the optional front bezel

### Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

### Steps

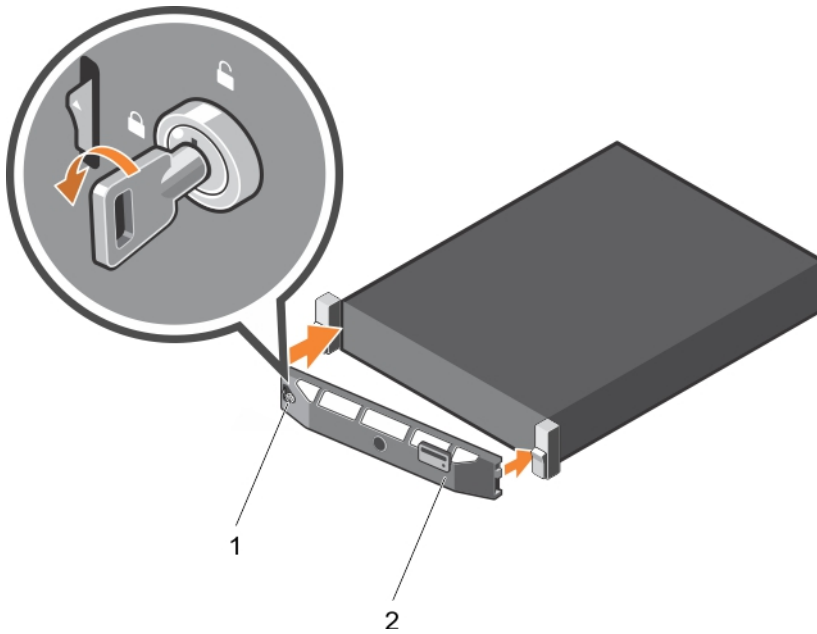
1. Locate and remove the bezel key.
  -  **NOTE:** The bezel key is attached to the back of the bezel.
2. Hook the right end of the bezel onto the chassis.
3. Fit the free end of the bezel onto the system.
4. Lock the bezel by using the key.



**Figure 10. Installing the optional front bezel**

1. bezel lock

2. front bezel



**Figure 11. Installing the Quick Sync bezel**

1. bezel lock

2. Quick Sync bezel

## System cover

The system cover protects the components inside the system and helps in maintaining air flow inside the system. Removing the system cover actuates the intrusion switch which aids in maintaining system security.

### Removing the system cover

#### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Turn off the system, including any attached peripherals.
3. Disconnect the system from the electrical outlet and disconnect the peripherals.
4. If installed, remove the optional bezel. For more information, see the Removing the optional front bezel section.

#### Steps

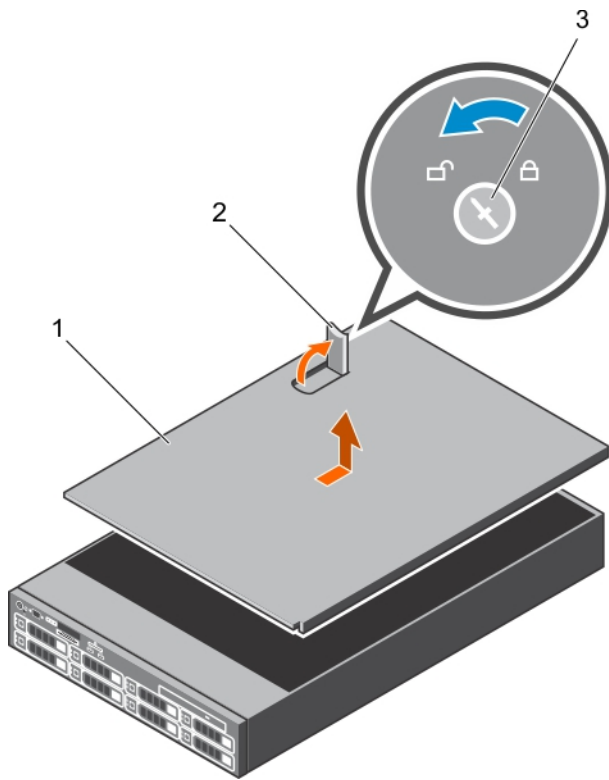
1. Rotate the latch release lock counter clockwise to the unlocked position.
2. Lift the latch toward the back of the system.

The system cover slides back and the tabs on the system cover disengage from the slots on the chassis.



**NOTE:** The position of the latch may vary depending on the configuration of your system.

3. Hold the cover on both sides, and lift the cover away from the system.



**Figure 12. Removing the system cover**

1. system cover
2. latch
3. latch release lock

### Next steps

1. Install the system cover.

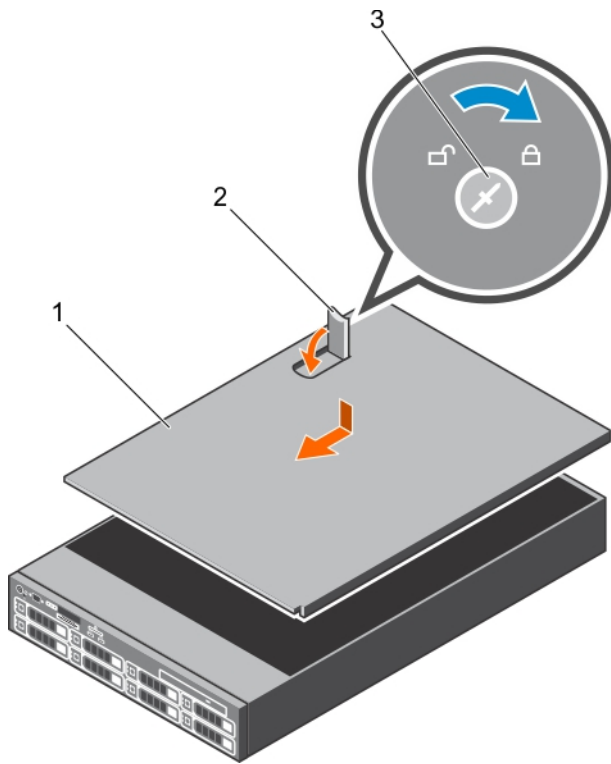
## Installing the system cover

### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Ensure that all internal cables are connected and placed out of the way and no tools or extra parts are left inside the system.

### Steps

1. Align the slots on the system cover with the tabs on the chassis.
2. Push the system cover latch down to move the system cover into the closed position.  
The system cover slides forward and the slots on the system cover engage with the tabs on the chassis. The system cover latch locks into place when the system cover is completely engaged with the tabs on the chassis.
3. Rotate the latch release lock clockwise to the locked position.



**Figure 13. Installing the system cover**

1. system cover
2. latch
3. latch release lock

#### Next steps

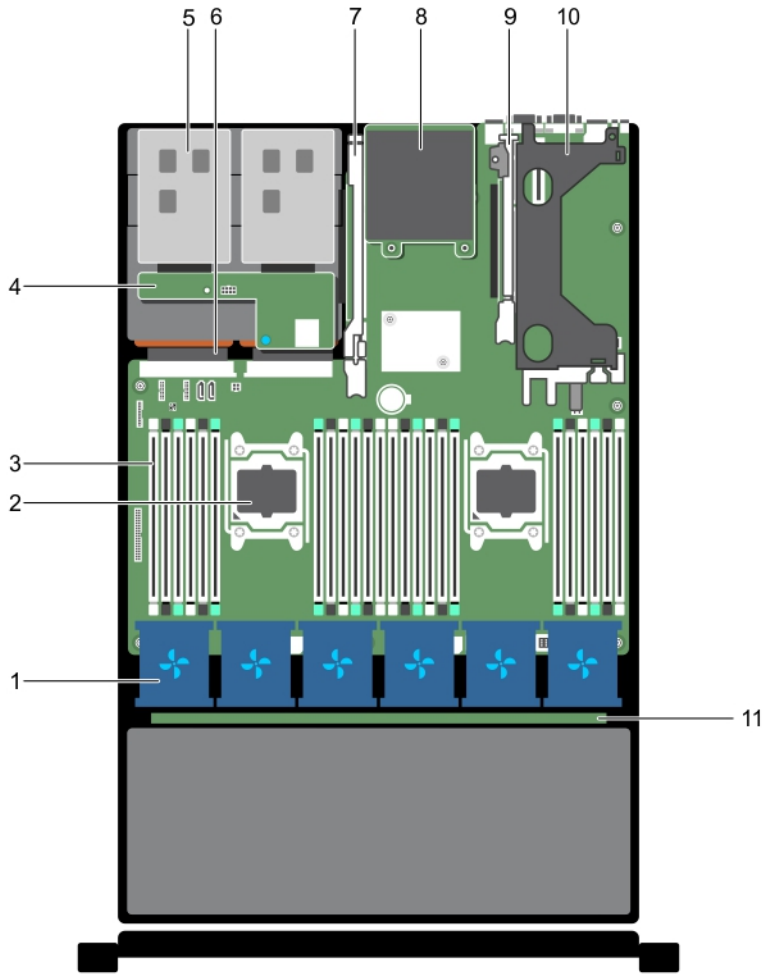
1. If removed, install the front bezel.
2. Reconnect the peripherals and connect the system to the electrical outlet.
3. Turn on the system, including any attached peripherals.

#### Related Links

[Safety instructions](#)

## 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 14. Inside the system**

- |  |                                |
|--|--------------------------------|
| 1. cooling-fan in the cooling-fan assembly (6) | 2. processor (2)               |
| 3. DIMMs (24)                                  | 4. hard-drive backplane (back) |
| 5. hard drive (2) (back)                       | 6. power supply unit (2)       |
| 7. expansion-card riser 3                      | 8. network daughter card       |
| 9. expansion-card riser 2                      | 10. expansion-card riser 1     |
| 11. hard-drive backplane                       |                                |

## Cooling shroud

The cooling shroud has aerodynamically placed openings that direct the airflow across the entire system. The airflow passes through all the critical parts of the system, where the vacuum pulls air across the entire surface area of the heat sink, thus allowing increased cooling.

**NOTE:** Systems that support the internal hard drive tray require low-profile heat sinks and do not require or support a cooling shroud.

## Related Links

[Safety instructions](#)

[Before working inside your system](#)

[After working inside your system](#)

## Removing the cooling shroud

### Prerequisites

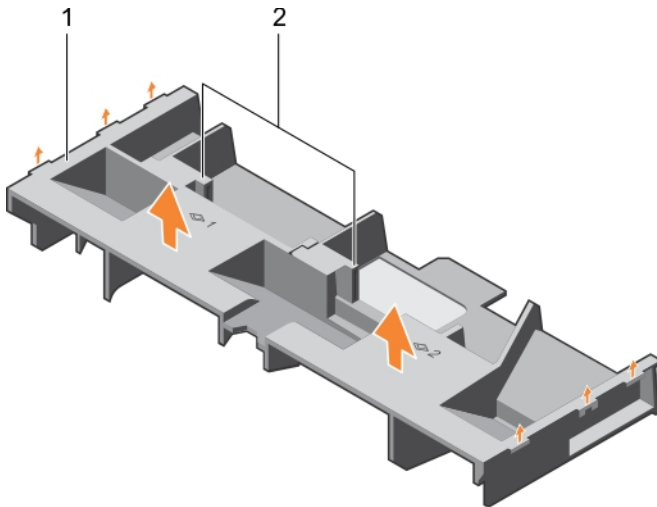
△ **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by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

△ **CAUTION:** Never operate your system with the cooling 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 the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove the full-length PCIe card.

### Steps

Holding the touch points, lift the cooling shroud away from the system.



**Figure 15. Removing the cooling shroud**

1. cooling shroud

2. touch point (2)

### Next steps

1. Install the cooling shroud.
2. If required, install the full-length PCIe card.
3. Follow the procedure listed in the After working inside your system section.

## Installing the cooling shroud

### Prerequisites

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

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

### Steps

1. Align the tabs on the cooling shroud with the securing slots on the chassis.
2. Lower the cooling shroud into the chassis until it is firmly seated.

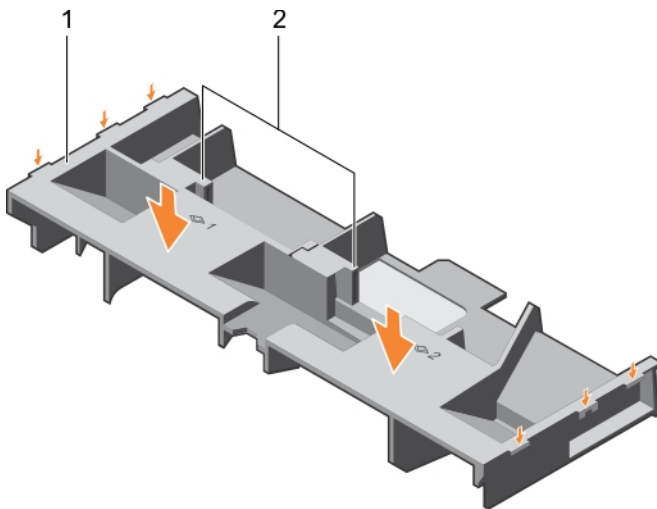


Figure 16. Installing the cooling shroud

1. cooling shroud

2. touch point (2)

### Next steps

1. If removed, install the full-length PCIe card.
2. Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

# Hard-drive tray assembly

The hard-drive tray is located behind the cooling-fan assembly. It supports four 3.5 inch hard drives.

**NOTE:** Systems that support the internal hard-drive tray require low-profile heat sinks and do not require or support a cooling shroud.

## Removing the hard drive tray

### Prerequisites

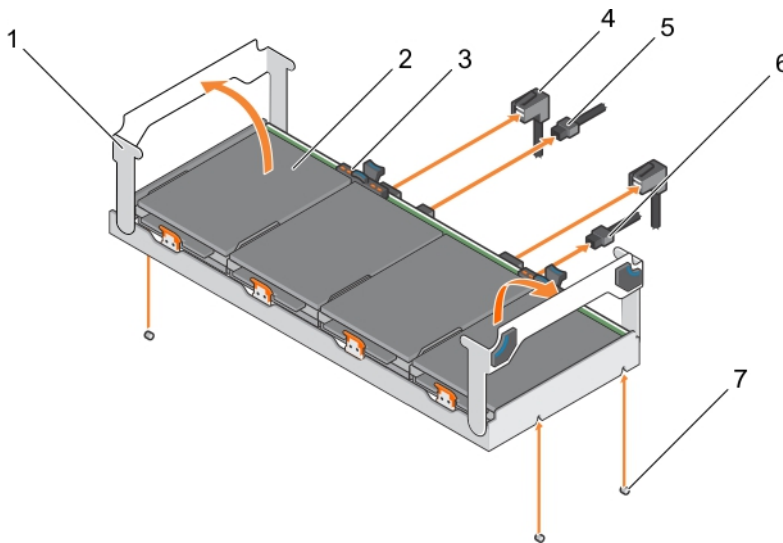
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

**CAUTION:** The hard drive tray is hot to touch for some time after the system has been powered down. Allow time for the hard drive tray to cool before handling it.

### Steps

1. Disconnect the SAS, power, and signal cables from the hard drive backplane.
2. Lift the hard drive tray handles 90 degrees upward.
3. Hold the hard drive tray handles and lift the hard drive tray out of the chassis.



**Figure 17. Removing the hard drive tray**

- |                                 |                          |
|---------------------------------|--------------------------|
| 1. hard drive tray handle (2)   | 2. hard drive (4)        |
| 3. hard drive indicator         | 4. SAS cable             |
| 5. backplane signal cable       | 6. backplane power cable |
| 7. guide pin on the chassis (4) |                          |

## Next steps

1. Install the hard drive tray. See the Installing the hard drive tray section.
2. Follow the procedure listed in the After working inside your system section.


## Related Links

- [Safety instructions](#)
- [After working inside your system](#)
- [Before working inside your system](#)
- [Installing the hard drive tray](#)

## Installing the hard drive tray

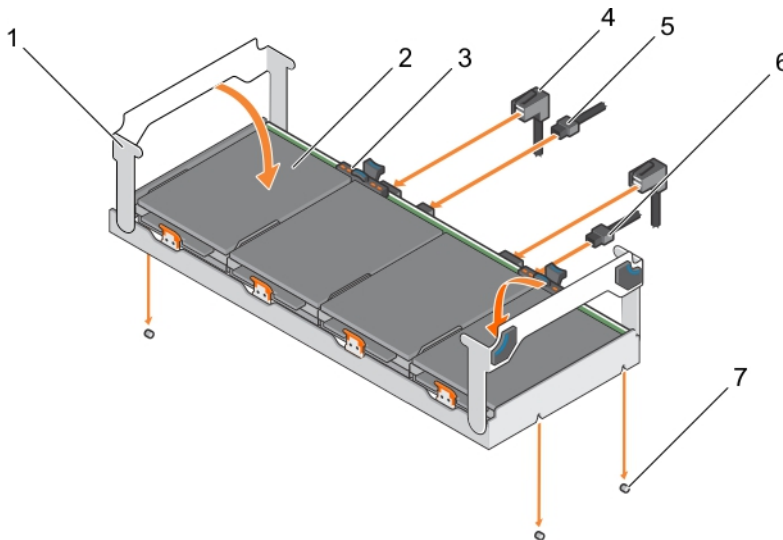
### Prerequisites

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

 **NOTE:** Systems that support the internal hard drive tray support low-profile heat sinks and do not support a cooling shroud.

### Steps

1. Lift the hard drive tray handles to the 90-degree angle position.
2. Hold the hard drive tray handles and align the slots on the hard drive tray with the guide pins on the chassis.
3. Slide the hard drive tray into the chassis.
4. Lower the hard drive tray handles to lock the hard drive tray in place.
5. Connect the SAS, power, and signal cables to the backplane.



**Figure 18. Installing the hard drive tray**

- |                               |                          |
|-------------------------------|--------------------------|
| 1. hard drive tray handle (2) | 2. hard drive (4)        |
| 3. hard drive indicator       | 4. SAS cable             |
| 5. backplane signal cable     | 6. backplane power cable |

7. guide pin on the chassis (4)

### Next steps

Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Removing a hard drive blank from a hard drive carrier

### Prerequisites

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

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

**⚠ CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

### Steps

1. Push out at the edges of the carrier to disengage the tabs on the hard drive carrier from the slots on the hard drive blank.
2. Lift the hard drive carrier away from the hard drive blank.

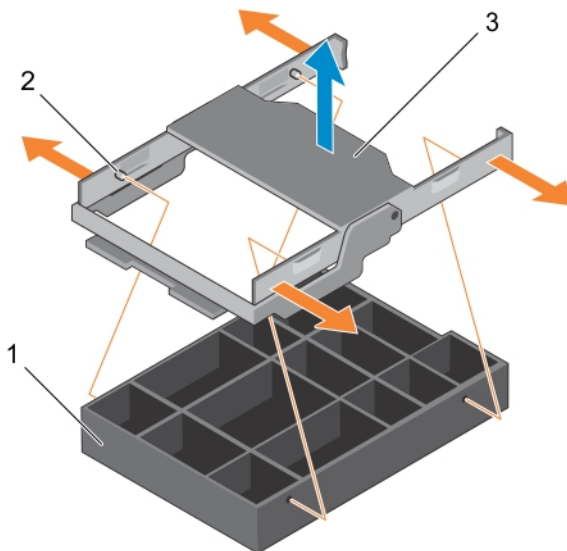


Figure 19. Removing the hard drive blank from a hard drive carrier

1. hard drive blank
2. tab on the hard drive carrier (4)
3. hard drive carrier

### Next steps

Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Installing a hard drive blank into a hard drive carrier

### Prerequisites

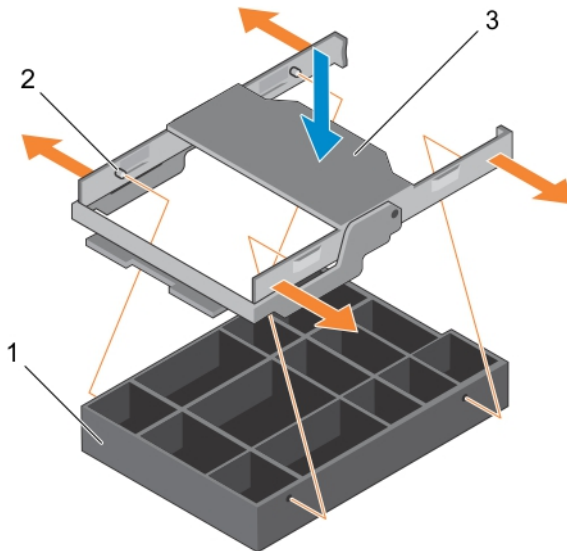
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

**CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

### Steps

1. Align the tabs on the hard drive carrier with the slots on the hard drive blank.
2. Pull the edges of the carrier to fit over the hard drive blank.
3. Lower the hard drive carrier onto the hard drive blank to secure it.



**Figure 20. Installing a hard drive blank into a hard drive carrier**

1. hard drive blank
2. tab on the hard drive carrier (4)
3. hard drive carrier

### Next steps

Follow the procedure listed in the After working inside your system section

## Related Links


[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)


## Removing a hard drive carrier from the hard drive tray

### Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. From the management software, prepare the hard drive for removal. Wait until the indicators on the hard drive carrier signal that the hard drive can be removed safely. For more information, see the documentation for the storage controller at [Dell.com/storagecontrollermanuals](http://Dell.com/storagecontrollermanuals).

If the hard drive is online, the green activity/fault indicator flashes as the drive is turned off. When the hard drive indicators are off, the hard drive is ready for removal.


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

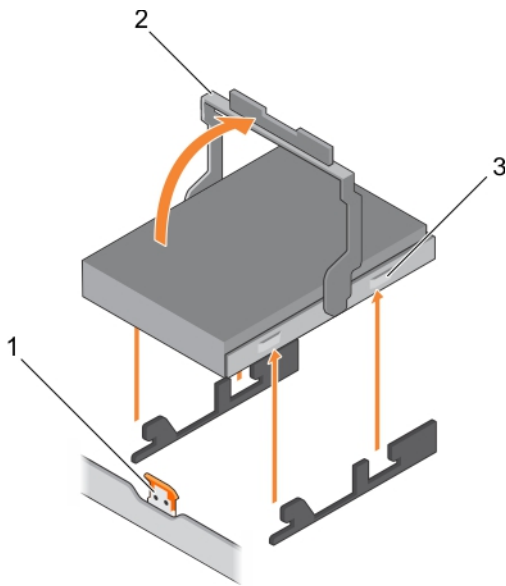
### Steps

1. Lift the hard drive carrier handle upward.
2. Press the release tab on the hard drive tray and lift the hard drive carrier handle upward to disengage the hard drive from the backplane.
3. Hold the hard drive carrier handle and lift the hard drive carrier out of the hard drive tray.

 **CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

4. If you are not replacing the hard drive immediately, insert a hard drive blank in the empty hard drive slot.

 **NOTE:** Install the hard drive blanks in the hard drive carrier before installing the hard drive carrier into the hard drive tray.



**Figure 21. Removing a hard drive carrier from the hard drive tray**

1. release tab on the hard drive tray
2. hard drive carrier handle
3. hard drive carrier

#### Related Links

[Safety instructions](#)

## Installing a hard drive carrier into the hard drive tray

#### Prerequisites

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

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

**△ CAUTION:** Use only hard drives that have been tested and approved for use with the hard drive backplane.

**△ CAUTION:** When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard 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 hard drive is installed and the system is powered on, the hard drive automatically begins to rebuild. Make absolutely sure that the replacement hard drive is blank or contains data that you wish to have over-written. Any data on the replacement hard drive is immediately lost after the hard drive is installed.

## Steps

1. Lift the hard carrier handle.
2. If a hard drive blank is installed in the hard drive slot, remove it.
3. Insert the hard drive carrier into the hard drive tray.
4. Lower the hard drive carrier handle to engage the hard drive to the connector on the backplane and lock the hard drive in place.

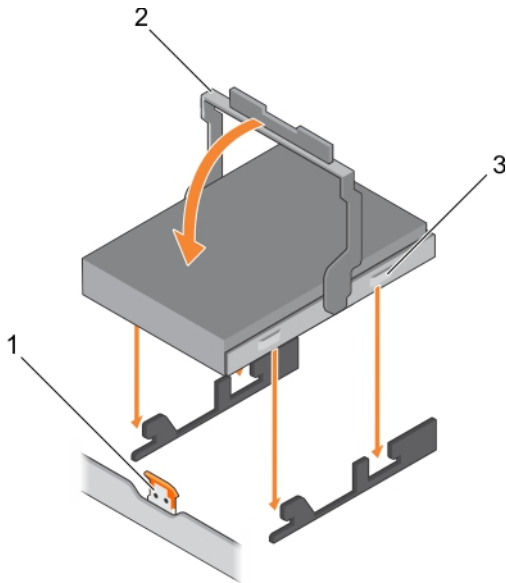


Figure 22. Installing a hard drive carrier into the hard drive tray

1. release tab on the hard drive tray
2. hard drive carrier handle
3. hard drive carrier

## Related Links

[Safety instructions](#)

[Before working inside your system](#)

## Removing a hard drive from a hard drive carrier

### Prerequisites

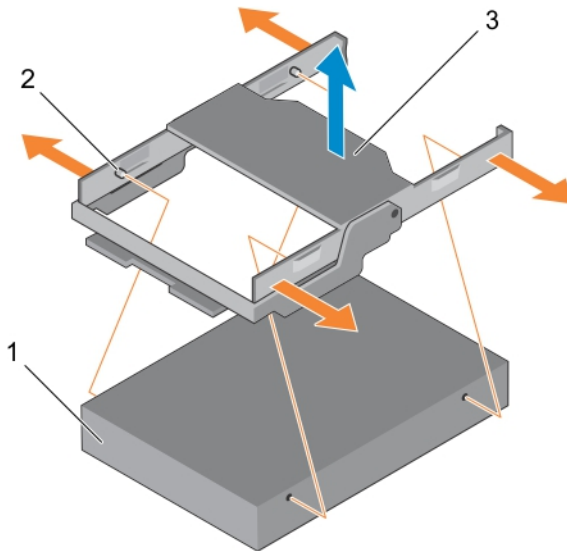
**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by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

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

**⚠ CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

### Steps

1. Push out at the edges of the carrier to disengage the tabs on the hard drive carrier from the slots on the hard drive.
2. Lift the hard drive carrier away from the hard drive.



**Figure 23. Removing the hard drive from a hard drive carrier**

1. hard drive
2. tab on the hard drive carrier (4)
3. hard drive carrier

### Next steps

Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

### Installing a hard drive into a hard drive carrier

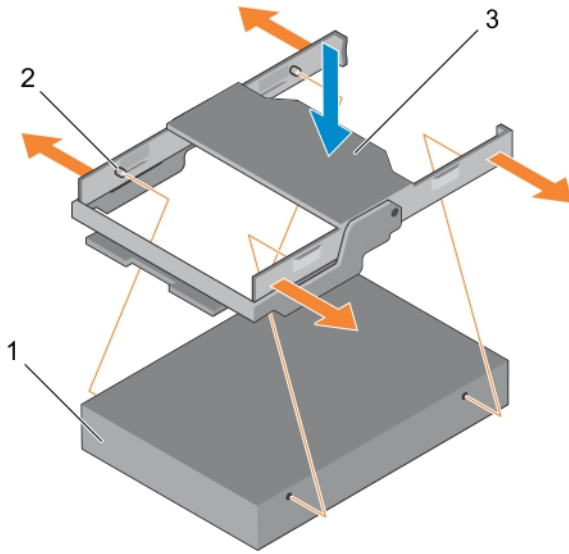
#### Prerequisites

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

**⚠ 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 tabs on the hard drive carrier with the slots on the hard drive.
2. Pull the edges of the carrier to fit over the hard drive.
3. Lower the hard drive carrier onto the hard drive to secure it.



**Figure 24. Installing a hard drive into a hard drive carrier**

1. hard drive
2. tab on the hard drive carrier (4)
3. hard drive carrier

#### Next steps

Follow the procedure listed in the After working inside your system section.

#### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Removing the hard drive backplane from the hard drive tray

#### Prerequisites

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

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

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Disconnect all the cables from the backplane.
4. Remove all the hard drive carriers.
5. Remove the hard drive tray from the system.

### Steps

Press the release tabs and lift the backplane out of the hard drive tray.

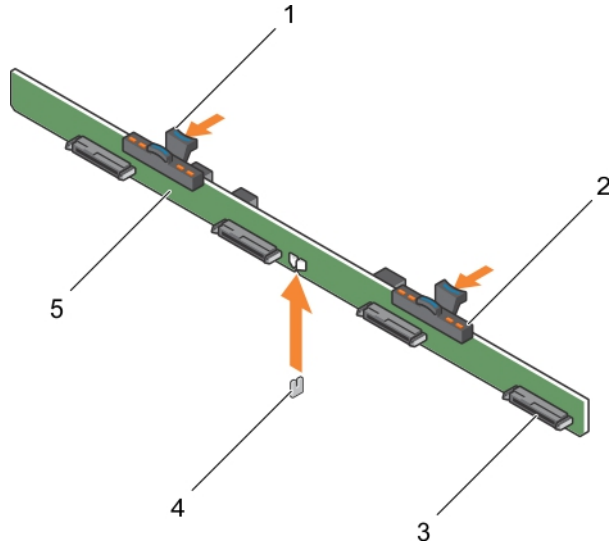


Figure 25. Removing the 3.5 inch (x4) hard drive backplane

- |                             |                          |
|-----------------------------|--------------------------|
| 1. release tab (2)          | 2. hard drive indicators |
| 3. hard drive connector (4) | 4. guide pin             |
| 5. hard drive backplane     |                          |

### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)

## Installing the hard drive backplane in the hard drive tray

### Prerequisites

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

**⚠ 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

Align the hard drive backplane with the guide pin on the chassis and lower the hard drive backplane on the chassis until it is firmly seated.

### Next steps

1. Install the hard drives carriers into the hard drive tray.
2. Install the hard drive tray into the chassis.
3. Follow the procedure listed in the After working inside your system section.

## Related Links


[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

# Cooling fans


Your system supports six hot-swappable cooling fans.


 **NOTE:** In the event of a problem with a particular fan, the fan number is referenced by the system management software, allowing you to easily identify and replace the proper fan by noting the fan numbers on the cooling fan assembly.


## Removing a cooling fan

### Prerequisites

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

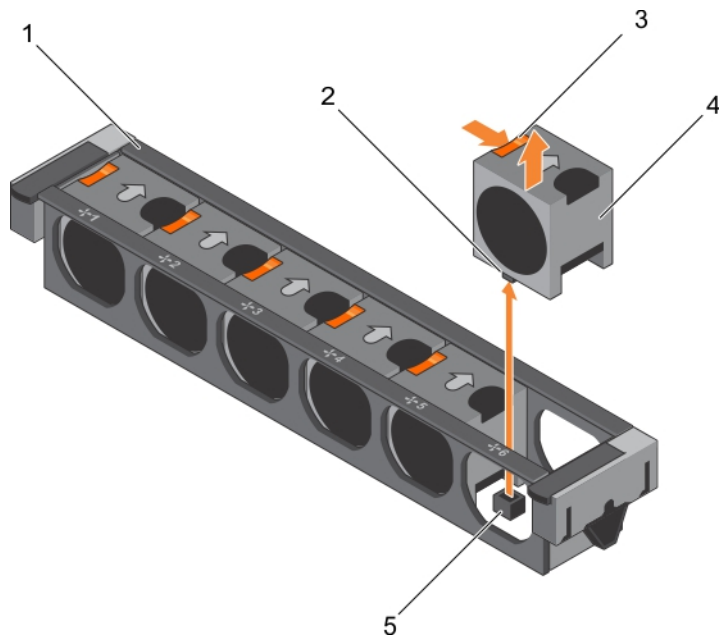
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

 **NOTE:** The procedure for removing each fan is identical.

### Steps

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



**Figure 26. Removing a cooling fan**

- |  |                              |
|--|------------------------------|
| 1. cooling fan assembly                          | 2. cooling fan connector (6) |
| 3. fan release tab (6)                           | 4. cooling fan (6)           |
| 5. cooling fan connector on the system board (6) |                              |

#### Next steps

1. Install the cooling fan.
2. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [After working inside your system](#)
- [Before working inside your system](#)

## Installing a cooling fan

#### Prerequisites

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

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

**NOTE:** Your system supports six hot swappable cooling fans.

**NOTE:** The procedure for installing each fan is identical.

### Steps

1. Align the connector at the base of the cooling fan with the connector on the system board.
2. Slide the cooling fan into the securing slot until the tab locks into place.

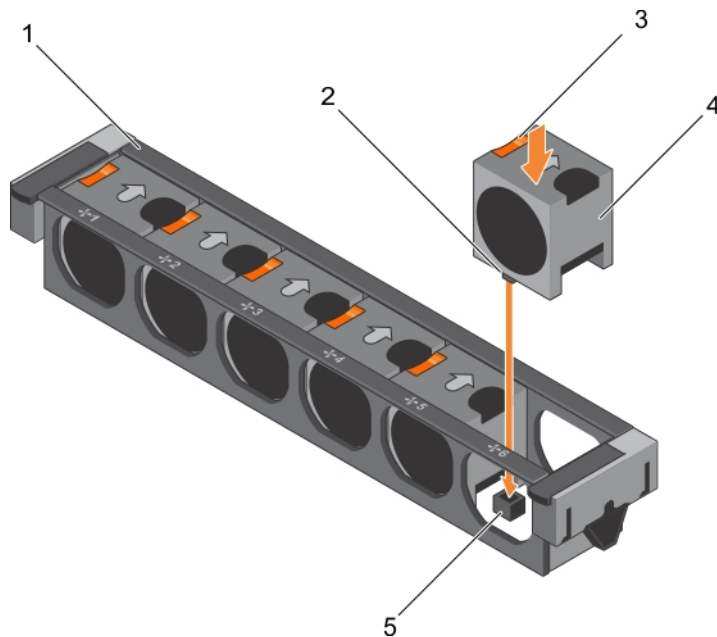


Figure 27. Installing a cooling fan

- |  |                              |
|--|------------------------------|
| 1. cooling fan assembly                          | 2. cooling fan connector (6) |
| 3. fan release tab (6)                           | 4. cooling fan (6)           |
| 5. cooling fan connector on the system board (6) |                              |

### Next steps

Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Cooling-fan assembly

The cooling fan assembly is an essential part of a server's cooling system. It ensures that the key components of the server such as the processors, hard drives, and memory get adequate air circulation to keep them cool. A failure in the server's cooling system can result in the server overheating and may lead to damage.

### Removing the cooling-fan assembly

#### Prerequisites

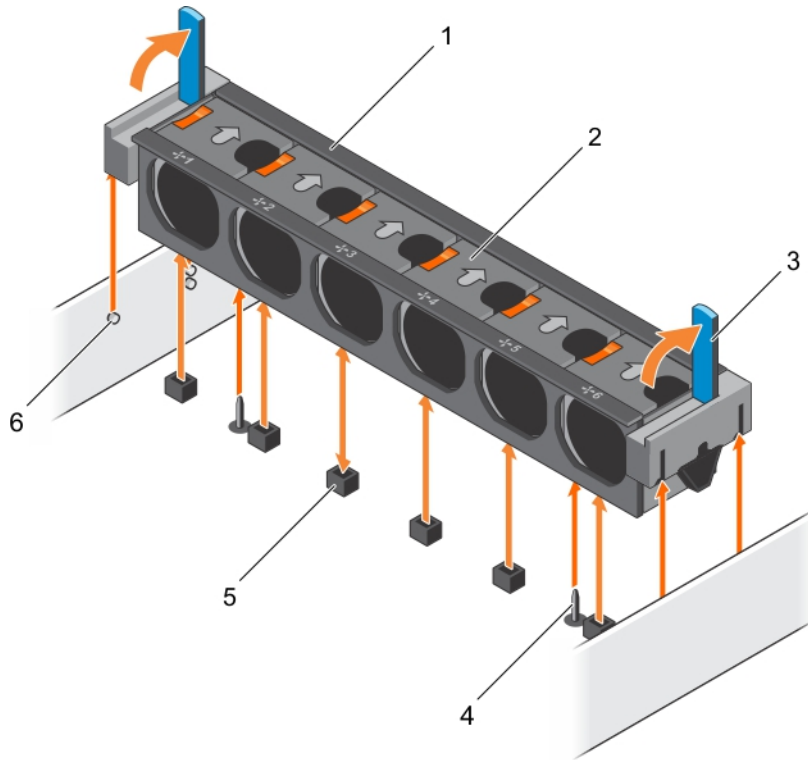
1. Follow the safety guidelines listed in the Safety instructions section.

2. Follow the procedure listed in the Before working inside your system section.

**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. Unlock the cooling-fan assembly from the chassis by lifting the release levers upward.
2. Lift the cooling-fan assembly out of the chassis.



**Figure 28. Removing the cooling-fan assembly**

- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. cooling-fan assembly      | 2. cooling fan (6)                   |
| 3. release lever (2)         | 4. guide pin on the system board (2) |
| 5. cooling-fan connector (6) | 6. guide pin on the chassis (6)      |

#### Next steps

1. Replace the cooling-fan assembly.
2. Follow the procedure listed in the After working inside your system section.

## Installing the cooling-fan assembly

### Prerequisites

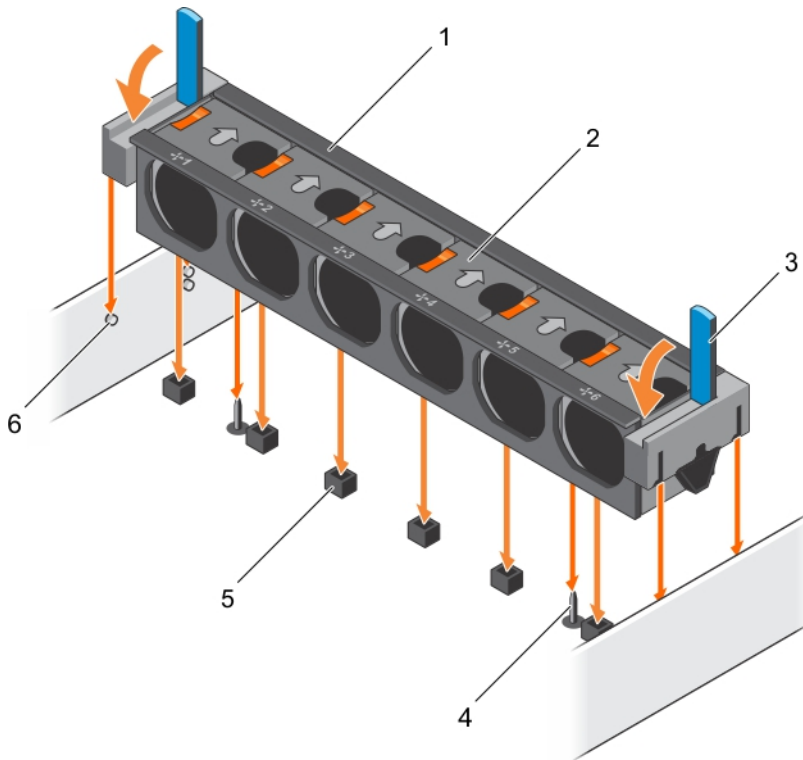
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

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

### Steps

1. Align the cooling-fan assembly slots with the guide pins on the chassis.
2. Slide the cooling-fan assembly into the chassis.
3. Lock the cooling-fan assembly into the chassis by lowering the release levers until firmly seated.



**Figure 29. Installing the cooling fan assembly**


- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. cooling fan assembly      | 2. cooling fan (6)                   |
| 3. release lever (2)         | 4. guide pin on the system board (2) |
| 5. cooling fan connector (6) | 6. guide pin on the chassis (6)      |

## Next steps

Follow the procedure listed in the After working inside your system section.

# System memory


Your system supports DDR4 registered DIMMs (RDIMMs).

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

Memory bus operating frequency can be 2133 MT/s depending on the following factors:

- DIMM type (RDIMM)
- Number of DIMMs populated per channel
- System profile selected (for example, Performance Optimized, Custom, or Dense Configuration Optimized)
- Maximum supported DIMM frequency of the processors

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

 **NOTE:** DIMMs in sockets A1 to A12 are assigned to processor 1 and DIMMs in sockets B1 to B12 are assigned to processor 2.

Memory channels are organized as follows:


<b>Processor 1</b>	channel 0: slots A1, A5, and A9
	channel 1: slots A2, A6, and A10
	channel 2: slots A3, A7, and A11
	channel 3: slots A4, A8, and A12
<b>Processor 2</b>	channel 0: slots B1, B5, and B9
	channel 1: slots B2, B6, and B10
	channel 2: slots B3, B7, and B11
	channel 3: slots B4, B8, and B12

The following table shows the memory populations and operating frequencies for the supported configurations.

**Table 29. Memory populations**

DIMM Type	DIMMs Populated/ Channel	Operating Frequency (in MT/s)	Operating Voltage	Maximum DIMM Rank/ Channel
RDIMM	1	2133	1.2 V	Dual rank
	2	2133	1.2 V	Dual rank
	3	2133	1.2 V	Dual rank

## General memory module installation guidelines

 **NOTE:** Memory configurations that fail to observe these guidelines can prevent your system from booting, stop responding during memory configuration, or operating with reduced memory.

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:

- x4 and x8 DRAM based memory modules can be mixed. For more information, see the Mode-specific guidelines section.
- Up to three dual- or single-rank RDIMMs can be populated per channel.
- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s) or slower depending on system DIMM configuration.
- 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.
- Populate all the sockets with white release tabs first, followed by the black release tabs, and then the green release tabs.
- When mixing memory modules with different capacities, populate the sockets with memory modules with highest capacity first. For example, if you want to mix 4 GB and 8 GB memory modules, populate 8 GB memory modules in the sockets with white release tabs and 4 GB memory modules in the sockets with black release tabs.
- In a dual-processor configuration, the memory configuration for each processor should be identical. For example, if you populate socket A1 for processor 1, then populate socket B1 for processor 2, and so on.
- Memory modules of different capacities can be mixed provided other memory population rules are followed (for example, 4 GB and 8 GB memory modules can be mixed).
- Mixing of more than two memory module capacities in a system is not supported.
- Populate four memory modules per processor (one DIMM per channel) at a time to maximize performance.

## Mode-specific guidelines

Four memory channels are allocated to each processor. The allowable configurations depend on the memory mode selected.

### Advanced Error Correction Code (lockstep)

Advanced Error Correction Code (ECC) mode extends SDDC from x4 DRAM based DIMMs to both x4 and x8 DRAMs. This protects against single DRAM chip failures during normal operation.


The installation guidelines for memory modules are as follows:

- Memory modules must be identical in size, speed, and technology.
- DIMMs installed in memory sockets with white release levers must be identical and the same rule applies for sockets with black release levers. This ensures that identical DIMMs are installed in matched pair —for example, A1 with A2, A3 with A4, A5 with A6, and so on.

### Memory optimized (independent channel) 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.


## Memory sparing

 **NOTE:** To use memory sparing, this feature must be enabled in System Setup.

In this mode, one rank per channel is reserved as a spare. If persistent correctable errors are detected on a rank, the data from this rank is copied to the spare rank, and the failed rank is disabled.

With memory sparing enabled, the system memory available to the operating system is reduced by one rank per channel. For example, in a dual-processor configuration with sixteen 4 GB single-rank memory modules, the available system memory is:  $3/4$  (ranks/channel)  $\times$  16 (memory modules)  $\times$  4 GB = 48 GB, and not  $16$  (memory modules)  $\times$  4 GB = 64 GB.

 **NOTE:** Memory sparing does not offer protection against a multi-bit uncorrectable error.

 **NOTE:** Both Advanced ECC/Lockstep and Optimizer modes support memory sparing.

## Memory mirroring

Memory mirroring offers the strongest memory module reliability mode compared to all other modes, providing improved uncorrectable multi-bit failure protection. In a mirrored configuration, 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. In the event of an uncorrectable error, the system switches over to the mirrored copy. This ensures SDDC and multi-bit protection.

The installation guidelines for memory modules are as follows:


- Memory modules must be identical in size, speed, and technology.
- Memory modules installed in memory module sockets with white release levers must be identical and the same rule applies for sockets with black and green release tabs. This ensures that identical memory modules are installed in matched pairs—for example, A1 with A2, A3 with A4, A5 with A6, and so on.

**Table 30. Processor configuration**

Processor	Configuration	Memory population rules	Memory population information
Single CPU	Memory population order	{1,2}, {3,4}	See Memory mirroring note

## Sample memory configurations

The following tables show sample memory configurations for standard and high configurations.


 **NOTE:** 1R, 2R, and 4R in the following tables indicate single-, dual-, and quad-rank DIMMs respectively.

**Table 31. Memory configurations**


System capacity (in GB)	DIMM size (in GB)	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
64	16	4	1R, x8, 2133 MT/s	A1, A2, A3, A4
128	16	8	2R, x8, 2133 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
256	16	16	2R, x8, 2133 MT/s,	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8


## Removing memory modules

### Prerequisites

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


1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the cooling shroud.
4. If installed, remove the cooling fan assembly. For more information, see the Removing the cooling fan assembly section.

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

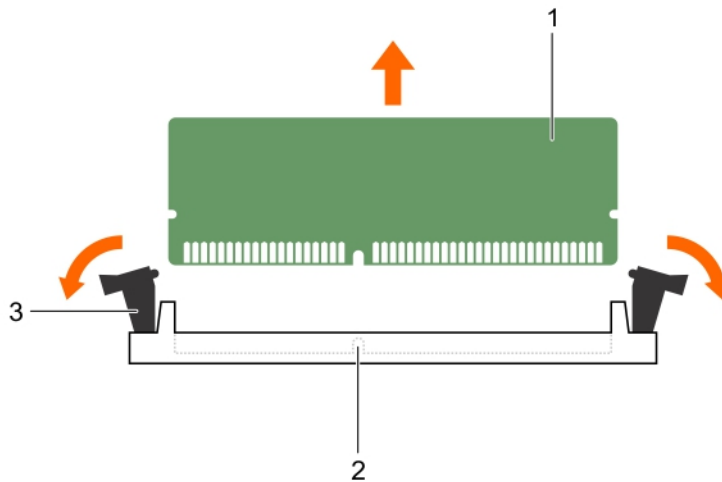
 **CAUTION:** To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. Remove memory module blanks only if you intend to install memory modules in those sockets.

### 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. To release the memory module from the socket, simultaneously press the ejectors on both ends of the memory module socket.
3. Lift and remove the memory module from the system.



**Figure 30. Removing the memory module**

- |                                     |                         |
|-------------------------------------|-------------------------|
| 1. memory module                    | 2. memory module socket |
| 3. memory module socket ejector (2) |                         |

#### Next steps



1. Install the memory module.
  -  **NOTE:** If you are removing the memory module permanently, install a memory module blank.
2. Install the cooling shroud.
3. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)

## Installing memory modules

#### Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.

2. Follow the procedure listed in the Before working inside your system section.
3. Removing the cooling fan assembly.
4. Removing the cooling fan assembly.
5. Remove the cooling shroud.

### Steps

1. Locate the appropriate memory module socket.

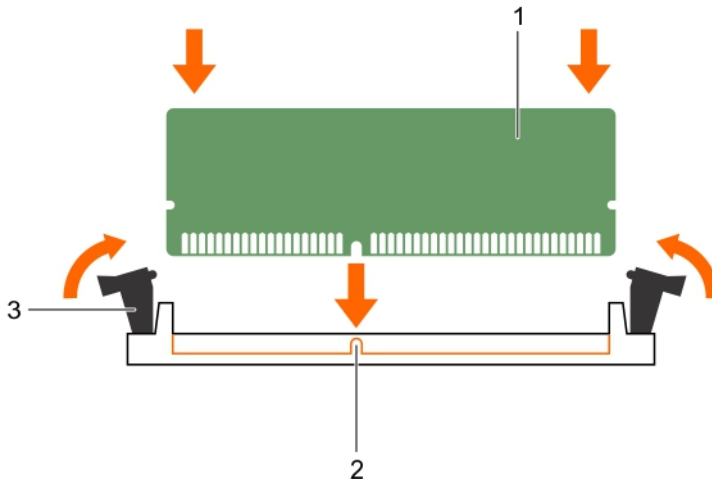
**CAUTION:** Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

2. 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.

**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. When the memory module is properly seated in the socket, the levers on the memory module socket align with the levers on the other sockets that have memory modules installed.



**Figure 31. Installing the memory module**

- |                                     |                  |
|-------------------------------------|------------------|
| 1. memory module                    | 2. alignment key |
| 3. memory module socket ejector (2) |                  |

### Next steps

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

3. Press F2 to enter System Setup, and check the **System Memory** setting.  
The system should have already changed the value to reflect 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.

#### Related Links


[Safety instructions](#)

[Before working inside your system](#)

## Processors and heat sinks


Use the following procedure when:

- Removing and installing a heat sink
- Installing an additional processor
- Replacing a processor


 **NOTE:** To ensure proper system cooling, you must install a processor blank in any empty processor socket.

### Removing a processor


#### Prerequisites

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


 **NOTE:** This is a Field Replaceable Unit (FRU). Removal and installation procedures should be performed only by Dell certified service technicians.


 **NOTE:** If you are upgrading your system, download the latest system BIOS version from **Dell.com/support** and follow the instructions included in the compressed download file to install the update on your system.

 **NOTE:** You can update the system BIOS by using the Dell Lifecycle Controller.



 **NOTE:** To ensure proper system cooling, you must install a processor blank in any empty processor socket.


1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Keep the Phillips #2 screwdriver ready.
4. If installed, remove the full-length PCIe card(s).
5. If installed, remove the full-length PCIe card(s).
6. Remove the cooling shroud.
7. Remove the heat sink.



 **WARNING:** The processor is hot to touch for some time after the system has been powered down. Allow the processor to cool before removing it.

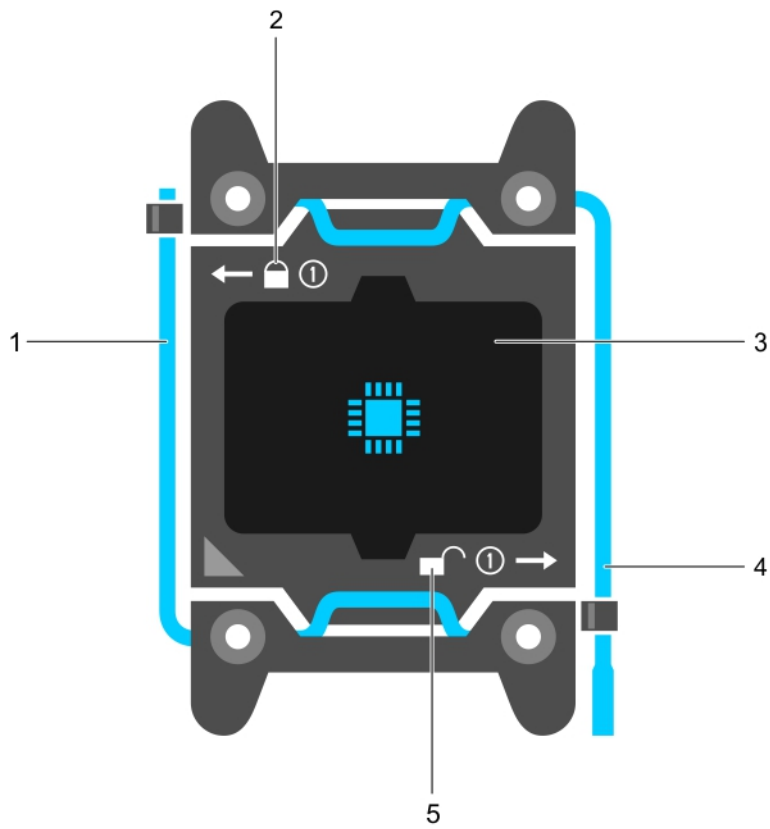
 **CAUTION: The processor is held in its socket under strong pressure. Be aware that the release lever can spring up suddenly if not firmly grasped.**

#### Steps

1. Release the *open first* socket lever near the unlock icon  by pushing the lever down and out from under the tab.
2. Release the *close first* socket release lever near the lock icon  by pushing the lever down and out from under the tab. Lift the lever 90 degrees upward.
3. Lower the *open first* socket-release lever to lift the processor shield.
4. Hold the tab on the processor shield and lift the processor shield until the *open first* socket-release lever lifts up.

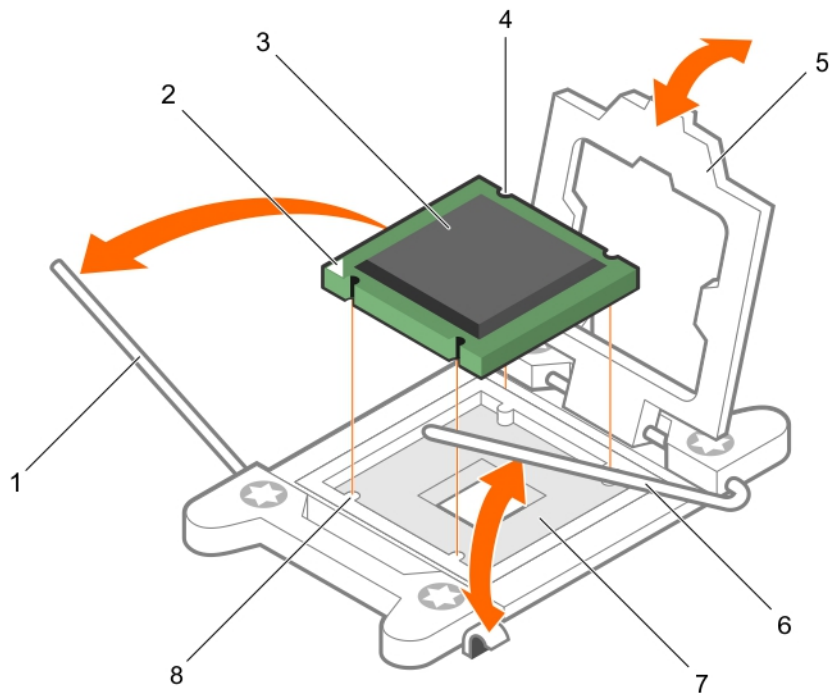
 **CAUTION: The socket pins are fragile and can be permanently damaged. Be careful not to bend the pins in the socket when removing the processor out of the socket.**

5. Lift the processor out of the socket and leave the *open first* socket-release lever up.
  -  **NOTE:** If you are permanently removing the processor, you must install a socket protective cap in the vacant socket to protect the socket pins and keep the socket free of dust.
  -  **NOTE:** After removing the processor, place it in an anti-static container for reuse, return, or temporary storage. Do not touch the bottom of the processor. Touch only the side edges of the processor.



**Figure 32. Processor shield**

- |  |   |
|--|---|
| 1. <i>close first</i> socket release lever | 2. lock icon                              |
| 3. processor                               | 4. <i>open first</i> socket release lever |
| 5. unlock icon                             |   |



**Figure 33. Removing a processor**

- |  |   |
|--|---|
| 1. <i>close first</i> socket-release lever | 2. pin-1 indicator of processor           |
| 3. processor                               | 4. slot (4)                               |
| 5. processor shield                        | 6. <i>open first</i> socket-release lever |
| 7. socket                                  | 8. socket keys (4)                        |

#### Next steps


1. Replace the processor(s).
2. Install the heat sink.
3. Reinstall the cooling shroud.
4. Follow the procedure listed in the After working inside your system section.

#### Related Links


- [Safety instructions](#)
- [After working inside your system](#)
- [Before working inside your system](#)

## Installing a processor


### Prerequisites

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


1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Keep the Phillips #2 screwdriver ready.
4. If you are upgrading your system, download the latest system BIOS version from [Dell.com/support](https://www.dell.com/support) and follow the instructions included in the compressed download file to install the update on your system.

 **NOTE:** You can also update the system BIOS by using the Dell Lifecycle Controller.

5. Remove the cooling shroud.

 **NOTE:** If applicable, close the expansion card latch on the cooling shroud to release the full length card.


6. If connected, disconnect the cables from expansion card(s).
7. If installed, remove the expansion card riser.

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

 **CAUTION:** Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.


### Steps


1. Unpack the new processor.

 **NOTE:** If the processor has previously been used in a system, remove any remaining thermal grease from the processor by using a lint-free cloth.


2. Locate the processor socket.


3. If applicable, remove the socket protective cap.

4. Release the *open first* socket-release lever near the unlock icon  by pushing the lever down and out from under the tab.

5. Similarly, release the *close first* socket-release lever near the lock icon  by pushing the lever down and out from under the tab. Lift the lever 90 degrees upward.



6. Hold the tab near the lock symbol on the processor shield and lift it up and out of the way.

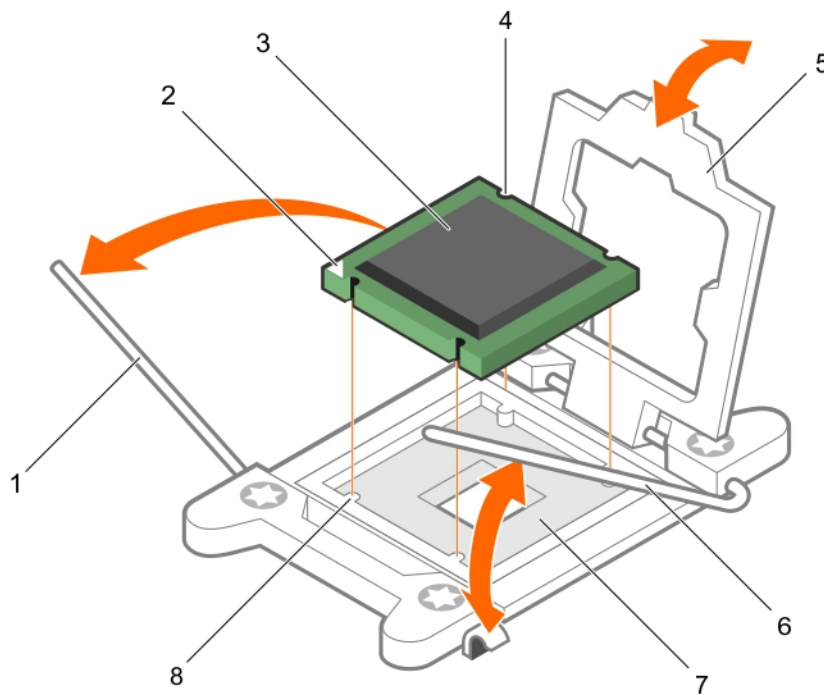
 **CAUTION:** Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the socket.

 **CAUTION:** While removing or reinstalling the processor, wipe your hands of any contaminants. Contaminants on the processor pins such as thermal grease or oil can damage the processor.

7. Align the processor with the socket keys.

**△ CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.**


8. Align the pin-1 indicator of the processor with the triangle on the system board.
9. Place the processor on the socket such that the slots on the processor align with the socket keys.
10. Close the processor shield.
11. Lower the *close first* socket-release lever near the lock icon  and push it under the tab to lock it.
12. Similarly, lower the *open first* socket-release lever near the unlock icon  and push it under the tab to lock it.



**Figure 34. Installing a processor**

- |                           |                                  |
|---------------------------|----------------------------------|
| 1. socket-release lever 1 | 2. pin-1 corner of the processor |
| 3. processor              | 4. slot (4)                      |
| 5. processor shield       | 6. socket-release lever 2        |
| 7. processor socket       | 8. tab (4)                       |

#### Next steps

 **NOTE:** Ensure that you install the heat sink after you install the processor. The heat sink is necessary to maintain proper thermal conditions.

1. Install the heat sink.
2. If removed, reinstall the PCIe expansion card riser.

3. If disconnected, reconnect the cables to the expansion card(s).
4. While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.
5. Run the system diagnostics to verify that the new processor operates correctly.

#### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## PCIe card holder

The PCIe card holder can be extended to support a full length PCIe card. This will prevent any damage to the card that may occur due to its length.

#### Related Links

[Safety instructions](#)


[Before working inside your system](#)

[After working inside your system](#)

## Removing the PCIe card holder

#### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove the full-length PCIe card.

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

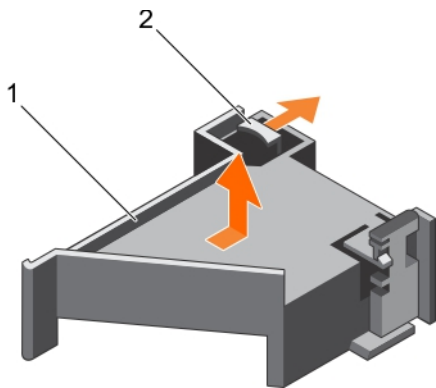
 **CAUTION: Do not use your system without the PCIe card holder installed. The PCIe card holder is necessary to ensure proper system cooling.**

#### Steps

1. Press the release tab and slide the card holder toward the back of the chassis to release the PCIe card holder from the chassis.
2. Lift the PCIe card holder out of the chassis.



**NOTE:** To ensure proper system cooling, you must replace the PCIe card holder.



**Figure 35. Removing the PCIe card holder**

1. PCIe card holder
2. release tab

#### Next steps

1. Replace the PCIe card holder.
2. If removed, install the full-length PCIe card.
3. Follow the procedure listed in the After working inside your system section.

## Installing the PCIe card holder

#### Prerequisites

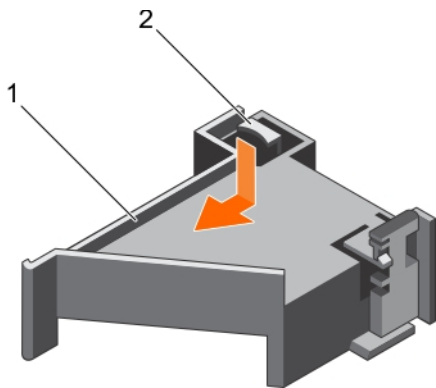
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

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

**⚠ CAUTION: Do not use your system without the PCIe card holder installed. The PCIe card holder is necessary to ensure proper system cooling.**

#### Steps

1. Align the PCIe card holder with the notches and tabs on the power supply unit cage.
2. Press the release tab and slide the PCIe card holder toward the front of the chassis until firmly seated.



**Figure 36. Installing the PCIe card holder**

1. PCIe card holder
2. release tab

#### Next steps

1. If applicable, replace the full-length PCIe card.
2. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Opening and closing the PCIe card holder latch

#### Prerequisites

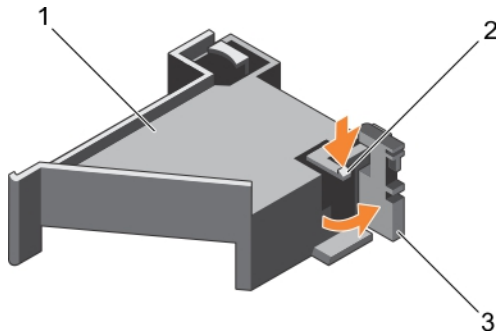
1. Follow the safety guidelines listed in Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

**⚠ 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

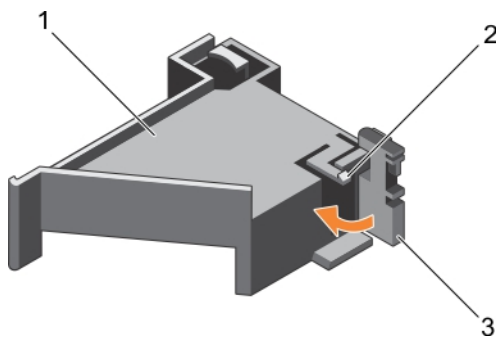
1. To open the PCIe card holder latch, press the release tab.
2. To close the PCIe card holder latch, rotate the latch clockwise until it locks.

**📌 NOTE:** Before installing a full-length PCIe card, the PCIe card holder latch must be closed. When the full-length PCIe card is installed, open the PCIe card holder latch. Before removing the full-length PCIe card, you must close the PCIe card holder latch.



**Figure 37. Opening the PCIe card holder latch**

- |                           |                |
|---------------------------|----------------|
| 1. PCIe card holder       | 2. release tab |
| 3. PCIe card holder latch |                |



**Figure 38. Closing the PCIe card holder latch**

- |                           |                |
|---------------------------|----------------|
| 1. PCIe card holder       | 2. release tab |
| 3. PCIe card holder latch |                |

#### Next steps

Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Cable retention bracket

Cable retention bracket provides support to the installed cables. The cable retention bracket also helps to prevent the cables from moving out of place, which may result in loose connections and reduced air flow inside the server.

### Removing the cable retention bracket

#### Prerequisites

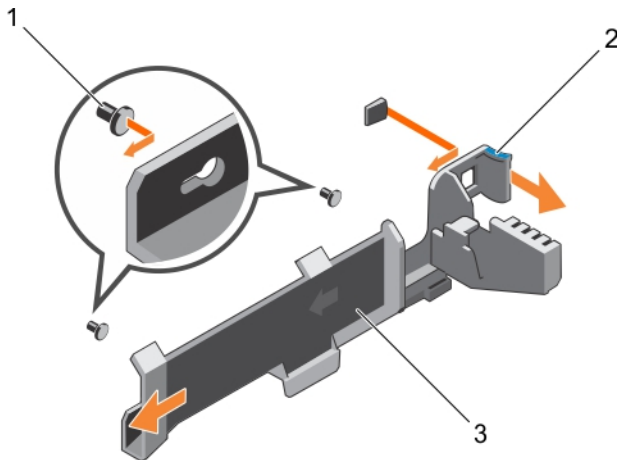
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

3. If installed, remove the cooling shroud.
4. Remove the PCIe card holder.
5. Remove all cables routed through the cable retention bracket.

**△ 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. Pull the tab to release it from the notch and slide the cable retention bracket toward the front of the chassis to release it from the chassis.
2. Lift the cable retention bracket out of the chassis.



**Figure 39. Removing the cable retention bracket**

1. alignment pin (2)
2. tab
3. cable retention bracket

#### Next steps

1. Install the cable retention bracket and reconnect all cables routed through the cable retention bracket.
2. If removed, install the PCIe card holder.
3. If removed, install the cooling shroud.
4. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the cable retention bracket

#### Prerequisites

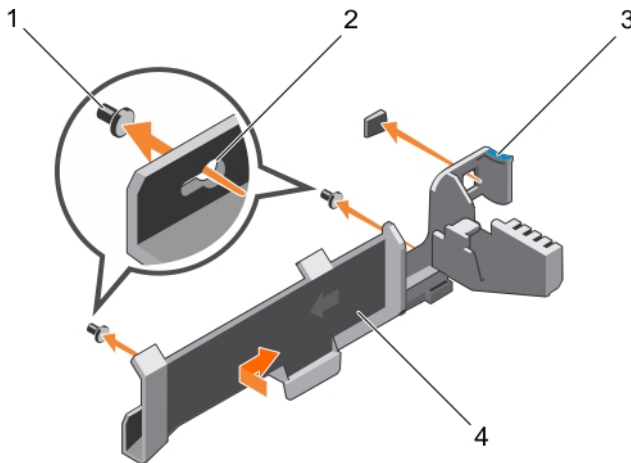
1. Follow the safety guidelines listed in the Safety instructions section.

2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove the cooling shroud.
4. Remove the PCIe card holder.

**△ 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 cable retention bracket with the alignment pins on the chassis.
2. Slide the cable retention bracket along the chassis wall until the tab clicks and locks the keyhole slots.
3. Place all cables to be routed in the cable retention bracket.



**Figure 40. Installing the cable retention bracket**

- |                      |                            |
|----------------------|----------------------------|
| 1. alignment pin (2) | 2. keyhole slot            |
| 3. tab               | 4. cable retention bracket |

#### Next steps

1. Install the PCIe card holder.
2. Install the cooling shroud.
3. Follow the procedure listed in the After working inside your system section.

#### Related Links

[Safety instructions](#)

[Before working inside your system](#)

[After working inside your system](#)

## Integrated storage controller card

Your system includes a dedicated expansion card slot on the system board for an integrated controller card. The integrated storage controller card provides the integrated storage subsystem for the internal hard drives in your system. The controller enables you to set up the hard drives in RAID configurations. The RAID configurations depend on the version of the storage controller included with your system.

## Removing the integrated storage controller card

### Prerequisites

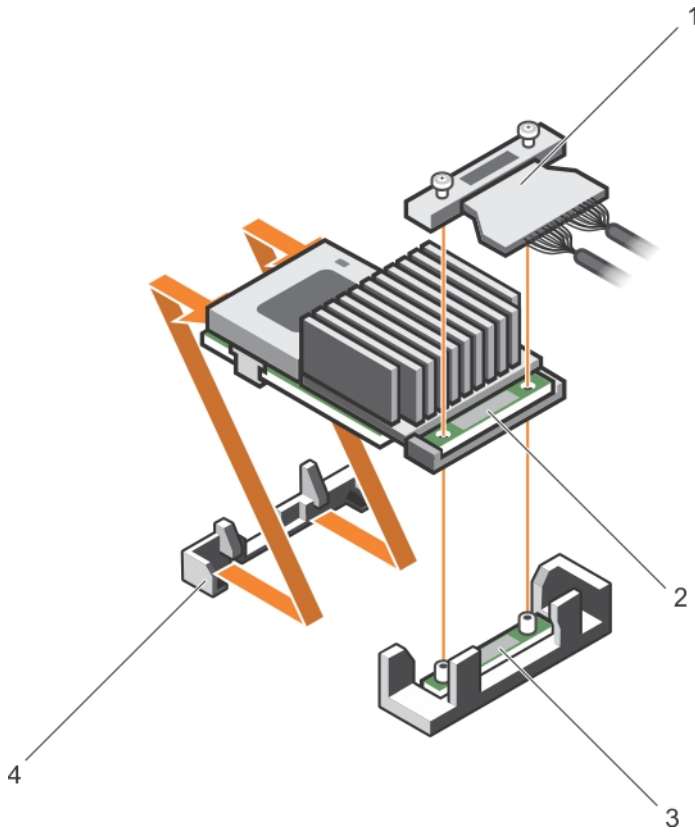


**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the cooling shroud.
4. Remove the expansion card riser 1.
5. Keep the Phillips #2 screwdriver ready.

### Steps

1. Loosen the screws that secure the integrated storage controller cable to the integrated storage controller card connector on the system board.
2. Lift the integrated storage controller cable away from the integrated storage controller.
3. Lift one end of the card and angle it to disengage the card from the integrated storage controller card holder on the system board.
4. Lift the card out of the system.



**Figure 41. Removing the integrated storage controller card**

- |   |  |
|---|--|
| 1. integrated storage controller cable                              | 2. integrated storage controller card        |
| 3. integrated storage controller card connector on the system board | 4. integrated storage controller card holder |

#### **Next steps**

1. Install the expansion card riser 1.
2. Install the cooling shroud.
3. Installing the integrated storage controller card.
4. Follow the procedure listed in the After working inside your system section.

#### **Related Links**

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the integrated storage controller card


### Prerequisites

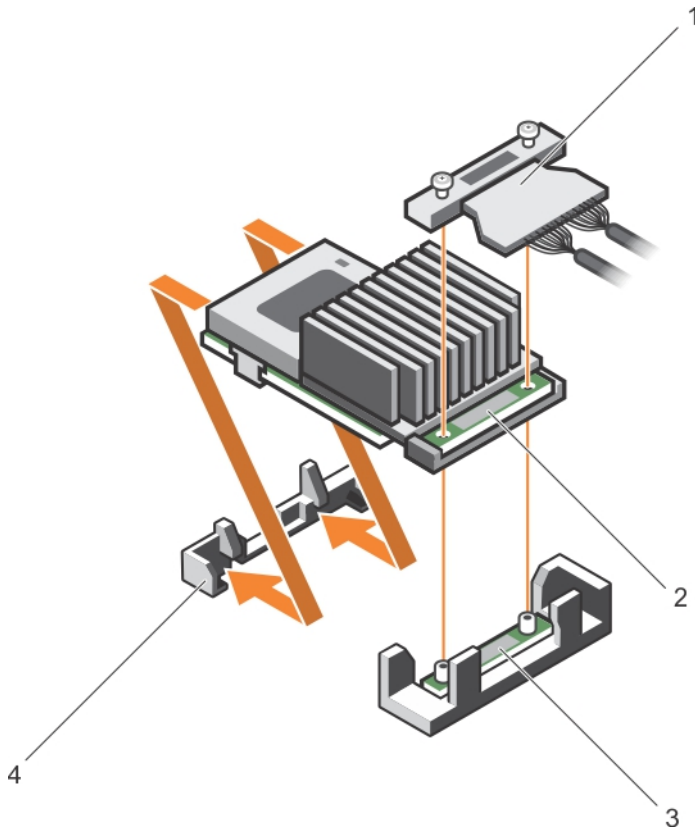


**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the cooling shroud.
4. Remove the expansion card riser 1.
5. Keep the Phillips #2 screwdriver ready.

### Steps

1. Align the end of the integrated storage controller card with the controller card connector on the system board.
2. Lower the connector side of the integrated storage controller card into the integrated storage controller card connector on the system board.
  -  **NOTE:** Ensure that the tabs on the system board align with the screw holes on the integrated storage controller card.
3. Align the screws on the integrated storage controller card cable with the screw holes on the connector.
4. Tighten the screws to secure the integrated storage controller card cable with the integrated storage controller card connector on the system board.



**Figure 42. Installing the integrated storage controller card**

- |   |  |
|---|--|
| 1. integrated storage controller cable                              | 2. integrated storage controller card        |
| 3. integrated storage controller card connector on the system board | 4. integrated storage controller card holder |

#### Next steps

1. Install the expansion card riser 1.
2. Install the cooling shroud.
3. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Expansion cards and expansion card riser

An expansion card in the server is an add-on card that can be inserted into an expansion slot on the system board or 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 unsupported or missing. It does not prevent your system from turning on and no BIOS POST message or F1/F2 pause is displayed.


## Expansion card installation guidelines

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

**Table 32. Supported expansion cards**

PCIe slot	Riser	Processor connection	Height	Length	Link width	Slot width
1	1	Processor 2	Low Profile	Half Length	x8	x16
2	1	Processor 2	Low Profile	Half Length	x8	x16
3	1	Processor 2	Low Profile	Half Length	x8	x16
4	2	Processor 2	Full Height	Full Length	x16	x16
5	2	Processor 1	Full Height	Full Length	x8	x16
6	3 (alternate)	Processor 1	Full Height	Full Length	x16	x16

 **NOTE:** To use PCIe slots 1 through 4 on the risers 1 and 2, both the processors must be installed.


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

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

**Table 33. Expansion card installation order**


Card priority	Card type	Slot priority	Max allowed
1	PCIe Bridge	4	1
2	RAID H730P (low profile)	3, 2	1
3	RAID H830	6, 4, 5	2
	RAID H830 (low profile)	3, 2	2
	100G Intel Omni-Path Architecture (OPA) Host Channel Adapters (HCA)	4, 6	2
4	14 Gb InfiniBand, Fourteen Data Rate (FDR) HCA	3, 2, 1	3
	40 Gb NICs (full height)	4, 6, 5	3
	40 Gb NICs (low profile)	3, 2, 1	3
5	FC16 HBA (full height)	4, 6, 5	3
	FC16 HBA (low profile)	2, 3, 1	3
6	10 Gb NICs (full height)	4, 6, 5	3
	10 Gb NICs (low profile)	2, 3, 1	3
7	FC8 HBA (full height)	4, 6, 5	3

Card priority	Card type	Slot priority	Max allowed
	FC8 HBA (low profile)	2, 3, 1	3
8	1 Gb NICs (full height)	4, 6, 5	3
	1 Gb NICs (low profile)	2, 3, 1	3
9	12 Gb SAS (low profile)	3, 2, 1	2
	12 Gb SAS (full height)	6, 4, 5	2
10	Integrated RAID	integrated slot	1
11	NDC	integrated slot	1

 **NOTE:** Ensure that the 100 G OPA x16 card is installed in slot 6 (x16 PCIe) on the alternate riser 3.

## Removing an expansion card from expansion card riser 2 or 3


### Prerequisites

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

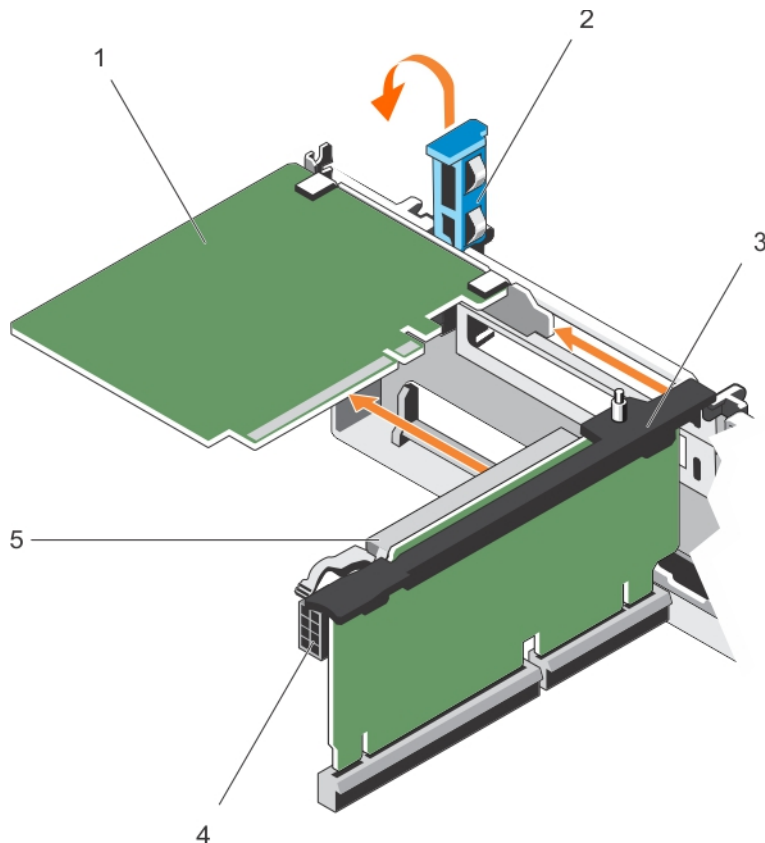
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. When removing a card from riser 3, ensure that the PCIe holder latch is closed.

### Steps

1. Disconnect any cables connected to the expansion card.
2. Lift the expansion card latch out of the guide slot.
3. Hold the expansion card by its edges, and remove it from the expansion card connector.
4. If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion card latch.

 **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.

5. Install the expansion card latch into the slot.
6. Close the expansion card locking tabs.



**Figure 43. Removing an expansion card from expansion card riser 2 or 3**

- |                             |                         |
|-----------------------------|-------------------------|
| 1. expansion card           | 2. expansion card latch |
| 3. expansion card riser     | 4. power connector      |
| 5. expansion card connector |                         |

#### Next steps

1. Install an expansion card into the expansion card riser.
2. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing an expansion card into the expansion card riser 2 or 3

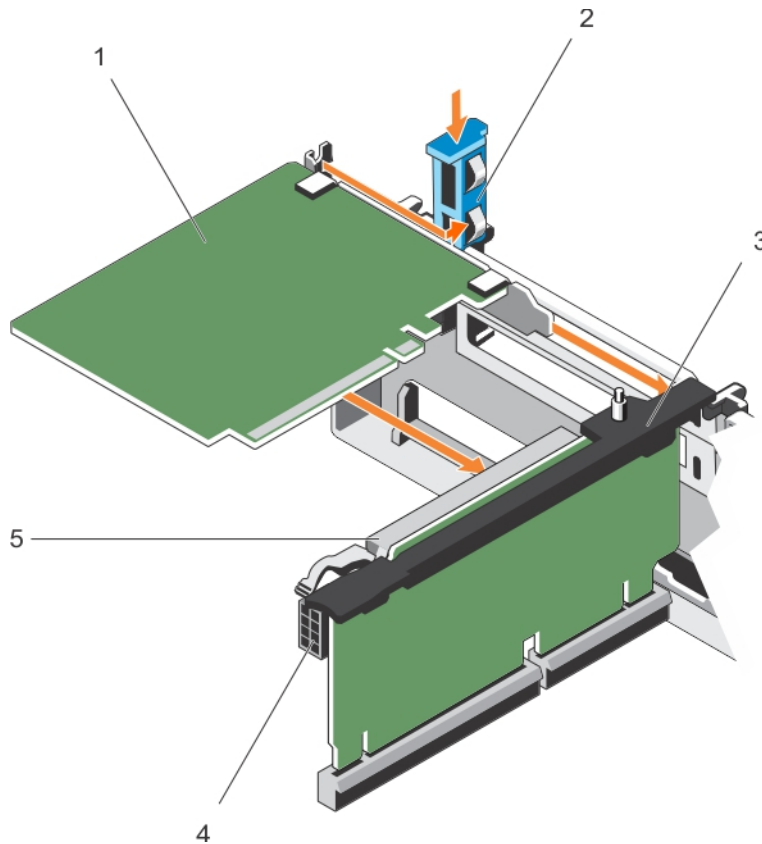
#### Prerequisites

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

**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. Unpack the expansion card and prepare it for installation.  
For instructions, see the documentation accompanying the card.
2. Lift the expansion card latch and remove the filler bracket.
3. Holding the card by its edges, position the card so that the connector on the expansion card aligns with the expansion card connector on the riser.
4. Insert the card-edge connector firmly into the expansion card connector until the card is fully seated.
5. Press the touch points to open the expansion card locking tabs.
6. Close the expansion card latch.
7. If applicable, connect the cables to the expansion card.



**Figure 44. Installing an expansion card into the expansion card riser 2 or 3**

- |                             |                         |
|-----------------------------|-------------------------|
| 1. expansion card           | 2. expansion card latch |
| 3. expansion card riser     | 4. power connector      |
| 5. expansion card connector |                         |

## Next steps

1. Follow the procedure listed in the After working inside your system section.
2. Install any device drivers required for the card as described in the documentation for the card.

## Related Links

[Safety instructions](#)

[Before working inside your system](#)

[After working inside your system](#)

## Removing an expansion card from the expansion card riser 1

### Prerequisites



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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Disconnect any cables connected to the expansion card.
4. Remove the expansion card riser.



**NOTE:** The expansion card riser 1 can be used only when both the processors are installed.

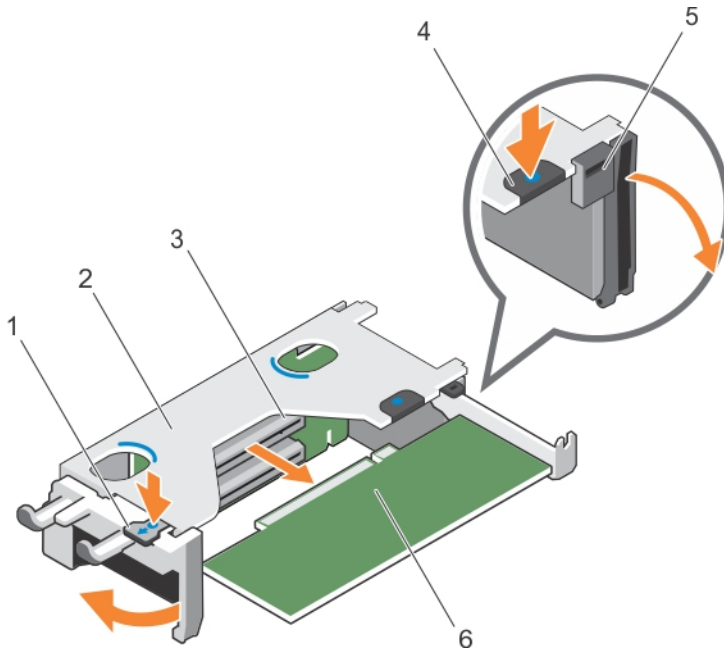
### Steps

1. Press tab A and rotate the latch clockwise.
2. Press tab B and rotate the latch downward.
3. Remove the expansion card from the expansion card riser 1.
4. If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening, and then close the expansion card latch.



**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.

5. Close the latches of tab A and tab B.



**Figure 45. Removing an expansion card from expansion card riser 1**

- |                             |                                |
|-----------------------------|--------------------------------|
| 1. tab A                    | 2. expansion card riser 1 cage |
| 3. expansion card connector | 4. tab B                       |
| 5. latch                    | 6. expansion card              |

#### Next steps

1. Install the expansion card.
2. Install the expansion card riser.
3. Follow the procedure listed in the After working inside your system section.

#### Related Links


- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing an expansion card into the expansion card riser 1

#### Prerequisites

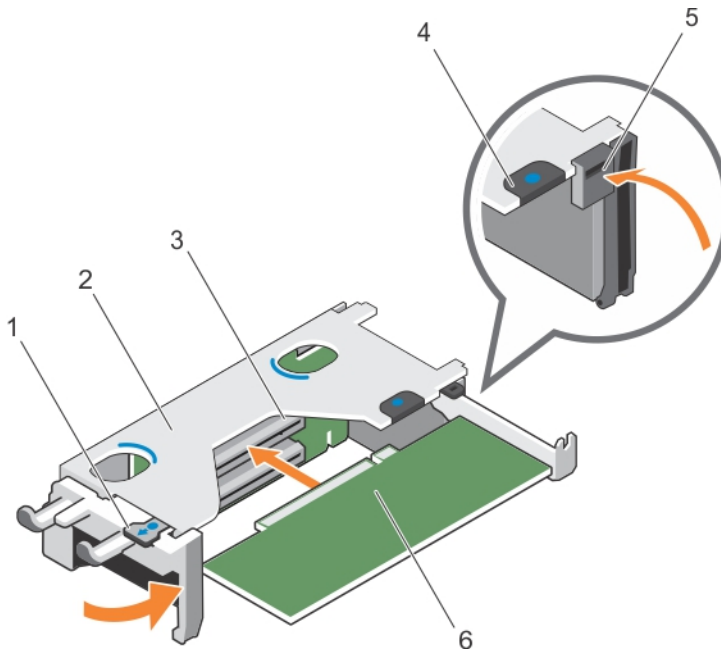
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the expansion card riser.

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

 **NOTE:** The expansion card riser 1 can be used only when both the processors are installed.

### Steps

1. Unpack the expansion card and prepare it for installation.  
For instructions, see the documentation accompanying the card.
2. Press tab A and rotate the latch clockwise.
3. Press tab B and rotate the latch down.
4. Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion card connector.
5. Insert the card-edge connector firmly into the expansion card connector until the card is fully seated.
6. Close the latches of tab A and tab B.



**Figure 46. Installing an expansion card into the expansion card riser 1**

- |                             |                                |
|-----------------------------|--------------------------------|
| 1. tab A                    | 2. expansion card riser 1 cage |
| 3. expansion card connector | 4. tab B                       |
| 5. latch                    | 6. expansion card              |

### Next steps

1. Install the expansion card riser.
2. If applicable, connect any cables to the expansion card.
3. Follow the procedure listed in the After working inside your system section.
4. Install any device drivers required for the card as described in the documentation for the card.

### Related Links

[Safety instructions](#)  
[Before working inside your system](#)  
[After working inside your system](#)

## Removing the riser 1 blank

### Prerequisites

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

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

### Steps

Press the tabs on the riser 1 blank and push the riser 1 blank out of the chassis.

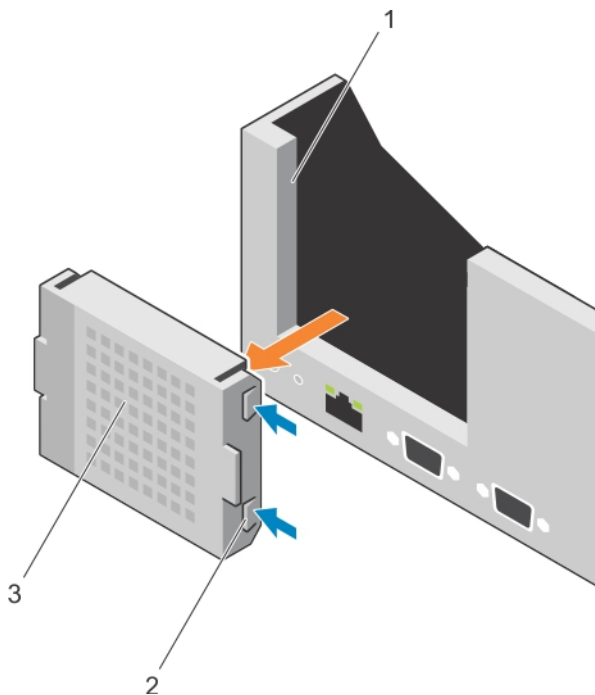


Figure 47. Removing the riser 1 blank

1. slot on the chassis
2. tab (2)
3. riser 1 blank

### Next steps

1. Install the expansion card risers.
2. Follow the procedure listed in the After working inside your system section.

### Related Links

[Safety instructions](#)

[After working inside your system](#)

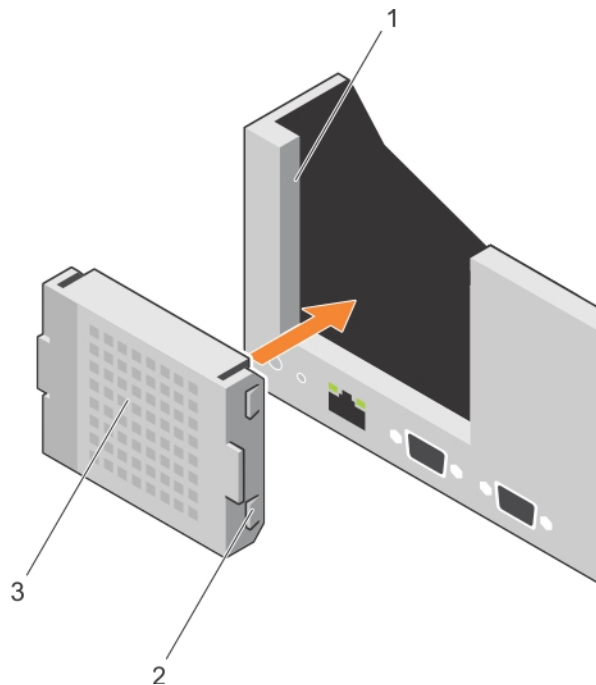
## Installing the riser 1 blank

### Prerequisites

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

### Steps

To install the riser 1 blank, align the blank with the slot on the chassis and insert it into the chassis until it clicks into place.



**Figure 48. Installing the riser 1 blank**

1. slot on the chassis
2. tab (2)
3. riser 1 blank

### Next steps

1. Install the expansion card risers.
2. Follow the procedure listed in the After working inside your system section.

## Removing expansion card risers

### Prerequisites

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

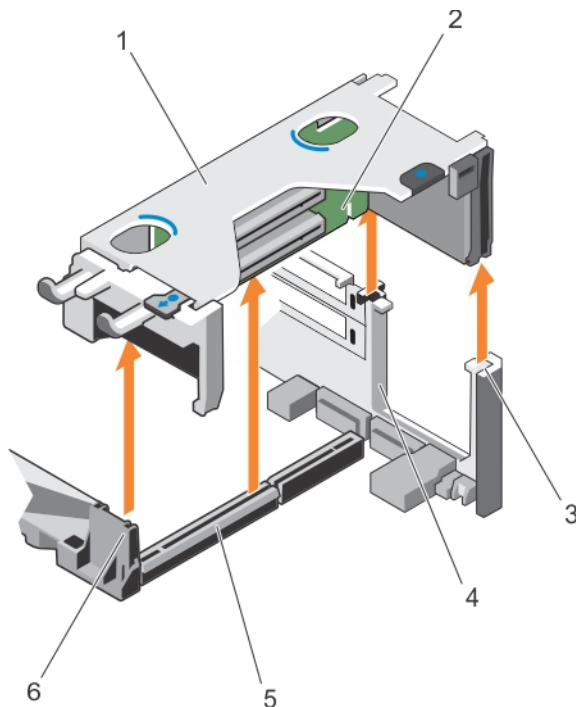
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove any expansion card installed on risers 2 and 3.

**✍ NOTE:** The expansion card riser 1 can be used only when both the processors are installed.

### Steps

1. Holding the slots on the expansion card riser, lift the riser from the riser connector on the system board.
2. To remove expansion card risers 2 and 3, hold the edges of the expansion card riser, and lift the riser from the riser connector on the system board.

**✍ NOTE:** To ensure proper system cooling, the riser 1 blank must be installed in the riser 1 slot. Remove the riser 1 blank only if you are installing riser 1.

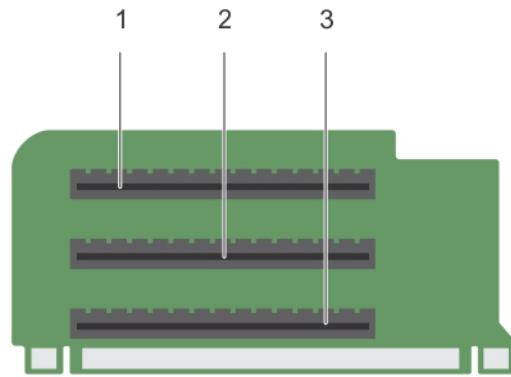


**Figure 49. Removing the expansion card riser 1**

- |                                |                            |
|--------------------------------|----------------------------|
| 1. expansion card riser 1 cage | 2. expansion card riser 1  |
| 3. riser guide-back (right)    | 4. riser guide-back (left) |

5. expansion card riser 1 connector

6. riser guide-front

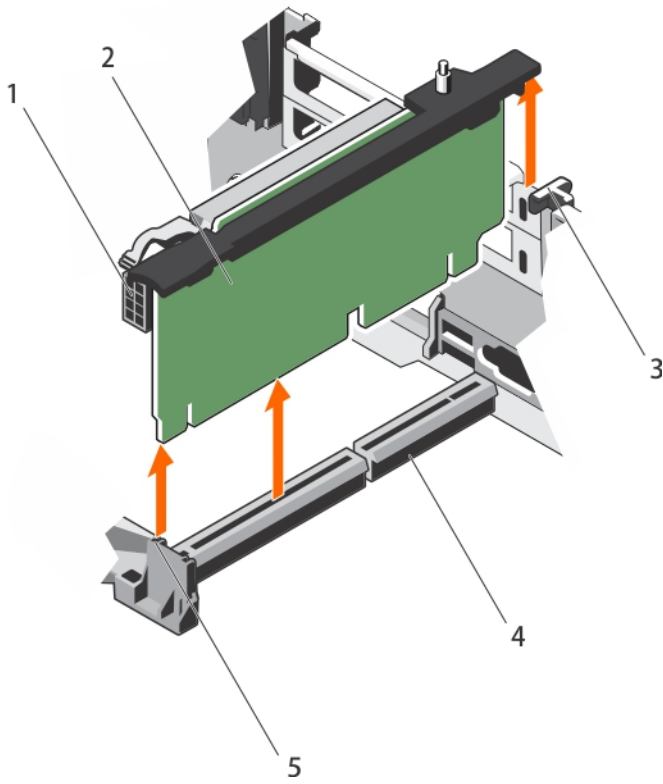


**Figure 50. Identifying connectors on the expansion card riser 1**

1. expansion card slot 1

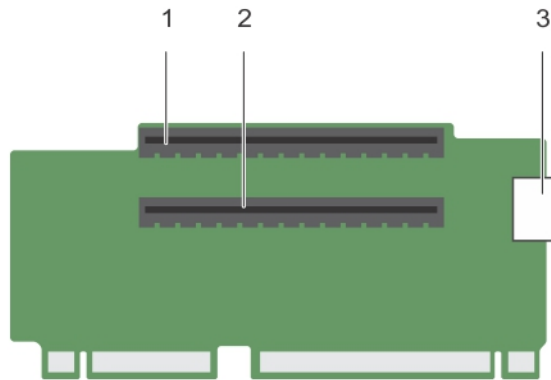
2. expansion card slot 2

3. expansion card slot 3



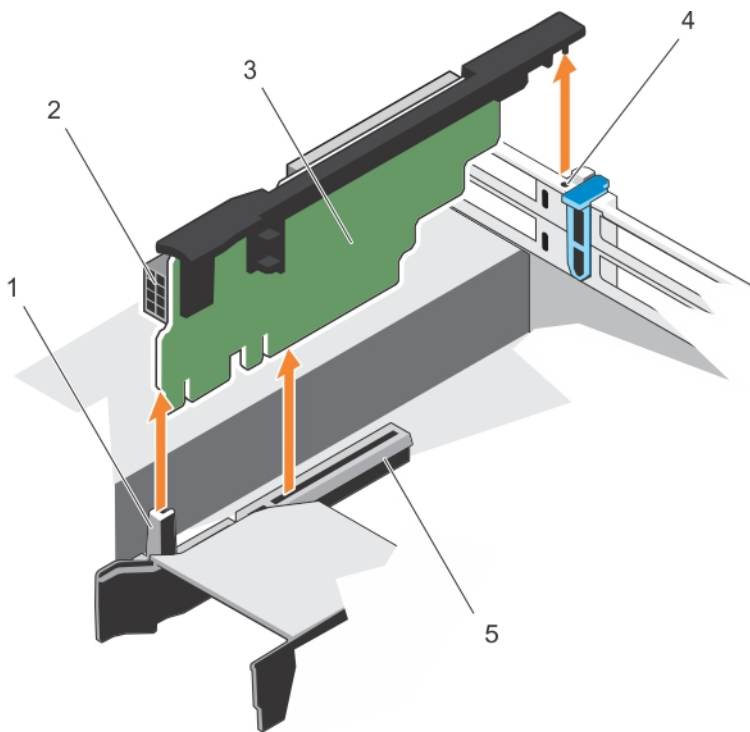
**Figure 51. Removing the expansion card riser 2**

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1. power connector (for GPU cards) | 2. expansion card riser 2           |
| 3. riser guide-back                | 4. expansion card riser 2 connector |
| 5. riser guide-front               |                                     |



**Figure 52. Identifying connectors on the expansion card riser 2**

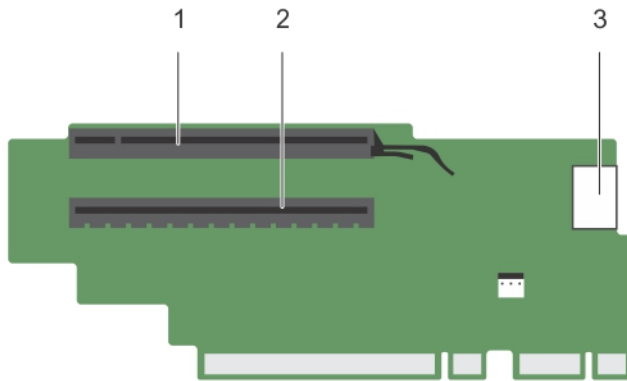
- 1. expansion card slot 4
- 2. expansion card slot 5
- 3. power connector (for GPU cards)



**Figure 53. Removing the expansion card riser 3**

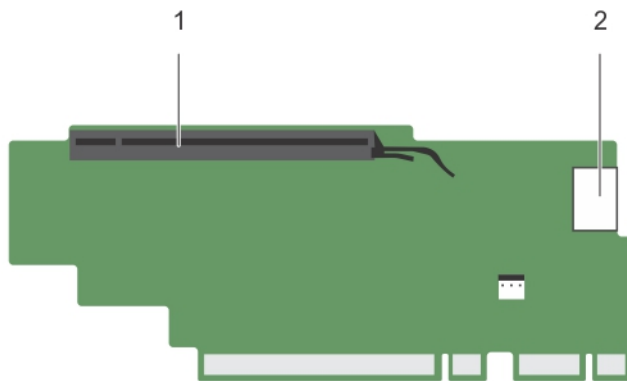
- 1. riser guide-front
- 2. power connector (for GPU cards)

3. expansion card riser 3
4. riser guide-back
5. expansion card riser 3 connector



**Figure 54. Identifying connectors on the expansion card riser 3 (default)**

1. expansion card slot 6
2. expansion card slot 7
3. power connector (for GPU cards)



**Figure 55. Identifying connectors on the expansion card riser 3 (alternate)**

1. expansion card slot 6
2. power connector (for GPU cards)

**Next steps**

1. If removed, install an expansion card on the riser.
2. If applicable, replace the expansion card riser.
3. Follow the procedure listed in the After working inside your system section.

## Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Installing expansion card risers

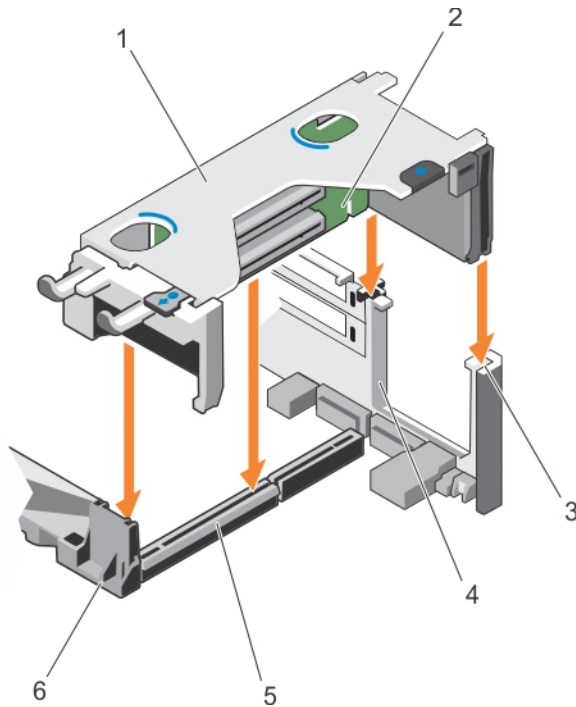
### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If removed, install the expansion card(s) into the expansion card riser 1.

**⚠ 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.**

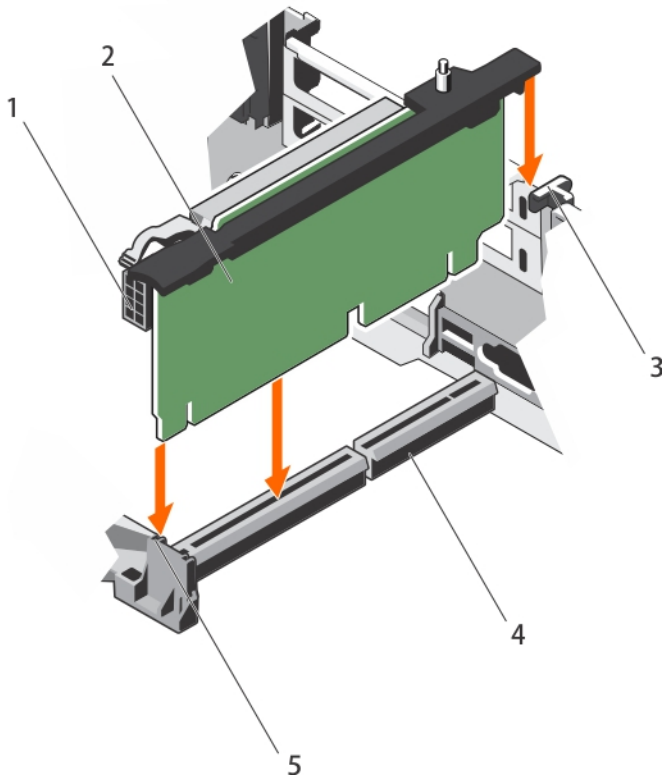
### Steps

1. Align the expansion card riser with the connectors and the riser guides on the system board.
2. Lower the expansion card riser into place until the expansion card riser is fully seated in the connector.



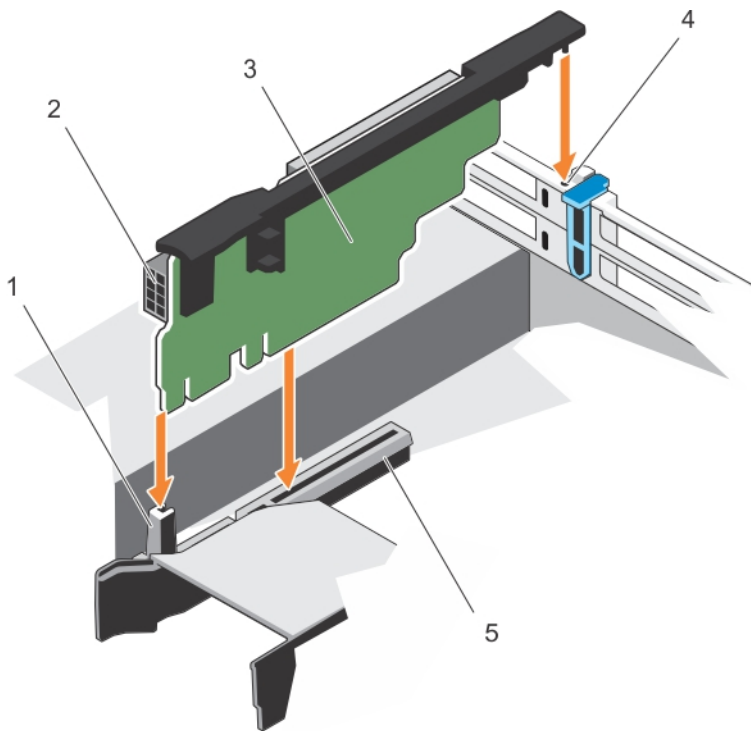
**Figure 56. Installing the expansion card riser 1**

- |                                     |                            |
|-------------------------------------|----------------------------|
| 1. expansion card riser 1 cage      | 2. expansion card riser 1  |
| 3. riser guide-back (right)         | 4. riser guide-back (left) |
| 5. expansion card riser 1 connector | 6. riser guide-front       |



**Figure 57. Installing the expansion card riser 2**

1. power connector (for GPU cards)
2. expansion card riser 2
3. riser guide-back
4. expansion card riser 2 connector
5. riser guide-front



**Figure 58. Installing the expansion card riser 3**

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| 1. riser guide-front                | 2. power connector (for GPU cards) |
| 3. expansion card riser 3           | 4. riser guide-back                |
| 5. expansion card riser 3 connector |                                    |

#### Next steps

1. Install the expansion card(s) into the expansion card risers 2 or 3.
2. Follow the procedure listed in the After working inside your system section.
3. Install any device drivers required for the card as described in the documentation for the card.

#### Related Links

[Safety instructions](#)

[After working inside your system](#)

[Before working inside your system](#)

## Internal dual SD module (optional)

The Internal Dual SD Module (IDSDM) card provides two SD card slots. This card offers the following features:

- Dual card operation — maintains a mirrored configuration by using SD cards in both the slots and provides redundancy.
  - ✎ **NOTE:** When the **Redundancy** option is set to **Mirror Mode** in the **Integrated Devices** screen of System Setup, the information is replicated from one SD card to another.
- Single card operation — single card operation is supported, but without redundancy.

## Removing an internal SD card

### Prerequisites

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

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

**NOTE:** Temporarily label each SD card with its corresponding slot number before removal. Re-install the SD card(s) into the corresponding slots.

### Steps

Locate the SD card slot on the internal dual SD module and press the card to release it from the slot.

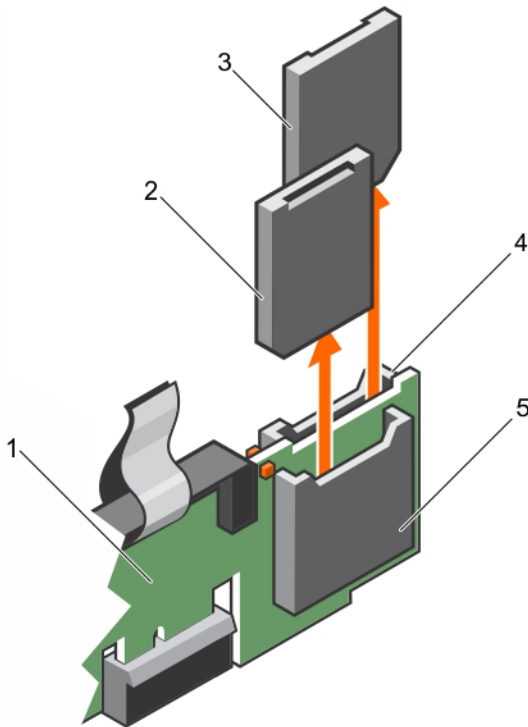


Figure 59. Removing an internal SD card

- |                   |                   |
|-------------------|-------------------|
| 1. IDSDM          | 2. SD card 1      |
| 3. SD card 2      | 4. SD card slot 2 |
| 5. SD card slot 1 |                   |

### Next steps

Follow the procedure listed in the After working inside your system section.

## Related Links

[Safety instructions](#)


[After working inside your system](#)


[Before working inside your system](#)

## Installing an internal SD card

### Prerequisites


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

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

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

### Steps

1. Locate the SD card connector on the internal dual SD module. Orient the SD card appropriately and insert the contact-pin end of the card into the slot.

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

2. Press the card into the card slot 1 to lock it into place.

### Next steps


### Related Links

[Safety instructions](#)

[Before working inside your system](#)

## Removing the internal dual SD module

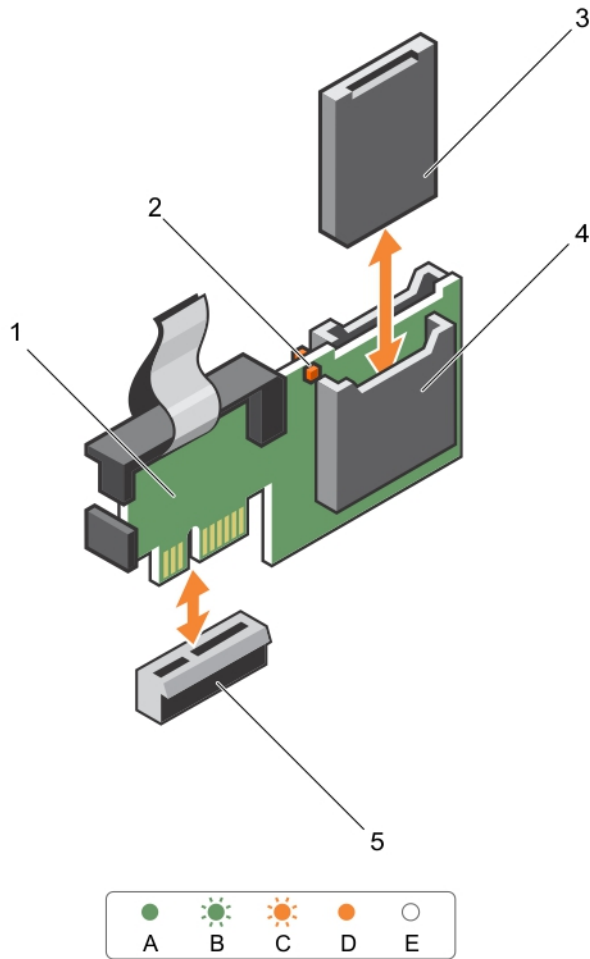
### Prerequisites

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

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

### Steps

1. Locate the internal dual SD module on the system board.
2. If installed, remove the SD card.
3. Hold the plastic pull tab and pull the dual SD module out of the chassis.



**Figure 60. Removing and installing the Internal Dual SD Module (IDSDM)**

- |                            |                             |
|----------------------------|-----------------------------|
| 1. Internal Dual SD module | 2. LED status indicator (2) |
| 3. SD card                 | 4. SD card slot             |
| 5. IDSDM connector         |                             |

The following table describes the IDSDM indicator codes.

**Table 34. IDSDM indicator codes**

Convention	IDSDM indicator code	Description
A	Green	Indicates that the card is online
B	Flashing green	Indicates rebuild or activity
C	Flashing amber	Indicates card mismatch or that the card has failed
D	Amber	Indicates that the card is offline, has failed, or is write protected

Convention	IDSDM indicator code	Description
E	Not lit	Indicates that the card is missing or is booting

### Next steps


Follow the procedure listed in the After working inside your system section.

### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the internal dual SD module

### Prerequisites


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

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

### Steps

1. Locate the IDSDM connector on the system board. To locate the IDSDM connector, see the System board jumpers and connectors section.
2. Align the connectors on the system board and the dual SD module.
3. Push the dual SD module until it is firmly seated on the system board.

### Next steps

1. Install the SD card into slot 1.
  -  **NOTE:** Temporarily label each SD card with its corresponding slot before removal. Replace the SD card into the same slot.
2. Follow the procedure listed in the After working inside your system section.

### Related Links

- [Removing a hot swappable hard drive](#)
- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Network daughter card

The Network daughter card (NDC) is a small, removable mezzanine card. The NDC provides you with the flexibility of choosing different network connectivity options, for example—4 x 1GbE, 2 x 10GbE and 2 x Converged Network Adapter.

## Removing the network daughter card

### Prerequisites

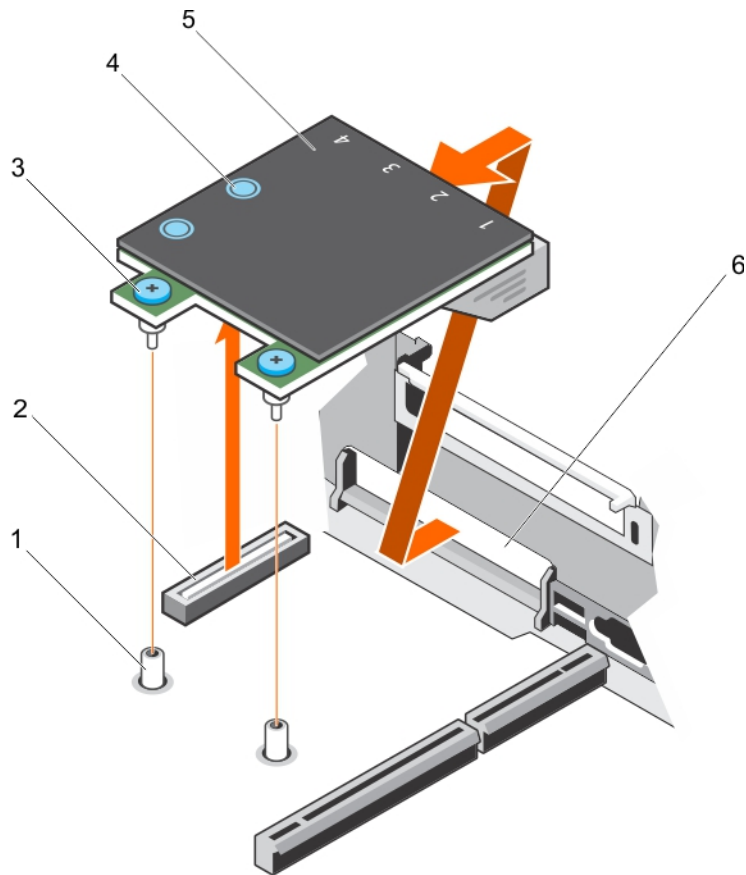
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove expansion card(s) from the expansion card riser 2.
4. Keep the Phillips #1 screwdriver ready.



**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. Loosen the captive screws that secure the network daughter card (NDC) to the system board.
2. Hold the NDC by the edges on either side of the touch point and lift the card to remove it from the connector on the system board.
3. Slide the NDC away from the back of the system until the Ethernet connectors are clear of the slot in the back panel.
4. Lift the NDC out of the chassis.



**Figure 61. Removing the NDC**

- |                                |  |
|--------------------------------|--|
| 1. captive screw socket (2)    | 2. connector on the system board           |
| 3. captive screw (2)           | 4. touch point (2)                         |
| 5. network daughter card (NDC) | 6. back panel slot for Ethernet connectors |

#### Next steps

1. Install the NDC.
2. If removed, install the expansion card(s) on the expansion card riser 2.
3. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the network daughter card

#### Prerequisites

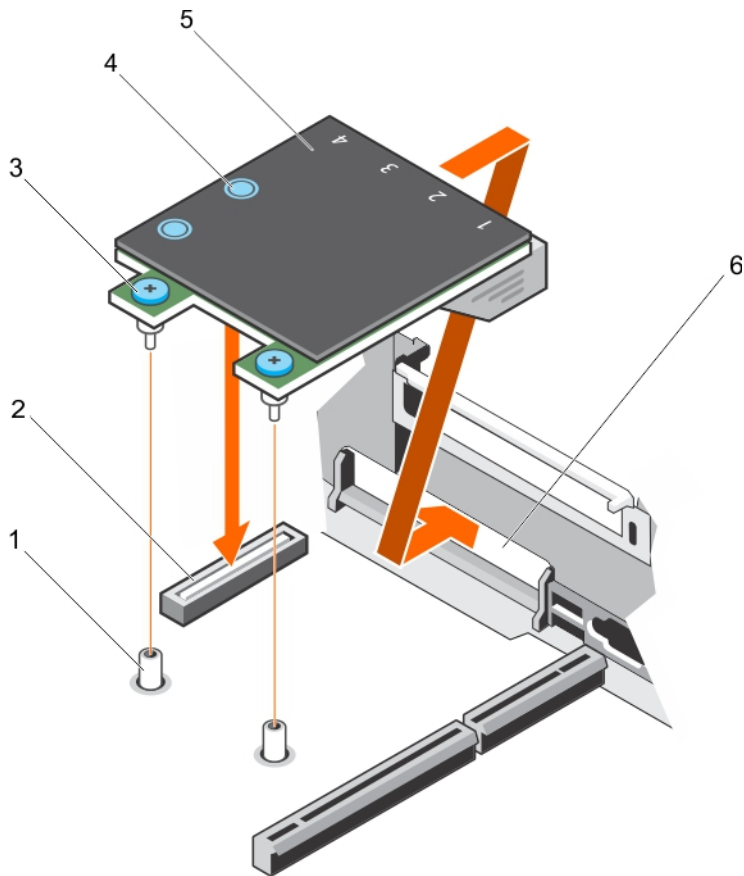
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

3. If applicable, remove the expansion card(s) in the expansion card riser 2.
4. Keep the Phillips #1 screwdriver ready.

**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. Orient the network daughter card (NDC) so that the Ethernet connectors fit through the slot in the back panel.
2. Align the captive screws on the card with the captive screw sockets on the system board.
3. Press the touch points on the card until the card connector is firmly seated on the system board connector.
4. Tighten the captive screws to secure the NDC to the system board.



**Figure 62. Installing the NDC**

- |                                |  |
|--------------------------------|--|
| 1. captive screw socket (2)    | 2. connector on the system board           |
| 3. captive screw (2)           | 4. touch point (2)                         |
| 5. network daughter card (NDC) | 6. back panel slot for Ethernet connectors |

## Next steps

1. If applicable, install the expansion card(s) in the expansion card riser 2.
2. Follow the procedure listed in the After working inside your system section.

## Related Links



- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

# System battery

The system battery is used for low-level system functions like powering the real-time clock and storing the computer's BIOS settings.


## Replacing the system battery

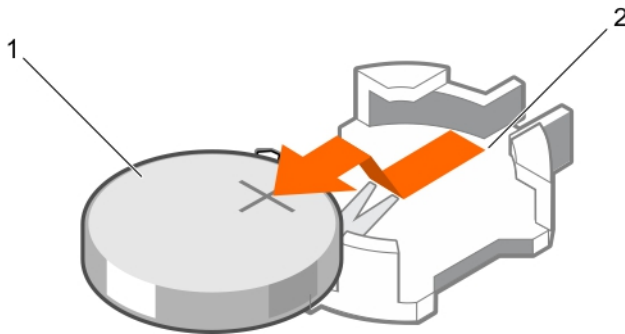
### Prerequisites

-  **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.
-  **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.

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

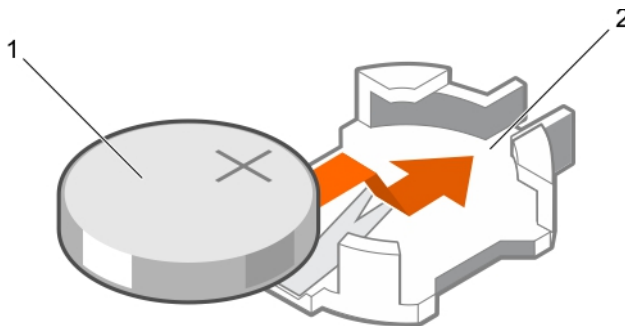
### Steps

1. Locate the battery socket. For more information, see the Jumpers and connectors section.
  -  **CAUTION:** To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.
2. Place your finger between the securing tabs at the negative side of the battery connector and lift the battery out of the socket.



**Figure 63. Removing the system battery**

1. system battery
2. system battery slot
3. To install a new system battery, hold the battery with the "+" facing up and slide it under the securing tabs.
4. Press the battery into the connector until it snaps into place.



**Figure 64. Installing the system battery**

1. system battery
2. system battery slot

#### Next steps

1. Install the cooling shroud.
2. Follow the procedure listed in the After working inside your system section.
3. While booting, press F2 to enter System Setup and ensure the battery is operating properly.
4. Enter the correct time and date in the System Setup **Time** and **Date** fields.
5. Exit System Setup.




#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Power supply units

Your system supports two 1100 W AC power supply modules.

 **NOTE:** Titanium power supply unit is nominally rated for 200 VAC to 240 VAC input only.

-  **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 will be put into standby when system utilization is low in order to maximize efficiency.
-  **NOTE:** If two power supply units are used, they must be of the same maximum output power.
-  **NOTE:** For AC power supply units, use only power supply units with the Extended Power Performance (EPP) label on the back. Mixing power supply units from previous generations of servers can result in a power supply unit mismatch condition or failure to power on.

## 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 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, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20 percent, 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 about iDRAC settings, see the *Integrated Dell Remote Access Controller User's Guide* available at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Removing the power supply unit blank

Install the power supply unit (PSU) blank only in the second PSU bay.

### Prerequisites

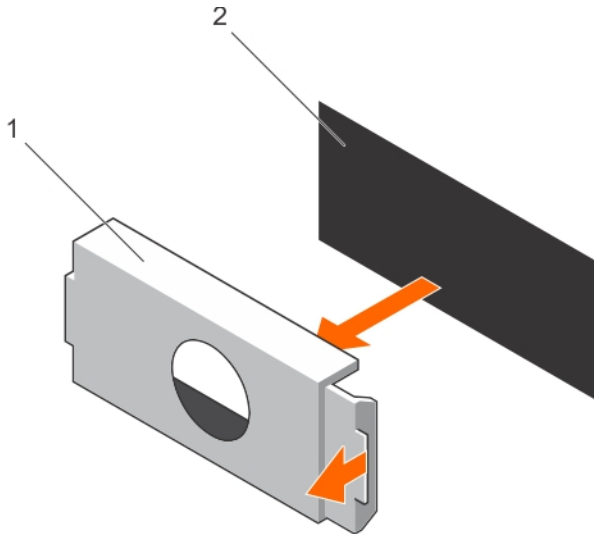
-  **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by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

Follow the safety guidelines listed in the Safety instructions section.

### Steps

If you are installing a second power supply unit (PSU), remove the PSU blank in the bay by pulling the blank outward.

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



**Figure 65. Removing the PSU blank**

1. PSU blank

2. PSU bay

#### **Next steps**

Install the PSU or PSU blank.

### **Installing the power supply unit blank**

Install the power supply unit (PSU) blank only in the second PSU bay.

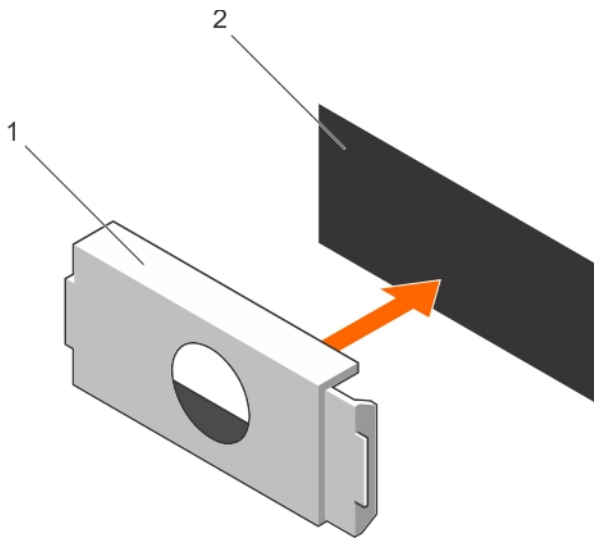
#### **Prerequisites**

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

1. Follow the safety guidelines listed in the Safety instructions section.

#### **Steps**

Align the power supply unit blank with the power supply unit slot and push it into the power supply unit slot until it clicks into place.



**Figure 66. Installing the PSU blank**

1. PSU blank

2. PSU bay

## Removing an AC power supply unit

### Prerequisites

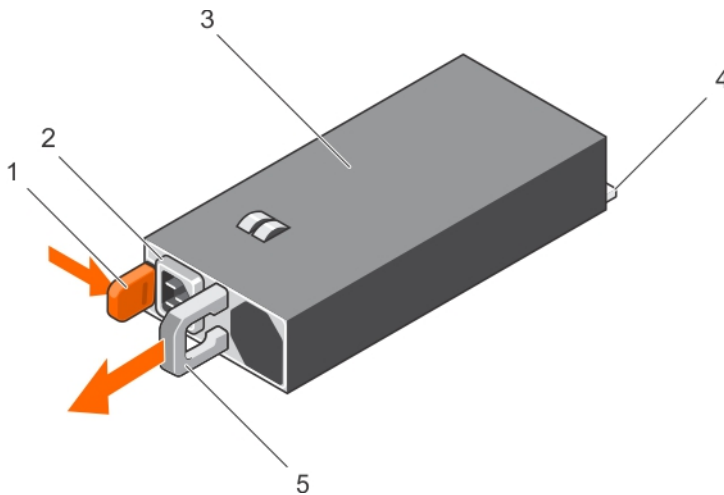
**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by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

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

**✍ NOTE:** You may have to unlatch and lift the optional cable management arm if it interferes with the power supply unit (PSU) removal. For information about the cable management arm, see the system's rack documentation.

### Steps

1. Disconnect the power cable from the power source and from the PSU you intend to remove, and then remove the cables from the strap.
2. Press the release latch and slide the PSU out of the chassis by using the PSU handle.



**Figure 67. Removing an AC PSU**

- |                  |                        |
|------------------|------------------------|
| 1. release latch | 2. PSU cable connector |
| 3. PSU           | 4. power connector     |
| 5. PSU handle    |                        |

## Installing an AC power supply unit

### Prerequisites

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

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. For systems that support redundant power supply units (PSUs), ensure that both the PSUs are of the same type and have the same maximum output power
3. If installed, remove the PSU blank.

### Steps

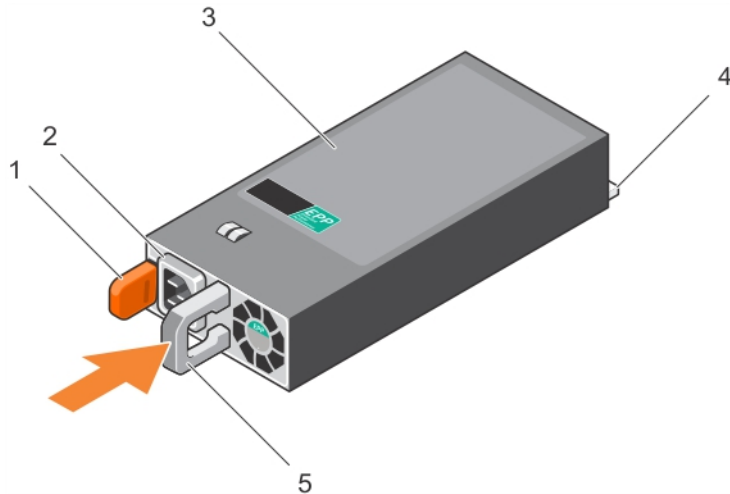
1. Slide the new PSU into the chassis until the PSU is fully seated and the release latch snaps into place.

**NOTE:** If you unlatched the cable management arm, relatch it. For information about the cable management arm, see the rack documentation of your system.

2. Connect the power cable to the PSU and plug the cable into a power outlet.

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

**NOTE:** When installing, hot swapping, or hot-adding a new PSU, wait for 15 seconds for the system to recognize the PSU and determine its status. The PSU redundancy may not occur until discovery is complete. Wait until the new PSU is discovered and enabled before you remove the other PSU. The PSU status indicator turns green to signify that the PSU is functioning properly.



**Figure 68. Installing an AC PSU**

- |                  |                        |
|------------------|------------------------|
| 1. release latch | 2. PSU cable connector |
| 3. PSU           | 4. power connector     |
| 5. PSU handle    |                        |

## Hard drives

Your system supports entry hard drives and enterprise-class hard drives. Entry hard drives are designed for 5x8 operating environment with less workload rating to drives and enterprise-class drives are designed for 24x7 operating environment. Selecting the correct drive class will enable the critical areas of quality, functionality, performance, and reliability to be optimized for the target implementation.

**NOTE:** Do not mix enterprise-class hard drives with entry hard drives.

Choosing the right drive type depends on the usage pattern. Improper use of entry hard drives (workload rating exceeds 55TB/year) will lead to significant risk and increase the drives failure rate.

For more information on these hard drives, see the *512e and 4Kn Disk Formats* whitepaper and *4K Sector HDD FAQ* document at [Dell.com/poweredgemanuals](http://Dell.com/poweredgemanuals).

All hard drives are connected to the system board through the hard drive backplane. Hard drives are supplied in hot-swappable hard drive carriers that fit in the hard drive slots.

**CAUTION:** Before attempting to remove or install a hard 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 hot-swap hard drive removal and insertion.

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

Use only hard drives that have been tested and approved for use with the hard drive backplane.

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

## Removing a 2.5 inch hard drive blank (rear)

### Prerequisites

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

△ **CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

Follow the safety guidelines listed in safety instructions section.

### Steps

Pull the hard drive blank out until it is free of the hard drive slot.

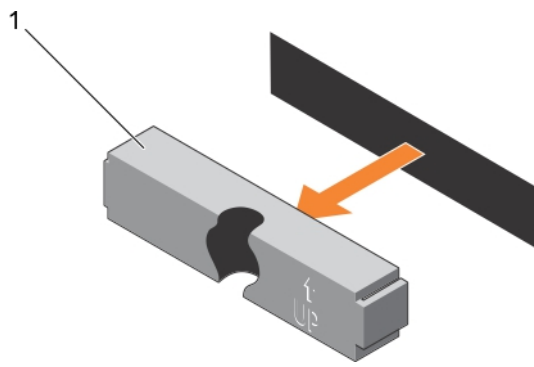


Figure 69. Removing and installing a 2.5 inch hard drive blank (rear)

1. hard drive blank (rear)

## Installing a 2.5 inch hard drive blank (rear)

### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.

### Steps

Insert the hard drive blank into the hard drive slot until it clicks into place.

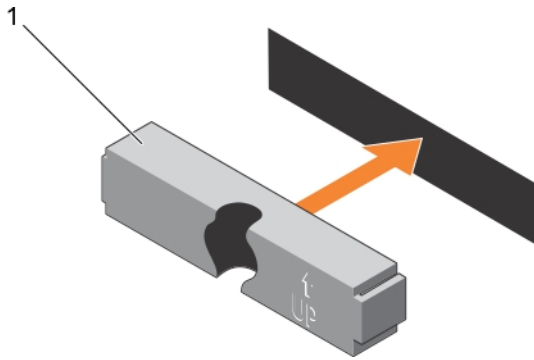


Figure 70. Installing a 2.5 inch hard drive blank (rear)

#### Next steps

Follow the procedure listed in the After working inside your system section.

#### Related Links

[Safety instructions](#)

[Safety instructions](#)

[After working inside your system](#)

## Removing a 3.5-inch hard drive blank

#### Prerequisites

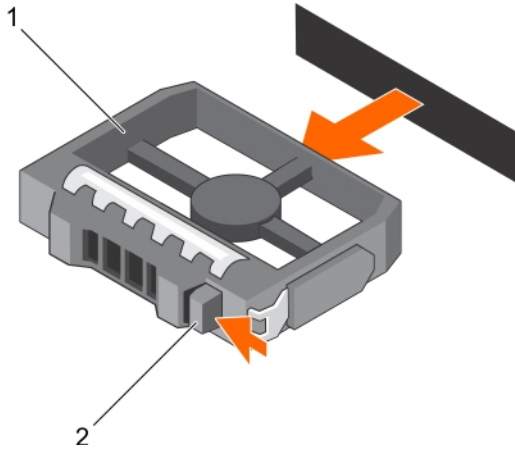
**⚠ CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by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

**⚠ CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

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

#### Steps

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



**Figure 71. Removing a 3.5-inch hard drive blank**

1. hard drive blank

2. release button

#### **Next steps**

If applicable, install the front bezel.

#### **Related Links**

[Safety instructions](#)

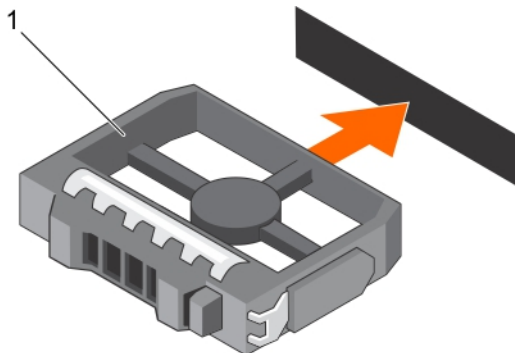
## **Installing a 3.5-inch hard drive blank**

#### **Prerequisites**

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

#### **Steps**

Insert the hard drive blank into the hard drive slot until the release button clicks into place.



**Figure 72. Installing a 3.5-inch hard drive blank**

1. hard drive blank

#### **Next steps**

If applicable, install the front bezel.

#### **Related Links**

[Safety instructions](#)

## Removing a hard drive from a hard drive carrier

### Prerequisites

1. Keep the Phillips #1 screwdriver ready.
2. Remove the hot swappable hard drive carrier from the system.

### Steps

1. Remove the screws from the slide rails on the hard drive carrier.
2. Lift the hard drive out of the hard drive carrier.

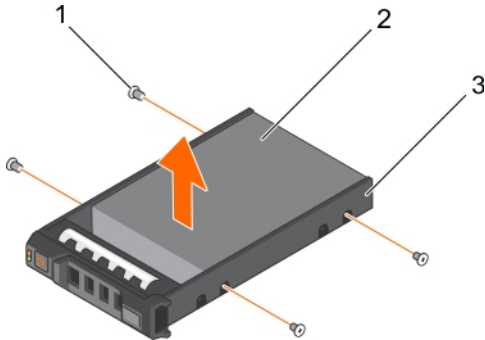


Figure 73. Removing a hard drive into a hard drive carrier

1. screw (4)
2. hard drive
3. hard drive carrier

### Related video

<http://www.Dell.com/QRL/Server/PER730/HDD>

## Installing a hard drive into a hard drive carrier

### Prerequisites

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

### Steps

1. Insert the hard drive into the hard drive carrier with the connector end of the hard drive toward the back of the carrier.
2. Align the screw holes on the hard drive with the screws holes on the hard drive carrier.  
When aligned correctly, the back of the hard drive is flush with the back of the hard drive carrier.
3. Attach the screws to secure the hard drive to the hard drive carrier.

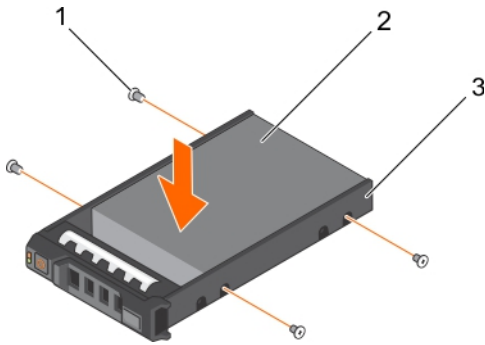


Figure 74. Installing a hard drive into a hard drive carrier

1. screw (4)
2. hard drive
3. hard drive carrier

#### Next steps

Install the hot swappable hard drive carrier.

## Removing a hot swappable hard drive

#### Prerequisites

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

1. Follow the safety guidelines listed in Safety instructions section.
2. If applicable, remove the bezel.
3. Using the management software, prepare the hard drive for removal. If the hard drive is online, the green activity/fault indicator flashes while the drive is turning off. When the hard drive indicators are off, the hard drive is ready for removal.

For more information, see the documentation for the storage controller.

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

#### Steps

1. Press the release button to open the hard drive carrier release handle.
2. Slide the hard drive carrier out of the hard drive slot.

**CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

3. If you are not replacing the hard drive immediately, insert a hard drive blank in the empty hard drive slot.

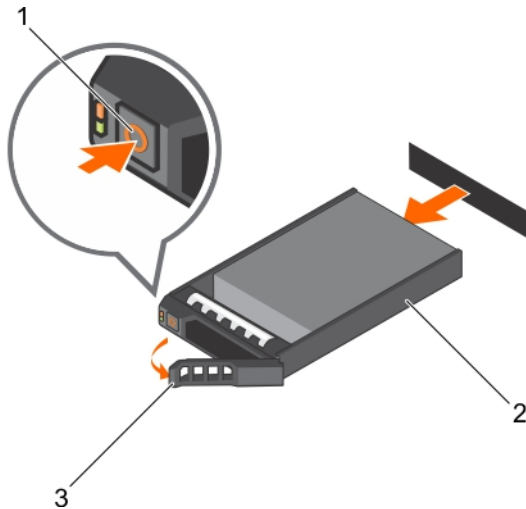


Figure 75. Removing and installing a hot-swappable hard drive

1. release button
2. hard drive carrier
3. hard drive carrier handle

#### Related Links

[Safety instructions](#)

## Installing a hot swappable hard drive

#### Prerequisites

- △ **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.
- △ **CAUTION:** Use only hard drives that have been tested and approved for use with the hard drive backplane.
- △ **CAUTION:** Combining SAS and SATA hard drives in the same RAID volume is not supported.
- △ **CAUTION:** When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard 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 hard drive is installed and the system is powered on, the hard drive automatically begins to rebuild. Make absolutely sure that the replacement hard drive is blank or contains data that you wish to have over-written. Any data on the replacement hard drive is immediately lost after the hard drive is installed.

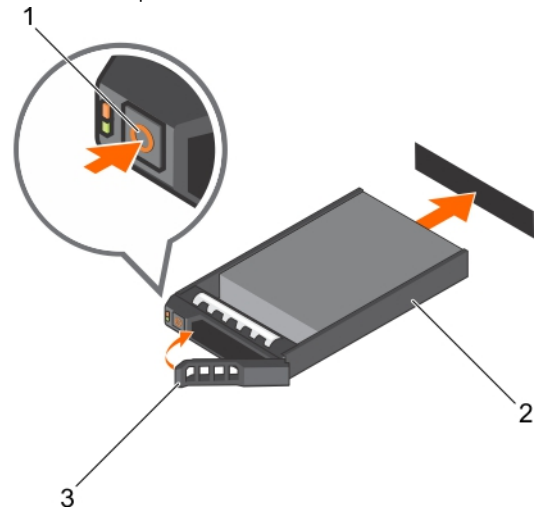
1. Follow the safety guidelines listed in Safety instructions section.

### Steps

1. If a hard drive blank is installed in the hard drive slot, remove it.
2. Install a hard drive in the hard drive carrier. For more information, see the Installing a hot swappable hard drive into a hot swappable hard drive carrier section.
3. Press the release button on the front of the hard drive carrier and open the hard drive carrier handle.
4. Insert the hard drive carrier into the hard drive slot until the carrier connects with the backplane.
5. Close the hard drive carrier handle to lock the hard drive in place.

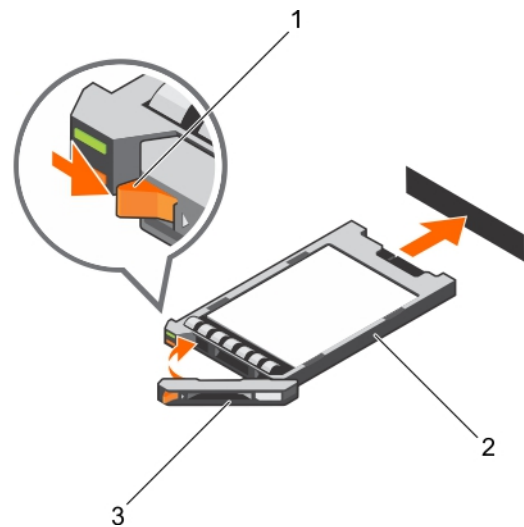
### Next steps

Install the optional front bezel.



**Figure 76. Installing a hot swappable hard drive**

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1. release button                   | 2. hard drive or SSD carrier |
| 3. hard drive or SSD carrier handle |                              |



**Figure 77. Installing a 1.8-inch hot swappable uSATA SSD**

- |                   |                |
|-------------------|----------------|
| 1. release button | 2. SSD carrier |
|-------------------|----------------|

3. SSD carrier handle

#### Related Links

[Safety instructions](#)

[Installing a hard drive into a hard drive carrier](#)


## Hard drive backplane


Your system supports 3.5 inch (x12) backplane, 3.5 inch (x4) backplane on the hard-drive tray plus 2.5 inch backplane (back).


### Removing the hard-drive backplane

#### Prerequisites

1. Follow the safety guidelines listed in Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the cooling shroud.
4. Remove the cooling-fan assembly.
5. Remove all hard drives.


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

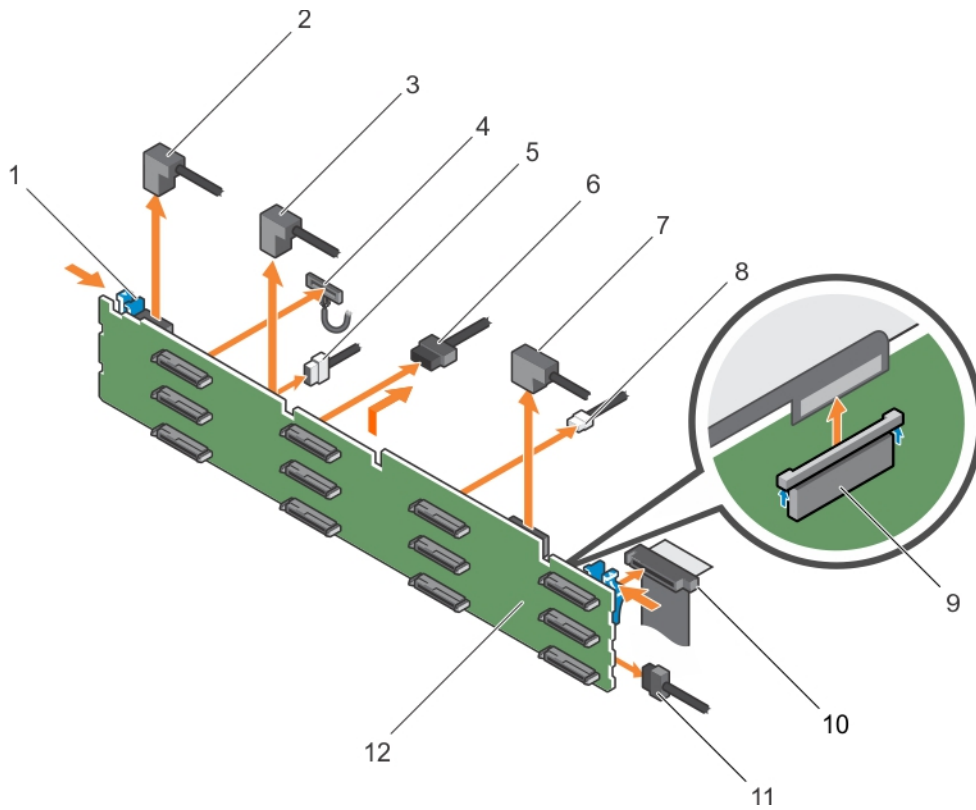
 **CAUTION:** To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.

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

#### Steps

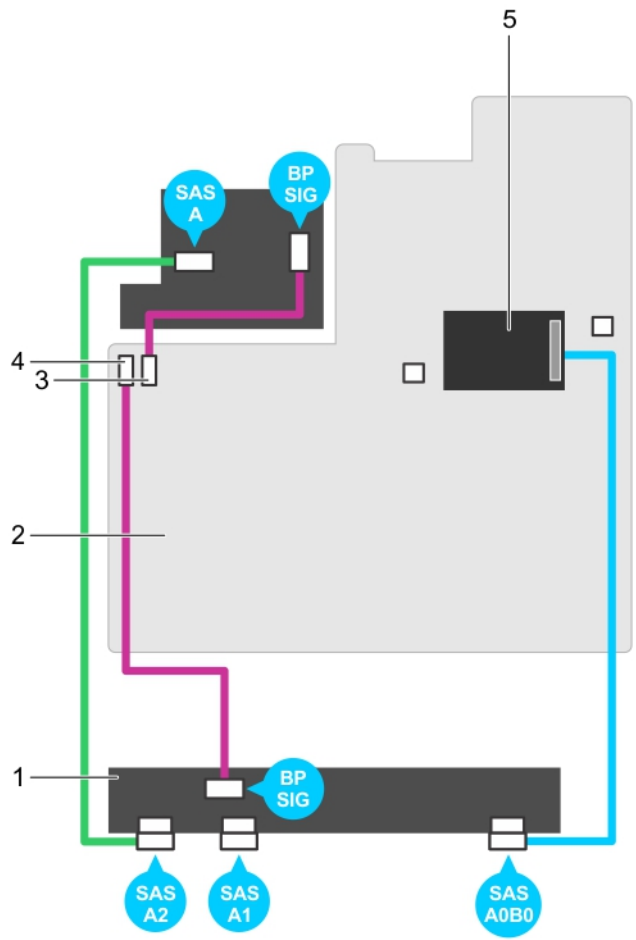
1. Disconnect the data, signal, and power cable(s) from the backplane.
2. Press the release tabs and lift the backplane upward and slide it toward the back of the chassis.

 **NOTE:** To prevent damage to the control panel flex cable, unlatch the blocking tab on the connector before removing the flex cable. Do not bend the flex cable at the connector. To unlatch the blocking tab for the x12 backplane, pull the locking tab up. For the x2 backplanes, rotate the locking tab 90 degrees clockwise.



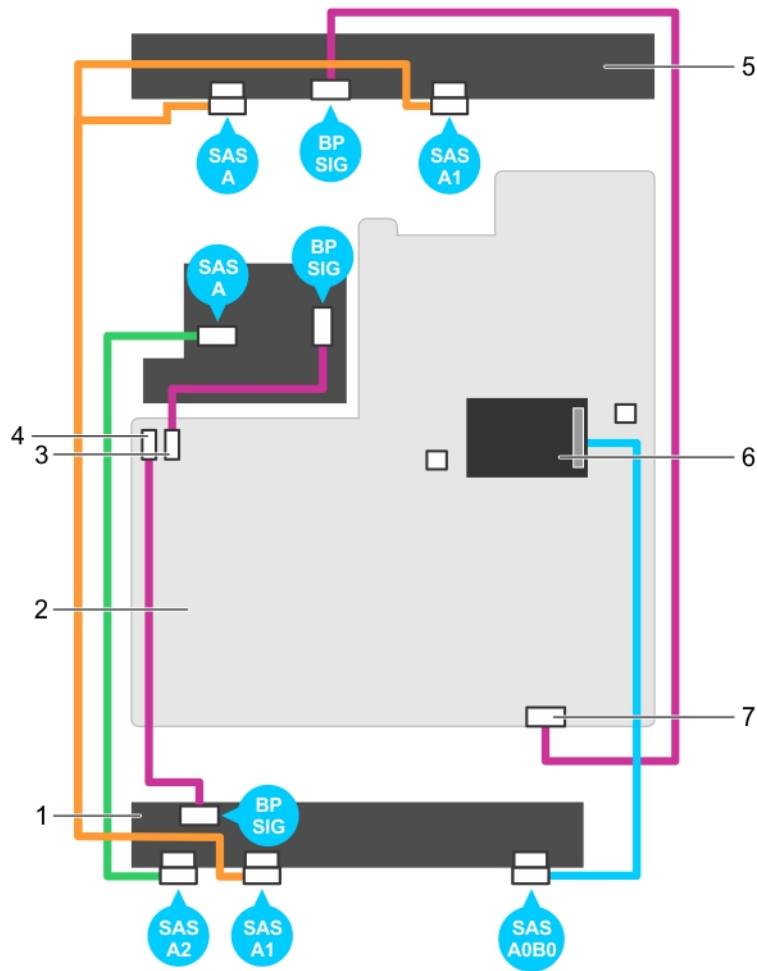
**Figure 78. Removing and installing the 3.5 inch (x12) backplane**

- |                           |   |
|---------------------------|---|
| 1. release tab (2)        | 2. cable A2                             |
| 3. cable A1               | 4. left ear control panel cable         |
| 5. backplane signal cable | 6. backplane power cable (2)            |
| 7. cable A0/B0            | 8. USB cable                            |
| 9. control panel cable    | 10. right ear control panel flex cable  |
| 11. hard-drive backplane  | 12. hard-drive backplane connector (12) |



**Figure 79. Cabling diagram—3.5 inch (x12) backplane (option 1)**

- |                                       |                                 |
|---------------------------------------|---------------------------------|
| 1. hard-drive backplane               | 2. system board                 |
| 3. backplane signal connector 0       | 4. backplane signal connector 1 |
| 5. integrated storage controller card |                                 |



**Figure 80. Cabling diagram—3.5 inch (x12) backplane (option 2)**

- |                                 |                                       |
|---------------------------------|---------------------------------------|
| 1. hard-drive backplane         | 2. system board                       |
| 3. backplane signal connector 0 | 4. backplane signal connector 1       |
| 5. hard-drive mid plane         | 6. integrated storage controller card |
| 7. backplane signal connector 2 |                                       |

**Next steps**

1. Replace the hard-drive backplane. Follow the steps in the Installing the hard-drive backplane section.
2. Follow the procedure listed in the Before working inside your system section.

## Related Links

[Safety instructions](#)

[Before working inside your system](#)

[Installing the hard drive backplane](#)

[After working inside your system](#)

## Installing the hard drive backplane

### Prerequisites

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



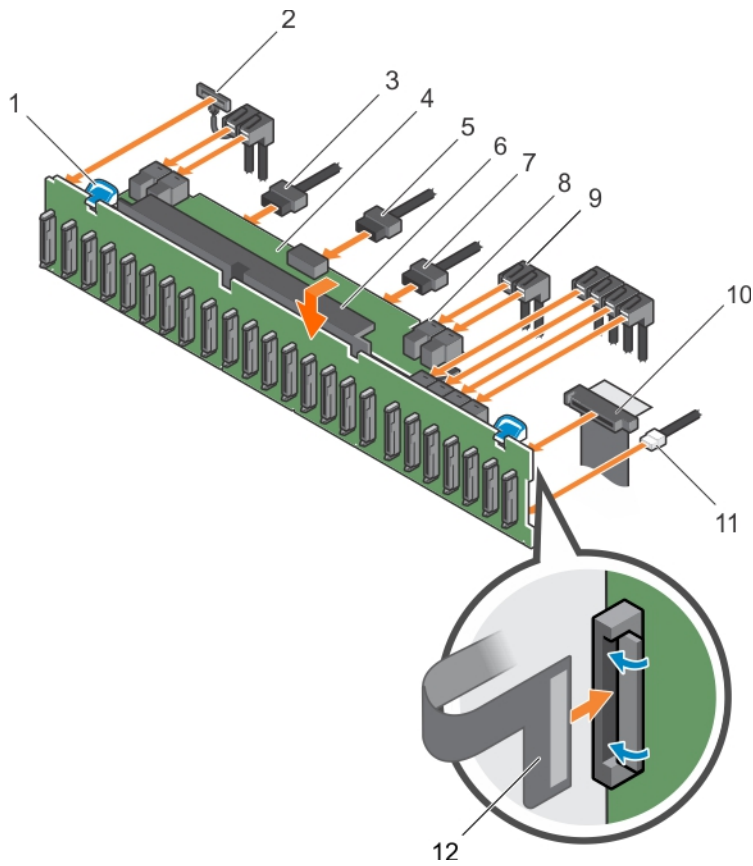
**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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



**CAUTION: To prevent damage to the control panel flex cable, do not bend the control panel flex cable after it is inserted into the connector.**

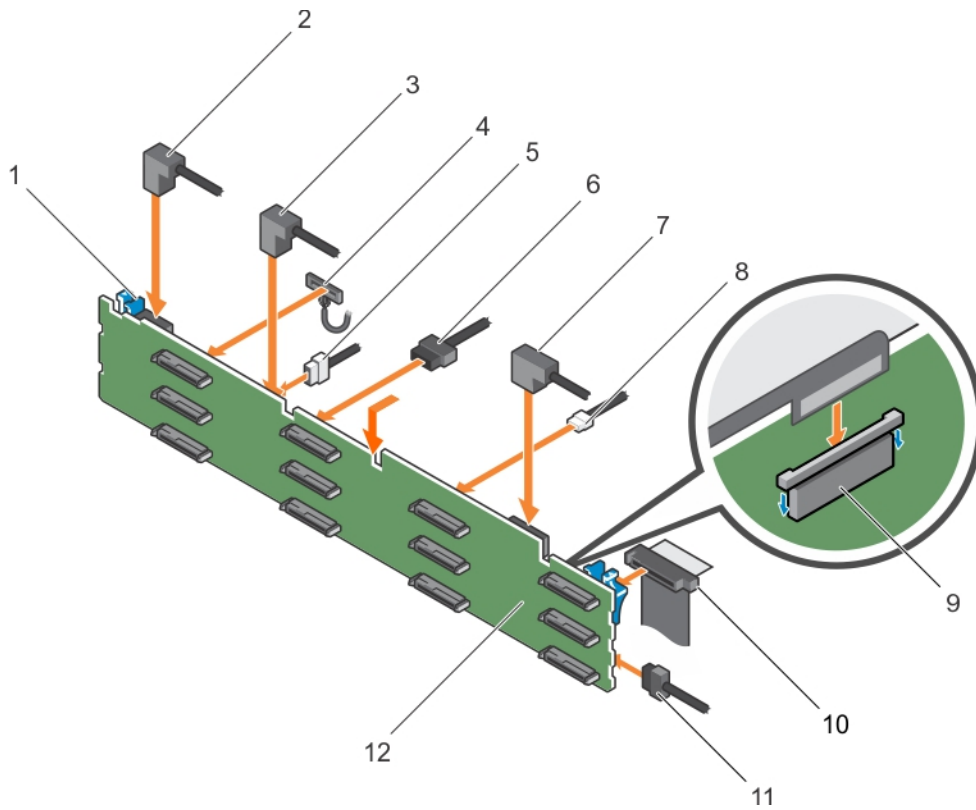
### Steps

1. Use the hooks on the chassis as guides to align the hard drive backplane.
2. Lower the hard drive backplane until the release tabs snap into place.
3. Connect the data, signal, and power cable(s) to the backplane.



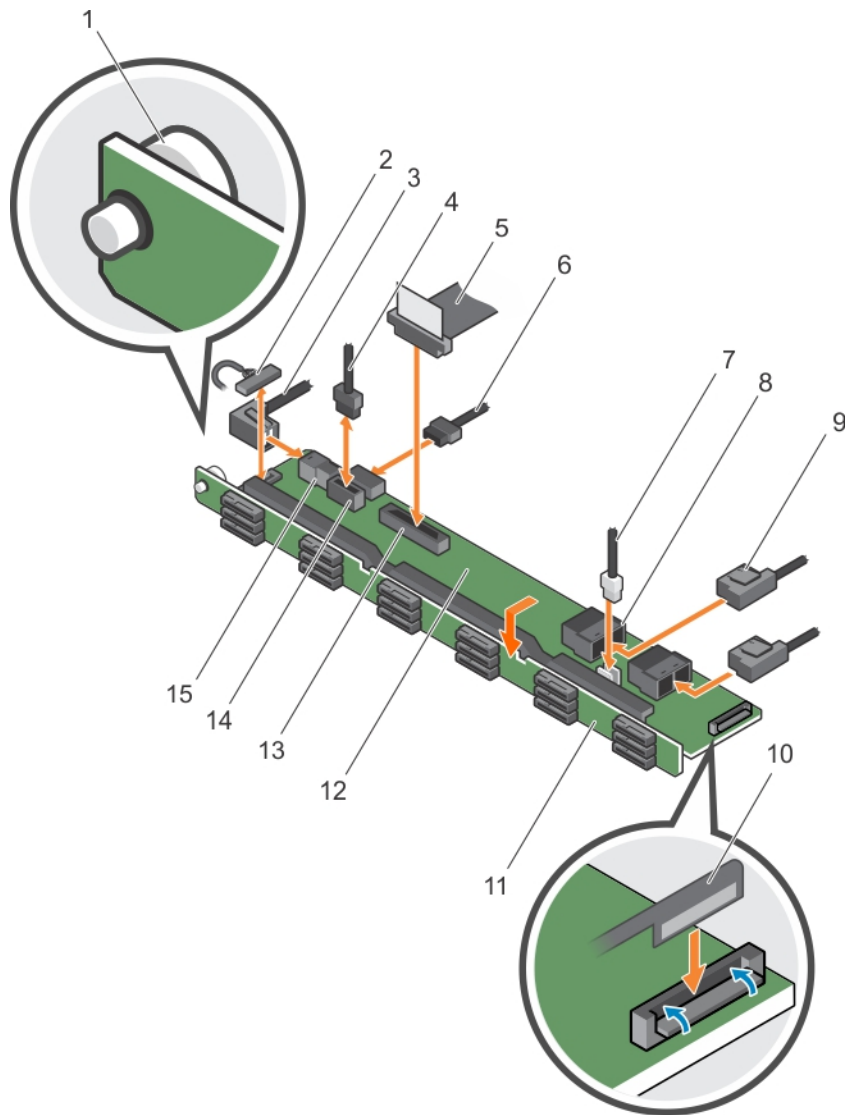
**Figure 81. Installing the 2.5 inch (x24) SAS/SATA backplane**

- |  |  |
|--|--|
| 1. release tab (2)                       | 2. left ear control panel cable        |
| 3. backplane power cable                 | 4. hard drive backplane expander       |
| 5. backplane signal cable                | 6. hard drive backplane assembly       |
| 7. backplane power cable                 | 8. mini SAS cable connector (2)        |
| 9. SAS cable (3)                         | 10. control panel cable                |
| 11. USB cable                            | 12. right ear control panel flex cable |
| 13. hard drive backplane connectors (24) |  |



**Figure 82. Installing the 3.5 inch (x12) SAS/SATA backplane**

- |                           |   |
|---------------------------|---|
| 1. release tab (2)        | 2. SAS cable A2                         |
| 3. SAS cable A1           | 4. left ear control panel cable         |
| 5. backplane signal cable | 6. backplane power cable (2)            |
| 7. SAS cable A0/B0        | 8. USB cable                            |
| 9. control panel cable    | 10. right ear control panel flex cable  |
| 11. hard drive backplane  | 12. hard drive backplane connector (12) |



**Figure 83. Installing the 1.8 Inch (x18) SAS/SATA backplane**

- |                                   |   |
|-----------------------------------|---|
| 1. release pin                    | 2. left ear control panel cable         |
| 3. SAS A2 cable                   | 4. backplane signal cable               |
| 5. control panel cable            | 6. backplane power cable                |
| 7. USB cable                      | 8. mini SAS connector (2)               |
| 9. SAS cable (2)                  | 10. right ear control panel flex cable  |
| 11. hard drive backplane assembly | 12. hard drive backplane expander       |
| 13. control panel connector       | 14. backplane power connector           |
| 15. SAS A2 connector              | 16. hard drive backplane connector (18) |

**Next steps**

1. Replace the cooling fan assembly.

2. Replace the cooling shroud.
3. Install the hard drives in their original locations.
4. Follow the procedure listed in the After working inside your system section.

#### Related Links

[Safety instructions](#)


[Before working inside your system](#)

[After working inside your system](#)


## Removing the hard drive backplane (rear)

#### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove both hard drives.

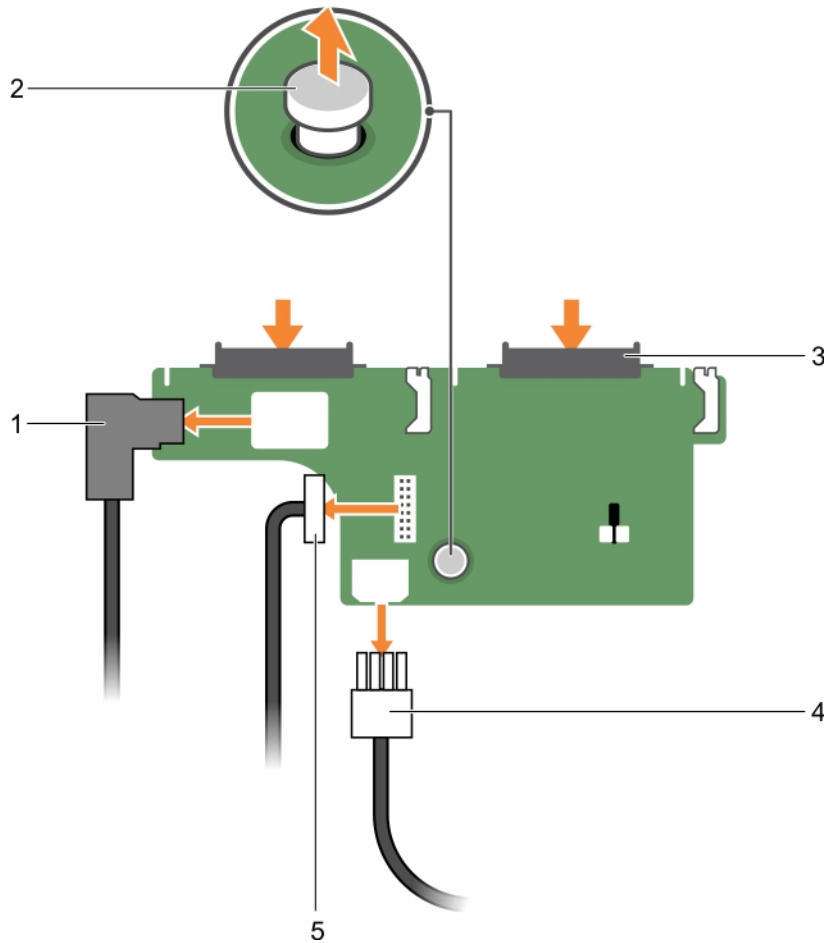
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

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

#### Steps

1. Disconnect all the cables from the backplane.
2. Lift the release pin and slide the backplane toward the front of the chassis.
3. Lift the backplane to remove it from the chassis.



**Figure 84. Removing the 2.5 inch (x2) hard drive backplane**

- |                             |                |
|-----------------------------|----------------|
| 1. SAS cable                | 2. release pin |
| 3. hard drive connector (2) | 4. power cable |
| 5. backplane signal cable   |                |

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)

## Installing the hard drive backplane (rear)

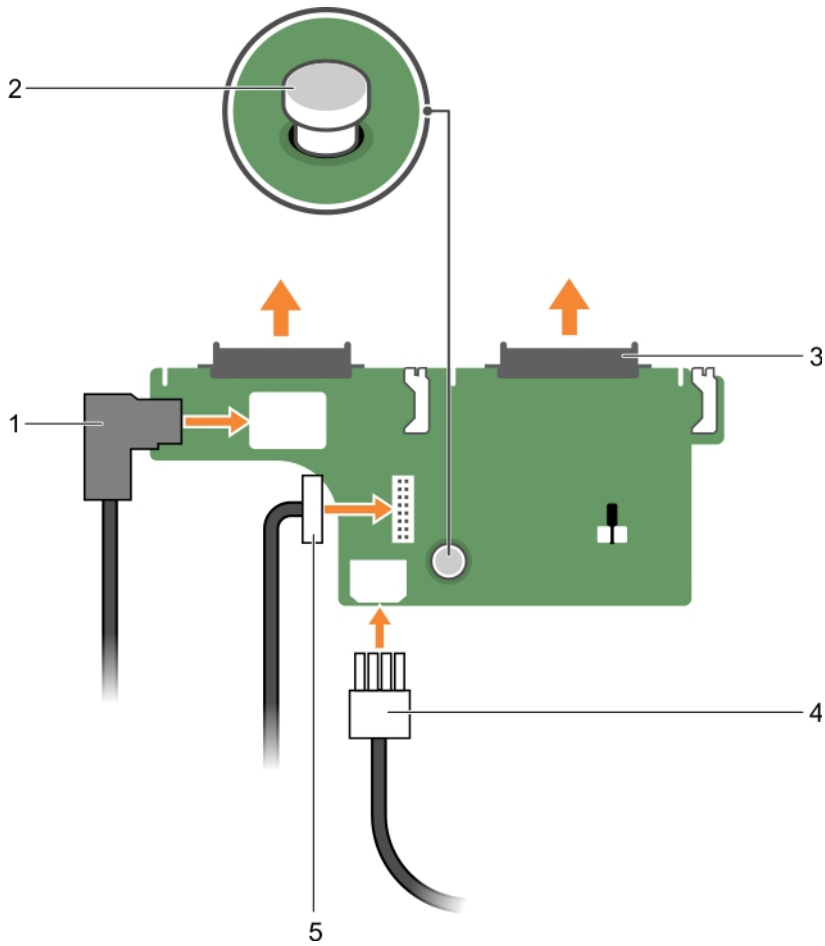
#### Prerequisites

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

**⚠ 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 notches on the backplane with the notches on the chassis.
2. Lift the release pin and slide the backplane toward the back of the chassis until firmly seated.
3. Release the release pin to lock the backplane to the chassis.
4. Reconnect all the cables to the backplane.



**Figure 85. Installing the 2.5 inch (x2) hard drive backplane**

- |                             |                |
|-----------------------------|----------------|
| 1. SAS cable                | 2. release pin |
| 3. hard drive connector (2) | 4. power cable |
| 5. backplane signal cable   |                |

### Next steps

1. Install both the hard drives in their original location.
2. Follow the procedure listed in the After working inside your system section.

### Related Links


- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

# Control panel

The control panel contains the power button, the diagnostic indicators, and the front USB ports.

## Removing the LCD control panel assembly


### Prerequisites

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

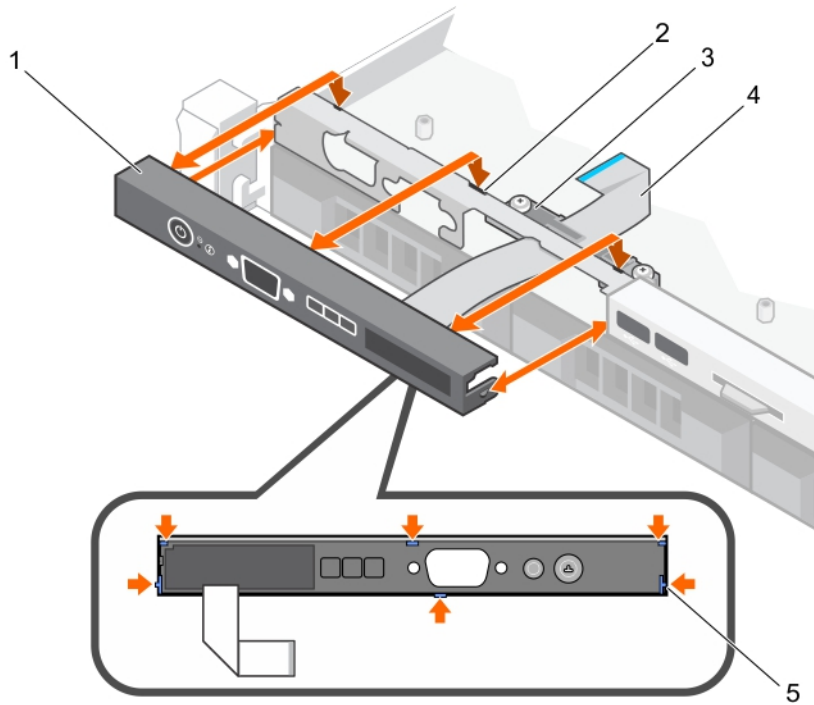
1. Follow the safety guidelines listed in safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Keep the Phillips #2 screwdriver ready.

### Steps

1. Disconnect the cables from the control panel board.

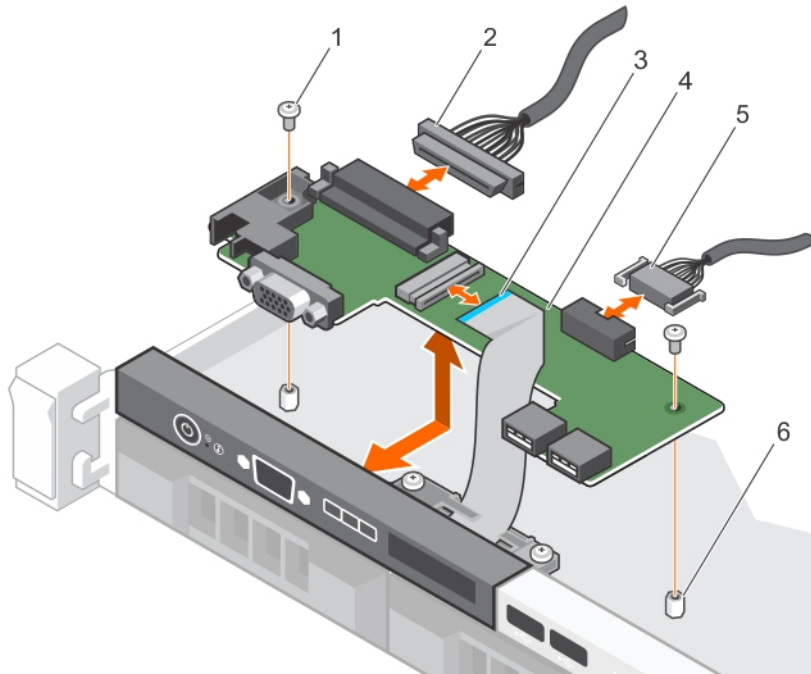
 **CAUTION:** Do not use excessive force when removing the control panel as it can damage the connectors.

2. Hold the top edge of the LCD control panel at the corners and pull upward until the LCD control panel tabs are released.
3. Pull the control panel away from the chassis.
4. Remove the screws securing the LCD control panel board.
5. Lift the LCD control panel board away from the chassis.



**Figure 86. Removing and installing the LCD control panel—four 3.5-inch hot swappable hard drive chassis**

- |  |                         |
|--|-------------------------|
| 1. LCD control panel                   | 2. notches (6)          |
| 3. display module cable retention clip | 4. display module cable |
| 5. tabs on the LCD control panel (6)   |                         |



**Figure 87. Removing and installing the LCD control panel board—four hard drive chassis**

- |                         |                                  |
|-------------------------|----------------------------------|
| 1. screw (2)            | 2. control panel connector cable |
| 3. display module cable | 4. LCD control panel board       |
| 5. USB connector cable  | 6. standoff on the chassis (2)   |

#### Next steps

1. Install the LCD control panel assembly.
2. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)
- [Installing the LCD control panel assembly](#)

## Installing the LCD control panel assembly

#### Prerequisites

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

1. Follow the safety guidelines listed in Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Keep the Phillips #2 screwdriver ready.

### Steps

1. Align the tabs on the control panel with the notches on the chassis.
2. Route the LCD cable through the cable retention clip.
3. Push the control panel toward the chassis until it snaps into place.

### Next steps

Follow the procedure listed in the After working inside your system section.

### Related Links


[Safety instructions](#)

[Before working inside your system](#)

[After working inside your system](#)

## Removing the LED control panel assembly

### Prerequisites

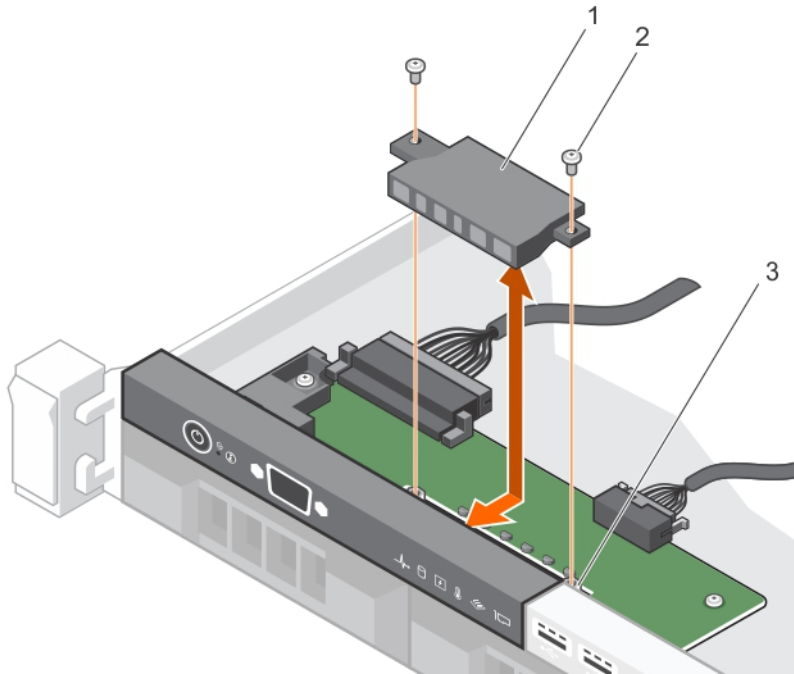
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

1. Follow the safety guidelines listed in Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Disconnect the cables connected to the control panel module.

 **CAUTION:** Do not use excessive force when removing the control panel as it can damage the connectors.

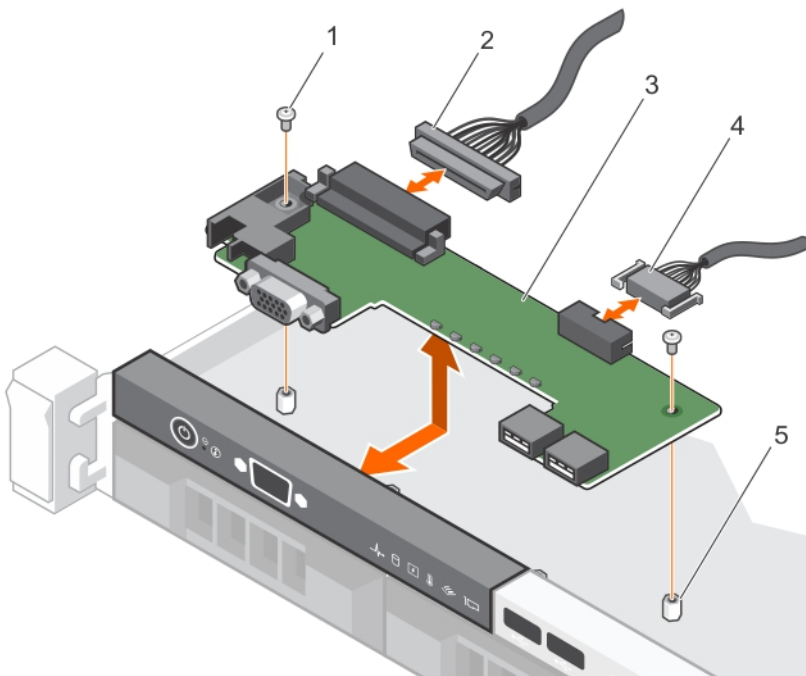
### Steps

1. For cabled hard drive chassis, perform the following steps:
  - a. Remove the screw(s) that secure the LED panel to the chassis.
  - b. Remove the LED panel.
2. Remove the screws that secure the control panel board to the chassis.
3. Lift the control panel board away from the chassis.



**Figure 88. Removing and installing the LED module—four cabled hard drive chassis**

- 1. LED module
- 2. screw (2)
- 3. slot on the chassis



**Figure 89. Removing and installing the LED control panel board—four cabled hard drive chassis**

- 1. screw (2)
- 2. control panel connector cable

3. control panel board
4. USB connector cable
5. standoff on the chassis (2)

#### Next steps


1. Install the LED control panel assembly.
2. Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [Installing the LED control panel assembly](#)
- [After working inside your system](#)

## Installing the LED control panel assembly

#### Prerequisites

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

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

#### Steps

1. For cabled hard drive systems, perform the following steps:
  - a. Insert the LED panel into the slot in the chassis.
  - b. Secure the LED panel with the screws.
2. Insert the control panel board into the slot in the chassis and align the two screw holes on the control panel board with the corresponding holes on the chassis.
3. Secure the control panel board with the screws.
4. Connect all the cables to the control panel board.

#### Next steps

Follow the procedure listed in the After working inside your system section.

#### Related Links

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the control panel

#### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Keep the T15 Torx screwdriver handy.

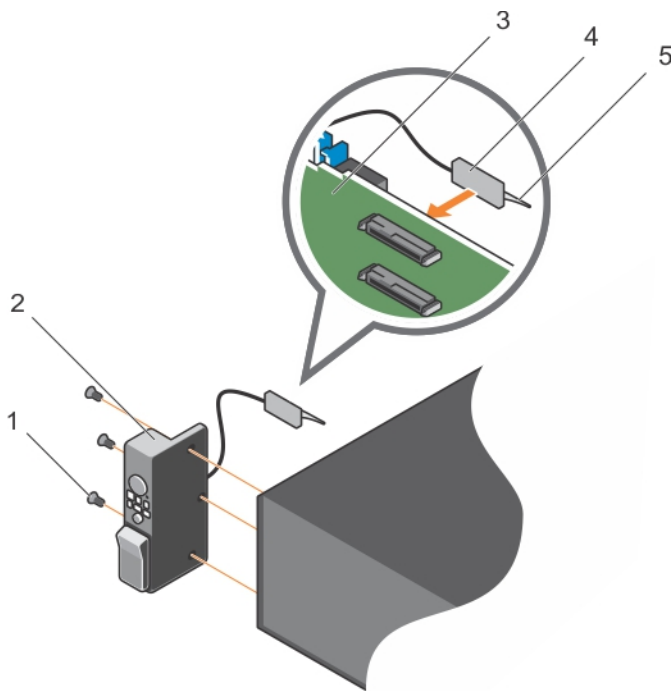
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

**Steps**

1. Fold the PPID label around the cable.
2. Fold the pull tab close to the connector and guide the connector and pull tab into the channel.
3. Push the cable until the cable passes completely through the channel.
4. Tighten the screws to secure the control panel to the chassis.

**NOTE:** You must route the cable properly to prevent it from being pinched or crimped.

5. Connect the cable connector to the hard drive backplane by pushing on the center of the connector.



**Figure 90. Installing the control panel**

- |                         |                  |
|-------------------------|------------------|
| 1. screw (3)            | 2. control panel |
| 3. hard-drive backplane | 4. connector     |
| 5. plastic pull tab     |                  |

**Next steps**




Follow the procedure listed in the After working inside your system section.


# System board

A system board (also known as the motherboard) is the main printed circuit board found in systems. The system board allows communication between many of the crucial electronic components of the system, such as the central processing unit (CPU) and memory, and also provides connectors for other peripherals. Unlike a backplane, a system board contains significant number of sub-systems such as the processor expansion cards, and other components.

## Removing the system board


### Prerequisites

-  **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.**
-  **CAUTION: If you are using the Trusted Platform Module (TPM) with an encryption key, you may be prompted to create a recovery key during program or System Setup. Be sure to create and safely store this recovery key. If you replace this system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your hard drives.**
-  **CAUTION: Do not attempt to remove the TPM plug-in module from the system board. 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, and it cannot be re-installed or installed on another system board.**

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the following:
  - a. Cooling shroud
  - b. Cooling fan assembly
  - c. Hard drive tray (if installed)
  - d. Power supply unit(s)
  - e. All expansion card risers
  - f. Integrated storage controller card
  - g. Internal dual SD module
  - h. Internal USB key (if installed)
  - i. PCIe card holder
  - j. Cable retention bracket
  - k. Heat sink(s)/heat sink blank(s)
  - l. Processors(s)/processor blank(s)
    -  **CAUTION: To prevent damage to the processor pins when replacing a faulty system board, ensure that you cover the processor socket with the processor protective cap.**
  - m. Memory modules and memory module blanks
  - n. Network daughter card

## Steps

1. Disconnect all cables from the system board.

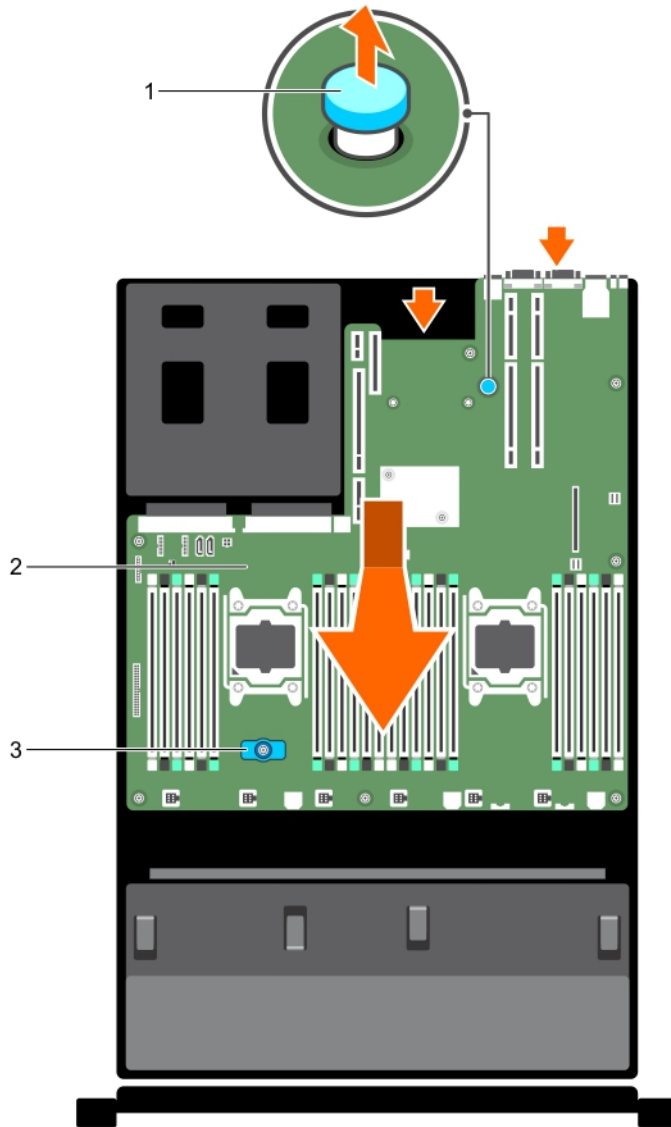
 **CAUTION: Take care not to damage the system identification button while removing the system board from the chassis.**

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

2. Hold the system board holder, lift the blue release pin, lift the system board, and then slide it toward the front of the chassis.

Sliding the system board toward the front of the chassis disengages the connectors from the back of the chassis slots.

3. Lift the system board out of the chassis.



**Figure 91. Removing the system board**

1. release pin
2. system board
3. system board holder

#### **Next steps**

1. Install the system board.
2. Follow the procedure listed in the After working inside your system section.


#### **Related Links**

- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)

## Installing the system board

### Prerequisites


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

 **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.**

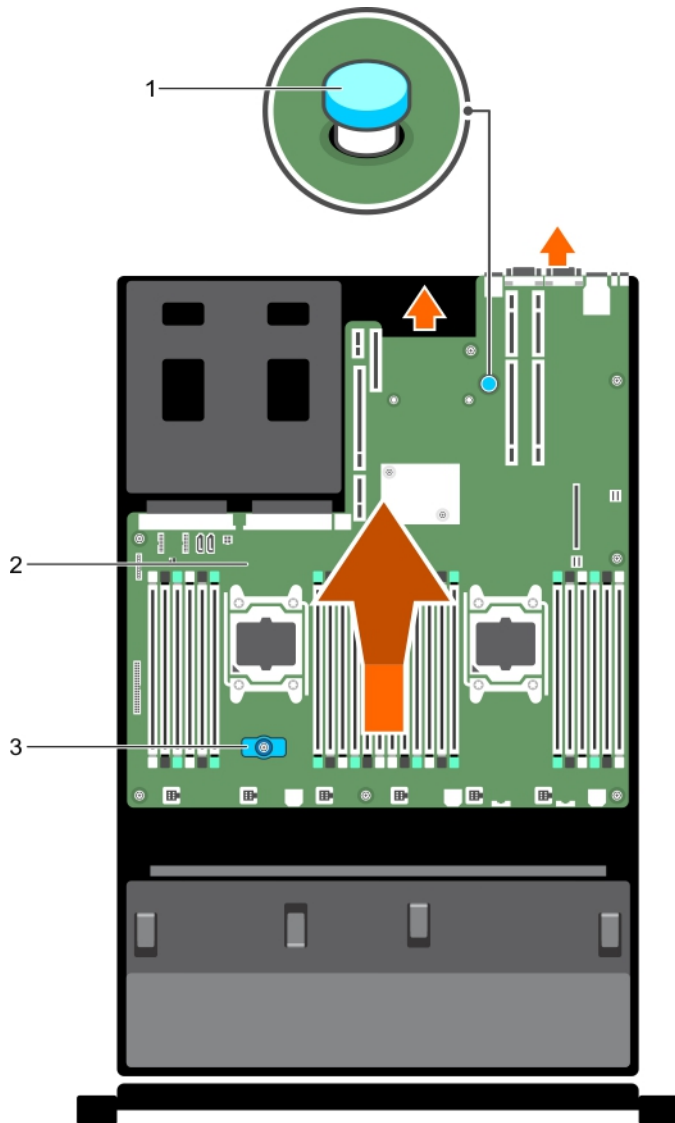
### Steps

1. Unpack the new system board assembly.

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

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

2. Hold the touch points and lower the system board into the chassis.
3. Push the system board toward the back of the chassis until the board clicks into place.



**Figure 92. Installing the system board**


- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. release pin</li> <li>3. system board holder</li> </ol> | <ol style="list-style-type: none"> <li>2. system board</li> </ol> |
|--|---|

**Next steps**

1. Install the Trusted Platform Module (TPM). For information about how to install the TPM, see the Installing the Trusted Platform Module section. For more information on the TPM, see the Trusted Platform Module section.

**NOTE:** The TPM plug-in module is attached to the system board and cannot be removed. A replacement TPM plug-in module will be provided for all system board replacements where a TPM plug-in module was installed.

2. Replace the following:
  - a. Cable retention bracket

- b. PCIe card holder
  - c. Hard drive tray (if applicable)
  - d. Integrated storage controller card
  - e. Internal USB key (if applicable)
  - f. Internal dual SD module
  - g. All expansion card risers
  - h. Heat sink(s)/heat sink blank(s) and processors(s)/processor blank(s)
  - i. Memory modules and memory module blanks
  - j. Network daughter card
  - k. Cooling fan assembly
  - l. Cooling shroud
  - m. Power supply unit(s)
3. Reconnect all cables to the system board.
-  **NOTE:** Ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.
4. Follow the procedure listed in the After working inside your system section.
5. Import your new or existing iDRAC Enterprise license. For more information, see Integrated Dell Remote Access Controller User's Guide, at [Dell.com/esmanuals](http://Dell.com/esmanuals).
6. Ensure that you:
- a. Use the Easy Restore feature to restore the Service Tag. For more information, see the Easy restore section.
  - b. If the Service Tag is not backed up in the backup flash device, enter the system Service Tag manually. For more information, see the Entering the system Service Tag section.
  - c. Update the BIOS and iDRAC versions.
  - d. Re-enable the Trusted Platform Module (TPM). For more information, see the Re-enabling the Trusted Platform Module (TPM) section.


#### Related Links

- [Trusted Platform Module](#)
- [Safety instructions](#)
- [Restoring the Service Tag by using the Easy Restore feature](#)
- [Initializing the TPM for TXT users](#)
- [Entering the system Service Tag by using System Setup](#)
- [Before working inside your system](#)
- [Installing the Trusted Platform Module](#)
- [After working inside your system](#)

#### Entering the system Service Tag by using System Setup

If Easy Restore fails to restore the Service Tag, 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**.

### Restoring the Service Tag by using the Easy Restore feature


The Easy Restore feature enables you to restore your system's Service Tag, license, UEFI configuration, and the system configuration data after replacing the system board. All data is automatically backed up in a backup flash device. If BIOS detects a new system board and the Service Tag in the backup flash device, BIOS prompts the user to restore the backup information.


1. Turn on the system.  
If BIOS detects a new system board, and if the Service Tag is present in the backup flash device, BIOS displays the Service Tag, the status of the license, and the **UEFI Diagnostics** version.
2. Perform one of the following steps:  
After the restore process is complete, BIOS prompts to restore the system configuration data.
3. Perform one of the following steps:
  - Press **Y** to restore the system configuration data.
  - Press **N** to use the default configuration settings.

After the restore process is complete, the system restarts.

## Trusted Platform Module

Trusted Platform Module (TPM) is a dedicated microprocessor designed to secure hardware by integrating cryptographic keys into devices. A software can use a Trusted Platform Module to authenticate hardware devices. As each TPM chip has a unique and secret RSA key burned in as it is produced, it can perform the platform authentication.

 **CAUTION: Do not attempt to remove the Trusted Platform Module (TPM) from the system board. After the TPM is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM breaks the cryptographic binding, and it cannot be re-installed or installed on another system board.**

 **NOTE:** This is a Field Replaceable Unit (FRU). Removal and installation procedures must be performed only by Dell certified service technicians.

### Related Links

- [Safety instructions](#)
- [Restoring the Service Tag by using the Easy Restore feature](#)
- [Initializing the TPM for TXT users](#)
- [Entering the system Service Tag by using System Setup](#)
- [Before working inside your system](#)
- [Installing the Trusted Platform Module](#)
- [After working inside your system](#)

## Installing the Trusted Platform Module

### Prerequisites


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

△ **CAUTION:** Do not attempt to remove the Trusted Platform Module (TPM) from the system board. Once the TPM is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM breaks the cryptographic binding, and it cannot be re-installed or installed on another system board.

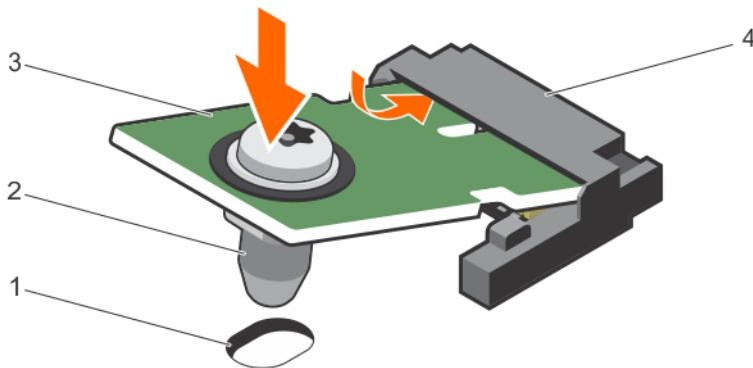
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

### Steps

1. Locate the TPM connector on the system board.

 **NOTE:** To locate the TPM connector on the system board, see the System board connectors section.

2. Align the edge connectors on the TPM with the slot on the TPM connector.
3. Insert the TPM into the TPM connector such that the plastic rivet aligns with the slot on the system board.
4. Press the plastic rivet until the rivet snaps into place.



**Figure 93. Installing the TPM**

- |                                   |                  |
|-----------------------------------|------------------|
| 1. rivet slot on the system board | 2. plastic rivet |
| 3. TPM                            | 4. TPM connector |

### Next steps

1. Install the system board.
2. Follow the procedure listed in the After working inside your system section.

## Related Links

- [Safety instructions](#)
- [Safety instructions](#)
- [Before working inside your system](#)
- [After working inside your system](#)
- [Installing the system board](#)

## Initializing the TPM for BitLocker users

Initialize the TPM.

For more information about initializing the TPM, see <http://technet.microsoft.com/en-us/library/cc753140.aspx>.

The **TPM Status** changes to **Enabled, Activated**.


## Initializing the TPM 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**.

# 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 requiring 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

### When to use the Embedded System Diagnostics

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

### Running the Embedded System Diagnostics from Boot Manager

#### Prerequisites

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

#### Steps

1. When the system is booting, press F11.
2. Use the up arrow and down arrow keys to select **System Utilities** → **Launch Diagnostics**.  
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 F11.
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.

## Dell Server E-Support Tool

Dell System E-Support Tool (DSET) allows you to collect hardware, storage and operating system information for your Dell Appliance. This information is consolidated into a single System Configuration Report that can be used for troubleshooting or inventory collection of a system.

You can run the DSET diagnostics from **C:\dell\_oem\support**.





## Jumpers and connectors

This topic provides specific information about the system 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 system and setup passwords. You must know the connectors on the system board to install components and cables correctly.

### System board jumper settings

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

**Table 35. System board jumper settings**

Jumper	Setting	Description
PWRD_EN	 2 4 6 (default)	The password reset feature is enabled (pins 2–4). BIOS local access is unlocked at the next AC power cycle.
	 2 4 6	The password reset feature is disabled (pins 4–6).
NVRAM_CLR	 1 3 5 (default)	The configuration settings are retained at the next system boot (pins 3–5).
	 1 3 5	The configuration settings are cleared at system boot (pins 1–3).

#### Related Links

[Disabling a forgotten password](#)

## System board jumpers and connectors

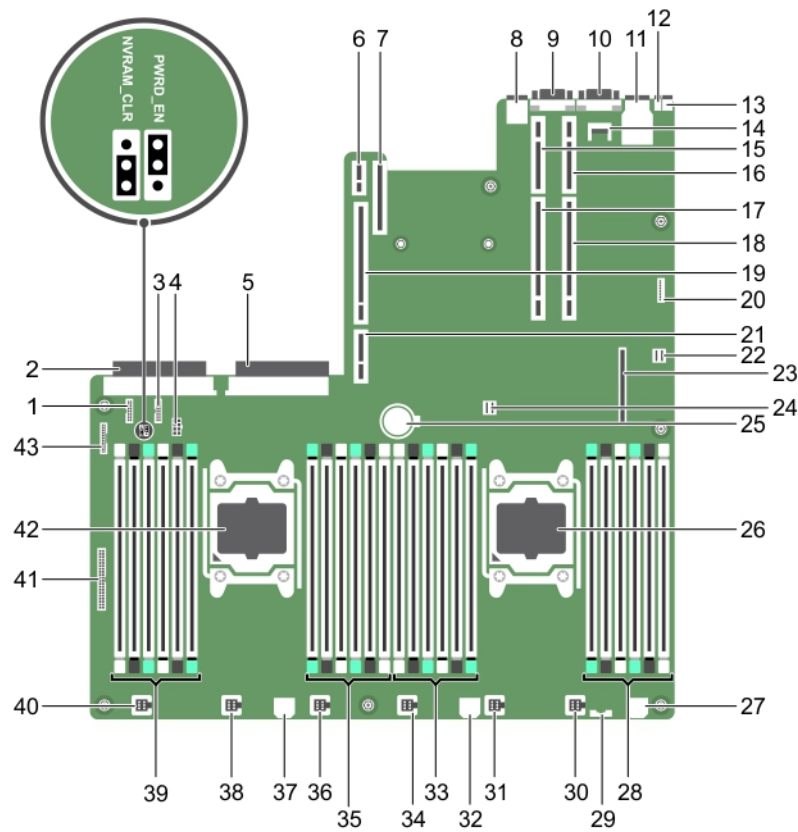


Figure 94. System board jumpers and connectors

Table 36. System board connectors

Item	Connector	Description
1	J_BP_SIG1	Backplane signal connector 1
2	J_PS_2	PSU 2 connector
3	J_BP_SIG0	Backplane signal connector 0
4	J_BP0	Backplane power connector 0
5	J_PS_1	PSU 1 connector
6	J_IDSMD	Internal dual SD module connector
7	J_NDC	Network daughter card connector
8	J_USB	USB connector
9	J_VIDEO_REAR	Video connector


<b>Item</b>	<b>Connector</b>	<b>Description</b>
10	J_COM1	Serial connector
11	J_IDRAC_RJ45	iDRAC8 connector
12	J_CYC	System identification connector
13	CYC_ID	System identification button
14	J_TPM_MODULE	Trusted Platform Module connector
15	J_RISER_2AX	Riser 3 connector
16	J_RISER_1AX	Riser 1 connector
17	J_RISER_2BX	Riser 2 connector
18	J_RISER_1BX	Riser 1 connector
19	J_RISER_3AX	Riser 3 connector
20	J_QS	Quick Sync bezel connector
21	J_RISER_3BX	Riser 3 connector
22	J_SATA_B	Internal SAS connector
23	J_STORAGE	Mini PERC connector
24	J_SATA_A	Internal SAS connector
25	BAT	Battery connector
26	CPU 2	Processor 2 socket
27	J_BP3	Backplane power connector 3
28	B10, B6, B2, B9, B5, B1	Memory module sockets
29	J_BP_SIG2	Backplane signal connector 2
30	J_FAN2U_6	Cooling fan connector
31	J_FAN2U_5	Cooling fan connector
32	J_BP2	Backplane power connector 2
33	B3, B7, B11, B4, B8, B12	Memory module sockets
34	J_FAN2U_4	Cooling fan connector
35	A10, A6, A2, A9, A5, A1	Memory module sockets
36	J_FAN2U_3	Cooling fan connector
37	J_BP1	Backplane power connector
38	J_FAN2U_2	Cooling fan connector
39	A3, A7, A11, A4, A8, A12	Memory module sockets
40	J_FAN2U_1	Cooling fan connector
41	J_CTRL_PNL	Control panel signal connector
42	CPU 1	Processor 1 socket

Item	Connector	Description
43	J_FP_USB	Front-panel USB connector

## Disabling a forgotten password

The software security features of the system include a system password and a setup password. The password jumper enables these password features or disables them and clears any password(s) currently in use.


### Prerequisites

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

### Steps

1. 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 4 and 6 to pins 2 and 4.
4. Install the system cover.


The existing passwords are not disabled (erased) until the system boots with the jumper on pins 2 and 4. However, before you assign a new system and/or setup password, you must move the jumper back to pins 4 and 6.


 **NOTE:** If you assign a new system and/or setup password with the jumper on pins 2 and 4, the system disables the new password(s) the next time it boots.

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

# Troubleshooting your system

## Safety first — for you and your 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.

 **NOTE:** Solution validation was performed by using the factory shipped hardware configuration.

## Troubleshooting system startup failure

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


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

## Troubleshooting external connections

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

## Troubleshooting the video subsystem

### Prerequisites

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

### Steps

1. Check the cable connections (power and display) to the monitor.
2. Check the video interface cabling from the system to the monitor.
3. Run the appropriate diagnostic test.

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

### Next steps

If the tests fail, see the Getting help section.

## Related Links

[Getting help](#)


# Troubleshooting a USB device

## Prerequisites

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

## Steps

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

 **NOTE:** Older operating systems may not support USB 3.0.

4. Check if USB 3.0 is enabled in System Setup. If enabled, disable it and see if the issue is resolved.
5. In **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
6. If the problem is not resolved, replace the keyboard and/or mouse with a known working keyboard or mouse.  
If the problem is not resolved, proceed to step 7 to troubleshoot other USB devices attached to the system.
7. Turn off all attached USB devices, and disconnect them from the system.
8. Restart the system.
9. If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.
10. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.
11. If the system is not accessible, reset the NVRAM\_CLR jumper inside your system and restore the BIOS to the default settings. See the System board jumper setting section
12. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
13. Reconnect and turn on each USB device one at a time.
14. If a USB device causes the same problem, turn off the device, replace the USB cable with a known good cable, and turn on the device.

## Next steps

If all troubleshooting fails, see the Getting help section.


## Related Links

[Getting help](#)

## Troubleshooting iDRAC Direct (USB XML configuration)

For information about USB storage device and server configuration, see the Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

### Steps

1. Ensure that your USB storage device is connected to the front USB Management Port, identified by  icon.
2. Ensure that your USB storage device is configured with an NTFS or an FAT32 file system with only one partition.
3. Verify that the USB storage device is configured correctly. For more information about configuring the USB storage device, see the Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).
4. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
5. Ensure that the **iDRAC Managed: USB XML Configuration** option is either **Enabled** or **Enabled only when the server has default credential settings**.
6. Remove and reinsert the USB storage device.
7. If import operation does not work, try with a different USB storage device.

### Next steps

If all troubleshooting fails, see the Getting help section.


### Related Links

[Getting help](#)

## Troubleshooting iDRAC Direct (Laptop connection)

For information about USB laptop connection and server configuration, see the *Integrated Dell Remote Access Controller User's Guide* at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

### Steps

1. Ensure that your laptop is connected to the front USB Management Port, identified by  icon with a USB Type A/A cable.
2. On the **iDRAC Settings Utility** screen, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
3. If the laptop is running Windows operating system, ensure that the iDRAC Virtual USB NIC device driver is installed.
4. If the driver is installed, ensure that you are not connected to any network through WiFi or cabled ethernet, as iDRAC Direct uses a non-routable address.

### Next steps

If all troubleshooting fails, see the Getting help section.

### Related Links

[Getting help](#)

# Troubleshooting a serial I/O device

## Steps

1. Turn off the system and any peripheral devices connected to the serial port.
2. Swap the serial interface cable with a known working cable, and turn on the system and the serial device.  
If the problem is resolved, replace the interface cable with a known working cable.
3. Turn off the system and the serial device, and swap the serial device with a compatible device.
4. Turn on the system and the serial device.

## Next steps

If the problem persists, see the Getting help section.

## Related Links

[Getting help](#)

# Troubleshooting a NIC

## Steps

1. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section for the available diagnostic tests.
2. Restart the system and check for any system messages pertaining to the NIC controller.
3. Check the appropriate indicator on the NIC connector:
  - If the link indicator does not glow, the cable connected might be disengaged.
  - If the activity indicator does not glow, the network driver files might be damaged or missing. Install or replace the drivers as necessary. For more information, see the NIC documentation.
  - Try another known good network cable.
  - If the problem persists, use another connector on the switch or hub.
4. Ensure that the appropriate drivers are installed and the protocols are bound. For more information, see the NIC documentation.
5. Enter System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.
6. Ensure that all the NICs, hubs, and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
7. Ensure that all network cables are of the proper type and do not exceed the maximum length.

## Next steps

If the problem persists, see the Getting help section.

## Related Links

[Getting help](#)

[Using system diagnostics](#)

# Troubleshooting a wet system

## Prerequisites



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

## Steps

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Remove the following components (if installed) from the system:
  - Power supply unit(s)
  - Optical drive
  - Hard drives
  - Hard drive backplane
  - USB memory key
  - Hard drive tray
  - Cooling shroud
  - Expansion card risers (if installed)
  - Expansion cards
  - Cooling fan assembly (if installed)
  - Cooling fans
  - Memory modules
  - Processor(s) and heat sink(s)
  - System board
4. Let the system dry thoroughly for at least 24 hours.
5. Reinstall the components you removed in step 3 except the expansion cards.
6. Install the system cover.
7. Turn on the system and attached peripherals.  
If the problem persists, see the Getting help section.
8. If the system starts properly, turn off the system, and reinstall all the expansion cards that you removed.
9. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

## Next steps

If the tests fail, see the Getting help section.


## Related Links

[Getting help](#)

[Using system diagnostics](#)

# Troubleshooting a damaged system

## Prerequisites

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

## Steps

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Ensure that the following components are properly installed:
  - cooling shroud
  - expansion card risers (if installed)
  - expansion cards
  - power supply unit(s)
  - cooling fan assembly (if installed)
  - cooling fans
  - processor(s) and heat sink(s)
  - memory modules
  - hard drive carriers/cage
  - hard drive backplane
4. Ensure that all cables are properly connected.
5. Install the system cover.
6. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

## Next steps

If the problem persists, see the Getting help section.


## Related Links


[Using system diagnostics](#)

[Getting help](#)

# Troubleshooting the system battery

## Prerequisites

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

 **NOTE:** If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.



**NOTE:** Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time set in System Setup, the problem may be caused by a software, rather than by a defective battery.

### Steps

1. Re-enter the time and date in System Setup.
2. Turn off the system, and disconnect it from the electrical outlet for at least an hour.
3. Reconnect the system to the electrical outlet, and turn on the system.
4. Enter System Setup.

If the date and time displayed in System Setup are not correct, check the System Error Log (SEL) for system battery messages.

### Next steps

If the problem persists, see the Getting help section.

### Related Links

[Getting help](#)

## Troubleshooting power supply units




**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.

### Troubleshooting power source problems

1. Press the power button to ensure that your system is turned on. If the power indicator does not glow when the power button is pressed, press the power button firmly.
2. Plug in another working power supply unit to ensure that the system board is not faulty.
3. Ensure that no loose connections exist.  
For example, loose power cables.
4. Ensure that the power source meets applicable standards.
5. Ensure that there are no short circuits.
6. Have a qualified electrician check the line voltage to ensure that it meets the needed specifications.

### Troubleshooting power supply unit problems

1. Ensure that no loose connections exist.  
For example, loose power cables.
2. Ensure that the power supply handle/LED indicates that the power supply is working properly.
3. If you have recently upgraded your system, ensure that the power supply unit has enough power to support the new system.
4. If you have a redundant power supply configuration, ensure that both the power supply units are of the same type and wattage.  
If the LED You may have to upgrade to a higher wattage power supply unit.
5. Ensure that you use only power supply units with the Extended Power Performance (EPP) label on the back.
6. Reseat the power supply unit.


 **NOTE:** After installing a power supply unit, allow several seconds for the system to recognize the power supply unit and determine if it is working properly.

If the problem persists, see the Getting help section.

#### Related Links

[Getting help](#)

## Troubleshooting cooling problems

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

Ensure that the following conditions exist:

- System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is not removed.
- Ambient temperature is not higher than the system specific ambient temperature.
- External airflow is not obstructed.
- A cooling fan is not removed or has not failed.
- The expansion card installation guidelines have been followed.

Additional cooling can be added by one of the following methods:

From the iDRAC web GUI:

1. Click **Hardware** → **Fans** → **Setup**.
2. From the **Fan Speed Offset** drop-down list, select the cooling level required or set the minimum fan speed to a custom value.

From F2 System Setup:

1. Select **iDRAC Settings** → **Thermal**, and set a higher fan speed from the fan speed offset or minimum fan speed.


From RACADM commands:

1. Run the command `racadm help system.thermalsettings`

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

## Troubleshooting cooling fans

#### Prerequisites

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



**NOTE:** The fan number is referenced by the systems management software. In the event of a problem with a particular fan, you can easily identify and replace it by noting down the fan numbers on the cooling fan assembly.

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

#### Steps

1. Reseat the fan or the fan's power cable.
2. Restart the system.

#### Next steps

1. Follow the procedure listed in the After working inside your system section.
2. If the problem persists, see the Getting help section.

#### Related Links

[Getting help](#)

[Safety instructions](#)

[Before working inside your system](#)

[After working inside your system](#)


## Troubleshooting system memory

#### Prerequisites



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

#### Steps

1. If the system is operational, run the appropriate system diagnostic test. See the Using system diagnostics section for the available diagnostic tests.  
If the diagnostic tests indicate a fault, follow the corrective actions provided by the diagnostic tests.
2. If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least for 10 seconds, and then reconnect the system to the power source.
3. Turn on the system and attached peripherals, and note the messages on the screen.  
If an error message is displayed indicating a fault with a specific memory module, go to step 12.
4. Enter System Setup, and check the system memory setting. Make any changes to the memory settings, if needed.  
If the memory settings match the installed memory but the problem still persists, go to step 12.
5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Remove the system cover.
7. Check the memory channels and ensure that they are populated correctly.  
 **NOTE:** See the system event log or system messages for the location of the failed memory module. Reinstall the memory device.
8. Reseat the memory modules in their sockets.

9. Install the system cover.
10. Enter System Setup and check the system memory setting.  
If the problem is not resolved, proceed with step 11.
11. Remove the system cover.
12. If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module with a known working memory module.
13. To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity.  
If an error message is displayed on the screen, this may indicate a problem with the installed DIMM type(s), incorrect DIMM installation, or defective DIMM(s). Follow the on-screen instructions to resolve the problem.
14. Install the system cover.
15. As the system boots, observe any error message that is displayed and the diagnostic indicators on the front of the system.
16. If the memory problem persists, repeat step 12 through step 15 for each memory module installed.

#### Next steps


If the problem persists, see the Getting help section.


#### Related Links

[Getting help](#)


## Troubleshooting an SD card

#### Prerequisites

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


 **NOTE:** Certain SD cards have a physical write-protect switch on the card. If the write-protect switch is turned on, the SD card is not writable.

#### Steps

1. Enter System Setup, and ensure that the **Internal SD Card Port** is enabled.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.  
 **NOTE:** When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next restart, the system displayed a message indicating the failure. If redundancy is enabled at the time of SD card failure, a critical alert will be logged and chassis health will degrade.
4. Replace the failed SD card with a new SD card.
5. Install the system cover.
6. Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
7. Enter System Setup, and ensure that the **Internal SD Card Port** and **Internal SD Card Redundancy** modes are set to the needed modes.



Verify that the correct SD slot is set as **Primary SD Card**.

8. Check if the SD card is functioning properly.
9. If the **Internal SD Card Redundancy** option is set to **Enabled** at the time of the SD card failure, the system prompts you to perform a rebuild.

 **NOTE:** The rebuild is always sourced from the primary SD card to the secondary SD card.

## Troubleshooting a hard drive

### Prerequisites

-  **CAUTION:** This troubleshooting procedure can erase data stored on the hard drive. Before you proceed, back up all files on the hard drive.
-  **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

### Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.  
Depending on the results of the diagnostics test, proceed as needed through the following steps.
2. If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:
  - a. Restart the system and press F10 during system startup to run the Dell Lifecycle Controller, and then run the Hardware Configuration wizard to check the RAID configuration.  
See the Dell Lifecycle Controller documentation or online help for information about RAID configuration.
  - b. Ensure that the hard drives are configured correctly for the RAID array.
  - c. Take the hard drive offline and reseal the drive.
  - d. Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the needed device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
4. Restart the system and enter the System Setup.
5. Verify that the controller is enabled and the drives are displayed in the System Setup.

### Next steps


If the problem persists, see the Getting help section.

### Related Links

[Getting help](#)

[Using system diagnostics](#)

## Troubleshooting a storage controller

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

 **NOTE:** When troubleshooting a SAS or PERC controller, see the documentation for your operating system and the controller.

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Verify that the installed expansion cards are compliant with the expansion card installation guidelines.
5. Ensure that each expansion card is firmly seated in its connector.
6. Install the system cover.
7. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
8. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
9. Remove the system cover.
10. Remove all expansion cards installed in the system.
11. Install the system cover.
12. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
13. Run the appropriate diagnostic test. See the Using system diagnostics section. If the tests fail, see the Getting help section.
14. For each expansion card you removed in step 10, perform the following steps:
  - a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
  - b. Remove the system cover.
  - c. Reinstall one of the expansion cards.
  - d. Install the system cover.
  - e. Run the appropriate diagnostic test. See the Using system diagnostics section.

If the problem persists, see the Getting help section.


#### Related Links


[Getting help](#)

[Using system diagnostics](#)

## Troubleshooting expansion cards

#### Prerequisites

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

 **NOTE:** When troubleshooting an expansion card, you also have to see the documentation for your operating system and the expansion card.

#### Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3. Remove the system cover.
4. Ensure that each expansion card is firmly seated in its connector.
5. Install the system cover.
6. Turn on the system and attached peripherals.
7. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
8. Remove the system cover.
9. Remove all expansion cards installed in the system.
10. Install the system cover.
11. Run the appropriate diagnostic test. See the Using system diagnostics section.  
If the tests fail, see the Getting help section.
12. For each expansion card you removed in step 8, perform the following steps:
  - a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
  - b. Remove the system cover.
  - c. Reinstall one of the expansion cards.
  - d. Install the system cover.
  - e. Run the appropriate diagnostic test. See the Using system diagnostics section.

#### Next steps

If the problem persists, see the Getting help section.

#### Related Links

[Getting help](#)

[Using system diagnostics](#)

## Troubleshooting processors

#### Prerequisites



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

#### Steps

1. Run the appropriate diagnostics test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Ensure that the processor and heat sink are properly installed.
5. Install the system cover.
6. Run the appropriate diagnostic test. See the Using system diagnostics section.
7. If the problem persists, see the Getting help section.

#### Related Links

[Getting help](#)


[Using system diagnostics](#)

## System messages

For a list of event and error messages generated by the system firmware and agents that monitor system components, see the Dell Event and Error Messages Reference Guide at [Dell.com/openmanagemanuals](https://www.dell.com/openmanagemanuals) > **OpenManage software**.

### Warning messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a hard drive, a message warns you that you may lose all data on the hard drive. Warning messages usually interrupt the task and need you to respond by typing y (yes) or n (no).

 **NOTE:** Warning messages are generated by either the application or the operating system. For more information, see the documentation that shipped with the operating system or application.

### Diagnostic messages

The system diagnostic utility will generate messages if there are errors detected when you run diagnostic tests on your system. For more information about system diagnostics, see the Using system diagnostics section.

#### Related Links

[Using system diagnostics](#)


### Alert messages

The systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation links listed in the Documentation resources section of this manual.

# Getting help

## Contacting Dell

### Prerequisites

 **NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

### About this task

Dell provides several online and telephone-based support and service options. If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer-service issues, go to [software.dell.com/support](https://software.dell.com/support).

## Locating Service Tag of your system

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code and Service Tag are found on the front of the system by pulling out the information tag. Alternatively, the information may be on a sticker on the chassis of the system. This information is used by Dell to route support calls to the appropriate personnel.

## Documentation feedback

Click the **Feedback** link in any of the Dell documentation pages, fill out the form, and click **Submit** to send your feedback.