

Dell PowerEdge R730 Owner's Manual

Regulatory Model: E31S Series
Regulatory Type: E31S001



Notes, cautions, and warnings

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

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

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

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About the PowerEdge R730 systems

The Dell PowerEdge R730 systems are rack servers that support up to two Intel Xeon E5-2600 v3 processors, up to 24 DIMMs, and 16 hard drives or solid state drives (SSDs).

Supported configurations on PowerEdge R730 systems

 **NOTE:** Your system supports only internal, hot-swappable hard drives.

| Systems | Configurations |
|----------------------------|---|
| Eight-hard drive systems | Up to eight 3.5-inch hard drives or eight 2.5-inch hard drives. |
| Sixteen-hard drive systems | Up to sixteen 2.5-inch hard drives. |

Front panel features and indicators

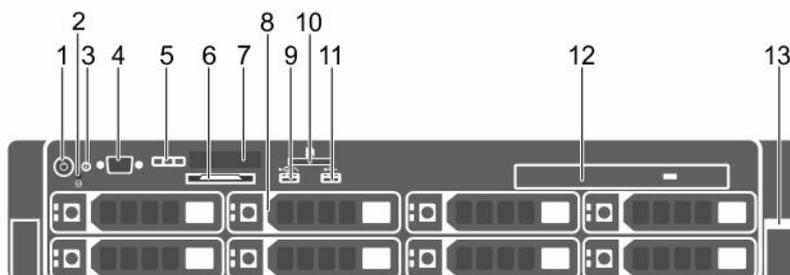


Figure 1. Front panel features and indicators (3.5-inch hard drive chassis)

| Item | Indicator, button, or connector | Icon | Description |
|------|----------------------------------|---|---|
| 1 | Power-on indicator, power button |  | The power-on indicator lights when the system power is on. The power button controls the power supply output to the system. |

| Item | Indicator, button, or connector | Icon | Description |
|------|--------------------------------------|---|---|
| | | |  NOTE: 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. |
| 2 | NMI button |  | <p>Used to troubleshoot software and device driver errors when running certain operating systems. This button can be pressed using the end of a paper clip.</p> <p>Use this button only if directed to do so by qualified support personnel or by the operating system documentation.</p> |
| 3 | 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 flashes until one of the buttons is pressed again.</p> <p>Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> <p>To reset iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.</p> |
| 4 | Video connector |  | Enables you to connect a display to the system. |
| 5 | LCD menu buttons | | Enable you to navigate the control panel LCD menu. |
| 6 | Information tag | | A slide-out label panel which allows you to record system information such as Service Tag, NIC, MAC address, and so on, as per your need. |
| 7 | LCD panel | | <p>Displays system ID, status information, and system error messages.</p> <p>For more information, see LCD panel features.</p> |
| 8 | Hard drives | | Up to eight 3.5-inch hot-swappable drives. |
| 9 | USB management port/ iDRAC Direct |  | Enables you to connect USB devices to the system or provides access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals . The USB management port is USB 2.0-compliant. |

| Item | Indicator, button, or connector | Icon | Description |
|------|---------------------------------|---|---|
| 10 | vFlash media card slot |  | Enables you to insert a vFlash media card. |
| 11 | USB connector |  | Enables you to connect USB devices to the system. The ports are USB 2.0-compliant. |
| 12 | Optical drive (optional) | | One optional SATA DVD-ROM drive or DVD+/-RW drive. |
| 13 | Quick Sync (optional) | | Indicates a Quick Sync enabled system. The Quick Sync feature is optional and requires a Quick Sync bezel. This feature allows management of the system using mobile devices. This feature aggregates hardware or firmware inventory and various system level diagnostic and error information which can be used in troubleshooting the system. For more information, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals . |

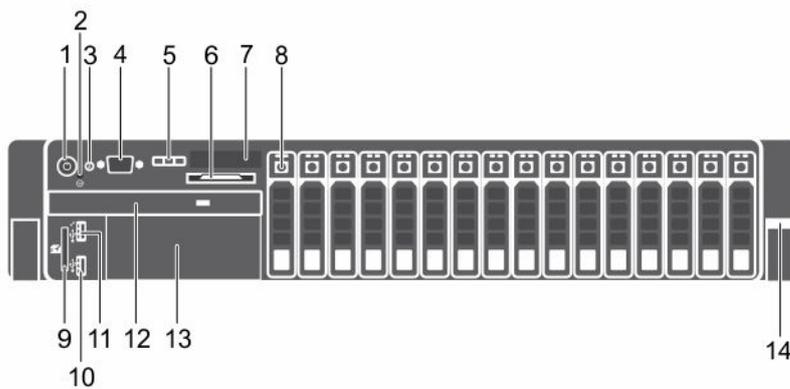


Figure 2. Front panel features and indicators (2.5-inch hard drive/SSD chassis)

| Item | Indicator, button, or connector | Icon | Description |
|------|----------------------------------|---|---|
| 1 | Power-on indicator, power button |  | The power-on indicator lights when the system power is on. The power button controls the power supply output to the system.  NOTE: 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. |
| 2 | NMI button |  | Used to troubleshoot software and device driver errors when running certain operating systems. |

| Item | Indicator, button, or connector | Icon | Description |
|------|-----------------------------------|---|---|
| | | | <p>This button can be pressed using the end of a paper clip.</p> <p>Use this button only if directed to do so by qualified support personnel or by the operating system documentation.</p> |
| 3 | 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 flashes until one of the buttons is pressed again.</p> <p>Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> <p>To reset iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.</p> |
| 4 | Video connector |  | Enables you to connect a display to the system. |
| 5 | LCD menu buttons | | Enable you to navigate the control panel LCD menu. |
| 6 | Information tag | | A slide-out label panel which allows you to record system information such as Service Tag, NIC, MAC address, and so on, as per your need. |
| 7 | LCD panel | | <p>Displays system ID, status information, and system error messages.</p> <p>For more information, see LCD panel features.</p> |
| 8 | Hard drives | | Up to sixteen 2.5-inch hot-swappable hard drives. |
| 9 | vFlash media card slot |  | Enables you to insert a vFlash media card. |
| 10 | USB connector |  | Enables you to connect USB devices to the system. The ports are USB 2.0-compliant. |
| 11 | USB management port/ iDRAC Direct |  | Enables you to connect USB devices to the system or provides access to the iDRAC Direct features. For more information, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals . The USB management port is USB 2.0-compliant. |
| 12 | Optical drive (optional) | | One optional SATA DVD-ROM drive or DVD+/-RW drive. |

| Item | Indicator, button, or connector | Icon | Description |
|------|---------------------------------|------|---|
| 13 | Tape drive slot (optional) | | One optional 3.5-inch tape backup unit. |
| 14 | Quick Sync (optional) | | Indicates a Quick Sync enabled system. The Quick Sync feature is optional and requires a Quick Sync bezel. This feature allows management of the system using mobile devices. This feature aggregates hardware or firmware inventory and various system level diagnostic and error information which can be used in troubleshooting the system. For more information, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals . |

LCD panel features

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

- The LCD backlight lights blue during normal operating conditions and lights amber to indicate an error condition.
- The LCD backlight is 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 through the iDRAC utility, the LCD panel, or other tools.

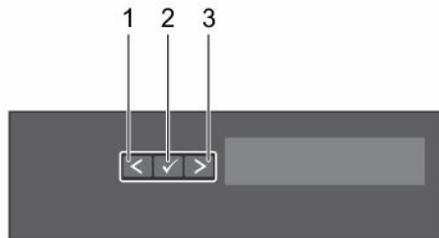


Figure 3. LCD panel features

| 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 | Moves the cursor forward in one-step increments. During message scrolling: <ul style="list-style-type: none"> • Press and hold the button to increase scrolling speed. • Release the button to stop. |

| Item | Button | Description |
|------|--------|-------------|
|------|--------|-------------|

 **NOTE:** The display stops scrolling when the button is released. After 45 seconds of inactivity the display starts scrolling.

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 is in standby mode, the LCD backlight turns off after five minutes of inactivity if there are no error messages. Press one of the three navigation buttons (Select, Left, or Right) to view the Home screen.

To navigate to the Home screen from another menu, continue to select the up arrow  until the Home icon  is displayed, and then select the Home icon.

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

View menu

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

| Option | Description |
|----------|--|
| iDRAC IP | Displays the IPv4 or IPv6 addresses for iDRAC8. Addresses include DNS (Primary and Secondary) , Gateway , IP , and Subnet (IPv6 does not have Subnet). |
| MAC | Displays the MAC addresses for iDRAC , iSCSI , or Network devices. |

| Option | Description |
|--------------------|--|
| Name | Displays the name of the Host , Model , or User String for the system. |
| Number | Displays the Asset tag or the Service tag for the system. |
| Power | Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the Set home submenu of the Setup menu. |
| Temperature | Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the Set home submenu of the Setup menu. |

Hard drive indicator codes

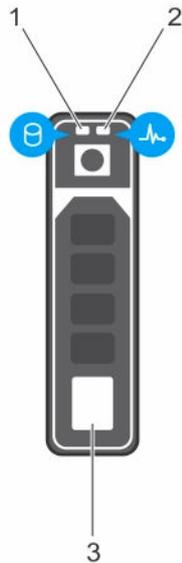


Figure 4. Hard drive indicators

1. hard drive activity indicator
2. hard drive status indicator
3. hard drive

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

| Drive-status indicator pattern (RAID only) | Condition |
|--|--|
| Blinks green two times per second | Identifying drive or preparing for removal. |
| Off | Drive ready for insertion or removal. |
| | NOTE: 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. |
| Blinks green, amber, and turns off | Predicted drive failure |

| Drive-status indicator pattern (RAID only) | Condition |
|--|------------------|
| Blinks amber four times per second | Drive failed |
| Blinks green slowly | Drive rebuilding |
| Steady green | Drive online |
| Blinks green three seconds, amber three seconds, and turns off six seconds | Rebuild aborted |

iDRAC Direct LED indicator codes

 **NOTE:** The iDRAC Direct LED indicator does not light up for the USB mode.

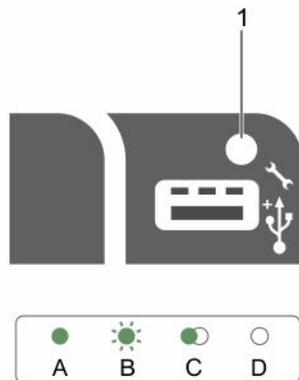


Figure 5. iDRAC Direct LED indicator

1. iDRAC Direct status indicator

The following table displays iDRAC Direct activity when configuring iDRAC Direct by using the management port (USB XML Import).

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

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

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

Quick Sync indicator codes

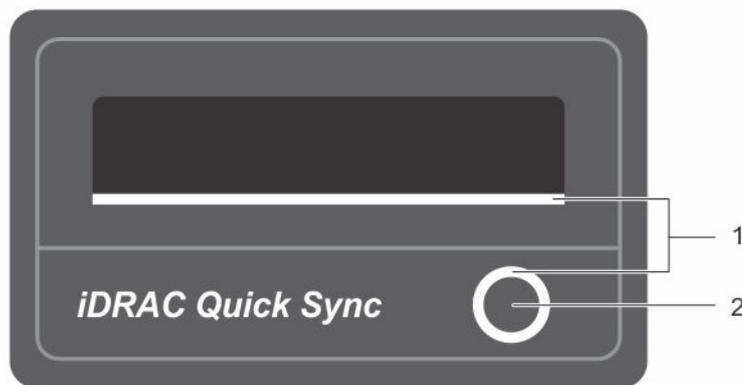


Figure 6. Quick Sync indicator codes

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

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

| Power indicator pattern | Condition |
|-------------------------|--|
| | <p>indicates that power is not delivered to the Quick Sync bezel.</p> <p> NOTE: For security purposes, Quick Sync turns off after thirty seconds of inactivity after the activation button is pressed. Once timed-out, the user is expected to press the activation button again to activate Quick Sync.</p> |

Back panel features and indicators

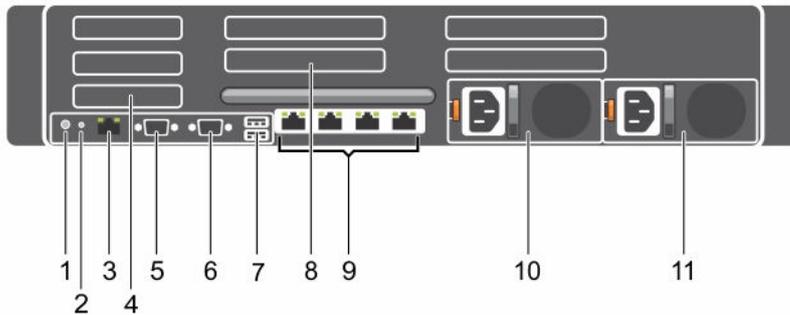


Figure 7. Back panel features and indicators

| Item | Indicator, button, or connector | Icon | Description |
|------|---------------------------------|---|--|
| 1 | System identification button |  | <p>The identification buttons on the front and back panels can be used to locate a particular system within a rack.</p> <p>When one of these buttons is pressed, the LCD panel on the front and the system status indicator on the back flashes until one of the buttons is pressed again.</p> <p>Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> |

| Item | Indicator, button, or connector | Icon | Description |
|------|--|--|---|
| | | | To reset iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds. |
| 2 | System identification connector | | Connects the optional system status indicator assembly through the optional cable management arm. |
| 3 | iDRAC8 Enterprise port |  | Dedicated management port. |
| 4 | Half-height PCIe expansion card slot (3) | | Allows you to connect up to three half-height PCI Express expansion cards. |
| 5 | Serial connector |  | Allows you to connect a serial device to the system. |
| 6 | Video connector |  | Allows you to connect a VGA display to the system. |
| 7 | USB connector (2) |  | Allows you to connect USB devices to the system. The ports are USB 3.0-compliant. |
| 8 | Full-height PCIe expansion card slot (4) | | Allows you to connect up to four full-height PCI Express expansion cards. |
| 9 | Ethernet connector (4) |  | Four integrated 10/100/1000 Mbps NIC connectors or Four integrated connectors that include: <ul style="list-style-type: none"> • Two 10/100/1000 Mbps NIC connectors • Two 100 Mbps/1 Gbps/10 Gbps SFP+/10 GbE T connectors |
| 10 | Power supply unit (PSU1) | | AC 495 W, 750 W, or 1100 W |
| 11 | Power supply unit (PSU2) | | or DC 750 W or 1100 W |

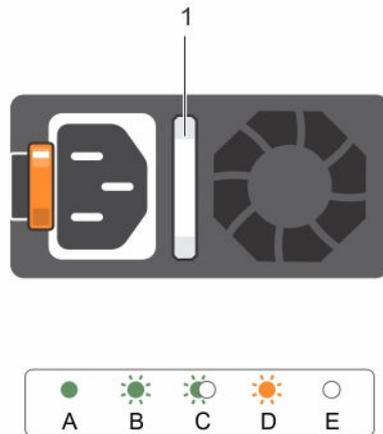


Figure 9. AC PSU status indicator

1. AC PSU status indicator/handle

| 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 that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. Replace the PSU with a PSU that matches the capacity of the other PSU. ⚠ CAUTION: For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back. Mixing PSUs from previous generations of Dell PowerEdge servers can result in a PSU mismatch condition or failure to power on. |
| D | Flashing amber | Indicates a problem with the PSU. ⚠ CAUTION: 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 power down the system. |

| Convention | Power indicator pattern | Condition |
|------------|-------------------------|---|
| | | <p>⚠ CAUTION: 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>⚠ CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.</p> <p>⚠ CAUTION: Combining AC and DC PSUs is not supported and triggers a mismatch.</p> |
| E | Not lit | Power is not connected. |

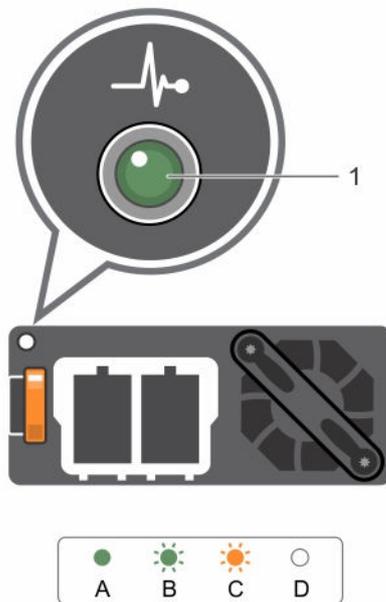


Figure 10. DC PSU status indicator

1. DC PSU status indicator

| 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. Replace the PSU with a PSU that matches the capacity of the other installed PSU. |
| C | Flashing amber | Indicates a problem with the PSU. |

| Convention | Power indicator pattern | Condition |
|------------|-------------------------|---|
| | | <p> CAUTION: 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 power down the system.</p> <p> CAUTION: 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.</p> <p> CAUTION: If two PSU are used, they must be of the same type and have the same maximum output power.</p> <p> CAUTION: Combining AC and DC PSU is not supported and triggers a mismatch.</p> |
| D | Not lit | Power is not connected. |

Documentation matrix

The documentation matrix provides information on documents that you can refer to for setting up and managing your system.

Table 1. Documentation matrix

| To... | See the... |
|--|--|
| Install your system into a rack | Rack documentation included with your rack solution. |
| Set up your system and know the system technical specifications | <i>Getting Started With Your System</i> that shipped with your system or see Dell.com/poweredgemanuals . |
| Install the operating system | Operating system documentation at Dell.com/operatingsystemmanuals |
| Get an overview of the Dell Systems Management offerings | Dell OpenManage Systems Management Overview Guide at Dell.com/openmanagemanuals > OpenManage software |
| Configure and log in to iDRAC, set up managed and management system, know the iDRAC features and troubleshoot by using iDRAC | Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals |
| Know about the RACADM subcommands and supported RACADM interfaces | RACADM Command Line Reference Guide for iDRAC at Dell.com/idracmanuals |
| Launch, enable and disable Dell Lifecycle Controller, know the features, use and troubleshoot Dell Lifecycle Controller | Dell Lifecycle Controller User's Guide at Dell.com/idracmanuals |

| To... | See the... |
|---|--|
| Use Dell Lifecycle Controller Remote Services | Dell Lifecycle Controller Remote Services Quick Start Guide at Dell.com/idracmanuals |
| Set up, use, and troubleshoot OpenManage Server Administrator | Dell OpenManage Server Administrator User's Guide at Dell.com/openmanagemanuals > OpenManage Server Administrator |
| Install, use, and troubleshoot OpenManage Essentials | Dell OpenManage Essentials User's Guide at Dell.com/openmanagemanuals > OpenManage Essentials |
| Know the features of the storage controller cards, deploy the cards, and manage the storage subsystem | Storage controller documentation at Dell.com/storagecontrollermanuals |
| Check the event and error messages generated by the system firmware and agents that monitor system components | Dell Event and Error Messages Reference Guide at Dell.com/openmanagemanuals > OpenManage software. |

Quick Resource Locator

Use the Quick Resource Locator (QRL) to get immediate access to system information and how-to videos. This can be done by visiting Dell.com/QRL or by using your smartphone or tablet and a model specific Quick Resource (QR) code located on your Dell PowerEdge system. To try out the QR code, scan the following image.



Performing initial system configuration

After you receive your system, you must set up your system, install the operating system if it is not pre-installed, and set up and configure the system iDRAC IP address.

Setting up your system

1. Unpack the system.
2. Install the system into the rack. For more information about installing the system into the rack, see your system *Rack Installation* placemat at Dell.com/poweredgedmanuals.
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.

Setting up and configuring the iDRAC IP address

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

- iDRAC Settings utility.
- Dell Lifecycle Controller.
- Dell Deployment Toolkit.
- System LCD panel.
- Quick Sync (optional)

You can configure iDRAC IP using:

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

For more information on setting up and configuring iDRAC, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/idracmanuals.

Logging in to iDRAC

You can log in to iDRAC as an iDRAC local user, a Microsoft Active Directory user, or a Lightweight Directory Access Protocol (LDAP) user. You can also log in by using Single Sign-On or a Smart Card. The

default user name is **root** and password is **calvin**. For more information about logging in to iDRAC and iDRAC licenses, see the Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).

You can also access iDRAC by using RACADM. For more information, see the RACADM Command Line Interface Reference Guide and the Integrated Dell Remote Access Controller User's Guide available at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).

Methods of installing the operating system

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

- Dell Systems Management Tools and Documentation media. See the operating system documentation at [Dell.com/operatingsystemmanuals](https://www.dell.com/support/manuals).
- Dell Lifecycle Controller. See the Lifecycle Controller documentation at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).
- Dell OpenManage Deployment Toolkit. See the OpenManage documentation at [Dell.com/openmanagemanuals](https://www.dell.com/support/manuals) > **OpenManage software**.

For information on the list of operating systems supported on your system, see the operating systems support matrix at [Dell.com/ossupport](https://www.dell.com/support).

Managing your system remotely

To perform out-of-band systems management using iDRAC, you must configure iDRAC for remote accessibility, set up the management station and managed system, and configure the supported Web browsers. For more information, see the Integrated Dell Remote Access Controller User's Guide at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).

You can also remotely monitor and manage the server by using the Dell OpenManage Server Administrator (OMSA) software and OpenManage Essentials (OME) systems management console. For more information, see [Dell.com/openmanagemanuals](https://www.dell.com/support/manuals) > **OpenManage software**.

Downloading drivers and firmware

It is recommended 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.

Steps

1. Go to [Dell.com/support/drivers](https://www.dell.com/support/drivers).
2. In the **Product Selection** section, enter the Service Tag of your system in the **Service Tag or Express Service Code** field.



NOTE: If you do not have the Service Tag, select **Automatically detect my Service Tag for me** to enable the system to automatically detect your Service Tag, or select **Choose from a list of all Dell products** to select your product from the **Product Selection** page.

3. Click **Get drivers and downloads**.

The drivers that are applicable to your selection are displayed.

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

Pre-operating system management applications

The pre-operating system management applications for your system help you manage different settings and features without booting to the operating system.

Your system has the following pre-operating system management applications:

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

Navigation keys

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

| Key | Description |
|------------|--|
| F2 | Enter System Setup . |
| F10 | Enters system services and starts Lifecycle Controller . |
| F11 | Enters Boot Manager . |
| F12 | Enters PXE Boot . |
| Page Up | Moves to the previous screen. |
| Page Down | Moves to the next screen. |
| Up arrow | Moves to the previous field. |
| Down arrow | Moves to the next field. |
| Enter | Enables you to type a value in the selected field (if applicable). |
| Spacebar | Expands or collapses a drop-down list, if applicable. |
| Tab | Moves to the next menu item. |
| |  NOTE: This feature is applicable for the standard graphic browser only. |
| Esc | Moves to the previous page until you view the main screen. Pressing Esc in the main screen exits System BIOS , iDRAC Settings , Device Settings , or Service Tag Settings , and proceeds with system boot. |
| F1 | Displays the system setup help. |

About 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 in two ways:

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

Entering System Setup

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

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

System Setup Main Menu

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

| Option | Description |
|------------------------|--|
| System BIOS | Enables you to configure BIOS settings. |
| iDRAC Settings | Enables you to configure iDRAC settings. 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. For more information about this utility, see <i>Integrated Dell Remote Access Controller User's Guide</i> at Dell.com/idracmanuals . |
| Device Settings | Enables you to configure device settings. |

System BIOS screen

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.

To view the **System BIOS** screen, click **System Setup Main Menu** → **System BIOS**.

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

| Option | Description |
|---------------------------|---|
| System Information | Displays information about the system such as the system model name, BIOS version, and Service Tag. |
| Memory Settings | Displays information and options related to the installed memory. |

| Option | Description |
|--------------------------------|---|
| Processor Settings | Displays information and options related to the processor such as speed, cache size. |
| SATA Settings | Displays options to enable or disable the integrated SATA controller and ports. |
| Boot Settings | Displays options to specify the boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings. |
| Network Settings | Displays options to change the network settings. |
| Integrated Devices | Displays options to manage integrated device controllers and ports, and specify related features and options. |
| Serial Communication | Displays options to manage the serial ports, and specify related features and options. |
| System Profile Settings | Displays options to change the processor power management settings, memory frequency, and so on. |
| System Security | Displays options to configure the system security settings, such as system password, setup password, TPM security. It also manages the power and NMI buttons on the system. |
| Miscellaneous Settings | Displays options to change the system date, time, and so on. |

System Information screen

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

To view the **System Information** screen, click **System Setup Main Menu** → **System BIOS** → **System Information**.

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

| Option | Description |
|--|---|
| System Model Name | Displays the system model name. |
| System BIOS Version | Displays the BIOS version installed on the system. |
| System Management Engine Version | Displays the current version of the Management Engine firmware. |
| System Service Tag | Displays the system Service Tag. |
| System Manufacturer | Displays the name of the system manufacturer. |
| System Manufacturer Contact Information | Displays the contact information of the system manufacturer. |
| System CPLD Version | Displays the current version of the system complex programmable logic device (CPLD) firmware. |

| Option | Description |
|-------------------------|--|
| UEFI Compliance Version | Displays the UEFI compliance level of the system firmware. |

Memory Settings screen

You can use the **Memory Settings** screen to view all the memory settings and enable or disable specific memory functions, such as system memory testing and node interleaving. To view the **Memory Setting** screen, click **System Setup Main Menu** → **System BIOS** → **Memory Settings**. The **Memory Settings** screen details are explained as follows:

| Option | Description |
|------------------------------|---|
| System Memory Size | Displays the amount of memory installed in the system. |
| System Memory Type | Displays the type of memory installed in the system. |
| System Memory Speed | Displays the system memory speed. |
| System Memory Voltage | Displays the system memory voltage. |
| Video Memory | Displays the amount of video memory. |
| System Memory Testing | Specifies whether the system memory tests are run during system boot. Options are Enabled and Disabled . This option is set to Disabled by default. |
| Memory Operating Mode | Specifies the memory operating mode. The options available are Optimizer Mode , Advanced ECC Mode , Mirror Mode , Spare Mode , Spare with Advanced ECC Mode , and Dell Fault Resilient Mode . This option is set to Optimizer Mode by default. <ul style="list-style-type: none">  NOTE: The Memory Operating Mode can have different default and available options based on the memory configuration of your system.  NOTE: The Dell Fault Resilient Mode 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. |
| Node Interleaving | Specifies if Non-Uniform Memory architecture (NUMA) is supported. If this field is set to Enabled , memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to Disabled , the system supports NUMA (asymmetric) memory configurations. This option is set to Disabled by default. |
| Snoop Mode | Specifies the Snoop Mode options. The Snoop Mode options available are Home Snoop , Early Snoop , and Cluster on Die . This option is set to Early Snoop by default. This field is available only when the Node Interleaving is set to Disabled . |

Processor Settings screen

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. To view the **Processor Settings** screen click the **System Setup Main Menu** → **System BIOS** → **Processor Settings**.

| Menu Item | Description |
|--|--|
| Logical Processor | Enables or disables the logical processors and displays the number of logical processors. If the Logical Processor option is set to Enabled , the BIOS displays all the logical processors. If this option is set to Disabled , the BIOS displays only one logical processor per core. By default, the Logical Processor option is set to Enabled . |
| Alternate RTID (Requestor Transaction ID) Setting | Enables you to allocate more RTIDs to the remote socket, thereby increasing cache performance between the sockets or easing work in normal mode for NUMA. By default, the Alternate RTID (Requestor Transaction ID) Setting is set to Disabled . |
| Virtualization Technology | Enables or disables the additional hardware capabilities provided for virtualization. By default, the Virtualization Technology option is set to Enabled . |
| Address Translation Service (ATS) | Defines the Address Translation Cache (ATC) for devices to cache the DMA transactions. This field provides an interface to a chipset's Address Translation and Protection Table to translate DMA addresses to host addresses. By default, the option is set to Enabled . |
| Adjacent Cache Line Prefetch | Optimizes the system for applications that require high utilization of sequential memory access. By default, the Adjacent Cache Line Prefetch option is set to Enabled . You can disable this option for applications that require high utilization of random memory access. |
| Hardware Prefetcher | Enables or disables the hardware prefetcher. By default, the Hardware Prefetcher option is set to Enabled . |
| DCU Streamer Prefetcher | Allows you to enable or disable the Data Cache Unit (DCU) streamer prefetcher. By default, the DCU Streamer Prefetcher option is set to Enabled . |
| DCU IP Prefetcher | Enables or disables the Data Cache Unit (DCU) IP prefetcher. By default, the DCU IP Prefetcher option is set to Enabled . |
| Execute Disable | Enables or disables the execute disable memory protection technology feature. By default, the Execute Disable option is set to Enabled . |
| Logical Processor Idling | Enables or disables the operating system capability to put logical processors in the idling state in order to reduce power consumption. By default, the option is set to Disabled . |
| Configurable TDP | Allows reconfiguration of Thermal Design Power (TDP) to lower levels. TDP refers to the maximum amount of power the cooling system is required to dissipate. |
| X2Apic Mode | Enables or disables the X2Apic mode. |
| Dell Controlled Turbo |  NOTE: Depending on the number of installed CPUs, there may be up to four processor listings. Controls the turbo engagement. Enable this option only when System Profile is set to Performance . |
| Number of Cores per Processor | Controls the number of enabled cores in each processor. By default, the Number of Cores per Processor option is set to All . |
| Processor 64-bit Support | Specifies if the processor(s) support 64-bit extensions. |
| Processor Core Speed | Displays the maximum core frequency of the processor. |

| Menu Item | Description |
|------------------------------|--|
| Processor 1 |  NOTE: Depending on the number of installed CPUs, there may be up to four processor listings. The following settings are displayed for each processor installed in the system. |
| Family-Model-Stepping | Displays the family, model and stepping of the processor as defined by Intel. |
| Brand | Displays the brand name reported by the processor. |
| Level 2 Cache | Displays the total L2 cache. |
| Level 3 Cache | Displays the total L3 cache. |
| Number of Cores | Displays the number of cores per processor. |

SATA Settings screen

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

To view the **SATA Settings** screen, click **System Setup Main Menu** → **System BIOS** → **SATA Settings**.

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

| Option | Description | | | | | | | | |
|-----------------------------|---|--------|-------------|--------------|--|-------------------|---|-----------------|--|
| Embedded SATA | Enables the embedded SATA option to be set to Off , ATAAHCI , or RAID modes. This option is set to AHCI by default. | | | | | | | | |
| Security Freeze Lock | Sends Security Freeze Lock command to the Embedded SATA drives during POST. This option is applicable only to ATA and AHCI modes. | | | | | | | | |
| Write Cache | Enables or disables the command for Embedded SATA drives during POST. | | | | | | | | |
| Port A | Sets the drive type of the selected device. For Embedded SATA settings in ATA mode, set this field to Auto to enable BIOS support. Set it to OFF to turn off BIOS support. For AHCI or RAID mode, BIOS support is always enabled. | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Model</td> <td>Displays the drive model of the selected device.</td> </tr> <tr> <td>Drive Type</td> <td>Displays the type of drive attached to the SATA port.</td> </tr> <tr> <td>Capacity</td> <td>Displays 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 | Model | Displays the drive model of the selected device. | Drive Type | Displays the type of drive attached to the SATA port. | Capacity | Displays the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives. |
| Option | Description | | | | | | | | |
| Model | Displays the drive model of the selected device. | | | | | | | | |
| Drive Type | Displays the type of drive attached to the SATA port. | | | | | | | | |
| Capacity | Displays the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives. | | | | | | | | |
| Port B | Sets the drive type of the selected device. For Embedded SATA settings in ATA mode, set this field to Auto to enable BIOS support. Set it to OFF to turn off BIOS support. For AHCI or RAID mode, BIOS support is always enabled. | | | | | | | | |
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| Drive Type | Displays the type of drive attached to the SATA port. | | | | | | | | |

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

Option

Description

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

Option

Description

Model

Displays the drive model of the selected device.

Drive Type

Displays the type of drive attached to the SATA port.

Capacity

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

Port G

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

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

Option

Description

Model

Displays the drive model of the selected device.

Drive Type

Displays the type of drive attached to the SATA port.

Capacity

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

Port H

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

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

Option

Description

Model

Displays the drive model of the selected device.

Drive Type

Displays the type of drive attached to the SATA port.

Capacity

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

Port I

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

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

Option

Description

Model

Displays the drive model of the selected device.

Drive Type

Displays the type of drive attached to the SATA port.

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

Boot Settings screen

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.

To view the **Boot Settings** screen, click **System Setup Main Menu** → **System BIOS** → **Boot Settings**.

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

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

Network Settings screen

You can use the **Network Settings** screen to modify PXE device settings. The network settings option is available only in the UEFI boot mode. BIOS does not control network settings in the BIOS boot mode. For BIOS boot mode, the option ROM of the network controllers handles the network settings. To view the **Network Settings** screen, click **System Setup Main Menu** → **System BIOS** → **Network Settings**.

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

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

Integrated Devices screen

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.

To view the **Integrated Devices** screen, click **System Setup Main Menu** → **System BIOS** → **Integrated Devices**.

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

| Option | Description |
|-----------------------------------|---|
| USB 3.0 Setting | 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 disabled by default. |
| User Accessible USB Ports | Enables or disables the USB ports. Selecting Only Back Ports On disables the front USB ports, selecting All Ports Off disables all USB ports. The USB keyboard and mouse operates 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.  NOTE: Selecting Only Back Ports On and All Ports Off disables the USB management port and also restrict access to iDRAC features. |
| Internal USB Port | Enables or disables the internal USB port. This option is set to Enabled by default. |
| Integrated RAID Controller | Enables or disables the integrated RAID controller. This option is set to Enabled by default. |
| Integrated Network Card 1 | Enables or disables the integrated network card. |
| Embedded NIC1 and NIC2 |  NOTE: The Embedded NIC1 and NIC2 option is only available on systems that do not have Integrated Network Card 1 . Enables or disables the Embedded NIC1 and NIC2. If set to Disabled , the NIC may still be available for shared network access by the embedded management controller. The embedded NIC1 and NIC2 option are only available on systems that do not have Network Daughter Cards (NDCs). This option is mutually exclusive with |

| Option | Description |
|---|---|
| | the Integrated Network Card 1 option. Configure this function by using the NIC management utilities of the system. |
| I/OAT DMA Engine | Enables or disables the I/OAT option. Enable only if the hardware and software support the feature. |
| Embedded Video Controller | Allows you to Enable or Disable the Embedded Video Controller . This option is set to Enabled by default. |
| Current State of Embedded Video Controller | Displays the current state of the embedded video controller. The Current State of Embedded Video Controller option is a read-only field, indicating the current state for the Embedded Video Controller . If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the Embedded Video Controller setting is set to Disabled . |
| SR-IOV Global Enable | Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to Disabled by default. |
| OS Watchdog Timer | If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to Enabled , the operating system is allowed to initialize the timer. When this option is set to Disabled (the default), the timer does not have any effect on the system. |
| Memory Mapped I/O above 4GB | Enables or disables the support for PCIe devices that require large amounts of memory. This option is set to Enabled by default. |
| Slot Disablement | 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. Slot disablement must be used only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled. |

Serial Communication screen

You can use the **Serial Communication** screen to view the properties of the serial communication port. To view the **Serial Communication** screen, click **System Setup Main Menu** → **System BIOS** → **Serial Communication**.

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

| Option | Description |
|-----------------------------|--|
| Serial Communication | Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled and the port address can be specified. This option is set to Auto by default. |
| Serial Port Address | Enables you to set the port address for serial devices. This option is set to Serial Device 1=COM2, Serial Device 2=COM1 by default. |
| |  NOTE: You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device. |

| Option | Description |
|----------------------------------|---|
| |  NOTE: Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1. |
| External Serial Connector | <p>Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this field.</p>  NOTE: Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.  NOTE: Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert this setting to the default setting of Serial Device 1. |
| Failsafe Baud Rate | Displays the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails, and the value must not be changed. This option is set to 115200 by default. |
| Remote Terminal Type | Sets the remote console terminal type. This option is set to VT 100/VT 220 by default. |
| Redirection After Boot | Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to Enabled by default. |

System Profile Settings screen

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

To view the **System Profile Settings** screen, click **System Setup Main Menu** → **System BIOS** → **System Profile Settings**.

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

| Option | Description |
|-----------------------------|---|
| System Profile | <p>Sets the system profile. If you set the System Profile option to a mode other than Custom, the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to Custom. This option is set to Performance Per Watt Optimized (DAPC) by default. DAPC is Dell Active Power Controller.</p>  NOTE: The following parameters are available only when the System Profile option is set to Custom . |
| CPU Power Management | Sets the CPU power management. This option is set to System DBPM (DAPC) by default. DBPM is Demand-Based Power Management. |
| Memory Frequency | Sets the speed of the system memory. You can select Maximum Performance , Maximum Reliability , or a specific speed. |

| Option | Description |
|--|--|
| Turbo Boost | Enables or disables the processor to operate in turbo boost mode. This option is set to Enabled by default. |
| Energy Efficient Turbo | Enables or disables the Energy Efficient Turbo . Energy Efficient Turbo (EET) is a mode of operation where a processor's core frequency is adjusted within the turbo range based on workload. |
| C1E | Enables or disables the processor to switch to a minimum performance state when it is idle. This option is set to Enabled by default. |
| C States | Enables or disables the processor to operate in all available power states. This option is set to Enabled by default. |
| Collaborative CPU Performance Control | Enables or disables the CPU power management. When set to Enabled , the CPU power management is controlled by the OS DBPM and the System DBPM (DAPC). This option is set to Disabled by default. |
| Memory Patrol Scrub | Sets the memory patrol scrub frequency. This option is set to Standard by default. |
| Memory Refresh Rate | Sets the memory refresh rate to either 1x or 2x. This option is set to 1x by default. |
| Uncore Frequency | Enables you to select the Processor Uncore Frequency . 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 Energy Efficiency Policy . |
| Energy Efficient Policy | Enables you to select the Energy Efficient Policy . The CPU uses the setting to manipulate the internal behavior of the processor and determines whether to target higher performance or better power savings. |
| Number of Turbo Boost Enabled Cores for Processor 1 |  NOTE: If there are two processors installed in the system, you see an entry for Number of Turbo Boost Enabled Cores for Processor 2 . Controls the number of turbo boost enabled cores for processor 1. The maximum number of cores is enabled by default. |
| Monitor/Mwait | Enables the Monitor/Mwait instructions in the processor. This option is set to Enabled for all system profiles, except Custom by default.  NOTE: This option can be disabled only if the C States option in Custom mode is set to disabled .  NOTE: When C States set to Enabled in Custom mode, changing the Monitor/Mwait setting does not impact the system power or performance. |

System Security Settings screen

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

To view the **System Security** screen, click **System Setup Main Menu** → **System BIOS** → **System Security Settings**.

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

| Option | Description |
|---|---|
| Intel AES-NI | Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set and is set to Enabled by default. |
| System Password | Sets the system password. This option is set to Enabled by default and is read-only if the password jumper is not installed in the system. |
| Setup Password | Sets the setup password. This option is read-only if the password jumper is not installed in the system. |
| Password Status | Locks the system password. This option is set to Unlocked by default. |
| TPM Security | <p> NOTE: The TPM menu is available only when the TPM module is installed.</p> <p>Enables you to control the reporting mode of the Trusted Platform Module (TPM). The TPM Security option is set to Off by default. You can only modify the TPM Status, TPM Activation, and Intel TXT fields if the TPM Status field is set to either On with Pre-boot Measurements or On without Pre-boot Measurements.</p> |
| TPM Information | Changes the operational state of the TPM. This option is set to No Change by default. |
| TPM Status | Displays the TPM status. |
| TPM Command | <p> CAUTION: Clearing the TPM results in the loss of all keys in the TPM. The loss of TPM keys may affect booting to the operating system.</p> <p>Clears all the contents of the TPM. The TPM Clear option is set to No by default.</p> |
| Intel TXT | Enables or disables the Intel Trusted Execution Technology (TXT). To enable the Intel TXT option, virtualization technology must be enabled and TPM Security must be Enabled with Pre-boot measurements. This option is set to Off by default. |
| Power Button | Enables or disables the power button on the front of the system. This option is set to Enabled by default. |
| NMI Button | Enables or disables the NMI button on the front of the system. This option is set to Disabled by default. |
| AC Power Recovery | Sets how the system reacts after AC power is restored to the system. This option is set to Last by default. |
| AC Power Recovery Delay | Sets how the system supports staggering of power up after AC power is restored to the system. This option is set to Immediate by default. |
| User Defined Delay (60s to 240s) | Sets the User Defined Delay when the User Defined option for AC Power Recovery Delay is selected. |
| UEFI Variable Access | Provides varying degrees of securing UEFI variables. When set to Standard (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to Controlled , selected UEFI variables are protected in the environment and new UEFI boot entries are forced to be at the end of the current boot order. |
| Secure Boot | Enables Secure Boot, where the BIOS authenticates each pre-boot image by using the certificates in the Secure Boot Policy. Secure Boot is disabled by default. |

| Option | Description |
|-----------------------------------|---|
| Secure Boot Policy | When Secure Boot policy is set to Standard , the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to Custom , the BIOS uses the user-defined key and certificates. Secure Boot policy is set to Standard by default. |
| Secure Boot Policy Summary | Displays the list of certificates and hashes that secure boot uses to authenticate images. |

Miscellaneous Settings screen

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

To view the **Miscellaneous Settings** screen, click **System Setup Main Menu** → **System BIOS** → **Miscellaneous Settings**. The **Miscellaneous Settings** screen details are explained as follows:

| Menu Item | Description |
|-------------------------------------|---|
| System Time | Enables you to set the time on the system. |
| System Date | Enables you to set the date on the system. |
| Asset Tag | Displays the asset tag and enables you to modify it for security and tracking purposes. |
| Keyboard NumLock | Enables you to set whether the system boots with the NumLock enabled or disabled. The Keyboard NumLock is set to On by default.  NOTE: This option does not apply to 84-key keyboards. |
| F1/F2 Prompt on Error | Enables or disables the F1/F2 prompt on error. F1/F2 Prompt on Error is set to Enabled by default. The F1/F2 prompt also includes keyboard errors. |
| Load Legacy Video Option ROM | Enables you to determine whether the system BIOS loads the legacy video (INT 10H) option ROM from the video controller. Selecting Enabled in the operating system does not support UEFI video output standards. This field is available only for UEFI boot mode. You cannot set this to Enabled if UEFI Secure Boot mode is enabled. |
| In-System Characterization | This option enables or disables In-System Characterization . In-System Characterization is set to Disabled by default. The two other options are Enabled and Enabled - No Reboot .  NOTE: The default setting for In-System Characterization is subject to change in future BIOS releases. When In-System Characterization (ISC) is set to enabled, ISC is executed during POST on detecting relevant change(s) in the system configuration. This helps in optimizing the system power and performance. ISC takes about 20 seconds to be executed, and system reset is required for ISC |

| Menu Item | Description |
|-----------|--|
| | results to be applied. The Enabled - No Reboot option executes ISC and continues without applying ISC results until the next time system reset occurs. The Enabled 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 is not executed. |

About Boot Manager

Boot manager enables you to add, delete, and arrange boot options. You can also access System Setup and boot options without restarting the system.

Entering Boot Manager

The boot manager screen enables you to select boot options and diagnostic utilities.

1. Turn on, or restart your system.
2. Press F11 when you see the message `F11 = Boot Manager`.
If your operating system begins to load before you press F11, allow the system to complete the booting, and then restart your system and try again.

Boot Manager main menu

| Menu item | Description |
|------------------------------------|---|
| Continue Normal Boot | The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found. |
| One Shot Boot Menu | Takes you to the boot menu, where you can select a one time boot device to boot from. |
| Launch System Setup | Enables you to access System Setup. Enables you to access System Setup. |
| Launch Lifecycle Controller | Exits the Boot Manager and invokes the Lifecycle Controller program. |
| System Utilities | Launches System Utilities menu such as System Diagnostics and UEFI shell. |

Changing the boot order

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

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

Choosing the system boot mode

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

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
 - Unified Extensible Firmware Interface (UEFI) boot mode is an enhanced 64-bit boot interface. If you have configured your system to boot to UEFI mode, it overlays 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.**

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

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

 **NOTE:** For the latest information about supported operating systems, go to Dell.com/ossupport.

Assigning a system and/or setup password

Prerequisites

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

You can assign a new system password and setup password or change an existing system password and setup password only when the password jumper setting is set to **Enabled** and **Password Status** is set to **Unlocked**.

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 restarting the 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 then 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 system password, and then press Enter or Tab.
A message prompts you to reenter the setup password.

7. Reenter the setup password, and click **OK**.
8. Press **Esc** to return to the **System BIOS** screen. Press **Esc** again.
A message prompts you to save the changes.

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

Using your system password to secure your system

About this task

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

Steps

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

Next steps

When **Password Status** is set to **Locked**, type the 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 stops functioning and must be turned off.

Even after you turn off and restart the system, the error message is displayed until the correct password is entered.

Deleting or changing an existing System password or Setup password

Prerequisites

Ensure that the Password jumper is set to **enabled** and the **Password Status** is set to **Unlocked** before attempting to delete or change the existing System password or Setup password. You cannot delete or change an existing System password or Setup password if the **Password Status** is set to **Locked**.

Steps

1. To enter System Setup, press **F2** immediately after a power-on or restart.
2. In **System Setup Main Menu**, select **System BIOS** and press **Enter**.
The **System BIOS** screen is displayed.
3. In the **System BIOS** screen, select **System Security** and press **Enter**.
The **System Security** screen is displayed.
4. In the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
5. Select **System Password**, change or delete the existing system password and press **Enter** or **Tab**.
6. Select **Setup Password**, change or delete the existing setup password and press **Enter** or **Tab**.

 **NOTE:** If you change the System password or Setup password, a message prompts you to reenter the new password. If you delete the System password or Setup password, a message prompts you to confirm the deletion.

7. Press **Esc** to return to the System BIOS screen. Press **Esc** again, and a message prompts you to save the changes and exit.

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.
- 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.

Embedded system management

The Dell Lifecycle Controller provides advanced embedded systems management throughout the server's lifecycle. The Dell Lifecycle Controller can be started during the boot sequence and can function independently of the operating system.

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

For more information about setting up the Dell Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Lifecycle Controller documentation at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).

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 requires the iDRAC Enterprise License upgrade.

For more information about using iDRAC, see *iDRAC User's Guide* at [Dell.com/idracmanuals](https://www.dell.com/support/manuals).

Entering the iDRAC settings utility

1. Turn on or restart the managed system.
2. Press F2 during Power-on Self-test (POST).
3. On the **System Setup Main Menu** page, click **iDRAC Settings**.
The **iDRAC Settings** screen is displayed.

Changing the Thermal Settings

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

1. Enter the iDRAC Settings utility.
2. Under **iDRAC Settings** → **Thermal** → **User Option**, select one of the following options:
 - Default
 - Maximum Exhaust Temperature
 - Fan Speed Offset

 **NOTE:** When the **User Option** is set to the default **Auto** setting, the user option cannot be modified.

3. Set the **Maximum Air Exhaust Temperature** or the **Fan Speed Offset** fields.
4. Click **Back** → **Finish** → **Yes**.

Installing and removing system components

Safety instructions

-  **WARNING:** Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.
-  **WARNING:** Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.
-  **CAUTION:** Do not operate the system without the cover for a duration exceeding five minutes.
-  **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.
-  **NOTE:** It is recommended that you always use a static mat and static strap while working on components inside the system.
-  **NOTE:** To ensure proper operation and cooling, all bays in the system must be populated at all times with either a module or with a blank.
-  **NOTE:** Operating the system without the system cover can result in component damage.

Before working inside your system

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.
For more information, see [Removing the bezel](#).
4. Remove the system cover.
For more information, see [Removing the system cover](#).

After working inside your system

1. Install the system cover.
For more information, see [Installing the system cover](#).
2. Install the optional bezel.
3. Reconnect the system to its electrical outlet and peripherals.
4. Turn the system on, including any attached peripherals.

Recommended tools

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

- Key to the bezel lock. This is only required when you have a bezel.
- #2 Phillips screwdriver
- #1 Phillips screwdriver
- T6, T8, T10, and T15 Torx screwdrivers

The following tools are required for assembling cables for a DC power supply unit (PSU):

- AMP 90871-1 hand-crimping tool or equivalent
- Tyco Electronics 58433-3 or equivalent
- 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).

Front bezel (optional)

Removing the front bezel

1. Unlock the bezel lock at the left end of the bezel.
2. Lift the release latch next to the bezel lock.
3. Pull the left end of the bezel, unhook the right end and remove the bezel.

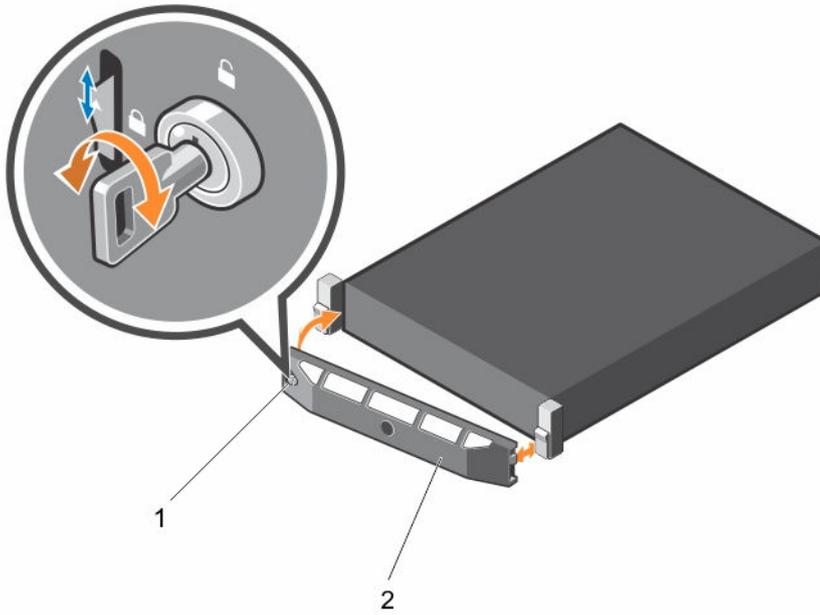


Figure 11. Removing and installing the front bezel

1. bezel lock

2. front bezel

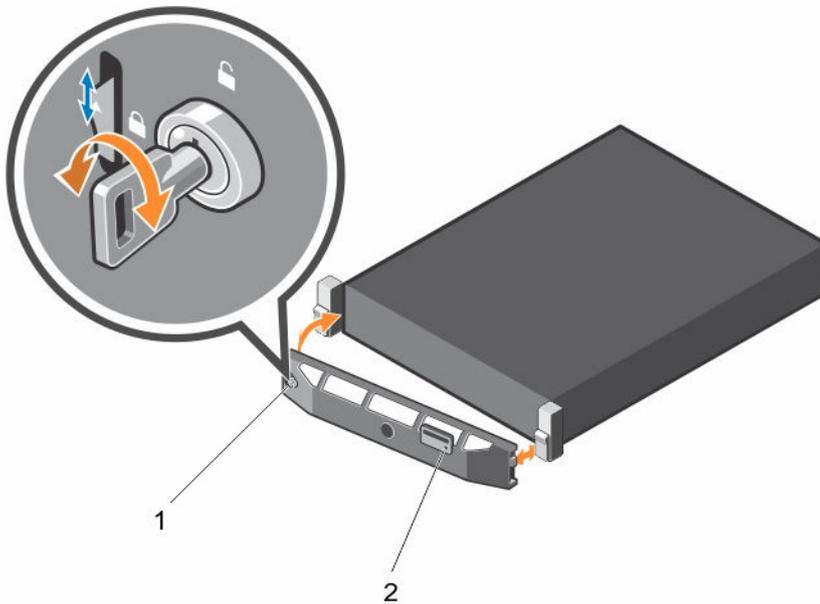


Figure 12. Removing and installing the Quick Sync bezel

1. keylock

2. Quick Sync bezel

Related videos

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

<http://www.Dell.com/QRL/Server/PER730/iDRAC-QuickSync>

Installing the front bezel

1. Hook the right end of the bezel onto the chassis.
2. Fit the free end of the bezel onto the system.
3. Secure the bezel with the keylock.

Removing the system cover

Prerequisites

1. Ensure that you follow the [Safety instructions](#).
2. Turn off the system, including any attached peripherals.
3. Disconnect the system from the electrical outlet and peripherals.
4. Remove the optional bezel. For more information see [Removing the bezel](#).

Steps

1. Rotate the latch release lock counter clockwise to the unlocked position.
2. Lift the latch and rotate the latch toward the back of the system.
The system cover slides back and the tabs on the system cover disengage from the slots on the chassis.
 **NOTE:** The position of the latch may vary depending on the configuration of your system.
3. Hold the cover on both sides, and lift the cover away from the system.

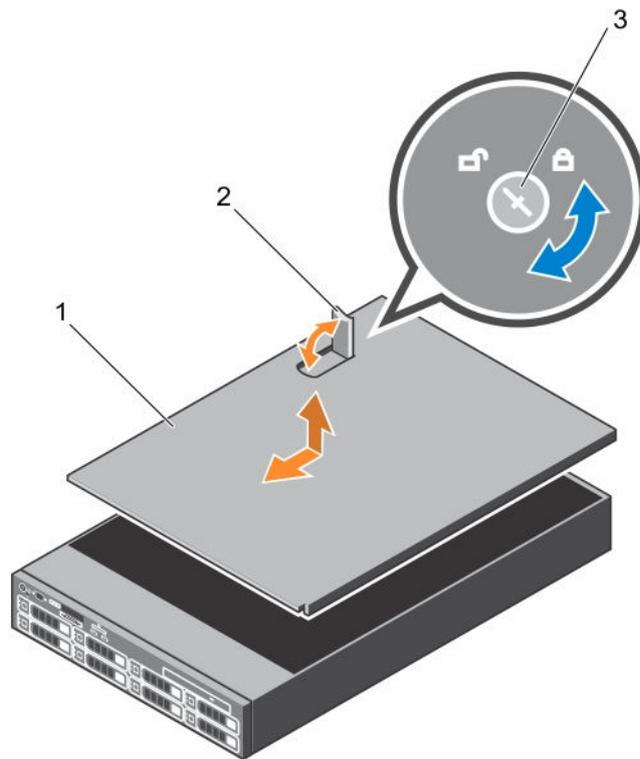


Figure 13. Removing and installing the system cover

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

Related video

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

Installing the system cover

Prerequisites

Ensure that you follow the [Safety instructions](#).

Steps

1. Align the slots on the system cover with the tabs on the chassis.
2. Push the system cover latch down to move the system cover into the closed position.
The system cover slides forward and the tabs on the system cover engage with the slots on the chassis. The system cover latch will lock into place when the system cover engages with the slots on the chassis.
3. Turn the latch release lock clockwise to the locked position.
4. Install the optional bezel.
5. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Inside the system

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

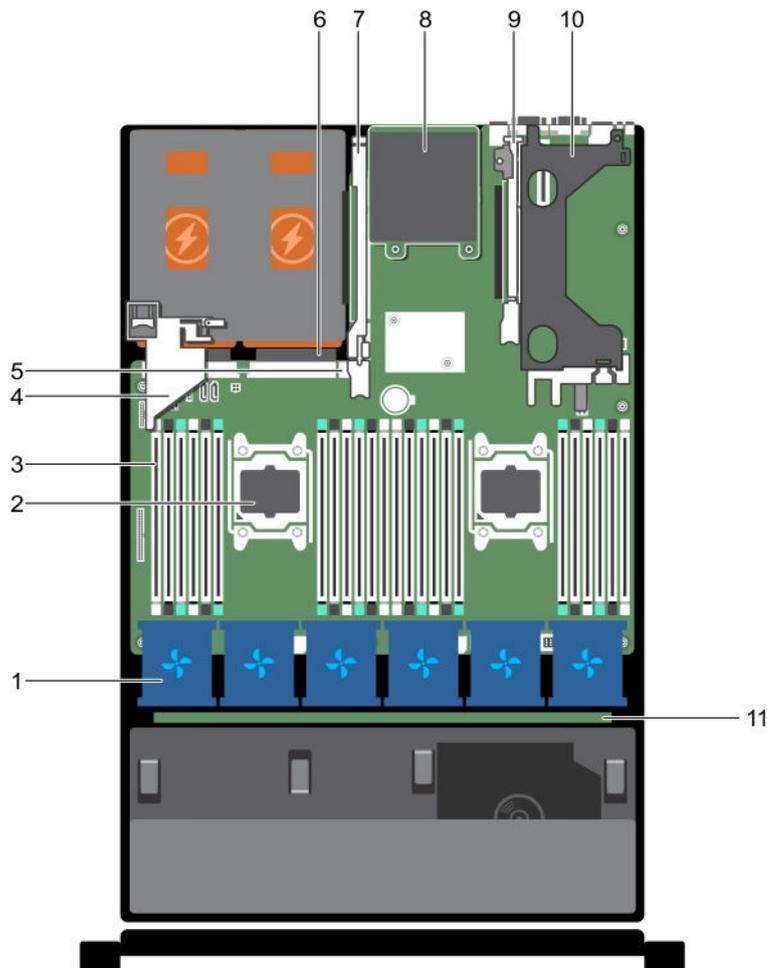


Figure 14. Inside the system

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

Cooling shroud

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 came with the product.

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If installed, remove the full-length PCIe card.

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

Steps

Hold the shroud and lift it away from the system.

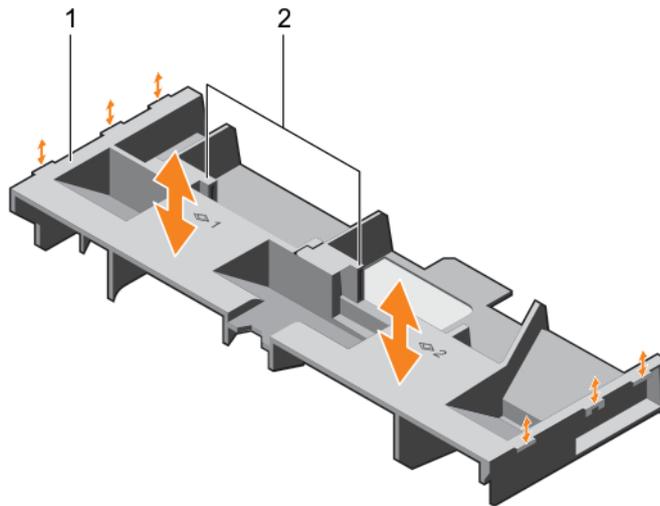


Figure 15. Removing and installing the cooling shroud

1. cooling shroud
2. touch point (2)

Next steps

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

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 came with the product.

1. Ensure that you read the [Safety instructions](#).
2. Route the cables inside the system along the chassis wall and secure the cables 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.

Next steps

1. If applicable, replace the full-length PCIe card.
2. Follow the procedure listed in [After working inside your system](#).

Cooling fans

Your system supports six hot-swappable cooling fans.

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

Removing a cooling fan

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

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

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

Steps

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

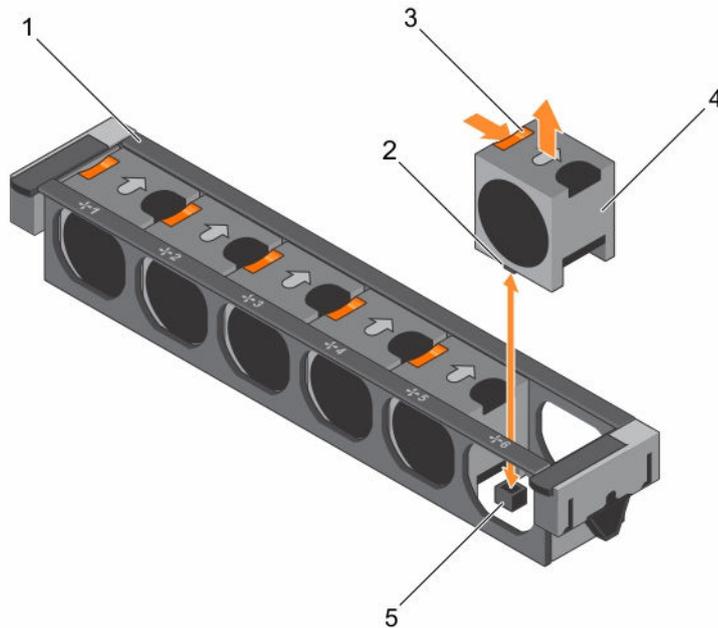


Figure 16. Removing and installing a cooling fan

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

Related video

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

Next steps

1. Replace the cooling fan. See [Installing a cooling fan](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing a cooling fan

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Align the plug at the base of the cooling fan with the connector on the system board.
2. Slide the cooling fan into the securing slots until the tabs lock into place.

Next steps

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

Cooling fan assembly

Removing the cooling fan assembly

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

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

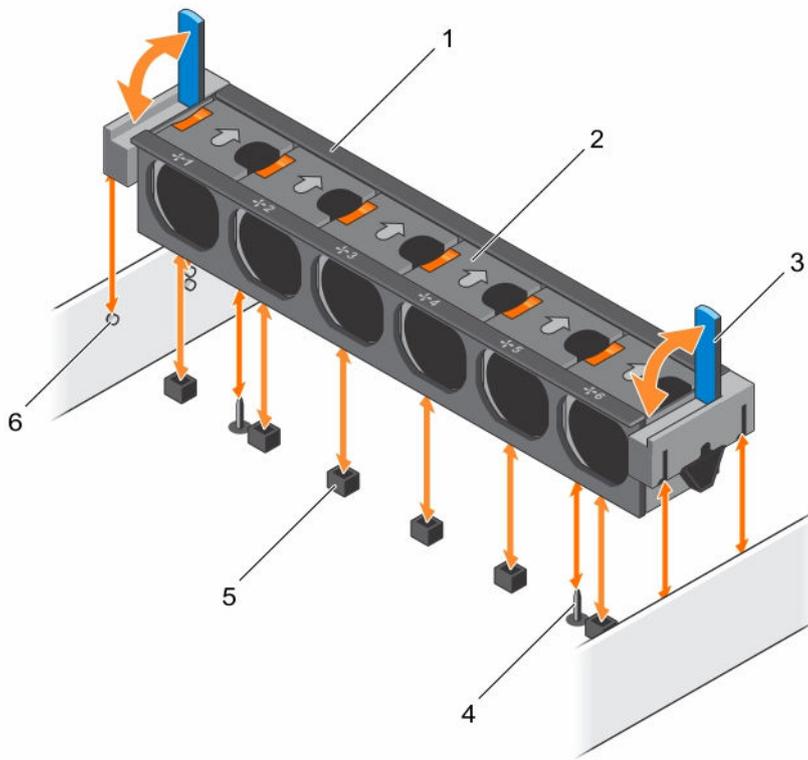


Figure 17. Removing and installing the cooling fan assembly

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

Related video

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

Next steps

1. Replace the cooling fan assembly. See [Installing the cooling fan assembly](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the cooling fan assembly

Prerequisites

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

1. Ensure that you read the [Safety instructions](#).

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



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

Steps

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

Next steps

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

System memory

Your system supports DDR4 registered DIMMs (RDIMMs), and load reduced DIMMs (LRDIMMs).



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

Memory bus operating frequency can be 1333 MT/s, 1600 MT/s, 1866 MT/s, or 2133 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.



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

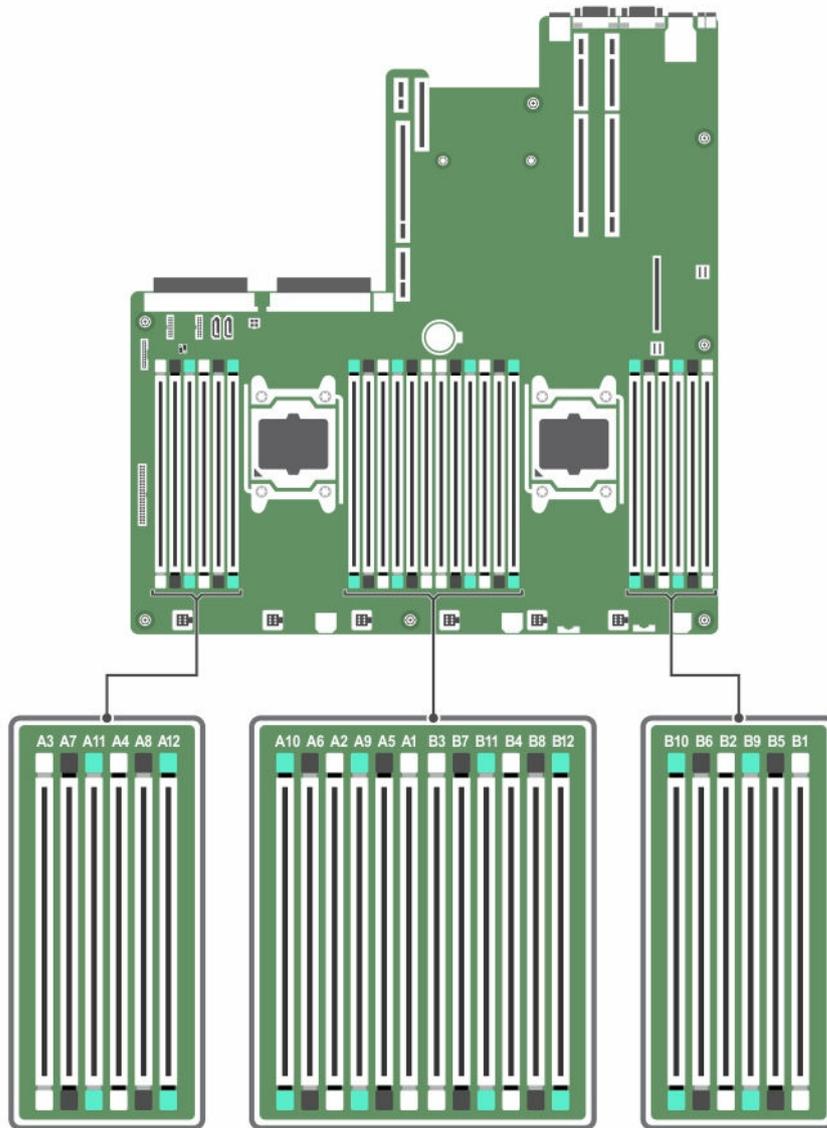


Figure 18. Memory socket locations

Memory channels are organized as follows:

- | | |
|--------------------|---|
| Processor 1 | channel 0: slots A1, A5, and A9 channel 1: slots A2, A6, and A10 channel 2: slots A3, A7, and A11 channel 3: slots A4, A8, and A12 |
| Processor 2 | channel 0: slots B1, B5, and B9 channel 1: slots B2, B6, and B10 channel 2: slots B3, B7, and B11 |

channel 3: slots B4, B8, and B12

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

| DIMM Type | DIMMs Populated/ Channel | Operating Frequency (in MT/s) | Maximum DIMM Rank/Channel |
|--------------|-----------------------------|----------------------------------|---------------------------|
| 1.2 V | | | |
| RDIMM | 1 | 2133, 1866, 1600, 1333 | Dual rank or single rank |
| | 2 | 2133, 1866, 1600, 1333 | Dual rank or single rank |
| | 3 | 1866, 1600, 1333 | Dual rank or single rank |
| LRDIMM | 1 | 2133, 1866, 1600, 1333 | Quad rank |
| | 2 | 2133, 1866, 1600, 1333 | Quad rank |
| | 3 | 1866, 1600, 1333 | Quad rank |

General memory module installation guidelines

Your 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 [Mode-specific guidelines](#).
- 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.
- 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 sockets with white release tabs first, then black, and then green.
- Populate the sockets by highest rank count in the following order — first in sockets with white release levers, then black, and then green. For example, if you want to mix single-rank and dual-rank memory modules, populate dual-rank memory modules in the sockets with white release tabs and single-rank memory modules in the sockets with black 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.

 **NOTE:** You can mix x4 and x8 DRAM based DIMMs to support RAS features. However, all guidelines for specific RAS features must be followed. x4 DRAM based DIMMs retain Single Device Data Correction (SDDC) in memory optimized (independent channel) mode. x8 DRAM based DIMMs require Advanced ECC mode to gain SDDC.

The following sections provide additional slot population guidelines for each mode:

Advanced ECC (lockstep)

Advanced 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.

 **NOTE:** Advanced ECC with mirroring is not supported.

Memory optimized (independent channel) mode

This mode supports SDDC only for memory modules that use x4 device width, and this mode 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 dual-rank memory modules, the available system memory is: $\frac{3}{4}$ (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.

Sample memory configurations

The following tables show sample memory configurations for one and two processor configurations that follow the appropriate memory guidelines.

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

Table 2. 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 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1 |
| 8 | 4 | 2 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1, A2 |
| 16 | 4 | 4 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1, A2, A3, A4 |
| | 8 | 2 | 2R, x8, 2133 MT/s, 2R, x8, 1866 MT/s | A1, A2 |
| 24 | 4 | 6 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6 |
| | 8 | 6 | 2R, x8, 2133 MT/s, 2R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6 |
| 48 | 4 | 12 | 1R, x8, 1866 MT/s, 1R, x8, 1600 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12 |
| | 8 | 6 | 2R, x8, 2133 MT/s, 2R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6 |
| 96 | 8 | 12 | 2R, x8, 1866 MT/s, 2R, x8 1600 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12 |
| | 16 | 6 | 2R, x4, 2133 MT/s, 2R, x4, 1866 MT/s | A1, A2, A3, A4, A5, A6 |

| System capacity (in GB) | DIMM size (in GB) | Number of DIMMs | DIMM rank, organization, and frequency | DIMM slot population |
|-------------------------|-------------------|-----------------|--|--|
| 128 | 16 | 8 | 2R, x4, 2133 MT/s, 2R, x4, 1866 MT/s, | A1, A2, A3, A4, A5, A6, A7, A8 |
| 144 | 16 and 8 | 10 | 2R, x4 and 2R, x8, 1866 MT/s 2R, x4 and 2R, x8, 1600 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A11  NOTE: 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. |
| 384 | 32 | 12 | LRDIMM, x4, 1866 MT/s LRDIMM, x4, 1600 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12 |
| 512 | 64 | 8 | LRDIMM, x4, 2133 MT/s | A1, A2, A3, A4, A5, A6, A7, A8 |
| 768 | 64 | 12 | LRDIMM, x4, 1866 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12 |

Table 3. Memory configurations—two processors

| System capacity (in GB) | DIMM size (in GB) | Number of DIMMs | DIMM rank, organization, and frequency | DIMM slot population |
|-------------------------|-------------------|-----------------|---|--|
| 16 | 4 | 4 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1, A2, B1, B2 |
| 32 | 4 | 8 | 1R, x8, 2133 MT/s, 1R, x8, 1866 MT/s | A1, A2, A3, A4, B1, B2, B3, B4 |
| 64 | 4 | 16 | 1R, x8, 2133 MT/s 1R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8 |
| | 8 | 8 | 2R, x8, 2133 MT/s, 2R, x8, 1866 MT/s | A1, A2, A3, A4, B1, B2, B3, B4 |
| 96 | 4 | 24 | 1R, x8, 1866 MT/s 1R, x8, 1600 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 | 2R, x8, 2133 MT/s, 2R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 |

| System capacity (in GB) | DIMM size (in GB) | Number of DIMMs | DIMM rank, organization, and frequency | DIMM slot population |
|-------------------------|-------------------|-----------------|--|--|
| 128 | 8 | 16 | 2R, x8, 2133 MT/s 2R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8 |
| | 16 | 8 | 2R, x4, 2133 MT/s, 2R, x4, 1866 MT/s | A1, A2, A3, A4, B1, B2, B3, B4 |
| 160 | 8 | 20 | 2R, x8, 1866 MT/s 2R, x8, 1600 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A11, B1, B2, B3, B4, B5, B6, B7, B8, B9, B11 |
| | 16 and 8 | 12 | 2R, x4, 2133 MT/s, 2R, x8, 2133 MT/s, 2R, x4, 1866 MT/s 2R, x8, 1866 MT/s | A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 |
| 192 | 8 | 24 | 2R, x8, 1866 MT/s 2R, x8, 1600 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 | 2R, x4, 2133 MT/s, 2R, x4, 1866 MT/s | A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 |
| 256 | 16 | 16 | 2R, x4, 2133 MT/s, 2R, x4, 1866 MT/s, | A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8 |
| 384 | 16 | 24 | 2R, x4, 1866 MT/s, 2R, x4, 1600 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 | LRDIMM, 4R, x4, 2133 MT/s | A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6 |
| 512 | 32 | 16 | LRDIMM, 4R, x4, 2133 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8 |
| 768 | 32 | 24 | LRDIMM, 4R, 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 |
| | | | RDIMM, 2R, x4, 1866 MT/s | |

 **NOTE:** 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.

| System capacity (in GB) | DIMM size (in GB) | Number of DIMMs | DIMM rank, organization, and frequency | DIMM slot population |
|-------------------------|-------------------|-----------------|--|--|
| | 64 | 12 | LRDIMM, 4R, x4, 2133 MT/s | A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6 |
| 1536 | 64 | 24 | LRDIMM, 4R, 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 |

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 came with the product.

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.
4. If installed, remove the cooling fan assembly. For more information, see [Removing the cooling fan assembly](#).

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

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

Steps

1. Locate the appropriate memory module socket.

 **CAUTION:** Handle each memory module only by the card edges, making sure 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.

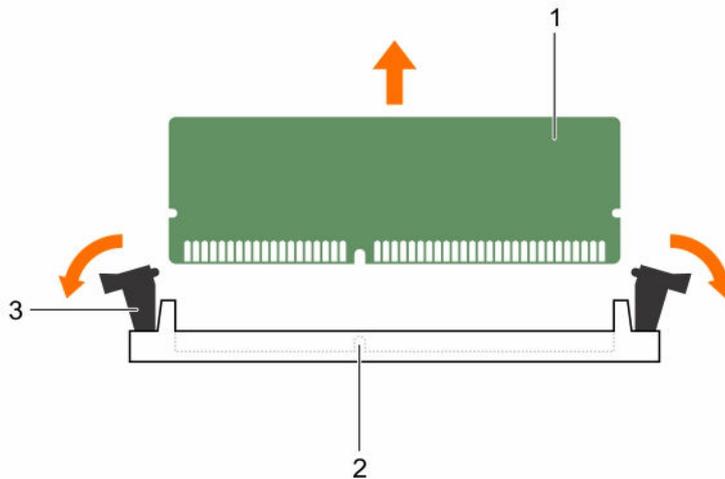


Figure 19. Removing and installing a memory module

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

Related video

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

Installing 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 came with the product.

1. Ensure that you follow the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.
4. Removing the cooling fan assembly.

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

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

Steps

1. Locate the appropriate memory module socket.

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

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

✎ NOTE: Retain the removed memory module blank(s) for future use.

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

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.

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

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

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.

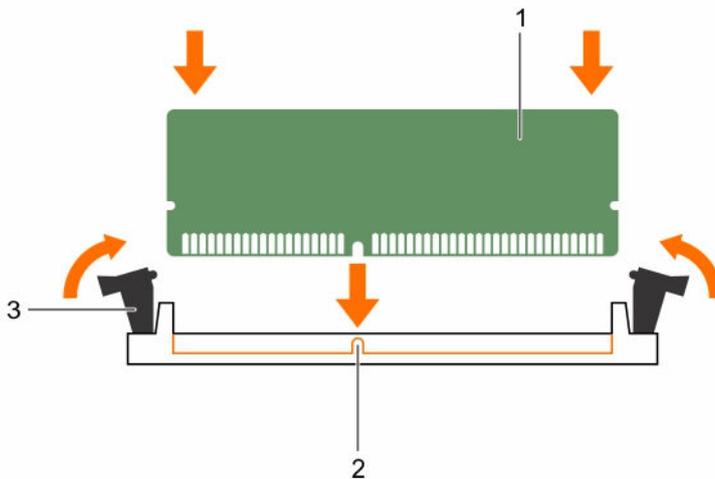


Figure 20. Installing the memory module

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

Next steps

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

3. Press F2 to enter System Setup, and check the **System Memory** setting.
The system should have already changed the value to reflect the installed memory.
4. If the value is incorrect, one or more of the memory modules may not be installed properly. Ensure that the memory module is firmly seated in the memory module socket.
5. Run the system memory test in system diagnostics.

Heat sink and processors

Use the following procedures when:

- Installing an additional processor.
- Replacing a processor.

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

Removing a 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 came with the product.

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

1. Ensure that you follow the [Safety instructions](#).
2. Keep the #2 Phillips screwdriver ready.
3. Follow the procedure listed in [Before working inside your system](#).
4. If installed, remove the full-length PCIe card(s).
5. Remove the cooling shroud.

 **WARNING:** The heat sink will be hot to touch for some time after the system has been powered down. Allow the heat sink to cool before removing it.

Steps

1. Loosen one of the screws that secure the heat sink to the system board.
Wait 30 seconds for the heat sink to loosen from the processor.
2. Remove the screw diagonally opposite the screw you first removed.
3. Repeat the procedure for the remaining two screws.
4. Remove the heat sink.

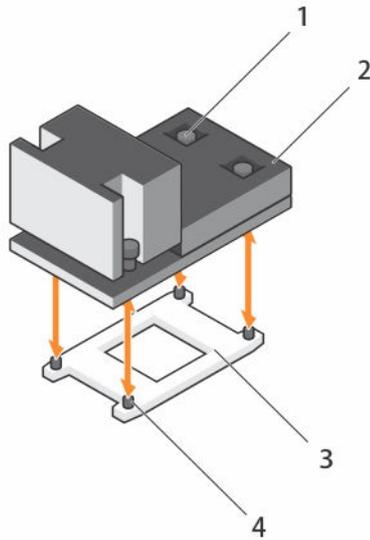


Figure 21. Removing and installing a heat sink

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

Next steps

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

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 came with the product.

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

1. Ensure that you follow the [Safety instructions](#).
2. Keep the #2 Phillips screwdriver ready.
3. 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 using the Dell Lifecycle Controller.

4. Follow the procedure listed in [Before working inside your system](#).
5. If installed, remove the full-length PCIe card(s).
6. Remove the cooling shroud.

 **WARNING:** The processor will be 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.

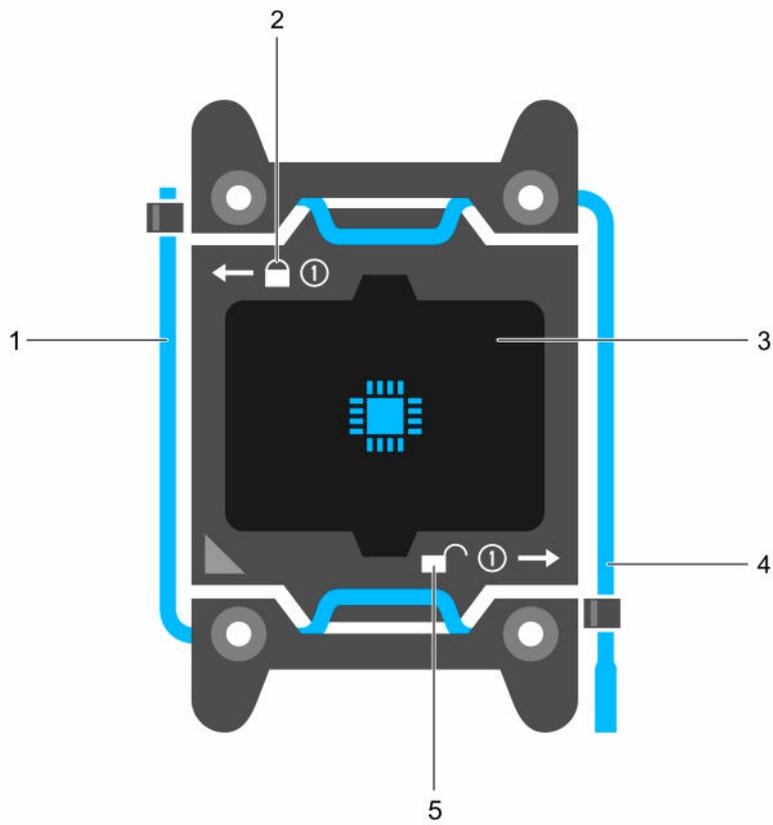


Figure 22. Processor shield

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

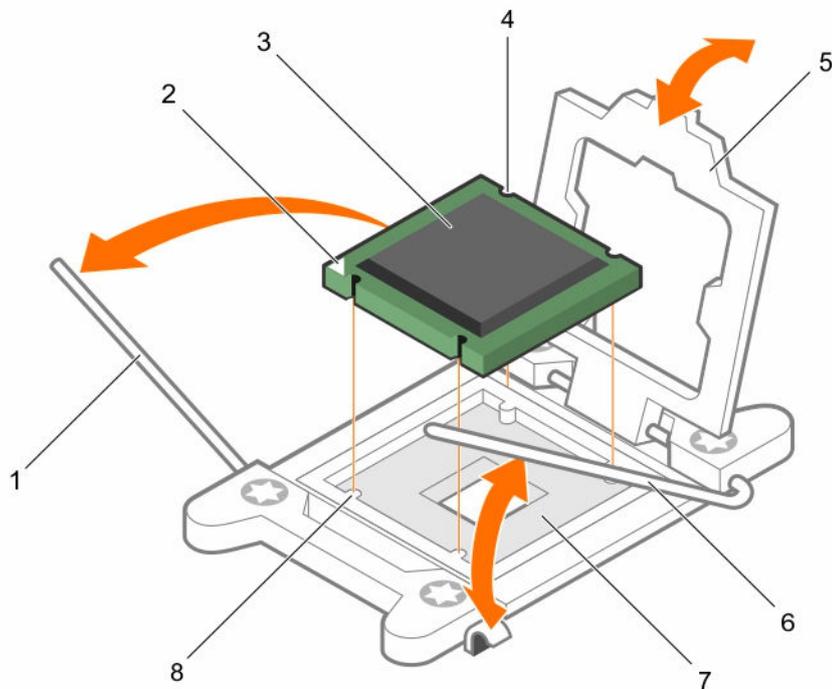


Figure 23. Removing and installing a processor

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

Next steps

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

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 came with the product.

1. Ensure that you follow the [Safety instructions](#).
2. Keep the #2 Phillips screwdriver ready.
3. Follow the procedure listed in [Before working inside your system](#).

4. Remove the cooling shroud.
5. Install the processor.

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

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 as shown in the following figure.

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.

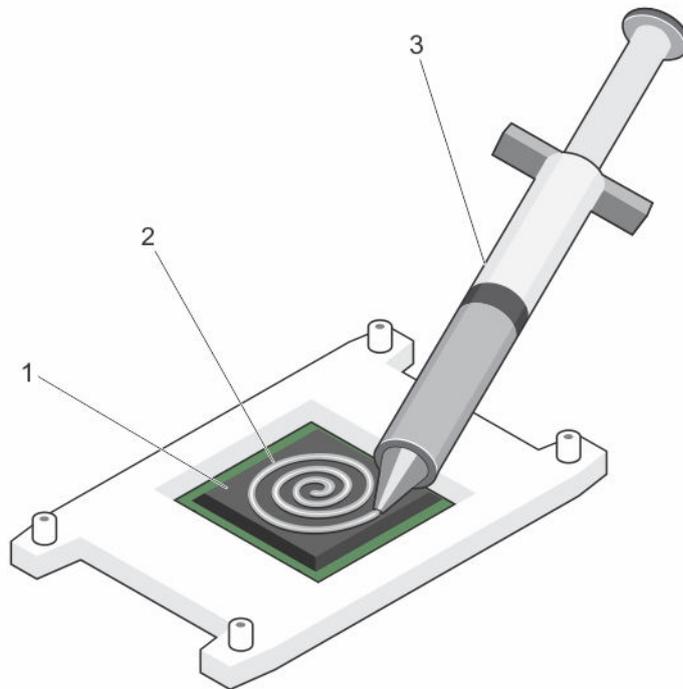


Figure 24. Applying thermal grease on the top of the processor

1. processor
2. thermal grease
3. 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. Tighten the screw diagonally opposite the first screw you tightened.

 **NOTE:** Do not over-tighten the heat sink retention screws when installing the heat sink. To prevent over-tightening, tighten the retention screw until resistance is felt, and stop once the screw is seated. The screw tension should be no more than 6 in-lb (6.9 kg-cm).

6. Repeat the procedure for the remaining two screws.

Next steps

1. Install the cooling shroud.
2. Follow the procedure listed in [After working inside your system](#).
3. While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.
4. Run the system diagnostics to verify that the new processor operates correctly.

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 came with the product.

1. Ensure that you read the [Safety instructions](#).
2. Keep the #2 Phillips screwdriver ready.
3. 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 also update the system BIOS using the Dell Lifecycle Controller.

4. Follow the procedure listed in [Before working inside your system](#).
5. Remove the cooling shroud.

 **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 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 socket.
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.

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. Follow the procedure listed in [After working inside your system](#).
3. While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.
4. Run the system diagnostics to verify that the new processor operates correctly.

PCIe card holder

Removing the PCIe card holder

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If installed, remove the full-length PCIe card.

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

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

Steps

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

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

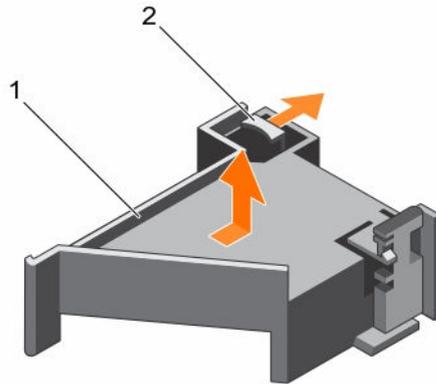


Figure 25. Removing and installing the PCIe card holder

1. PCIe card holder
2. release tab

Next steps

1. Replace the PCIe card holder. See [Installing the PCIe card holder](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the PCIe card holder

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

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

Steps

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

Next steps

1. If applicable, replace the full-length PCIe card.
2. Follow the procedure listed in [After working inside your system](#).

Opening and closing the PCIe card holder latch

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

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

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

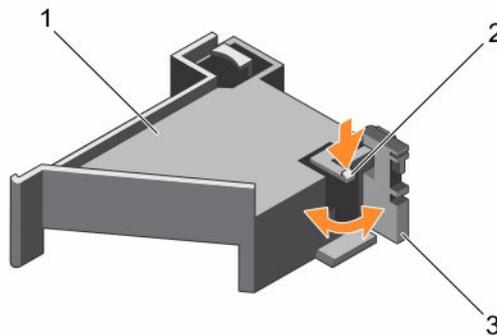


Figure 26. Opening and closing the PCIe card holder latch

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

Next steps

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

Cable retention bracket

Removing the cable retention bracket

Prerequisites

1. Ensure that you read the [Safety instructions](#).

2. Follow the procedure listed in [Before working inside your system.](#)
3. Remove the cooling shroud.
4. Remove the PCIe card holder.
5. Remove all cables routed through the cable retention bracket.

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

Steps

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

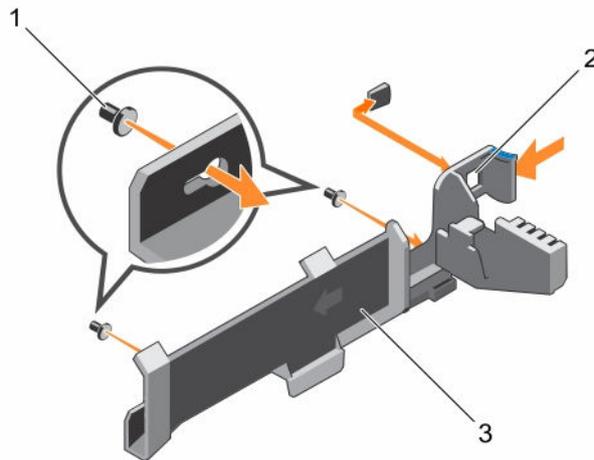


Figure 27. Removing and installing the cable retention bracket

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

Next steps

1. Replace the cable retention bracket. See [Installing the cable retention bracket.](#)
2. Follow the procedure listed in [After working inside your system.](#)

Installing the cable retention bracket

Prerequisites

1. Ensure that you read the [Safety instructions.](#)
2. Follow the procedure listed in [Before working inside your system.](#)

3. Remove the cooling shroud.
4. Remove the PCIe card holder.

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

Steps

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

Next steps

1. Install the PCIe card holder.
2. Install the cooling shroud.
3. Follow the procedure listed in [After working inside your system](#).

Integrated storage controller card

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

Removing the integrated storage controller card

Prerequisites

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

1. Ensure that you follow the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.
4. Remove the expansion card riser 1.
5. Keep the Phillips #2 screwdriver ready.

Steps

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

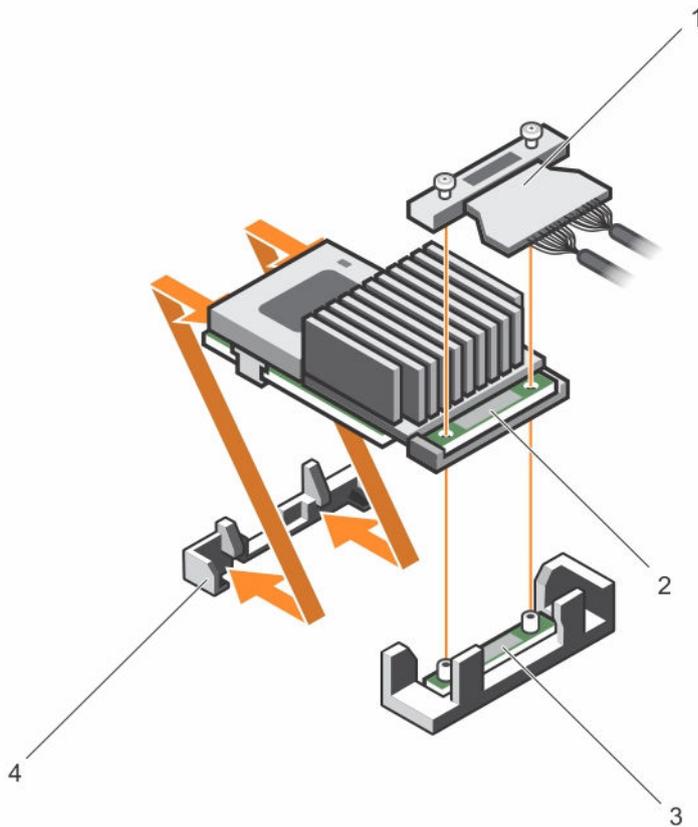


Figure 28. Removing and installing the integrated storage controller card

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

Next steps

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

Installing the integrated storage controller card

Prerequisites

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

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).

3. Remove the cooling shroud.
4. Remove the expansion card riser 1.
5. Keep the Phillips #2 screwdriver ready.

Steps

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

Next steps

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

Expansion cards and expansion card risers

 **NOTE:** A missing or an unsupported expansion card riser logs a System Event Log (SEL). It does not prevent your system from powering on. A no BIOS POST message or F1/F2 pause is displayed.

Expansion card installation guidelines

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

Table 4. Supported expansion cards

| Riser | PCIe slot | Processor connection | Height | Length | Link width | Slot width |
|---------------|-----------|----------------------|-------------|-------------|------------|------------|
| 1 | 1 | Processor 2 | Low Profile | Half Length | x8 | x16 |
| 1 | 2 | Processor 2 | Low Profile | Half Length | x8 | x16 |
| 1 | 3 | Processor 2 | Low Profile | Half Length | x8 | x16 |
| 2 | 4 | Processor 2 | Full Height | Full Length | x16 | x16 |
| 2 | 5 | Processor 1 | Full Height | Full Length | x8 | x16 |
| 3 (default) | 6 | Processor 1 | Full Height | Full Length | x8 | x16 |
| 3 (alternate) | 6 | Processor 1 | Full Height | Full Length | x16 | x16 |
| 3 (default) | 7 | Processor 1 | Full Height | Full Length | x8 | x16 |

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

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

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

Table 5. Expansion card installation order

| Card priority | Card type | Slot priority | Max allowed |
|---------------|--------------------------|-----------------|-------------|
| 1 | GPU (double width) | 6, 4 | 2 |
| | GPU (single width) | 6, 4, 7, 5 | 4 |
| 2 | RAID H830 | 7, 6, 4, 5 | 2 |
| | RAID H830 (low profile) | 3, 2 | 2 |
| 3 | 40 Gb NICs (full height) | 5, 7, 4, 6 | 4 |
| | 40 Gb NICs (low profile) | 3, 2, 1 | 3 |
| 4 | FC16 HBA (full height) | 5, 7, 4, 6 | 4 |
| | FC16 HBA (low profile) | 2, 3, 1 | 3 |
| 5 | 10 Gb NICs (full height) | 5, 7, 4, 6 | 4 |
| | 10 Gb NICs (low profile) | 2, 3, 1 | 3 |
| 6 | FC8 HBA (full height) | 5, 7, 4, 6 | 4 |
| | FC8 HBA (low profile) | 2, 3, 1 | 3 |
| 7 | 1 Gb NICs (full height) | 5, 7, 4, 6 | 4 |
| | 1 Gb NICs (low profile) | 2, 3, 1 | 3 |
| 8 | 12 Gb SAS (low profile) | 3, 2, 1 | 3 |
| | 12 Gb SAS (full height) | 7, 6, 4, 5 | 4 |
| 9 | Integrated RAID | integrated slot | 1 |
| 10 | NDC | integrated slot | 1 |

Removing an expansion card from expansion card riser 2 or 3

Prerequisites

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

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. When removing a card from Riser 3, ensure that the PCIe holder latch is closed.

 **NOTE:** The procedure for installing and removing a full length PCIe card is similar to the procedure for removing and installing a GPU card. For more information, see [Removing a GPU card](#) and [Installing a GPU card](#).

Steps

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

 **NOTE:** You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

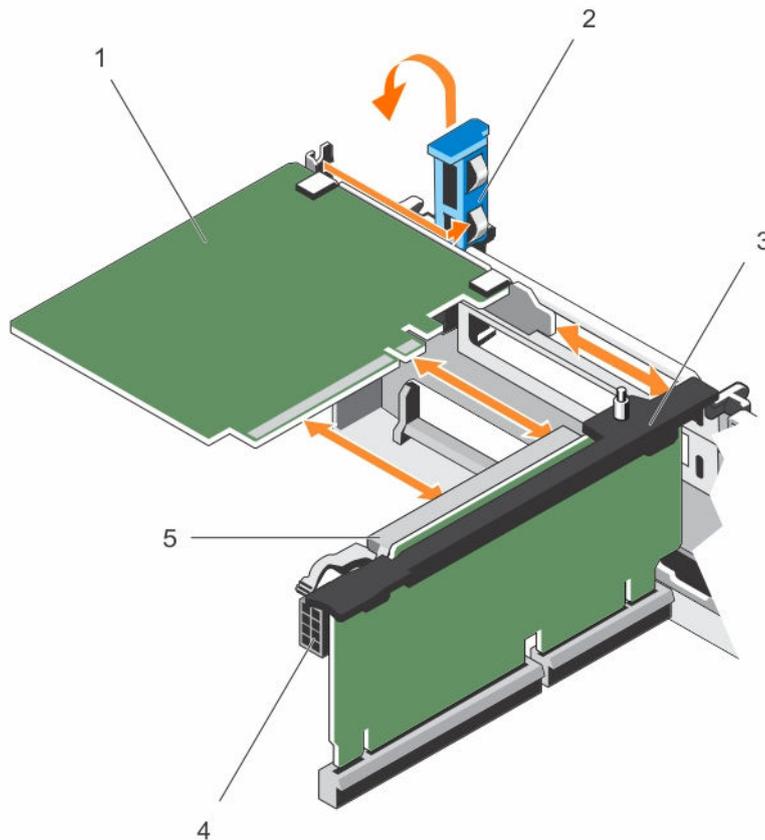


Figure 29. Removing and installing an expansion card from expansion card riser 2 or 3

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

Next steps

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

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

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

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

 **NOTE:** When installing a GPU card on riser 2 or riser 3 (default), connect the GPU card power cable to the power connector on the riser.

Next steps

1. Follow the procedure listed in [After working inside your system](#).
2. Install any device drivers required for the card as described in the documentation for the card.

Removing an expansion card from the expansion card riser 1

Prerequisites

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

1. Ensure that you follow the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Disconnect any cables connected to the expansion card.
4. Remove the expansion card riser.

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

Steps

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

 **NOTE:** You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

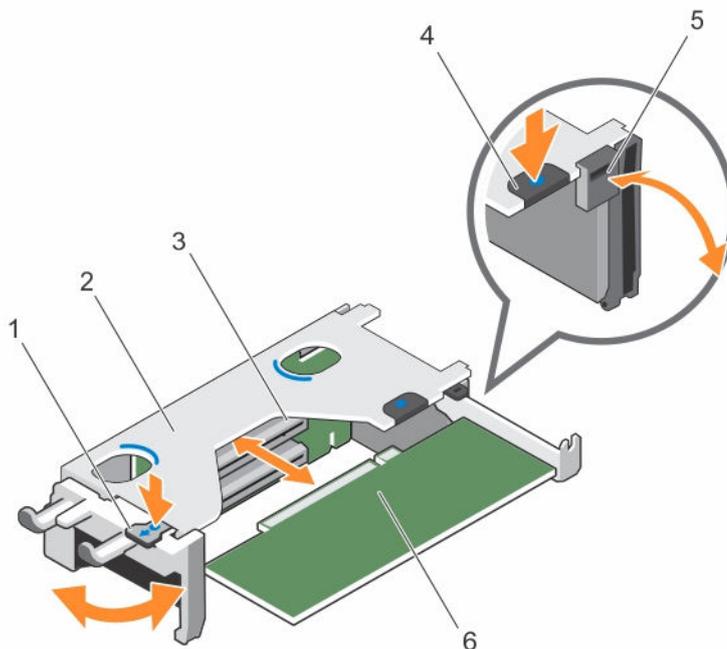


Figure 30. Removing and installing an expansion card from expansion card riser 1

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

Next steps

1. Install the expansion card riser. For more information, see [Installing expansion card risers](#)
2. Follow the procedure listed in [After working inside your system](#).

Installing an expansion card into the expansion card riser 1

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the expansion card riser.

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

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

Steps

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

Next steps

1. Install the expansion card riser. For more information, see [Installing expansion card risers](#).
2. If applicable, connect any cables to the expansion card.
3. Follow the procedure listed in [After working inside your system](#).
4. Install any device drivers required for the card as described in the documentation for the card.

Removing the riser 1 blank

Prerequisites

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

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the expansion card riser.

Steps

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

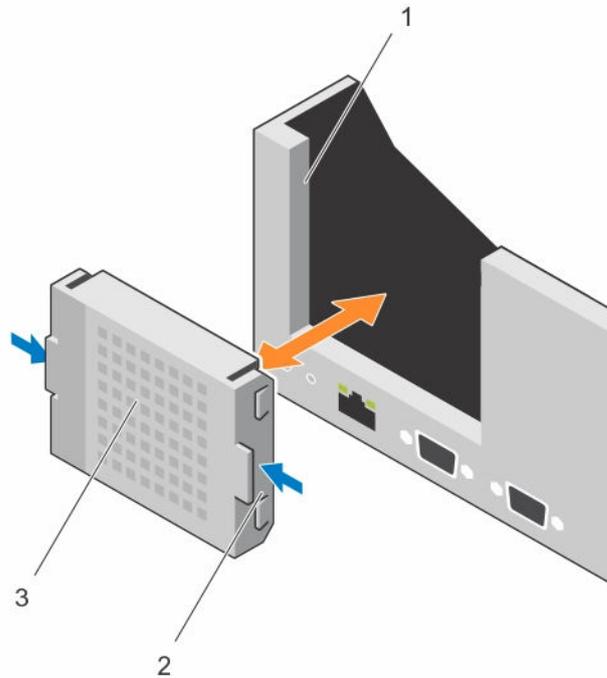


Figure 31. Removing and installing the riser 1 blank

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

Installing the riser 1 blank

Prerequisites

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

Steps

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

Removing expansion card risers

Prerequisites

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

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If installed, remove any expansion card installed on risers 2 and 3.

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

Steps

Holding the slots on the expansion card riser, lift the riser from the riser connector on the system board.

 **NOTE:** To remove expansion card risers 2 and 3, hold the edges of the expansion card riser.

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

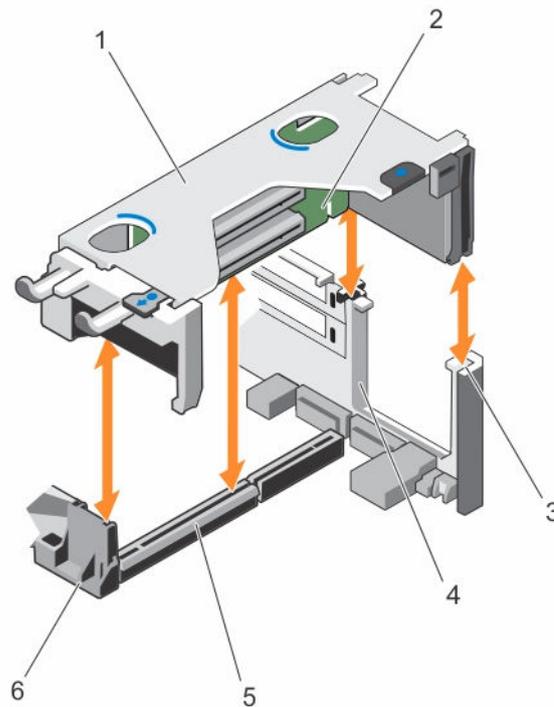


Figure 32. Removing and installing the expansion card riser 1

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

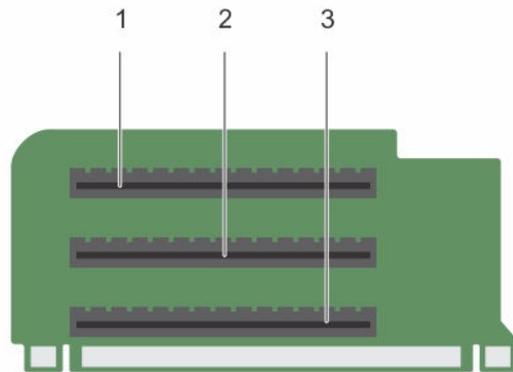


Figure 33. Identifying connectors on the expansion card riser 1

1. expansion card slot 1
2. expansion card slot 2
3. expansion card slot 3

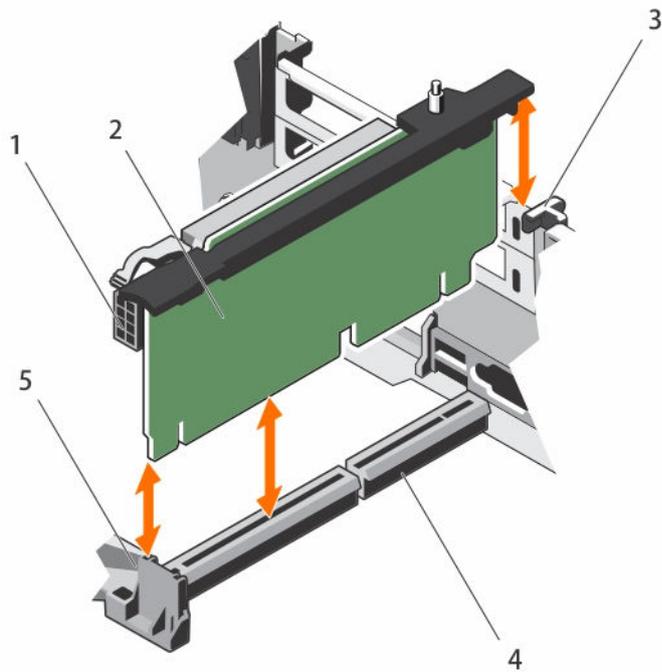


Figure 34. Removing and installing the expansion card riser 2

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

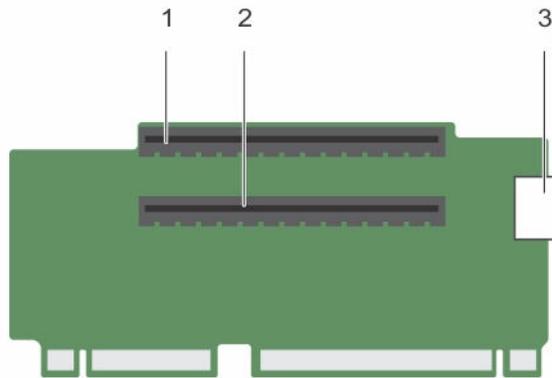


Figure 35. Identifying connectors on the expansion card riser 2

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

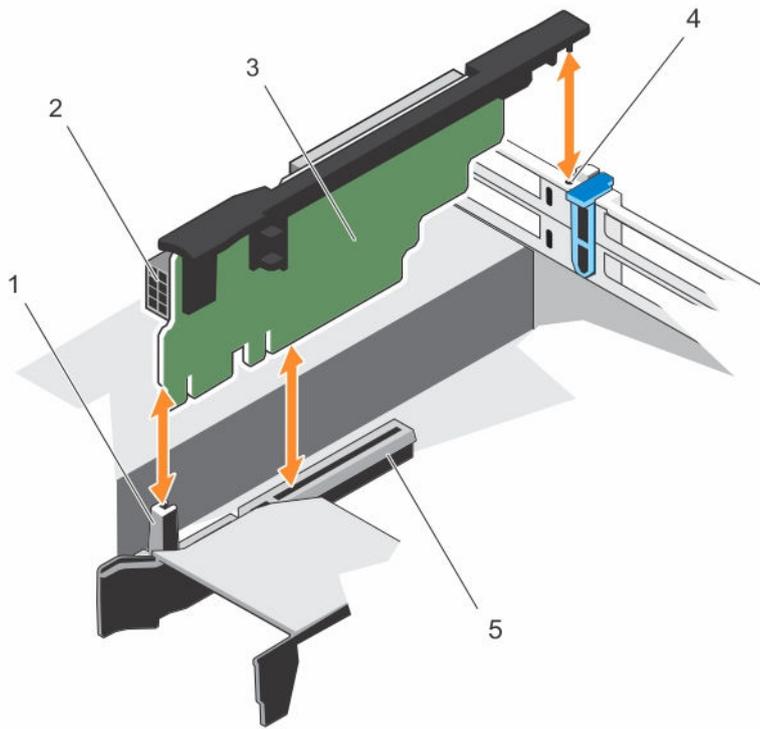


Figure 36. Removing and installing the expansion card riser 3

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

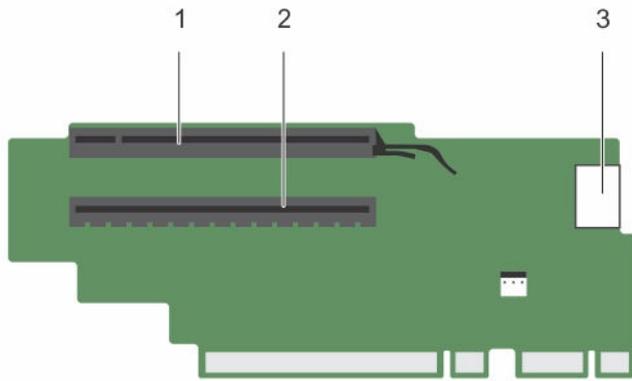


Figure 37. Identifying connectors on the expansion card riser 3 (default)

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

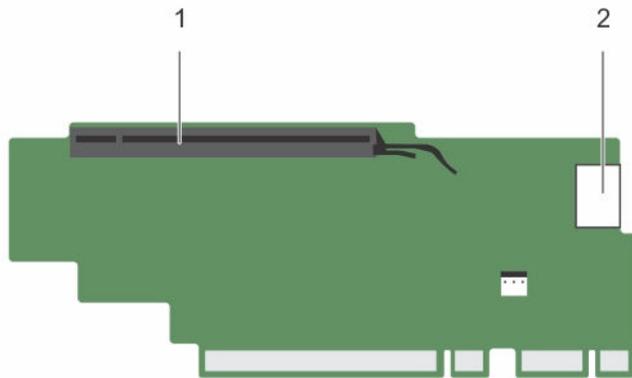


Figure 38. Identifying connectors on the expansion card riser 3 (alternate)

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

Next steps

1. If applicable, remove or install an expansion card on the riser.
2. If applicable, replace the expansion card riser.
3. Follow the procedure listed in [After working inside your system.](#)

Installing expansion card risers

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If applicable, reinstall the expansion card(s) into the expansion card riser 1.

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

Steps

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

Next steps

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

GPU card installation guidelines

- Ensure that both the processors are installed.
- The processor must be of 135 W or less.
- The processor must use a GPU kit low-profile heat sink.
- Due to the high power consumption of GPUs, the ambient system inlet temperature is restricted to 30°C to ensure adequate system cooling when one or more GPU cards are installed.
- Ensure that the GPU enablement kit is available.
The GPU enablement kit includes:
 - Low-profile heat sinks
 - Power cables for the GPU cards
 - Filler brackets with closeout EMI shield for unoccupied PCIe slots
- All GPU cards must be of the same type and model.
- Ensure that your system uses the redundant 1100 W power supplies.
- You can install up to two double-wide GPU cards.
 -  **NOTE:** Two double-wide GPU cards configuration requires optional riser 3.
- You can install up to four single-wide GPU cards.

Removing a GPU card

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Lift the expansion card latch.
2. Close the expansion card locking tabs on the cooling shroud and the risers.
3. Hold the GPU card by its edges and slide out the GPU card at an angle to release it from the connector on the riser card.
4. Disconnect the cable from the GPU card.
5. If you are removing the card permanently, install a metal filler bracket over the empty slot opening and close the expansion card locking tabs.

NOTE: You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

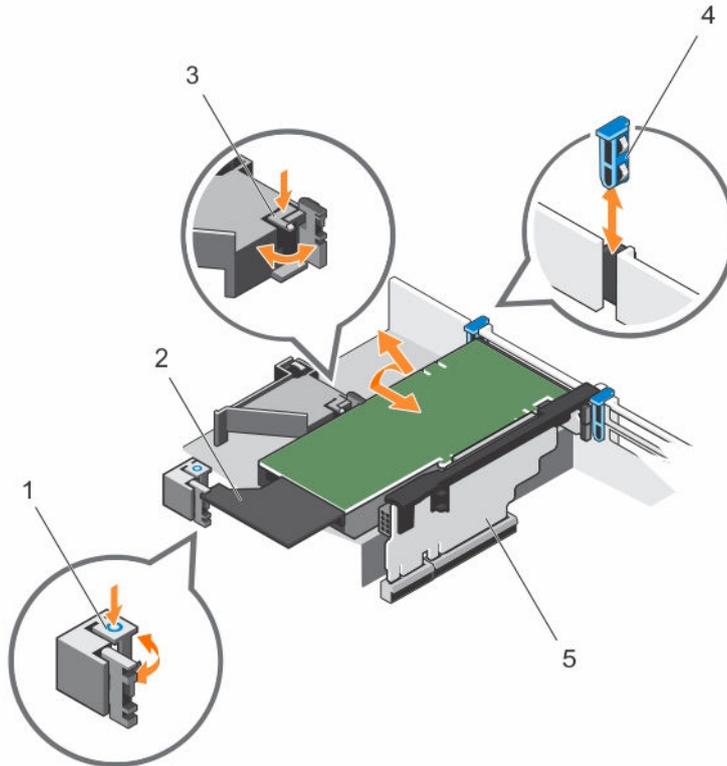


Figure 39. Removing and installing the GPU card

- | | |
|-----------------------------------|-------------------------|
| 1. expansion card locking tab (3) | 2. GPU card |
| 3. PCIe card holder latch | 4. expansion card latch |

5. expansion card riser 3

Next steps

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

Installing a GPU card

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.
4. Remove the heat sinks.

 **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.

Steps

1. Unpack the GPU cards and the GPU enablement kit.
2. Install the heat sinks from the kit and reinstall the cooling shroud.
3. Close the expansion card locking tab on the cooling shroud and riser.
4. Lift the expansion card latch.
5. Remove the filler brackets for the single- or double-wide GPU cards.
6. Replace the remaining filler brackets with the brackets from the GPU kit.
7. Align the GPU card connector with the slot on the riser.
8. Insert the GPU card into the riser slot until it is fully seated.
9. Locate the GPU power connectors on the cable and plug them to the six-pin and eight-pin connectors on the GPU card.

 **NOTE:** Ensure that the GPU card is installed correctly into the GPU card lock.

10. Press down on the GPU card lock to secure the card in position.
11. Ensure that the GPU card is seated into the PCIe card holder latch.
12. Press the touch point to open the PCIe card holder latch and/or the expansion card locking tabs.
13. Connect the GPU power cable to the riser.
14. Close the expansion card latch/latches.

Next steps

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

Internal dual SD module (optional)

Removing an internal SD card

Prerequisites

1. Ensure that you read the [Safety instructions](#).

2. Follow the procedure listed in [Before working inside 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 came with the product.

 **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.

Steps

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

Next steps

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

Installing an internal SD card

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

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

Steps

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

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

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

Next steps

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

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 came with the product.

1. Ensure that you follow the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Locate the Internal Dual SD Module (IDSDM) on the system board.

- If installed, remove the SD card(s).

Steps

Hold the pull tab and pull the IDSDM out of the chassis.

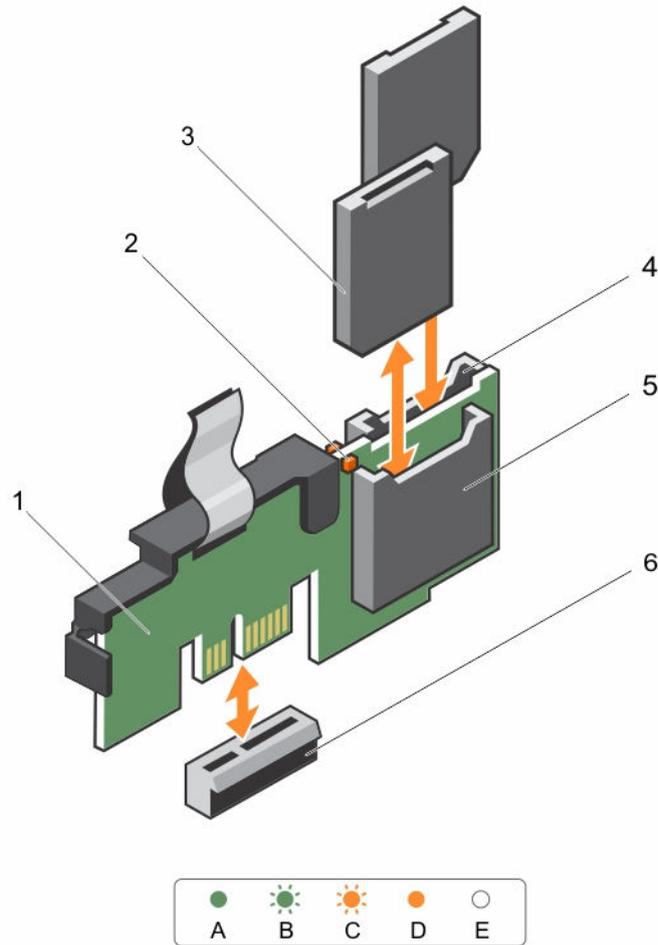


Figure 40. Removing and installing the Internal Dual SD Module (IDSDM)

- | | |
|----------------------------|-----------------------------|
| 1. Internal Dual SD module | 2. LED status indicator (2) |
| 3. SD card (2) | 4. SD card slot 2 |
| 5. SD card slot 1 | 6. IDSDM connector |

The following table describes the IDSDM indicator codes:

| Convention | IDSDM indicator code | Description |
|------------|----------------------|------------------------------------|
| A | Green | Indicates that the card is online. |
| B | Flashing green | Indicates rebuild or activity. |

| Convention | IDSDM indicator code | Description |
|------------|----------------------|--|
| 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

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

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 came with the product.

1. Ensure that you follow the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).

Steps

1. Locate the Internal Dual SD Module (IDSDM) connector on the system board. To locate the internal dual SD module connector, see [System board jumpers and connectors](#).
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 card(s).
 -  **NOTE:** Temporarily label each SD card with its corresponding slot before removal. Replace the SD card(s) into the same slots.
2. Follow the procedure listed in [After working inside your system](#).

Network daughter card

Removing the network daughter card

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If installed, remove expansion card(s) from the expansion card riser 2.
4. Keep the #1 Phillips screwdriver handy.

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

Steps

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

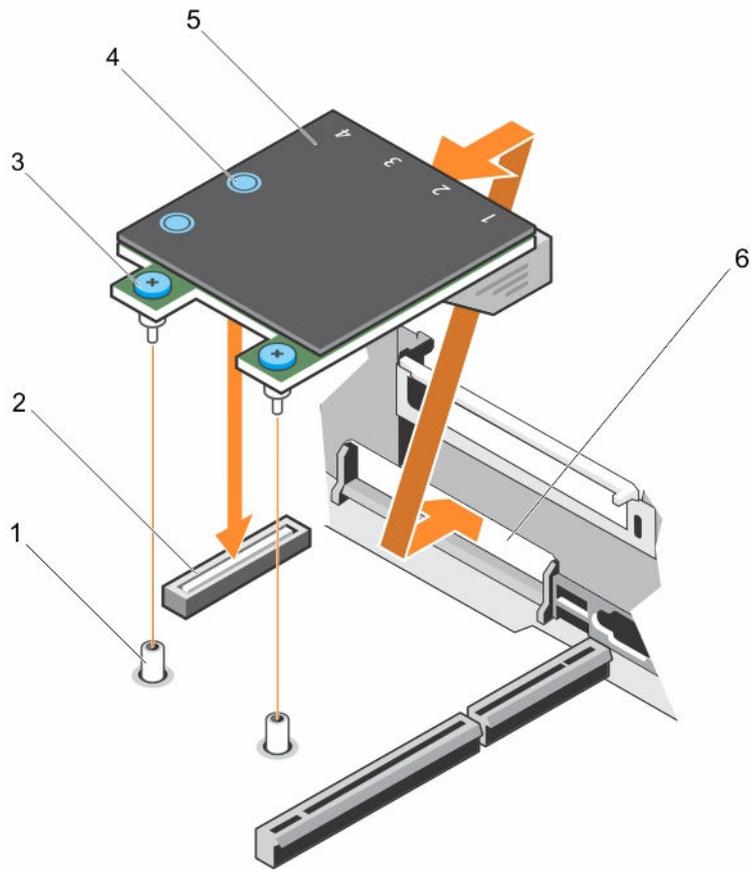


Figure 41. Removing and installing the Network Daughter Card (NDC)

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

Next steps

1. Replace the network daughter card. See [Installing the network daughter card](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the network daughter card

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. If applicable, remove the expansion card(s) in the expansion card riser 2.
4. Keep the #1 Phillips screwdriver handy.

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

Steps

1. Angle the card so that the Ethernet connectors fit through the slot in the back panel.
2. Align the captive screws on the card with the captive screw sockets on the system board.
3. Press the touch points on the card until the card connector is firmly seated on the system board connector.
4. Using a #1 Phillips screwdriver, tighten the captive screws to secure the network daughter card to the system board.

Next steps

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

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.

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

Replacing the internal USB key

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Enable the USB connector in the **Internal USB Port** option of the **Integrated Devices** screen of System Setup.

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.

Steps

1. Locate the USB connector or USB key on the system board.

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

2. If installed, remove the USB key.
3. Insert the new USB key into the USB connector.

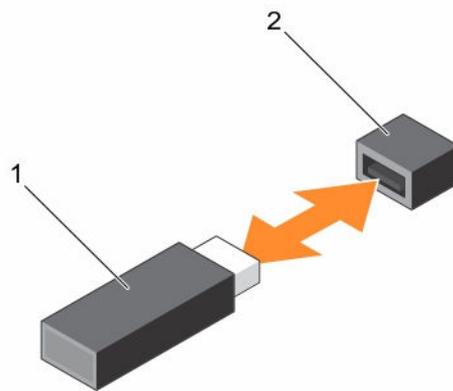


Figure 42. Replacing the internal USB key

1. USB memory key
2. USB memory key connector

Next steps

1. Follow the procedure listed in [After working inside your system](#).
2. While booting, press <F2> to enter System Setup and verify that the USB key is detected by the system.

System battery

Replacing the system battery

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.

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

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

Steps

1. Locate the battery socket. For more information, see [System Board Connectors](#).

⚠ 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.

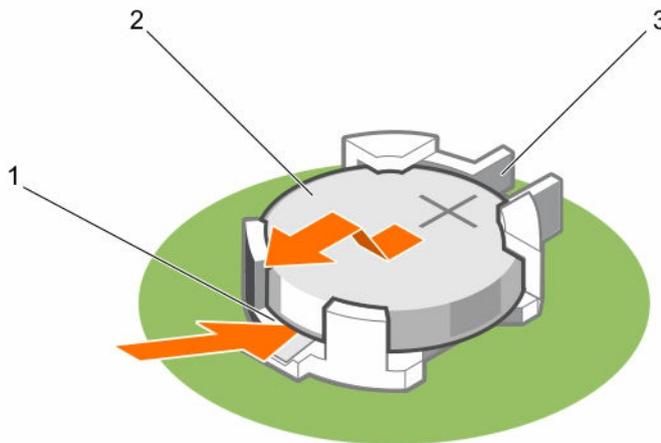


Figure 43. Removing the system battery

1. positive side of the battery connector
 2. system battery
 3. negative side of the battery connector
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.

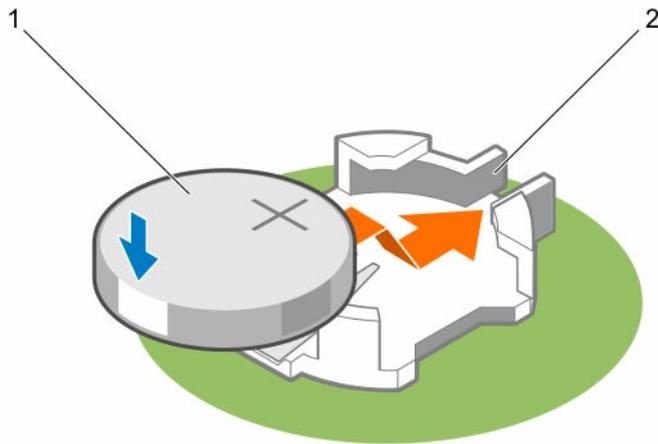


Figure 44. Installing the system battery

1. system battery
2. positive side of the battery connector

Next steps

1. Install the cooling shroud.
2. Follow the procedure listed in [After working inside your system](#).
3. While booting, press <F2> to enter the 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.

Power supply units

Your system supports one of the following:

- Two 495 W, 750 W, or 1100 W AC power supply modules
- Two 1100 W DC power supply modules
- Two 750 W mixed mode power supply modules

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

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

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

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

Hot spare feature

Your system supports the Hot spare feature that significantly reduces the power overhead associated with power supply redundancy.

When the Hot spare feature is enabled, one of the redundant PSUs is switched to the sleep state. The active PSU supports 100% 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%, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20%, 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 at Dell.com/idracmanuals.

Removing the power supply unit blank

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 power supply 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.

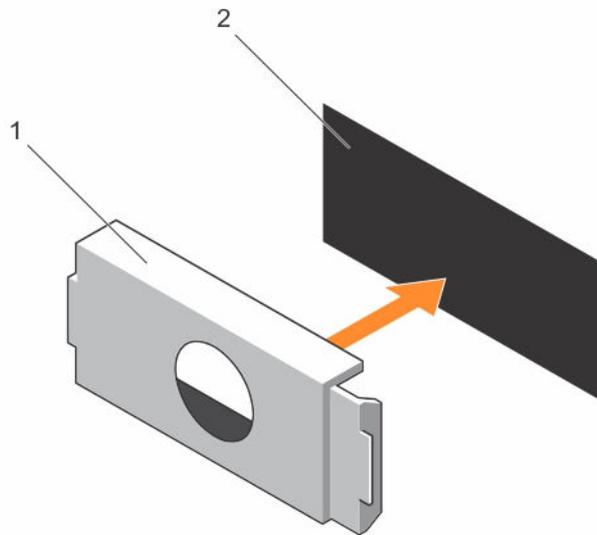


Figure 45. Removing and installing the PSU blank

1. PSU blank

2. PSU bay

Installing the power supply unit blank

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

Align the power supply unit (PSU) blank with the PSU bay and push it into the chassis until it clicks into place.

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 came with the product.

⚠ CAUTION: The system requires 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 system's rack documentation.

Steps

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

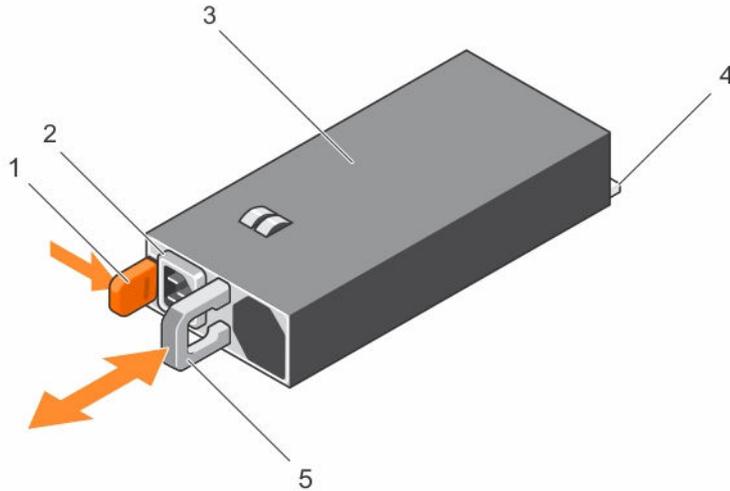


Figure 46. Removing and installing an AC power supply unit

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

Related video

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

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 came with the product.

Verify that the power supply unit being installed is of the same type and has the same maximum output power as the existing power supply unit.

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

Steps

1. If installed, remove the power supply unit blank.
2. Slide the new power supply unit into the chassis until the power supply unit is fully seated and the release latch snaps into place.

🔧 NOTE: If you unlatched the cable management arm, re-latch it. For information about the cable management arm, see the rack documentation of your system.

3. Connect the power cable to the power supply unit 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 power supply unit, wait for 15 seconds for the system to recognize the power supply unit and determine its status. The power supply redundancy may not occur until discovery is complete. Wait until the new power supply unit is discovered and enabled before you remove the other power supply unit. The power-supply unit status indicator turns green to signify that the power supply unit is functioning properly.

Wiring instructions for a DC power supply unit

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

 **WARNING:** For equipment using $-(48-60)$ V DC power supplies, 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

⚠ WARNING: For equipment using $-(48-60)$ V DC power supplies, 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.

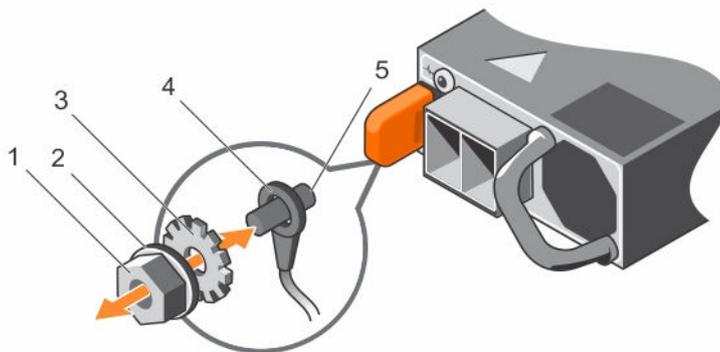


Figure 47. Assembling and connecting the safety ground wire

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

Assembling the DC input power wires

Prerequisites

⚠ WARNING: For equipment using $-(48-60)$ V DC power supplies, 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 ends of the DC power wires, exposing approximately 13 mm (0.5 inch) of copper wire.

⚠ WARNING: Reversing polarity when connecting DC power wires can permanently damage the power supply or the system.

2. Insert the copper ends into the mating connectors and tighten the captive screws at the top of the mating connector using a #2 Phillips screwdriver.

⚠ WARNING: 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.

3. Rotate the rubber cap clockwise to fix it over the captive screws.
4. Insert the mating connector into the power supply.

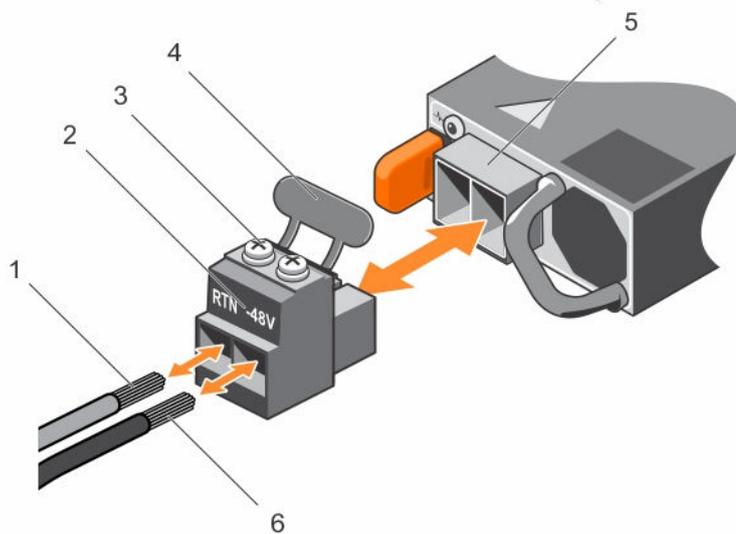


Figure 48. Assembling the DC input power wires

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

Removing a DC power supply unit

Prerequisites

⚠ WARNING: For equipment using -(48–60) V DC power supplies, 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 requires 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 power supply you intend to remove.
2. Disconnect the safety ground wire.
3. Press the release latch and slide the power supply out of the chassis.

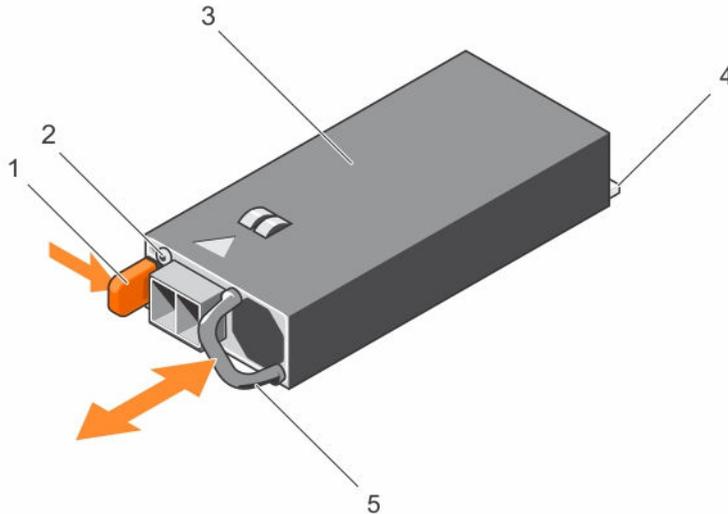


Figure 49. Removing and installing a DC power supply

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

Installing a DC power supply unit

Prerequisites

WARNING: For equipment using $-48-60$ V DC power supplies, 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. Verify that both the power supplies 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.
2. If installed, remove the power supply blank.
3. Slide the new power supply unit into the chassis until the power supply unit 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 system's rack documentation.

4. Connect the safety ground wire.
5. Install the DC power connector in the power supply unit.

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

6. Connect the wires to a DC power source.

 **NOTE:** When installing, hot-swapping, or hot-adding a new power supply, wait for 15 seconds for the system to recognize the power supply and determine its status. The power-supply status indicator turns green to signify that the power supply is functioning properly.

System board

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 came with the 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. Once 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. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the following:
 - a. cooling shroud
 - b. cooling fan assembly
 - c. power supply unit(s)
 - d. all expansion card risers
 - e. integrated storage controller card
 - f. internal dual SD module
 - g. internal USB key (if installed)
 - h. PCIe card holder
 - i. cable retention bracket
 - j. heat sink(s)/heat sink blank(s)
 - k. processors(s)/processor blank(s)

 **CAUTION: To prevent damage to the processor pins when replacing a faulty system board, ensure that you cover the processor socket with the processor protective cap.**

- l. memory modules and memory module blanks
- m. network daughter card

Steps

1. Disconnect the mini SAS cable from the system board.
2. Disconnect all cables from the system board.

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

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

3. Hold the system board holder, lift the blue release pin, lift the system board, and then slide it toward the front of the chassis.
Sliding the system board toward the front of the chassis disengages the connectors from the back of the chassis slots.
4. Lift the system board out of the chassis.

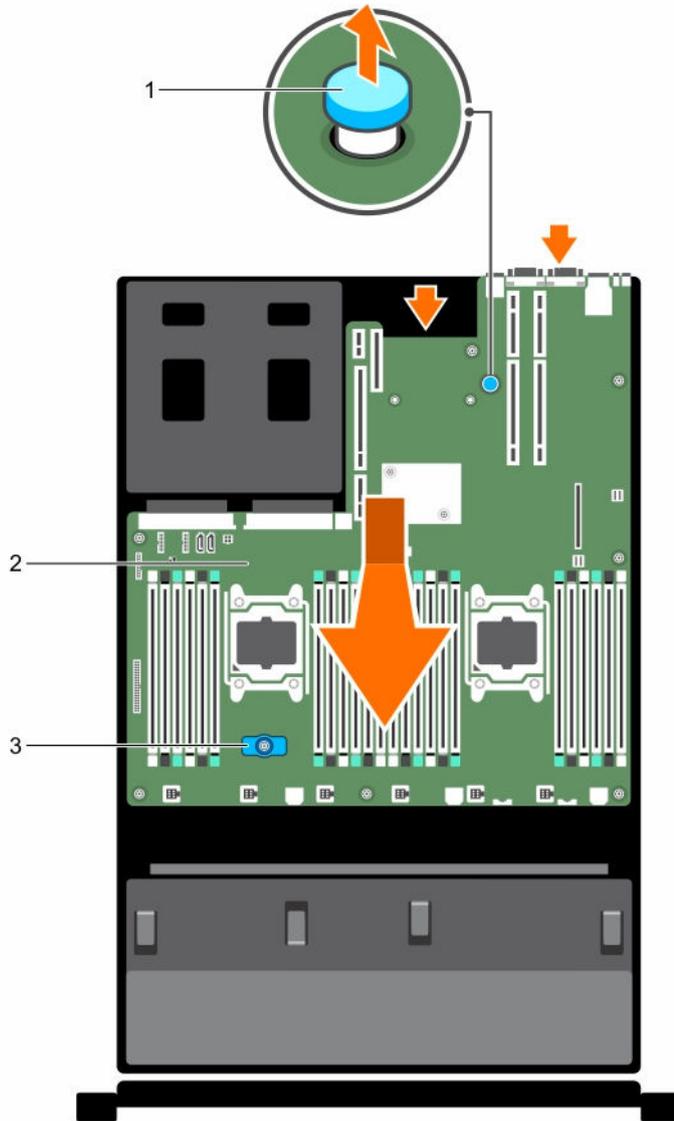


Figure 50. Removing and installing the system board

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

Next steps

1. Replace the system board. See, [Installing the system board](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the system board

Prerequisites

1. Ensure that you read the [Safety instructions](#).

2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Unpack the new system board assembly.

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

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

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

Next steps

1. Install the Trusted Platform Module (TPM). For information on how to install TPM, [Installing the Trusted Platform Module](#). For more information on TPM, see [Trusted Platform Module](#).
 **NOTE:** The TPM plug-in module is attached to the system board and cannot be removed. A replacement TPM plug-in module will be provided for all system board replacements where a TPM plug-in module was installed.
2. Replace the following:
 - a. cable retention bracket
 - b. PCIe card holder
 - c. integrated storage controller card
 - d. internal USB key (if applicable)
 - e. internal dual SD module
 - f. all expansion card risers
 - g. heat sink(s)/heat sink blank(s) and processors(s)/processor blank(s)
 - h. memory modules and memory module blanks
 - i. network daughter card
 - j. cooling fan assembly
 - k. cooling shroud
 - l. power supply unit(s)
3. Reconnect all cables to the system board.
 **NOTE:** Ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.
4. Follow the procedure listed in [After working inside your system](#).
5. Import your new or existing iDRAC Enterprise license. For more information, see Integrated Dell Remote Access Controller User's Guide, at Dell.com/esmanuals.
6. Ensure that you:
 - a. Use the Easy Restore feature to restore the service tag. For more information, see [Restoring the Service Tag by using the Easy Restore feature](#).
 - 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](#).

- c. Update the BIOS and iDRAC versions.
- d. Re-enable the Trusted Platform Module (TPM). For more information, see [Re-enabling the TPM for TXT users](#).

Entering the system service tag by using System Setup

If you know the system service tag, use System Setup menu to enter the service tag.

About this task

 **NOTE:** This procedure must be followed if Easy Restore fails to populate 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 Dell.com/idracmanuals.

Restoring the Service Tag by using the Easy Restore feature

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

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

The Trusted Platform Module (TPM) is used to generate or store keys, protect or authenticate passwords, and create or store digital certificates. TPM can also be used to enable the BitLocker hard drive encryption feature on a Windows Server.

 **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.

 **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 came with the 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.

Ensure that you read the [Safety instructions](#).

Steps

1. Locate the TPM connector on the system board.
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 bolt aligns with the slot on the system board.
4. Press the plastic bolt until the bolt snaps into place.

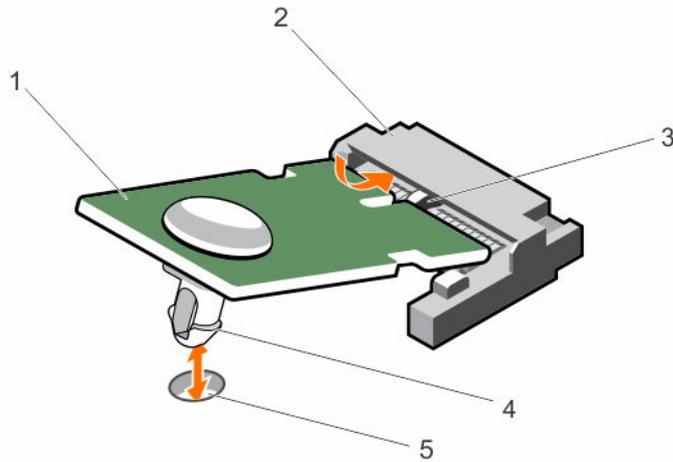


Figure 51. Installing the TPM

- | | |
|------------------------------|------------------|
| 1. TPM | 2. TPM connector |
| 3. slot on the TPM connector | 4. plastic bolt |
| 5. slot on the system board | |

Re-enabling the TPM for BitLocker users

Initialize the TPM.

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

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

Re-enabling the TPM for TXT users

1. While booting your system, press F2 to enter System Setup.
2. In the **System Setup Main Menu**, click **System BIOS** → **System Security Settings**.
3. In the **TPM Security** option, select **On with Pre-boot Measurements**.
4. In the **TPM Command** option, select **Activate**.
5. Save the settings.
6. Restart your system.
7. Enter System Setup again.
8. In the **System Setup Main Menu**, click **System BIOS** → **System Security Settings**.
9. In the **Intel TXT** option, select **On**.

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 exceed 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.

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

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

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

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

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

Removing a 2.5 inch hard drive blank

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. Ensure that you read the [Safety instructions](#).
2. If installed, remove the bezel.

Steps

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

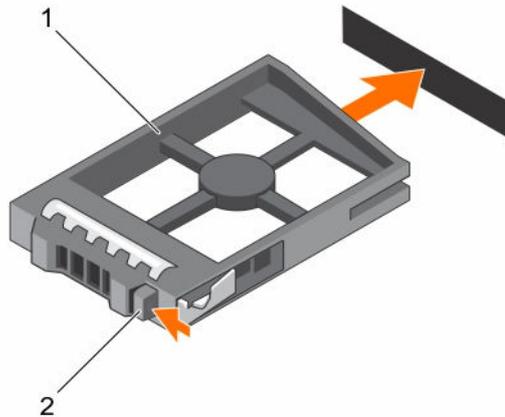


Figure 52. Removing and installing a 2.5 inch hard drive blank

1. hard drive blank
2. release button

Installing a 2.5 inch hard drive blank

Prerequisites

1. Ensure that you read the [Safety instructions](#).
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.

Next steps

If applicable, install the front bezel.

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 drive blanks installed.

1. Ensure that you read the [Safety instructions](#).
2. If installed, remove the front bezel.

Steps

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

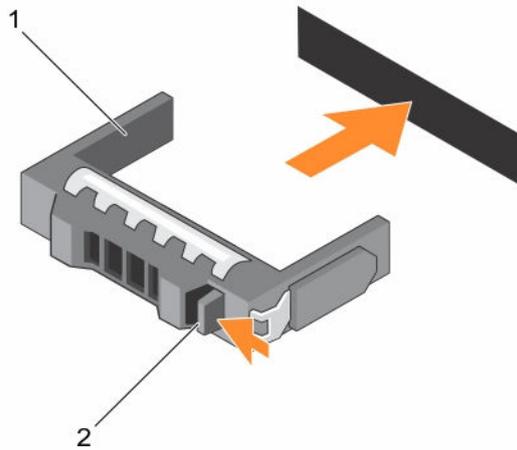


Figure 53. Removing and installing a 3.5 inch hard drive blank

- | | |
|---------------------|-------------------|
| 1. hard drive blank | 2. release button |
|---------------------|-------------------|

Next steps

If applicable, install the front bezel.

Installing a 3.5 inch hard drive blank

Prerequisites

1. Ensure that you read the [Safety instructions](#).
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.

Next steps

If applicable, install the front bezel.

Removing a hot swappable hard drive/SSD

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. Ensure that you read the [Safety instructions](#).
2. If applicable, remove the bezel.
3. If applicable, remove the system cover to remove hot-swappable drives inside your system. Follow the procedure listed in [Before working inside your system](#).
4. Using the management software, prepare the hard drive for removal. If the hard drive is online, the green activity/fault indicator flashes while the drive is turning off. When the hard drive indicators are off, the hard drive is ready for removal.

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

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

Steps

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

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

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

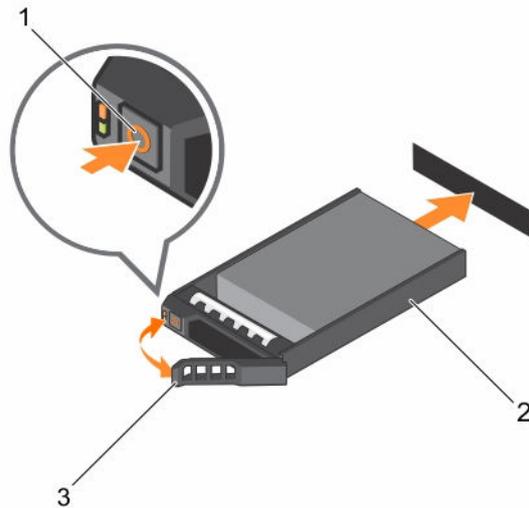


Figure 54. Removing and installing a hot-swappable hard drive/SSD

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

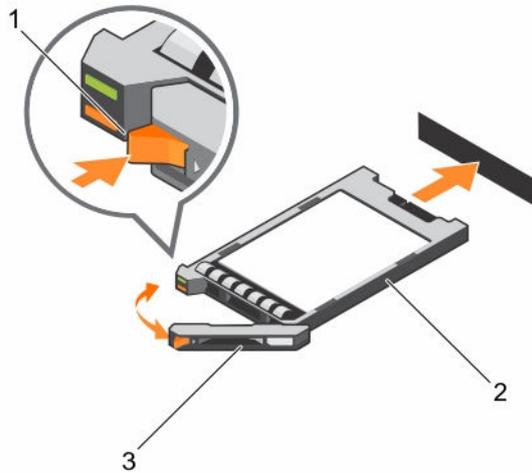


Figure 55. Removing and installing a 1.8 inch hot-swappable uSATA SSD carrier

1. release button
2. SSD carrier
3. SSD carrier handle

Related video

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

Installing a hot-swap hard drive

Prerequisites

- △ **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.
- △ **CAUTION:** Use only hard drives that have been tested and approved for use with the hard drive backplane.
- △ **CAUTION:** When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.
- △ **CAUTION:** Combining SAS and SATA hard drives in the same RAID volume is not supported.
- △ **CAUTION:** To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.
- △ **CAUTION:** When a replacement hot-swappable hard drive is installed and the system is powered on, the hard drive automatically begins to rebuild. Make absolutely sure that the replacement hard drive is blank or contains data that you wish to have over-written. Any data on the replacement hard drive is immediately lost after the hard drive is installed.

Steps

1. If a hard drive blank is installed in the hard drive slot, remove it.
2. Install a hard drive in the hard drive carrier.
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.

Removing a hard drive from a hard drive carrier

Prerequisites

1. Keep the #1 Phillips screwdriver handy.
2. Remove the 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.

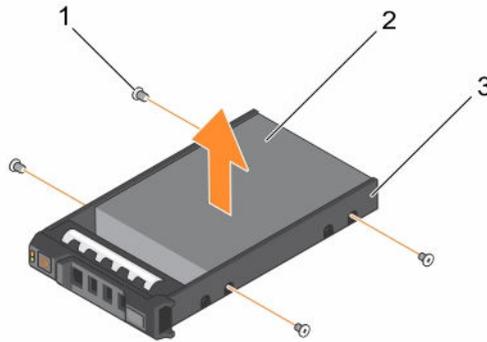


Figure 56. Removing and installing a hard drive into a hard drive carrier

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

Related video

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

Installing a hard drive into a hard drive carrier

Prerequisites

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

Steps

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

Removing a 1.8 inch hard drive blank

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. If installed, remove the front bezel.

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

Steps

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

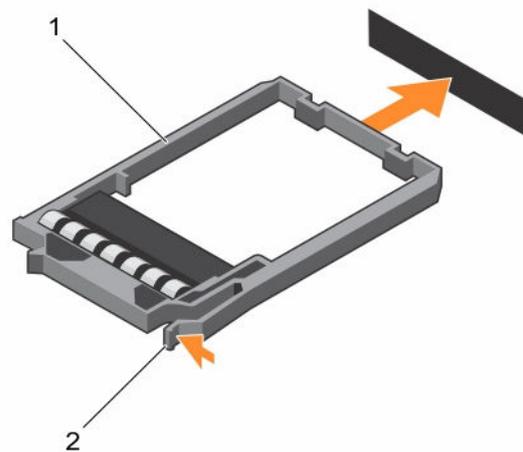


Figure 57. Removing and installing a 1.8 inch hard drive blank

1. hard drive blank
2. release button

Next steps

If applicable, install the front bezel.

Installing a 1.8 inch hard drive blank

Prerequisites

1. Ensure that you read the [Safety instructions](#).
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.

Next steps

If applicable, install the front bezel.

Removing a 1.8 inch hard drive from a hard drive carrier

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Remove the hard drive carrier from the system.

Steps

1. Turn the hard drive carrier.
2. Pull the rails of the hard drive carrier and lift the hard drive out of the hard drive carrier.

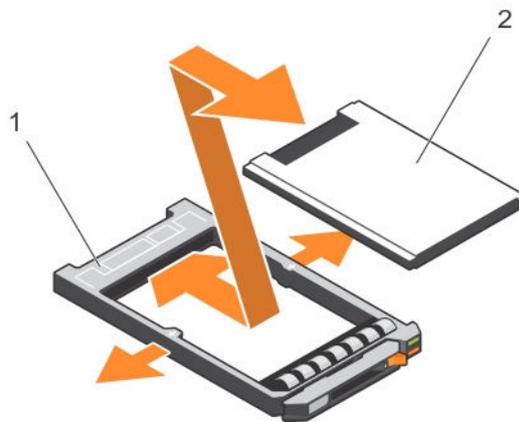


Figure 58. Removing and installing a 1.8 hard drive into a hard drive carrier

1. hard drive carrier
2. hard drive

Installing a 1.8 inch hard drive into a hard drive carrier

Prerequisites

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

Steps

Insert the hard drive into the hard drive carrier with the connector end of the hard drive toward the back.

When aligned correctly, the back of the hard drive is flush with the back of the hard drive carrier.

Hard drive backplane

Depending on your system configuration:

2.5 inch (x16) SAS/SATA backplane or

2.5 inch (x8) SAS/SATA backplane or

3.5 inch (x8) SAS/SATA backplane

Removing the hard drive backplane

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Remove the cooling shroud.
4. Remove the cooling fan assembly.
5. Remove all hard drives.

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

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

 **CAUTION:** Note the number of each hard drive and temporarily label them before you remove the hard drive so that you can replace them in the same locations.

Steps

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

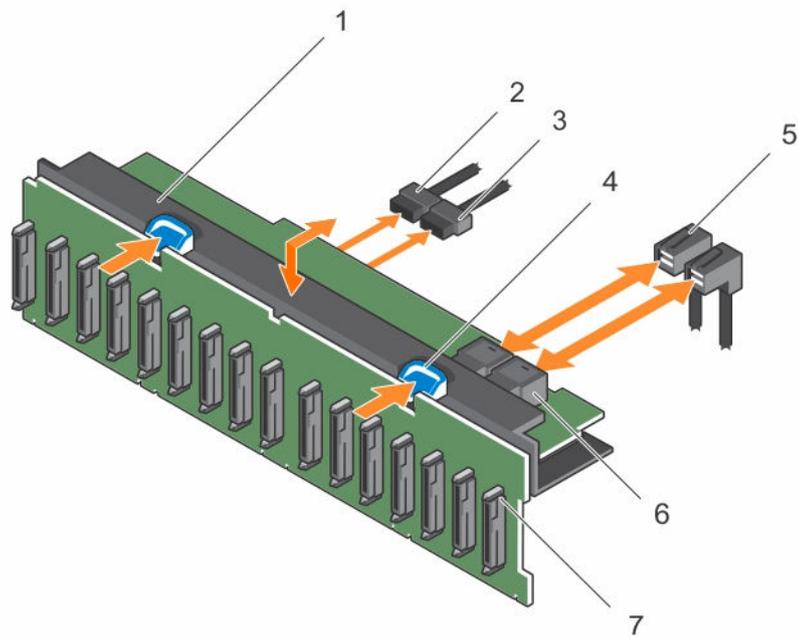


Figure 59. Removing and installing the 2.5 inch (x16) SAS/SATA backplane

- | | |
|----------------------------------|---------------------------|
| 1. hard drive backplane assembly | 2. backplane signal cable |
| 3. backplane power cable | 4. release tab (2) |
| 5. SAS cable (2) | 6. mini SAS connector (2) |
| 7. hard drive connector (16) | |

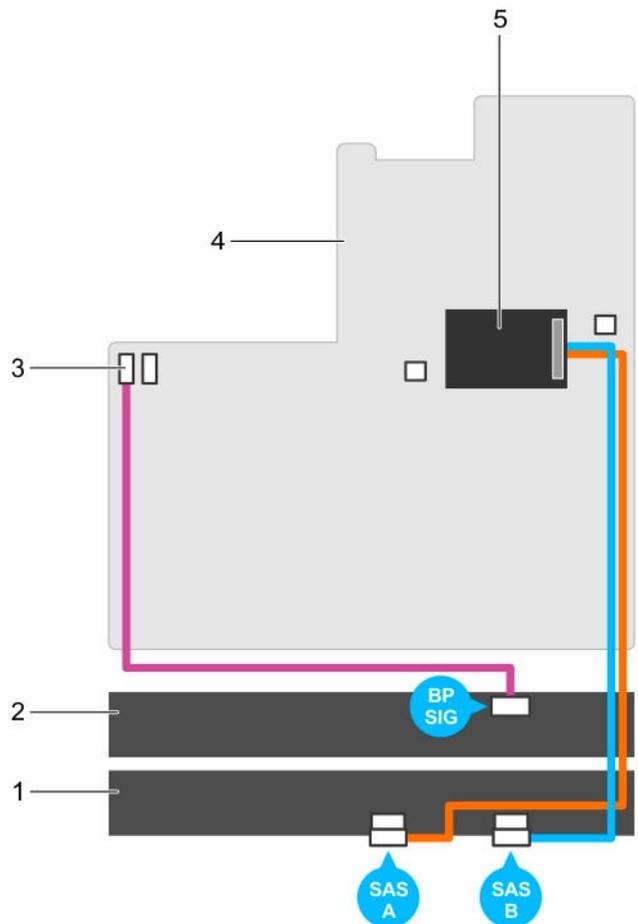


Figure 60. Cabling diagram—2.5 inch (x16) SAS/SATA backplane

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

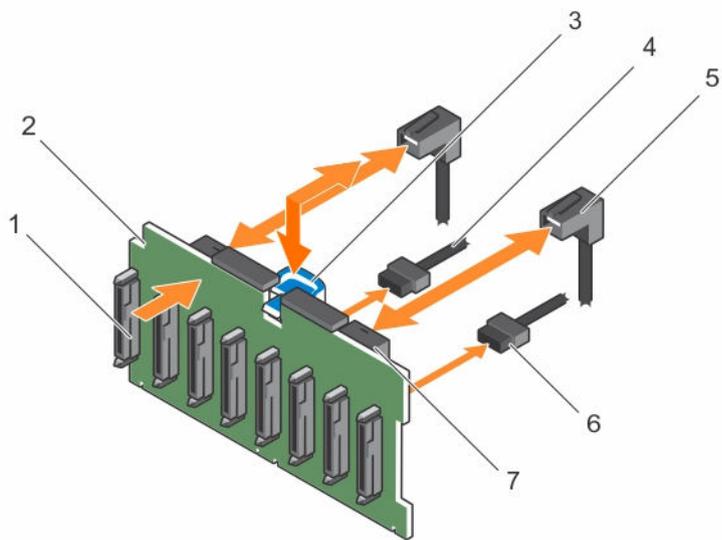


Figure 61. Removing and installing the 2.5 inch (x8) SAS/SATA backplane

- | | |
|-----------------------------|---------------------------|
| 1. hard drive connector (8) | 2. hard drive backplane |
| 3. release tab | 4. backplane power cable |
| 5. SAS cable (2) | 6. backplane signal cable |
| 7. mini SAS connector (2) | |

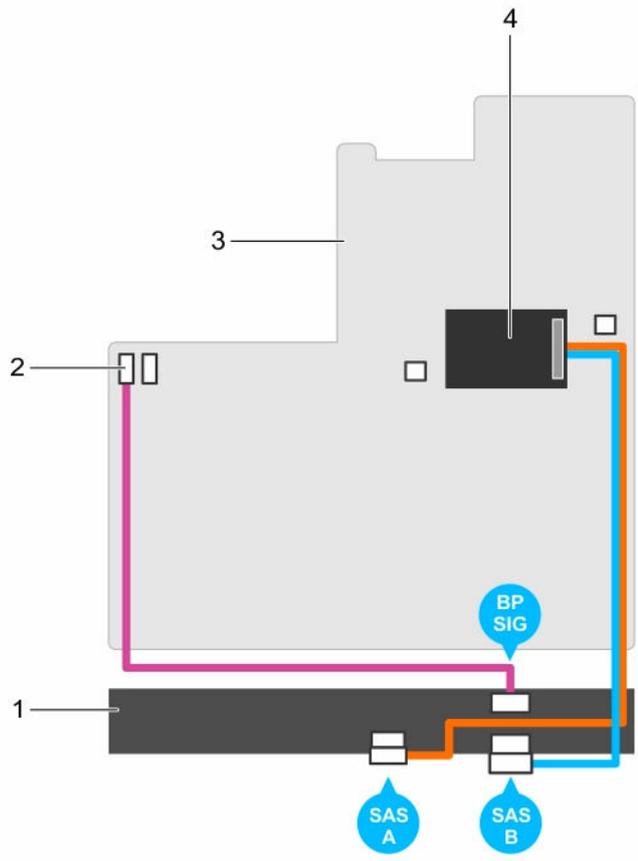


Figure 62. Cabling diagram—2.5 inch (x8) SAS/SATA backplane (option 1)

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

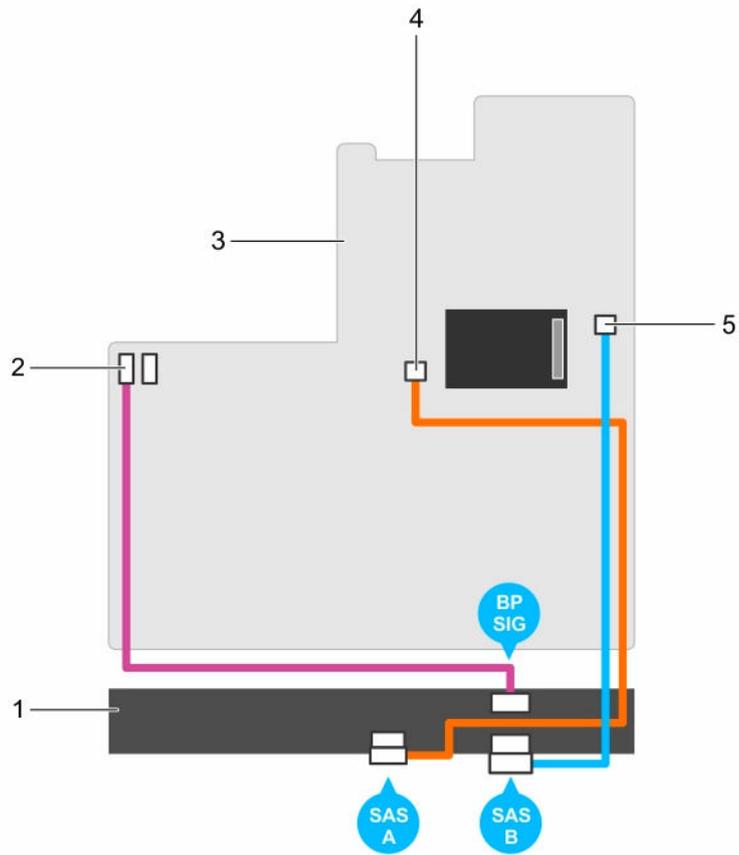


Figure 63. Cabling diagram—2.5 inch (x8) SAS/SATA backplane (option 2)

- | | |
|--|--|
| 1. hard drive backplane | 2. backplane signal connector 1 |
| 3. system board | 4. SAS A connector on the system board |
| 5. SAS B connector on the system board | |

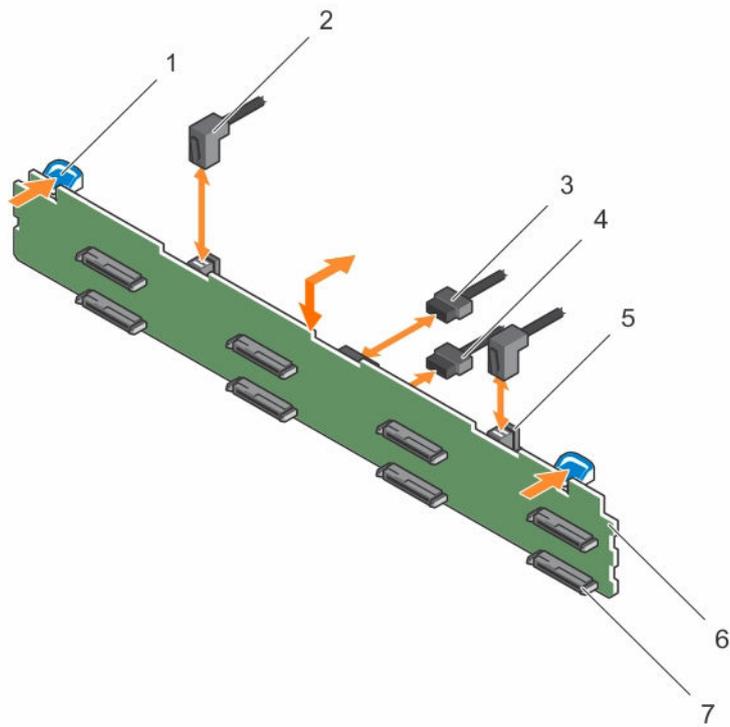


Figure 64. Removing and installing the 3.5 inch (x8) SAS/SATA backplane

- | | |
|-------------------------------|--------------------------|
| 1. release tab (2) | 2. SAS cable (2) |
| 3. backplane signal connector | 4. backplane power cable |
| 5. mini SAS cable connector | 6. hard drive backplane |
| 7. hard drive connector (8) | |

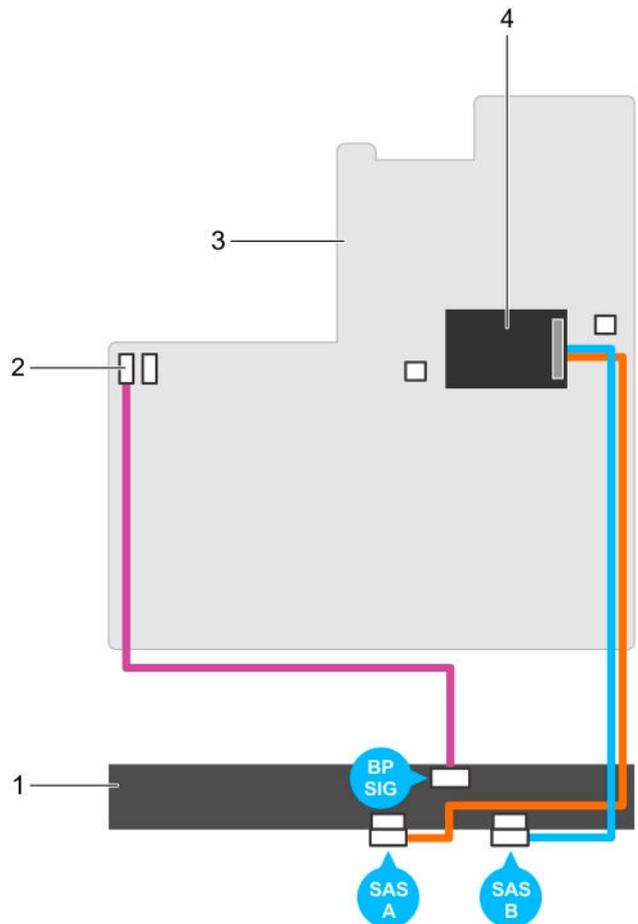


Figure 65. Cabling diagram—3.5 inch (x8) SAS/SATA backplane—(option 1)

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

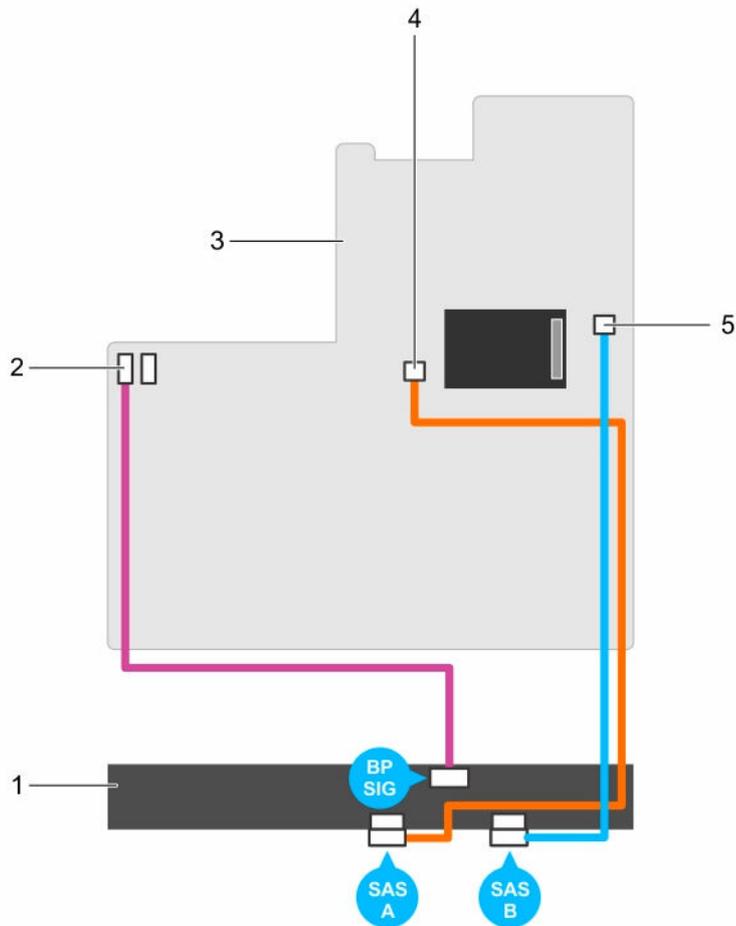


Figure 66. Cabling diagram—3.5 inch (x8) SAS/SATA backplane (option 2)

- | | |
|--|--|
| 1. hard drive backplane | 2. backplane signal connector 1 |
| 3. system board | 4. SAS A connector on the system board |
| 5. SAS B connector on the system board | |

Next steps

1. Replace the hard drive backplane. See [Installing the hard drive backplane](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the hard drive backplane

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

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

Steps

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

Next steps

1. Replace the cooling fan assembly.
2. Replace the cooling shroud.
3. Install the hard drives in their original locations.
4. Follow the procedure listed in [After working inside your system](#).

Tape backup unit (optional)

The tape backup unit is supported only on 2.5 inch hard drive systems.

Removing the tape backup unit

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Disconnect the power and data cables from the back of the tape backup unit.
Ensure you note the routing of the power and data cables inside the chassis as you remove them from the system board and the tape backup unit. You must route these cables properly when you replace them to prevent them from being pinched or crimped.
2. To remove the tape backup unit, press the release tab and slide the tape backup unit out of the tape backup unit slot.

 **NOTE:** If the tape backup unit is being permanently removed, install a tape backup unit blank by sliding it into the slot until it snaps into place.

 **NOTE:** The procedure to install and remove the tape backup unit blank is similar to that of the tape backup unit.

NOTE: Tape backup unit blank must be installed in empty tape backup unit slot to maintain FCC certification of the system. The blank also keeps dust and dirt out of the system and aid in proper cooling and airflow inside the system.

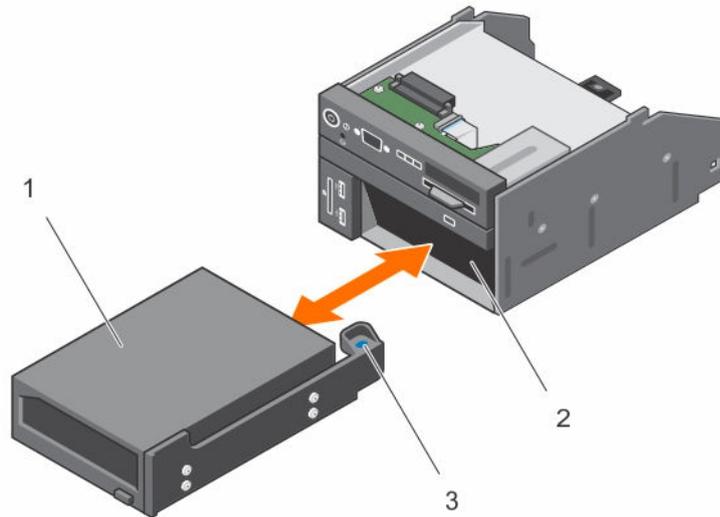


Figure 67. Removing and installing the tape backup unit

1. tape backup unit
2. tape backup unit slot
3. release tab

Installing the tape backup unit

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Unpack and prepare the tape backup unit for installation.
For instructions, see the documentation that accompanied the drive.
2. If applicable, remove the tape backup unit blank by pressing the release tab and sliding the tape backup unit blank out of the chassis.
3. Slide the tape backup unit into the slot until it snaps into place.
4. Connect the power and data cables to the back of the drive and the system board.

Next steps

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

Optical drive (optional)

Removing the optical drive

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Disconnect the power/data cable from the back of the drive.
Ensure that you note the routing of the power/data cable on the side of the system as you remove them from the system board and drive. You must route these cables properly when you replace them to prevent them from being pinched or crimped.
2. To release the optical drive, press the release tab.
3. Slide the optical drive out of the system until it is free of the optical drive slot.
4. If you are not adding a new optical drive, install the optical drive blank.

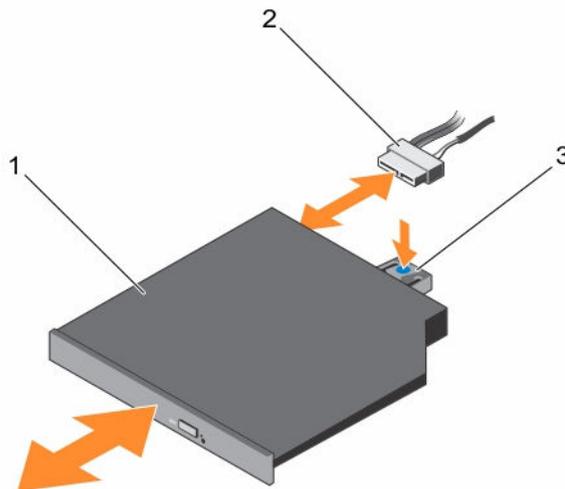


Figure 68. Removing and installing the optical drive

1. optical drive
2. power and data cable

3. release tab

Next steps

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

Installing the optical drive

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside 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 came with the product.

Steps

1. Align the optical drive with the optical drive slot on the front of the chassis.
2. Slide in the optical drive until the release tab snaps into place.
3. Connect the power/data cable to the optical drive and system board.



NOTE: You must route the cable properly on the side of the system to prevent it from being pinched or crimped.

Next steps

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

SD vFlash media 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.

Replacing an SD vFlash media card

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.

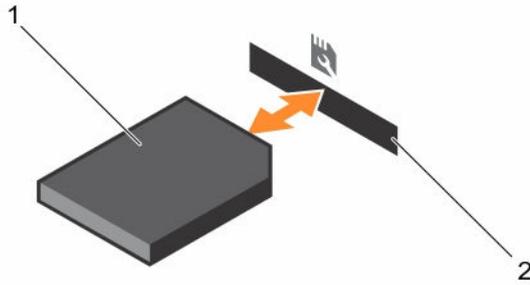


Figure 69. Removing and installing the SD vFlash media card

1. SD vFlash media card
 2. 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.

Control panel assembly

Removing the control panel

Prerequisites

1. Ensure that you read the [Safety instructions](#).
2. Follow the procedure listed in [Before working inside your system](#).
3. Keep the #2 Phillips screwdriver handy.

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

Steps

1. Using a #2 Phillips screwdriver, remove the screw(s) securing the control panel to the chassis.

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

2. From inside the system, push the control panel out of the chassis.
3. Remove all the cables connecting the control panel to the chassis.

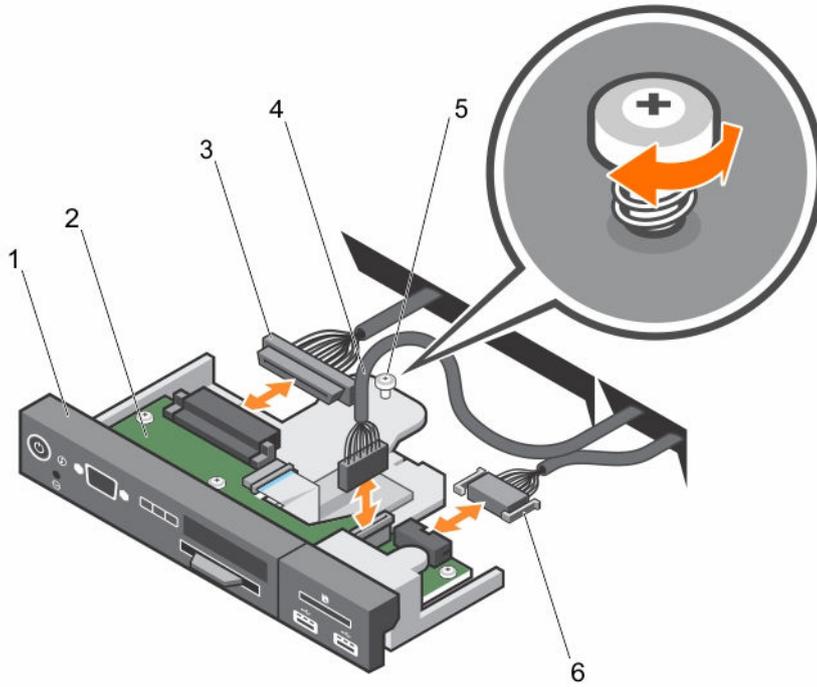


Figure 70. Removing and installing the control panel—3.5 inch hard drive system

- | | |
|----------------------------------|---------------------------------|
| 1. control panel | 2. control panel board |
| 3. control panel connector cable | 4. USB connector cable |
| 5. screw | 6. vFlash media connector cable |

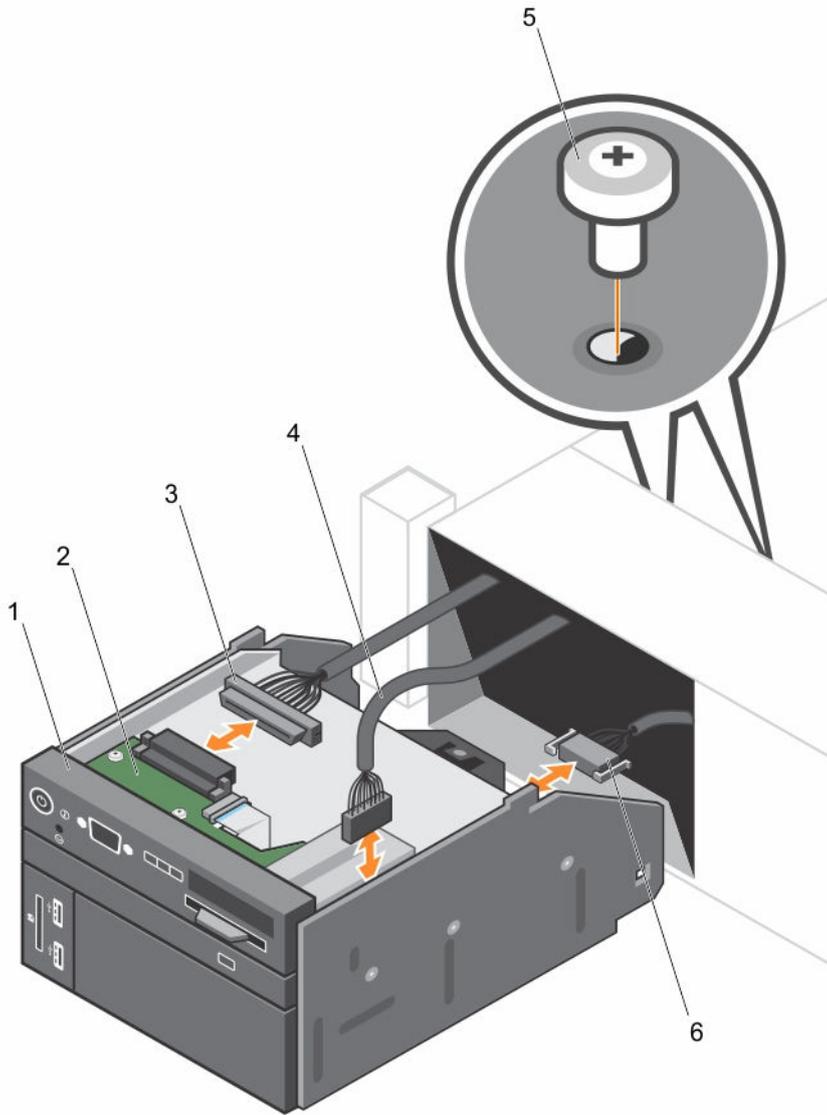


Figure 71. Removing and installing the control panel—2.5 inch hard drive system

- | | |
|----------------------------------|---------------------------------|
| 1. control panel | 2. control panel board |
| 3. control panel connector cable | 4. USB connector cable |
| 5. screw (2) | 6. vFlash media connector cable |
4. Locate and press the tabs on the information tag.
 5. Push the information tag out of the slot to remove it from the control panel.

NOTE: Retain the information tag for replacement in the new control panel.

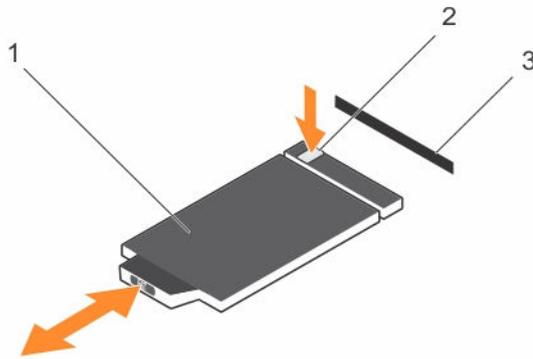


Figure 72. Removing and installing the information tag

1. information tag
2. tab
3. slot

Next steps

1. Replace the control panel. See [Installing the control panel](#).
2. Follow the procedure listed in [After working inside your system](#).

Installing the control panel

Prerequisites

1. Ensure that you follow the [Safety instructions](#).
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 came with the product.

Steps

1. Replace the blank information tag in the new control panel with the information tag retained from the old control panel.
📌 NOTE: Information tag lists system information such as Service Tag, NIC, and MAC address.
2. To install the information tag, push the information tag into the control panel slot.
3. Connect all the applicable cables to the control panel.
4. Slide the control panel into the slot in the chassis and secure the module with the screw.

Next steps

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

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 came with the product.

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, you must boot to the same boot mode in which you installed the operating system.

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

Troubleshooting external connections

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

Troubleshooting the video subsystem

Steps

1. Check the power connections to the monitor.
2. Check the video interface cabling from the system to the monitor.
3. Run the appropriate diagnostic test.

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

Next steps

If the tests fail, see [Getting Help](#).

Troubleshooting a USB device

Prerequisites

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

Steps

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

 **NOTE:** Older operating systems may not support USB 3.0.

4. Check if USB 3.0 is enabled in System Setup. If enabled, disable it and see if the issue is resolved.
5. In **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
6. If the problem is not resolved, replace the keyboard and/or mouse with a known working keyboard or mouse.
If the problem is not resolved, proceed to step 7 to troubleshoot other USB devices attached to the system.
7. Turn off all attached USB devices, and disconnect them from the system.
8. Restart the system.
9. If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.
10. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.
11. If the system is not accessible, reset the NVRAM_CLR jumper inside your system and restore the BIOS to the default settings.
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 [Getting Help](#).

Troubleshooting iDRAC Direct (USB XML configuration)

For information on USB storage device and server configuration, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/esmmanuals.

Steps

1. Ensure that your USB storage device is connected to the front USB Management Port, identified by  icon.
2. Ensure that your USB storage device is configured with an NTFS or an FAT32 file system with only one partition.
3. Verify that the USB storage device is configured correctly. For more information about configuring the USB storage device, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/esmmanuals.
4. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
5. Ensure that the **iDRAC Managed: USB XML Configuration** option is either **Enabled** or **Enabled only when the server has default credential settings**.
6. Remove and reinsert the USB storage device.

7. If import operation does not work, try with a different USB storage device.

Next steps

If all troubleshooting fails, see [Getting help](#).

Troubleshooting iDRAC Direct (Laptop connection)

For information on USB laptop connection and server configuration, see the Integrated Dell Remote Access Controller User's Guide at Dell.com/esmmanuals.

Steps

1. Ensure that your laptop is connected to the front USB Management Port, identified by  icon with a USB Type A/A cable.
2. In the **iDRAC Settings Utility**, ensure that **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
3. If the laptop is running the Windows operating system, ensure that the iDRAC Virtual USB NIC device driver is installed.
4. If the driver is installed, ensure that you are not connected to any network through WiFi or cabled ethernet, as iDRAC Direct uses a non-routable address.

Next steps

If all troubleshooting fails, see [Getting help](#).

Troubleshooting a serial I/O device

Steps

1. Turn off the system and any peripheral devices connected to the serial port.
2. Swap the serial interface cable with a known working cable, and turn on the system and the serial device.
If the problem is resolved, replace the interface cable with a known working cable.
3. Turn off the system and the serial device, and swap the serial device with a compatible device.
4. Turn on the system and the serial device.

Next steps

If the problem persists, see [Getting Help](#).

Troubleshooting an NIC

Steps

1. Run the appropriate diagnostic test. For more information, see [Using system diagnostics](#) 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.
 - If applicable, change the autonegotiation setting.

- If the problem persists, use another connector on the switch or hub.
- 4. Ensure that the appropriate drivers are installed and the protocols are bound. For more information, see the NIC documentation.
- 5. Enter System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.
- 6. Ensure that all the NICs, hubs, and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
- 7. Ensure that all network cables are of the proper type and do not exceed the maximum length.

Next steps

If all troubleshooting fails, see [Getting Help](#).

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 came with the 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 from the system:
 - hard drives
 - hard drive backplane
 - USB memory key
 - hard drive tray
 - cooling shroud
 - expansion card risers (if present)
 - expansion cards
 - power supply unit(s)
 - cooling fan assembly (if present)
 - cooling fans
 - processor(s) and heat sink(s)
 - memory modules
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 system does not start properly, see [Getting Help](#).
8. If the system starts properly, shut down the system, and reinstall all the expansion cards that you removed.
9. Run the appropriate diagnostic test. For more information, see [Using System Diagnostics](#).

Next steps

If the tests fail, see [Getting Help](#).

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 came with the 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 present)
 - expansion cards
 - power supply(s)
 - cooling fan assembly (if present)
 - cooling fans
 - processor(s) and heat sink(s)
 - memory modules
 - hard drive carriers
 - hard drive backplane
4. Ensure that all cables are properly connected.
5. Install the system cover.
6. Run the appropriate diagnostic test. For more information, see [Using System Diagnostics](#).

Next steps

If the tests fail, see [Getting Help](#).

Troubleshooting the system battery

Prerequisites



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



NOTE: If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.



NOTE: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time set in System Setup, the problem may be caused by a software, rather than by a defective battery.

Steps

1. Re-enter the time and date in System Setup.
2. Turn off the system, and disconnect it from the electrical outlet for at least an hour.
3. Reconnect the system to the electrical outlet, and turn on the system.
4. Enter System Setup.

If the date and time displayed in System Setup are not correct, check the System Error Log (SEL) for system battery messages.

Next steps

If the problem persists, see [Getting Help](#).

Troubleshooting power supply units

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

Troubleshooting power source problems

1. Press the power button to ensure that your system is turned on. If the power indicator does not glow when the power button is pressed, press the power button firmly.
2. Plug in another working PSU 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 required specifications.

Power supply unit problems

1. Ensure that no loose connections exist.
For example, loose power cables.
2. Ensure that the power supply handle/LED indicates that the power supply is working properly.
3. If you have recently upgraded your system, ensure that the power supply unit has enough power to support the new system.
4. If you have a redundant power supply configuration, ensure that both the power supply units are of the same type and wattage.
If the LED You may have to upgrade to a higher wattage power supply unit.
5. Ensure that you use only power supply units with the Extended Power Performance (EPP) label on the back.
6. Reseat the power supply unit.

 **NOTE:** After installing a power supply unit, allow several seconds for the system to recognize the power supply unit and determine if it is working properly.

If the problem persists, see [Getting Help](#).

Troubleshooting cooling problems

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

From F2 System Setup

1. Select **iDRAC Settings** → **Thermal**, and set a higher fan speed from the fan speed offset or minimum fan speed.

From RACADM commands

1. Run the command `racadm help system.thermalsettings`

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

Troubleshooting cooling fans

Prerequisites

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

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

Steps

1. Remove the system cover.
2. Reseat the fan or the fan's power cable.

3. Install the system cover.
4. Restart the system.

Next steps

If the problem persists, see [Getting Help](#).

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 came with the product.

Steps

1. If the system is operational, run the appropriate system diagnostic test. See [Using system diagnostics](#) for the available diagnostic tests.
If the diagnostics tests indicate a fault, follow the corrective actions provided by the diagnostic tests.
2. If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least for 10 seconds, and then reconnect the system to the power source.
3. Turn on the system and attached peripherals, and note the messages on the screen.
If an error message is displayed indicating a fault with a specific memory module, go to step 12.
4. Enter System Setup, and check the system memory setting. Make any changes to the memory settings, if needed.
If the memory settings match the installed memory but the problem still persists, go to step 12.
5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Remove the system cover.
7. Check the memory channels and ensure that they are populated correctly.
 **NOTE:** See the system event log or system messages for the location of the failed memory module. Reinstall the memory device.
8. Reseat the memory modules in their sockets.
9. Install the system.
10. Enter System Setup and check the system memory setting.
If the problem is not resolved, proceed with step 11.
11. Remove the system cover.
12. If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module with a known working memory module.
13. To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity.
If an error message is displayed on the screen, this may indicate a problem with the installed DIMM type(s), incorrect DIMM installation, or defective DIMM(s). Follow the on-screen instructions to resolve the problem.
14. Install the system cover.
15. As the system boots, observe any error message that is displayed and the diagnostic indicators on the front of the system.

16. If the memory problem persists, repeat step 12 through step 15 for each memory module installed.

Next steps

If the problem persists after all memory modules have been checked, see [Getting Help](#).

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 came with the 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 reseat 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 is not resolved, see [Getting Help](#).

Troubleshooting an SD card

Prerequisites

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

 **NOTE:** Certain SD cards have a physical write-protect switch on the card. If the write-protect switch is turned on, the SD card is not writable.

Steps

1. Enter System Setup, and ensure that the **Internal SD Card Port** is enabled.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
 -  **NOTE:** When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next restart, the system displays a message indicating the failure. If redundancy is enabled at the time of SD card failure, a critical alert will be logged and chassis health will degrade.

4. Replace the failed SD card with a new SD card.
5. Install the system cover.
6. Reconnect the system to its electrical outlet and turn the system on, 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 required modes.
Verify that the correct SD slot is set as **Primary SD Card**.
8. Check if the SD card is functioning properly.
9. If the **Internal SD Card Redundancy** option is set to **Enabled** at the time of the SD card failure, the system will prompt you to perform a rebuild.

 **NOTE:** The rebuild will always be sourced from the primary SD card to the secondary SD card.

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 came with the 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 front 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 is not resolved, see [Getting Help](#).

Troubleshooting a tape backup 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 came with the product.

Steps

1. Use a different tape cartridge.
2. Ensure that the device drivers for the tape backup unit are installed and are configured correctly. See your tape drive documentation for more information about device drivers.
3. Reinstall the tape-backup software as instructed in the tape-backup software documentation.
4. Ensure that the interface cable of the tape drive is connected to the external port on the controller card.
5. Perform the following steps to ensure that the controller card is properly installed:
 - a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
 - b. Remove the system cover.
 - c. Reseat the controller card in the expansion card slot.
 - d. Install the system cover.
 - e. Turn on the system and attached peripherals.
6. Run the appropriate diagnostic test. For more information, see [Using System Diagnostics](#).

Next steps

If you cannot resolve the problem, see [Getting Help](#).

Troubleshooting a hard drive

Prerequisites

-  **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.
-  **CAUTION:** This troubleshooting procedure can erase data stored on the hard drive. Before you proceed, back up all files on the hard drive.

Steps

1. Run the appropriate diagnostic test. For more information, see [Using system diagnostics](#).
Depending on the results of the diagnostics test, proceed as needed through the following steps.
2. If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:
 - a. Reboot 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 on RAID configuration.
 - b. Ensure that the hard drive(s) are configured correctly for the RAID array.
 - c. Take the hard drive offline and reseat the drive.
 - d. Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
4. Reboot the system and enter System Setup.
5. Verify that the controller is enabled and the drives are displayed in System Setup.

Next steps

If the problem persists, try troubleshooting the expansion cards or see [Getting Help](#).

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 came with the product.

 **NOTE:** When troubleshooting a SAS or PERC controller, see the documentation for your operating system and the controller.

1. Run the appropriate diagnostic test. For more information, see [Using system diagnostics](#).
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. For more information, see [Using system diagnostics](#). If the tests fail, see [Getting Help](#).
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. For more information, see [Using system diagnostics](#).

If the tests fail, see [Getting Help](#).

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 came with the product.

 **NOTE:** When troubleshooting an expansion card, you also have to see the documentation for your operating system and the expansion card.

Steps

1. Run the appropriate diagnostic test. For more information, see [Using system diagnostics](#).
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. For more information, see [Using system diagnostics](#).
If the tests fail, see [Getting Help](#).
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. For more information, see [Using system diagnostics](#).
13. If the problem persists, see [Getting Help](#).

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 came with the product.

Steps

1. Run the appropriate diagnostics test. See [Using system diagnostics](#) for available diagnostic tests.
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. For more information, see [Using system diagnostics](#).
7. If the problem persists, see [Getting Help](#).

System messages

For a list of event and error messages generated by the system firmware and agents that monitor system components, see the Dell Event and Error Messages Reference Guide at [Dell.com/openmanagemanuals](https://www.dell.com/openmanagemanuals) > **OpenManage software**.

Warning messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a hard drive, a message warns you that you may lose all data on the hard drive. Warning messages usually interrupt the task and require you to respond by typing y (yes) or n (no).

 **NOTE:** Warning messages are generated by either the application or the operating system. For more information, see the documentation that accompanied the operating system or application.

Diagnostic messages

The system diagnostic utilities may issue messages if you run diagnostic tests on your system. For more information about system diagnostics, see [Using system diagnostics](#).

Alert messages

The systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation.

Using system diagnostics

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

Dell Embedded System Diagnostics

 **NOTE:** The Dell Embedded System Diagnostics is also known as Enhanced Pre-boot System Assessment (ePSA) diagnostics.

The Embedded System Diagnostics provides a set of options for particular device groups or devices enabling you to:

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)
- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

When to use the Embedded System Diagnostics

If a major component or device in the system does not operate properly, running the Embedded System Diagnostics may indicate component failure.

Running the Embedded System Diagnostics from Boot Manager

1. When the system is booting, press **F11**.
2. Use the up and down arrow keys to select **System Utilities** → **Launch Diagnostics**.
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

Running the Embedded System Diagnostics from the Dell Lifecycle Controller

1. As the system boots, press <F11>.
2. Select **Hardware Diagnostics** → **Run Hardware Diagnostics**.
The **ePSA Pre-boot System Assessment** window is displayed, listing all devices detected in the system. The diagnostics starts executing the tests on all the detected devices.

System diagnostics controls

| Menu | Description |
|---------------|---|
| Configuration | Displays the configuration and status of all detected devices. |
| Results | Displays the results of all tests that are executed. |
| System health | Provides the current overview of the system performance. |
| Event log | Displays a time-stamped log of the results of all tests run on the system. This is displayed if at least one event description is recorded. |

Jumpers and connectors

System board jumper settings

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

Table 6. 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). |

System board jumpers and connectors

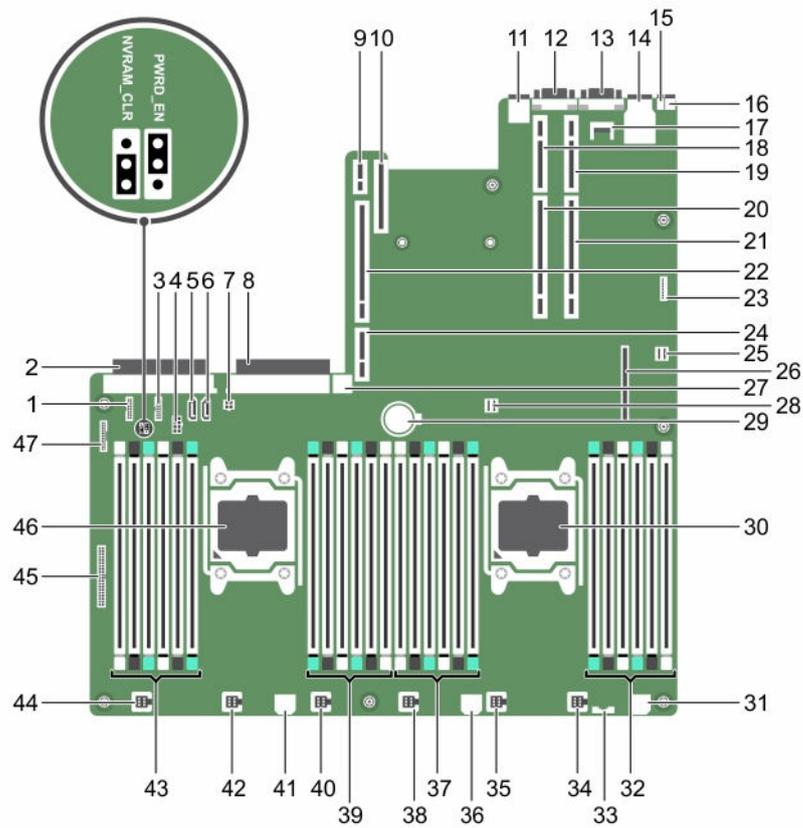


Figure 73. System board jumpers and connectors

| Item | Connector | Description |
|------|------------|-----------------------------------|
| 1 | J_BP_SIG1 | Backplane signal connector 1 |
| 2 | J_PS_2 | PSU 2 connector |
| 3 | J_BP_SIG0 | Backplane signal connector 0 |
| 4 | J_BP0 | Backplane power connector 0 |
| 5 | J_SATA_CD | Optical drive SATA connector |
| 6 | J_SATA_TBU | Tape backup unit SATA connector |
| 7 | J_TBU | Tape backup unit power connector |
| 8 | J_PS_1 | PSU 1 connector |
| 9 | J_IDSMD | Internal dual SD module connector |
| 10 | J_NDC | Network daughter card connector |

| Item | Connector | Description |
|-------------|--------------------------|-----------------------------------|
| 11 | J_USB | USB connector |
| 12 | J_VIDEO_REAR | Video connector |
| 13 | J_COM1 | Serial connector |
| 14 | J_IDRAC_RJ45 | iDRAC8 connector |
| 15 | J_CYC | System identification connector |
| 16 | CYC_ID | System identification button |
| 17 | J_TPM_MODULE | Trusted Platform Module connector |
| 18 | J_RISER_2AX | Riser 3 connector |
| 19 | J_RISER_1AX | Riser 1 connector |
| 20 | J_RISER_2BX | Riser 2 connector |
| 21 | J_RISER_1BX | Riser 1 connector |
| 22 | J_RISER_3AX | Riser 3 connector |
| 23 | J_QS | Quick Sync bezel connector |
| 24 | J_RISER_3BX | Riser 3 connector |
| 25 | J_SATA_B | Internal SAS connector |
| 26 | J_STORAGE | Mini PERC connector |
| 27 | J_USB_INT | Internal USB connector |
| 28 | J_SATA_A | Internal SAS connector |
| 29 | BAT | Battery connector |
| 30 | CPU 2 | Processor 2 socket |
| 31 | J_BP3 | Backplane power connector 3 |
| 32 | B10, B6, B2, B9, B5, B1 | Memory module sockets |
| 33 | J_BP_SIG2 | Backplane signal connector 2 |
| 34 | J_FAN2U_6 | Cooling fan connector |
| 35 | J_FAN2U_5 | Cooling fan connector |
| 36 | J_BP2 | Backplane power connector 2 |
| 37 | B3, B7, B11, B4, B8, B12 | Memory module sockets |
| 38 | J_FAN2U_4 | Cooling fan connector |
| 39 | A10, A6, A2, A9, A5, A1 | Memory module sockets |
| 40 | J_FAN2U_3 | Cooling fan connector |
| 41 | J_BP1 | Backplane power connector |
| 42 | J_FAN2U_2 | Cooling fan connector |
| 43 | A3, A7, A11, A4, A8, A12 | Memory module sockets |

| Item | Connector | Description |
|------|------------|--------------------------------|
| 44 | J_FAN2U_1 | Cooling fan connector |
| 45 | J_CTRL_PNL | Control panel signal connector |
| 46 | CPU 1 | Processor 1 socket |
| 47 | J_FP_USB | Front panel USB connector |

Disabling a forgotten password

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

Prerequisites



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Steps

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

The existing passwords are not disabled (erased) until the system boots with the jumper on pins 2 and 4. However, before you assign a new system and/or setup password, you must move the jumper back to pins 4 and 6.



NOTE: If you assign a new system and/or setup password with the jumper on pins 2 and 4, the system disables the new password(s) the next time it boots.

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

Technical specifications

Processor

| | |
|----------------|---|
| Processor type | One or two Intel Xeon processor E5-2600 v3 product family |
|----------------|---|

Power

AC power supply unit (PSU) per power supply

| | |
|--|--|
| Wattage | 495 W, 750 W, or 1100 W |
| Heat dissipation | 1908 BTU/hr maximum (495 W PSU) |
|  NOTE: Heat dissipation is calculated using the power supply unit wattage rating. | 2891 BTU/hr maximum (750 W PSU) |
| | 2843 BTU/hr maximum (750 W Titanium PSU) |
| | 4100 BTU/hr maximum (1100 W PSU) |
| | 4416 BTU/hr maximum (DC 1100 W PSU) |
| | 2891 BTU/hr maximum (750 W mixed mode PSU) |
| Voltage | 100–240 V AC, autoranging, 50/60 Hz |
|  NOTE: This system is also designed to be connected to IT power systems with a phase to phase voltage not exceeding 230 V. | or 200–240 V AC, autoranging, 50/60 Hz, for 750 W Titanium power supply |

DC power supply (per power supply)

| | |
|--|--|
| Wattage | 1100 W or 750 W (Platinum power supply for China only) |
| Heat dissipation | 4416 BTU/hour maximum |
|  NOTE: Heat dissipation is calculated using the power supply wattage rating. | |
| Voltage | –(48–60) V DC |
|  NOTE: This system is also designed to be connected to IT power systems with a phase to phase voltage not exceeding 230 V. | |

| | |
|----------------|---------------------------------|
| System battery | CR 2032 3.0-V lithium coin cell |
|----------------|---------------------------------|

Expansion Bus

| | |
|-----------------------------------|---|
| Bus type | PCI Express Generation 3 |
| Expansion cards | For a list of supported expansion cards, see Expansion card installation guidelines . |
| Expansion slots using riser card: | |
| Riser 1 | (Slot 1) One half-height, low-profile x8 link (Slot 2) One half-height, low-profile x8 link (Slot 3) One half-height, low-profile x8 link |
| Riser 2 | (Slot 4) One full-height, full-length x16 link  NOTE: To use slots 1 through 4, both the processors must be installed. |
| Riser 3 (default) | (Slot 5) One full-height, full-length x8 link (Slot 6) One full-height, full-length x8 link (Slot 7) One full-height, full-length x8 link |
| Riser 3 (alternate for GPU) | (Slot 6) One full-height, full-length x16 link |

Memory

| | |
|--------------------------|---|
| Architecture | 1333 MT/s, 1600 MT/s, 1866 MT/s or 2133 MT/s DDR4 registered, load-reduced Error Correcting Code (ECC) DIMMs Support for advanced ECC or memory optimized operation |
| Memory module sockets | Twenty-four 288-pin |
| Memory module capacities | |
| LRDIMMs | 32 GB or 64 GB quad-ranked |
| RDIMMs | 4 GB single-ranked, 8 GB, 16 GB or 32 GB dual-ranked |
| Minimum RAM | 4 GB with a single processor 8 GB with dual processors (minimum one memory module per processor) |
| Maximum RAM | Up to 1536 GB with dual processors Up to 786 GB with a single processor |

Drives

| | |
|--------------------------|--|
| Hard drives | |
| Eight-hard drive systems | Up to eight 3.5 inch or 2.5 inch, internal, hot-swappable SAS, SATA, or Nearline |

Drives

| | |
|----------------------------|---|
| | SAS hard drives in hard drive slots 0 through 7. |
| Sixteen-hard drive systems | Up to sixteen 2.5 inch, internal, hot-swappable SAS, SATA, SAS/SATA SSD, or Nearline SAS hard drives in hard drive slots 0 through 15. |
| Optical drive | One optional SATA DVD-ROM drive or DVD+/-RW drive.  NOTE: DVD devices are data only. |

Connectors

Back

| | |
|--------|---|
| NIC | Four 1 Gbps, two 1 Gbps plus two 10 Gbps, or four 10 Gbps |
| Serial | 9-pin, DTE, 16550-compatible |
| USB | Two 4-pin, USB 3.0-compliant |
| Video | 15-pin VGA |

Front

| | |
|----------------------|--|
| USB | One 4-pin, USB 2.0-compliant One USB management port/iDRAC Direct |
| Video | 15-pin VGA |
| External vFlash card | One flash memory card slot with iDRAC8 Enterprise card  NOTE: The card slot is available for use only if the iDRAC8 Enterprise license is installed on your system. |

Internal

| | |
|-------------------------|---|
| USB | One 4-pin, USB 3.0-compliant |
| Internal Dual SD Module | Two optional flash memory card slots with the internal SD module  NOTE: One card slot is dedicated for redundancy. |

Video

| | |
|--------------|----------------|
| Video type | Matrox G200eR2 |
| Video memory | 16 MB |

Physical

| | |
|------------------------------|---|
| Height | 8.73 cm (3.44 inch) |
| Width | 48.2 cm (18.98 inch) |
| Depth | 75.58 cm (29.75 inch) |
| Maximum configuration weight | <ul style="list-style-type: none">• 31.5 kg (69.45 lb) (3.5-inch hard drive systems)• 31.4 kg (69.23 lb) (2.5-inch hard drive systems) |
| Empty weight | <ul style="list-style-type: none">• 18.9 kg (41.67 lb) (3.5-inch hard drive systems)• 20.8 kg (45.86 lb) (2.5-inch hard drive systems) |

Environmental specifications



NOTE: For additional information about environmental measurements for specific system configurations, see [Dell.com/environmental_datasheets](https://www.dell.com/environmental_datasheets).

Temperature

| | |
|--|---|
| 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. For information on restrictions, see the Standard operating temperature section. |
| Fresh air | For information on fresh air, see the Expanded Operating Temperature section. |
| Maximum temperature gradient (operating and storage) | 20°C/h (36°F/h) |

Relative humidity

| | |
|-----------|--|
| 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. |

Maximum vibration

| | |
|-----------|---|
| Operating | 0.26 G _{rms} at 5 Hz to 350 Hz (all operation orientations). |
| Storage | 1.88 G _{rms} at 10 Hz to 500 Hz for 15 min (all six sides tested). |

Maximum shock

| | |
|-----------|---|
| 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. |
|-----------|---|

Environmental 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.

Maximum altitude

Operating 3048 m (10,000 ft).

Storage 12,000 m (39,370 ft).

Operating temperature de-rating

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 contamination

 **NOTE:** This section defines the limits to help avoid IT equipment damage and/or failure from particulates and gaseous contamination. If it is determined that levels of particulates or gaseous pollution are beyond the limits specified below and are the reason for the damage and/or failures to your equipment, it may be necessary for you to re-mediate the environmental conditions that are causing the damage and/or failures. Re-mediation of environmental conditions will be the responsibility of the customer.

Air filtration

Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.

 **NOTE:** 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.

 **NOTE:** 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.

 **NOTE:** Applies to data center and non-data center environments.

Corrosive dust

- Air must be free of corrosive dust.
- Residual dust present in the air must have a deliquescent point less than 60% relative humidity.

 **NOTE:** Applies to data center and non-data center environments.

Gaseous contamination

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

Copper coupon corrosion rate <300 Å/month per Class G1 as defined by ANSI/ISA71.04-1985.

Environmental specifications

Silver coupon corrosion rate <200 Å/month as defined by AHSRAE TC9.9.

Standard operating temperature

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.

Temperature and processor restrictions Ambient temperature is restricted to 30°C for 3.5-inch hard drive chassis with:

- the hard drive tray and a maximum of 120 W processors.
- 6 TB SAS or SATA drives in the hard drive tray and a maximum of 105 W processors.
- a maximum of 135 W processors.

Ambient temperature is restricted to 30°C for 1.8 uSATA drive chassis and supports a maximum of 145 W processors.

Expanded operating temperature

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

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

Continuous operation 5°C to 40°C at 5% to 85% RH with 29°C dew point.

 **NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate continuously down to 5°C or as high as 40°C.

For temperatures between 35°C and 40°C, de-rate maximum allowable temperature by 1°C per 175 m above 950 m (1°F per 319 ft).

≤ 1% of annual operating hours -5°C to 45°C at 5% to 90% RH with 29°C dew point.

 **NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate down to -5°C or up to 45°C for a maximum of 1% of its annual operating hours.

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

Expanded Operating Temperature Restrictions

- Do not perform a cold startup below 5°C.
- The operating temperature specified is for a maximum altitude of 3050 m (10,000 ft).
- 160 W (10 core) processor is not supported.

- Tape Backup Unit (TBU) is not supported.
- Redundant power supplies are required.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- PCIe SSD and GPU is not supported.

Getting help

Contacting Dell

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

1. Go to **Dell.com/support**.
2. Select your country from the drop-down menu on the bottom 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.

Locating your system Service Tag

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.

 **NOTE:** The Quick Resource Locator (QRL) code on the information tag is unique to your system. Scan the QRL to get immediate access to your system information using your smart phone or tablet.

Documentation feedback

Click on the **Feedback** link in any of the Dell documentation pages, fill out the form, and click **Submit** to send your feedback.

Quick Resource Locator

Use the Quick Resource Locator (QRL) to get immediate access to system information and how-to videos. This can be done by visiting **Dell.com/QRL** or by using your smartphone or tablet and a model

specific Quick Resource (QR) code located on your Dell PowerEdge system. To try out the QR code, scan the following image.

