

# Dell PowerEdge T630

## Owner's Manual



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# Dell PowerEdge T630 server overview

The Dell PowerEdge T630 rackable tower servers support up to:

- Intel Xeon E5-2600 v4 processors
- 24 DIMMs
- Eighteen 3.5 inch hard drives
- Four Dell PowerEdge Express Flash devices
- Thirty two 2.5 inch hard drives

 **NOTE:** The T630 systems support only internal, hot-swappable hard drives.

## Topics:

- [Supported configurations for the PowerEdge T630 server](#)
- [Front panel](#)
- [Back panel](#)
- [Diagnostic indicators on the front panel](#)
- [Locating service tag of your system](#)

## Supported configurations for the PowerEdge T630 server

The Dell PowerEdge T630 system supports the following configurations:

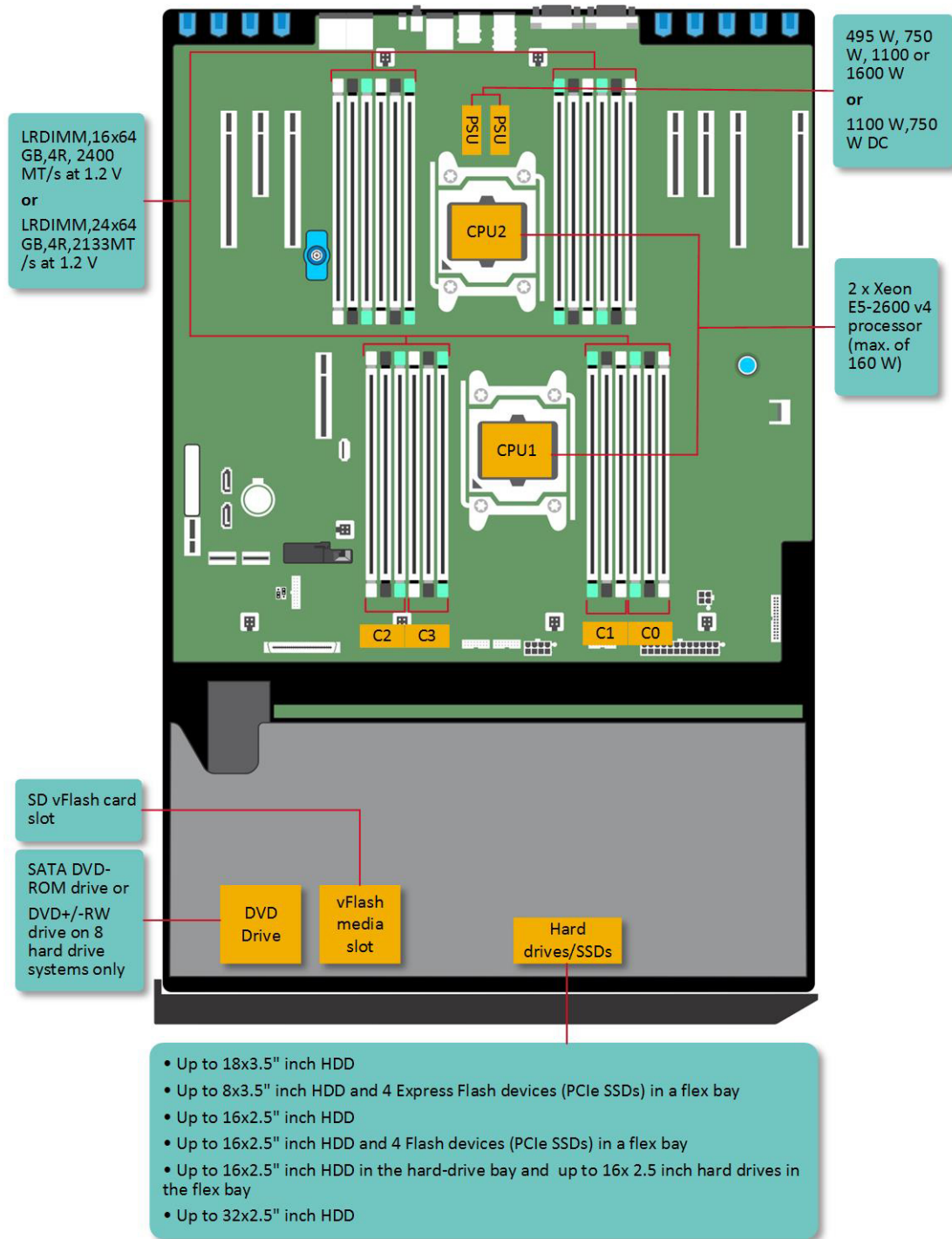
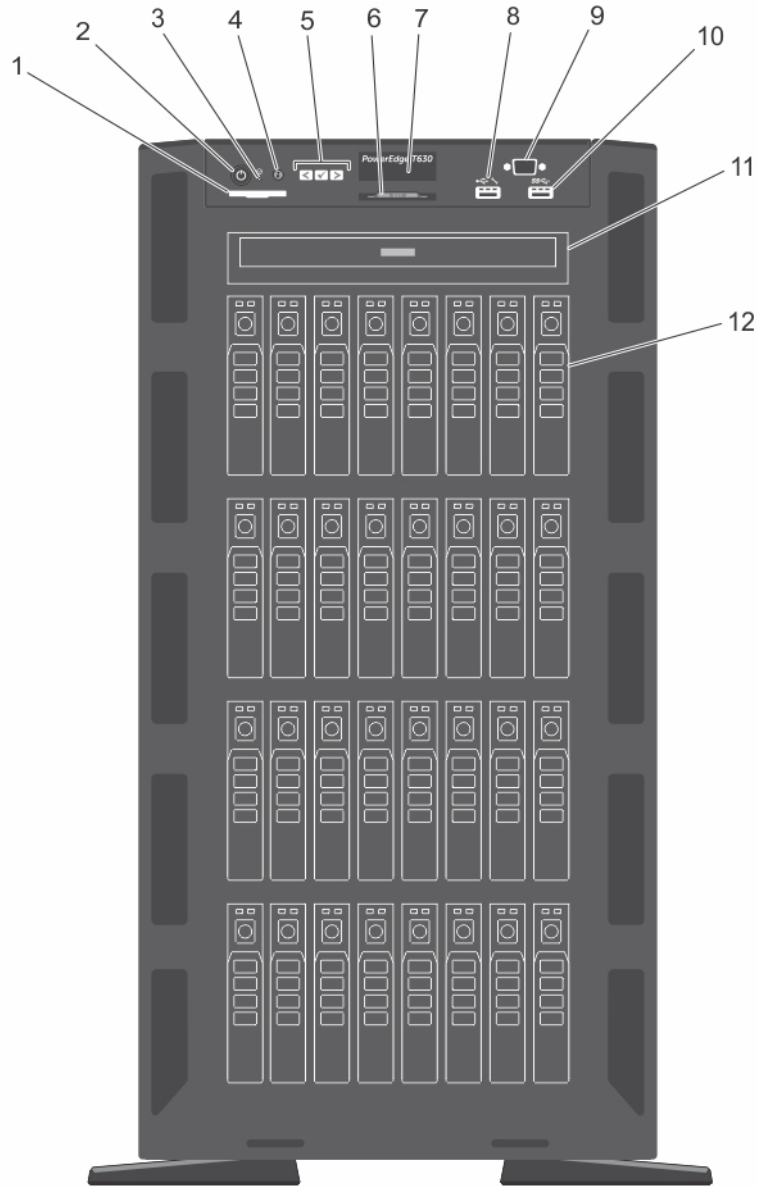


Figure 1. Supported configurations for the PowerEdge T630

# Front panel






## 2.5-inch hard drive chassis




**Figure 2. Front panel— 2.5-inch hard drive chassis**

- |                                    |                                 |
|------------------------------------|---------------------------------|
| 1. SD vFlash card slot             | 2. power button                 |
| 3. NMI button                      | 4. System identification button |
| 5. LCD menu buttons                | 6. Information tag              |
| 7. LCD panel                       | 8. iDRAC Direct port            |
| 9. VGA connector                   | 10. USB connector               |
| 11. Optical drive or tapedrive bay | 12. Physical drives             |

**Table 1. Front panel button and connector description**

Item	Button, or connector	Icon	Description
1	SD vFlash card slot		Use this to insert a vFlash media card. The vFlash media card is an SD card that extends the functionalities of the iDRAC enterprise card.
2	Power-on indicator, power button		<p>The power-on indicator turns on when the system power is on. The power button controls the power supply output to the system.</p> <p><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.</p>
3	NMI button		<p>Use this button 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><b>NOTE:</b> Use this button only if directed to do so by qualified support personnel or by the operating system documentation.</p>
4	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 LCD panel on the front and the system status indicator on the back flash until one of the buttons is pressed again.</p> <p>Press to toggle the system ID ON or 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 &lt;F2&gt; iDRAC setup) press and hold for more than 15 seconds.</p>
5	LCD menu buttons		Use this button to navigate the control panel LCD menu.
6	Information tag		Contains system information such as service tag, NIC, MAC address for your reference. The information tag is a slide-out label panel.
7	LCD panel		<p>Displays system ID, status information, and system error messages. The LCD flashes blue during normal system operation. When the system needs attention, the LCD turns amber, and displays an error code followed by descriptive text.</p> <p><b>NOTE:</b> If the system is connected to a power source and an error is detected, the LCD flashes amber regardless of whether the system is turned on or off.</p>
8	USB management port/iDRAC Direct port		<p>The USB management port can function as a regular USB port or provide access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>.</p> <p>This port is USB 2.0-compliant</p>
9	VGA connector		<p>Allows you to connect a VGA display to the system.</p> <p><b>NOTE:</b> The VGA connector is available only in the rack-mode configuration of your system. For information about converting your system from tower to the rack mode, see Preparing a system for conversion from tower mode to rack mode section.</p>

**Table 1. Front panel button and connector description (continued)**

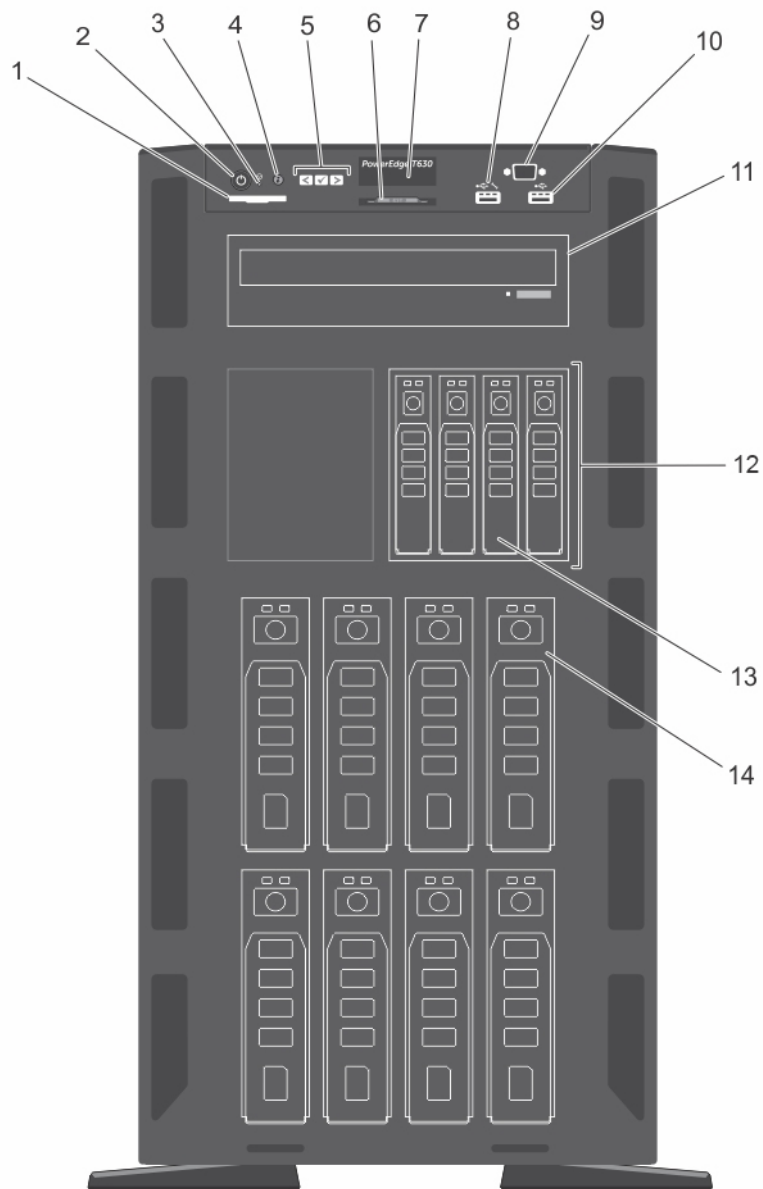
<b>Item</b>	<b>Button, or connector</b>	<b>Icon</b>	<b>Description</b>
10	USB connector		Use this to connect USB devices to the system. This port is USB 3.0-compliant.
11	Optical drive or tape-drive bay		Use this to install optical drives or tape drives. For more information on supported optical drives and tape drives, see the section Optical drives and tape drives section.
12	Physical drives		Up to thirty two 2.5-inch hard drives

**Related concepts**

[Preparing a system for conversion from tower mode to rack mode](#) on page 24

## 3.5-inch hard drive chassis











**Figure 3. Front panel— 3.5-inch hard drive plus four PCIe SSD chassis**

- |                                    |                                 |
|------------------------------------|---------------------------------|
| 1. SD vFlash card slot             | 2. power button                 |
| 3. NMI button                      | 4. System identification button |
| 5. LCD menu buttons                | 6. Information tag              |
| 7. LCD panel                       | 8. iDRAC Direct port            |
| 9. VGA connector                   | 10. USB connector               |
| 11. Optical drive or tapedrive bay | 12. Flex Bay                    |
| 13. PCIe SSDs                      | 14. 3.5-inch hard drives        |

**Table 2. Front panel button and connector description**

Item	Button, or connector	Icon	Description
1	SD vFlash card slot		Use this to insert a vFlash media card. The vFlash media card is an SD card that extends the functionalities of the iDRAC enterprise card.
2	Power-on indicator, power button		<p>The power-on indicator turns on when the system power is on. The power button controls the power supply output to the system.</p> <p><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.</p>
3	NMI button		<p>Use this button 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><b>NOTE:</b> Use this button only if directed to do so by qualified support personnel or by the operating system documentation.</p>
4	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 LCD panel on the front and the system status indicator on the back flash until one of the buttons is pressed again.</p> <p>Press to toggle the system ID ON or 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 &lt;F2&gt; iDRAC setup) press and hold for more than 15 seconds.</p>
5	LCD menu buttons		Use this button to navigate the control panel LCD menu.
6	Information tag		Contains system information such as service tag, NIC, MAC address for your reference. The information tag is a slide-out label panel.
7	LCD panel		<p>Displays system ID, status information, and system error messages. The LCD flashes blue during normal system operation. When the system needs attention, the LCD turns amber, and displays an error code followed by descriptive text.</p> <p><b>NOTE:</b> If the system is connected to a power source and an error is detected, the LCD flashes amber regardless of whether the system is turned on or off.</p>
8	USB management port/iDRAC Direct port		<p>The USB management port can function as a regular USB port or provide access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at <a href="http://Dell.com/idracmanuals">Dell.com/idracmanuals</a>.</p> <p>This port is USB 2.0-compliant</p>
9	VGA connector		<p>Allows you to connect a VGA display to the system.</p> <p><b>NOTE:</b> The VGA connector is available only in the rack-mode configuration of your system. For information about converting your system from tower to the rack mode, see Preparing a system for conversion from tower mode to rack mode section.</p>

**Table 2. Front panel button and connector description (continued)**

Item	Button, or connector	Icon	Description
10	USB connector		Use this to connect USB devices to the system. This port is USB 3.0-compliant.
11	Optical drive or tape-drive bay		Use this to install optical drives or tape drives. For more information on supported optical drives and tape drives, see the section Optical drives and tape drives section.
12	Flex Bay		Supports installation of up to four PCIe SSDs
13	PCIe SSDs		Up to four PCIe SSDs
14	Physical drives		Up to eight 3.5-inch hard drives

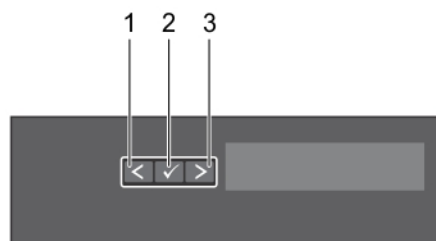
**Related concepts**

[Preparing a system for conversion from tower mode to rack mode](#) on page 24

## LCD panel

The LCD panel of your system provides system information, status, and error messages to indicate if the system is functioning correctly or if the system needs attention. For more information about error messages, see the *Dell Event and Error Messages Reference Guide* at [Dell.com/openmanagemanuals](http://Dell.com/openmanagemanuals) > **OpenManage software**.

- The LCD backlight turns blue during normal operating conditions.
- When the system needs attention, the LCD turns amber, and displays an error code followed by descriptive text.
- **NOTE:** If the system is connected to a power source and an error is detected, the LCD turns amber regardless of whether the system is turned on or off.
- The LCD backlight is turned off when the system is in standby mode and can be turned on by pressing either the Select, Left, or Right button on the LCD panel.
- The LCD backlight remains off if LCD messaging is turned off using the iDRAC utility, the LCD panel, or other tools.



**Figure 4. LCD panel features**




**Table 3. LCD panel features**

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


## Viewing Home screen

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

### Steps

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

## Setup menu


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

Option	Description
<b>iDRAC</b>	Select <b>DHCP</b> or <b>Static IP</b> to configure the network mode. If <b>Static IP</b> is selected, the available fields are <b>IP</b> , <b>Subnet (Sub)</b> , and <b>Gateway (Gtw)</b> . Select <b>Setup DNS</b> to enable DNS and to view domain addresses. Two separate DNS entries are available.
<b>Set error</b>	Select <b>SEL</b> to view LCD error messages in a format that matches the IPMI description in the SEL. This enables you to match an LCD message with an SEL entry.  Select <b>Simple</b> to view LCD error messages in a simplified user-friendly description. For more information about error messages, see the <i>Dell Event and Error Messages Reference Guide</i> at <a href="https://www.dell.com/support/manuals/openmanage">Dell.com/openmanagemanuals</a> > <b>OpenManage software</b> .
<b>Set home</b>	Select the default information to be displayed on the <b>Home</b> screen. See View menu section for the options and option items that can be set as the default on the <b>Home</b> screen.

### Related references

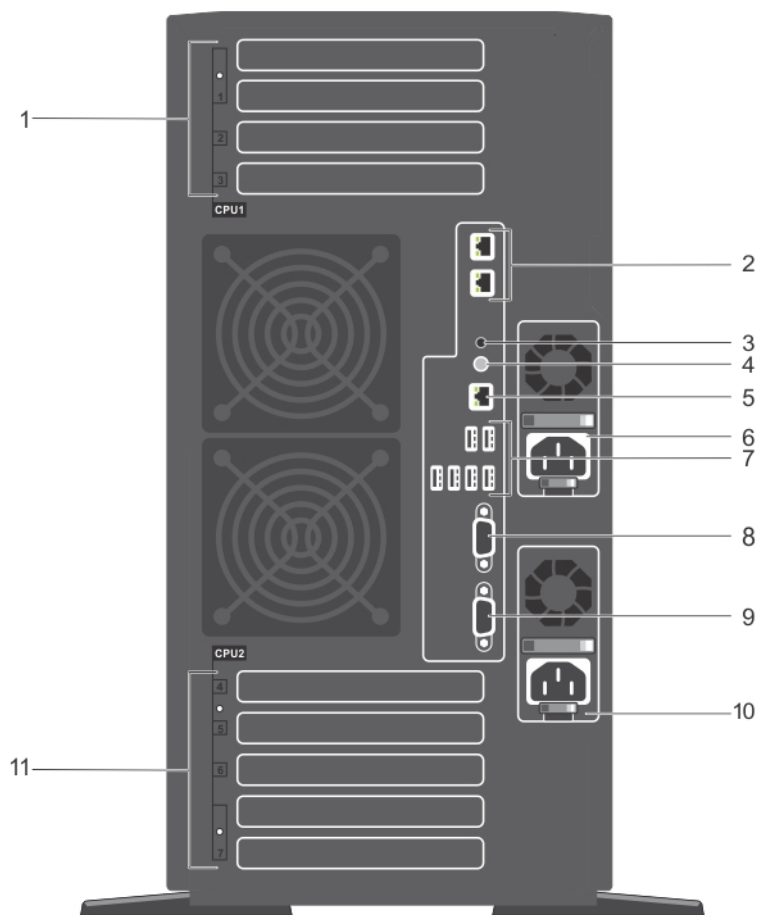
[View menu](#) on page 16

## View menu

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

Option	Description
<b>iDRAC IP</b>	Displays the <b>IPv4</b> or <b>IPv6</b> addresses for iDRAC8. Addresses include <b>DNS (Primary and Secondary)</b> , <b>Gateway</b> , <b>IP</b> , and <b>Subnet</b> (IPv6 does not have Subnet).
<b>MAC</b>	Displays the MAC addresses for <b>iDRAC</b> , <b>iSCSI</b> , or <b>Network</b> devices.
<b>Name</b>	Displays the name of the <b>Host</b> , <b>Model</b> , or <b>User String</b> for the system.
<b>Number</b>	Displays the <b>Asset tag</b> or the <b>Service tag</b> for the system.
<b>Power</b>	Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the <b>Set home</b> submenu of the <b>Setup</b> menu.
<b>Temperature</b>	Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the <b>Set home</b> submenu of the <b>Setup</b> menu.



# Back panel







**Figure 5. Back panel features**

- |   |                                 |
|---|---------------------------------|
| 1. PCIe expansion card slots (3) (processor 1)          | 2. Ethernet connectors          |
| 3. System identification connector                      | 4. System identification button |
| 5. iDRAC Enterprise port                                | 6. Power supply (PSU1)          |
| 7. USB port(6)  | 8. Video connector              |
| 9. Serial connector                                     | 10. Power supply (PSU2)         |
| 11. Full-height PCIe expansion card slots (processor 2) |                                 |

**Table 4. Back panel indicator, button, or Connector description**

Item	Indicator, Button, or Connector	Icon	Description
1	PCIe expansion card slots (3) (processor 1)		You can connect up to two PCI Express expansion cards and one PERC card.
2	Ethernet connectors		Two integrated 10/100/1000 Mbps NIC connectors.
3	System identification connector		It connects the optional system status indicator assembly through the optional cable management arm.
4	System identification button		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 LCD panel on the front and the


**Table 4. Back panel indicator, button, or Connector description (continued)**

Item	Indicator, Button, or Connector	Icon	Description
			<p>system status indicator on the back flash 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 the BIOS progress mode.</p> <p>To reset iDRAC (if not disabled in F2 iDRAC setup), press and hold for more than 15 seconds.</p>
5	iDRAC Enterprise port		<p>Dedicated management port.</p> <p><b>NOTE:</b> The port is available for use only if the iDRAC Enterprise license is installed on your system.</p>
6	Power supply (PSU1)		<p><b>AC</b> 495 W, 750 W, 1100 W, or 1600 W</p> <p><b>or</b></p> <p><b>DC</b> 1100 W</p>
7	USB port(6)		You can connect USB devices to the system. Four ports are USB 2.0-compliant and two ports are USB 3.0-compliant.
8	Video connector		You can connect a VGA display to the system.
9	Serial connector		You can connect a serial device to the system.
10	Power supply (PSU2)		<p><b>AC</b> 495 W, 750 W, 1100 W, or 1600 W</p> <p><b>or</b></p> <p><b>DC</b> 1100 W</p>
11	Full-height PCIe expansion card slots (processor 2)		Connects up to four full-height PCI Express expansion cards.





## Diagnostic indicators on the front panel

**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 5. 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/support/manuals">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>

**Table 5. Diagnostic indicators (continued)**

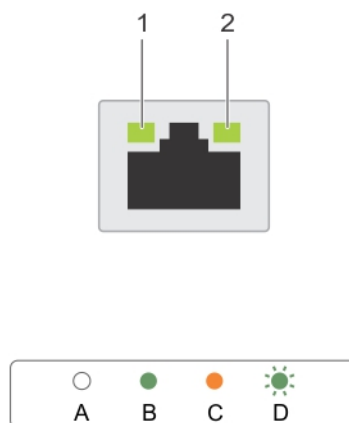
Icon	Description	Condition	Corrective action
	Hard drive indicator	The indicator flashes amber if there is a hard drive error.	Check the System Event Log to determine the hard drive that has an error. Run the appropriate Online Diagnostics test. Restart the system and run embedded diagnostics (ePSA). If the hard drives are configured in a RAID array, restart the system and enter the host adapter configuration utility program.
	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).	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 references**

[Getting help](#) on page 207

## NIC indicator codes

The 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 6. NIC Indicator Codes**

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 7. AC PSU status indicator**

1. AC PSU status indicator/handle

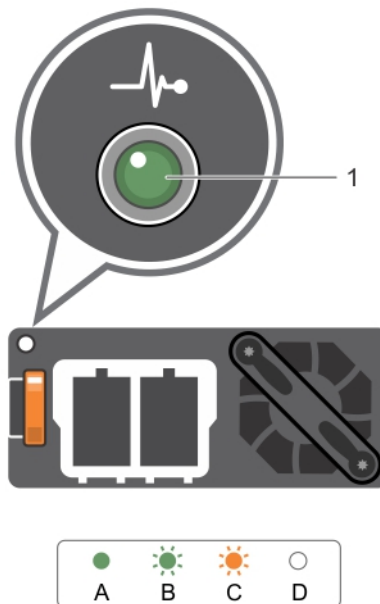
**Table 7. AC PSU status indicators**

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. <b>NOTE:</b> Ensure that both the PSUs are of the same capacity. <b>CAUTION:</b> For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back. <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.
D	Flashing amber	Indicates a problem with the PSU.



**Table 7. AC PSU status indicators (continued)**

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.



**Figure 8. DC PSU status indicator**

1. DC PSU status indicator

**Table 8. DC PSU status indicators**

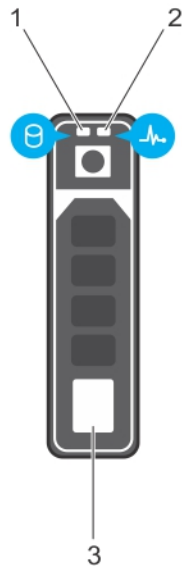
Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and that the PSU is operational.
B	Flashing green	When hot-adding a PSU, the PSU indicator flashes green. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. Ensure that both the PSUs are of the same capacity.
C	Flashing amber	Indicates a problem with the PSU. <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</p>

**Table 8. DC PSU status indicators (continued)**

Convention	Power indicator pattern	Condition
		change from a High Output configuration to a Low Output configuration or vice versa, you must turn off the system.
		<b>CAUTION:</b> AC PSU support both 220 V and 110 V input voltages with the exception of Titanium PSU, which support only 220 V. When two identical PSU receive different input voltages, they can output different wattages, and trigger a mismatch.
		<b>CAUTION:</b> If two PSU are used, they must be of the same type and have the same maximum output power.
		<b>CAUTION:</b> Combining AC and DC PSU is not supported and triggers a mismatch.
D	Not lit	Power is not connected.

## 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 9. Hard drive indicators**

1. Hard drive activity indicator
2. Hard drive status indicator
3. 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 9. Hard drive indicator codes**

Drive-status indicator pattern	Condition
Flashes green twice per second	Identifying drive or preparing for removal.
Off	Drive ready for insertion or removal.

**Table 9. Hard drive indicator codes (continued)**

Drive-status indicator pattern	Condition
	<b>i</b> <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
Flashes green for three seconds, amber for three seconds, and then turns off after six seconds	Rebuild stopped

## 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.

# Converting the system from tower mode to rack mode

Your system can be converted from the tower mode to the rack mode.

To convert your system from the tower mode to the rack mode, you require the tower to rack conversion kit, which contains the following items:

- Rack ears (left and right) with three screws each
- VGA module
- Rack slide cover
- Mylar cover
- A pair of rails (optional)

## Topics:

- [Preparing a system for conversion from tower mode to rack mode](#)

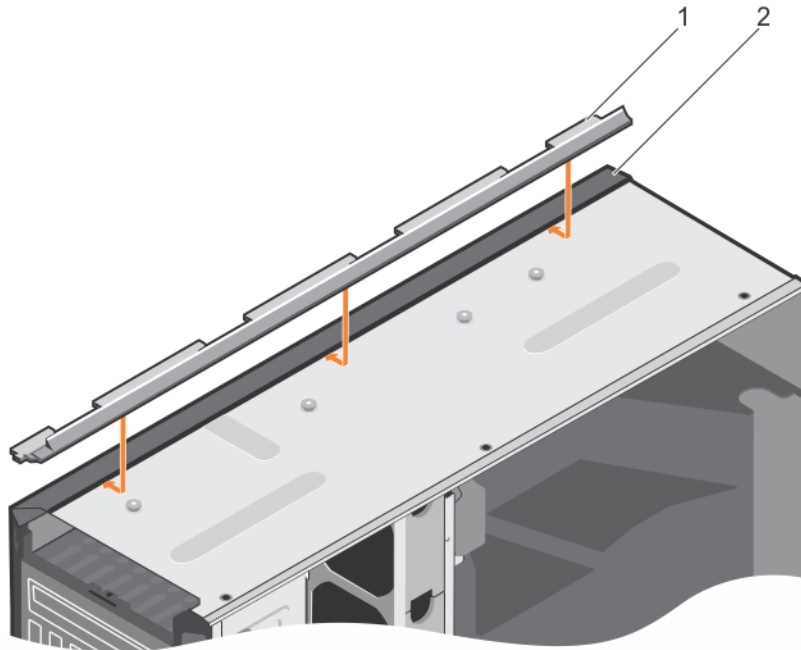
## Preparing a system for conversion from tower mode to rack mode

### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
4. Lay the system on a flat, stable surface.
5. If installed, remove the system feet or caster wheels. For more information, see removing the system feet or removing caster wheels.
6. Remove the system cover.

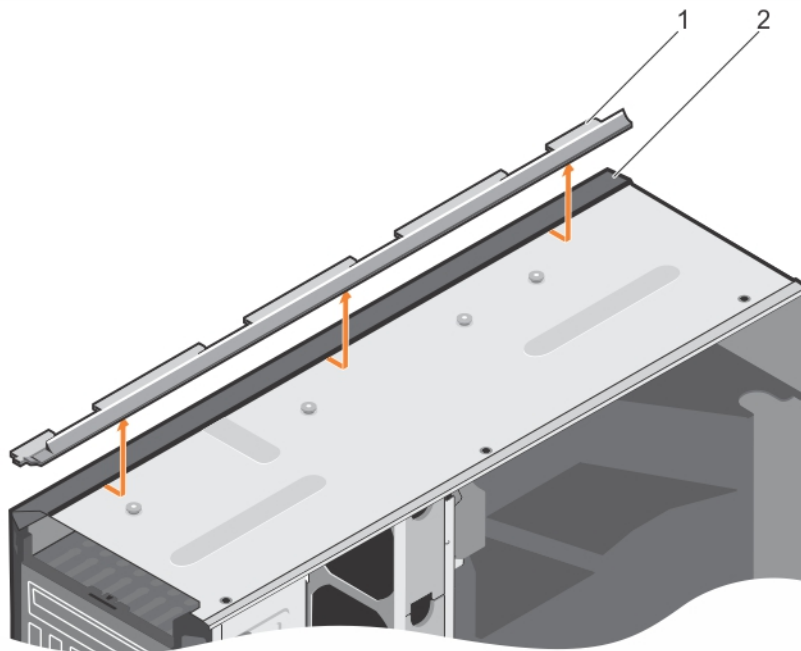
### Steps

1. Remove the system top cover. For more information, see the Removing system top cover section.
2. Remove the control-panel assembly. For more information, see the Removing control panel assembly section.
3. Install the rack slide cover by performing the following steps:
  - a. Slide the rack slide cover between the system's side cover and the chassis.
  - b. Slide the rack slide cover toward the back of the system until the tabs on rack slide cover locks with the tabs extending from the chassis.



**Figure 10. Installing the rack slide cover**

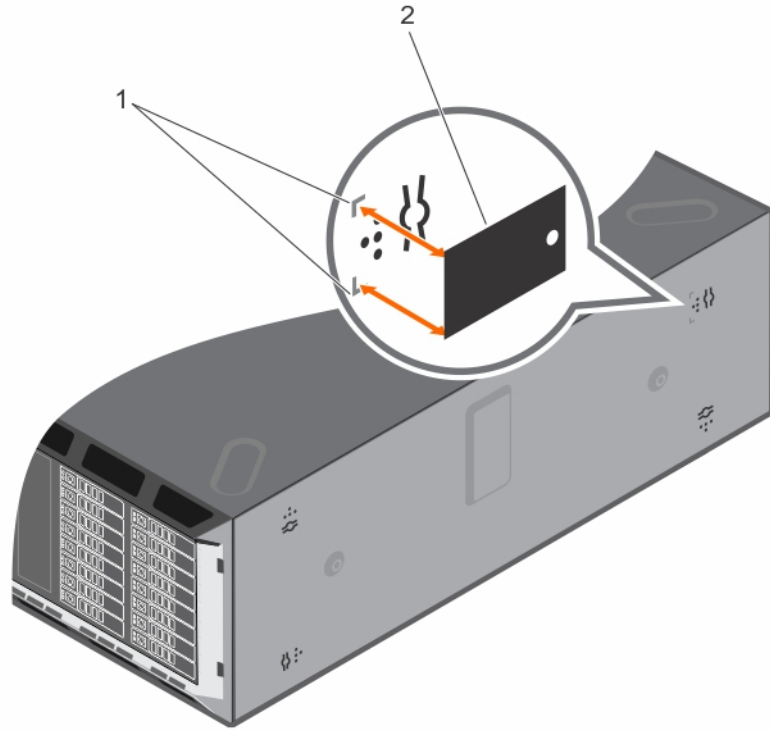
- a. rack slide cover
- b. system chassis



**Figure 11. Removing the rack slide cover**

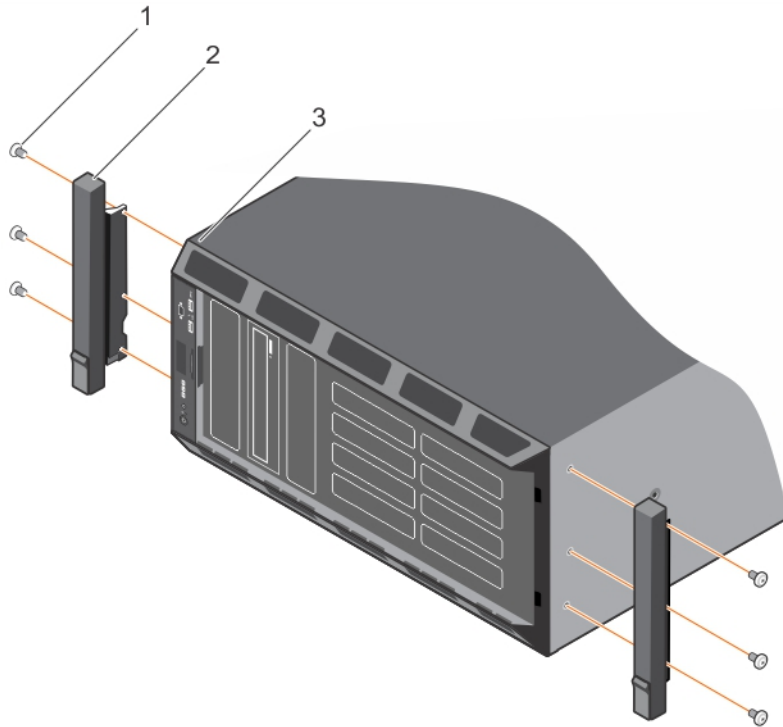
- a. rack slide cover
- b. system chassis

4. Install the control panel assembly. For more information, see [Installing control panel assembly](#).
5. Attach the mylar to cover the openings on the chassis where the system rear feet were installed in the tower mode. See the following figure for more information.



**Figure 12. Attaching the mylar cover**

- a. marking on chassis
  - b. mylar cover
6. Install the system cover.
7. Install the rack ears by performing the following steps:
- a. Align the three screw holes on the rack ears with the screw holes on the top and the bottom of system.
  - b. Install the three screws using a Phillips #2 screwdriver.



**Figure 13. Removing the rack ears**

- a. screw (6)
- b. rack ear (2)
- c. system in rack mode

8. Install the system in the rack. For more information, see the Rack Installation Guide that is shipped with your system.

#### **Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

#### **Related tasks**

[Removing the system cover](#) on page 78


[Removing the control panel assembly](#) on page 174

## Documentation resources

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

To view the document that is listed in the documentation resources table:

- From the Dell EMC support site:
  1. Click the documentation link that is provided in the Location column in the table.
  2. Click the required product or product version.
  3. On the Product Support page, click **Manuals & documents**.
- Using search engines:
  - Type the name and version of the document in the search box.

 **NOTE:** To locate the product name and model, see the front of your system.

**Table 10. Additional documentation resources for your system**

Task	Document	Location
Setting up your system	<p>For more information about installing and securing the system into a rack, see the Rail Installation Guide included with your rack solution.</p> <p>For information about setting up your system, see the <i>Getting Started Guide</i> document that is shipped with your system.</p>	<a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>
Configuring your system	<p>For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide.</p> <p>For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC.</p> <p>For information about Redfish and its protocol, supported schema, and Redfish Eventing are implemented in iDRAC, see the Redfish API Guide.</p> <p>For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide.</p>	<a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>
	For information about earlier versions of the iDRAC documents, see the iDRAC documentation.	<a href="http://www.dell.com/idracmanuals">www.dell.com/idracmanuals</a>



**Table 10. Additional documentation resources for your system (continued)**

Task	Document	Location	
	To identify the version of iDRAC available on your system, on the iDRAC web interface, click <b>?</b> > <b>About</b> .		
	For information about installing the operating system, see the operating system documentation.	<a href="http://www.dell.com/operatingsystemmanuals">www.dell.com/operatingsystemmanuals</a>	
	For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.	<a href="http://www.dell.com/support/drivers">www.dell.com/support/drivers</a>	
Managing your system	For information about systems management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.	<a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>	
	For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	<a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > OpenManage Server Administrator	
	For information about installing, using, and troubleshooting Dell OpenManage Essentials, see the Dell OpenManage Essentials User's Guide.	<a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > OpenManage Essentials	
	For information about installing, using, and troubleshooting Dell OpenManage Enterprise, see the Dell OpenManage Enterprise User's Guide.	<a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a> > OpenManage Enterprise	
	For information about installing and using Dell SupportAssist, see the Dell EMC SupportAssist Enterprise User's Guide.	<a href="https://www.dell.com/serviceabilitytools">https://www.dell.com/serviceabilitytools</a>	
	For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.	<a href="http://www.dell.com/openmanagemanuals">www.dell.com/openmanagemanuals</a>	
	Working with the Dell PowerEdge RAID controllers	For information about understanding the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card and deploying the cards, see the Storage controller documentation.	<a href="http://www.dell.com/storagecontrollermanuals">www.dell.com/storagecontrollermanuals</a>
Understanding event and error messages	For information about the event and error messages that are generated by the system firmware and agents that monitor system	<a href="http://www.dell.com/qrl">www.dell.com/qrl</a>	

**Table 10. Additional documentation resources for your system (continued)**

<b>Task</b>	<b>Document</b>	<b>Location</b>
	components, see the Error Code Lookup.	
Troubleshooting your system	For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.	<a href="http://www.dell.com/poweredgemanuals">www.dell.com/poweredgemanuals</a>

# Technical specifications

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

**Topics:**

- [Chassis dimensions](#)
- [Chassis weight](#)
- [Processor specifications](#)
- [PSU specifications](#)
- [System battery specifications](#)
- [Expansion bus specifications](#)
- [Memory specifications](#)
- [Drive specifications](#)
- [Ports and connectors specifications](#)
- [Video specifications](#)
- [Environmental specifications](#)

# Chassis dimensions

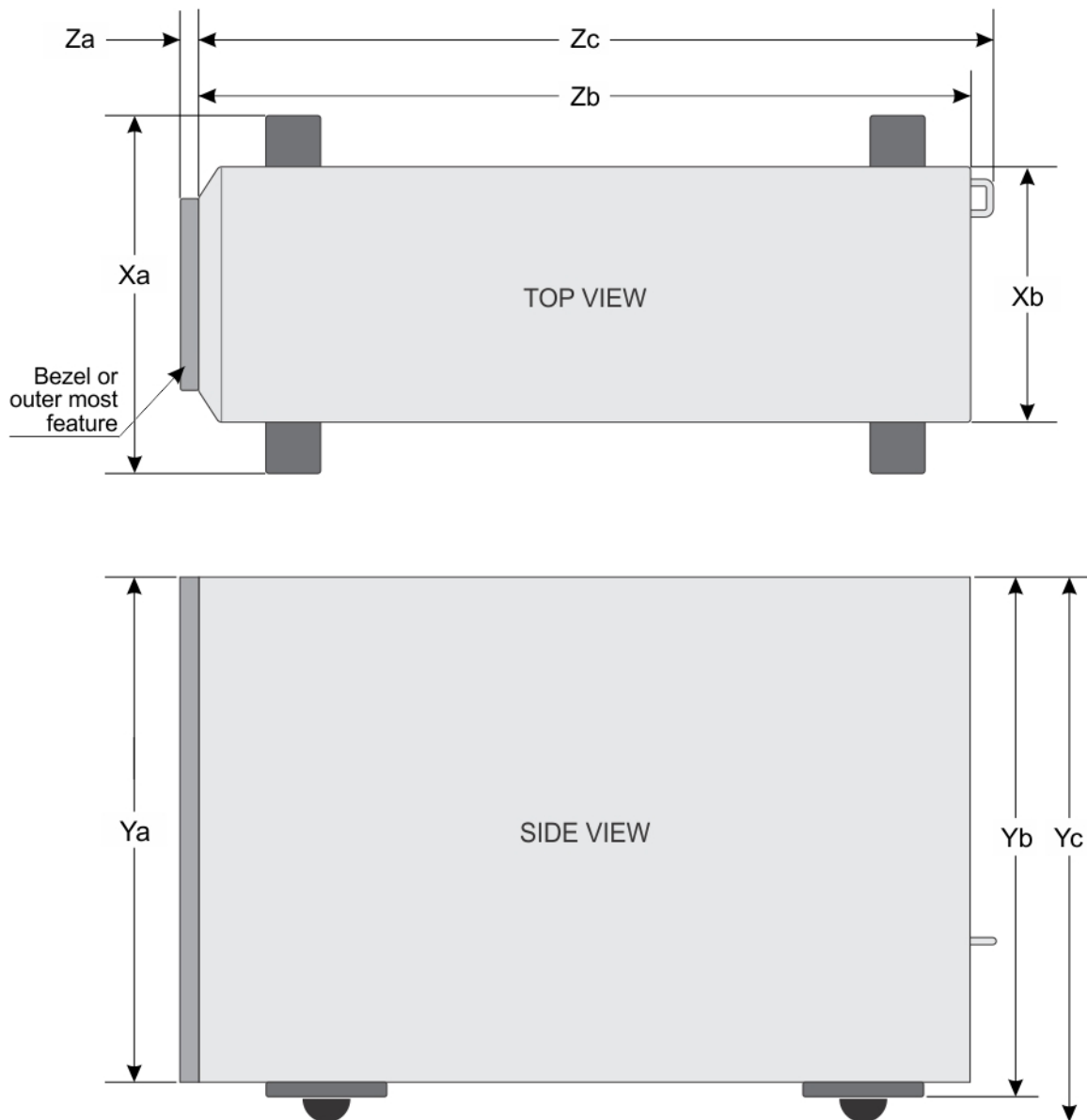


Figure 14. Details the dimensions of Dell PowerEdge T630 system

Table 11. The dimensions of Dell PowerEdge T630 system

System	Xa	Xb	Ya	Yb	Yc	Za with bezel	Za without bezel	Zb*	Zc
PowerEdge T630	304.5	217.9	434.5	443.5	471.5	15.9	0.0	659.9	692.8

# Chassis weight

**Table 12. Chassis weight**

PowerEdge T630	Maximum weight
3.5 inch hard-drive chassis	49.65 kg
2.5 inch hard-drive chassis	42.36 kg

# Processor specifications

The PowerEdge T630 system supports up to two Intel Xeon E5-2600 v4 or Xeon E5-2600 v3 product family processors.

# PSU specifications

The PowerEdge T630 system supports up to two AC or DC redundant power supply units (PSUs).

**Table 13. PSU specifications**

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage
495 W AC	Platinum	1908 BTU/hr	50/60 Hz	100–240 V AC, autoranging
750 W AC	Platinum	2891 BTU/hr		200–240 V AC, autoranging
	Titanium	2843 BTU/hr		
1100 W AC	Platinum	4100 BTU/hr		100–240 V AC, autoranging
1600 W AC	Platinum	6000 BTU/hr		100–240 V AC, autoranging
1100 W DC (for China only)	NA	4416 BTU/hr		–(48–60) V DC

- NOTE:** Heat dissipation is calculated using the PSU wattage rating.
- NOTE:** This system is also designed to connect to the IT power systems with a phase to phase voltage not exceeding 230 V.
- NOTE:** PSUs rated for 1600 W and higher require high-line voltage (200-240 V) to supply their rated capacity.

# System battery specifications

The PowerEdge T630 system supports CR 2032 3.0-V lithium coin cell system battery.

# Expansion bus specifications

The PowerEdge T630 system supports PCI express (PCIe) generation 3 and 2 expansion cards. The following table describes the supported expansion cards:

**Table 14. Supported PCI express generation 3 expansion cards**

PCIe Slot	Processor Connection	Height	Length	Link Width	Slot Width
1 (Gen3)	Processor 1	Standard Height	Full Length	x16	x16

**Table 14. Supported PCI express generation 3 expansion cards (continued)**

PCIe Slot	Processor Connection	Height	Length	Link Width	Slot Width
2 (Gen2)	Platform Controller Hub	Standard Height	Full Length*	x4	x8
3 (Gen3)	Processor 1	Standard Height	Full Length	x16	x16
4 (Gen3)	Processor 2	Standard Height	Half Length	x8	x8
5 (Gen2)	Processor 2	Standard Height	Full Length*	x4	x8
6 (Gen3)	Processor 2	Standard Height	Full Length	x16	x16
7 (Gen3)	Processor 2	Standard Height	Full Length	x16	x16
8 (Internal PERC Slot)	Processor 1	Standard Height	Half Length	x8	x8

\*PCIe Generation 2 expansion card.

**(i) NOTE:** To use PCIe slots 4, 5, 6, and 7, both the processors must be installed.

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

## Memory specifications

The PowerEdge T630 system supports 1866 MT/s, 2133 MT/s or 2400 MT/s DDR4 Registered or Load-Reduced Error Correcting Code (ECC) DIMMs support for advanced ECC or memory optimized operation.

**Table 15. Memory specifications**

Memory module sockets	Memory capacity	Minimum RAM	Maximum RAM
Twenty-four 288-pin	<ul style="list-style-type: none"> <li>64 GB quad rank (LRDIMMs)</li> <li>4 GB single rank (RDIMMs)</li> <li>8 GB or 16 GB dual rank (RDIMMs)</li> </ul>	<ul style="list-style-type: none"> <li>4 GB with single processor</li> <li>8 GB with dual processors (minimum one memory module per processor)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 768 GB with a single processor</li> <li>Up to 1536 GB with dual processors</li> </ul>

## Drive specifications

### Hard drives

The PowerEdge T630 system supports:

- Up to eight 3.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives or Up to eight 2.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives in a 3.5 inch hard-drive carrier. Hard-drive slots 0 through 3 and 4 through 7.
- Up to eight 3.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives and four Dell PowerEdge Express Flash devices (PCIe SSDs) . Hard-drive slots 0 through 7 and 0 through 3
- Up to eighteen 3.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives. Hard-drive slots 0 through 5, 6 through 11, and 12 through 17.
- Up to sixteen 2.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives. Hard-drive slots 0 through 7 and 8 through 15.
- Up to thirty-two 2.5 inch, internal, hot-swappable SAS, SATA, SSD, or Nearline SAS hard drives Hard-drive slots 0 through 7, 8 through 15, 16 through 23, and 24 through 31.

- Up to thirty-two 2.5 inch, internal, hot-swappable SAS, SATA, SATA SSD, or Nearline SAS hard drives. Hard-drive slots 0 through 7, 8 through 15, 0 through 7, and 8 through 15.

## Optical drive

The PowerEdge T630 system supports one optional SATA DVD-ROM drive or DVD+/-RW drive or One optional slim SATA DVD-ROM drive or DVD +/-RW drive.

**NOTE:** DVD devices are data only.

## Ports and connectors specifications

### Serial connector

The serial connector connects a serial device to the system. The PowerEdge T630 system supports DB-9 Serial Port connector.

### Internal Dual SD Module

The PowerEdge RT630 system supports two optional flash memory card slots with an internal SD module.

**NOTE:** One card slot is dedicated for redundancy.

### VGA ports

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The PowerEdge T630 system supports two 15-pin VGA ports on the front and back panels.

**NOTE:** The front VGA port is available only with the rack configuration.

### USB ports

The PowerEdge T630 system supports:

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

The following table provides more information about the USB specifications:

**Table 16. USB specifications**

System	Front panel	Back panel	Internal
PowerEdge T630	<ul style="list-style-type: none"> <li>• Two Hi-Speed USB Host</li> <li>• One USB 2.0-compliant ports and one USB 3.0-complaint ports</li> </ul>	<ul style="list-style-type: none"> <li>• Six Hi-Speed USB Host</li> <li>• Four USB 2.0 compliant ports</li> <li>• Two USB 3.0-complaint ports</li> </ul>	One 4-pin, USB 3.0-compliant port

### NIC ports

The PowerEdge T630 system supports four Network Interface Controller (NIC) ports on the back panel, which is available in the following NIC configurations:

- Two 10/100/1000 Mbps

# Video specifications

The PowerEdge T630 system supports Integrated Matrox G200 with iDRAC8 and 16 MB application memory.

**Table 17. Supported video resolution options**

Resolution	Refresh Rate (Hz)	Color Depth (bit)
640 x 480	60, 70	8, 16, 32
800 x 600	60, 75, 85	8, 16, 32
1024 x 768	60, 75, 85	8, 16, 32
1280 x 1024	60	8, 16, 32
1440 x 900 (stretch goal)	60	8, 16, 32

# 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 <sub>rms</sub> at 5 Hz to 350 Hz (all operation orientations).
Storage	1.88 G <sub>rms</sub> 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.



**Table 21. Maximum shock specifications (continued)**

Maximum vibration	Specifications
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	30482000 m (10,0006560 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	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. <i>i</i> <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. <i>i</i> <b>NOTE:</b> Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles. <i>i</i> <b>NOTE:</b> This condition applies to data center and non-data center environments.
Corrosive dust	<ul style="list-style-type: none"> <li>Air must be free of corrosive dust.</li> <li>Residual dust present in the air must have a deliquescent point less than 60% relative humidity.</li> </ul> <i>i</i> <b>NOTE:</b> This condition applies to data center and non-data center environments.

**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.

## Expanded operating temperature

**Table 26. Expanded operating temperature specifications**

Expanded operating temperature	Specifications
Continuous operation	<p>5°C to 40°C at 5% to 85% RH with 29°C dew point.</p> <p><b>NOTE:</b> Outside the standard operating temperature (10°C to 35°C), the system can operate continuously in temperatures as low as 5°C and as high as 40°C.</p> <p>For temperatures between 35°C and 40°C, de-rate maximum allowable temperature by 1°C per 175 m above 950 m (1°F per 319 ft).</p>
≤ 1% of annual operating hours	<p>–5°C to 45°C at 5% to 90% RH with 29°C dew point.</p> <p><b>NOTE:</b> Outside the standard operating temperature (10°C to 35°C), the system can operate down to –5°C or up to 45°C for a maximum of 1% of its annual operating hours.</p> <p>For temperatures between 40°C and 45°C, de-rate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft).</p>

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

**NOTE:** When operating in the expanded temperature range, ambient temperature warnings maybe reported on the LCD panel and in the System Event Log.

## Expanded operating temperature restrictions

- Do not perform a cold startup below 5°C.
- You must have six fans configured on your system.
- The operating temperature specified is for a maximum altitude of 3048 m (10,000 ft)
- Express Flash is not supported.
- GPU is not supported.
- 160 W workstation CPU is not supported.
- Internal TBU (Tape Backup Unit) is not supported.
- Two power supplies in redundant mode are required, but do not support PSU failure function.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- PCIe SSD is not supported
- Eighteen 3.5 inch hard-drive configuration is not supported
- Fusion IO is not supported.

# Initial system setup and configuration

## Topics:

- [Setting up your system](#)
- [iDRAC configuration](#)
- [Log in to iDRAC](#)
- [Options to install the operating system](#)
- [Downloading the drivers and firmware](#)

## Setting up your system

Complete the following steps to set up your system:

### Steps

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/poweredge manuals](http://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 EMC systems. iDRAC alerts administrators to system issues, helps them perform remote system management, and reduces the need for physical access to the system.

## Options to set up iDRAC IP address

You must configure the initial network settings based on your network infrastructure to enable the communication to and from iDRAC. You can set up the IP address by using one of the following interfaces:

Interfaces	Document/Section
<b>iDRAC Settings utility</b>	See <i>Dell Integrated Dell Remote Access Controller User's Guide</i> at <a href="http://Dell.com/idrac manuals">Dell.com/idrac manuals</a>
<b>Dell Deployment Toolkit</b>	See <i>Dell Deployment Toolkit User's Guide</i> at <a href="http://Dell.com/openmanagement manuals">Dell.com/openmanagement manuals</a>
<b>Dell Lifecycle Controller</b>	See <i>Dell Lifecycle Controller User's Guide</i> at <a href="http://Dell.com/idrac manuals">Dell.com/idrac manuals</a>
<b>Chassis or Server LCD panel</b>	See the LCD panel section

You must use the default iDRAC IP address 192.168.0.120 to configure the initial network settings, including setting up DHCP or a static IP for iDRAC.

**NOTE:** To access iDRAC, ensure that you install the iDRAC port card or connect the network cable to the Ethernet connector 1 on the system board.

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

## 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 latest Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](https://www.dell.com/idracmanuals).

## Options to install the operating system

If the system is shipped without an operating system, install the supported operating system by using one of the following resources:

**Table 27. Resources to install the operating system**

Resources	Location
Dell Systems Management Tools and Documentation media	<a href="https://www.dell.com/operatingsystemmanuals">https://www.dell.com/operatingsystemmanuals</a>
Dell Lifecycle Controller	<a href="https://www.dell.com/idracmanuals">https://www.dell.com/idracmanuals</a>
Dell OpenManage Deployment Toolkit	<a href="https://www.dell.com/openmanagemanuals">https://www.dell.com/openmanagemanuals</a>
Dell certified VMware ESXi	<a href="https://www.dell.com/virtualizationsolutions">https://www.dell.com/virtualizationsolutions</a>
Supported operating systems on Dell PowerEdge systems	<a href="http://www.dell.com/ossupport">www.dell.com/ossupport</a>
Installation and How-to videos for supported operating systems on Dell PowerEdge systems	<a href="https://www.youtube.com/playlist?list=PLe5xhhyFjDPfTCaDRFfIB_VsoLpL8x84G">https://www.youtube.com/playlist?list=PLe5xhhyFjDPfTCaDRFfIB_VsoLpL8x84G</a>

## Downloading the drivers and firmware

Dell EMC 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](https://www.dell.com/support/drivers).
2. In the **Drivers & Downloads** section, type the Service Tag of your system in the **Service Tag or Express Service Code** box, and then click **Submit**.

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

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

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

# Pre-operating system management applications

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

## Topics:

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

## Options to manage the pre-operating system applications

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

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

### Related concepts

[System Setup](#) on page 42


[Boot Manager](#) on page 67

[Dell Lifecycle Controller](#) on page 66

[PXE boot](#) on page 68

## 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.

### Related references

[System Setup details](#) on page 43

### Related tasks

[Viewing System Setup](#) on page 43

# Viewing System Setup

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

### 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.

### Related concepts

[System Setup](#) on page 42

### Related references

[System Setup details](#) on page 43

## 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.

### Related references

[System BIOS Settings details](#) on page 44

[Device Settings](#) on page 66

## 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.

### Related references

[System BIOS Settings details](#) on page 44

[Boot Settings](#) on page 45

[System Information](#) on page 49

[Memory Settings](#) on page 53

[Processor Settings](#) on page 54

[SATA Settings](#) on page 56

[Integrated Devices](#) on page 59

[Serial Communication](#) on page 61

[System Profile Settings](#) on page 62

[Miscellaneous Settings](#) on page 64  
[iDRAC Settings utility](#) on page 65  
[Device Settings](#) on page 66

### Related tasks

[System Security Settings details](#) on page 48  
[Viewing System BIOS](#) on page 44

## Viewing System BIOS

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

### 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**.

### Related references

[System BIOS](#) on page 43  
[System BIOS Settings details](#) on page 44

## System BIOS Settings details

### About this task

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>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.



### Related references

[System BIOS](#) on page 43

### Related tasks

[Viewing System BIOS](#) on page 44

## 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.

### Related references

[System BIOS](#) on page 43

[Choosing the system boot mode](#) on page 46

### Related tasks

[Boot Settings details](#) on page 45

[Viewing Boot Settings](#) on page 45

[Changing the boot order](#) on page 47

## Viewing Boot Settings

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

### 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**.

### Related references

[Boot Settings](#) on page 45

[Choosing the system boot mode](#) on page 46

### Related tasks

[Boot Settings details](#) on page 45





[Changing the boot order](#) on page 47

## Boot Settings details

### About this task

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

Option	Description
<b>Boot Mode</b>	Enables you to set the boot mode of the system.

Option	Description
	<p> <b>CAUTION:</b> Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.</p> <p>If the operating system supports 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>	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.
<b>Hard-Disk Failover</b>	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.
<b>BIOS Boot Settings</b>	Enables or disables BIOS boot options.  <b>NOTE:</b> This option is enabled only if the boot mode is BIOS.
<b>UEFI Boot Settings</b>	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.  <b>NOTE:</b> This option is enabled only if the boot mode is UEFI.

#### Related references

[Boot Settings](#) on page 45

[Choosing the system boot mode](#) on page 46

#### Related tasks

[Viewing Boot Settings](#) on page 45

[Changing the boot order](#) on page 47

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

#### Related references

[Boot Settings](#) on page 45

### Related tasks

[Boot Settings details](#) on page 45

[Viewing Boot Settings](#) on page 45

## Changing the boot order

### About this task

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

### Steps

1. On the **System Setup Main Menu** screen, click **System BIOS > Boot Settings**.
2. Click **BIOS/UEFI Boot 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.

### Related references

[Boot Settings](#) on page 45

### Related tasks

[Boot Settings details](#) on page 45

[Viewing Boot Settings](#) on page 45

## 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.

### Related references

[Operating with a setup password enabled](#) on page 52

[System BIOS](#) on page 43

### Related tasks

[System Security Settings details](#) on page 48

[Viewing System Security](#) on page 47

[Creating a system and setup password](#) on page 51

[Using your system password to secure your system](#) on page 51

[Deleting or changing system and setup password](#) on page 52


## Viewing System Security

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

### 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**.

### Related references

[System Security](#) on page 47



### Related tasks

[System Security Settings details](#) on page 48

## System Security Settings details

### About this task

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>	<p> <b>NOTE:</b> The TPM menu is available only when the TPM module is installed.</p> <p>Enables you to control the reporting mode of the TPM. The <b>TPM Security</b> option is set to <b>Off</b> by default. You can only modify the TPM Status, TPM Activation, and Intel TXT fields if the <b>TPM Status</b> field is set to either <b>On with Pre-boot Measurements</b> or <b>On without Pre-boot Measurements</b>.</p>
<b>TPM Information</b>	Changes the operational state of the TPM. This option is set to <b>No Change</b> by default.
<b>TPM Status</b>	Specifies the TPM status.
<b>TPM Command</b>	<p> <b>CAUTION:</b> 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.</p> <p>Clears all the contents of the TPM. The <b>TPM Clear</b> option is set to <b>No</b> by default.</p>
<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 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.

Option	Description
<b>Secure Boot Policy Summary</b>	Specifies the list of certificates and hashes that secure boot uses to authenticate images.

#### Related references

[System Security](#) on page 47

#### Related tasks

[Viewing System Security](#) on page 47

## Secure Boot Custom Policy Settings

Secure Boot Custom Policy Settings is displayed only when **Secure Boot Policy** is set to **Custom**.

### Viewing Secure Boot Custom Policy Settings

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

#### 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**.
5. On the **System Security** screen, click **Secure Boot Custom Policy Settings**.

### Secure Boot Custom Policy Settings details

The **Secure Boot Custom Policy Settings** screen details are explained as follows:

Option	Description
<b>Platform Key</b>	Imports, exports, deletes, or restores the platform key (PK).
<b>Key Exchange Key Database</b>	Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.
<b>Authorized Signature Database</b>	Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).
<b>Forbidden Signature Database</b>	Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).

## System Information

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

#### Related references

[System Information details](#) on page 50

[System BIOS](#) on page 43

## Related tasks

[Viewing System Information](#) on page 50

## Viewing System Information

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

### 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**.

### Related references

[System Information](#) on page 49

## System Information details

### About this task

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.

### Related references

[System Information](#) on page 49

[System Information details](#) on page 50


## Related tasks

[Viewing System Information](#) on page 50

## 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, ("), (+), (.), (-), (.), (/), (:), ([), (\), (]), (`).

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.

### Related references

[System Security](#) on page 47

### Related tasks

[System board jumper settings](#) on page 193

[System Security Settings details](#) on page 48

## Using your system password to secure your system

### About this task

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

### Steps

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

### Next steps

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

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

### Related references

[System Security](#) on page 47

## 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.

### Related references

[System Security](#) on page 47

## 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.

### Related references

[System Security](#) on page 47



## Memory Settings

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

### Related references

[Memory Settings details](#) on page 53

[System BIOS](#) on page 43

### Related tasks

[Viewing Memory Settings](#) on page 53


## Viewing Memory Settings

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

### 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**.

### Related references

[Memory Settings](#) on page 53

[Memory Settings details](#) on page 53

## Memory Settings details

### About this task

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 memory speed.
<b>System Memory Voltage</b>	Specifies the memory voltage.
<b>Video Memory</b>	Specifies the amount of video memory.
<b>System Memory Testing</b>	Specifies whether the 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.

Option	Description
	<p><b>NOTE:</b> The <b>Memory Operating Mode</b> option can have different default and available options based on the memory configuration of your system.</p> <p><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.</p>
<b>Node Interleaving</b>	Specifies if the 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> .

### Related references

[Memory Settings](#) on page 53

### Related tasks

[Viewing Memory Settings](#) on page 53

## 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.

### Related references

[Processor Settings details](#) on page 55

[System BIOS](#) on page 43

### Related tasks

[Viewing Processor Settings](#) on page 54

## Viewing Processor Settings

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

### 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**.

### Related references





[Processor Settings](#) on page 54

[Processor Settings details](#) on page 55

## Processor Settings details

### About this task

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

#### Related references

[Processor Settings](#) on page 54

#### Related tasks

[Viewing Processor Settings](#) on page 54

## SATA Settings

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

#### Related references

[System BIOS](#) on page 43

#### Related tasks

[SATA Settings details](#) on page 57

[Viewing SATA Settings](#) on page 56

## Viewing SATA Settings

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

#### 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**.

#### Related references

[SATA Settings](#) on page 56

#### Related tasks

[SATA Settings details](#) on page 57

## SATA Settings details

### About this task

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>	<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><thead><tr><th>Option</th><th>Description</th></tr></thead><tbody><tr><td><b>Model</b></td><td>Specifies the drive model of the selected device.</td></tr><tr><td><b>Drive Type</b></td><td>Specifies the type of drive attached to the SATA port.</td></tr><tr><td><b>Capacity</b></td><td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td></tr></tbody></table>	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								
<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port B</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><thead><tr><th>Option</th><th>Description</th></tr></thead><tbody><tr><td><b>Model</b></td><td>Specifies the drive model of the selected device.</td></tr><tr><td><b>Drive Type</b></td><td>Specifies the type of drive attached to the SATA port.</td></tr><tr><td><b>Capacity</b></td><td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td></tr></tbody></table>	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								
<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port C</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><thead><tr><th>Option</th><th>Description</th></tr></thead><tbody><tr><td><b>Model</b></td><td>Specifies the drive model of the selected device.</td></tr><tr><td><b>Drive Type</b></td><td>Specifies the type of drive attached to the SATA port.</td></tr><tr><td><b>Capacity</b></td><td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td></tr></tbody></table>	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								
<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port D</b>	<p>Sets the drive type of the selected device. For <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><thead><tr><th>Option</th><th>Description</th></tr></thead><tbody><tr><td><b>Model</b></td><td>Specifies the drive model of the selected device.</td></tr><tr><td><b>Drive Type</b></td><td>Specifies the type of drive attached to the SATA port.</td></tr><tr><td><b>Capacity</b></td><td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td></tr></tbody></table>	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								
<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								

<b>Option</b>	<b>Description</b>								
<b>Port E</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"> <thead> <tr> <th style="text-align: left;"><b>Option</b></th> <th style="text-align: left;"><b>Description</b></th> </tr> </thead> <tbody> <tr> <td><b>Model</b></td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td><b>Drive Type</b></td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td><b>Capacity</b></td> <td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </table>	<b>Option</b>	<b>Description</b>	<b>Model</b>	Specifies the drive model of the selected device.	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
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<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port 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"> <thead> <tr> <th style="text-align: left;"><b>Option</b></th> <th style="text-align: left;"><b>Description</b></th> </tr> </thead> <tbody> <tr> <td><b>Model</b></td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td><b>Drive Type</b></td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td><b>Capacity</b></td> <td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </table>	<b>Option</b>	<b>Description</b>	<b>Model</b>	Specifies the drive model of the selected device.	<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.	<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.
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<b>Model</b>	Specifies the drive model of the selected device.								
<b>Drive Type</b>	Specifies the type of drive attached to the SATA port.								
<b>Capacity</b>	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.								
<b>Port 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"> <thead> <tr> <th style="text-align: left;"><b>Option</b></th> <th style="text-align: left;"><b>Description</b></th> </tr> </thead> <tbody> <tr> <td><b>Model</b></td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td><b>Drive Type</b></td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td><b>Capacity</b></td> <td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </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 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"> <thead> <tr> <th style="text-align: left;"><b>Option</b></th> <th style="text-align: left;"><b>Description</b></th> </tr> </thead> <tbody> <tr> <td><b>Model</b></td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td><b>Drive Type</b></td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td><b>Capacity</b></td> <td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </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 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> <p>For <b>AHCI</b> or <b>RAID</b> mode, BIOS support is always enabled.</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><b>Option</b></th> <th style="text-align: left;"><b>Description</b></th> </tr> </thead> <tbody> <tr> <td><b>Model</b></td> <td>Specifies the drive model of the selected device.</td> </tr> <tr> <td><b>Drive Type</b></td> <td>Specifies the type of drive attached to the SATA port.</td> </tr> <tr> <td><b>Capacity</b></td> <td>Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.</td> </tr> </tbody> </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.
<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.								

Option	Description
<b>Port J</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.
<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.

#### Related references

[SATA Settings](#) on page 56

#### Related tasks

[Viewing SATA Settings](#) on page 56

## 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.

#### Related references

[System BIOS](#) on page 43

#### Related tasks

[Integrated Devices details](#) on page 60

[Viewing Integrated Devices](#) on page 59

## Viewing Integrated Devices

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

#### 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**.

#### Related references

[Integrated Devices](#) on page 59



#### Related tasks

[Integrated Devices details](#) on page 60

## Integrated Devices details

### About this task

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

Option	Description
<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.
<b>User Accessible USB Ports</b>	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.  <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.
<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>	 <b>NOTE:</b> The Embedded NIC1 and NIC2 options are only available on systems that do not have <b>Integrated Network Card 1</b> .  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.
<b>I/OAT DMA Engine</b>	Enables or disables the I/OAT option. Enable only if the hardware and software support the feature.
<b>I/O Snoop Holdoff Response</b>	Selects the number of cycles PCI I/O can withhold snoop requests from the CPU, to allow time to complete its own write to LLC. This setting can help improve performance on workloads where throughput and latency are critical.
<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.

### Related references

[Integrated Devices](#) on page 59



### Related tasks

[Viewing Integrated Devices](#) on page 59

## Serial Communication

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

### Related references

[System BIOS](#) on page 43

### Related tasks

[Serial Communication details](#) on page 61

[Viewing Serial Communication](#) on page 61

## Viewing Serial Communication

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

### 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**.

### Related references

[Serial Communication](#) on page 61

### Related tasks

[Serial Communication details](#) on page 61

## Serial Communication details

### About this task

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

Option	Description
	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>	<p>Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this option.</p> <p><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.</p> <p><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.</p>
<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 <b>115200</b> by default.
<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.

#### Related references

[Serial Communication](#) on page 61

#### Related tasks

[Viewing Serial Communication](#) on page 61

## System Profile Settings

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

#### Related references

[System BIOS](#) on page 43

#### Related tasks

[System Profile Settings details](#) on page 63

[Viewing System Profile Settings](#) on page 62

## Viewing System Profile Settings

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

#### 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**.

#### Related references

[System Profile Settings](#) on page 62



#### Related tasks



[System Profile Settings details](#) on page 63

## System Profile Settings details

### About this task

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.
<b>Memory Frequency</b>	Sets the speed of the 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.
<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 Boot Enabled</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> .

Option	Description
<b>Cores for Processor 1</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>	<p>Enables the Monitor/Mwait instructions in the processor. This option is set to <b>Enabled</b> for all system profiles, except <b>Custom</b> by default.</p> <p> <b>NOTE:</b> This option can be disabled only if the <b>C States</b> option in the <b>Custom</b> mode is set to <b>disabled</b>.</p> <p> <b>NOTE:</b> When <b>C States</b> is set to <b>Enabled</b> in the <b>Custom</b> mode, changing the Monitor/Mwait setting does not impact the system power or performance.</p>

#### Related references

[System Profile Settings](#) on page 62

#### Related tasks

[Viewing System Profile Settings](#) on page 62

## 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.

#### Related references

[System BIOS](#) on page 43

#### Related tasks

[Miscellaneous Settings details](#) on page 65

[Viewing Miscellaneous Settings](#) on page 64


## Viewing Miscellaneous Settings

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

#### 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**.

#### Related references

[Miscellaneous Settings](#) on page 64



#### Related tasks

[Miscellaneous Settings details](#) on page 65

## Miscellaneous Settings details

### About this task

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 changes 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.

### Related references


[Miscellaneous Settings](#) on page 64

### Related tasks

[Viewing Miscellaneous Settings](#) on page 64

## 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).

### Related concepts

[Device Settings](#) on page 66

### Related references

[System BIOS](#) on page 43

### Related tasks

[Entering the iDRAC Settings utility](#) on page 66  
[Changing the thermal settings](#) on page 66

## Entering the iDRAC Settings utility

### Steps

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.

### Related references

[iDRAC Settings utility](#) on page 65

## 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**.

### Related references

[iDRAC Settings utility](#) on page 65

## Device Settings

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

### Related references

[System BIOS](#) on page 43

## Dell Lifecycle Controller


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

### Related references

[Embedded systems management](#) on page 66

## Embedded systems management

The Dell Lifecycle Controller provides advanced embedded systems management throughout the lifecycle of the system. 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](https://www.dell.com/ldracmanuals).

#### Related references

[Dell Lifecycle Controller](#) on page 66

## Boot Manager

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

#### Related references

[Boot Manager main menu](#) on page 67

[System BIOS](#) on page 43

#### Related tasks

[Viewing Boot Manager](#) on page 67

## Viewing Boot Manager

To enter **Boot Manager**:

#### Steps

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

```
F11 = Boot Manager
```

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

#### Related references

[Boot Manager](#) on page 67

[Boot Manager main menu](#) on page 67

## 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.

### Related references

[Boot Manager](#) on page 67

### Related tasks

[Viewing Boot Manager](#) on page 67

## One-shot BIOS boot menu

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


### Related references

[Boot Manager](#) on page 67

## System Utilities

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

- Launch Diagnostics
- BIOS/UEFI Update File Explorer
- Reboot System


 **NOTE:** Depending on the boot mode selected, you might have BIOS or UEFI Update File Explorer.

### Related references

[Boot Manager](#) on page 67

## PXE boot

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

 **NOTE:** To access the **PXE boot** option, boot the system and then press F12. The system scans and displays the active networked systems.



# Installing and removing system components

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

## Topics:

- Safety instructions for converting system from tower to rack
- Before working inside your system
- After working inside your system
- Recommended tools
- Front bezel (optional)
- System feet
- Caster wheels – optional
- System cover
- Inside the system
- Cooling shroud
- Cooling fans
- Cooling-fan assembly (optional)
- System memory
- Flex bays
- Hard drives
- Optical drives and tape drives
- Internal USB memory key (optional)
- Expansion card holder
- Expansion cards
- GPU card holder (optional)
- GPU cards (optional)
- Internal dual SD module (optional)
- Internal SD card
- Processors and heat sinks
- Power supply unit
- System battery
- Hard drive backplane
- SD vFlash card (optional)
- Control panel assembly
- System board
- Trusted Platform Module
- Power interposer board and power distribution board

## Safety instructions for converting system from tower to rack

- ⚠ **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:** Do not attempt to convert your system into a rack unless authorized by Dell. Only customers certified by Dell for tower to rack conversion can convert a tower system into a rack system.

**NOTE:** For specific caution statements and procedures, see the rack installation documentation for your system at [Dell.com/poweredgemanuals](https://www.dell.com/poweredge/manuals). For complete safety and regulatory information, see the safety instructions that shipped with your system.

Observe the following precautions for stability and safety of the system in rack mode:

- Before installing your equipment in a rack, install the front and side rack stabilizers. Failure to install the stabilizers can cause the rack to tip over.
- Always load from bottom up, and load the heaviest items first.
- Do not overload the AC power supply branch circuit that provides power to the rack.

## 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/poweredgemanuals](https://www.dell.com/poweredge/manuals).

5. Lay the system on its side.
6. Remove the system cover.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Removing the system cover](#) on page 78

[Removing the optional front bezel](#) on page 71

## After working inside your system

### Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

### Steps

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

### Related tasks

[Installing the system cover](#) on page 79


[Installing the optional front bezel](#) on page 72

## Recommended tools

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

- Key to the bezel lock.  
The key is needed only if your system includes a bezel.
- Phillips #2 screwdriver
- Wrist grounding strap

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


- AMP 90871-1 hand-crimping tool or equivalent
  - Tyco Electronics 58433-3 or equivalent
  - Wire-stripper pliers to remove insulation from size 10 AWG solid or stranded, insulated copper wire
-  **NOTE:** Use alpha wire part number 3080 or equivalent (65/30 stranding).

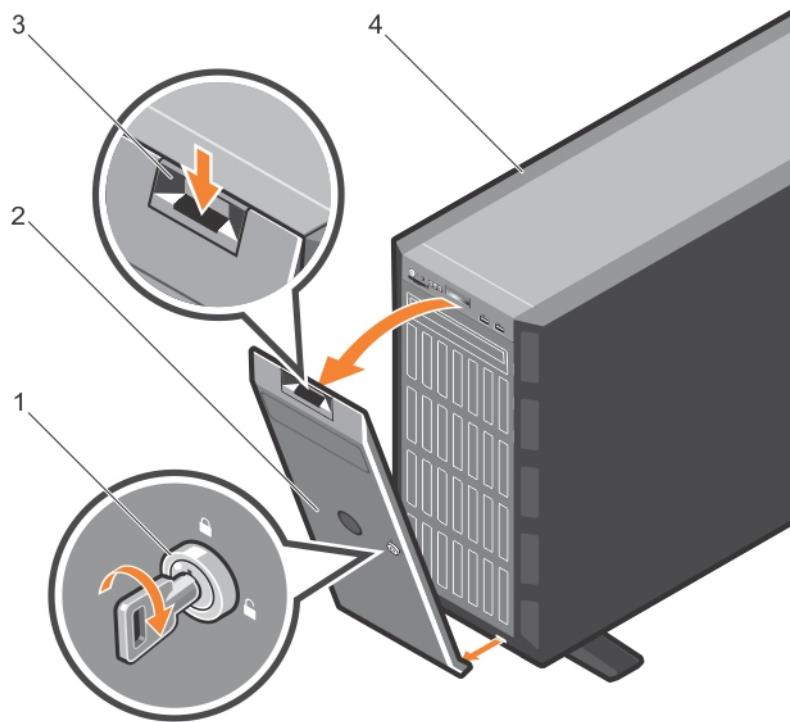
## Front bezel (optional)

The front bezel is attached to the front side of the system 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

### Steps

1. Unlock the bezel by using the bezel keys.  
 **NOTE:** There are two bezel keys attached to the back of the bezel.
2. Press the release latch at the top of the bezel.
3. Pull the top end of the bezel away from the system.
4. Unhook the bezel tabs from the slots at the bottom of the system board, and pull the bezel away from the system.



**Figure 15. Removing the front bezel**

- |                  |           |
|------------------|-----------|
| 1. bezel key     | 2. bezel  |
| 3. release latch | 4. system |

### Next steps

Install the optional front bezel.

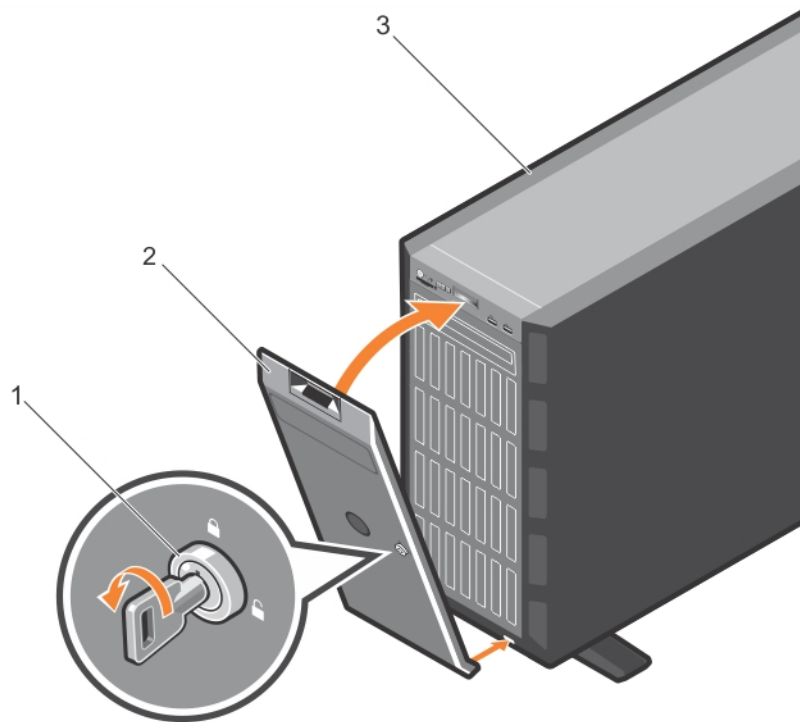
### Related concepts

[Installing the optional front bezel](#) on page 72

## Installing the optional front bezel

### Steps

1. Locate and remove the bezel keys.  
**i** **NOTE:** There are two bezel keys attached to the back of the bezel.
2. Insert the bezel tabs into the bezel tab slots in the chassis.
3. Press the release latch, and push the bezel toward the system until the bezel locks into place.
4. Lock the bezel by using the key.



**Figure 16. Installing the front bezel**

- a. bezel key
- b. bezel
- c. system

#### Related concepts

[Removing the optional front bezel](#) on page 71

## System feet

The system feet provide stability to the system in the tower mode.

## Removing the system feet

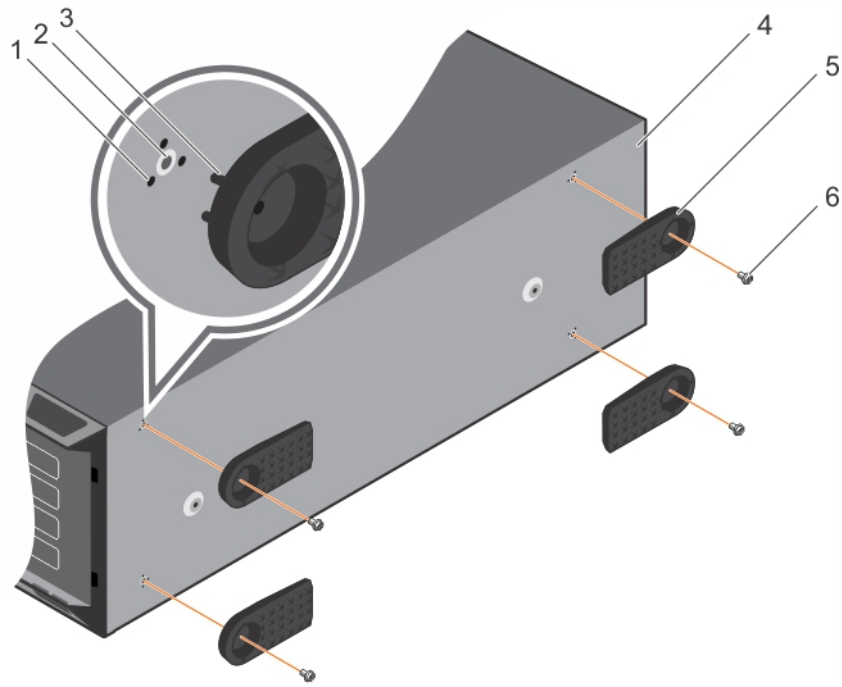
#### Prerequisites

**NOTE:** It is recommended that you remove the system feet only when you are converting the system from the tower mode to the rack mode, or when you are replacing the system feet with the wheel assembly.

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Rotate the system feet inward.
4. Place the system on its side on a flat, stable surface.

#### Steps

Remove the screws that secure the system feet to the base of the tower.



**Figure 17. Removing and installing the system feet**

- |                    |                      |
|--------------------|----------------------|
| 1. tab slot (12)   | 2. screw hole (4)    |
| 3. tab (12)        | 4. base of the tower |
| 5. system feet (4) | 6. screw (4)         |

**Related concepts**

[Installing the system feet](#) on page 74

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

## Installing the system feet

**Prerequisites**

**CAUTION:** Installing the feet on a stand-alone tower system is necessary to provide a stable foundation for the system. Failure to install the feet poses the risk of having the system tip over, possibly causing bodily injury or damage to the system.

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Place the system on its side on a flat, stable surface.

**Steps**

1. Align the three tabs on the system feet with the three slots on the base of the chassis.
2. Secure the system feet to the base of the chassis by using the screws.

**Next steps**

Place the system upright on a flat, stable surface, and turn the system feet outward.

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Removing the system feet](#) on page 73

# Caster wheels – optional

Caster wheels provide mobility to the system in the tower mode.

The caster wheel assembly consists of:

- Caster wheel units (front and back)
- Two screws for the caster wheel units

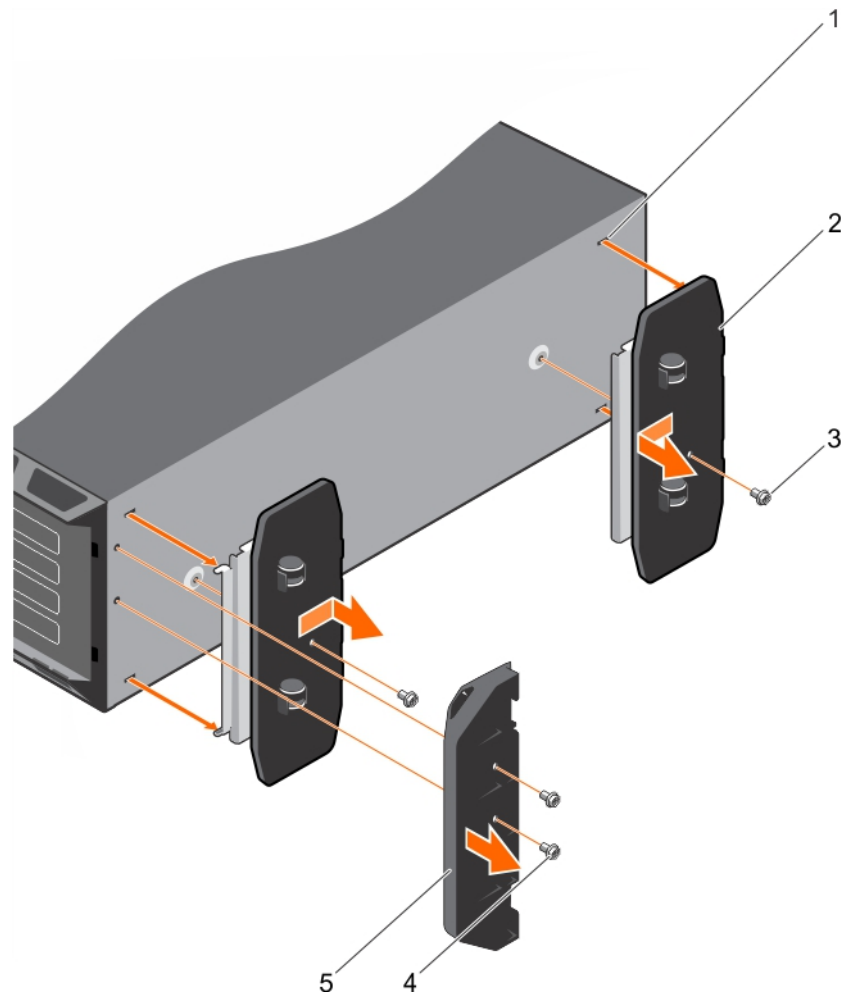
## Removing caster wheels

### Prerequisites

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Place the system on a flat, stable surface with the wheels extending beyond the edge of the surface.

### Steps

1. Remove the screw that secures the front wheel unit to the base of the chassis.
2. Offset the front wheel unit slightly to the back of the system to release the retention hooks, and pull out the front wheel unit.
3. Remove the screw that secures the back wheel unit to the base of the chassis.
4. Offset the back wheel unit slightly to the front of the system to release the retention hooks, and pull out the back wheel unit.



**Figure 18. Removing caster wheels**

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 1. slots on base of the tower (4) | 2. wheel assembly unit (2)    |
| 3. screw (2)                      | 4. screw for support unit (2) |
| 5. support unit                   |                               |

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Installing caster wheels](#) on page 76

## Installing caster wheels

#### Prerequisites

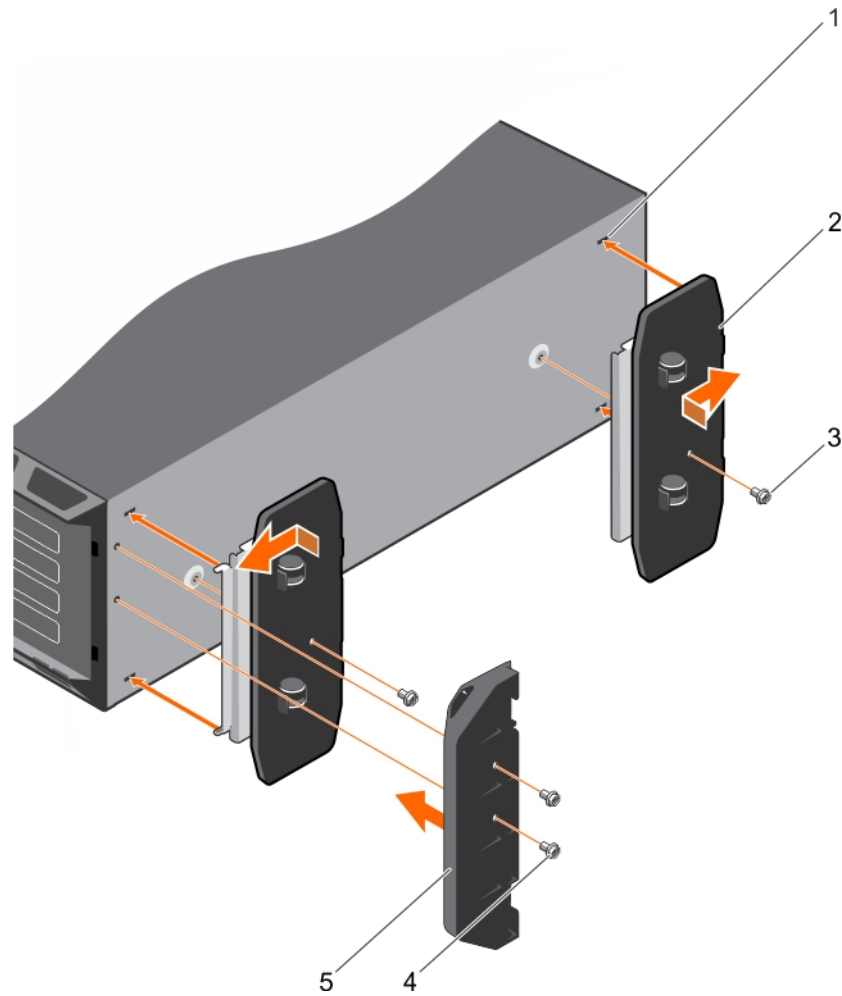
1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Place the system on its side on a flat, stable surface with the base of the system extending off the edge of the surface.
4. If installed, remove the system feet. For more information, see the Removing system feet section.

#### Steps

1. Align the two retention hooks on the back wheel unit with the two slots on the base of the chassis, and insert the hooks into the slots.



2. Offset the back wheel slightly to the back of the system and secure the unit in place by using a single screw.
3. Align the two retention hooks on the front wheel with the two slots on the base of the chassis, and insert the hooks into the slots.
4. Offset the front wheel slightly to the front and secure the unit in place by using a screw.



**Figure 19. Installing castor wheels**

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 1. slots on base of the tower (4) | 2. wheel assembly unit (2)    |
| 3. screw (2)                      | 4. screw for support unit (2) |
| 5. support unit                   |                               |

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Removing the system feet](#) on page 73

[Removing castor wheels](#) on page 75

# System cover

The system cover protects the components inside the system and helps in maintaining air flow inside the system. Removing the system cover activates the intrusion switch.

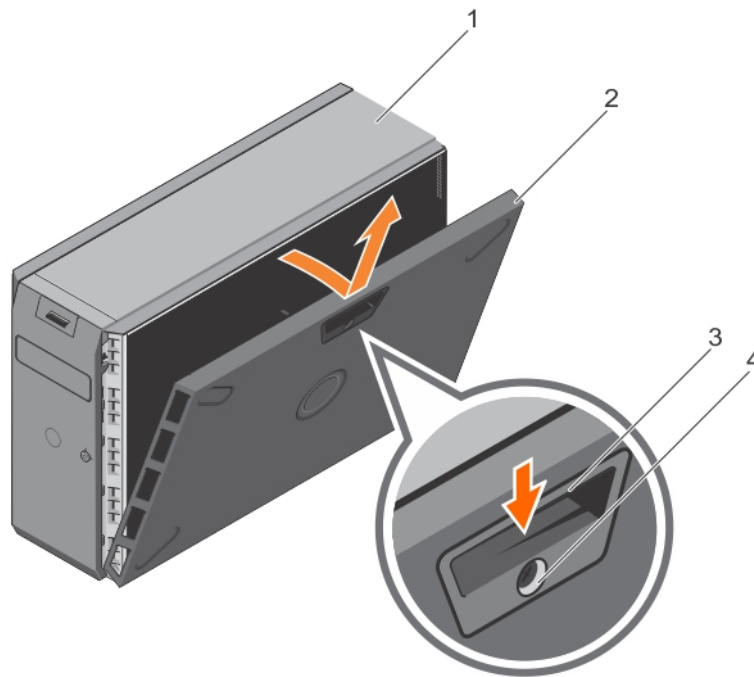
## Removing the system cover

### Prerequisites

1. Follow the safety guidelines listed in the Safety instructions section.
2. Turn off the system and any attached peripherals.
3. Disconnect the system from the electrical outlet and peripherals.
4. If installed, remove the front bezel.
5. Place the system on a flat, stable surface.

### Steps

1. Turn the latch release lock to the unlocked position.
2. Press the cover release latch and remove the system cover.



**Figure 20. Removing the system cover**

- |                        |                             |
|------------------------|-----------------------------|
| 1. system              | 2. system cover             |
| 3. cover release latch | 4. cover release latch lock |

### Next steps

1. Install the system cover.
2. Place the system upright on its feet on a flat and stable surface.
3. Reconnect the peripherals and connect the system to the electrical outlet.
4. Turn the system on, including any attached peripherals.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Installing the system cover](#) on page 79

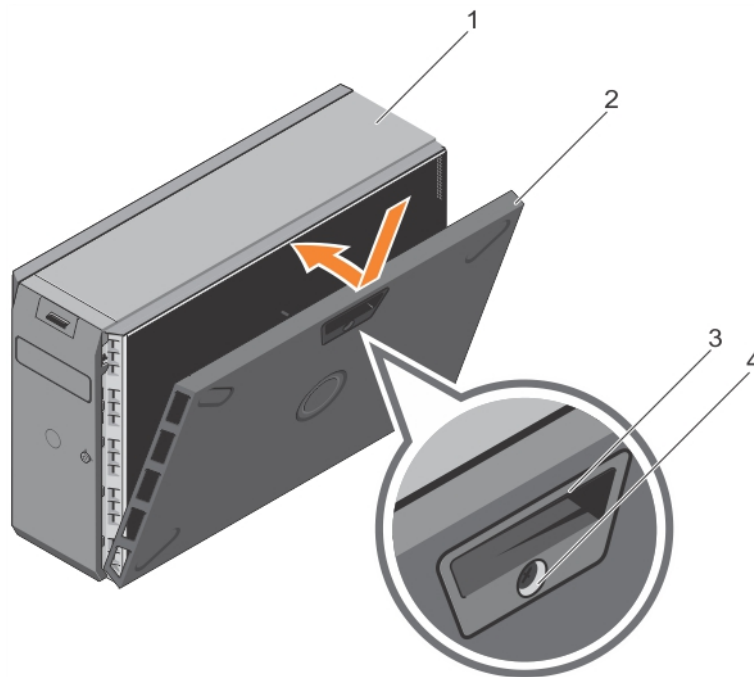
# Installing the system cover

## 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. 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. Press the cover release latch, and push the cover toward the chassis until the latch locks into place.
3. Rotate the latch release lock clockwise to the locked position.



**Figure 21. Installing the system cover**

- |                        |                             |
|------------------------|-----------------------------|
| 1. system              | 2. system cover             |
| 3. cover release latch | 4. cover release latch lock |

## Next steps

1. Place the system upright on its feet on a flat and stable surface.
2. If removed, install the front bezel.
3. Reconnect the peripherals and connect the system to the electrical outlet.
4. Turn on the system, including any attached peripherals.
5. Follow the procedure listed in the After working inside your system section.

## Related references

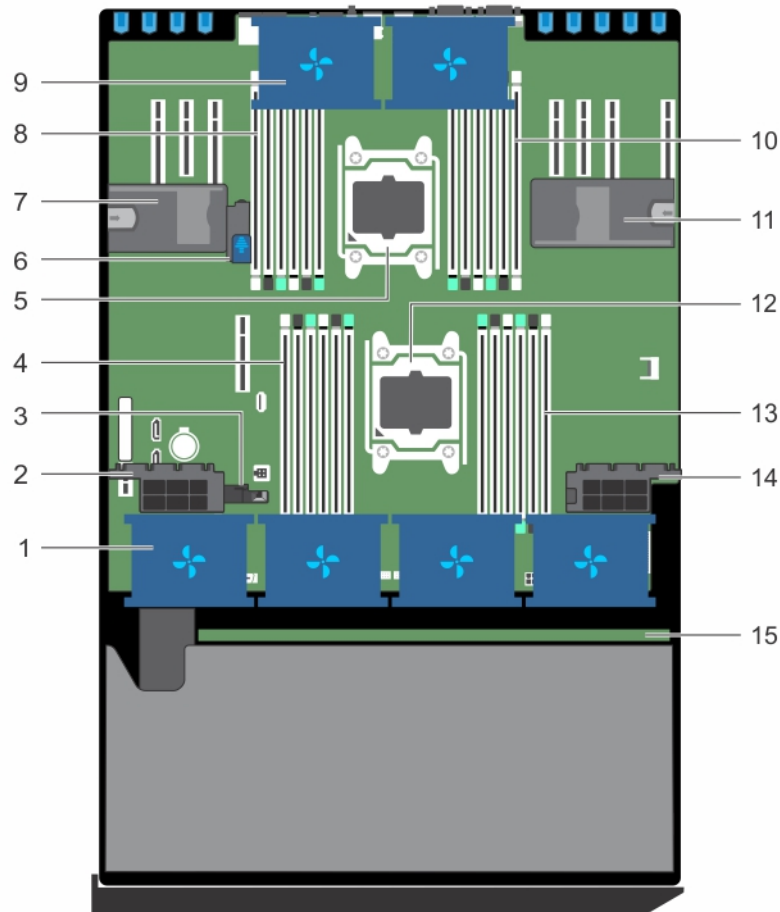
[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Removing the system cover](#) on page 78

# 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 22. Inside the system**

- |   |                           |
|---|---------------------------|
| 1. cooling fan in the cooling fan assembly (optional) | 2. expansion card holder  |
| 3. guide to align the cooling shroud                  | 4. DIMM slots (6)         |
| 5. processor 2  | 6. system-board holder    |
| 7. expansion card holder                              | 8. DIMM slots (6)         |
| 9. cooling fan in the cooling shroud (2)              | 10. DIMM slots (6)        |
| 11. expansion card holder                             | 12. processor 1           |
| 13. DIMM slots (6)                                    | 14. expansion card holder |
| 15. hard-drive backplane                              |                           |

# Cooling shroud

The cooling shroud aerodynamically directs 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.

## Removing the cooling shroud

### Prerequisites

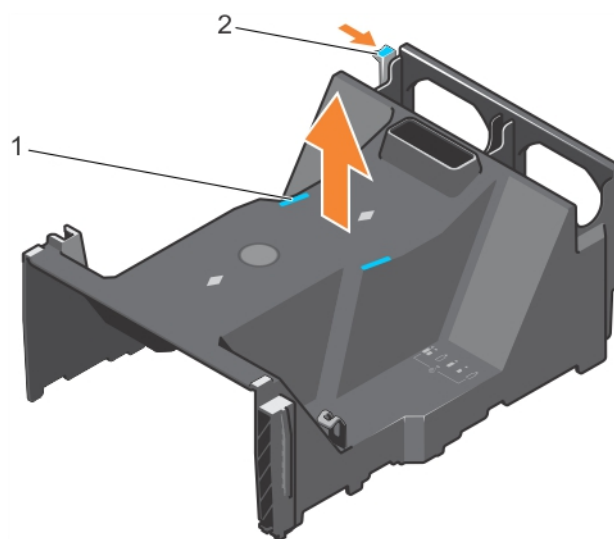
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 air shroud removed. The system may get overheated quickly, resulting in shutdown of the system and loss of data.

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If required, remove the two cooling fans.

### Steps

Pull the cooling shroud release tab, and holding the touch points at the center of the cooling shroud, lift the shroud from the system.



**Figure 23. Removing the cooling shroud**

- a. touch point (2)
- b. cooling shroud release tab

### Next steps

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

### Related concepts

[Installing the cooling shroud](#) on page 82

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

[Removing the optional cooling fan assembly](#) on page 85

# Installing the cooling shroud

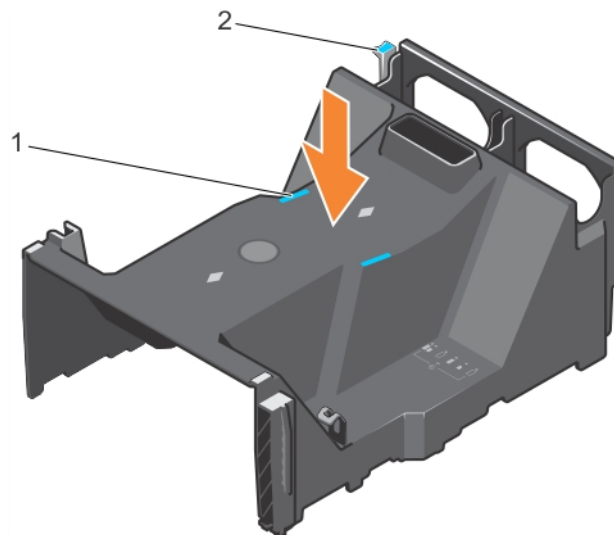
## Prerequisites

**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.
3. If removed, install the cooling fans in the cooling shroud.



**Figure 24. Installing the cooling shroud**

- a. touch point (2)
- b. cooling shroud release tab

## Next steps

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

## Related concepts

[Removing the cooling shroud](#) on page 81

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

# Cooling fans

There are two cooling fans on the cooling shroud and an optional cooling fan assembly that houses four cooling fans on your system.

**NOTE:** Each fan is listed in the system's management software, referenced by the respective fan number. If there is a problem with a particular fan, you can 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.

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

**CAUTION:** 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.

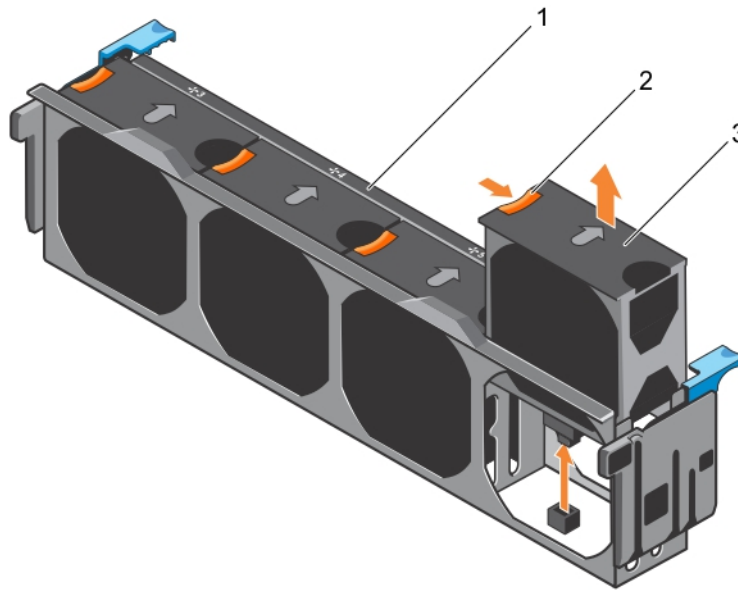
**CAUTION:** The cooling fans are hot-swappable. To maintain proper cooling while the system is on, replace only one fan at a time.

**CAUTION:** Do not operate the system with the cover removed for a duration exceeding five minutes.

**NOTE:** The procedure for removing an individual fan from the cooling-fan assembly and the cooling shroud is identical.

### Steps

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



**Figure 25. Removing a cooling fan from the cooling-fan assembly**

- a. cooling-fan assembly
- b. fan release tab
- c. cooling fan

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Before working inside your system](#) on page 70

[Installing a cooling fan](#) on page 84

[After working inside your system](#) on page 70

## 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.

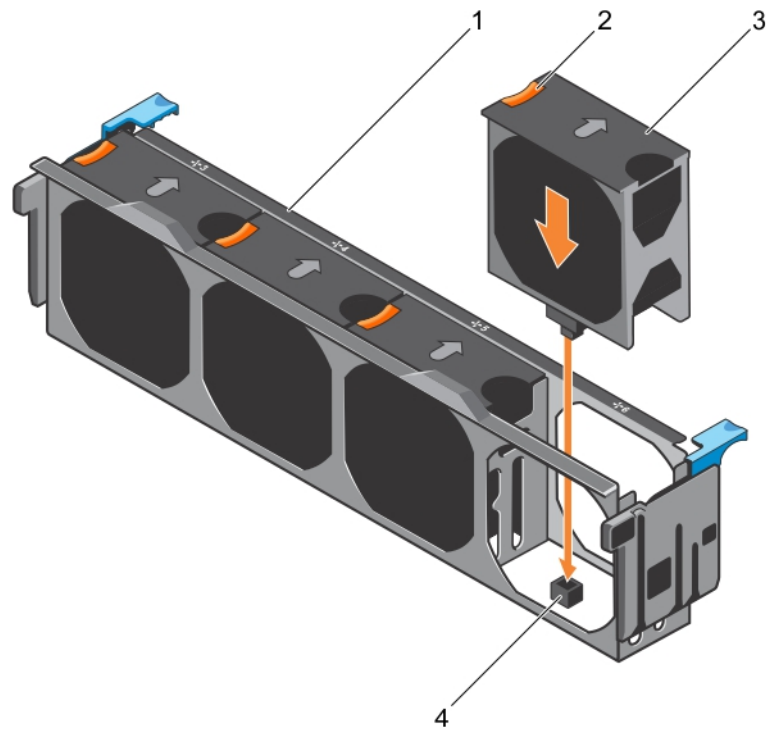
**NOTE:** The procedure for installing an individual fan in the cooling-fan assembly and the cooling shroud is identical.

Follow the safety guidelines listed in the safety instructions section.

#### Steps

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





**Figure 26. Installing a cooling fan into the cooling-fan assembly**

#### Next steps

1. cooling-fan assembly
2. fan release tab
3. cooling fan
4. cooling fan connector on the system board

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[After working inside your system](#) on page 70

## Cooling-fan assembly (optional)

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 optional cooling fan assembly

#### Prerequisites

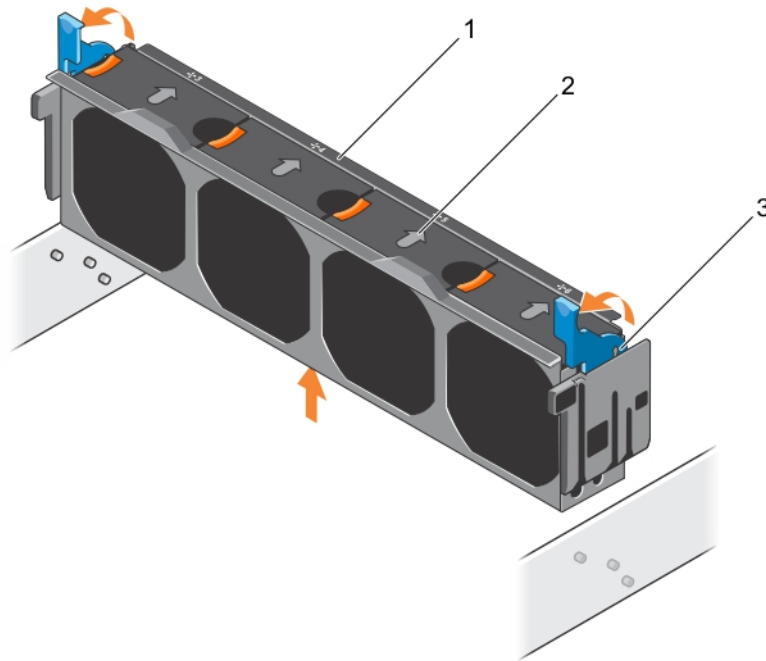
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

**Steps**

1. Unlock the cooling fan assembly from the chassis by lifting the release levers up.
2. Lift the cooling fan assembly out of the chassis.



**Figure 27. Removing the cooling fan assembly**

- a. cooling fan assembly
- b. cooling fan (4)
- c. release lever (2)

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Before working inside your system](#) on page 70

[Installing the optional cooling fan assembly](#) on page 86

## Installing the optional 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.

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

Follow the safety guidelines listed in the safety instructions section.

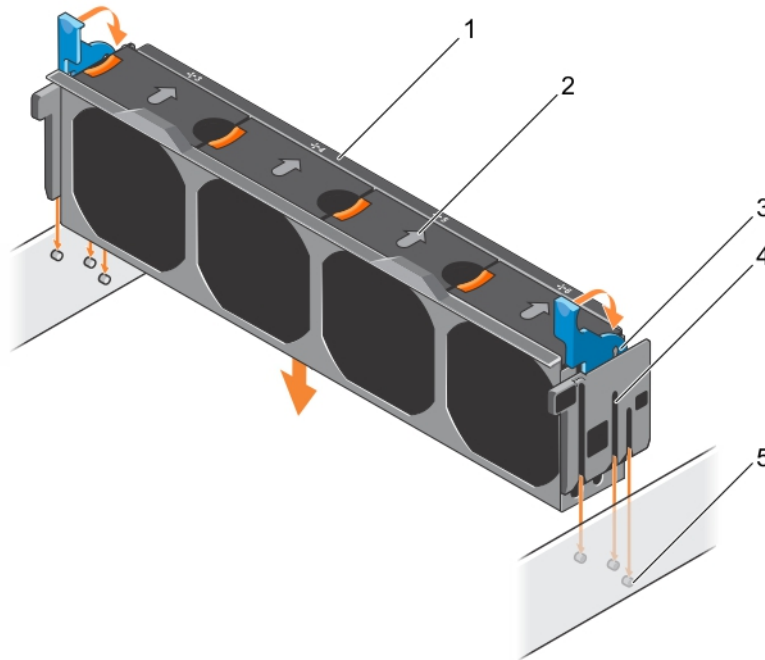
**Steps**

1. Align the slots on the cooling fan assembly with the guide pins on the chassis side walls.

2. Slide the cooling fan assembly into the chassis.
3. Lock the cooling fan assembly into the chassis by pressing the release levers down.

**Next steps**

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



**Figure 28. Installing the cooling fan assembly**

- |                         |                    |
|-------------------------|--------------------|
| 1. cooling-fan assembly | 2. cooling fan (4) |
| 3. release lever (2)    | 4. slot (6)        |
| 5. guide pin (6)        |                    |

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Removing the optional cooling fan assembly](#) on page 85

[After working inside your system](#) on page 70

## System memory

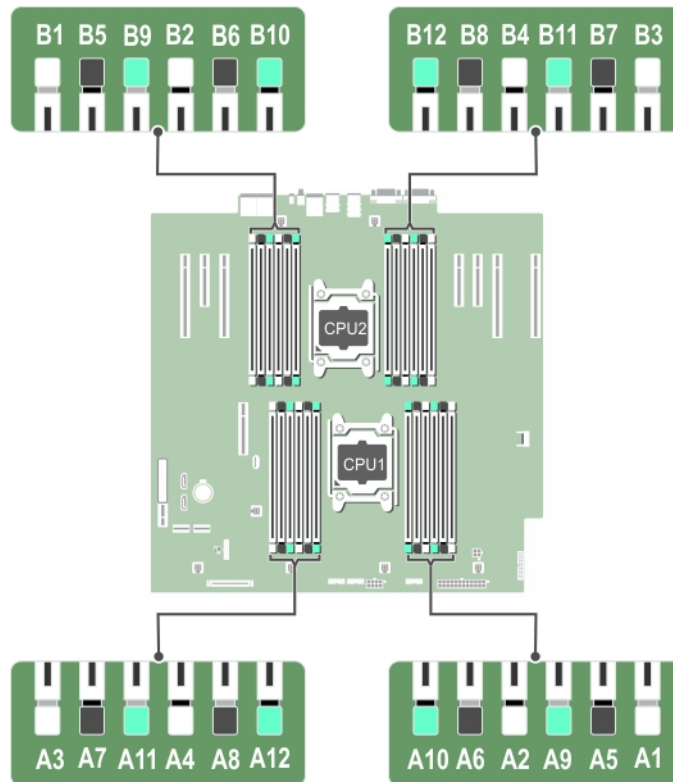
The system supports DDR4 registered DIMMs (RDIMMs) and load reduced DIMMs (LRDIMMs). System memory holds the instructions that are executed by the processor.

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

Memory bus operating frequency can be 1866 MT/s, 2133 MT/s, or 2400 MT/s depending on the following factors:

- DIMM type (RDIMM or LRDIMM)
- 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.



**Figure 29. Memory socket locations**

Memory channels are organized as follows:

**Table 28. Memory channels**

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

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

**Table 29. Memory population**

DIMM Type	DIMMs Populated/ Channel	Voltage	Operating Frequency (in MT/s)	Maximum DIMM Rank/ Channel
RDIMM	1	1.2 V	2400, 2133, 1866	Dual rank or single rank
	2		2400, 2133, 1866	Dual rank or single rank
	3		1866	Dual rank or single rank
LRDIMM	1	1.2 V	2400, 2133, 1866	Quad rank
	2		2400, 2133, 1866	Quad rank
	3		2133, 1866	Quad 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:

- RDIMMs and LRDIMMs must not be mixed.
- 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.
- Up to three LRDIMMs can be populated per channel regardless of rank count.
- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s) 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

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 one and two processor configurations that follow the appropriate memory guidelines.

**NOTE:** 1 R, 2 R, 4 R and 8 R in the following tables indicate single, dual, and quad-rank DIMMs respectively.

**Table 31. Memory configurations—single processor**

System capacity—in GB	DIMM size—in GB	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
4	4	1	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1
8	4	2	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2
16	4	4	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4
	8	2	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2
24	4	6	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6
48	4	12	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
	8	6	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6
96	8	12	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
	16	6	2 R, x8, 2400 MT/s 2 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6
128	16	8	2 R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8

**Table 31. Memory configurations—single processor (continued)**

System capacity—in GB	DIMM size—in GB	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
			2 R, x8, 2133 MT/s	
144	8	10	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A11*
	16	10	2 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A11*
256	32	8	2 R, x4, 2400 MT/s 2 R, x4, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8
384	32	12	2 R, x4, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
512	64	8	4 R, x4, 2133 MT/s 4 R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8
768	64	12	4 R, x4, 1866 MT/s 4 R, x4, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12
1536	128	12	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12	

\* 16 GB DIMMs must be installed in slots numbered A1, A2, A3, A4, A5, A6, A7, and A8 and 8 GB DIMMs must be installed in slots A9 and A11.

**NOTE:** If all 3 slots in the channel are populated with 128 GB LRDIMMS, the clock speed drops to 2133MHz.


**Table 32. Memory configurations—2 processors**

System capacity—in GB	DIMM size—in GB	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
16	4	4	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, B1, B2
32	4	8	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
64	4	16	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	8	8	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
96	4	24	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	8	12	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
128	8	16	1 R, x8, 2400 MT/s 1 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	16	8	2 R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4

**Table 32. Memory configurations—2 processors (continued)**


System capacity—in GB	DIMM size—in GB	Number of DIMMs	DIMM rank, organization, and frequency	DIMM slot population
			2 R, x8, 2133 MT/s	
160	8	20	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10
192	8	24	1 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	16	12	2 R, x8, 2400 MT/s 2 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
256	16	16	2 R, x8, 2400 MT/s 2 R, x8, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
384	16	24	2 R, x8, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
	32	12	2 R, x4, 2400 MT/s 2 R, x4, 2133 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
512	32	16	2 R, x4, 2400 MT/s 2 R, x4, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	64	8	4 R, x4, 2400 MT/s 4 R, x4, 2133 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
768	32	24	2 R, x4, 1866 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
1024	64	16	4 R, x4, 2133 MT/s 4 R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
1536	64	24	4 R, x4, 1866 MT/s 4 R, x4, 2133 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12
3072	128	24	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12	

\* 16 GB DIMMs must be installed in slots numbered A1, A2, A3, A4, B1, B2, B3, and B4 and 8 GB DIMMs must be installed in slots A5, A6, B5, and B6.

 **NOTE:** If all 3 slots in the channel are populated with 128 GB LRDIMMS, the clock speed drops to 2133MHz.

## 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.

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

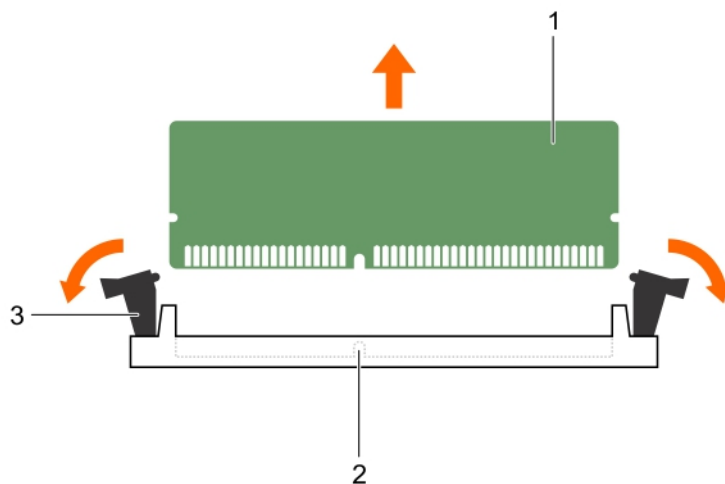
**CAUTION:** To ensure proper system cooling, memory module blanks must be installed in any memory socket that is not occupied. Remove memory module blanks only if you intend to install memory modules in those sockets.

### 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**

- a. memory module
- b. memory module socket
- c. 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 references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks


[Before working inside your system](#) on page 70


[Removing the optional cooling fan assembly](#) on page 85

[Installing memory modules](#) on page 94

# Installing memory modules

## Prerequisites

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

 **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.


## Steps

1. Locate the appropriate memory module socket.

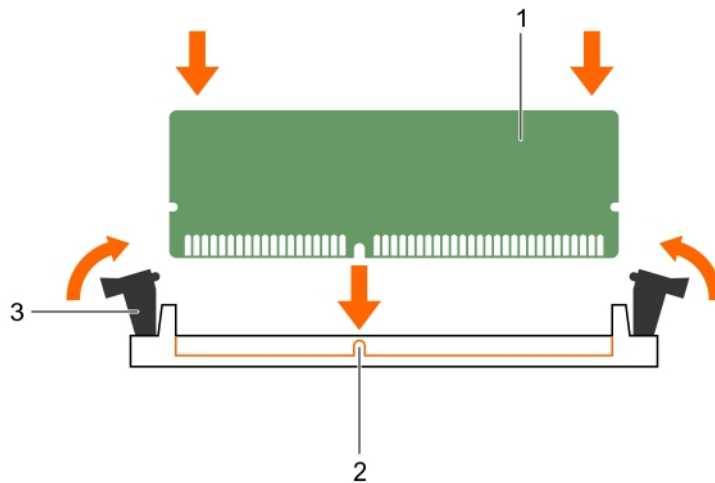
 **CAUTION:** Handle each memory module only by the card edges, ensuring not to touch the middle of the memory module or metallic contacts.

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**

- a. memory module
- b. alignment key
- c. memory module socket ejector (2)

#### Next steps

1. Follow the procedure listed in the After working inside your system section.
2. 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.
3. 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.
4. Run the system memory test in system diagnostics.

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Before working inside your system](#) on page 70

[After working inside your system](#) on page 70

[Removing memory modules](#) on page 92

[Removing the optional cooling fan assembly](#) on page 85

## Flex bays

Your system's flex bay supports sixteen 2.5 inch hard drives or four Dell PowerEdge Express Flash devices.

## Removing a flex bay

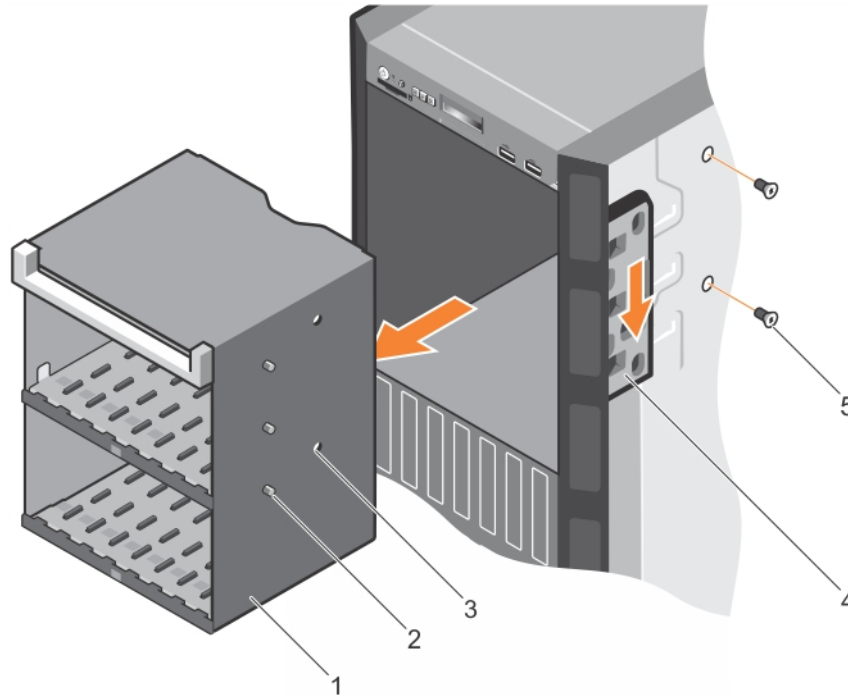
#### Prerequisites

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. 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. Remove the cables.
  - a. For a 2.5 inch drive flex bay, remove the cables from the slim optical-drive and the backplane.
  - b. For a Dell PowerEdge Express Flash device flex bay, remove the cables from the backplane.
2. Remove the two screws that secure the flex bay to the chassis.
3. Press the release latch and pull the flex bay away from the chassis.



**Figure 32. Removing a flex bay**

- |                   |                  |
|-------------------|------------------|
| 1. flex bay       | 2. tab (3)       |
| 3. screw hole (2) | 4. release latch |
| 5. screw (2)      |                  |

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing a flex bay](#) on page 96

## Installing a flex bay

### Prerequisites

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.

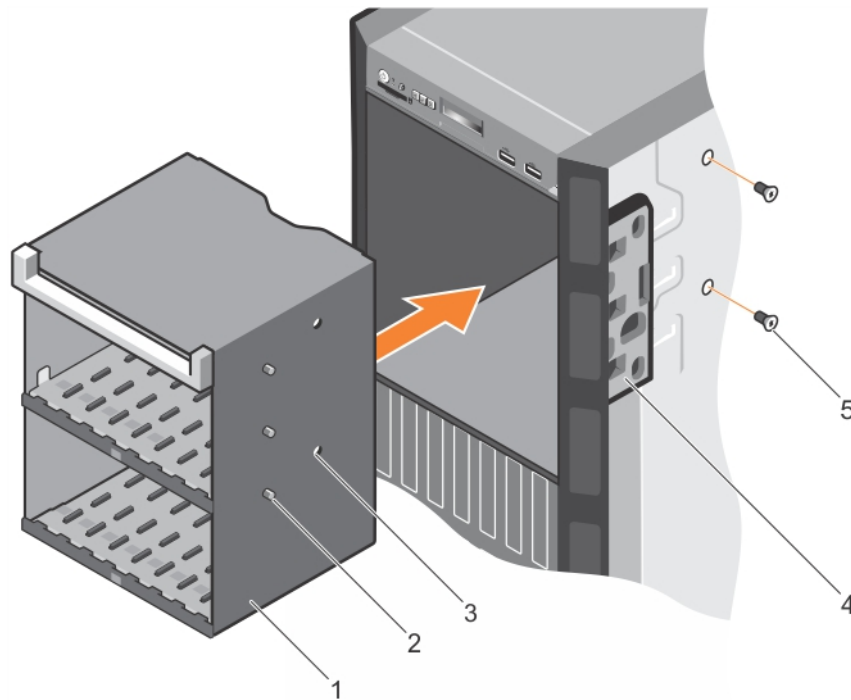
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

### Steps

1. Align the tabs on the flex bay with the slots on the front of the chassis.
2. Insert the flex bay into the chassis until the tabs click into place.
3. Install the two screws to secure the flex bay to the chassis.

### Next steps

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



**Figure 33. Installing a flex bay**

- |                   |                  |
|-------------------|------------------|
| 1. flex bay       | 2. tab (3)       |
| 3. screw hole (2) | 4. release latch |
| 5. screw (2)      |                  |

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69


### Related tasks

[After working inside your system](#) on page 70

[Removing a flex bay](#) on page 95

## 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](https://www.dell.com/poweredge/manuals).

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 hot swappable hard drive or solid state 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 the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If applicable, remove the bezel.
4. Using the management software, prepare the hard drive for removal. If the hard drive is online, the green activity or 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.

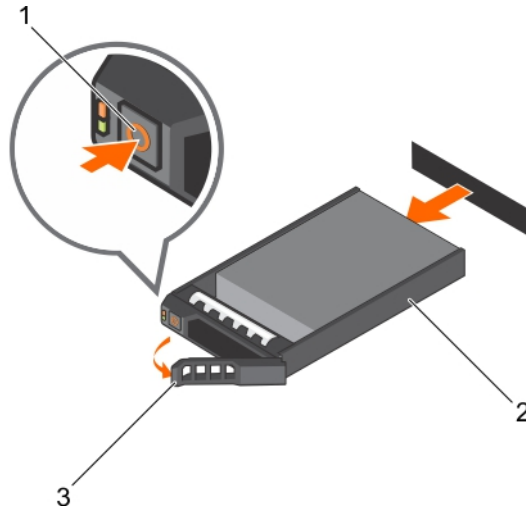
 **CAUTION:** To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.

### Steps

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

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

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



**Figure 34. Removing a hot swappable hard drive or SSD**

- a. release button
- b. hard drive or SSD carrier
- c. hard drive or SSD carrier handle

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Before working inside your system](#) on page 70

[After working inside your system](#) on page 70

[Removing the optional front bezel](#) on page 71

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

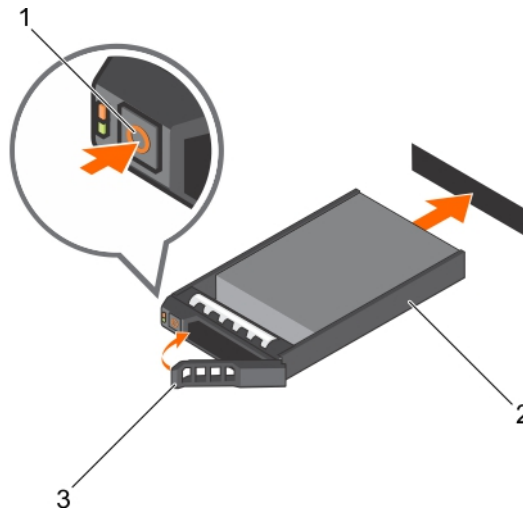
1. Follow the safety guidelines listed in Safety instructions section.

## 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 35. Installing a hot swappable hard drive**

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

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Removing a 2.5-inch hard drive blank

### Prerequisites

**CAUTION:** Many repairs may only be done by a certified service technician. 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.

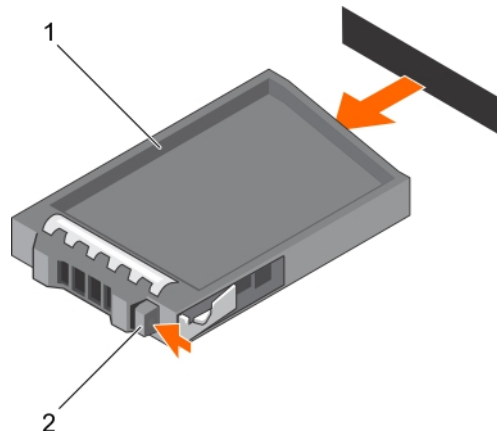
**CAUTION:** To maintain proper system cooling, all empty hard drive slots must have hard drive blanks installed.

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

## Steps

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





**Figure 36. Removing a 2.5-inch hard drive blank**

- a. hard drive blank
- b. release button

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Installing a 2.5-inch hard drive blank](#) on page 101

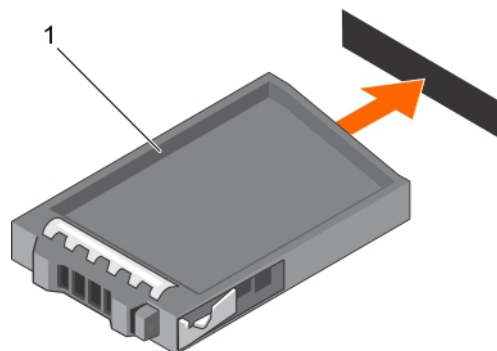
## Installing a 2.5-inch hard drive blank

**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 37. Installing a 2.5-inch hard drive blank**

- a. hard drive blank

**Next steps**

If removed, install the front bezel.

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Removing a 2.5-inch hard drive blank](#) on page 100

# Removing a 3.5-inch hard drive blank

## Prerequisites

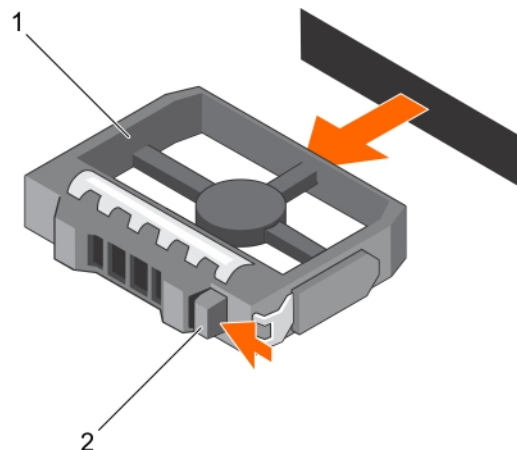
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 38. Removing a 3.5-inch hard drive blank**

- a. hard drive blank
- b. release button

## Next steps

If applicable, install the front bezel.

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Installing the optional front bezel](#) on page 72

[Installing a 3.5-inch hard drive blank](#) on page 102

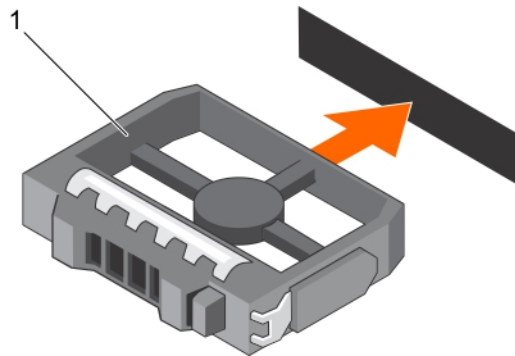
# Installing a 3.5-inch hard drive blank

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

- a. hard drive blank

## Next steps

If applicable, install the front bezel.

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

# Installing a 2.5-inch hard drive into a 3.5-inch hard drive adapter

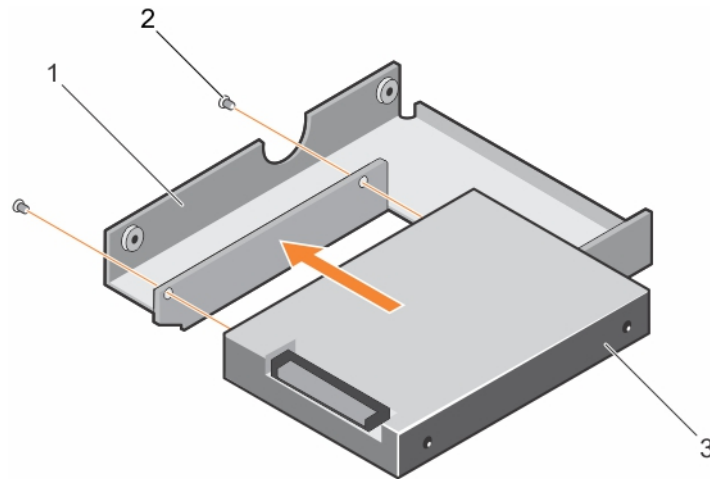
## Prerequisites

**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. Keep the Phillips #2 screwdriver ready.
3. Remove a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier.

## Steps

1. Align the screw holes on the 2.5-inch hard drive with the screw holes on the 3.5-inch hard drive adapter.
2. Install the screws to secure the hard drive to the 3.5-inch hard drive adapter.



**Figure 40. Installing a 2.5-inch hard drive into a 3.5-inch hard drive adapter**

- a. 3.5-inch hard drive adapter
- b. screw (2)
- c. 2.5-inch hard drive

### Next steps

Install the 3.5-inch adapter into the 3.5-inch hard drive carrier.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Removing a 2.5-inch hard drive from a 3.5-inch hard drive adapter](#) on page 104

## Removing a 2.5-inch hard drive from a 3.5-inch hard drive adapter

### Prerequisites

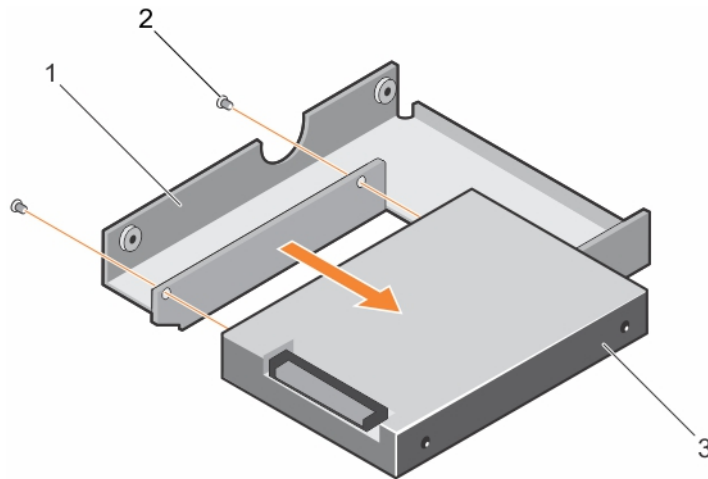
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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. Keep the Phillips #2 screwdriver ready.
3. Remove the 3.5-inch hard drive adapter from the 3.5-inch hot swappable hard drive carrier.

**NOTE:** A 2.5-inch hot swappable hard drive is installed in a 3.5-inch hard drive adapter, which is then installed in the 3.5-inch hot swappable hard drive carrier.

### Steps

1. Remove the screws from the side of the 3.5-inch hard drive adapter.
2. Remove the hard drive from the 3.5-inch hard drive adapter.



**Figure 41. Removing a 2.5-inch hard drive from a 3.5-inch hard drive adapter**

- a. 3.5-inch hard drive adapter
- b. screw (2)
- c. 2.5-inch hard drive

### Next steps

Install a 2.5-inch hard drive into a 3.5-inch hard drive adapter.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Installing a 2.5-inch hard drive into a 3.5-inch hard drive adapter](#) on page 103

## Installing a 3.5-inch hard drive adapter into a hot swap hard drive carrier

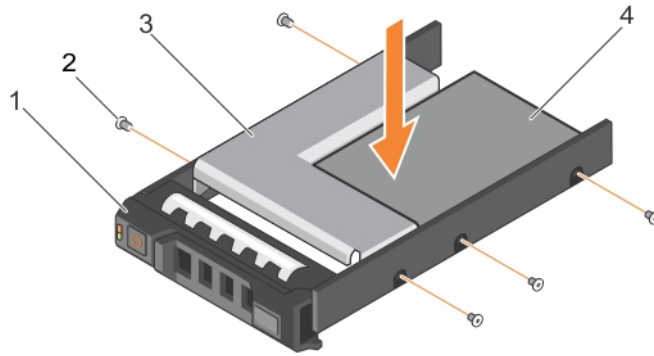
### Prerequisites

**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. Keep the Phillips #2 screwdriver ready.
3. If installed, remove the front bezel.
4. Install the 2.5-inch hot swappable hard drive into the hot swappable hard drive adapter.

### Steps

1. Insert the 3.5-inch hard drive adapter into the hot swappable hard drive carrier with the connector end of the hard drive toward the back of the hot swappable hard drive carrier.
2. Align the screw holes on the hard drive with the holes on the hot swappable hard drive carrier.
3. Install the screws to secure the hot swappable hard drive to the hot swappable hard drive carrier.



**Figure 42. Installing a 3.5-inch hard drive adapter into a hot swappable hard drive carrier**

1. 3.5-inch hard drive carrier
2. screw (5)
3. hard drive adapter
4. 2.5-inch hard drive

### Next steps

1. Install the hot swappable hard drive carrier into the system.
2. If removed, install the front bezel.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Removing a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier](#) on page 106

## Removing a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier

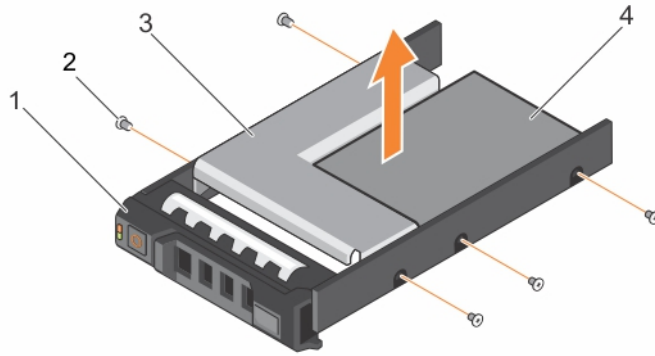
### Prerequisites

**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 safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. If installed, remove the front bezel.

### Steps

1. Remove the 3.5-inch hot swappable hard drive carrier from the system.
2. Remove the screws from the rails on the hot swappable hard drive carrier.
3. Lift the 3.5-inch hard drive adapter out of the 3.5-inch hot swappable hard drive carrier.



**Figure 43. Removing a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier**

- |                                |                        |
|--------------------------------|------------------------|
| 1. 3.5-inch hard drive carrier | 2. screw (5)           |
| 3. hard drive adapter          | 4. 2.5-inch hard drive |

**Next steps**

If removed, install the front bezel.

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Installing a 3.5-inch hard drive adapter into a hot swap hard drive carrier](#) on page 105

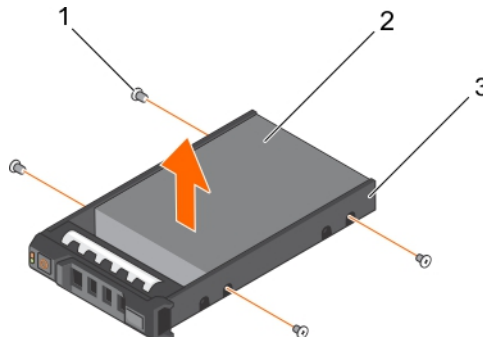
## Removing a hard drive or a solid state drive from a hard drive carrier

**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 44. Removing a hard drive from a hard drive carrier**

- a. screw (4)
- b. hard drive
- c. hard drive carrier

### Next steps

If applicable, install a hard drive into the hard drive carrier.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Installing a hot swappable hard drive into a hot swappable 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.

**NOTE:** Hot swappable hard drives are supplied in hot swappable hard drive carriers that fit in the hard drive slots.

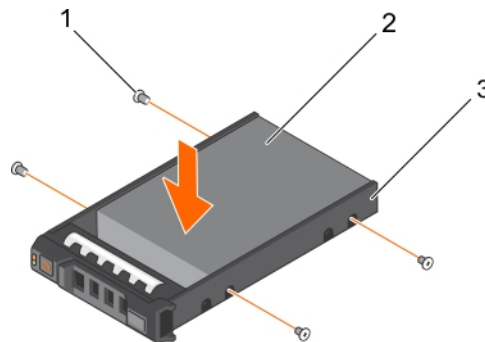
1. Keep the Phillips #2 screwdriver ready.
2. Remove the hot swappable hard drive carrier.

### Steps

1. Insert the hot swappable hard drive into the hard drive carrier with the connector end of the hard drive toward the back.
2. Align the screw holes on the hard drive with the set of screw 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.

### Next steps

Install the hard drive carrier into the system.



**Figure 45. Installing a hot swappable hard drive into a hot swappable hard drive carrier**

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Optical drives and tape drives

Your system supports one of the following configurations:



**Table 33. System configurations**

System	Configurations
Systems with up to eight 3.5 inch hard drives or sixteen 2.5 inch hard drives	Up to three SATA half height optical drives Up to three SATA/SAS/SCSI tape drives A combination of optical and tape drives
Systems with up to eight 3.5 inch hard drives or eight 2.5 inch hard drives in the 3.5 inch hard-drive carrier, or sixteen 2.5 inch hard drives and four PCIe SSDs	Up to one SATA half height optical drive Up to one SATA/SAS/SCSI tape drive
Systems with up to eighteen 3.5 inch hard drives	One optical or tape drive
Systems with up to thirty-two 2.5 inch hard drives	One slim optical drive with option to choose from DVD-ROM or DVD-RW. Tape drives are not supported.

## Removing the optical drive or tape drive

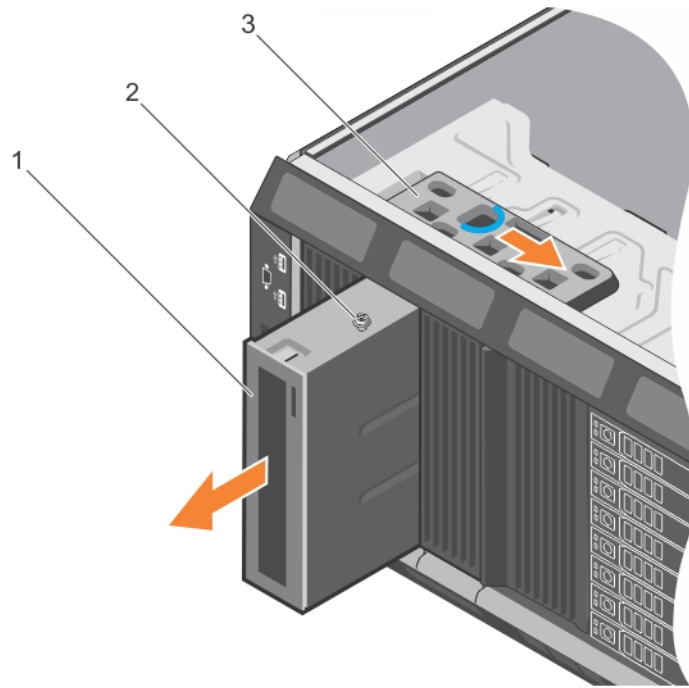
### Prerequisites

1. Follow the safety guidelines listed in safety instructions section.
2. Follow the procedure listed in 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

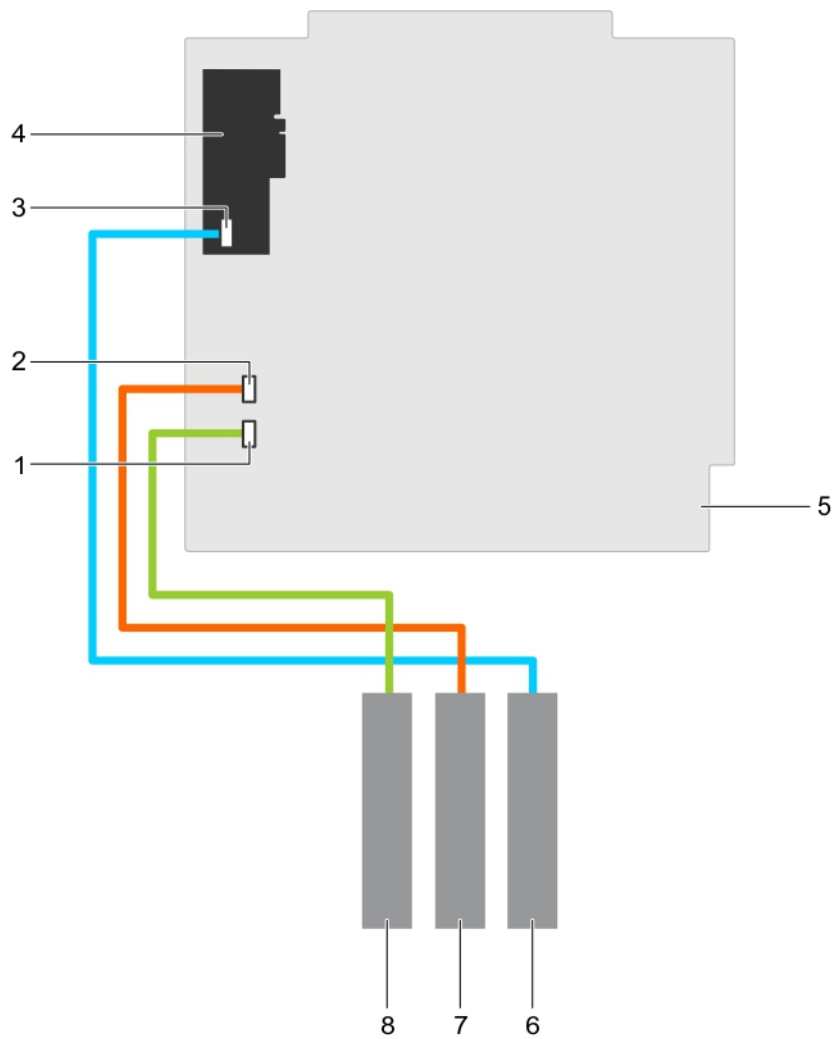
1. Disconnect the power and data cable from the back of the drive.
  - NOTE:** Observe the routing of the power and data cable inside the chassis as you remove them from the system board and the drive. You must route these cables properly when you replace them to prevent them from being pinched or crimped.
2. To remove the drive, push the release latch as indicated in the figure.
3. Slide the drive out of the drive bay.
4. If you are not immediately replacing the optical drive or tape drive, install the blank.
  - NOTE:** Blanks must be installed on empty optical drive or tape drive slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system. Perform the same steps to install blanks.



**Figure 46. Removing the optical drive or tape drive**

- a. optical drive/tape drive
- b. guide
- c. release latch

**i** **NOTE:** The following figure shows the cabling diagram for an optical drive/tape drive with an x16 backplane. All backplanes (x8, x18, and x16) have an ODD connector.



**Figure 47. Cabling— optical drive and tape drive**

- |   |                                       |
|---|---------------------------------------|
| 1. ODD1/TBU connector on system board               | 2. ODD2/TBU connector on system board |
| 3. mini-SAS/SATA connector on internal tape adapter | 4. internal tape adapter              |
| 5. system board                                     | 6. SAS tape drive                     |
| 7. optical drive 2                                  | 8. optical drive 1                    |

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing the optical drive or tape drive](#) on page 112

# Installing the optical drive or tape 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.

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

## Steps

1. Unpack and prepare the drive for installation.

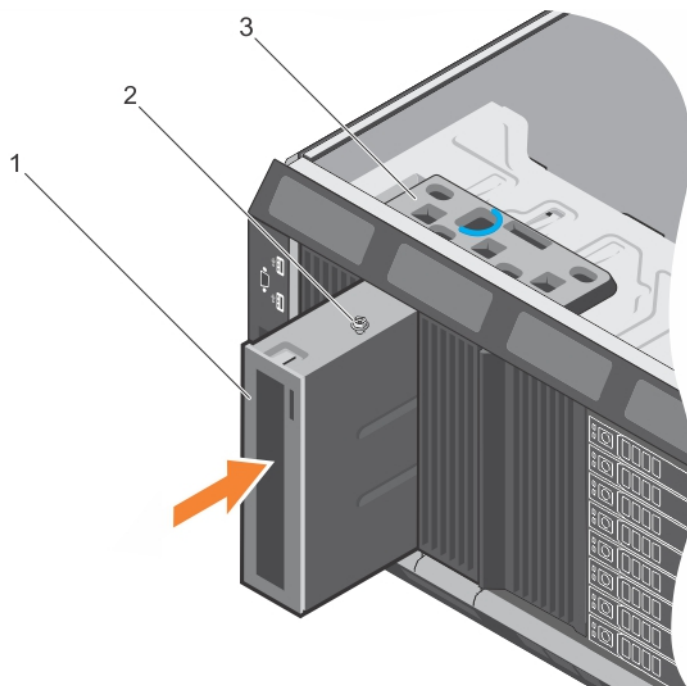
For instructions, see the documentation that shipped with the drive.

If you are installing a SAS tape drive, you must have an internal tape adapter installed. For more information on installing a SAS tape drive, see installing an expansion card section.

2. If applicable, remove the old drive or the drive blank.
3. Align the guide on the drive with the slot on drive bay.
4. Slide the drive into the slot until the latch snaps into place.
5. Connect the power and data cable to the back of the drive.
6. Connect the power and data cables to the backplane and the system board.

The system board connectors are ODD1/TBU and ODD2/TBU. The system can connect up to two optical drives, or one optical drive with one SATA tape backup unit, and one SAS tape backup unit using Dell OpenManage IT Assistant.

**NOTE:** For systems configured with software RAID and installed with PowerVault RD1000, connect the PowerVault RD1000 data cable to ODD1/TBU (SATA\_E) port and the optical drive data cable to ODD2/TBU (SATA\_F) port on the system board respectively.



**Figure 48. Installing the optical drive or tape drive**

- a. optical drive/tape drive
- b. guide
- c. release latch

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing an expansion card](#) on page 120

[After working inside your system](#) on page 70

## Removing the slim optical drive blank

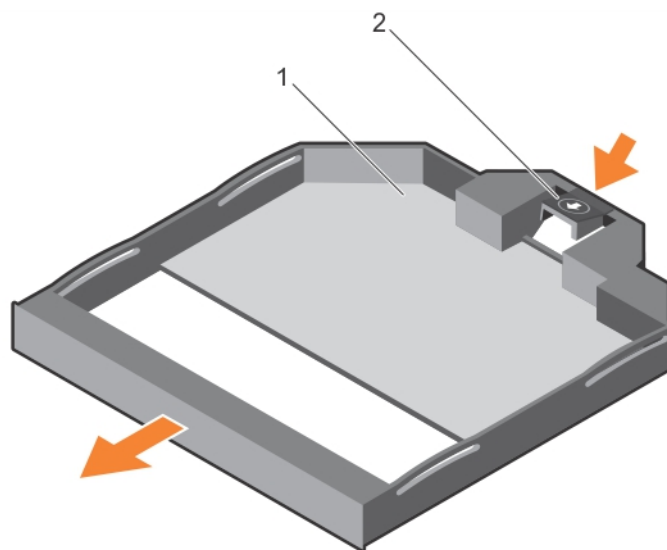
### Prerequisites

**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 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.

### Steps

1. Locate the touch point for the slim optical drive blank lock inside the system.
2. Press the lock and pull the slim optical drive blank out of the chassis.



**Figure 49. Removing the slim optical drive blank**

- a. slim optical drive blank
- b. optical drive blank lock

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing the slim optical drive blank](#) on page 114

## Installing the slim optical 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 are shipped with your product.

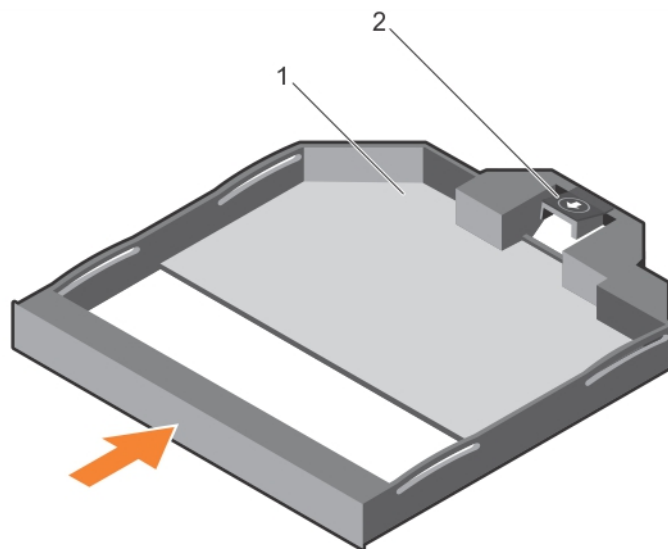
1. Follow the safety instructions listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

### Steps

1. Align the slim optical drive blank with the slim optical drive bay.
2. Slide the optical drive blank into the optical drive bay until the lock clicks into place.

### Next steps

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



**Figure 50. Installing the slim optical drive blank**

1. slim optical drive blank
2. optical drive blank lock

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[After working inside your system](#) on page 70

[Removing the slim optical drive blank](#) on page 113

## Internal USB memory key (optional)

An optional USB memory key installed inside your system can be used as a boot device, security key, or mass storage device.

To boot from the USB memory key, configure the USB memory key with a boot image and then specify the USB memory key in the boot sequence in System Setup.

The internal USB port must be enabled in **Internal USB Port** option in the **Integrated Devices** screen of **System Setup**.

**NOTE:** To locate the internal USB port (INT\_USB) on the system board, see the System board jumpers and connectors section.

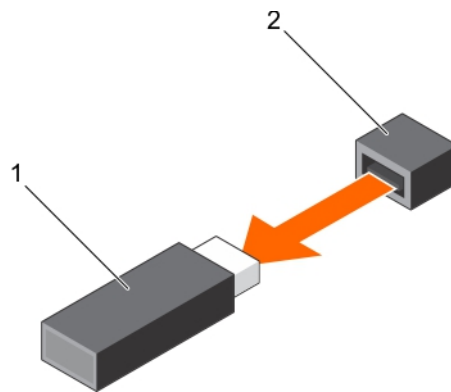
## Replacing the optional internal USB memory key

### 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.

### Steps

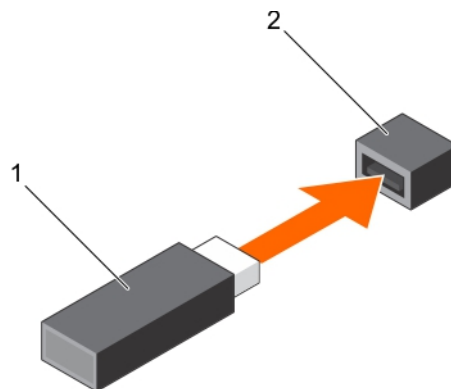
1. Locate the USB port or USB memory key on the system board.  
To locate the USB port, see the System board jumpers and connectors section.
2. If installed, remove the USB memory key from the USB port.



**Figure 51. Removing the internal USB memory key**

- a. USB memory key
- b. USB port

3. Insert the replacement USB memory key into the USB port.



**Figure 52. Installing the internal USB memory key**

- a. USB memory key
- b. USB port

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system on page 70](#)

[After working inside your system on page 70](#)

## Expansion card holder

### Removing the expansion card holder

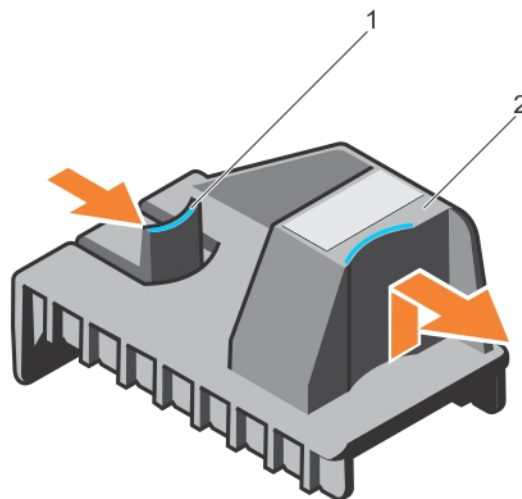
#### Prerequisites

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.

#### Steps

Press the tab and pull the expansion card holder away from the chassis.



**Figure 53. Removing the expansion card holder**

- a. tab
- b. expansion card holder

#### Related references

[Safety instructions for converting system from tower to rack on page 69](#)

#### Related tasks

[Before working inside your system on page 70](#)

[Installing the expansion card holder on page 117](#)



# Installing the expansion card holder

## 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.

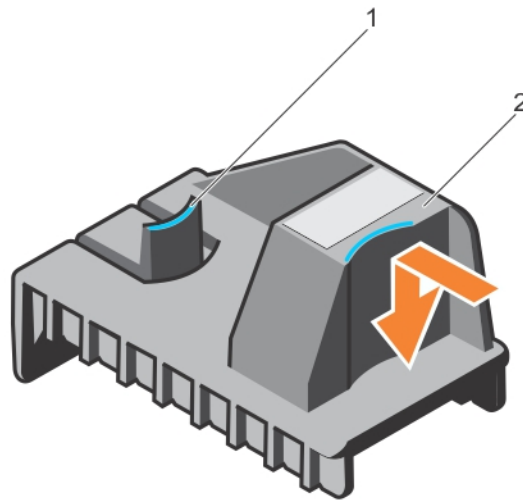
Follow the safety guidelines listed in the safety instructions section.

## Steps

Align the expansion card holder with the projections on the chassis and push it down until firmly seated.

## Next steps

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



**Figure 54. Installing the expansion card holder**

1. tab
2. expansion card holder

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[After working inside your system](#) on page 70

[Removing the expansion card holder](#) on page 116

# Expansion cards

An expansion card in the system 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.

## Expansion card installation guidelines

The following table describes the supported expansion cards:

**Table 34. Supported PCI express generation 3 expansion cards**

PCIe Slot	Processor Connection	Height	Length	Link Width	Slot Width
1 (Gen3)	Processor 1	Standard Height	Full Length	x16	x16
2 (Gen2)	Platform Controller Hub	Standard Height	Full Length*	x4	x8
3 (Gen3)	Processor 1	Standard Height	Full Length	x16	x16
4 (Gen3)	Processor 2	Standard Height	Half Length	x8	x8
5 (Gen2)	Processor 2	Standard Height	Full Length*	x4	x8
6 (Gen3)	Processor 2	Standard Height	Full Length	x16	x16
7 (Gen3)	Processor 2	Standard Height	Full Length	x16	x16
8 (Internal PERC Slot)	Processor 1	Standard Height	Half Length	x8	x8

\*PCIe Generation 2 expansion card.

**NOTE:** To use PCIe slots 4, 5, 6, and 7, both the processors must be installed.


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

The following table describes the installation order for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority must be installed first by using the slot priority indicated.

**Table 35. Expansion card installation order**

CPU	Card Priority	Card Type	Slot Priority	Maximum Allowed
CPU1	1	Dell PowerEdge Express Flash (PCIe SSD) Bridge	1, 3	1
	2	GPU (single width and double width)	3, 1	2
	3	RAID (H330 )	8, 1, 3	1
		RAID (H730)	8	1
		RAID (H730P)	8, 1, 3	1
		RAID (H830)	3,1	2
	4	40 Gb NICs	3, 1	2
	5	FC16 HBA	3, 1	2
	6	10 Gb NICs	3, 1	2
		10 Gb NICs (Intel and Broadcom Dual Port 10GBASE-T)	1, 3	2
7	FC8 HBA	3, 1, 2	3	
9	1 Gb NICs	1, 3, 2	3	


**Table 35. Expansion card installation order (continued)**

CPU	Card Priority	Card Type	Slot Priority	Maximum Allowed
		1 Gb NIC (Broadcom Quad Port)	1, 3	2
	10	Non-RAID	3, 1	2
CPU2	1	Dell PowerEdge Express Flash (PCIe SSD) Bridge	1, 3	1
	2	GPU (single width and double width)	3, 6, 7, 1	4
	3	RAID (H330 )	8, 1, 3	1
		RAID (H730)	8	1
		RAID (H730P)	8, 1, 3	1
		RAID (H830)	3, 4, 6, 7, 1	2
	4	40 Gb NICs	3, 4, 6, 7, 1	5
	5	FC16 HBA	3, 4, 6, 7, 1	5
		FC16 HBA (QLE2660 V2 and QLE2662 V2)	3, 4, 6, 7, 1	2
	6	10 Gb NICs	3, 4, 6, 7, 1	5
		10 Gb NIC (Emulex Dual Port)  <b>NOTE:</b> The slot priority for Emulex V2 Dual Port is 3, 4, 6, 7, 1 and the maximum number of cards supported is 5.	3, 4, 6, 7, 1	2
		10 Gb NICs (Intel 10G BASE-T Dual Port and Broadcom 10G BASE-T Dual Port)	4, 6, 7, 1, 3	5
	7	FC8 HBA	3, 4, 6, 7, 1, 5, 2	7
	9	1 Gb NICs	3, 4, 6, 7, 1, 5, 2	7
	1 Gb NIC (Broadcom Quad Port)	4, 7, 1, 3, 6	5	
10	Non-RAID	3, 4, 6, 7, 1	5	

## Removing a expansion 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. Remove the expansion card holder.

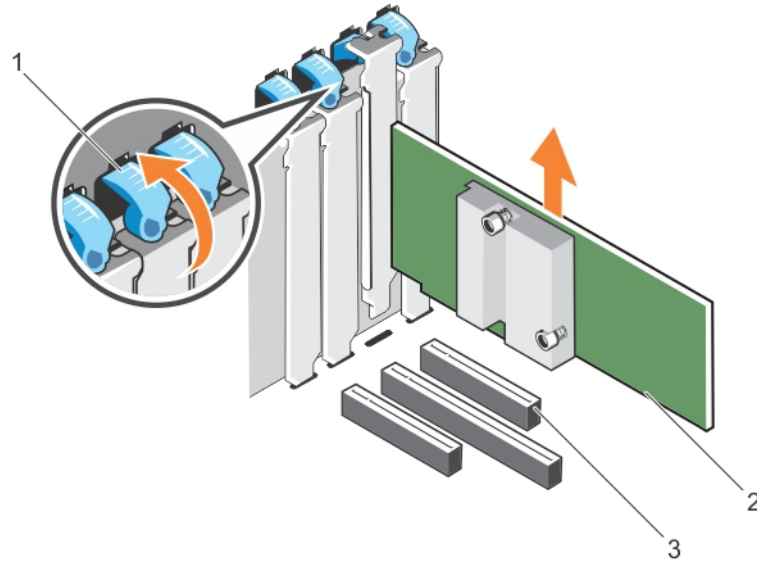
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

### Steps

1. If installed, disconnect the data cables from the PERC card and/or the power cables from the GPU card.

2. Press the expansion card latch and push down the latch to open it.
3. Hold the expansion card by its edge, and pull the card up to remove it from the expansion card connector and the system.
4. Install the filler brackets by performing the following steps:
  - a. Align the slot on the filler bracket with the tab on the expansion card slot.
  - b. Press the expansion card latch till the filler bracket locks into place.

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



**Figure 55. Removing an expansion card**

- a. expansion card latch
- b. expansion card
- c. expansion card connector

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[After working inside your system](#) on page 70

[Installing an expansion card](#) on page 120

## Installing an expansion 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. Remove the expansion 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

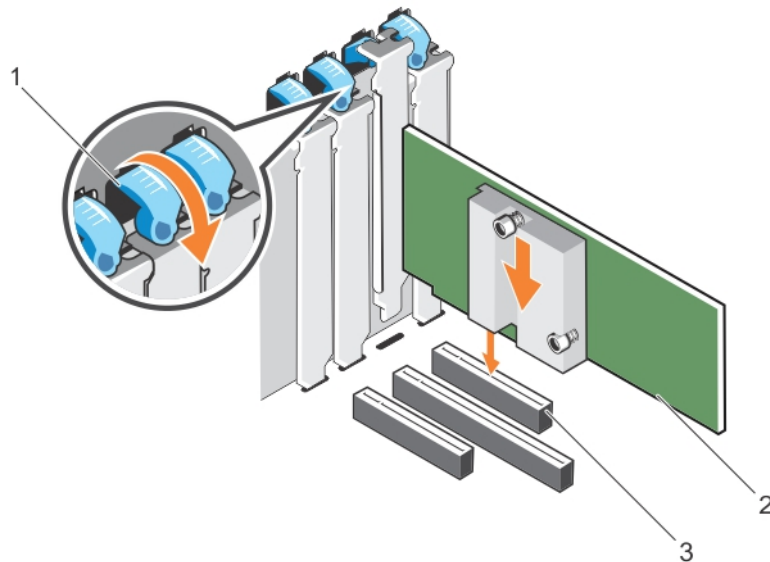
1. Unpack the expansion card and prepare it for installation.  
For instructions, see the documentation accompanying the card.
2. Open the expansion card latch adjacent to the slot you want to install the expansion card.
3. Remove the existing expansion card or filler bracket from the expansion card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

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

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 expansion card latch by pushing the latch up until the latch snaps into place.
7. Connect any cables to the expansion card.
8. Replace the expansion card holder.

## Next steps

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



**Figure 56. Installing an expansion card**

- a. expansion card latch
- b. expansion card
- c. expansion card connector

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

# GPU card holder (optional)

## Removing the optional GPU card holder

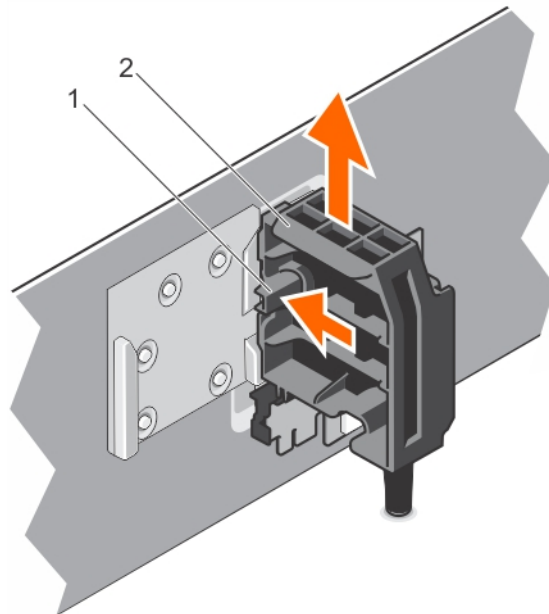
### Prerequisites

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. Remove the cooling shroud.

**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

Press the release tab and pull the GPU card holder out of the chassis.



**Figure 57. Removing the GPU card holder**

- a. release tab
- b. GPU card holder

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Installing the optional GPU card holder](#) on page 123

[Before working inside your system](#) on page 70

[Removing the cooling shroud](#) on page 81

# Installing the optional GPU 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.

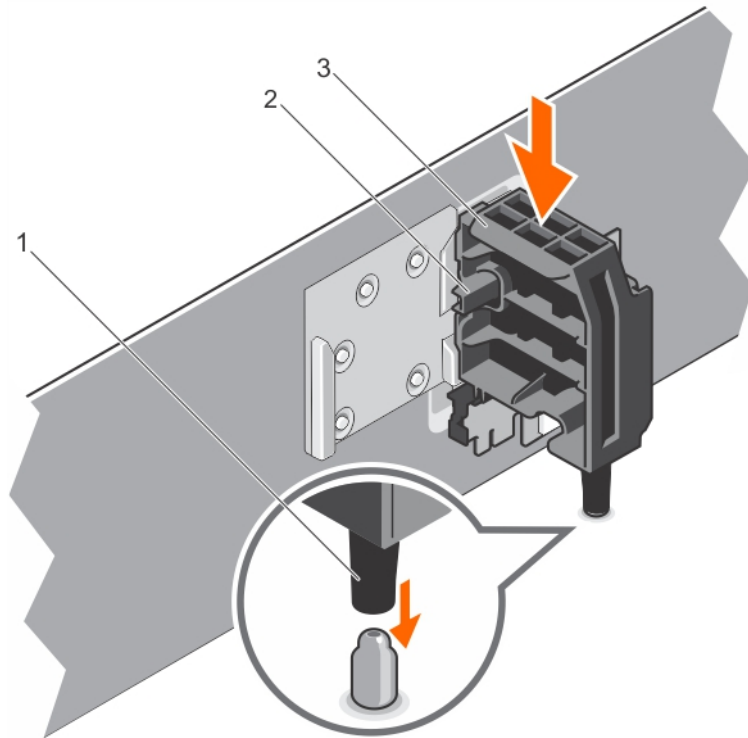
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

## Steps

Align the GPU card holder with the slots on the chassis and the guide pin, and push down the GPU card holder until it is firmly seated.

## Next steps

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



**Figure 58. Installing the GPU card holder**

1. guide pin
2. release tab
3. GPU card holder

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[After working inside your system](#) on page 70


[Removing the optional GPU card holder](#) on page 122


# GPU cards (optional)

## GPU card installation guidelines

Observe the following guidelines while installing a GPU card:

- Ensure that the GPU enablement kit is ready.
- Ensure that all GPU cards are of the same type or model.
- Each GPU card supports up to 6 GB of dedicated GDDR5 memory.
- A single processor configuration only supports up to two double or single width cards on slots 1 and 3.
- A dual processor configuration supports up to four double or single width cards on slots 1, 3, 6, and 7.
- Both the processors must be installed to use slots 6 and 7.
- Two double-width GPU cards on a single processor configuration and four double width GPU cards on a dual processor configuration.
- For four GPGPU configuration, only one PERC can be supported on internal slot.
- Four double-width 300 W GPU cards (Intel 3120A or Intel 7120A) on a dual processor configuration or two double-width 300 W GPU cards (Intel 3120A or Intel 7120A) on a single processor configuration cannot operate at an ambient temperature above 30 °C.
- The 3.5 inch x18 hard-drive system configuration supports two double-width 300 W GPU cards (Intel 3120A or Intel 7120A) on slots 3 and 6 on dual processor configuration, and one double-width 300 W GPU card (Intel 3120A or Intel 7120A) on slot 3 on single processor configuration.
- A system with Express Flash configuration supports a maximum of two GPU cards.
- The GPU cards must be installed:
  - On the x16 PCIe Generation 3 interfaces available on slots 1, 3, 6, and 7.
  - On systems that support one 5.25-inch removable media storage devices.
  - On systems with six fan configuration.
  - On systems that have 1100 W and 1600 W power supply.


 **NOTE:** When you have more than two GPU cards on your system, you will need two 1100 W PSUs installed on your system.

 **NOTE:** For Nvidia Tesla m60A GPGPU support, add another adapter cable to fit the M60 Power pins.

## Removing an optional GPU 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. Remove the cooling shroud.
4. Remove the expansion 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.

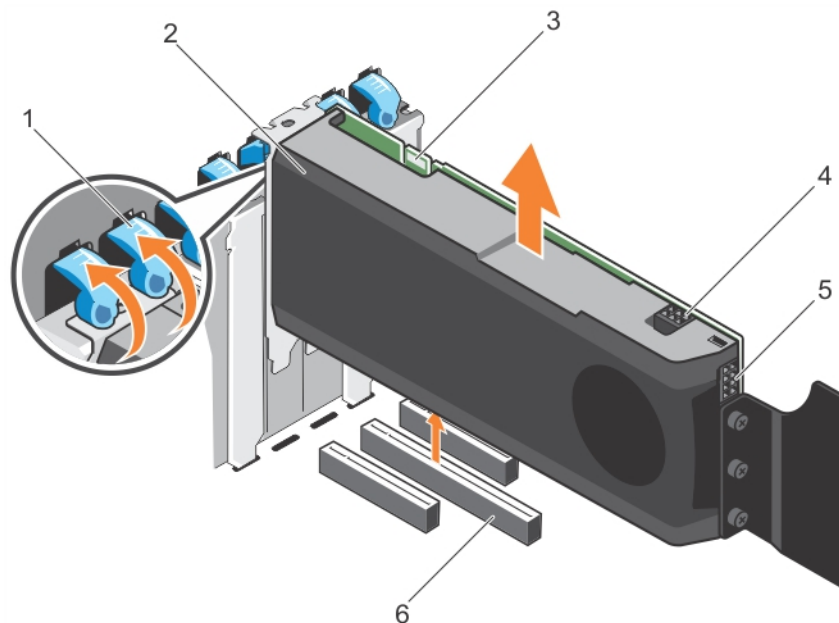
### Steps

1. Disconnect the cables from the GPU card.

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

2. Open the two expansion card latches by pressing the latch and then pushing the latch toward the rear.
3. Hold the card by its edge, and pull the card up to remove it from the card connector and the system.





**Figure 59. Removing a GPU card**

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. expansion card latch (2) | 2. GPU card                 |
| 3. SLI data connector       | 4. GPU card power connector |
| 5. GPU card power connector | 6. x16 connector            |

### Next steps

1. Perform the following steps to install the filler brackets:
  - a. Align the slot on the filler bracket with the tab on the expansion card slot.
  - b. Press the expansion card latch till the filler bracket locks into place.

**NOTE:** Filler brackets must be installed in empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.
2. Close the two expansion card latches by pushing the latch until the latch snaps into place.
3. Replace the expansion card holder.
4. Install the cooling shroud.
5. Follow the procedure listed in the After working inside your system section.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

- [After working inside your system](#) on page 70
- [Installing the cooling shroud](#) on page 82
- [Installing the expansion card holder](#) on page 117

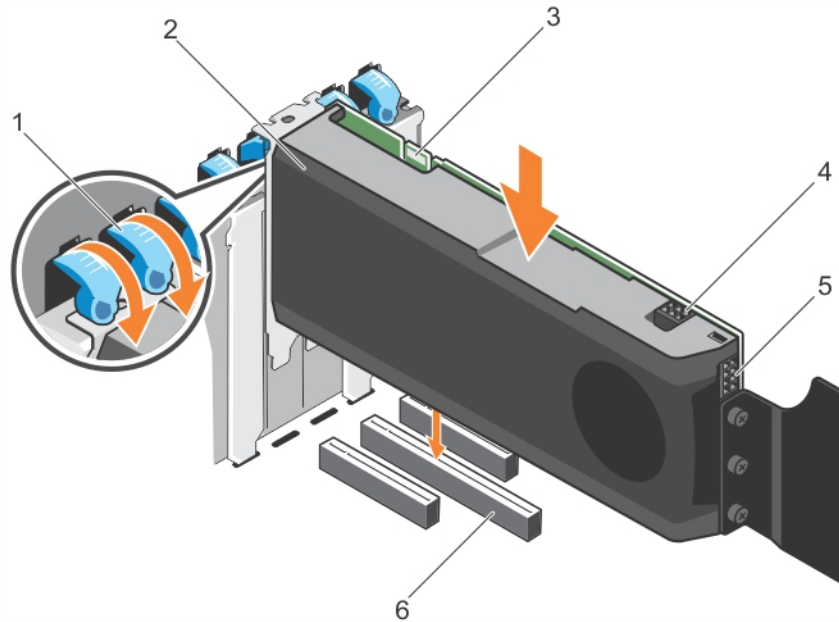
## Installing an optional GPU card

### 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 holder.
5. Open the two expansion card latches.
6. Remove the filler brackets.

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



**Figure 60. Installing a GPU card**

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. expansion card latch (2) | 2. GPU card                 |
| 3. SLI data connector       | 4. GPU card power connector |
| 5. GPU card power connector | 6. x16 connector            |

### Steps

1. Locate the x16 slot on the system board.
2. Insert the GPU card into the slot.
3. Connect the cables from PIB to the GPU card.
4. Close the two expansion card latches.

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[After working inside your system](#) on page 70

[Installing the cooling shroud](#) on page 82

[Installing the expansion card holder](#) on page 117

[Before working inside your system](#) on page 70

[Removing the cooling shroud](#) on page 81

## 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 the optional internal dual SD module

### Prerequisites

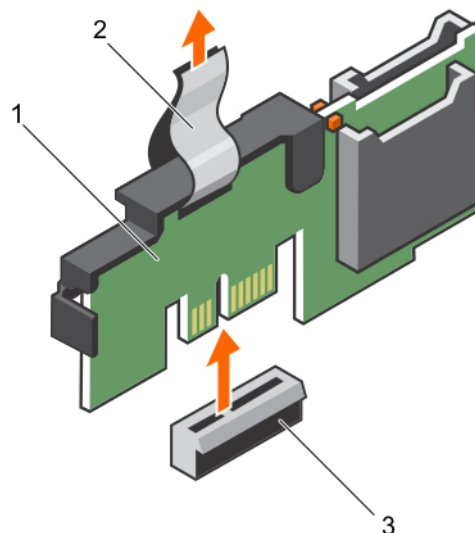
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove the SD cards.

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

### Steps

1. Locate the internal dual SD module (IDSDM) on the system board. To locate the internal dual SD module connector, see the System board connectors section.
2. Holding the pull tab, lift the IDSDM out of the system.



**Figure 61. Removing the internal dual SD module (IDSDM)**

- a. IDSDM
- b. pull tab
- c. IDSDM connector

The following table describes the IDSDM indicator codes:

**Table 36. 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.
E	Not lit	Indicates that the card is missing or is booting.

### Next steps

1. Install the IDSDM.
2. If removed, install the SD cards.
3. Follow the procedure listed in the After working inside your system section.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing the optional internal dual SD module](#) on page 128

## Installing the optional 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 the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
  - NOTE:** Temporarily label each SD card with its corresponding slot before removal.

### Steps

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

### Next steps

1. Install the SD cards.
  - NOTE:** Re-install the SD cards into the same slots based on the labels you had marked on the cards during removal.
2. Follow the procedure listed in the After working inside your system section.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

# Internal SD card

## Removing an internal SD card

### Prerequisites

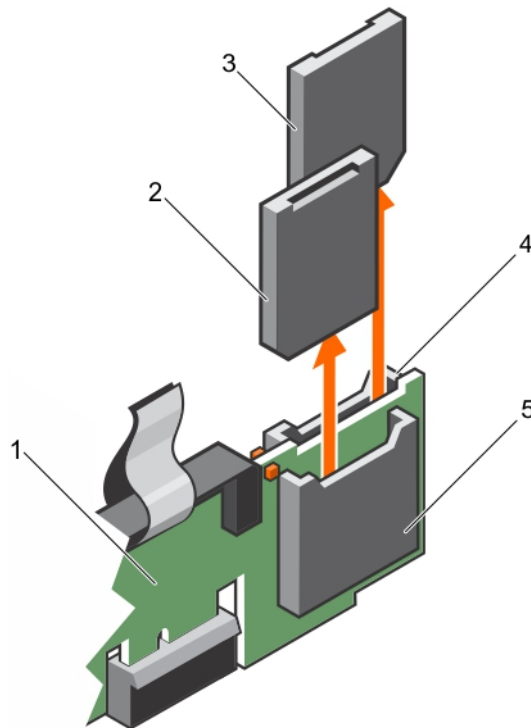
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

**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. Reinstall 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 62. 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 references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Installing the optional internal dual SD module](#) on page 128


[Before working inside your system](#) on page 70


[After working inside your system](#) on page 70


# Installing 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.
3. If installed, remove the cooling shroud.


 **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 System Setup.

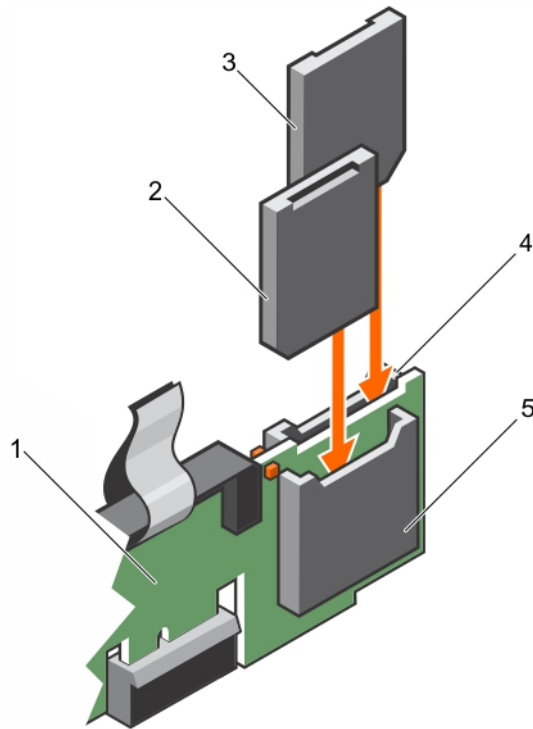
 **NOTE:** Temporarily label each SD card with its corresponding slot number before removal. Re-install the SD card(s) into the corresponding slots.

## 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 to lock it into place.



**Figure 63. Installing an internal SD card**

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

### Next steps

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

## Processors and heat sinks

Use the following procedures when:

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

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

## Removing a heat sink

### Prerequisites

**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.

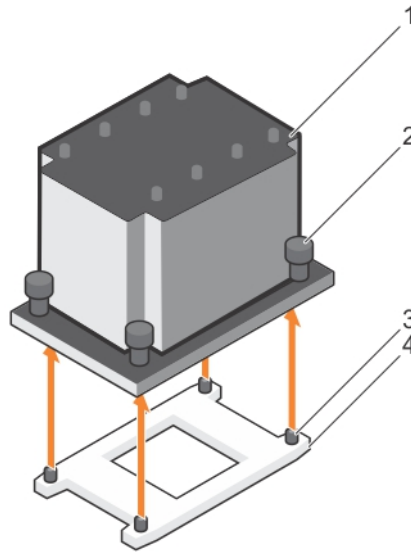
**WARNING:** The heat sink is hot to touch. Allow the heat sink to cool for some time after powering down the system.

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 fan assembly.
4. If installed, remove the full-length PCIe card(s).

5. Remove the cooling shroud.
6. Keep the Phillips #2 screwdriver ready.

### Steps

1. Loosen one of the screws that secure the heat sink to the system board.  
Allow some time (approximately 30 seconds) for the heat sink to loosen from the processor.
2. Remove the screw diagonally opposite to the screw that you first removed.
3. Repeat step 1 and 2 for removing the remaining two screws.
4. Remove the heat sink.



**Figure 64. Removing a heat sink**

- |                              |                         |
|------------------------------|-------------------------|
| 1. heat sink                 | 2. retention screws (4) |
| 3. retention screw slots (4) | 4. processor socket     |

### Next steps

1. Replace the heat sink(s) and processor(s).
2. Replace the processor and heat sink.
3. Follow the procedure listed in the After working inside your system section.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70


[Installing a heat sink](#) on page 138


## 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. Remove the cooling shroud.
6. 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

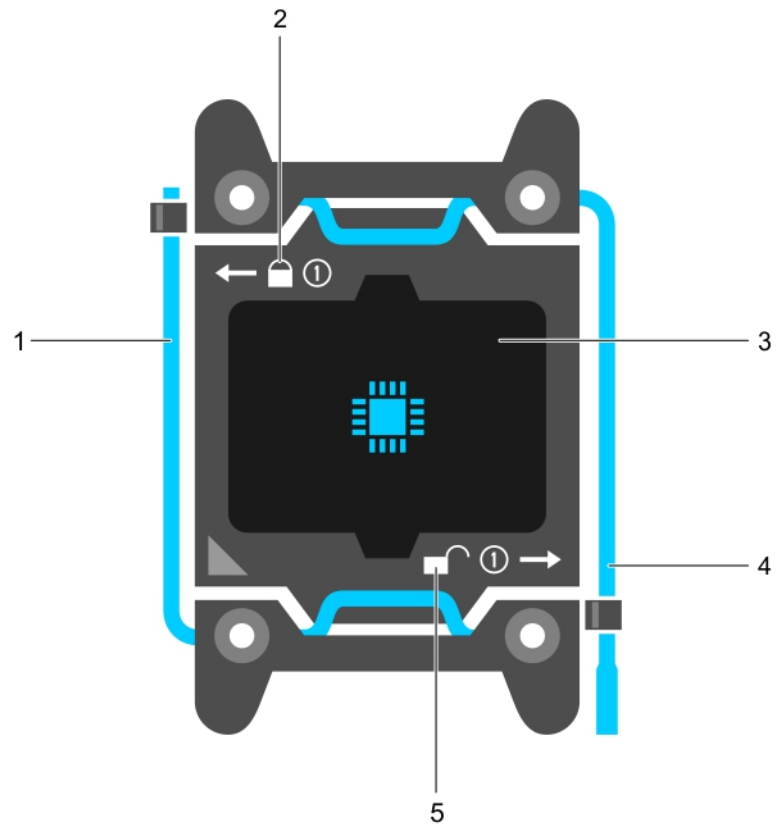
1. Release the *open first* socket lever near the unlock icon  by pushing the lever down and out from under the tab.
2. Release the *close first* socket release lever near the lock icon  by pushing the lever down and out from under the tab. Lift the lever 90 degrees upward.
3. Lower the *open first* 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.

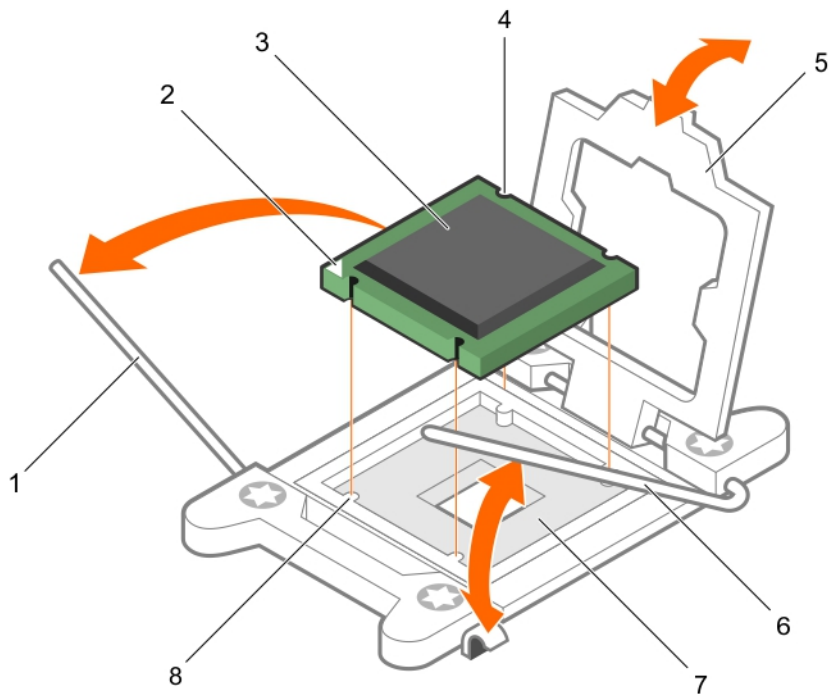
 **NOTE:** If you are permanently removing the processor, you must install a socket protective cap in the vacant socket to protect the socket pins and keep the socket free of dust.

 **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 65. Processor shield**

- 1. *close first* socket release lever
- 2. lock icon
- 3. processor
- 4. *open first* socket release lever
- 5. unlock icon



**Figure 66. Removing a processor**

- |  |   |
|--|---|
| 1. <i>close first</i> socket-release lever | 4. slot (4)                               |
| 3. processor                               | 5. processor shield                       |
| 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 references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70


[Installing a processor](#) on page 135

## 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. If installed, remove the cooling fan assembly.
6. If installed, remove the full-length PCIe card.
7. Remove the cooling shroud.
8. If connected, disconnect the cables from expansion card(s).
9. If installed, remove the expansion card riser.

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


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



 **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.

 **NOTE:** If you are installing a single processor, it must be installed in socket CPU1.


### 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.

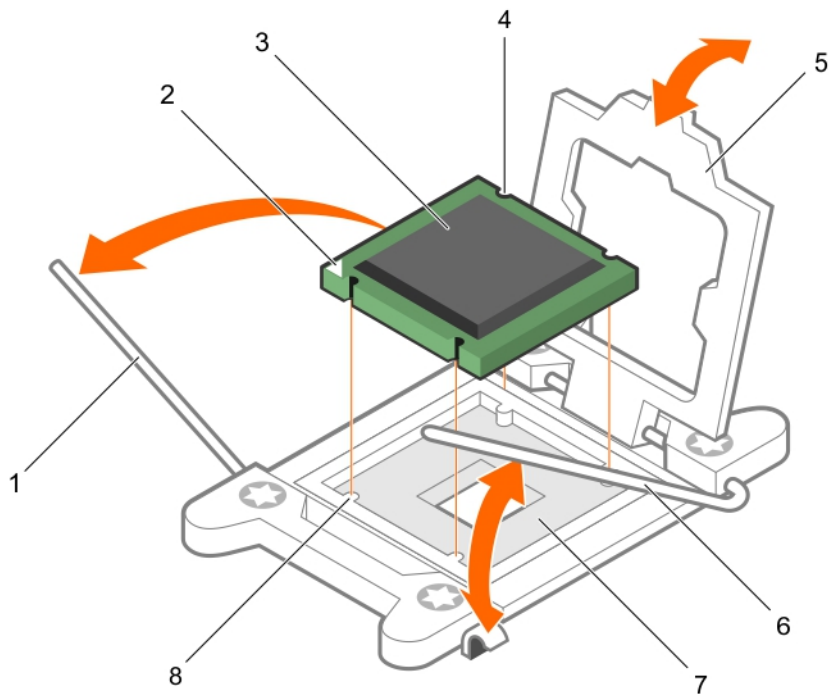
 **CAUTION:** Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the socket.

 **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 67. 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. Follow the procedure listed in the After working inside your system.
5. While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.
6. Run the system diagnostics to verify that the new processor operates correctly.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

- [Removing the cooling shroud](#) on page 81
- [Removing the control panel assembly](#) on page 174
- [Removing a processor](#) on page 132
- [After working inside your system](#) on page 70

# Installing a heat sink

## 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.

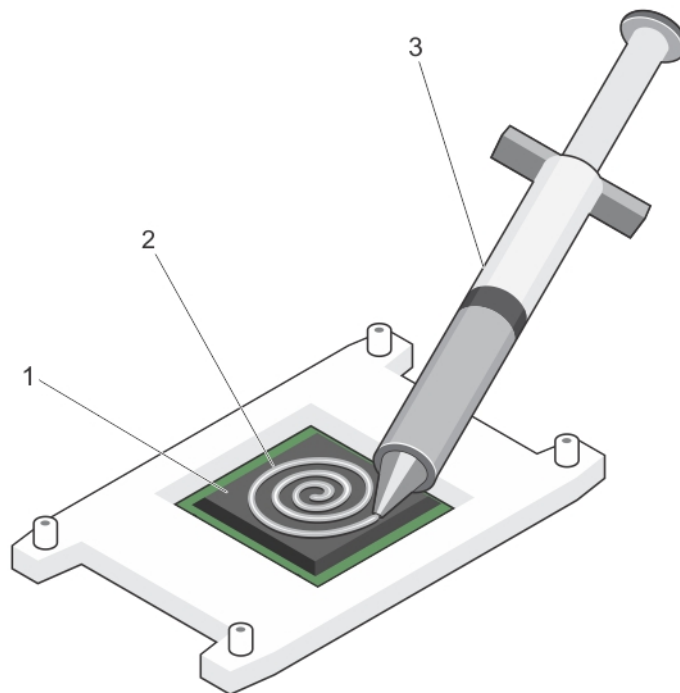
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. If installed, remove the cooling fan assembly.
4. If installed, remove the full-length PCIe card.
5. Install the processor.
6. Keep the Phillips #2 screwdriver ready.

## Steps

1. If you are using an existing heat sink, remove the thermal grease from the heat sink by using a clean lint-free cloth.
2. Use the thermal grease syringe included with your processor kit to apply the grease in a thin spiral on the top of the processor.

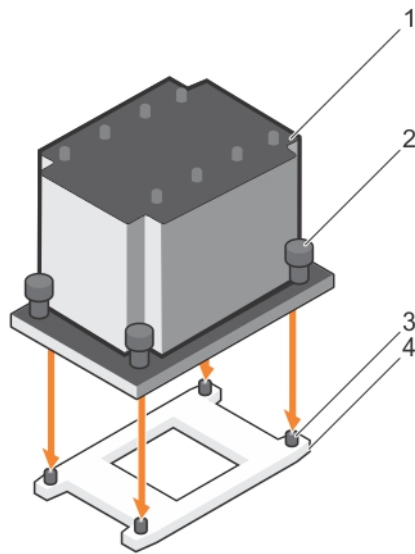
**CAUTION:** Applying too much thermal grease can result in excess grease coming in contact with and contaminating the processor socket.

**NOTE:** The thermal grease syringe is intended for one-time use only. Dispose of the syringe after you use it.



**Figure 68. Applying thermal grease on the top of the processor**

- a. processor
  - b. thermal grease
  - c. thermal grease syringe
3. Place the heat sink onto the processor.
  4. Tighten one of the four screws to secure the heat sink to the system board.
  5. Repeat the procedure for the remaining two screws.



**Figure 69. Installing the heat sink**

- |                             |                        |
|-----------------------------|------------------------|
| 1. heat sink                | 2. retention screw (4) |
| 3. retention screw slot (4) | 4. processor socket    |

### Next steps

1. If applicable, install the PCIe card.
2. If applicable, install the cooling fan assembly.
3. Follow the procedure listed in the After working inside your system section.
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 references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Removing the optional cooling fan assembly](#) on page 85

[Installing a processor](#) on page 135

## Power supply unit

Your system supports either:

- Two 495 W, 750 W, 1100 W, or 1600 W (Platinum) AC power supply modules or
- Two 750 W (Titanium) AC power supply modules or
- Two 1100 W DC power supply modules

**CAUTION:** If two power supplies units (PSU) are used, they must be of the same maximum output power.

**NOTE:** 495 W, 750 W, and 1100 W Platinum power supplies are nominally rated for 100 VAC to 240 VAC input.  
750 W Titanium and 1600 W Platinum power supplies are nominally rated for 200 VAC to 240 VAC input.  
1100 W DC power supply is nominally rated for -(48-60) VDC input.

**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 to maximize efficiency.

**NOTE:** For AC power supplies, use only power supplies with the Extended Power Performance (EPP) label on the back. Mixing PSUs from previous generations of servers can result in a power supply mismatch condition or failure to turn on.

**NOTE:** When you have more than two GPU cards on your system, you will need two 1100 W PSUs installed on your system.

## 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](https://www.dell.com/idracmanuals).

## 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.

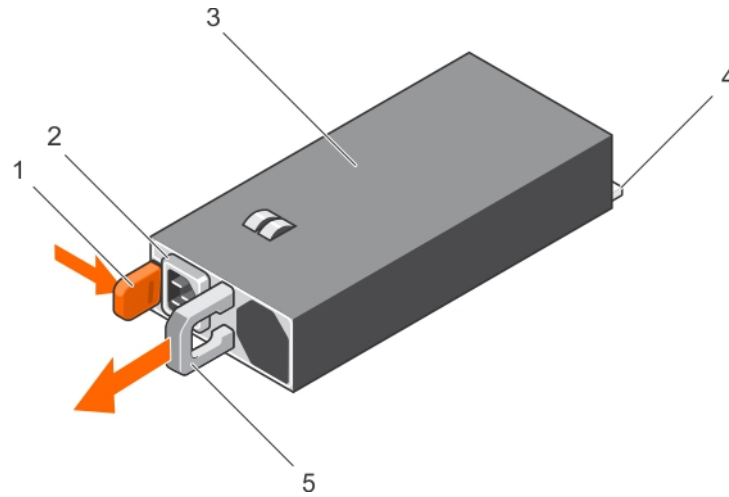
If applicable, unlatch and lift the optional cable management arm if it interferes with the power supply unit (PSU) removal. For information about the cable management arm, see the system's rack documentation.

Follow the safety guidelines listed in the Safety instructions section.

### 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 70. Removing an AC PSU**

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

#### Next steps

- If applicable, install the AC PSU.
- If applicable, install the PSU blank.

#### Related tasks

[Installing an AC power supply unit](#) on page 141

## 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.

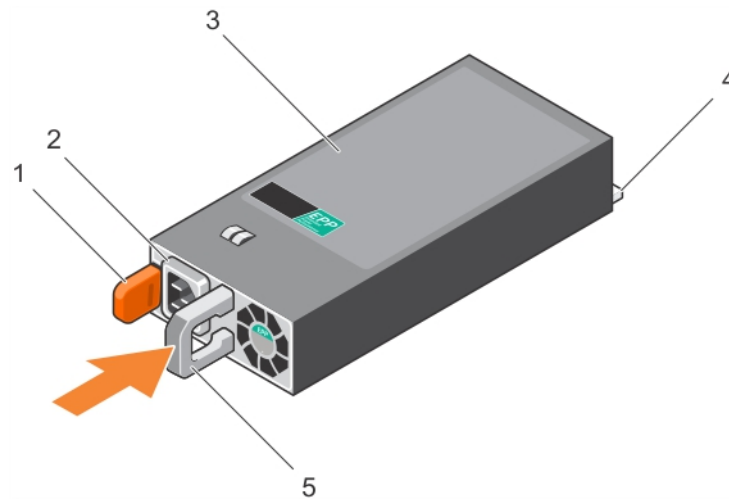
#### Steps

1. Slide the PSU into the chassis until the PSU is fully seated and the release latch snaps into place.
2. If applicable, relatch the cable management arm.  
For information about the cable management arm, see the rack documentation of your system.
3. 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 71. Installing an AC PSU**

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

### Related tasks

[Removing an AC power supply unit](#) on page 140

## Wiring instructions for a DC power supply unit

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

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

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

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

**NOTE:** A readily accessible disconnect device that is approved and rated, is incorporated in the field wiring.

### Input requirements

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

### Kit contents

- Dell part number 6RYJ9 terminal block or equivalent (1)

- #6-32 nut equipped with lock washer (1)

## Required tools

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

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

## Required wires

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

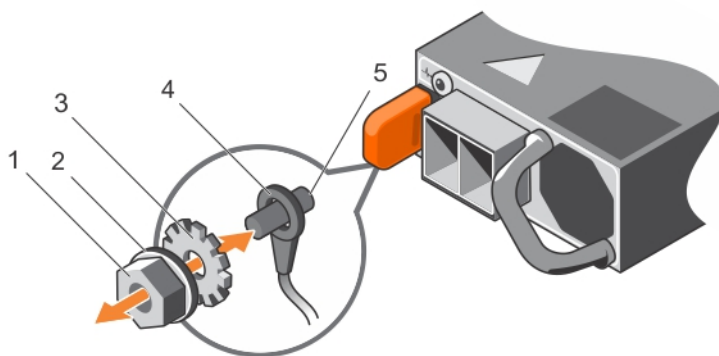
## Assembling and connecting the safety ground wire

### Prerequisites

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

### Steps

1. Strip the insulation from the end of the green or yellow wire, exposing approximately 4.5 mm (0.175 inch) of copper wire.
2. Using a hand-crimping tool (Tyco Electronics, 58433-3 or equivalent), crimp the ring-tongue terminal (Jeerson Terminals Inc., R5-4SA or equivalent) to the green/yellow wire (safety ground wire).
3. Connect the safety ground wire to the grounding post on the back of the system by using a #6-32 nut equipped with a locking washer.



**Figure 72. Assembling and connecting the safety ground wire**

- |                   |                       |
|-------------------|-----------------------|
| 1. #6-32 nut      | 2. spring washer      |
| 3. locking washer | 4. safety ground wire |
| 5. grounding post |                       |

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

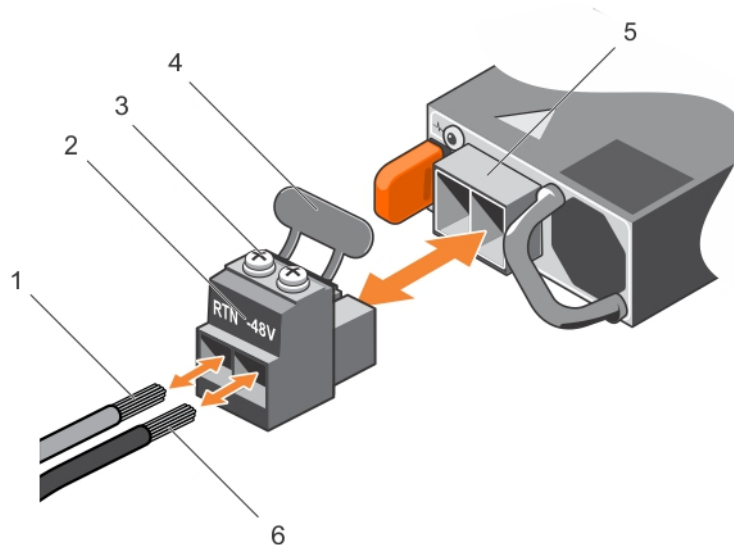
# Assembling the DC input power wires

## Prerequisites

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

## Steps

- Strip the insulation from the ends of the DC power wires, exposing approximately 13 mm (0.5 inch) of copper wire.  
**NOTE:** Reversing polarity when connecting DC power wires can permanently damage the power supply or the system.
- Insert the copper ends into the mating connectors and tighten the captive screws at the top of the mating connector using a Phillips #2 screwdriver.  
**NOTE:** To protect the power supply from electrostatic discharge, the captive screws must be covered with the rubber cap before inserting the mating connector into the power supply.
- Rotate the rubber cap clockwise to fix it over the captive screws.
- Insert the mating connector into the power supply.



**Figure 73. Assembling the DC input power wires**

- |                       |                       |
|-----------------------|-----------------------|
| 1. wire RTN           | 2. DC power connector |
| 3. captive screws (2) | 4. rubber cap         |
| 5. DC power socket    | 6. wire $-48$ V       |

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Removing a DC power supply unit

### Prerequisites

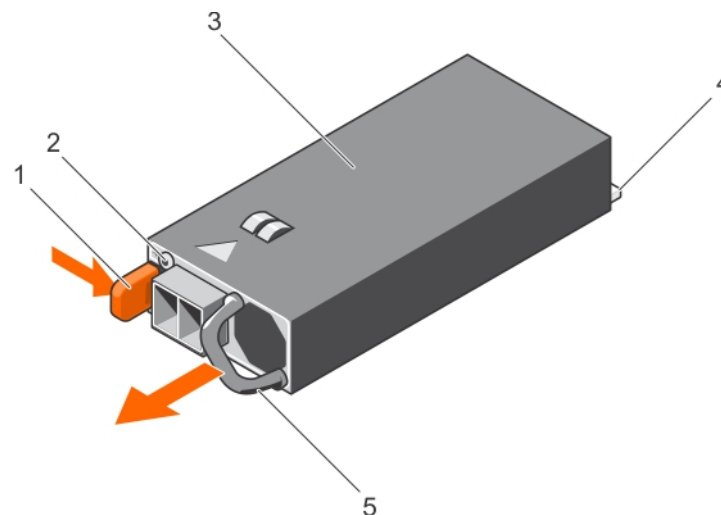
**NOTE:** For equipment using  $-(48-60)$  V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national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

**CAUTION:** The system needs one power supply for normal operation. On power-redundant systems, remove and replace only one power supply 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 power supply removal. For information about the cable management arm, see the rack documentation of your system.

### Steps

1. Disconnect the power wires from the power source and the connector from the PSU you intend to remove.
2. Disconnect the safety ground wire.
3. Press the release latch and slide the PSU out of the chassis by using the PSU handle.



**Figure 74. Removing a DC PSU**

- |                  |                                  |
|------------------|----------------------------------|
| 1. release latch | 2. power supply status indicator |
| 3. PSU           | 4. power connector               |
| 5. PSU handle    |                                  |

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Installing a DC power supply unit](#) on page 145

## Installing a DC power supply unit

### Prerequisites

**NOTE:** For equipment using  $-(48-60)$  V DC power supply units (PSUs), a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical

wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all 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. If installed, remove the PSU blank.
4. Verify that both the PSUs are of the same type and have the same maximum output power.

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

### Steps

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

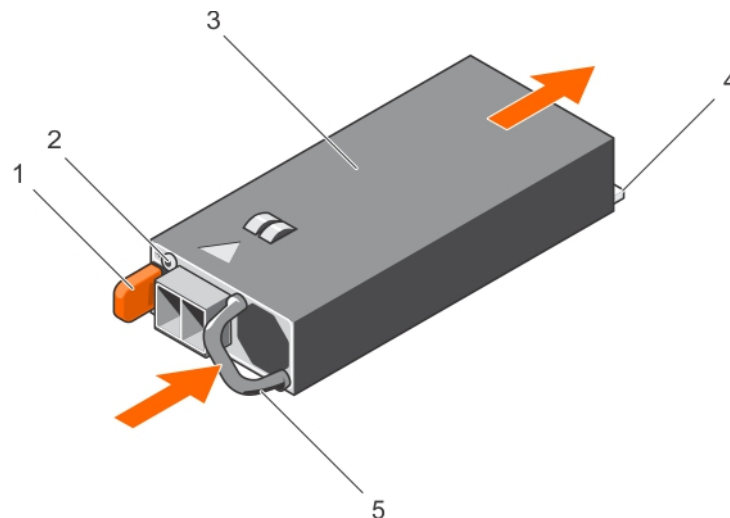
**NOTE:** If you have unlatched the cable management arm, relatch it. For information about the cable management arm, see the rack documentation.

2. Connect the safety ground wire.
3. Install the DC power connector in the PSU.

**CAUTION:** When connecting the power wires, ensure that you secure the wires with the strap to the PSU handle.

4. Connect the wires to a DC power source.

**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 status indicator turns green to signify that the PSU is functioning properly.



**Figure 75. Installing a DC PSU**

- |                  |                                  |
|------------------|----------------------------------|
| 1. release latch | 2. power supply status indicator |
| 3. PSU           | 4. power connector               |
| 5. PSU handle    |                                  |

### Next steps

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

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[After working inside your system](#) on page 70

## Removing the power supply unit blank

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

### Prerequisites

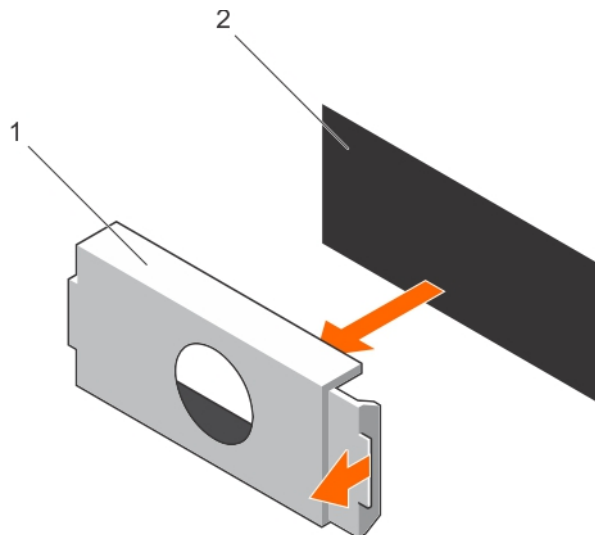
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 76. Removing the PSU blank**

- a. PSU blank
- b. PSU bay

### Next steps

Install the PSU or PSU blank.

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Installing the power supply unit blank](#) on page 148

## Installing the power supply unit blank

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

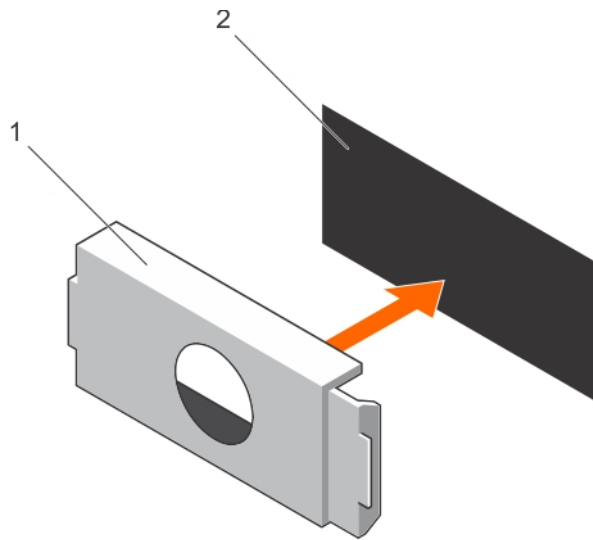
### Prerequisites

**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 77. Installing the PSU blank**

- a. PSU blank
- b. PSU bay

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Removing the power supply unit blank](#) on page 147

## System battery

The system battery is used to power the real-time clock and storing the BIOS settings of the system.

## Replacing the system battery

### Prerequisites

**NOTE:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type 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.

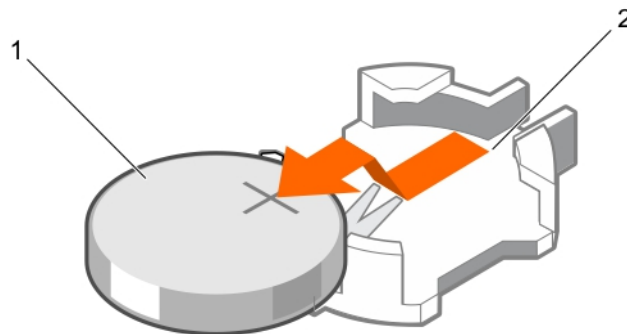
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the cooling shroud.

### 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.

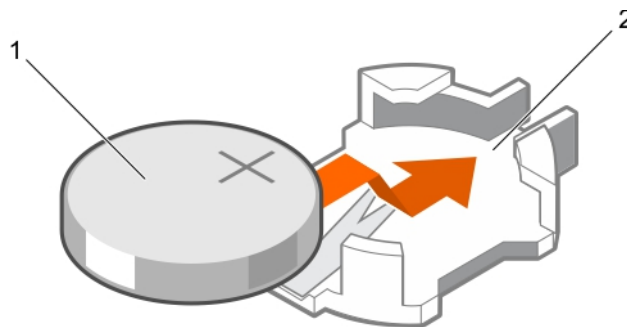
2. Place your finger between the securing tabs at the negative side of the battery connector, and lift the battery out of the socket.



**Figure 78. Removing the system battery**

- a. system battery
- b. 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 79. Installing the system battery**

- a. system battery
- b. 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 references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[After working inside your system](#) on page 70

[Before working inside your system](#) on page 70

[Removing the cooling shroud](#) on page 81

# Hard drive backplane

Depending on the configuration, your system supports one of the following:

- 3.5 inch x8 SAS/SATA backplane
- 3.5 inch x18 SAS/SATA backplane
- 2.5 inch x4 Dell PowerEdge Express Flash (PCIe SSD) backplane
- 2.5 inch x16 SAS/SATA backplane
- 2.5 inch x32 SAS/SATA backplane

Depending on the configuration, your system supports one of the following backplane combinations:

- 3.5 inch x8 SAS/SATA backplane and 2.5 inch x4 PCIe SSD backplane
- 2.5 inch x16 SAS/SATA backplane and 2.5 inch x4 PCIe SSD backplane
- 2.5 inch x16 SAS/SATA backplane for hard-drives in the hard drive bay and 2.5 inch x16 SAS/SATA backplane for hard-drives in a flex bay.

## Removing 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.
3. Remove all hard drives.
4. Remove the cooling shroud.
5. If applicable, remove the cooling-fan assembly.

**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.

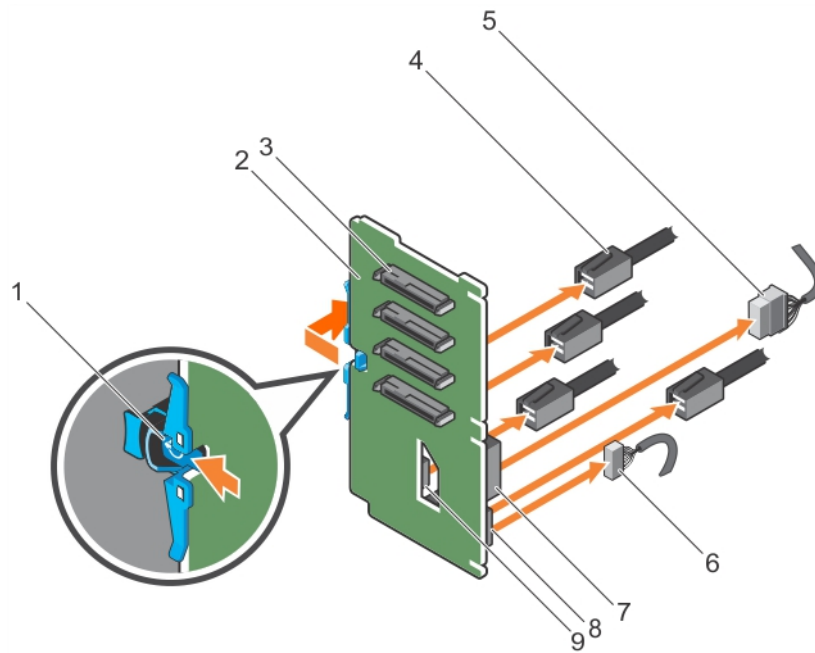
**CAUTION:** To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.

**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

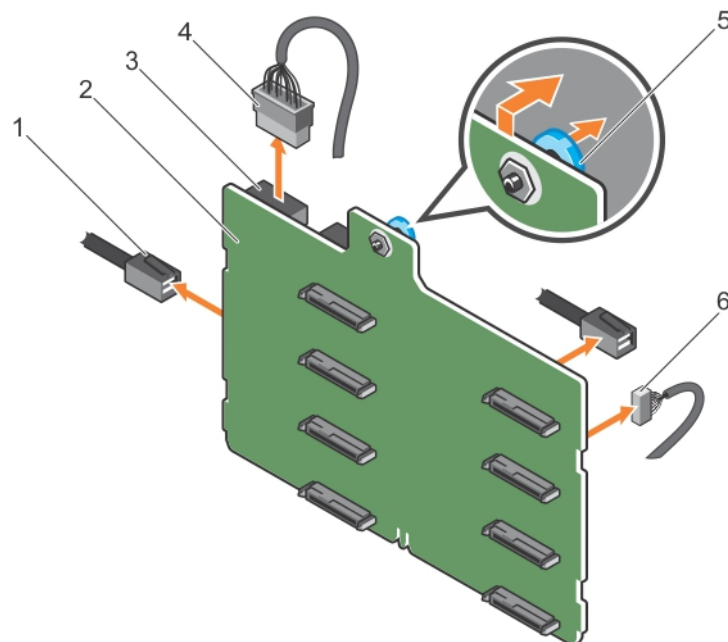
1. Disconnect the SAS/SATA/SSD data, signal, and power cable(s) from the backplane.
2. Pull the release pin or the release tab and pull the backplane up and out from the system.

**NOTE:** For a Dell PowerEdge Express Flash (PCIe SSD) backplane, press the release tab to unlock the hard-drive backplane and release it from the hard-drive bay.



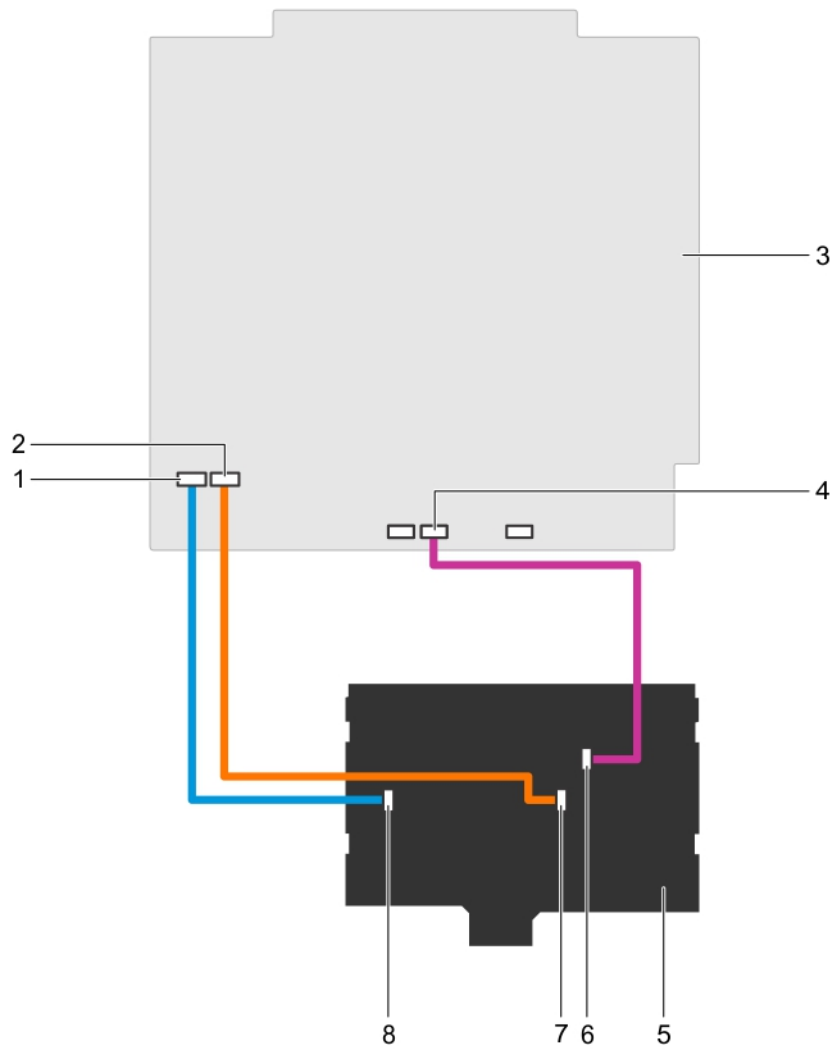
**Figure 80. Removing the PCIe SSD hard drive backplane**

- |                                      |  |
|--------------------------------------|--|
| 1. release tab                       | 2. PCIe SSD hard drive backplane       |
| 3. hard-drive connector              | 4. PCIe cable                          |
| 5. power cable                       | 6. signal cable                        |
| 7. power connector on backplane      | 8. signal cable connector on backplane |
| 9. PCIe cable connector on backplane |  |



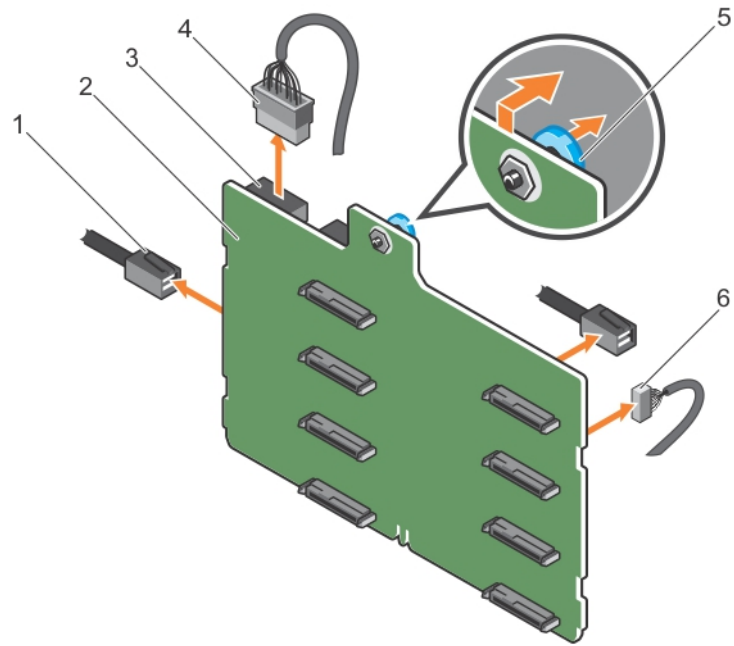
**Figure 81. Removing a 3.5 inch (x8) SAS/SATA backplane**

- |                              |                          |
|------------------------------|--------------------------|
| 1. SAS cable                 | 2. x8 backplane          |
| 3. backplane power connector | 4. backplane power cable |
| 5. release pin               | 6. signal cable          |



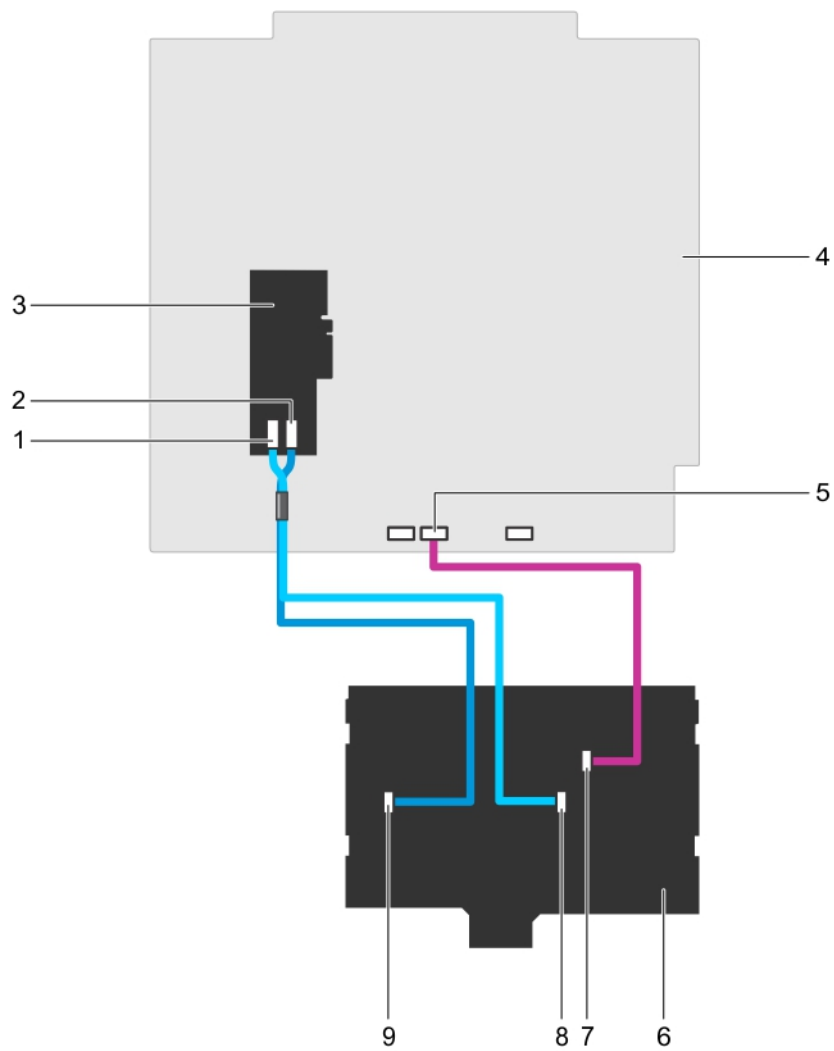
**Figure 82. Cabling—3.5 inch (x8) SAS/SATA backplane**

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| 1. SAS A connector on system board | 2. SAS B connector on system board  |
| 3. system board                    | 4. signal connector on system board |
| 5. x8 backplane                    | 6. signal connector on backplane    |
| 7. SAS B connector on backplane    | 8. SAS A connector on backplane     |



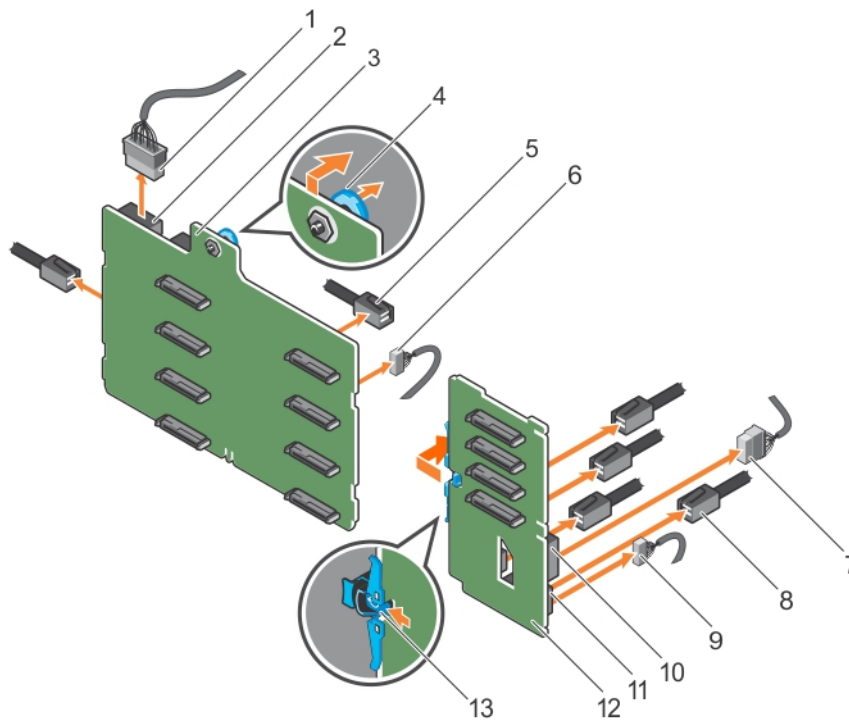
**Figure 83. Removing a 3.5 inch (x8) SAS/SATA backplane with a single PERC card**

- |                    |                 |
|--------------------|-----------------|
| 1. SAS cable       | 2. x8 backplane |
| 3. power connector | 4. power cable  |
| 5. release pin     | 6. signal cable |



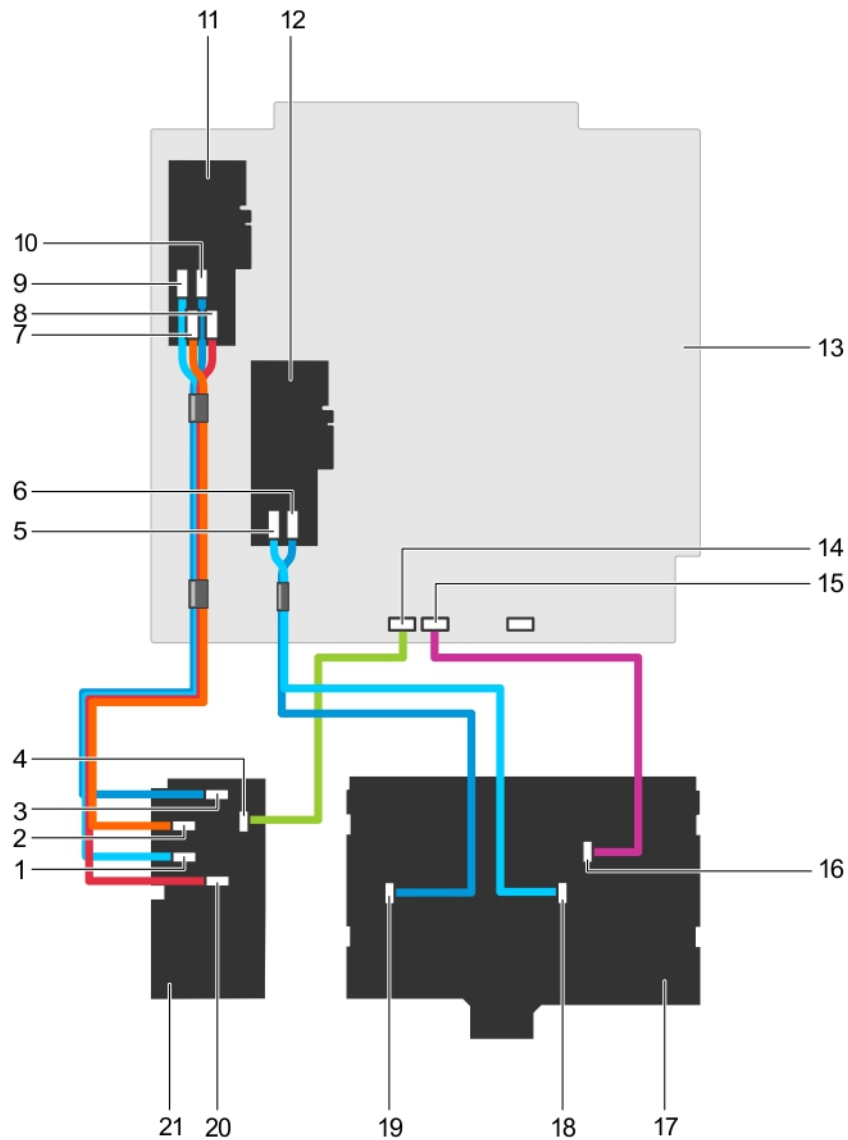
**Figure 84. Cabling—3.5 inch (x8) SAS/SATA backplane with a single PERC card**

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. SAS B connector on PERC card     | 2. SAS A connector on PERC card |
| 3. PERC card                        | 4. system board                 |
| 5. signal connector on system board | 6. x8 backplane                 |
| 7. signal connector on backplane    | 8. SAS B connector on backplane |
| 9. SAS A connector on backplane     |                                 |



**Figure 85. Removing a 3.5 inch (x8) plus 2.5 Inch (x4) SAS/SATA backplane**

- |  |   |
|--|---|
| 1. x8 backplane power cable                | 2. power connector on x8 backplane        |
| 3. x8 backplane                            | 4. release pin                            |
| 5. SAS cable on x8 backplane               | 6. signal cable on x8 backplane           |
| 7. power cable on PCIe SSD backplane       | 8. PCIe cable on PCIe SSD backplane       |
| 9. signal cable on PCIe SSD backplane      | 10. power connector on PCIe SSD backplane |
| 11. signal connector on PCIe SSD backplane | 12. PCIe SSD backplane                    |
| 13. release tab                            |   |

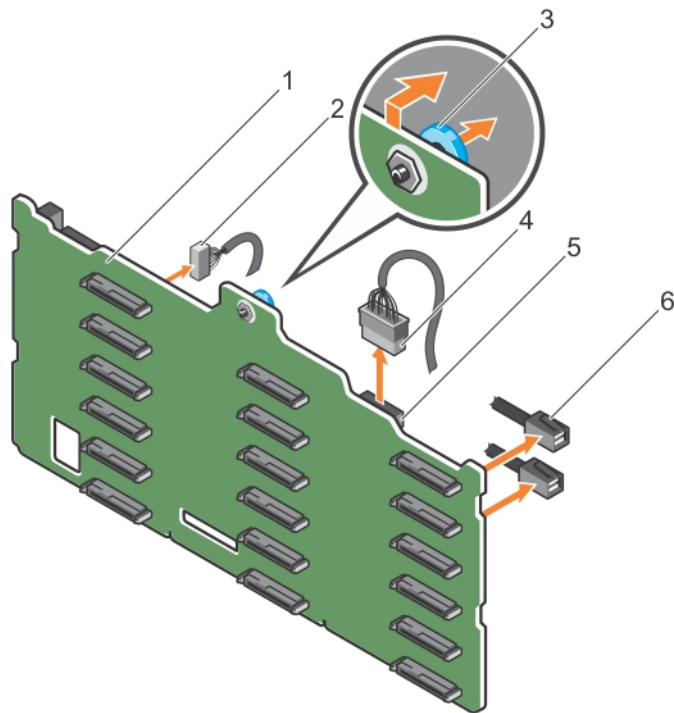


**Figure 86. Cabling—3.5 Inch (x8) plus 2.5 inch (x4) SAS/SATA backplane**

- |   |  |
|---|--|
| 1. PCIe C connector on PCIe SSD backplane                         | 2. PCIe B connector on PCIe SSD backplane                          |
| 3. PCIe A connector on PCIe SSD backplane                         | 4. PCIe SSD backplane signal connector                             |
| 5. SAS B cable from 3.5 inch backplane on PERC card               | 6. SAS A cable from 3.5 inch backplane on PERC card                |
| 7. PCIe C connector from PCIe SSD backplane to PCIe extender card | 8. PCIe A connector from PCIe SSD backplane to PCIe extender card  |
| 9. PCIe D connector from PCIe SSD backplane to PCIe extender card | 10. PCIe B connector from PCIe SSD backplane to PCIe extender card |
| 11. PCIe bridge card  | 12. PERC card 2  |
| 13. System Board  | 14. PCIe SSD backplane signal connector on system board            |
| 15. x8 backplane signal connector on system board                 | 16. x8 backplane signal connector                                  |
| 17. 3.5-inch x8 backplane   | 18. SAS B connector on x8 backplane                                |
| 19. SAS A connector on x8 backplane                               | 20. PCIe D connector on PCIe SSD backplane                         |

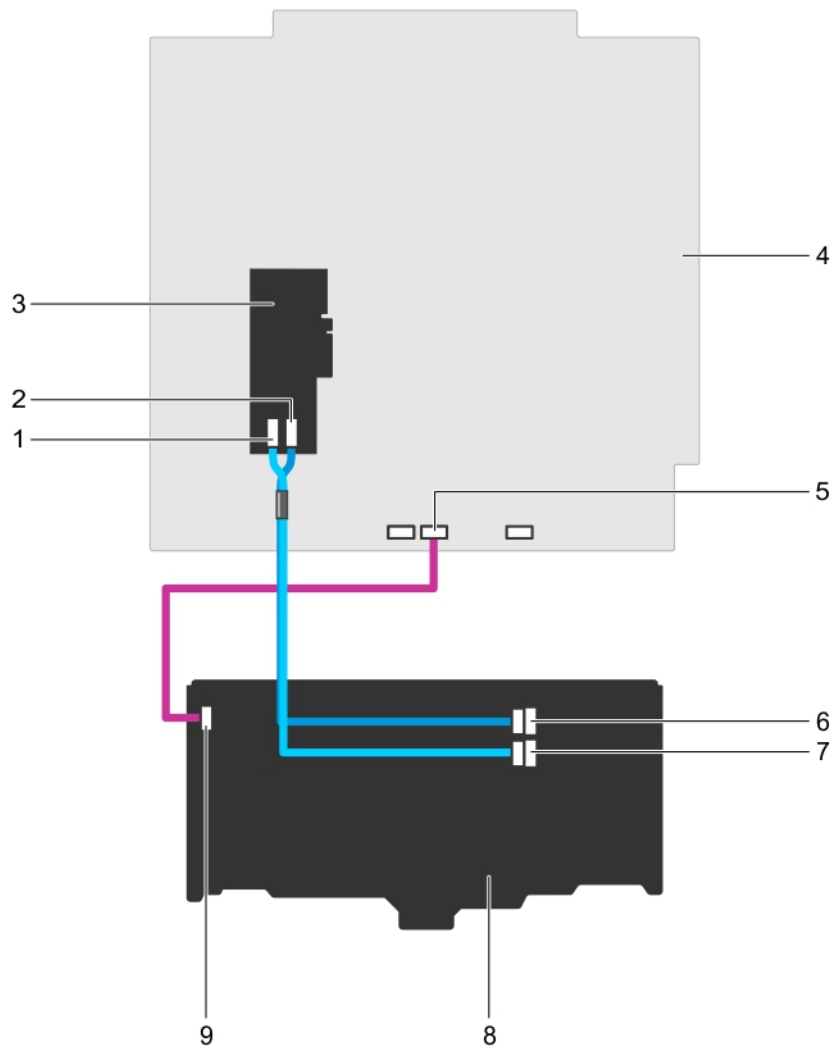


21. PCIe SSD backplane



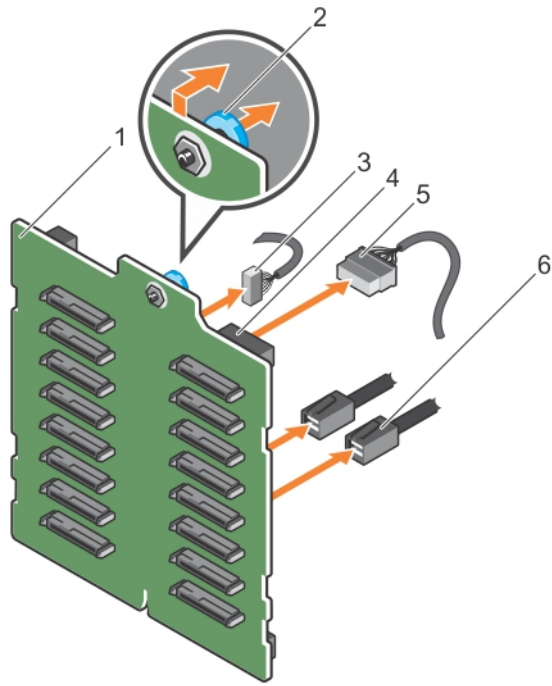
**Figure 87. Removing a 3.5 inch (x18) SAS/SATA backplane**

- |                    |                 |
|--------------------|-----------------|
| 1. x18 backplane   | 2. signal cable |
| 3. release pin     | 4. power cable  |
| 5. power connector | 6. SAS cable    |



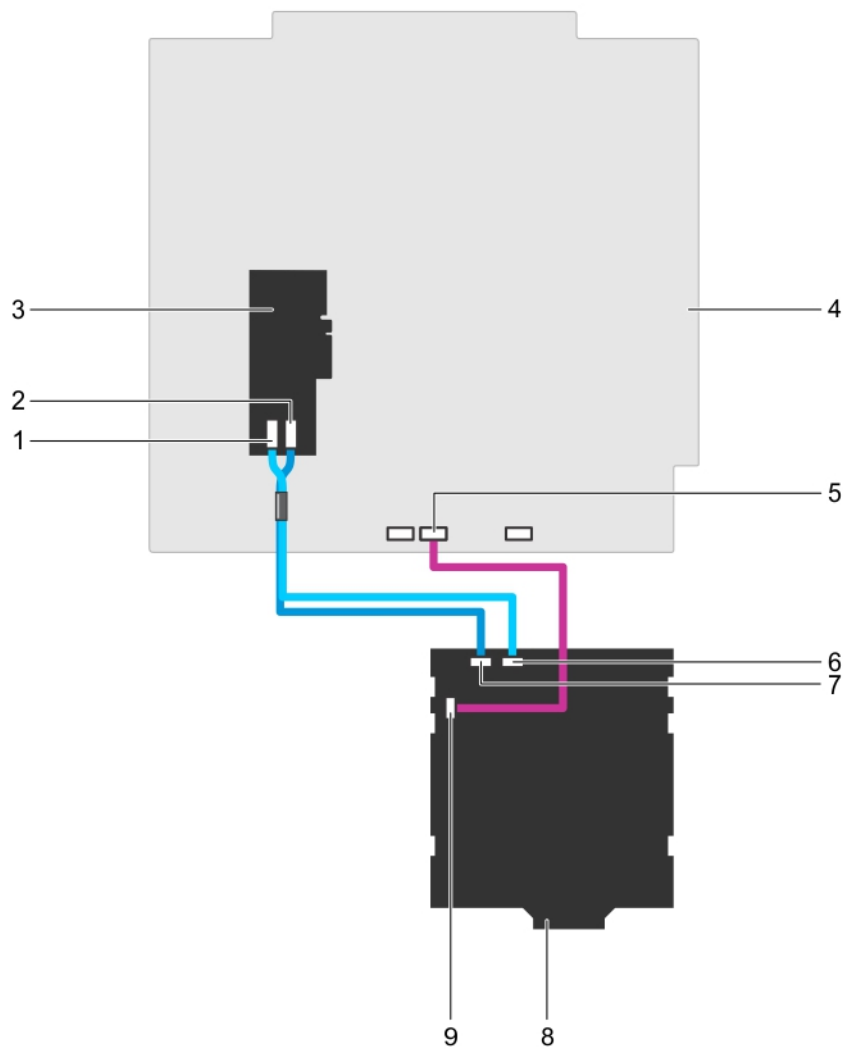
**Figure 88. Cabling—3.5 inch (x18) SAS/SATA backplane**

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. SAS B connector on PERC card     | 2. SAS A connector on PERC card |
| 3. PERC card                        | 4. System board                 |
| 5. signal connector on system board | 6. SAS A connector on backplane |
| 7. SAS B connector on backplane     | 8. x18 backplane                |
| 9. signal connector on backplane    |                                 |



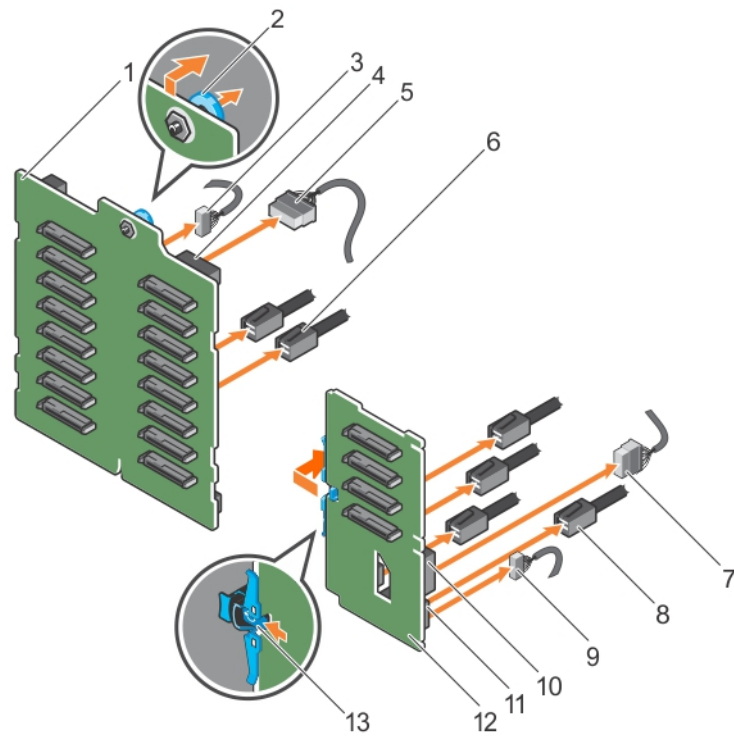
**Figure 89. Removing a 2.5 inch (x16) SAS/SATA backplane**

- |                  |                    |
|------------------|--------------------|
| 1. x16 backplane | 2. release pin     |
| 3. signal cable  | 4. power connector |
| 5. power cable   | 6. SAS cable       |



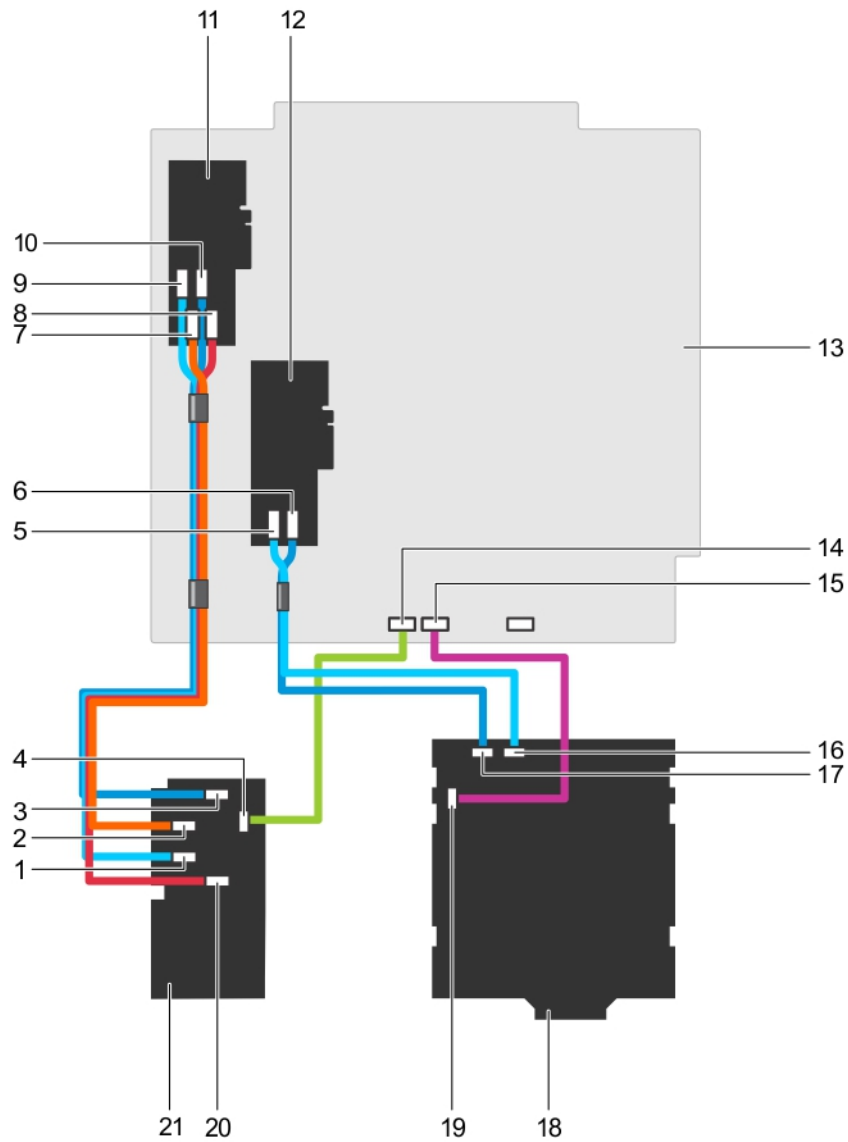
**Figure 90. Cabling—2.5 inch (x16) SAS/SATA backplane**

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. SAS B connector on PERC card     | 2. SAS A connector on PERC card |
| 3. PERC card                        | 4. system board                 |
| 5. signal connector on system board | 6. SAS B connector on backplane |
| 7. SAS A connector on backplane     | 8. x16 backplane                |
| 9. signal connector on backplane    |                                 |



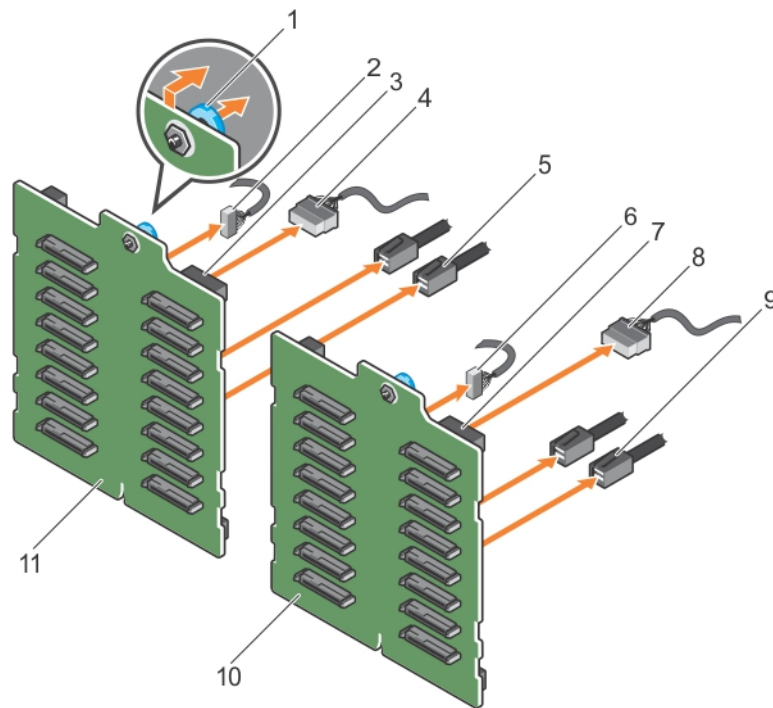
**Figure 91. Removing a 2.5 inch (x16) plus 2.5 Inch (x4) SAS/SATA backplane**

- |  |   |
|--|---|
| 1. x16 backplane                           | 2. release pin                            |
| 3. signal cable to x16 backplane           | 4. power connector on x16 backplane       |
| 5. power cable to x16 backplane            | 6. SAS cable to x16 backplane             |
| 7. power cable to PCIe SSD backplane       | 8. PCIe cable to PCIe SSD backplane       |
| 9. signal cable to PCIe SSD backplane      | 10. power connector on PCIe SSD backplane |
| 11. signal connector on PCIe SSD backplane | 12. PCIe SSD backplane                    |
| 13. release tab                            |   |



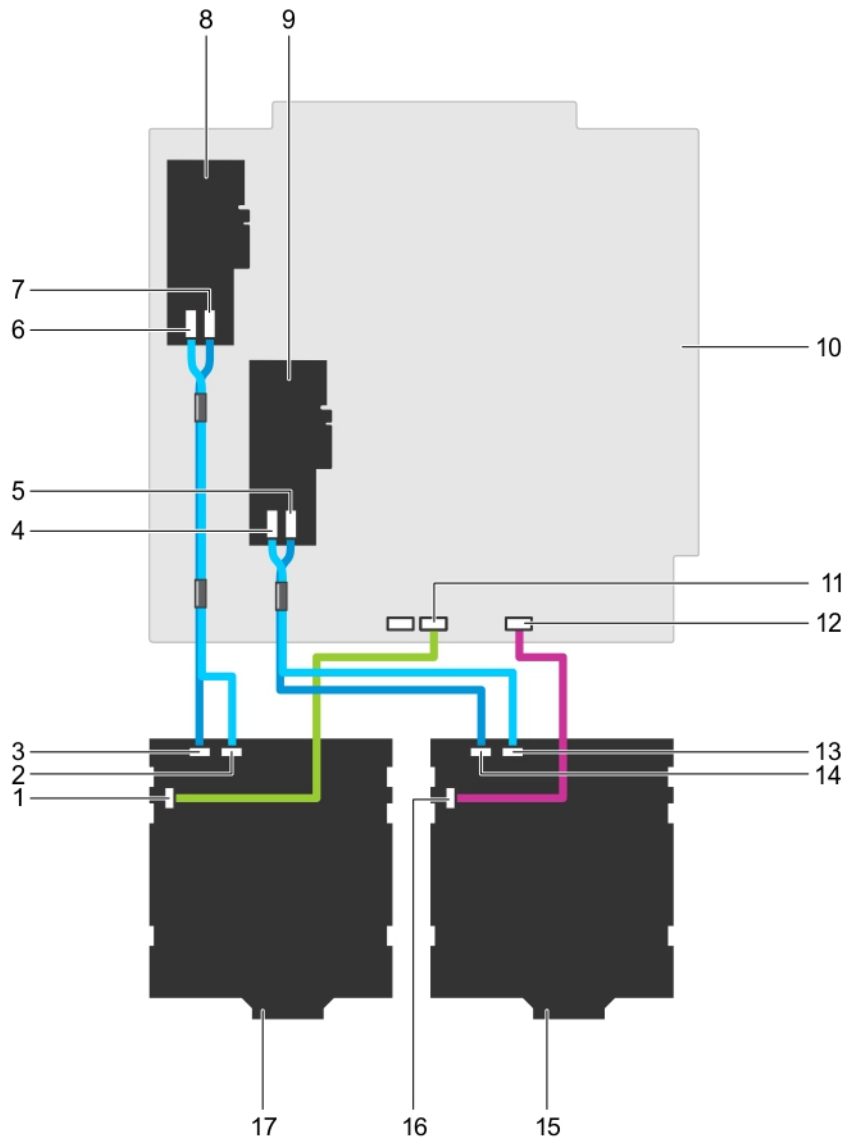
**Figure 92. Cabling—2.5 inch (x16) plus 2.5 inch (x4) SAS/SATA backplane**

- |   |  |
|---|--|
| 1. PCIe C connector on PCIe SSD backplane                         | 2. PCIe B connector on PCIe SSD backplane                          |
| 3. PCIe A connector on PCIe SSD backplane                         | 4. PCIe SSD backplane signal connector                             |
| 5. SAS B cable from 2.5 inch backplane on PERC card               | 6. SAS A cable from 2.5 inch backplane on PERC card                |
| 7. PCIe C connector from PCIe SSD backplane to PCIe extender card | 8. PCIe A connector from PCIe SSD backplane to PCIe extender card  |
| 9. PCIe D connector from PCIe SSD backplane to PCIe extender card | 10. PCIe B connector from PCIe SSD backplane to PCIe extender card |
| 11. PCIe bridge card  | 12. PERC card 2  |
| 13. System Board  | 14. PCIe SSD backplane signal connector on system board            |
| 15. x16 backplane signal connector on system board                | 16. SAS B cable on x16 backplane                                   |
| 17. SAS A cable on x16 backplane                                  | 18. 2.5-inch x16 backplane   |
| 19. x16 backplane signal cable                                    | 20. PCIe D connector on PCIe SSD backplane                         |



**Figure 93. Removing a 2.5 inch (x32) SAS/SATA backplane with two PERC cards**

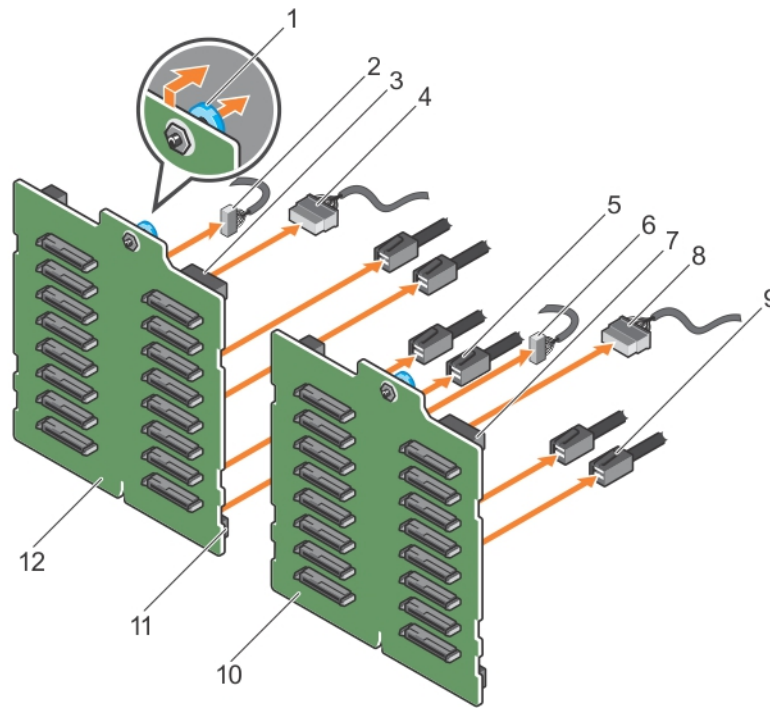
1. release pin
2. signal cable to backplane 2
3. power connector on backplane 2
4. power cable to backplane 2
5. SAS cable to backplane 2
6. signal cable to backplane 1
7. power connector on backplane 1
8. power cable to backplane 1
9. SAS cable to backplane 1
10. backplane 1
11. backplane 2



**Figure 94. Cabling—2.5 inch (x32) SAS/SATA backplane with two PERC cards**

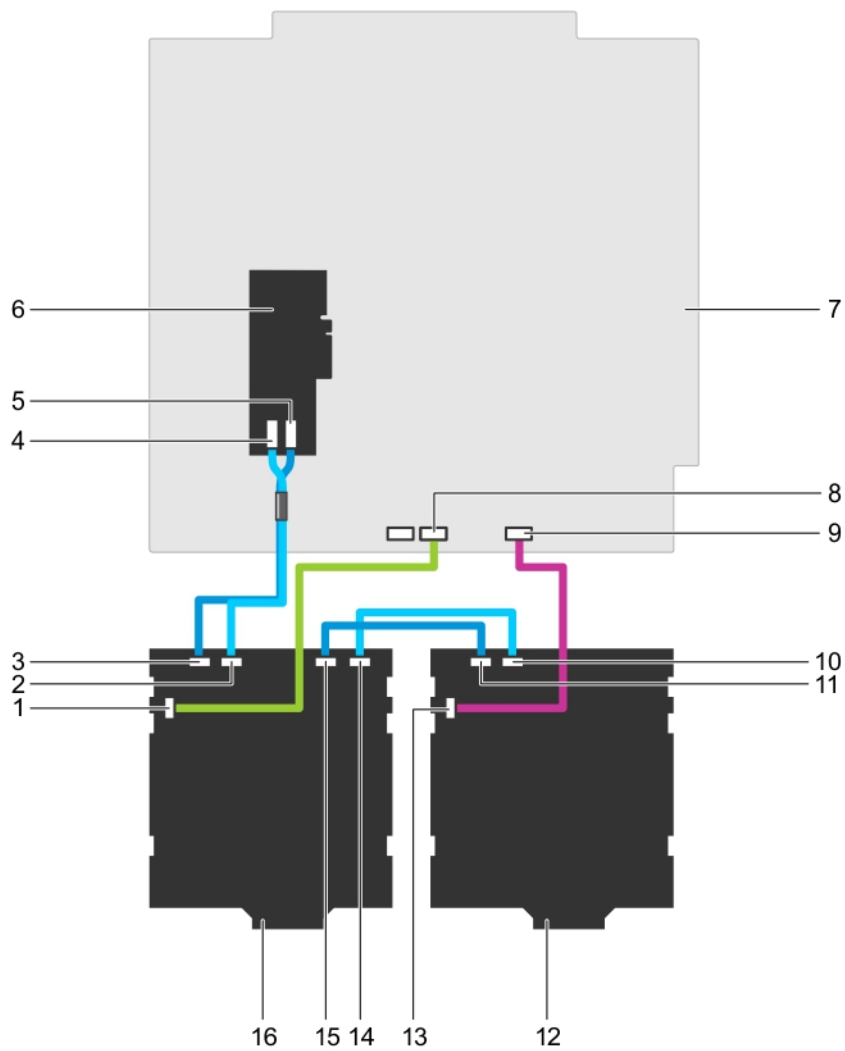
- |   |   |
|---|---|
| 1. signal connector on backplane 2                | 2. SAS B connector on backplane 2                 |
| 3. SAS A connector on backplane 2                 | 4. SAS B connector on PERC 1                      |
| 5. SAS A connector on PERC 1                      | 6. SAS B connector on PERC 2                      |
| 7. SAS A connector on PERC 2                      | 8. PERC card 2                                    |
| 9. PERC card 1                                    | 10. system board                                  |
| 11. signal cable from backplane 2 on system board | 12. signal cable from backplane 1 on system board |
| 13. SAS B connector on backplane 1                | 14. SAS A connector on backplane 1                |
| 15. backplane 1                                   | 16. signal connector on backplane 1               |
| 17. backplane 2                                   |   |





**Figure 95. Removing 2.5 inch (x32) SAS/SATA backplane with a single PERC card**

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. release pin                    | 2. signal cable to backplane 2 |
| 3. power connector on backplane 2 | 4. power cable to backplane 2  |
| 5. SAS cable to backplane 2       | 6. signal cable to backplane 1 |
| 7. power connector on backplane 1 | 8. power cable to backplane 1  |
| 9. SAS cable to backplane 1       | 10. x16 backplane 1            |
| 11. SAS connector on backplane 2  | 12. x16 backplane 2            |



**Figure 96. Cabling—2.5 inch (x32) SAS/SATA backplane with a single PERC card**

- |   |   |
|---|---|
| 1. signal connector on backplane 2              | 2. SAS B connector on backplane 2               |
| 3. SAS A connector on backplane 2               | 4. SAS B connector on PERC card                 |
| 5. SAS A connector on PERC card                 | 6. x32 PERC card                                |
| 7. system board                                 | 8. backplane 2 signal connector on system board |
| 9. backplane 1 signal connector on system board | 10. SAS B connector on backplane 1              |
| 11. SAS A connector on backplane 1              | 12. backplane 1                                 |
| 13. signal connector on backplane 1             | 14. SAS B1 connector on backplane 2             |
| 15. SAS A1 connector on backplane 2             | 16. backplane 2                                 |

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69


**Related tasks**

[Before working inside your system](#) on page 70

[Removing the cooling shroud](#) on page 81


## Installing the hard drive backplane

### 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.

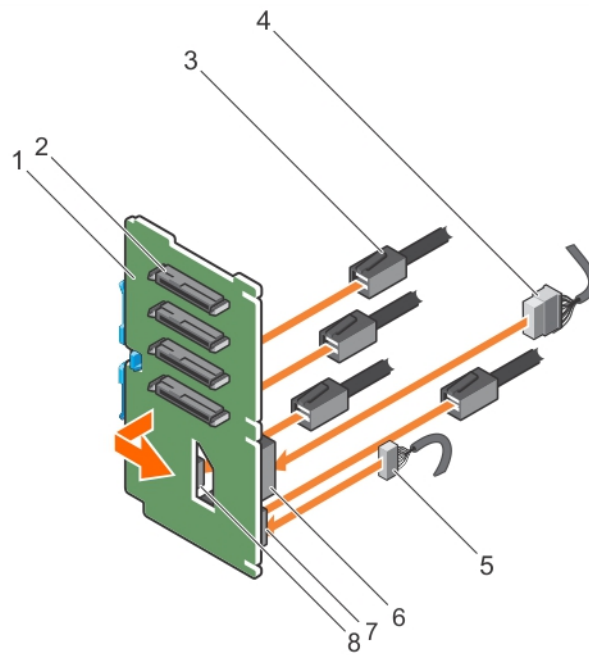
1. Follow the safety guidelines listed in safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove all the hard drives. For more information, see the Removing a hot swap hard drive section.
4. If applicable, remove the cooling-fan assembly. For more information, see the Removing the cooling-fan assembly (optional) section.
5. Remove the cooling shroud. For more information, see the Removing the cooling shroud section.

### Steps

1. Use the hooks at the base of the chassis as guides to align the hard drive backplane.
2. Lower the hard-drive backplane into the chassis to secure the hard drive backplane into place.  
 **NOTE:** For a Dell PowerEdge Express Flash (PCIe SSD) backplane, lower the hard-drive backplane into the chassis until the release tab snaps into place.
3. Connect the SAS/SATA/SSD data, signal, and power cable(s) to the backplane. See the cabling instructions provided in this document.

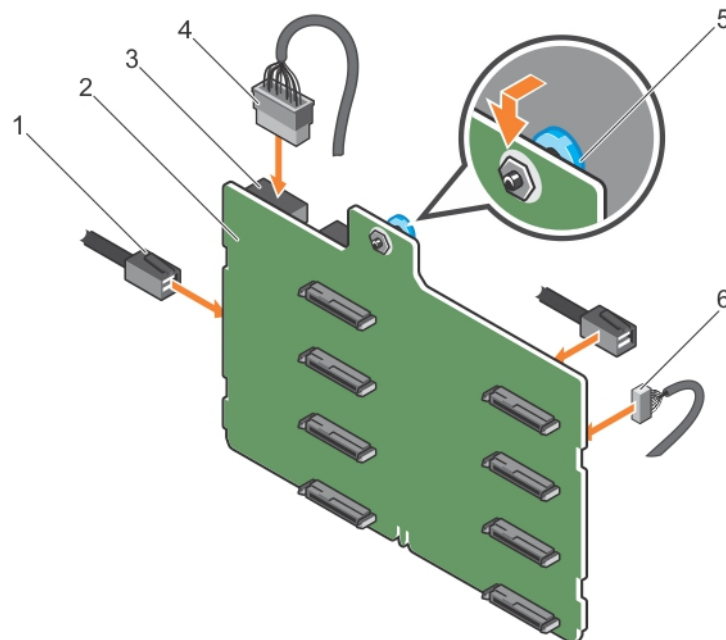
### Next steps

1. If applicable, install the cooling-fan assembly. For more information, see the Installing the cooling-fan assembly (optional) section.
2. Install the cooling shroud. For more information, see the Installing the cooling shroud section.
3. Install the hard drives in their original locations.
4. Follow the procedure listed in the After working inside your system section.



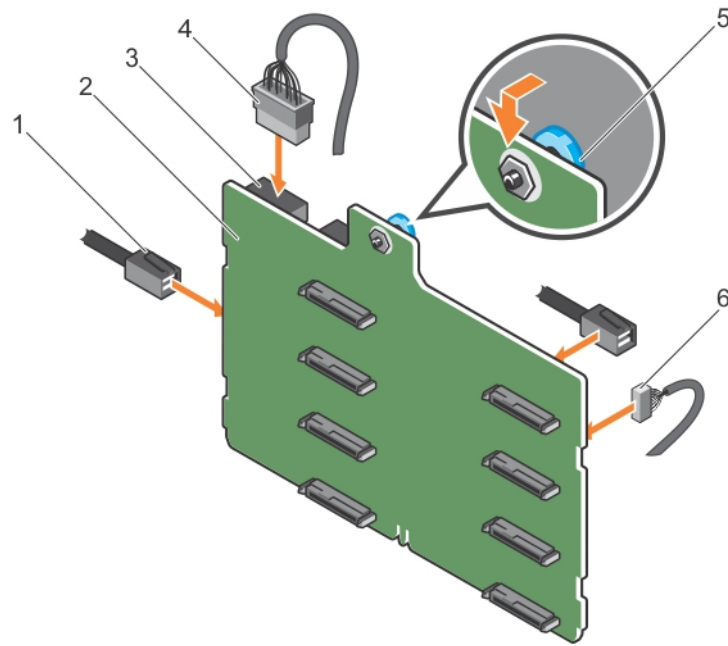
**Figure 97. Installing the PCIe SSD hard drive backplane**

- |  |                                      |
|--|--------------------------------------|
| 1. PCIe SSD hard drive backplane       | 2. PCIe SSD hard drive connector     |
| 3. PCIe cable                          | 4. power cable                       |
| 5. signal cable                        | 6. power connector on backplane      |
| 7. signal cable connector on backplane | 8. PCIe cable connector on backplane |



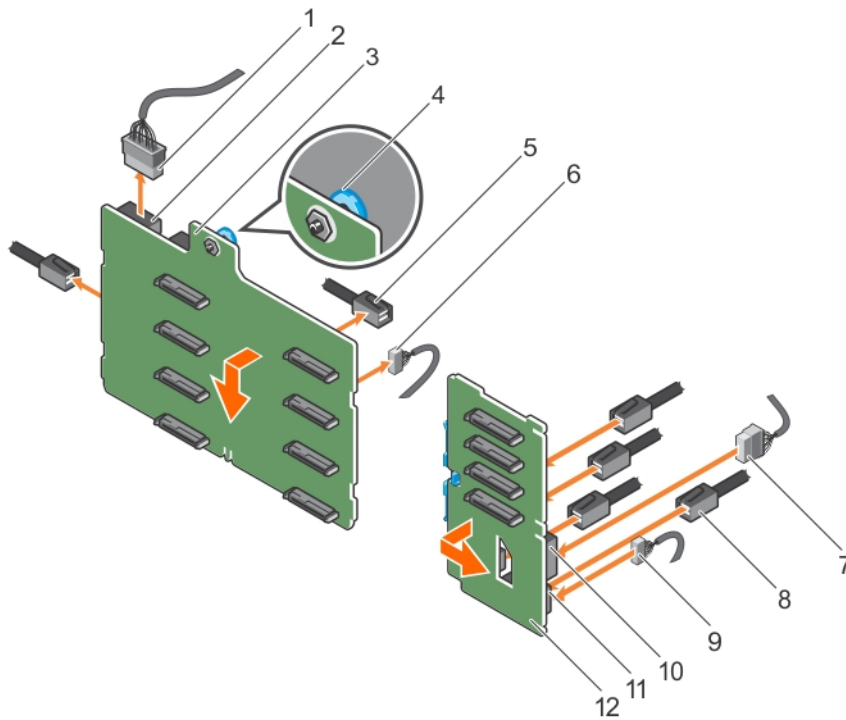
**Figure 98. Installing a 3.5 inch (x8) SAS/SATA backplane**

- |                              |                          |
|------------------------------|--------------------------|
| 1. SAS cable                 | 2. x8 backplane          |
| 3. backplane power connector | 4. backplane power cable |
| 5. Release pin               | 6. signal cable          |



**Figure 99. Installing a 3.5 inch (x8) SAS/SATA backplane with a single PERC card**

- |                    |                 |
|--------------------|-----------------|
| 1. SAS cable       | 2. x8 backplane |
| 3. power connector | 4. power cable  |
| 5. release pin     | 6. signal cable |

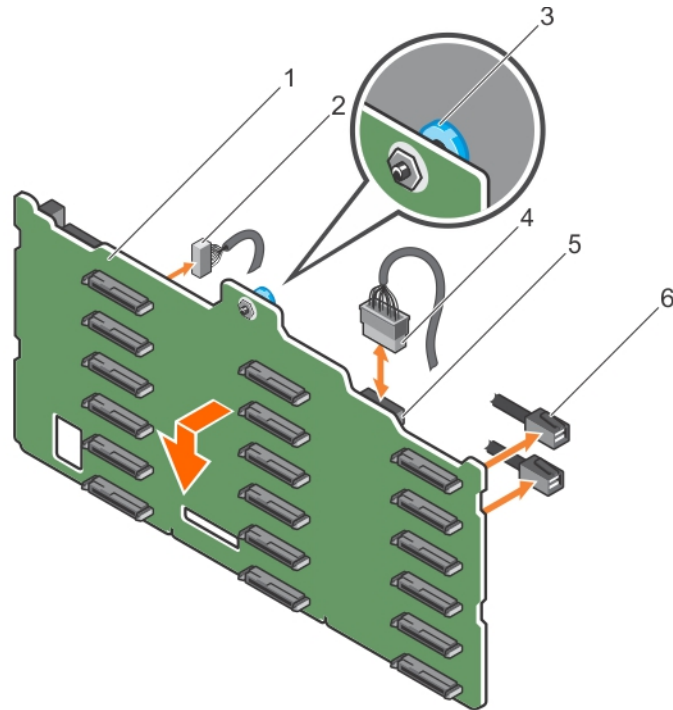


**Figure 100. Installing a 3.5 inch (x8) plus 2.5 Inch (x4) SAS/SATA backplane**

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. x8 backplane power cable          | 2. power connector on x8 backplane  |
| 3. x8 backplane                      | 4. release pin                      |
| 5. SAS cable on x8 backplane         | 6. signal cable on x8 backplane     |
| 7. power cable on PCIe SSD backplane | 8. PCIe cable on PCIe SSD backplane |

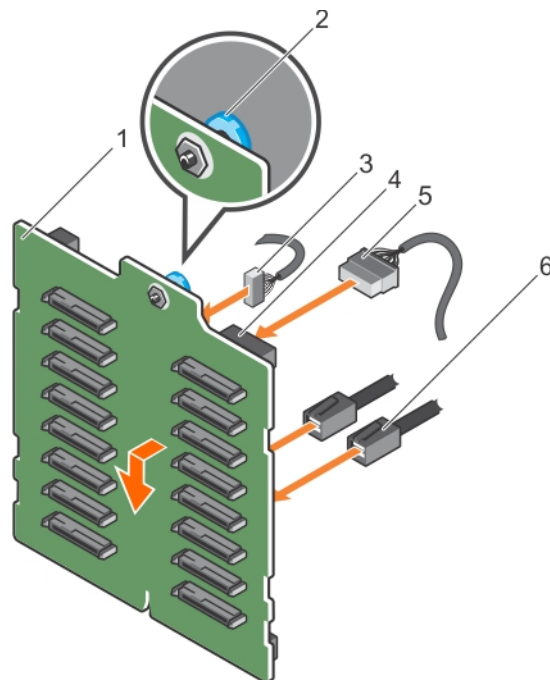
- 9. signal cable on PCIe SSD backplane
- 11. signal connector on PCIe SSD backplane

- 10. power connector on PCIe SSD backplane
- 12. PCIe SSD backplane



**Figure 101. Installing a 3.5 inch (x18) SAS/SATA backplane**

- 1. x18 backplane
- 2. signal cable
- 3. release pin
- 4. power cable
- 5. power connector
- 6. SAS cable

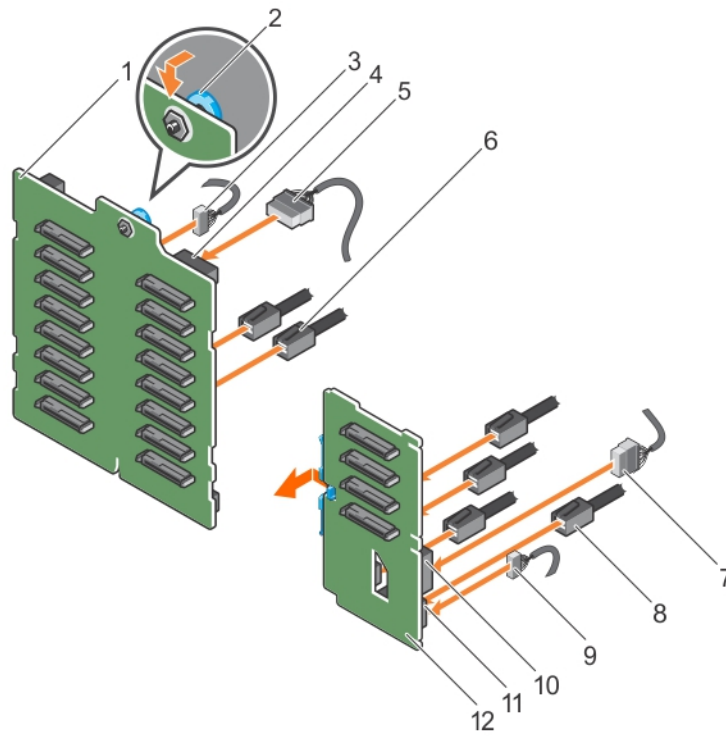


**Figure 102. Installing a 2.5 inch (x16) SAS/SATA backplane**

- 1. x16 backplane
- 2. release pin

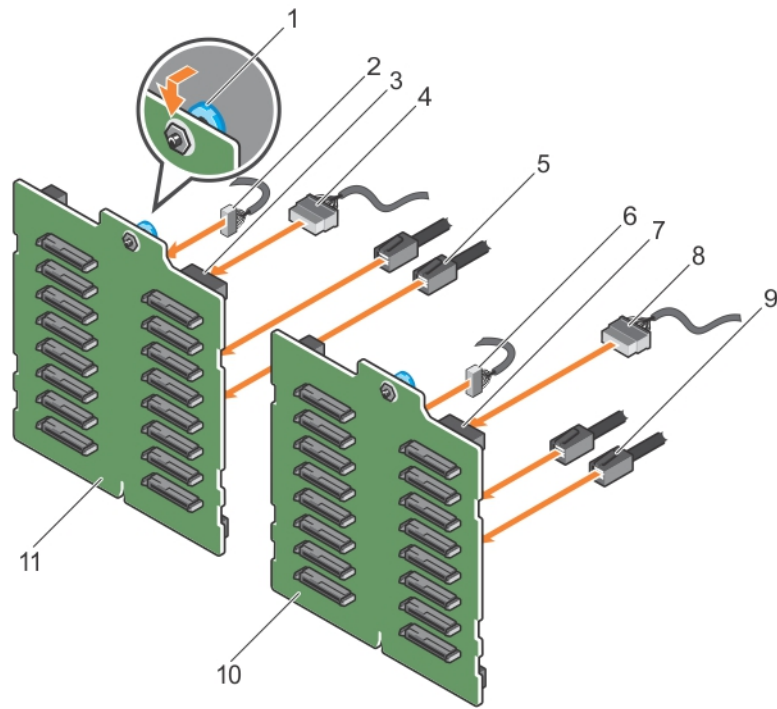
- 3. signal cable
- 5. power cable

- 4. power connector
- 6. SAS cable



**Figure 103. Installing a 2.5 inch (x16) plus 2.5 Inch (x4) SAS/SATA backplane**

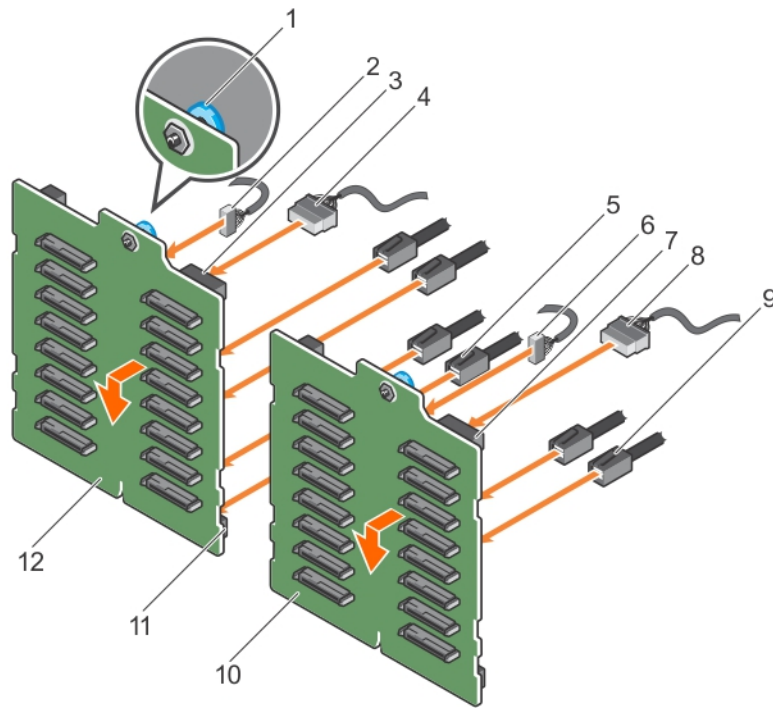
- 1. x16 backplane
- 2. release pin
- 3. signal cable to x16 backplane
- 4. power connector on x16 backplane
- 5. power cable to x16 backplane
- 6. SAS cable to x16 backplane
- 7. power cable to PCIe SSD backplane
- 8. PCIe cable to PCIe SSD backplane
- 9. signal cable to PCIe SSD backplane
- 10. power connector on PCIe SSD backplane
- 11. signal connector on PCIe SSD backplane
- 12. PCIe SSD backplane



**Figure 104. Installing a 2.5 inch (x32) SAS/SATA backplane with two PERC cards**

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. release pin                    | 2. signal cable to backplane 2 |
| 3. power connector on backplane 2 | 4. power cable to backplane 2  |
| 5. SAS cable to backplane 2       | 6. signal cable to backplane 1 |
| 7. power connector on backplane 1 | 8. power cable to backplane 1  |
| 9. SAS cable to backplane 1       | 10. x16 backplane 1            |
| 11. x16 backplane 2               |                                |





**Figure 105. Installing a 2.5 inch (x32) SAS/SATA backplane with a single PERC card**

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. release pin                    | 2. signal cable to backplane 2 |
| 3. power connector on backplane 2 | 4. power cable to backplane 2  |
| 5. SAS cable to backplane 2       | 6. signal cable to backplane 1 |
| 7. power connector on backplane 1 | 8. power cable to backplane 1  |
| 9. SAS cable to backplane 1       | 10. x16 backplane 1            |
| 11. SAS connector on backplane 2  | 12. x16 backplane 2            |

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Before working inside your system](#) on page 70

[After working inside your system](#) on page 70

[Removing a hot swappable hard drive or solid state drive](#) on page 98

[Installing the cooling shroud](#) on page 82

[Installing the optional cooling fan assembly](#) on page 86

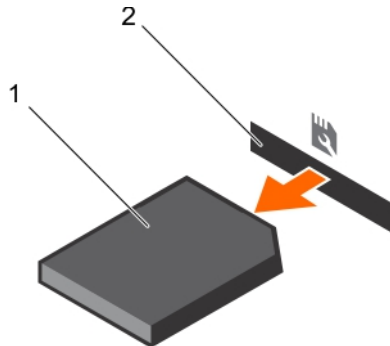
## SD vFlash card (optional)

An SD vFlash card is a Secure Digital (SD) card that plugs into the SD vFlash card slot in the iDRAC port card. It provides persistent on-demand local storage and a custom deployment environment that enables automation of server configuration, scripts, and imaging. It emulates USB device(s). For more information, see the Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](http://Dell.com/idracmanuals).

## Replacing an optional SD vFlash media card

### Steps

1. Locate the SD vFlash media slot on the system.
2. To remove the SD vFlash media card, push the card inward to release it, and pull the card from the card slot.



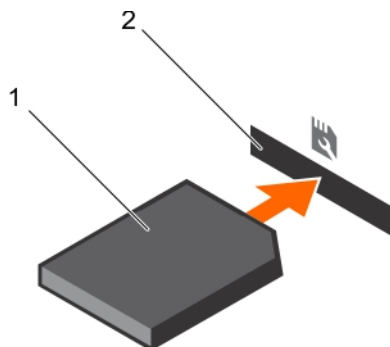
**Figure 106. Removing the SD vFlash media card**

- a. SD vFlash media card
- b. SD vFlash media card slot

3. To install an SD vFlash media card, with the label side facing up, insert the contact-pin end of the SD vFlash media card into the card slot on the module.

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

4. Press the card inward to lock it into the slot.



**Figure 107. Installing the SD vFlash media card**

- a. SD vFlash media card
- b. SD vFlash media card slot

## Control panel assembly

### Removing the control panel assembly

#### Prerequisites

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Follow the procedure listed in the Before working inside your system section.
4. If applicable, remove the cooling fan assembly.

**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.

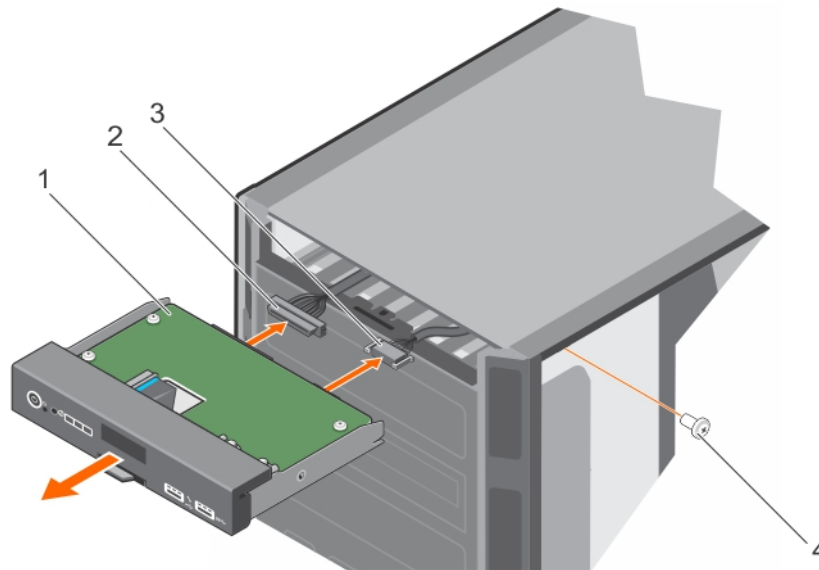
### Steps

1. Remove the screw that secures control panel to the chassis.
2. Disconnect the control panel cable and the control panel USB cable from the system board.

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

3. Slide the control panel out of the chassis.

**NOTE:** Follow the same steps to remove the control panel in the rack-mode configuration.

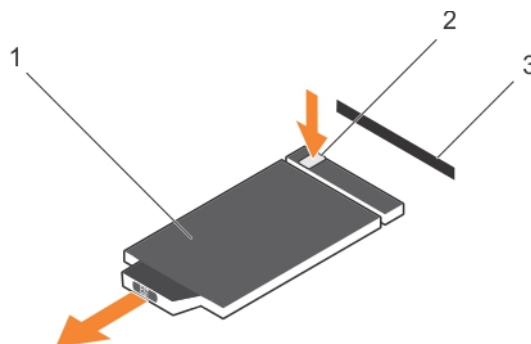


**Figure 108. Removing the control panel assembly**

- |                            |                        |
|----------------------------|------------------------|
| 1. control panel           | 2. control panel cable |
| 3. control panel USB cable | 4. screw               |

4. To remove the information tag, perform the following steps:
  - a. Locate and press the tabs on the information tag.
  - b. Push the information tag out of the slot to remove it from the control panel.

**NOTE:** Retain the information tag to replace it in the new control panel.



**Figure 109. Removing the information tag**

- i. information tag

- ii. tab
- iii. slot

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

### Related tasks

[Before working inside your system](#) on page 70

[Installing the control panel assembly](#) on page 176

## Installing the control panel assembly

### Prerequisites

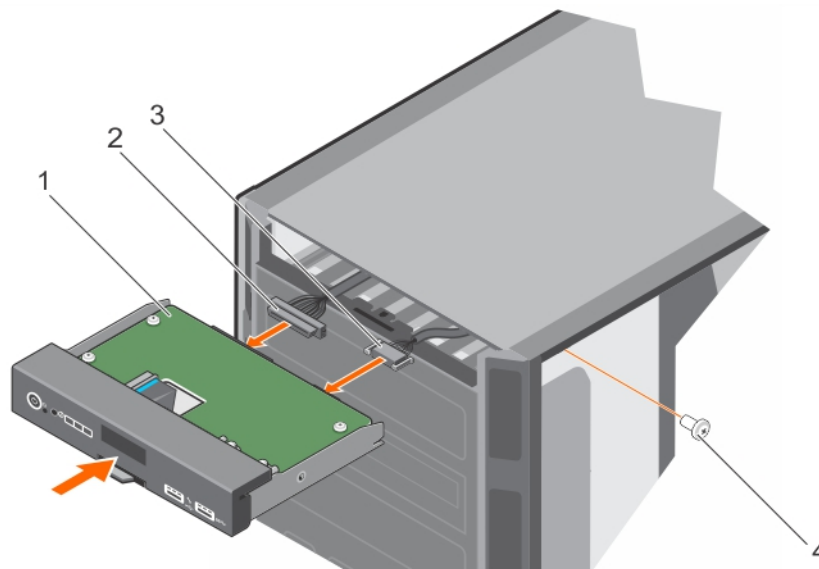
**CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.

### Steps

1. Replace the blank information tag in the new control panel with the information tag retained from the old control panel.

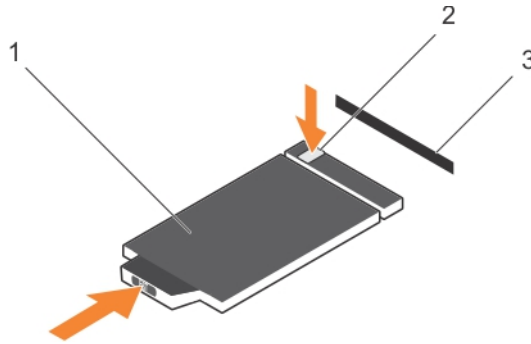
**NOTE:** An Information tag contains system information about the Service Tag, NIC, and MAC address etc.



**Figure 110. installing the control panel assembly**

- |                            |                        |
|----------------------------|------------------------|
| 1. control panel           | 2. control panel cable |
| 3. control panel USB cable | 4. screw               |

2. To install the information tag, push the information tag into the control-panel slot.



**Figure 111. Installing the information tag**

- a. information tag
- b. tab
- c. slot

3. Connect the control panel cable and the control panel USB cable to the control panel assembly.
4. Align and insert the control panel into the control panel slot in the chassis.
5. Secure the control panel to the chassis by using the screw.
6. Connect the control panel cable and the control panel USB cable to the system board.

#### Next steps

1. If applicable, install the cooling fan assembly.
2. Follow the procedure listed in the After working inside your system section.

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[After working inside your system](#) on page 70

[Installing the optional cooling fan assembly](#) on page 86


## System board

The system board has the connectors for your system components and also contains the integrated components.



## Removing the system board

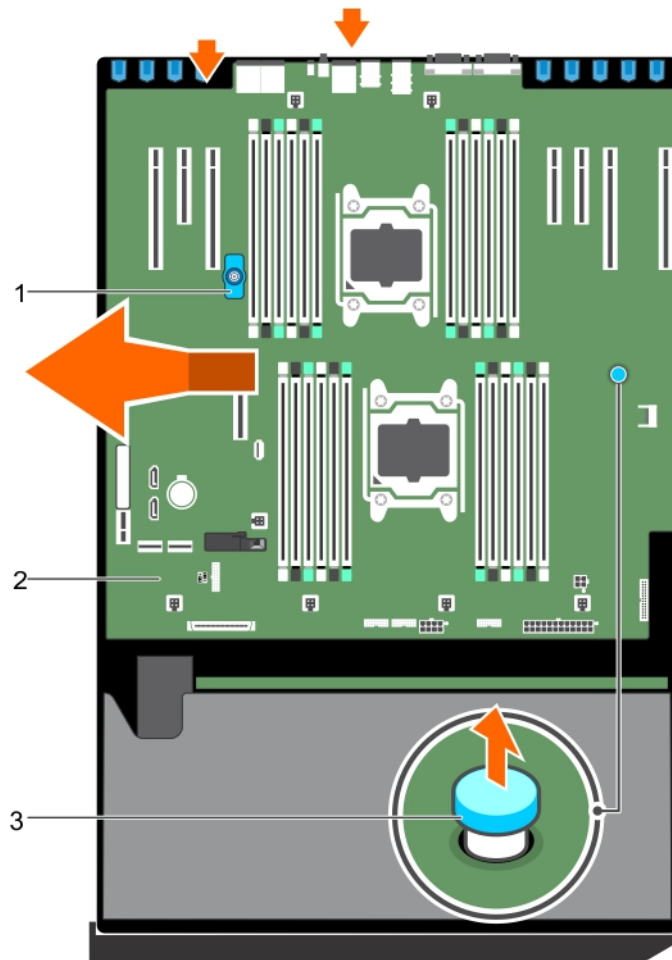
#### Prerequisites

- ⚠ **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 motherboard. After the TPM plug-in module is installed, it is cryptographically bound to that specific motherboard. Any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, and it cannot be re-installed or installed on another motherboard.

1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Follow the procedure listed in the Before working inside your system section.
4. Remove the following:
  - a. PCIe card holder
  - b. Cooling shroud
  - c. Cooling-fan assembly, if applicable
  - d. Integrated storage controller card
  - e. Internal dual SD module
  - f. Internal USB key (if installed)
  - g. Heat sink(s)
  - h. Processors(s)
    -  **NOTE:** 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
  - i. memory modules

### 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.
2. Holding the post, pull the blue release pin, and slide the system board toward the front of the system.
3. Holding the post, incline the system board at an angle, and lift the system board out of the chassis.
  -  **CAUTION:** Do not lift the system board by holding a memory module, processor, or other components.



**Figure 112. Removing the system board**

- a. post
- b. system board
- c. release pin

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Before working inside your system](#) on page 70

[Installing the system board](#) on page 179

## Installing 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.

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

## Steps


1. Unpack the new system board assembly.

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

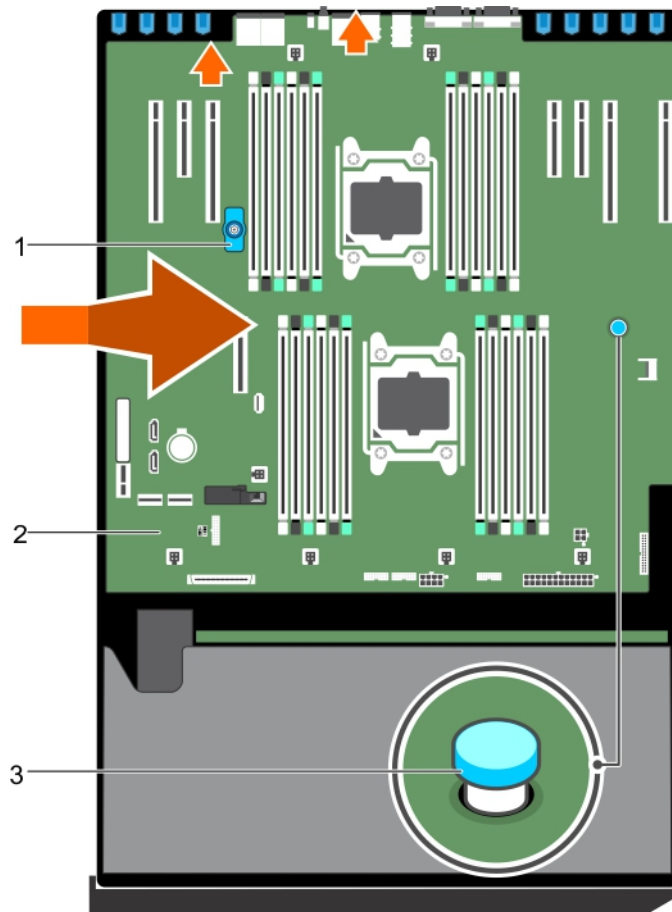
2. Holding the post, incline the system board, and lower the system board into the chassis.
3. Push the system board toward the back of the chassis such that the ports on the system board align with the corresponding slots on the chassis.

## Next steps

1. Install the Trusted Platform Module (TPM). For information on how to install TPM, see installing TPM section. For information on TPM, see the Trusted platform module section.
2. Install the following:
  - a. processors(s) and heat sink(s)
  - b. internal USB key (if installed)
  - c. internal dual SD module
  - d. integrated storage controller card
  - e. cooling-fan assembly, if applicable
  - f. cooling shroud
  - g. PCIe card holder
3. Reconnect all cables to the system board.

 **NOTE:** Ensure that the cables inside the system are routed along the chassis wall and secured by 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 the 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 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 TPM for BitLocker users section or the Re-enabling the TPM for Intel TXT users section.





**Figure 113. Installing the system board**

- a. post
- b. system board
- c. release pin

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Before working inside your system](#) on page 70

[Installing the Trusted Platform Module](#) on page 182

## 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.

#### Steps

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 [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

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

By using the Easy Restore feature, you can restore your 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.

### Steps

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:
  - Press **Y** to restore the Service Tag, license, and diagnostics information.
  - Press **N** to navigate to the Dell Lifecycle Controller based restore options.
  - Press F10 to restore data from a previously created **Hardware Server Profile**.

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.

## 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.

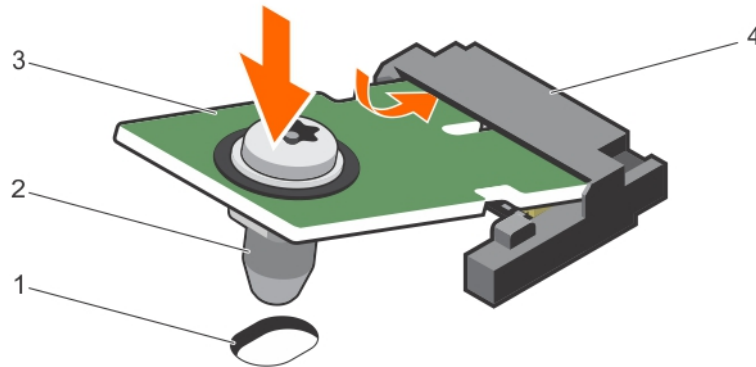
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

### 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 114. Installing the TPM**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. rivet slot on the system board</li> <li>3. TPM</li> </ol> | <ol style="list-style-type: none"> <li>2. plastic rivet</li> <li>4. TPM connector</li> </ol> |
|---|--|

#### Next steps

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

#### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

#### Related tasks

[Before working inside your system](#) on page 70

## Initializing the TPM for BitLocker users

#### Steps

Initialize the TPM.

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

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

## Initializing the TPM for TXT users

#### Steps

1. While booting your system, press F2 to enter System Setup.
2. On the **System Setup Main Menu** screen, click **System BIOS > System Security Settings**.
3. From the **TPM Security** option, select **On with 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**.

# Power interposer board and power distribution board

## Removing the power interposer 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.

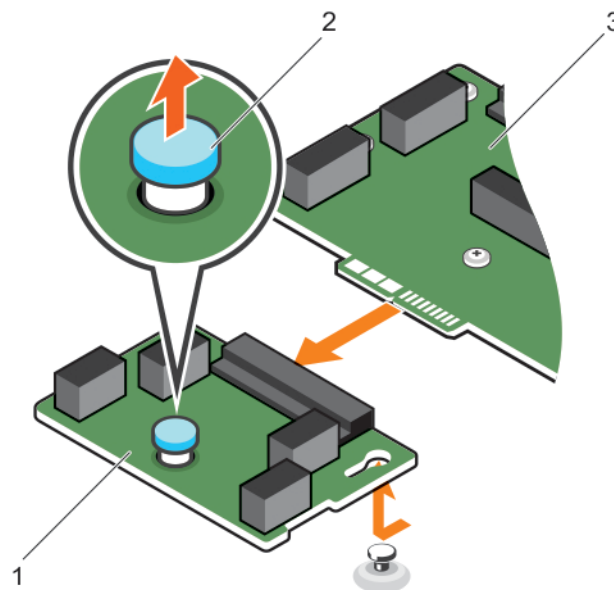
1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.

**CAUTION:** To prevent damage to the power interposer board (PIB), you must remove the power supply module(s) from the system before removing the power interposer board or power distribution board (PDB).

3. Remove the power supply module(s) from the back of the chassis.
4. Remove the PCIe card holders.
5. Remove the cooling shroud.
6. If connected, remove the cooling fan assembly.
7. Disconnect the power cables from the system board and the hard-drive backplane.
8. Remove the system board. For more information, see the Removing the system board section.

### Steps

1. Pull the release pin and detach the PIB from the PDB.
2. Slide and lift the PIB up until the grooves on the PIB disengage from the pins on the chassis.



**Figure 115. Removing the power interposer board**

- a. power interposer board
- b. release pin
- c. power distribution board

### Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

[Removing the system board](#) on page 177

[Installing the power interposer board](#) on page 187

# Removing the power distribution 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.

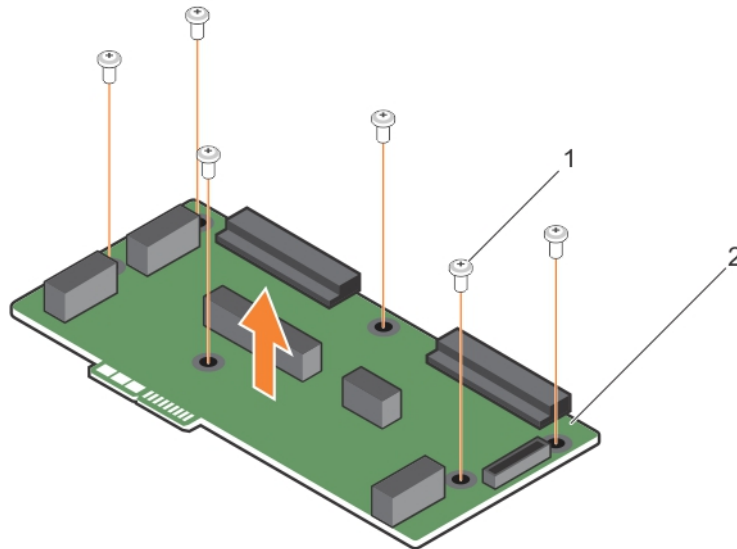
1. Follow the safety guidelines listed in the safety instructions section.
2. Keep the #2 Phillips screwdriver ready.
3. Follow the procedure listed in the Before working inside your system section.

**CAUTION:** To prevent damage to the power interposer board (PIB), you must remove the power supply module(s) from the system before removing the power interposer board or power distribution board (PDB).

4. Disconnect the power supply module(s) from the back of the chassis.
5. Remove the PCIe card holders.
6. Remove the cooling shroud.
7. If applicable, remove the cooling fan assembly.
8. Disconnect the power cables from the system board and the hard-drive backplane.
9. Remove the system board. For more information, see the Removing the system board section.
10. Remove the power interposer board.

## Steps

1. Disconnect the power cables from the power distribution board (PDB).
2. Remove the six screws that secure the PDB to the chassis.
3. Lift the PDB up and out of the chassis.



**Figure 116. Removing the power distribution board**

- a. screws (6)
- b. power distribution board

## Related concepts

[Installing the power distribution board](#) on page 186

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[Before working inside your system](#) on page 70

# Installing the power distribution 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.

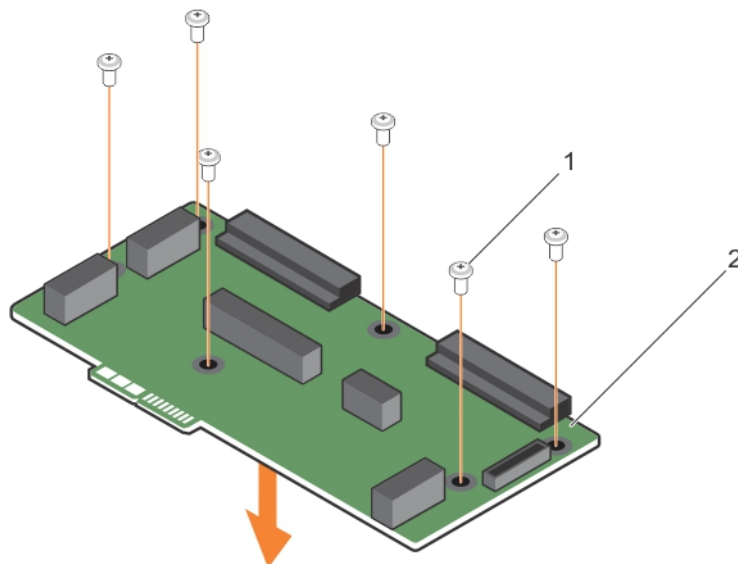
1. Follow the safety guidelines listed in the Safety instructions section.
2. Keep the Phillips #2 screwdriver ready.

## Steps

1. Align the screw holes on the power distribution board (PDB) with the holes on the chassis.
2. Secure the PDB on to the chassis by using the six screws.
3. Connect the power cables to the PDB.

## Next steps

1. Install the power interposer board.
2. Install the system board. For more information, see the Installing system board section.
3. Connect the power cables to the system board and the hard-drive backplane.
4. If applicable, install the cooling fan assembly.
5. Install the cooling shroud.
6. Install the PCIe card holders.
7. Install the power supply module(s) in their original locations.
8. Follow the procedure listed in the After working inside your system section.



**Figure 117. Installing the power distribution board**

1. screws (6)
2. power distribution board

## Related references

[Safety instructions for converting system from tower to rack](#) on page 69

## Related tasks

[After working inside your system](#) on page 70

[Removing the power distribution board](#) on page 185

# Installing the power interposer 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.

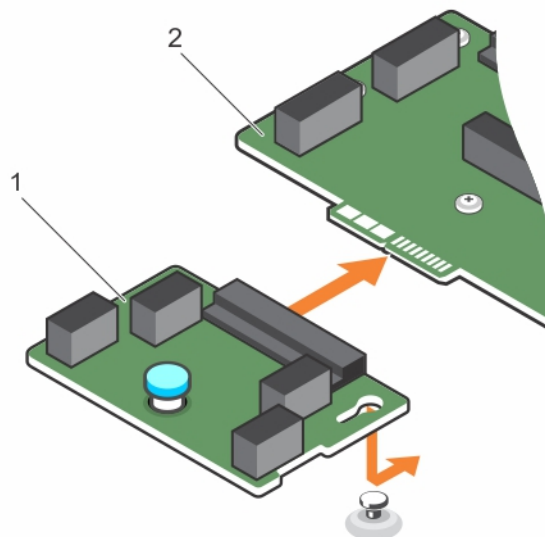
Follow the safety guidelines listed in the safety instructions section.

## Steps

1. Install the power distribution board (PDB).
2. Align the power interposer board (PIB) connector with the connector on the PDB.
3. Align the grooves on the PIB aligned with the pins on the chassis, and then connect the PIB to the connector on the PDB.

## Next steps

1. Install the system board. For more information, see the Installing system board section.
2. Connect the power cables to the system board and the hard-drive backplane.
3. If applicable, install the cooling fan assembly.
4. Install the cooling shroud.
5. Install the PCIe card holders.
6. Install the power supply module(s) in their original locations.
7. Follow the procedure listed in the After working inside your system section.



**Figure 118. Installing the power interposer board**

1. power interposer board
2. power distribution board

**Related references**

[Safety instructions for converting system from tower to rack](#) on page 69

**Related tasks**

[Installing the power interposer board](#) on page 187

[After working inside your system](#) on page 70



# Using system diagnostics

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

**NOTE:** For more information about OEM diagnostic event messages, see the Event and Error Message Reference Guide for 13th Generation Dell PowerEdge Servers Version 1.2

## Topics:

- [Dell Embedded System Diagnostics](#)

## Dell Embedded System Diagnostics

**NOTE:** The Dell Embedded System Diagnostics is also known as Enhanced Pre-boot System Assessment (ePSA) diagnostics.

The Embedded System Diagnostics provides a set of options for particular device groups or devices allowing you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

## Running the Embedded System Diagnostics from Boot Manager

### Prerequisites

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

### Steps

1. When the system is booting, press F10.
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

### Steps

1. As the system boots, press F10.
2. Select **Hardware Diagnostics → Run Hardware Diagnostics**.  
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

## System diagnostic controls

<b>Menu</b>	<b>Description</b>
<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>Systemhealth</b>	Provides the current overview of the system performance.
<b>Event log</b>	Displays a time-stamped log of the results of all tests run on the system. This is displayed if at least one event description is recorded.

# Jumpers and connectors

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

## Topics:

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

## System board connectors

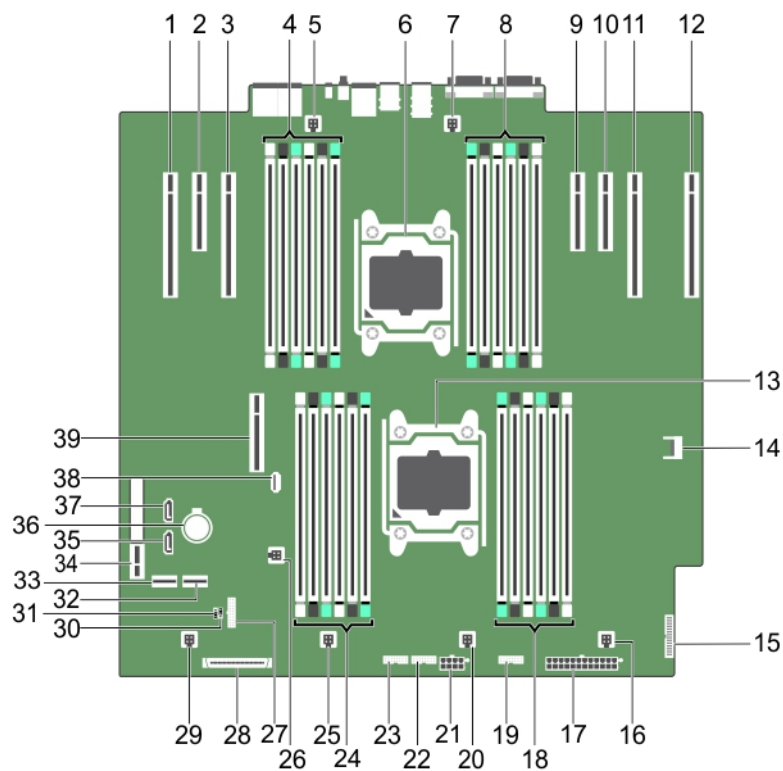


Figure 119. System board jumpers and connectors

Table 37. System board jumpers and connector description





Item	Connector	Description
1	SLOT1 PCIE_G3_X16 (CPU1)	PCIe card connector 1
2	SLOT2 PCIE_G2_X4 (PCH)	PCIe card connector 2
3	SLOT3 PCIE_G3_X16 (CPU1)	PCIe card connector 3
4	B1, B5, B9, B2, B6, B10	Memory module sockets
5	FAN1	Cooling shroud fan connector

**Table 37. System board jumpers and connector description (continued)**

<b>Item</b>	<b>Connector</b>	<b>Description</b>
6	CPU2	Processor 2
7	FAN2	Fan connector
8	B12, B8, B4, B11, B7, B3	Memory module sockets
9	SLOT4 PCIE_G3_X8 (CPU2)	PCIe card connector 4
10	SLOT5 PCIE_G2_X4 (CPU2)	PCIe card connector 5
11	SLOT6 PCIE_G3_X16 (CPU2)	PCIe card connector 6
12	SLOT7 PCIE_G3_X16 (CPU2)	PCIe card connector 7
13	CPU1	Processor 1
14	TPM_Module	Trusted Platform Module (TPM) connector
15	PIB_CONN	PIB signal connector
16	FAN6	Fan connector
17	PWR_CONN_2	PIB signal connector
18	A10, A6, A2, A9, A5, A1	Memory module sockets
19	BP_SIG2	Backplane signal connector 2
20	FAN5	Cooling shroud fan connector
21	PWR_CONN_1	Power connector
22	BP_SIG1	Backplane signal connector 1
23	BP_SIG0	Dell PowerEdge Express Flash (PCIe SSD) signal connector
24	A3, A7, A11, A4, A8, A12	Memory module sockets
25	FAN4	Cooling shroud fan connector
26	INTRUSION	Chassis intrusion switch connector
27	FP_USB	Control panel USB connector
28	CTRL_PNL	Control panel interface connector
29	FAN3	Cooling shroud fan connector
30	PWRD_EN	See System board jumper settings
31	NVRAM_CLR	See System board jumper settings
32	SW RAID_B	SW RAID connector 2
33	SW RAID_A	SW RAID connector 1
34	IDSMD	Internal dual SD module connector
35	SATA_TBU	Tape drive SATA connector
36	BATTERY	System battery connector
37	SATA_CDROM	Optical drive SATA connector
38	INT_USB_3.0	Internal USB 3.0 connector
39	SLOT8 PCIE_G3_X8 (CPU1)	PCIe card connector 8

# System board jumper settings

Table 38. 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).

## Disabling forgotten password


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

### Prerequisites

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

### Related tasks

[Removing the system cover](#) on page 78

[Installing the system cover](#) on page 79

# 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.

### Topics:

- [Troubleshooting system startup failure](#)
- [Troubleshooting external connections](#)
- [Troubleshooting the video subsystem](#)
- [Troubleshooting a USB device](#)
- [Troubleshooting a serial input and output device](#)
- [Troubleshooting a NIC](#)
- [Troubleshooting a wet system](#)
- [Troubleshooting a damaged system](#)
- [Troubleshooting the system battery](#)
- [Troubleshooting power supply units](#)
- [Troubleshooting cooling problems](#)
- [Troubleshooting cooling fans](#)
- [Troubleshooting system memory](#)
- [Troubleshooting an internal USB key](#)
- [Troubleshooting a micro SD card](#)
- [Troubleshooting an optical drive](#)
- [Troubleshooting a drive or SSD](#)
- [Troubleshooting a storage controller](#)
- [Troubleshooting expansion cards](#)
- [Troubleshooting processors](#)

## 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.


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

For any further queries contact, [Global Technical Support](#).

# Troubleshooting the video subsystem

## Prerequisites

 **NOTE:** Ensure that 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.

 **NOTE:** The VGA ports are not hot-pluggable.

## Steps

1. Check the cable connections (power and display) to the monitor.
2. Check the video interface cabling from the system to the monitor.

## Results

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

## Next steps


If the tests fail, see the Getting help section.

## Related references


[Getting help](#) on page 207

# 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.  
If the problem is not resolved, proceed to troubleshoot other USB devices attached to the system.
7. Turn off all attached USB devices, and disconnect them from the system.
8. Restart the system.
9. If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.
10. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.
11. If the system is not accessible, reset the NVRAM\_CLR jumper inside your system and restore the BIOS to the default settings. See the System board jumper setting section
12. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
13. Reconnect and turn on each USB device one at a time.

14. If a USB device causes the same problem, turn off the device, replace the USB cable with a known good cable, and turn on the device.

### Next steps

If all troubleshooting fails, see the Getting help section.

### Related references

[Getting help](#) on page 207

## Troubleshooting a serial input and output device

### Prerequisites

### 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 I/O serial device.  
If the problem is resolved, replace the interface cable with a known working cable.
3. Turn off the system and the I/O serial device, and swap the serial device with a compatible device.
4. Turn on the system and the I/O serial device.

### Next steps


If the problem persists, see the Getting help section.

### Related references

[Getting help](#) on page 207

## Troubleshooting a NIC

### Prerequisites

 **NOTE:** Network Daughter Card (NDC) slot is not hot-pluggable.

### 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 the NICs and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
8. 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 references

[Getting help](#) on page 207

## 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 fan(s)
  - 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 references

[Getting help](#) on page 207

# Troubleshooting a damaged system

## Prerequisites

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

## Steps

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Ensure that the following components are properly installed:
  - cooling shroud
  - expansion card risers (if installed)
  - expansion cards
  - power supply unit(s)
  - cooling fan assembly (if installed)
  - cooling fan(s)
  - processor(s) and heat sink(s)
  - memory modules
  - drive carriers or cage
  - drive backplane
4. Ensure that all cables are properly connected.
5. Install the system cover.
6. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

## Next steps

If the problem persists, see the Getting help section.

## Related references

[Getting help](#) on page 207

# 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 the 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 references

[Getting help](#) on page 207

## Troubleshooting power supply units

#### 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.

The following sections provide information on troubleshooting power source and power supply units problems.

**NOTE:** Power Supply Units (PSUs) are hot-pluggable.

## Troubleshooting power source problems

#### Steps

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.

#### Results

**NOTE:** Some power supply units require 200-240V AC to deliver their rated capacity. For more information, see the system Technical Specifications section in the Installation and Service Manual available at [www.dell.com/poweredgemanuals](http://www.dell.com/poweredgemanuals).

## Power supply unit problems

#### Steps

1. Ensure that no loose connections exist.  
For example, loose power cables.
2. Ensure that the power supply unit (PSU) handle or LED indicates that the PSU is working properly.  
For more information about PSU indicators, see the Power indicator codes section.
3. If you have recently upgraded your system, ensure that the PSU has enough power to support the new system.
4. If you have a redundant PSU configuration, ensure that both the PSUs are of the same type and wattage.  
You may have to upgrade to a higher wattage PSU.
5. Ensure that you use only PSUs with the Extended Power Performance (EPP) label on the back.

6. Reseat the PSU.

**NOTE:** After installing a PSU, allow several seconds for the system to recognize the PSU and determine if it is working properly.

If the problem persists, see the Getting help section.

## Troubleshooting cooling problems

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

Ensure that the following conditions exist:

- System cover, cooling shroud, EMI filler panel, 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 that is required or set the minimum fan speed to a custom value.

From F2 System Setup:

1. Select **iDRAC Settings > Thermal**, and set a higher fan speed from the fan speed offset or minimum fan speed.

From RACADM commands:

1. Run the command `racadm help system.thermalsettings`

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

### Related references

[Getting help](#) on page 207

## 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 management software of the system. In the event of a problem with a particular fan, you can easily identify and replace it by noting down the fan numbers on the cooling fan assembly.

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

### 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 references

[Getting help](#) on page 207

# 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.

**NOTE:** Memory slots are not hot-pluggable.

**NOTE:** NVDIMM-N battery is not hot-pluggable.

## Steps

1. If the system is operational, run the appropriate diagnostic test. See the Using system diagnostics section for the available diagnostic tests.  
If the diagnostic tests indicate a fault, follow the corrective actions that are 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 one or more installed DIMM types, incorrect DIMM installation, or defective DIMMs. 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 references

[Getting help](#) on page 207

## Troubleshooting an internal USB key

### 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. Enter System Setup and ensure that the **USB key port** is enabled on the **Integrated Devices** screen.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Locate the USB key and reseal it.
5. Install the system cover.
6. Turn on the system and attached peripherals, and check if the USB key is functioning.
7. If the problem is not resolved, repeat step 2 and step 3.
8. Insert a known working USB key.
9. Install the system cover.

### Next steps


If the problem persists, see the Getting help section.


### Related references

[Getting help](#) on page 207


## Troubleshooting a micro SD card

### Prerequisites

 **NOTE:** Certain micro SD cards have a physical write-protect power on the card. If the write-protect switch is turned on, the micro SD card is not writable.

 **NOTE:** IDSDM and vFlash slots are not hot-pluggable.


### 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 is logged and chassis health will degrade.
4. Replace the failed micro SD card with a new micro 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 micro 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.

### Related references

[Getting help](#) on page 207

## Troubleshooting an optical 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.

### Steps

1. Try using a different CD or DVD.
2. If the problem is not resolved, enter System Setup and ensure that the integrated SATA controller and the drive's SATA port are enabled.
3. Run the appropriate diagnostic test.
4. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
5. If installed, remove the bezel.
6. Remove the system cover.
7. Ensure that the interface cable is securely connected to the optical drive and to the controller.
8. Ensure that a power cable is properly connected to the drive.
9. Install the system cover.

### Next steps

If the problem persists, see the [Getting help](#) section.


### Related references

[Getting help](#) on page 207

## Troubleshooting a drive or SSD

### Prerequisites

 **CAUTION:** This troubleshooting procedure can erase data stored on the drive. Before you proceed, back up all files on the drive.

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

## Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.  
Depending on the results of the diagnostics test, proceed as required through the following steps.
2. If your system has a RAID controller and your drives are configured in a RAID array, perform the following steps:
  - a. Restart the system and press F10 during system startup to run the Dell Lifecycle Controller, and then run the Hardware Configuration wizard to check the RAID configuration.  
See the Dell Lifecycle Controller documentation or online help for information about RAID configuration.
  - b. Ensure that the drives are configured correctly for the RAID array.
  - c. Take the drive offline and reseal the drive.
  - d. Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the needed device drivers for your controller card are installed and are configured correctly. For more information, see the operating system documentation.
4. Restart the system and enter the System Setup.
5. Verify that the controller is enabled and the drives are displayed in the System Setup.

## Next steps

If the problem persists, see the Getting help section.

## Related references

[Getting help](#) on page 207

# 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 controller, see the documentation for your operating system and the controller.

**NOTE:** Mini-PERC socket is not hot-pluggable.

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 references


[Getting help](#) on page 207

# 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.

 **NOTE:** Riser slots are not hot-pluggable.

### 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 references

[Getting help](#) on page 207

# 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.

 **NOTE:** Processor sockets are not hot-pluggable.

## 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.

# Getting help

## Topics:

- [Contacting Dell EMC](#)
- [Documentation feedback](#)
- [Accessing system information by using QRL](#)
- [UEFI iSCSI Settings](#)

## Contacting Dell EMC

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

### Steps

1. Go to [www.dell.com/support/home](http://www.dell.com/support/home).
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
  - a. Enter your system Service Tag in the **Enter your Service Tag** field.
  - b. Click **Submit**.  
The support page that lists the various support categories is displayed.
4. For general support:
  - a. Select your product category.
  - b. Select your product segment.
  - c. Select your product.  
The support page that lists the various support categories is displayed.
5. For contact details of Dell EMC Global Technical Support:
  - a. Click [Global Technical Support](#).
  - b. Enter your system Service Tag in the **Enter your Service Tag** field on the Contact Us webpage.

## Documentation feedback

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

## Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) located on the information tag in the front of the system, to access the information about the PowerEdge system.

### Prerequisites

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

The QRL includes the following information about your system:

- How-to videos
- Reference materials, including the Installation and Service Manual, LCD diagnostics, and mechanical overview

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

### Steps

1. Go to [www.dell.com/qrl](http://www.dell.com/qrl) and navigate to your specific product or
2. Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code on your system or in the Quick Resource Locator section.

## Quick Resource Locator (QRL) for PowerEdge T630



## UEFI iSCSI Settings

You can use the iSCSI Settings screen to modify iSCSI device settings. The iSCSI Settings option is available only in the UEFI boot mode. BIOS does not control network settings in the BIOS boot mode. For the BIOS boot mode, the option ROM of the network controller handles the network settings.

### Related references

[UEFI iSCSI Settings](#) on page 208