Dell PowerEdge R530xd
Owner's Manual

Regulatory Model: E29S Series
Regulatory Type: E29S002

Notes, cautions, and warnings

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

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

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

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About your PowerEdge R530xd system

The Dell PowerEdge R530xd is a rack server that supports up to two processors based on the Intel Xeon E5 2600 V3 product family, up to sixteen DIMMs, and up to fourteen drive bays for hard drives/SSDs.

Front-panel features and indicators

Figure 1. Front-panel features and indicators

Item	Indicator, Button, or Connector	Icon	Description
1	Diagnostic indicators		The diagnostic indicators light up to display error status. For more information, see Diagnostic indicators.
2	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pressed, the system status indicator on the back flashes until one of the buttons is pressed again. Press to toggle the system ID on and off. If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode. To reset the iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.

3	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.
4	NMI button		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. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.
5	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.
6	Hard drives		Up to twelve 3.5 inch or 2.5 inch (in a hybrid drive carrier) hot-swappable hard drives.
7	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/esmmanuals**. The USB management port is USB 2.0-compliant.
8	iDRAC Direct LED indicator		The indicator lights up to display error status.
9	Video connector		Enables you to connect a display to the system.

Diagnostic indicators

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

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

Icon	Description	Condition	Corrective action
	Health indicator	If the system is on, and in good health, the indicator lights solid blue.	None required.
		The indicator blinks amber if the system	See the System Event Log or system messages for the specific issue. For more information on error messages, see the Dell

Icon	Description	Condition	Corrective action
		is on or in standby, and if any error exists (for example, a failed fan or hard drive).	Event and Error Messages Reference Guide at **dell.com/esmmanuals**. Invalid memory configurations can cause the system to halt at startup without any video output. See Getting help.
	Hard-drive indicator	The indicator blinks amber if a hard drive experiences an error.	See the System Event Log to determine the hard drive that has an error. Run the appropriate Online Diagnostics test. Restart system and run embedded diagnostics (ePSA). If the hard drives are configured in a RAID array, restart the system and enter the host adapter configuration utility program.
	Electrical indicator	The indicator blinks amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply or voltage regulator).	See the System Event Log or system messages for the specific issue. If it is due to a problem with the power supply, check the LED on the power supply. Re-seat the power supply by removing and reinstalling it. If the problem persists, see Getting help.
	Temperature indicator	The indicator blinks amber if the system experiences a thermal error (for example, a temperature out of range or fan failure).	Ensure that none of the following conditions exist: • A cooling fan is removed or has failed. • System cover, cooling shroud, EMI filler panel, memory-module blank, or back-filler bracket is removed. • Ambient temperature is too high. • External airflow is obstructed. See Getting help.
	Memory indicator	The indicator blinks amber if a memory error occurs.	See the system event log or system messages for the location of the failed memory. Reinstall the memory device. If the problem persists, see Getting help.
	PCIe indicator	The indicator blinks amber if a PCIe card experiences an error.	Restart the system. Update any required drivers for the PCIe card. Re-install the card. If the problem persists, see Getting help. **NOTE:** For more information on supported PCIe cards, see . .

Hard-drive indicator patterns

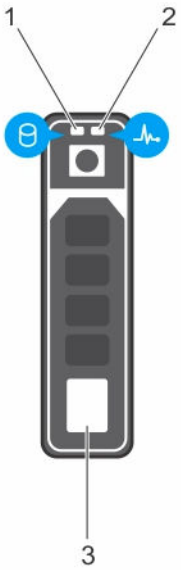


Figure 2. Hard-drive indicators

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 the 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 OFF	Predicted drive failure
Blinks amber four times per second	Drive failed
Blinks green slowly	Drive rebuilding
Steady green	Drive online

Drive-status indicator pattern (RAID only)	Condition
Blinks green three seconds, amber three seconds, and OFF six seconds	Rebuild aborted

iDRAC Direct LED indicator codes

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

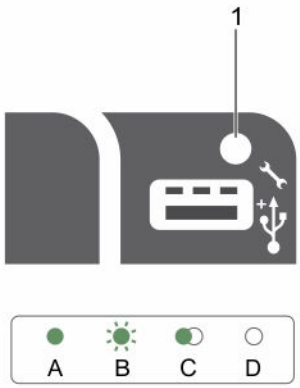


Figure 3. iDRAC Direct LED indicator

1. iDRAC Direct status indicator

The table below 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 2 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 table below displays iDRAC Direct activity when configuring iDRAC Direct 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.

Back-panel features and indicators

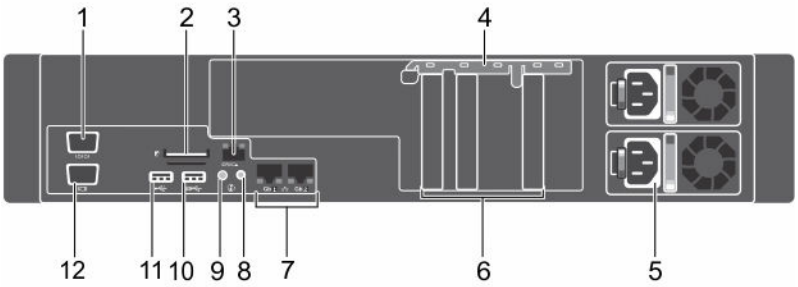


Figure 4. Back-panel features and indicators without dual riser module

Item	Indicator, button, or connector	Icon	Description	
1	Serial connector		Enables you to connects a serial device to the system.	
2	vFlash media card slot (Optional)		Enables you to insert a vFlash media card.	
3	iDRAC port (Optional)		Dedicated management port for the iDRAC Ports Card.	
4	PCIe expansion card retainer		PCIe card lock	
5	Redundant Power Supply Unit (2)		AC	495 W EPP, 750 W EPP, or 1100 W EPP
			Or	
			DC	750 W
6	Half Height PCIe expansion card slots (3)		Enables you to connect PCIe expansion cards.	
7	Ethernet connectors (2)		Integrated 10/100/1000 Mbps NIC connector	

Item	Indicator, button, or connector	Icon	Description
8	System identification connector		Enables you to connect the optional system status indicator assembly through the optional cable management arm.
9	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the system status indicator on the back blink until one of the buttons is pushed again. Press to toggle the system ID on and off. If the system hangs during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode. To reset the iDRAC (if not disabled in System Setup) press and hold the System Identification button for more than 15 seconds.
10	USB connector		Connects USB devices to the system. This port is USB 3.0-compliant.
11	USB connector		Connects USB devices to the system. This port is USB 2.0-compliant.
12	Video connector		Connects a VGA display to the system.

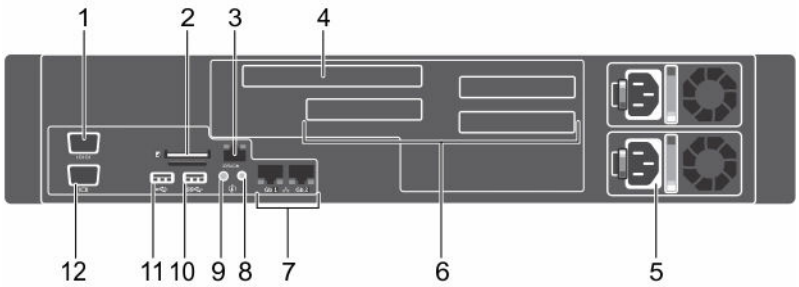


Figure 5. Back-panel features and indicators with dual riser module

Item	Indicator, button, or connector	Icon	Description
1	Serial connector		Connects a serial device to the system.
2	vFlash media card slot (Optional)		Enables you to insert a vFlash media card.
3	iDRAC port (Optional)		Dedicated management port for the iDRAC Ports Card.

Item	Indicator, button, or connector	Icon	Description	
4	Full height, full length PCIe Expansion card slot (1)		Enables you to connect a full height, full length PCIe expansion card.	
5	Redundant Power Supply Unit (2)		AC	495 W EPP, 750 W EPP or 1100 W EPP
			Or	
			DC	750 W
6	Half Height PCIe Expansion card slots (3)		Enables you to connect PCIe expansion cards.	
7	Ethernet connectors (2)		Integrated 10/100/1000 Mbps NIC connector	
8	System identification connector		Connects the optional system status indicator assembly through the optional cable management arm.	
9	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the system status indicator on the back blink until one of the buttons is pushed again. Press to toggle the system ID on and off. If the system hangs during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode. To reset the iDRAC (if not disabled in System Setup) press and hold for more than 15 seconds.	
10	USB connector		Connects USB devices to the system. This port is USB 3.0-compliant.	
11	USB connector		Connects USB devices to the system. This port is USB 2.0-compliant.	
12	Video connector		Connects a VGA display to the system.	

NIC indicator codes

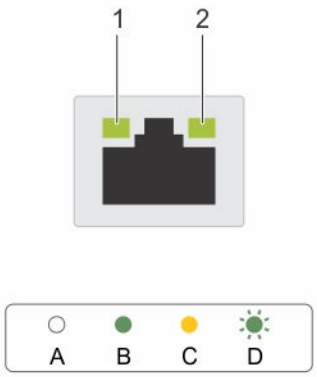


Figure 6. NIC indicators

1. link indicator
2. activity indicator

Convention	Indicator pattern	Description
A	Link and activity indicators are OFF	The NIC is not connected to the network.
B	Link indicator is green	The NIC is connected to a valid network at its maximum port speed (1 Gbps).
C	Link indicator is yellow	The NIC is connected to a valid network at less than its maximum port speed.
D	Activity indicator is blinking green	Network data is being sent or received.

Power supply unit indicator codes

Power indicator codes for AC and DC redundant power supply unit

Each AC power supply unit (PSU) has an illuminated translucent handle and each DC PSU (when available) has an LED that serves as an indicator to show whether power is present or a power fault has occurred.

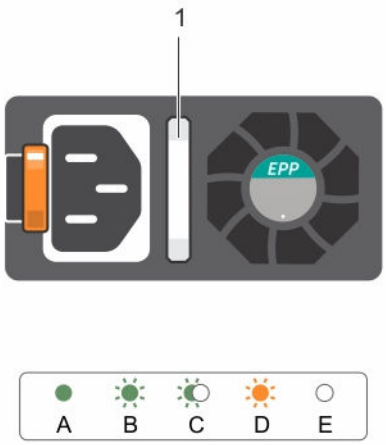


Figure 7. AC power supply unit status indicator

Convention	Power indicator pattern	Condition
A	Green	The handle indicator lights green indicating that a valid power source is connected to the PSU and that the PSU is operational.
B	Flashing green	When updating the firmware of , the PSU handle flashes green. **CAUTION:** Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs will not function. You must roll back the power supply firmware by using Life cycle controller. See *Dell Lifecycle Controller User's Guide* at **dell.com/esmmanuals**
C	Flashes green and turns off	When hot-adding a PSU, the handle of the new power supply unit flashes green five times at 4 Hz rate and turns off. This indicates that the new PSU is mismatched with the PSU that is installed (in terms of efficiency, feature set, health status, and supported voltage). Use a PSU that matches the capacity of the PSU that is installed. **NOTE:** For AC power supplies, use only PSUs with the Extended Power Performance (EPP) label on the back. Mixing PSUs from previous generations of servers can result in a PSU mismatch condition or failure to power on.
D	Flashing amber	Indicates a problem with the power supply unit.

Convention	Power indicator pattern	Condition
		CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the opposite power supply unit 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. **CAUTION: AC power supplies support both 220 V and 110 V input voltages with the exception of Titanium power supplies, which support only 220 V. When two identical power supplies receive different input voltages, they can output different wattages, and trigger a mismatch.** **CAUTION: If two power supplies are used, they must be of the same type and have the same maximum output power.** **CAUTION: Combining AC and DC power supplies is not supported and triggers a mismatch.**
E	Not lit	Power is not connected.

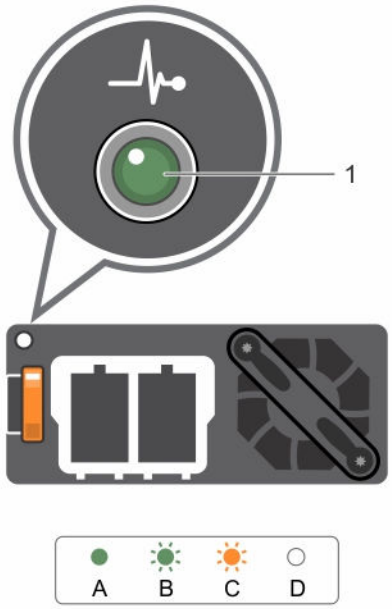


Figure 8. DC power supply unit status indicator

Convention	Power indicator pattern	Condition
A	Green	The handle/LED indicator lights green indicating that a valid power source is connected to the PSU and that the PSU is operational.
B	Flashing green	When hot-adding a PSU, the handle of the new power supply unit flashes green five times at 4 Hz rate and turns off. This indicates that the new PSU is mismatched with the PSU that is installed (in terms of efficiency, feature set, health status, and supported voltage). Use a PSU that matches the capacity of the PSU that is installed.
C	Flashing amber	Indicates a problem with the PSU. **CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the opposite 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.** **CAUTION: If two power supplies are used, they must be of the same type and have the same maximum output power.** **CAUTION: Combining AC and DC power supplies is not supported and triggers a mismatch.**
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.

To...	Refer to...
Install your system into a rack	Rack documentation included with your rack solution
Set up your system and know the system technical specifications	*Getting Started With Your System* 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**
Configure and log in to iDRAC, set up managed and management system, know the iDRAC features and troubleshoot using iDRAC	Integrated Dell Remote Access Controller User's Guide at **dell.com/esmmanuals**
Know about the RACADM subcommands and supported RACADM interfaces	RACADM Command Line Reference Guide for iDRAC and CMC at **dell.com/esmmanuals**

To...	Refer to...
Launch, enable and disable Lifecycle Controller, know the features, use and troubleshoot Lifecycle Controller	Dell Lifecycle Controller User's Guide at **dell.com/esmmanuals**
Use Lifecycle Controller Remote Services	Dell Lifecycle Controller Remote Services Quick Start Guide at **dell.com/esmmanuals**
Set up, use, and troubleshoot OpenManage Server Administrator	Dell OpenManage Server Administrator User's Guide at **dell.com/openmanagemanuals**
Install, use and troubleshoot OpenManage Essentials	Dell OpenManage Essentials User's Guide at **dell.com/openmanagemanuals**
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/esmmanuals**

Quick Resource Locator (QRL)

Use the Quick Resource Locator (QRL) to get immediate access to system information and how-to videos. This can be done by visiting **www.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.

2

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 on installing the system into the rack, see your system *Rack Installation Placemat* at **dell.com/poweredgemanuals**.
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 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
- Lifecycle Controller
- Dell OpenManage Deployment Toolkit
- Server LCD panel

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

You can configure iDRAC IP address by using the following interfaces:

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

- 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/esmmanuals**.

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 on logging in to iDRAC and iDRAC licenses, see the Integrated Dell Remote Access Controller User's Guide at **Dell.com/esmmanuals**.

You can also access iDRAC 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/esmmanuals**.

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**.
- Dell Lifecycle Controller. See the Lifecycle Controller documentation at **Dell.com/esmmanuals**.
- Dell OpenManage Deployment Toolkit. See the OpenManage documentation at **Dell.com/openmanagemanuals**.

For information on the list of operating systems supported on your system, see the operating systems support matrix at **Dell.com/ossupport**.

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/esmmanuals**.

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**.

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**.
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 allow 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 you require to a diskette drive, USB drive, CD, or DVD.

3

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

Navigation keys

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

Key	Description
<Page Up>	Moves to the previous screen.
<Page Down>	Moves to the next screen.
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
<Enter>	Enables you to type a value in the selected field (if applicable) or follow the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
<Tab>	Moves to the next focus area. 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 or iDRAC Settings/ Device Settings/Service Tag Settings and proceeds with system boot.
<F1>	Displays the System Setup help.

About System Setup

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

You can access **System Setup** in two ways:

- Standard Graphical Browser — This is enabled by default.
- Text Browser — This is enabled by using Console Redirection.

NOTE: By default, help text for the selected field is displayed in the graphical browser. To view the help text in the text browser, press <F1>.

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

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 the Integrated Dell Remote Access Controller User's Guide at **Dell.com/esmmanuals**.
Device Settings	Enables you to configure device settings.

System BIOS screen

By using the **System BIOS** screen, you can view the BIOS settings as well as edit specific functions such as **Boot Order**, **System Password**, **Setup Password**, and enabling or disabling USB ports.
To view the System BIOS screen click **System BIOS** on the **System Setup Main Menu**.

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

Menu Item	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.
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 enable or disable integrated device controllers and ports and specify related features and options.
Serial Communication	Displays options to enable or disable 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. It also enables or disables support for 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, 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:

Menu Item	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.
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 as well as 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**.

Menu Item	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 utilized.
System Memory Testing	Specifies whether system memory tests are run during system boot. Options are **Enabled** and **Disabled**. By default, the **System Memory Testing** option is set to **Disabled**.
Memory Operating Mode	Specifies the memory operating mode. The options available are **Optimizer Mode**, **Advanced ECC Mode**, **Mirror Mode**, **Spare Mode**, and **Spare with Advanced ECC Mode**. By default, the **Memory Operating Mode** option is set to **Optimizer Mode**. NOTE: The **Memory Operating Mode** can have different defaults and available options based on the memory configuration of your system.
Node Interleaving	Specifies if Non-Uniform Memory architecture (NUMA) is supported. If this field is **Enabled**, memory interleaving is supported if a symmetric memory configuration is installed. If **Disabled**, the system supports NUMA (asymmetric) memory configurations. By default, **Node Interleaving** option is set to **Disabled**.
Snoop Mode	Specifies the Snoop Mode options. Snoop Mode options available are **Home Snoop**, **Early Snoop**, and **Cluster on Die**. By default, the Snoop Mode option is set to **Early Snoop**.

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 **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

Menu Item	Description
	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**.
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.
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.
Processor Bus Speed	Displays the bus speed of the processor. NOTE: The processor bus speed option displays only when both processors are installed.
Processor 1	NOTE: Depending on the number of installed CPUs, there may be up to two 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.

Menu Item	Description
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 on your system.
To view the **SATA Settings** screen click **System Setup Main Menu → System BIOS → SATA Settings**.

Menu Item	Description
Embedded SATA	Enables the embedded SATA to be set to **Off**, **ATA**, **AHCI**modes. By default, the **Embedded SATA** option is set to **AHCI**.
Security Freeze Lock	Sends Security Freeze Lock command to the Embedded SATA drives during POST. This option is applicable only to ATA and AHCI mode.
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** mode BIOS always enables support.
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. The 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** mode BIOS always enables support.
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. The 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:

Menu Item	Description
Boot Mode	Enables you to set the boot mode of the system.

Menu Item	Description
	CAUTION: Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode. NOTE: Setting this field to **UEFI** disables the **BIOS Boot Settings** menu. Setting this field to **BIOS** disables the **UEFI Boot Settings** menu. 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. By default, the **Boot Mode** option is set to **BIOS**.
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. By default, the **Boot Sequence Retry** option is set to **Enabled**.
Hard-Disk Failover	Specifies the devices in the **Hard-Disk Drive Sequence** that are attempted in the boot sequence. When this option is set to **Disabled**, only the first hard disk device in the list is attempted to boot. When set to **Enabled**, all hard disk devices are attempted to boot, as listed 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. Network Settings are only available in UEFI boot mode. BIOS does not control network settings in the BIOS boot mode. For BIOS boot mode, the network settings are handled by the network controllers option ROM.
To view the **Network Settings** screen, click **System Setup Main Menu → System BIOS → Network Settings**.

Menu Item	Description
PXE Device n (n = 1 to 2)	Enables or disables the device. When enabled, a UEFI boot option is created for the device.
PXE Device n Settings (n = 1 to 2)	Allows you to control the configuration of the PXE device.

Integrated Devices screen details

The **Integrated Devices** screen allows you to view and configure the settings of all integrated devices including the video controllerand the USB ports.
In the **System Setup Main Menu**, click **System BIOS → Integrated Devices**.

Menu Item	Description
USB 3.0 Setting	Allows you to enable or disable the USB 3.0 support. Enable this option only if your operating system supports USB 3.0. Disabling this allows devices to operate at USB 2.0 speed. USB 3.0 is disabled by default.

User Accessible USB Ports	Allows you to enable or disable the USB ports. Selecting **Only Back Ports On** disables the front USB ports and 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** will disable the USB management port and also restrict access to iDRAC features.
Internal USB Port	Allows you to enable or disable the internal USB port. By default, the **Internal USB Port** option is set to **Enabled**.
Embedded NIC1 and NIC2	Allows you to enable or disable the Embedded NIC1 and NIC2. If set to **Disabled**, the NIC may still be available for shared network access by the embedded management controller. Configure this function using the NIC management utilities of the system.
I/OAT DMA Engine	Allows you to enable or disable the I/OAT option. Enable only if the hardware and software supports the feature.
Embedded Video Controller	Allows you to enable or disable the **Embedded Video Controller**. By default, the embedded video controller is **Enabled**. 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 **Disabled**.
Current State of Embedded Video Controller	Displays the current state of the Embedded Video Controller. **Current State of Embedded Video Controller** is a read only field, indicating the current state for the Embedded Video Controller.
SR-IOV Global Enable	Allows you to enable or disable the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. By default, the **SR-IOV Global Enable** option is set to **Disabled**.
OS Watchdog Timer	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this field is set to **Enabled**, the operating system is allowed to initialize the timer. When is the field is set to **Disabled** (the default), the timer will have no effect on the system.
Memory Mapped I/O above 4 GB	Allows you to enable support for PCIe devices that require large amounts of memory. By default, the option is set to **Enabled**.

Slot Disablement	Allows you to enable or disable 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 is preventing booting into the operating system or causing delays in system startup. If the slot is disabled, both the Option ROM and UEFI driver 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:

Menu Item	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. By default, the **Serial Communication** option is set to **Auto**.
Serial Port Address	Enables you to set the port address for serial devices. By default, the **Serial Port Address** option is set to **Serial Device 1=COM2, Serial Device 2=COM1**. 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. 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. Therefore, 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	Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this field. 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. Therefore, 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. By default, the **Failsafe Baud Rate** option is set to **115200**.
Remote Terminal Type	Sets the remote console terminal type. By default, the **Remote Terminal Type** option is set to **VT 100/VT 220**.

Menu Item	Description
Redirection After Boot	Enables or disables the BIOS console redirection when the operating system is loaded. By default, the **Redirection After Boot** option is set to **Enabled**.

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:

Menu Item	Description
System Profile	Sets the system profile. If you set the **System Profile** option to a mode other than **Custom**, the BIOS automatically sets the rest of the options. You can only change the rest of the options if the mode is set to **Custom**. By default, the **System Profile** option is set to **Performance Per Watt Optimized (DAPC)**. DAPC is Dell Active Power Controller. NOTE: The following parameters are available only when the **System Profile** option is set to **Custom**.
CPU Power Management	Sets the CPU power management. By default, the **CPU Power Management** option is set to **System DBPM (DAPC)**. 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.
Turbo Boost	Enables or disables the processor to operate in turbo boost mode. By default, the **Turbo Boost** option is set to **Enabled**.
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. By default, the **C1E** option is set to **Enabled**.
C States	Enables or disables the processor to operate in all available power states. By default, the **C States** option is set to **Enabled**.
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). By default, the option is set to **Disabled**.
Memory Patrol Scrub	Sets the memory patrol scrub frequency. By default, the **Memory Patrol Scrub** option is set to **Standard**.
Memory Refresh Rate	Sets the memory refresh rate to either 1x or 2x. By default, the **Memory Refresh Rate** option is set to **1x**.
Uncore Frequency	Enables you to select the **Processor Uncore Frequency**. Dynamic mode allows the processor to optimize power resources across the cores and uncore during runtime. The optimization of the uncore

Menu Item	Description
	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 Boot 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. By default, the maximum number of cores is enabled.
Monitor/Mwait	Enables the Monitor/Mwait instructions in the processor. By default, the Monitor/Mwait option is set to **Enabled** for all system profiles, except **Custom**. 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 system power/ 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**.

Menu Item	Description
Intel AES-NI	Improves the speed of applications by performing encryption and decryption 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. By default, the **Password Status** option is set to **Unlocked**.
Intel TXT	Enables or disables the Intel Trusted Execution Technology (TXT). To enable **Intel TXT**, Virtualization Technology must be enabled and TPM Security must be **Enabled** with Pre-boot measurements. By default, the **Intel TXT** option is set to **Off**.
Power Button	Enables or disables the power button on the front of the system. By default, the **Power Button** option is set to **Enabled**.

Menu Item	Description
NMI Button	Enables or disables the NMI button on the front of the system. By default, the **NMI Button** option is set to **Disabled**.
AC Power Recovery	Sets how the system reacts after AC power is restored to the system. By default, the **AC Power Recovery** option is set to **Last**.
AC Power Recovery Delay	Sets how the system supports staggering of power up after AC power is restored to the system. By default, the **AC Power Recovery Delay** option is set to **Immediate**.
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 using the certificates in the Secure Boot Policy. Secure Boot is disabled by default.
Secure Boot Policy	When Secure Boot policy is set to **Standard**, the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to **Custom**, the BIOS uses the user-defined key and certificates. Secure Boot policy is set to **Standard** by default.
Secure Boot Policy Summary	Displays the list of certificates and hashes that secure boot uses to authenticate images.

Secure Boot Custom Policy Settings screen

Secure Boot Custom Policy Settings is displayed only when **Secure Boot Policy** is set to **Custom**.
In the **System Setup Main Menu**, click **System BIOS → System Security → Secure Boot Custom Policy Settings**. The **Secure Boot Custom Policy Settings** screen details are explained as follows:

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

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** click **System Setup Main Menu → System BIOS → Miscellaneous Settings**.

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. By default the **Keyboard NumLock** is set to **On**. NOTE: This option does not apply to 84-key keyboards.
F1/F2 Prompt on Error	Enables or disables the F1/F2 prompt on error. By default, **F1/F2 Prompt on Error** is set to **Enabled**. 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 only for UEFI boot mode. You cannot set this to **Enabled** if **UEFI Secure Boot** mode is enabled.

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 finish 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.

Menu Item	Description
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.

About Dell Lifecycle Controller

Dell Lifecycle Controller allows you to perform tasks such as configuring BIOS and hardware settings, deploying an operating system, updating drivers, changing RAID settings, and saving hardware profiles. For more information about Dell Lifecycle Controller, see the documentation at **Dell.com/esmmanuals**.

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. From the **System Setup Main Menu**, 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.

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

CAUTION: Trying to boot the operating system from the other boot mode will cause the system to halt at startup.

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 on supported operating systems, go to **Dell.com/ossupport**.

Assigning a system and setup password

Prerequisites

NOTE: The password jumper enables or disables the System Password and Setup Password features..

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 **Enabled** and **Password Status** is **Unlocked**.

If the password jumper setting is disabled, the existing **System Password** and **Setup Password** is deleted and you need not provide the system password to boot the system.

About this task

To assign a **System Password** and **Setup Password**, follow the steps below:

Steps

1. To enter System Setup, press <F2> immediately after a power-on or reboot.
2. From the **System Setup Main Menu**, select **System BIOS** and press <Enter>.
   The **System BIOS** screen is displayed.
3. On the **System BIOS** screen, select **System Security** and press <Enter>.
   The **System Security** screen is displayed.
4. On the **System Security** screen, verify that **Password Status** is **Unlocked**.
5. Select **System Password**, enter your system password, and press <Enter> or <Tab>.
   Use the following guidelines to assign the system password:
   - A password can have up to 32 characters.
   - The password can contain the numbers 0 through 9.
   - Only the following special characters are allowed: space, (”), (+), (,), (-), (.), (/), (;), ([), (\), (]), (`).

   A message prompts you to re-enter the system password.
6. Re-enter the system password, and click **OK**.
7. Select **Setup Password**, enter your setup password and press <Enter> or <Tab>.
   A message prompts you to re-enter the setup password.
8. Re-enter the setup password, and click **OK**.
9. Press <Esc> to return to the System BIOS screen. Press <Esc> again.
   A message prompts you to save the changes.

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

Related Tasks

System board connectors

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 **Locked**, type the password and press <Enter> when prompted at reboot.

NOTE: If an incorrect system password is entered, the system displays a message and prompts you to re-enter your password. You have three attempts to enter the correct password. After the third unsuccessful attempt, the system displays an error message that the system has halted and must be powered down.

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

NOTE: You can use the **Password Status** option with the **System Password** and **Setup Password** options to protect your system from unauthorized changes.

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 re-enter 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**, enter the correct setup password before modifying most of the System Setup options.

If you do not enter 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 shut down and restart the system, the error message is displayed until the correct password is entered. The following options are exceptions:

- If **System Password** is not **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 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 Lifecycle Controller.

For more information about setting up the Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Lifecycle Controller documentation at **Dell.com/support/home**.

iDRAC Settings utility

The iDRAC Settings utility is an interface to set up and configure the iDRAC parameters using UEFI. You can enable or disable various iDRAC parameters 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 on using iDRAC, see the iDRAC User's Guide at **dell.com/esmmanuals**.

Entering the iDRAC Settings utility

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

3. In 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 between the following options:
   - Default
   - Fan Speed Offset

   NOTE: When the **User Option** is set to the default **Auto** setting, the user option cannot be modified.
3. Set the **Fan Speed Offset** fields.
4. Click **Back → Finish → Yes**.

4

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.

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.
4. Remove the system cover.

Related Tasks

Removing the front bezel
Removing the system cover

After working inside your system

1. Install the system cover.
2. If applicable, install the front bezel.

3. Reconnect the system to its electrical outlet.
4. Turn the system on, including any attached peripherals.

Related Tasks

Installing the system cover
Installing the front bezel

Recommended tools

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

- Key to the front bezel lock. This is required only if you have a front bezel.
- #1 Phillips screwdriver
- #2 Phillips screwdriver
- #T15 Torx screwdriver

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

- AMP 90871-1 or Tyco Electronics 58433-3 or equivalent hand-crimping tool
- 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.
2. Lift the release latch next to the lock.
3. Rotate the left end of the bezel away from the front panel.
4. Unhook the right end of the bezel and pull the bezel away from the system.

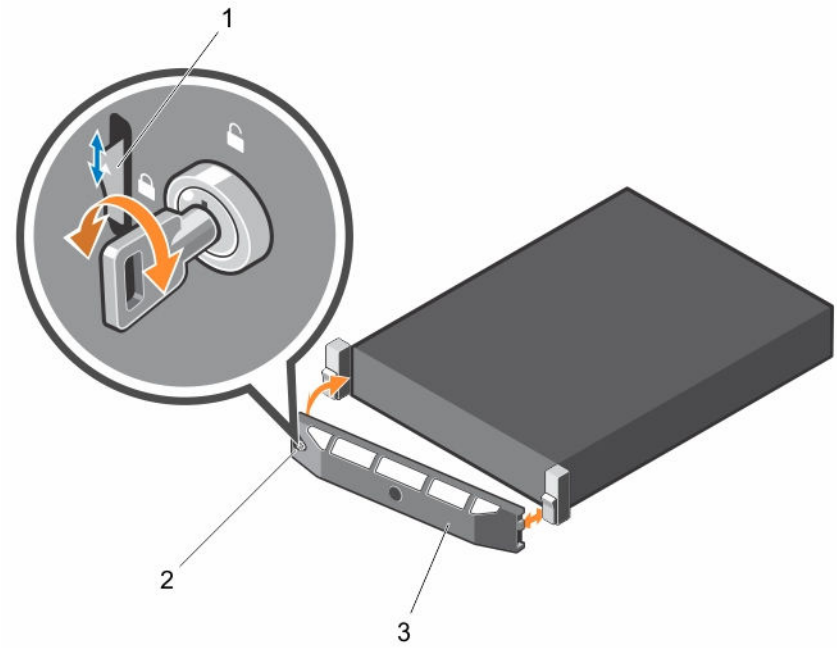


Figure 9. Removing and installing the front bezel

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

Installing the front bezel

1. Hook the right end of the bezel onto the chassis.
2. Fit the other end of the bezel onto the chassis.
3. Lock the bezel.

Removing and installing the system cover

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: Installing or removing the system cover when the system is on may expose you to a risk of electric shock.

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 operate the system without the cover for a duration exceeding five minutes.

Removing the system cover

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.

Steps

1. On the top of the system, locate the latch release lock and rotate the lock to the unlocked position.
2. Lift the latch and slide the cover back. The system cover slides back and the tabs on the system cover disengages from the slots on the chassis.
3. Hold the cover on both sides and lift the cover away from the system.

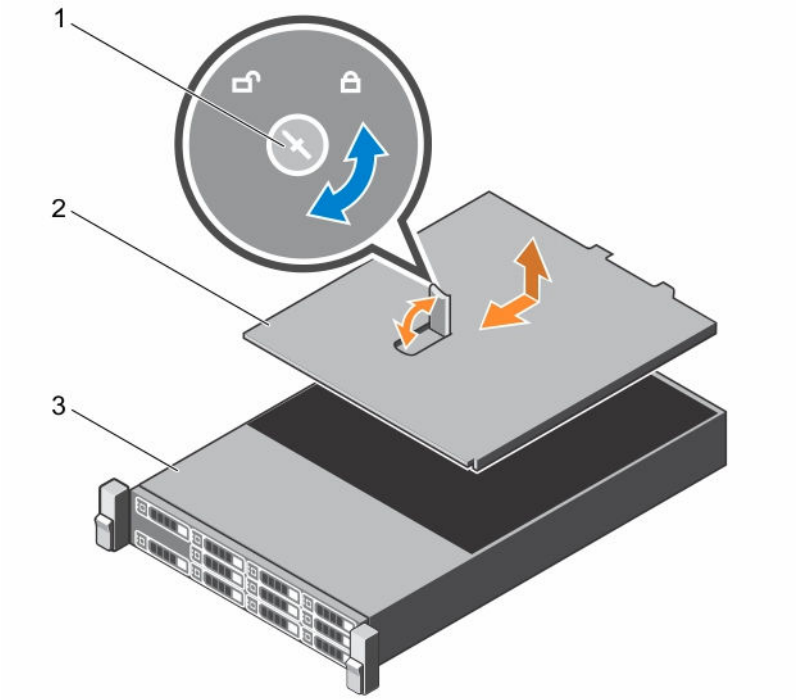


Figure 10. Opening and closing the system

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

Next steps

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

Related Tasks

Installing the system cover

Installing the system cover

Prerequisites

Ensure that you read the Safety instructions.

Steps

1. Align the slots of the system cover with the tabs on the chassis.
2. Press the cover release latch, and push the cover toward the front of the chassis until the latch locks into place.
3. Turn the cover latch release lock clockwise to the locked position.

Next steps

1. Install the bezel (optional).
2. Follow the procedure listed in After working inside your system.

Related Tasks

Installing the front bezel

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.

NOTE: Components that are hot-swappable are marked orange, and touch-points on the components are marked blue.

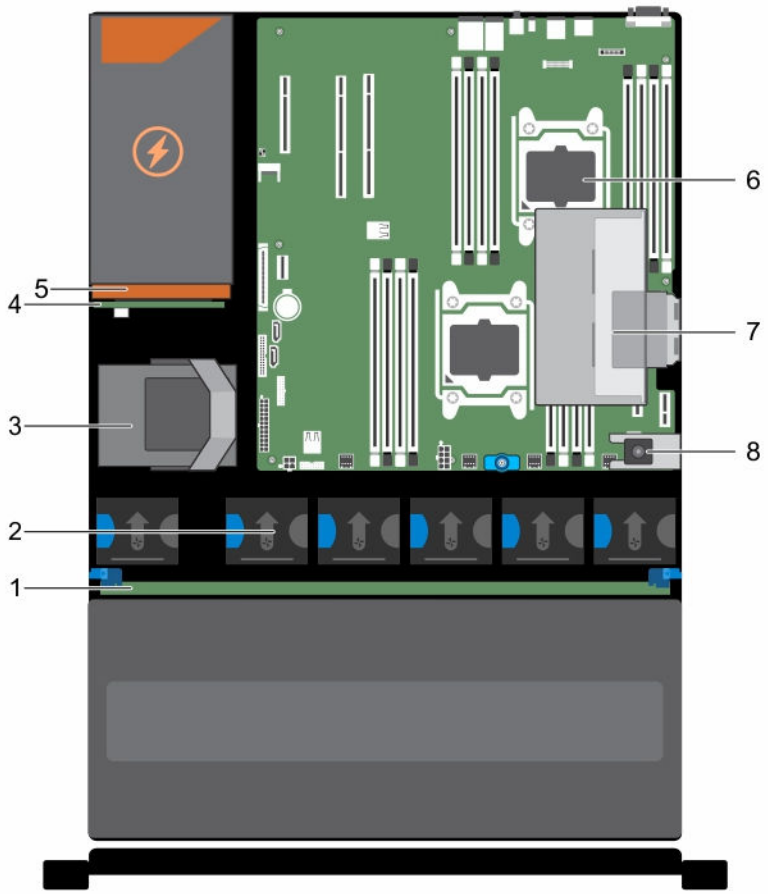


Figure 11. Inside the system— with internal PERC riser

1. hard-drive backplane
2. cooling fan (6)
3. internal hard drive module
4. power-interposer board
5. power supply
6. processor (2)
7. internal PERC riser
8. intrusion switch

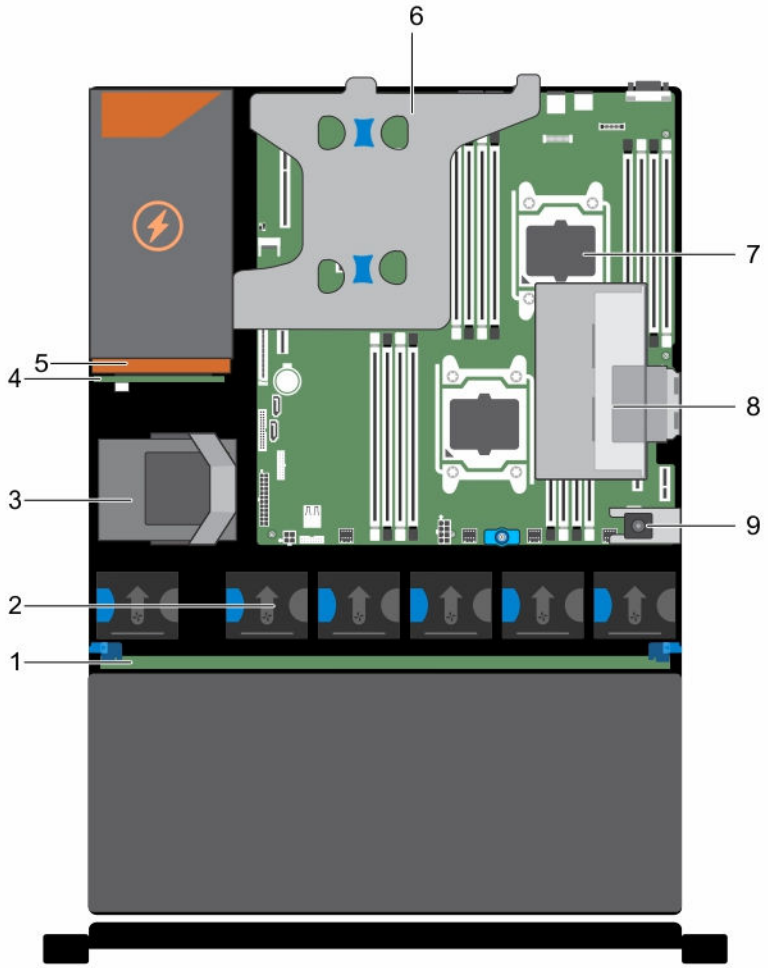


Figure 12. Inside the system— with dual riser module and internal PERC riser

1. hard-drive backplane
2. cooling fan (6)
3. internal hard drive module
4. power-interposer board
5. power supply
6. dual riser module
7. processor (2)
8. internal PERC riser
9. intrusion switch

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 connected, disconnect the cables from expansion card (s).

   NOTE: If required, close the expansion card latch on the cooling shroud to release the full length card.
4. If installed, remove the expansion card riser.

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

By holding the sides of the cooling shroud, lift the cooling shroud away from the system.

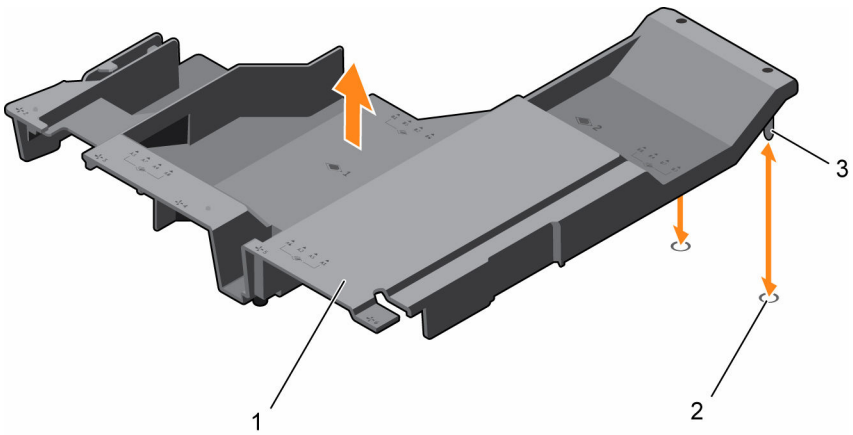


Figure 13. Removing and installing the cooling shroud

1. cooling shroud
2. cooling shroud alignment slots (2)
3. cooling shroud alignment pins (2)

Next steps

1. Reinstall the cooling shroud.
2. If removed, reinstall the optional PCIe expansion card riser.
3. If disconnected, connect the cables to the expansion card(s).
4. If required, open the expansion-card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) dual riser module
Removing an expansion card from the dual riser module
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

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.

NOTE: For proper seating of the cooling shroud in the chassis, ensure that the cables inside the system are routed along the chassis wall and secured using the cable securing bracket.

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.

Steps

1. Align the tabs on the cooling shroud with the securing holes at the back of the chassis.
2. Lower the cooling shroud into the chassis until it is firmly seated.

Next steps

1. Install the optional PCIe expansion card riser.
2. If disconnected, reconnect thecables to the expansion card(s).
3. If required, open the expansion-card latch on the cooling shroud to support the full length expansion card.
4. Follow the procedure listed in After working inside your system.

Related Tasks

Installing an expansion card into the dual riser module
Installing the (optional) dual riser module

Intrusion switch

Removing the intrusion switch

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.

Steps

1. Disconnect the intrusion switch cable from the connector on the system board.
2. Slide the intrusion switch out of the intrusion switch slot.

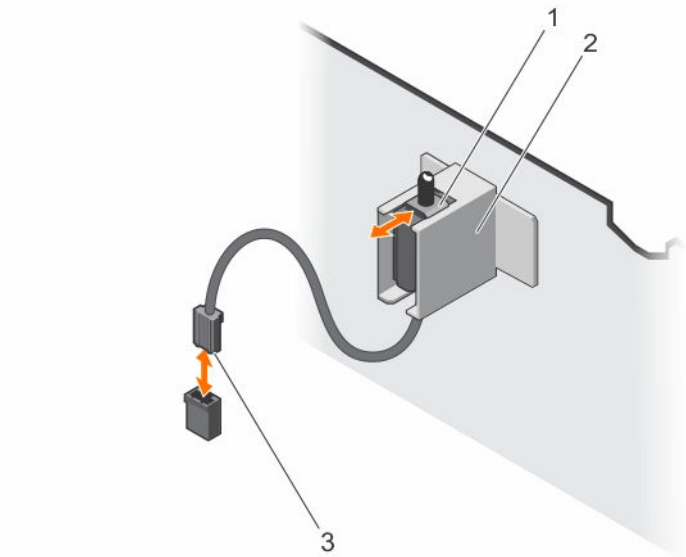


Figure 14. Removing and installing the intrusion switch

1. intrusion switch
2. intrusion switch holder
3. intrusion switch connector

Next steps

- Install the intrusion switch.
- Install the cooling shroud.

Related Tasks

Removing the cooling shroud
Installing the intrusion switch
Installing the cooling shroud

Installing the intrusion switch

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.

Steps

1. Slide the intrusion switch into the intrusion switch slot.
2. Connect the intrusion switch cable to the connector on the system board.

Next steps

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

Related Tasks

Removing the cooling shroud
Installing the cooling shroud

System memory

Your system supports DDR4 registered DIMMs (RDIMM).

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

Memory bus operating frequency can be 2133 MT/s, 1866 MT/s, 1600 MT/s, or 1333 MT/s depending on:

- 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 16 memory sockets split into four sets of four sockets. DIMMs in sockets A1 to A8 are assigned to processor 1 and DIMMs in sockets B1 to B8 are assigned to processor 2. Each 4-socket set is organized into two channels. In each channel of the 4-socket set, the release levers of the first socket are marked white and those of the second socket are marked black.

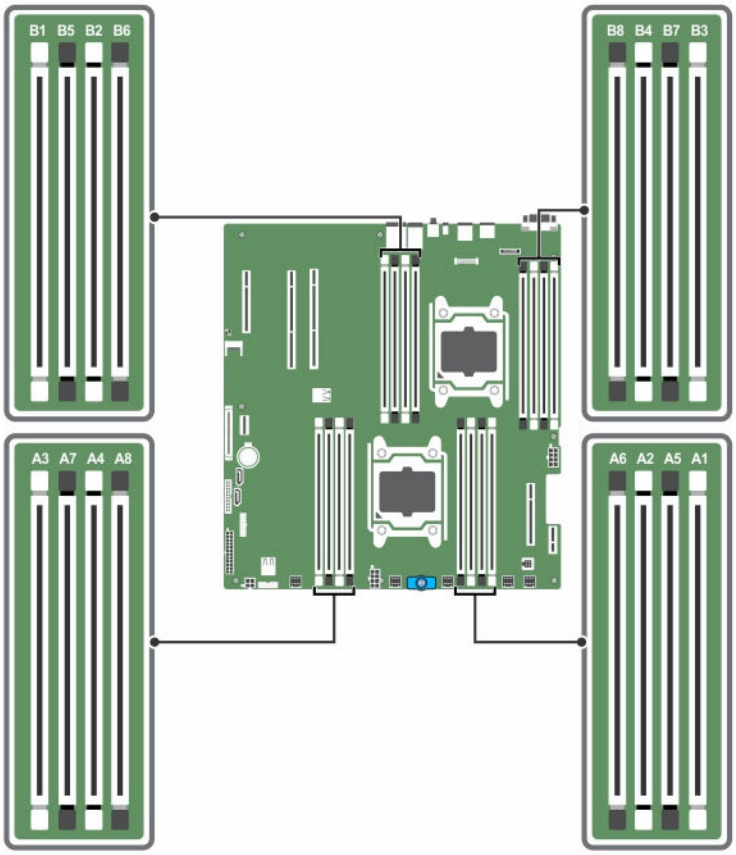


Figure 15. Memory socket locations

Memory channels are organized as follows:

Processor 1	channel 0: slots A1 and A5
	channel 1: slots A2 and A6
	channel 2: slots A3 and A7
	channel 3: slots A4 and A8
Processor 2	channel 0: slot B1 and B5
	channel 1: slot B2 and B6
	channel 2: slot B3 and B7
	channel 3: slot B4 and B8

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
		1.2v	
RDIMM	1	2133	Single rank or dual rank
	2	1866	

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:

- x4 and x8 DRAM based DIMMs can be mixed. For more information, see Mode-specific guidelines.
- Up to two dual- or single-rank RDIMMs can be populated per channel.
- Populate DIMM sockets only if a processor is installed. For single-processor systems, sockets A1 to A8 are available. For dual-processor systems, sockets A1 to A8 and sockets B1 to B8 are available.
- Populate all sockets with white release levers first, and then all the sockets with black release levers.
- 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 DIMMs, populate 8 GB DIMMs in the sockets with white release levers and 4 GB DIMMs in the sockets with black release levers.
- In a dual-processor configuration, the memory configuration for each processor should be identical through the first eight slots. 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 DIMM capacities in a system is not supported.
- Populate two DIMMs 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: 3/4 (ranks/channel) × 16 (memory modules) × 4 GB = 48 GB, and not 16 (memory modules) × 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.

Sample memory configurations

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

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

Table 1. 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, 2133MT/s	A1
8	4	2	1R, x8, 2133MT/s	A1, A2
	8	1	2R, x8, 2133MT/s	A1
16	4	4	1R, x8, 2133MT/s	A1, A2, A3, A4
	8	2	2R, x8, 2133MT/s	A1, A2
	16	1	2R, x4, 2133MT/s	A1

System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	DIMM Rank, Organization, and Frequency	DIMM Slot Population
24	4	6	1R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6
32	4	8	1R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8
	8	4	2R, x8, 2133MT/s	A1, A2, A3, A4
	16	2	2R, x4, 2133MT/s	A1, A2
	32	1	2R, x4, 2133MT/s	A1
48	8	6	2R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6
	16	3	2R, x4, 2133MT/s	A1, A2, A3,
64	8	8	2R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8
	16	4	2R, x4, 2133MT/s	A1, A2, A3, A4
	32	2	2R, x4, 2133MT/s	A1, A2
96	16	6	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6
	32	3	2R, x4, 2133MT/s	A1, A2, A3,
128	16	8	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8
	32	4	2R, x4, 2133MT/s	A1, A2, A3, A4
192	32	6	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6
256	32	8	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8

Table 2. Memory configurations—two processors

System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	DIMM Rank, Organization, and Frequency	DIMM Slot Population
8	4	2	1R, x8, 2133MT/s,	A1,B1
16	4	4	1R, x8, 2133MT/s,	A1, A2, B1, B2
	8	2	2R, x8, 2133MT/s	A1,B1
24	4	6	1R, x8, 2133MT/s,	A1, A2, A3, B1, B2, B3,
32	4	8	1R, x8, 2133MT/s,	A1, A2, A3, A4, B1, B2, B3, B4
	8	4	2R, x8, 2133MT/s	A1, A2, B1, B2

System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	DIMM Rank, Organization, and Frequency	DIMM Slot Population
	16	2	2R, x4, 2133MT/s	A1,B1
48	4	12	1R, x8, 2133MT/s,	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
	8	6	2R, x8, 2133MT/s	A1, A2, A3, B1, B2, B3,
56	4	14	1R, x8, 2133MT/s,	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
64	4	16	1R, x8, 2133MT/s,	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	8	8	2R, x8, 2133MT/s	A1, A2, A3, A4, B1, B2, B3, B4
	16	4	2R, x4, 2133MT/s	A1, A2, B1, B2
	32	2	2R, x4, 2133MT/s	A1,B1
96	8	12	2R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
	16	6	2R, x4, 2133MT/s	A1, A2, A3, B1, B2, B3,
112	8	14	2R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
128	8	16	2R, x8, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	16	8	2R, x4, 2133MT/s	A1, A2, A3, A4, B1, B2, B3, B4
	32	4	2R, x4, 2133MT/s	A1, A2, B1, B2
192	16	12	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
	32	6	2R, x4, 2133MT/s	A1, A2, A3, B1, B2, B3,
224	16	14	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
256	16	16	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	32	8	2R, x4, 2133MT/s	A1, A2, A3, A4, B1, B2, B3, B4
384	32	12	2R, x4, 2133MT/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
448	32	14	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
512	32	16	2R, x4, 2133MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8

Removing a memory 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 read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Remove the cooling shroud.

   NOTE: If open, close the expansion-card latch on the cooling shroud to release the full-length card.
4. If connected, disconnect the cables from expansion card (s).
5. If installed, remove the expansion-card riser.

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.
3. Lift the memory module out of the system.

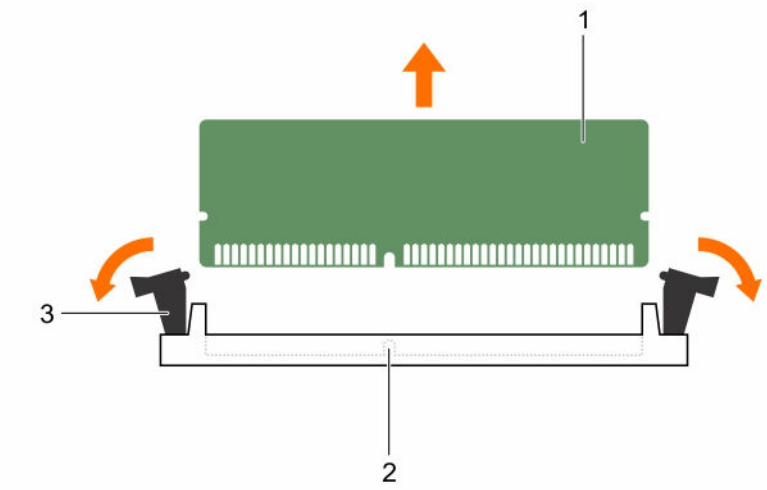


Figure 16. Removing and installing a memory module

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

Next steps

1. If you are removing the memory module permanently, install a memory module blank.
2. If removed, install the PCIe expansion-card riser.
3. If disconnected, reconnect the cables to the expansion card(s).
4. Reinstall the cooling shroud.
5. If closed, open the expansion card latch on the cooling shroud to support the full length expansion card.
6. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) dual riser module
Removing an expansion card from the dual riser module
Removing the cooling shroud
Installing memory modules
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

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 read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If installed, remove the PCIe expansion card riser
4. Remove the cooling shroud.

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.

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.

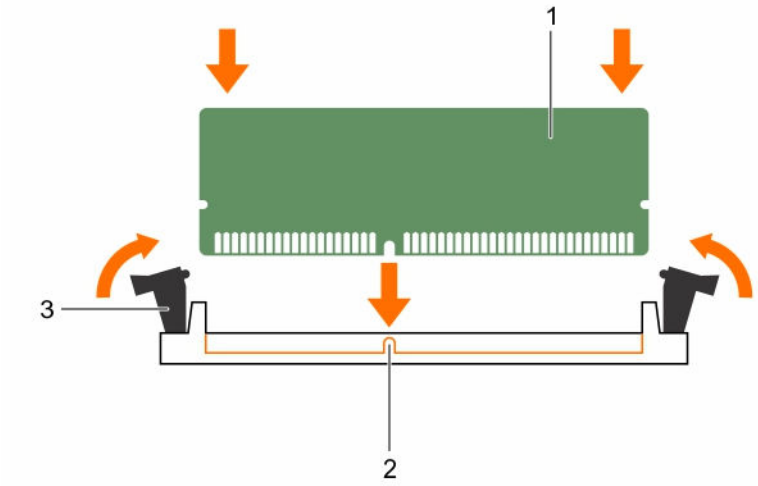


Figure 17. Installing the memory module

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

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.

5. Repeat steps 1 to 4 of this procedure to install the remaining memory modules.

Next steps

1. If removed, reinstall the PCIe expansion card riser.
2. Reinstall the cooling shroud.
3. Follow the procedure listed in After working inside your system.
4. 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.
5. If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat steps 2 and 3 of Removing a memory module procedure, checking to ensure that the memory modules are firmly seated in their sockets.
6. Run the system memory test in the system diagnostics.

Related Tasks

Removing the (optional) dual riser module
Removing an expansion card from the dual riser module
Removing the cooling shroud
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Hard drives

Your system supports up to twelve 3.5 inch or 2.5 inch(with 3.5 inch drive carrier adapters) hot-swappable hard drives/SSDs and two internal 2.5 inch cabled hard drives/SSDs.

Hard drives that connect to the system board through the hard drive backplane are hot-swappable. Hot-swappable hard drives are supplied in hot-swappable hard drive carriers that fit in the hard drive slots. The internal cabled hard drives/SSDs are not hot-swappable.

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 reboot your system while the hard drive is being formatted. Doing so can cause a hard drive failure.

NOTE: 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 of time for the formatting to be completed. Be aware that high-capacity hard drives can take a long time to format.

Removing a hot-swappable hard drive carrier

Prerequisites

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

1. Ensure that you read the Safety instructions.
2. If installed, remove the front bezel.
3. Using the management software, prepare the hard drive for removal. For more information, see the documentation for the storage controller.

   If the hard drive is online, the green activity/fault indicator flashes when the hard drive is turned off. You can remove the hard-drive when the hard drive indicators turn off.

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

Steps

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

   CAUTION: To maintain proper system cooling, all empty hard-drive slots must have hard-drive blanks installed.
3. If you are not replacing the hard drive immediately, insert a hard drive blank in the empty hard drive slot.

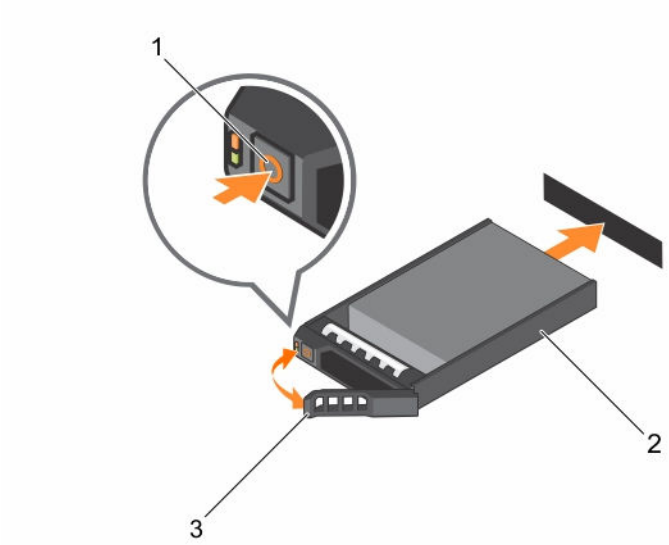


Figure 18. Removing and installing a hot-swap hard drive

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

Next steps

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

Related Tasks

Removing the front bezel

Installing the front bezel

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.

1. Ensure that you read the Safety instructions.
2. If applicable, remove the front bezel.

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

CAUTION: Combining SAS and SATA hard drives in the same RAID volume is not supported.

CAUTION: When installing a hard drive, ensure that the adjacent drives are fully installed. Inserting a hard drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

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

CAUTION: When a replacement hot-swappable hard drive is installed and the system is powered on, the hard drive automatically begins to rebuild. Make absolutely sure that the replacement hard drive is blank or contains data that you wish to have over-written. Any data on the replacement hard drive is immediately lost after the hard drive is installed.

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. Push the hard drive carrier completely into the hard drive slot.
5. Close the hard drive carrier handle to lock the hard drive in place.

Next steps

Install the optional front bezel.

1. Follow the procedure listed in After working inside your system.
2. Install the optional front bezel.

Related Tasks

Removing the front bezel
Installing a hot-swap hard drive
Installing 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.

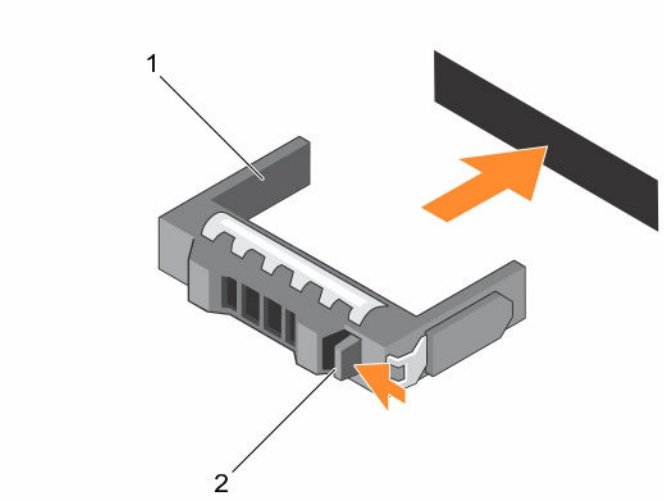


Figure 19. Removing and installing a 3.5 inch hard drive blank

1. hard drive blank
2. release button

Next steps
If applicable, install the front bezel.
Related Tasks
Removing the front bezel
Installing 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 and push the hard drive blank into the slot until the release button clicks into place.

Next steps
If removed, install the front bezel.
Related Tasks
Removing the front bezel
Installing the front bezel

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

Prerequisites

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

1. Ensure that you read the Safety instructions.
2. Keep the #2 Phillips screwdriver ready.

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

Steps

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

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

Prerequisites

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

1. Ensure that you read the Safety instructions.
2. Keep the #2 Phillips screwdriver ready.

Steps

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

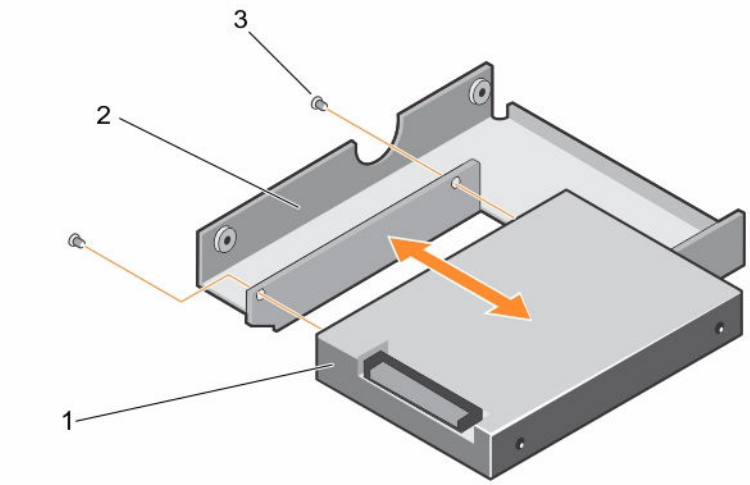


Figure 20. Removing and installing a 2.5 inch hard drive into a 3.5 inch hard-drive adapter

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

Removing a hard-drive adapter from a hard-drive carrier

Prerequisites

1. Ensure that you read the Safety instructions.
2. Keep the #2 Phillips screwdriver ready.

Steps

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

Installing a hard-drive adapter 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.

1. Ensure that you read the Safety instructions.
2. Keep the #2 Phillips screwdriver ready.

Steps

1. Insert the hard-drive adapter into the hard-drive carrier with the connector end of the hard drive toward the back of the hard-drive carrier.
2. Align the screw holes on the hard drive with the holes on the hard-drive carrier.

3. Install the screws to secure the hard drive to the hard-drive carrier.

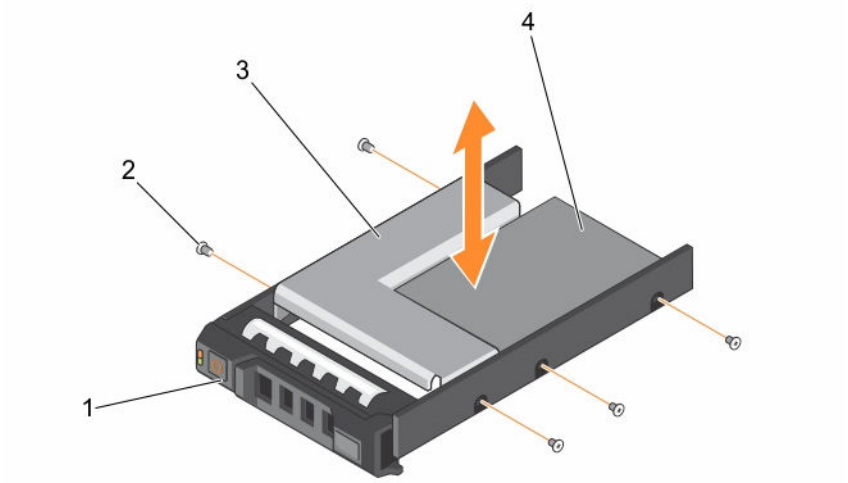


Figure 21. Removing and installing a hard-drive adapter into a 3.5 inch hard-drive carrier

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

Removing a hard drive from a hard drive carrier

Prerequisites

1. Keep the #2 Phillips screwdriver ready.
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.

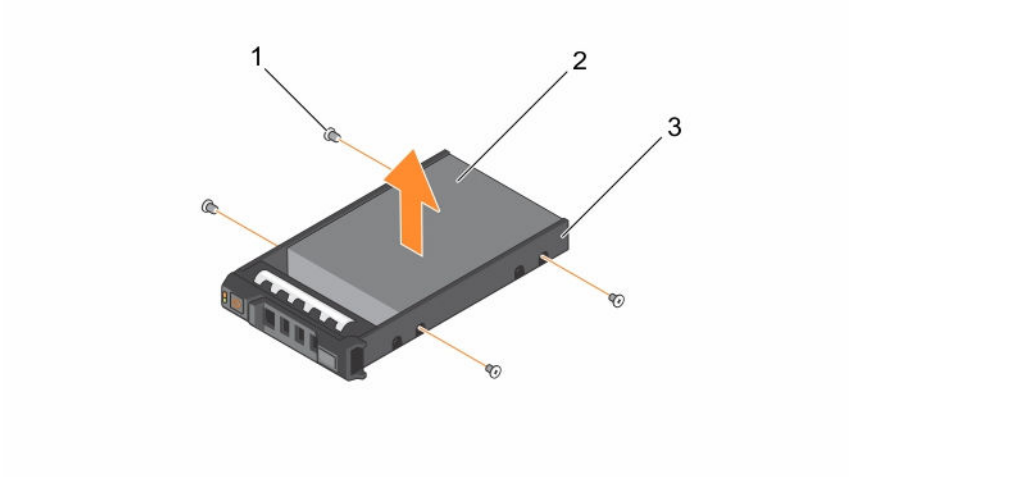


Figure 22. Removing and installing a hard drive into a hard drive carrier

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

Related Tasks

Removing a hot-swappable hard drive carrier

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.

Keep the #2 Phillips screwdriver ready.

Steps

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

   When aligned correctly, the back of the hard drive is flush with the back of the hard drive carrier.
3. Tighten the screws to secure the hard drive to the hard drive carrier.

Removing the (optional) 2.5 inch internal hard drive carrier

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from expansion card (s).

4. If required, remove the PCIe expansion card riser.
5. Remove the cooling shroud.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
6. Disconnect the power and data cables from the internal hard drive.

Steps

1. Lift the handle-lock to the open position
2. Lift the 2.5 inch internal hard drive carrier out of the chassis.

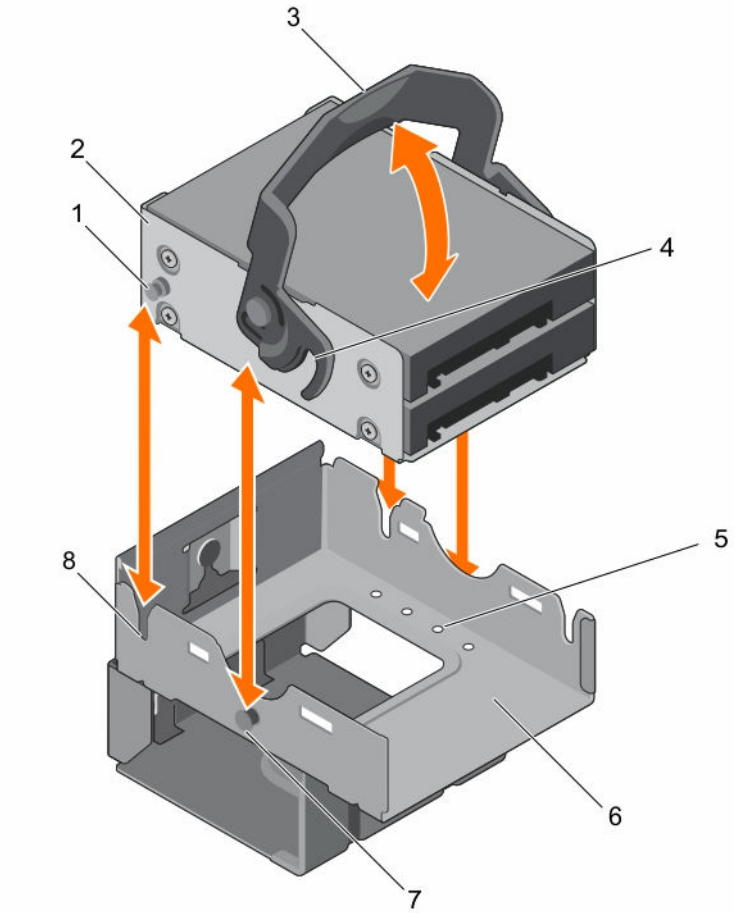


Figure 23. Removing and installing the 2.5 inch internal hard drive carrier

1. internal hard drive carrier guide
2. internal hard drive carrier
3. handle-lock
4. lock guide
5. hard drive retention screw (8)
6. internal hard drive cage
7. lock guide pin
8. guide slot

Next steps

1. Install the 2.5 inch internal hard drive carrier.
2. Reconnect the power and data cables to the internal hard drives.

3. If removed, reinstall the PCIe expansion card riser.
4. If disconnected, reconnect the cables to the expansion card(s).
5. Reinstall the cooling shroud.
6. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
7. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) dual riser module
Removing the cooling shroud
Installing the (optional) 2.5 inch internal hard drive carrier
Installing the (optional) dual riser module
Installing the cooling shroud

Installing the (optional) 2.5 inch internal hard drive carrier

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If applicable, disconnect the power or data cables from expansion card (s).
4. If required, remove the PCIe expansion card riser.

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

Steps

1. Align the internal hard drive carrier with the guide pins to the slot on the internal hard drive cage.
2. Insert the internal hard drive carrier into the internal hard drive cage and press the handle-lock down to the lock position.

Next steps

1. Reconnect the power and data cables to the internal hard drives.
2. If removed, reinstall the PCIe expansion card riser.
3. If disconnected, reconnect the cables to the expansion card(s).
4. Reinstall the cooling shroud.
5. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
6. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) dual riser module
Removing the cooling shroud
Installing the (optional) dual riser module
Installing the cooling shroud

Removing the (optional) 2.5 inch internal hard drive from the internal 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.

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 ready.
4. Disconnect the power and data cables from the hard drive.
5. Remove the internal hard drive carrier.

Steps

1. Remove the screws that secure the hard drive to the internal hard drive carrier.
2. Slide the hard drive out of the internal hard drive carrier.

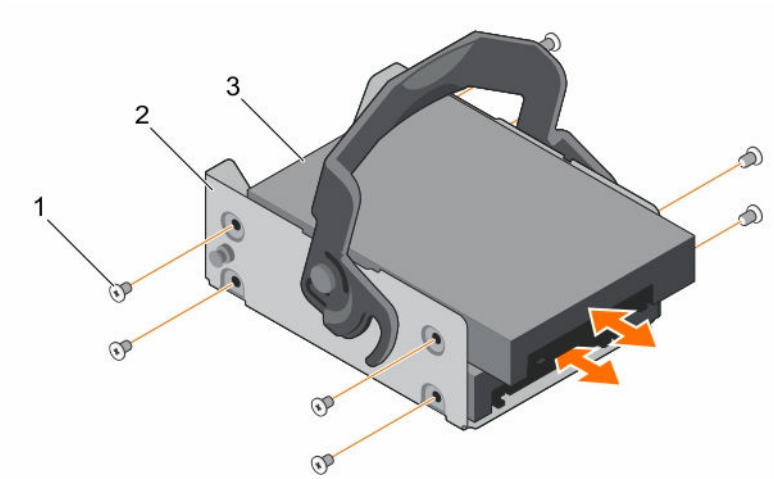


Figure 24. Removing and installing a hard drive from the internal hard drive carrier

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

Next steps

Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) 2.5 inch internal hard drive carrier

Installing the (optional) 2.5 inch internal hard drive into the internal 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.

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 ready.
4. Remove the internal hard drive carrier.

Steps

1. Slide the hard drive into the internal hard drive carrier.
2. Secure the hard drive to the internal hard drive carrier.

NOTE: The screws are located on the 2.5 inch internal hard drive cage.

Next steps

1. Connect the data and power cables to the hard drive.
2. Install the internal hard drive carrier.
3. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) 2.5 inch internal hard drive carrier
Installing the (optional) 2.5 inch internal hard drive carrier

Removing the (optional) 2.5 inch internal hard drive cage

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 ready.
4. If connected, disconnect the cables from expansion card (s).
5. If required, remove the PCIe expansion card riser.

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

6. Remove the cooling shroud.
7. Disconnect the power and data cables from the hard drive.
8. Remove the internal hard drive carrier.
9. Disconnect the FAN1 cable from the power interposer board.

NOTE: The FAN1 cable is routed behind the internal hard drive cage.

Steps

1. Remove the screw that secures the internal hard drive cage to the chassis.
2. Lift the internal hard drive cage out of the chassis.

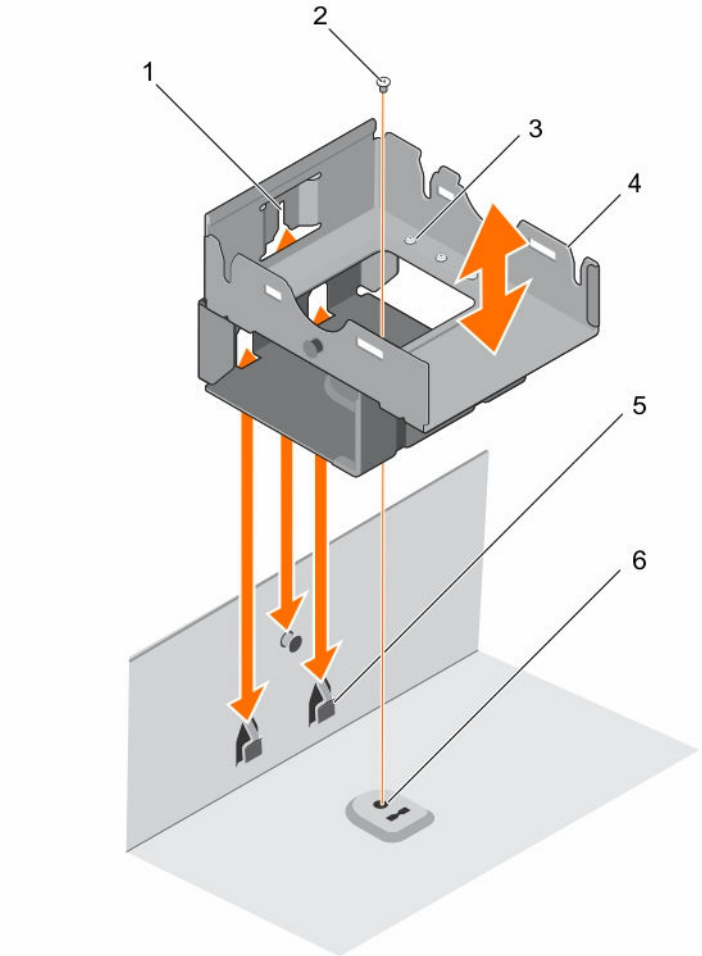


Figure 25. Removing and installing the 2.5 inch internal hard drive cage

1. internal hard drive cage guide
2. screw (1)
3. hard drive retention screw (8)
4. internal hard drive cage
5. internal hard drive cage guide slot
6. screw hole on chassis

Next steps

1. Install the internal hard drive carrier.
2. Reconnect the FAN1 cable to the power interposer board.
3. If installed, reinstall the PCIe expansion card riser.
4. If disconnected, reconnect the cables to the expansion card(s).
5. Reinstall the cooling shroud.
6. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.

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

Related Tasks

Removing the (optional) dual riser module
Removing the cooling shroud
Removing the (optional) 2.5 inch internal hard drive carrier
Installing the (optional) 2.5 inch internal hard drive carrier
Installing the (optional) dual riser module
Installing the cooling shroud

Installing the (optional) 2.5 inch internal hard drive cage

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 ready.
4. If connected, disconnect the cables from expansion card (s).
5. If required, remove the PCIe expansion card riser.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
6. Remove the cooling shroud.
7. Disconnect the power and data cables from the hard drive.
8. Disconnect the FAN1 cable from the power interposer board.

   NOTE: The FAN1 cable is routed behind the internal hard drive cage.

Steps

1. Align the internal hard drive cage guide with the guide slots on the chassis.
2. Insert the internal hard drive cage into the chassis.
3. Secure the internal hard drive cage to the chassis.

Next steps

1. Install the internal hard drive carrier.
2. Reconnect the FAN1 cable to the power interposer board.
3. If removed, reinstall the PCIe expansion card riser.
4. If disconnected, reconnect the cables to the expansion card(s).
5. Reinstall the cooling shroud.
6. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
7. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the (optional) dual riser module
Removing the cooling shroud
Installing the (optional) dual riser module
Installing the cooling shroud

Cooling fans

Your system supports six cooling fans. A fan blank is pre-installed on the sixth cooling fan slot (FAN6) in a single processor configuration. FAN6 is required in a dual processor configuration.

NOTE: Hot-swap removal or installation of the fans is not supported.

NOTE: Each fan is listed in the system's management software, referenced by the respective fan number. If there is a problem with a particular fan, you can easily identify and replace the proper fan by noting the fan numbers on the cooling fan assembly.

Listed here is the fan configuration table which shows the various fan configurations based on the CPU configuration in the server.

CPU Type	CPU 1	CPU 2	PSU Type	FAN1	FAN2	FAN3	FAN4	FAN5	FAN6
55W-120W	Y	N	Redundant	Y	Y	Y	Y	Y	N
	Y	Y	Redundant	Y	Y	Y	Y	Y	Y

Removing a cooling fan

Prerequisites

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

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

NOTE: The procedure for removing each cooling fan is the same.

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 riser.

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

Steps

1. Remove the fan cable connector from the system board by pressing the release tab on the system board end of the connector, and lifting it away from the system board.

   NOTE: The FAN1 cable will be connected to the connector on the Power interposer board.
2. Free the cable from the cable holders on the fan bracket.
3. Press the release tab on the cooling fan and lift the fan away from the chassis.

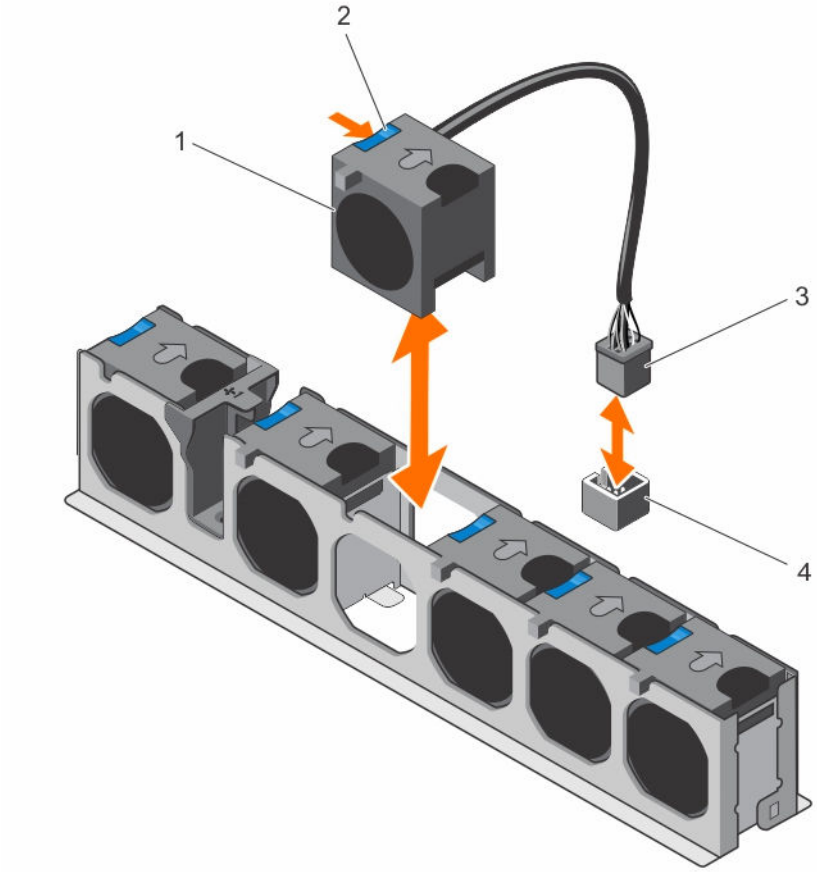


Figure 26. Removing and installing a cooling fan

1. cooling fans (6)
2. cooling fan release tab
3. cooling fan cable connector
4. cooling fan connector on the system board

Next steps

1. If applicable, install the PCIe expansion card riser.
2. Reinstall the cooling shroud.
3. Follow the procedure listed in After working inside your system.

Installing a cooling fan

Prerequisites

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

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.

Steps

1. Align the fan with the cable end of the fan toward the system board connector and power interposer board.
2. Lower the fan into the fan bracket until it clicks into position.
3. Connect the fan's power cable to the corresponding power connector on the system board or the power interposer board.
4. Route the cable through the cable holders on the fan bracket.

   NOTE: FAN1 connects to the power interposer board, route the cable behind the internal hard drive cage.

Next steps

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

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 the **System Setup**.

NOTE: To locate the internal USB connector (INT_USB) on the system board, see System board 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. If connected, disconnect the cables from expansion card (s).
4. If required, remove the PCIe expansion card riser.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
5. If applicable, remove the full length PCIe expansion card.
6. Remove the cooling shroud.

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

Steps

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

NOTE: To locate the internal USB connector on the system board, see System board connectors.

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

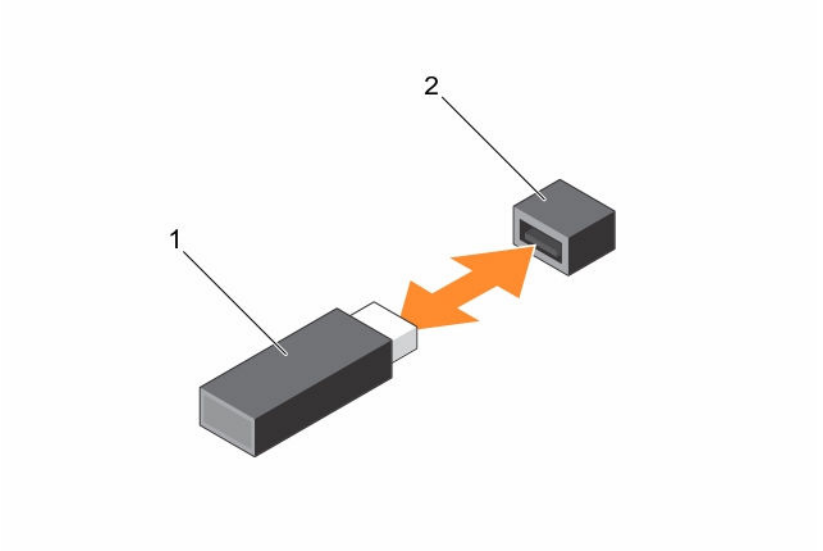


Figure 27. Replacing the internal USB key

1. USB memory key
2. USB memory key connector

Next steps

1. If removed, reinstall the full length PCIe expansion card.
2. If removed, reinstall the PCIe expansion card riser.
3. If disconnected, reconnect the cables to the expansion card(s).
4. Reinstall the cooling shroud.
5. Follow the procedure listed in After working inside your system.
6. While booting, press <F2> to enter the **System Setup** and verify that the USB key is detected by the system.

Related Tasks

Removing the (optional) dual riser module
Removing an expansion card from the dual riser module
Removing the cooling shroud
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Expansion cards and expansion card riser (optional)

NOTE: A missing or an unsupported expansion card riser logs an SEL event. It does not prevent your system from powering on and no BIOS POST message or F1/F2 pause is displayed.

Expansion card installation guidelines

Your system supports PCI Express Generation 2 and Generation 3 expansion cards.

Use the following table as a guide for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority must be installed first by using the slot priority indicated.

Table 3. Expansion card slots available on system board only

Location	PCIe slot	Processor connection	Height	Length	Link width	Slot width
System board	1	Processor 1	Low Profile	Half Length	x16	x16
System board	2	Processor 1	Low Profile	Half Length	x16	x16
System board	3	Platform Controller Hub (Mapped to Processor 1)	Low Profile	Half Length	x4	x8

Table 4. Expansion card slots available with optional dual riser module and optional internal PERC riser

Location	PCIe slot	Processor connection	Height	Length	Link width	Slot width
Dual riser module	1	Processor 1	Full height	Full Length	x16	x16
Dual riser module	2	Processor 1	Low Profile	Half Length	x8	x8
Dual riser module	3	Processor 1	Low Profile	Half Length	x8	x8
Dual riser module	4	Processor 1	Low Profile	Half Length	x8	x8
Internal riser	5	Processor 2	Low Profile	Half Length	x8	x8

NOTE: The optional dual riser module is installed on PCIe slot 1 and 2 on the system board.

NOTE: When your system is installed with the optional dual riser module in PCIe slot 1 and 2 on the system board, you cannot install an expansion card in PCIe slot 3 of the system board.

NOTE: When x16 card installed in PCIe Slot 1 on dual riser module the PCIe Slot 2 on the expansion card will not function. The expansion card riser can be used either with four x8 PCIe cards or with one x16 PCIe card on PCIe Slot 1 and two x8 PCIe cards on slots 3 and 4 of the dual riser module.

NOTE: Only slots 1, 2 and the internal PCIe slot support Generation 3 PCIe expansion cards.

NOTE: The expansion cards are not hot-swap.

Table 5. Expansion card installation priority on system board only

Card Priority	Category	Slot Priority	Max Allowed
1	GPU	NA	0
2	RAID Integrated storage	1	1
	RAID Adapter (Low profile)	2	1
3	40G NICs	NA	0
4	FC16 HBA	NA	0
5	10Gb NICs	1,2	2
6	FC8 HBA	NA	0
7	1Gb NICs (Intel Quad Port)	1,2,3	3
	1Gb NICs (Intel Dual Port)	1,2,3	3
8	Non-RAID	1,2	2

Table 6. Expansion card installation priority on optional dual riser module and optional internal PERC riser

Card Priority	Category	Slot Priority	Max Allowed
1	GPU	NA	0
2	RAID Integrated storage	Integrated Slot	1
3	RAID Adapter (Low profile)	3	1
4	40G NICs (Full height)	NA	0
5	FC16 HBA (Low profile)	NA	0
	FC16 HBA (Full height)	NA	0
6	10Gb NICs (Low profile)	2,3,4	3
	10Gb NICs (Full height)	1	1
7	FC8 HBA (Low profile)	NA	0
	FC8 HBA (Full height)	NA	0
8	1Gb NICs (Low profile)	2,3,4	3
	1Gb NICs (Full height)	1	1
9	Non-RAID (Low profile)	2,3,4	3
	Non-RAID (Full height)	1	1

Removing an expansion card from 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. If connected, disconnect the cables from the expansion card.
2. Pull the expansion card retention latch lock and lift the latch up to open the expansion card retention latch.
3. Hold the expansion card by its edge, pull the card up to remove it from the expansion card connector and out of the system.
4. If the expansion card is not going to be replaced, install a filler bracket by performing the following steps:
   a. Align the slot on the filler bracket with the tab on the expansion card slot.
   b. Press the expansion card latch till the filler bracket locks into place.

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

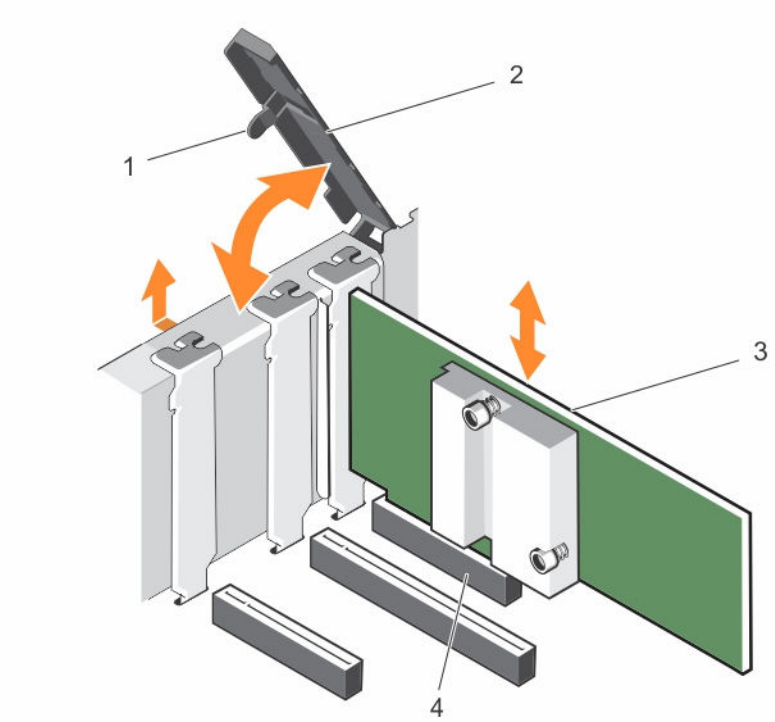


Figure 28. Removing and installing an expansion card from the system board

1. expansion card retention latch lock
2. expansion card retention latch
3. expansion card
4. expansion card connector

Next steps

1. If disconnected, reconnect the cables to the expansion card.

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

Installing an expansion card on 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 expansion card and prepare it for installation.

   For instructions, see the documentation accompanying the card.
2. Open the expansion card retention latch.
3. If you are installing a new card, remove the filler bracket.

   NOTE: Store the filler bracket for future use. Filler brackets must be installed in empty expansion card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.
4. Holding the card by its edges, position the card so that the card's edge connector aligns with the expansion card connector.
5. Insert the card's edge connector firmly into the expansion card connector until the card is fully seated.
6. Close the expansion card retention latch by pushing the latch down until the latch snaps into place.
7. Connect the required cables to the expansion card.

Next steps

Follow the procedure listed in After working inside your system.

Removing the (optional) dual riser 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 read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from expansion card (s).

Steps

Holding the dual riser module by the finger holds, lift the dual riser module from the riser connector on the system board.

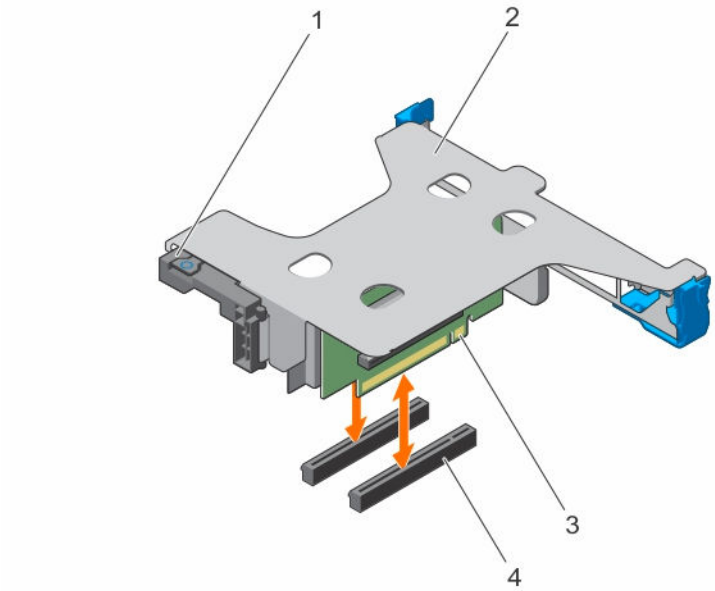


Figure 29. Removing and installing the dual riser module

1. full height expansion card latch
2. dual riser module
3. expansion card riser (2)
4. PCIe connector on the system board (2)

Next steps

1. If removed, reinstall the expansion card(s) onto the dual riser module.
2. If disconnected, connect the power or data cables to the expansion card(s).
3. Install the dual riser module.
4. Follow the procedure listed in After working inside your system.

Installing the (optional) dual riser 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 read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Install the expansion card on to the dual riser module, if applicable.

NOTE: Ensure that the expansion card is properly seated along the chassis, so that the expansion card latch can be closed.

Steps

1. Align the dual riser module with the guide pins on the chassis near PCIe slots 1 and 2.
2. Insert the dual riser module into the chassis and press the module to lock it into place.

Next steps

1. If applicable, connect the cables to the expansion card (s).
2. Follow the procedure listed in After working inside your system.

Removing the internal PERC riser

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from the expansion card (s).
4. If required, remove the dual riser module.
5. Remove the cooling shroud

Steps

Hold the internal PERC riser module by the edges and lift it out of the server.

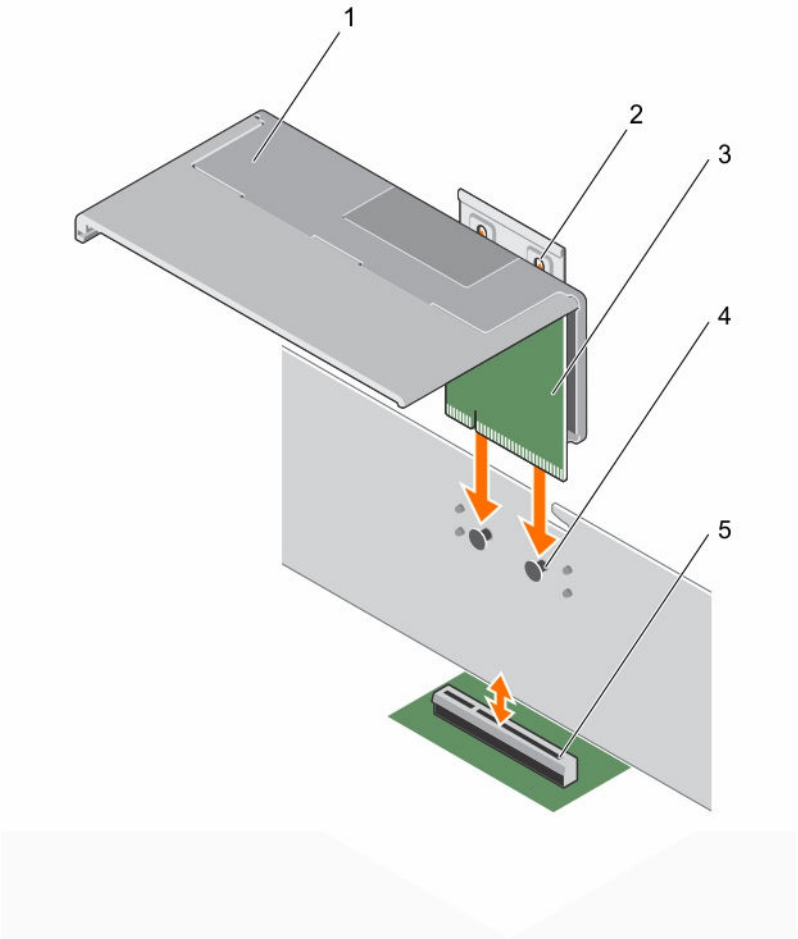


Figure 30. Removing and installing the internal PERC riser

1. internal PERC riser
2. guide slot on the internal PERC riser
3. internal PERC riser
4. guide pin on the chassis
5. PCIe connector on system board

Next steps

1. Install the cooling shroud.
2. If removed, reinstall the dual riser module.
3. Reconnect all disconnected cables.
4. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Installing the internal PERC riser

Prerequisites

1. Ensure that you read the Safety instructions.

2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the from expansion card (s).
4. If connected, remove the full length expansion card.
5. Remove the cooling shroud
6. If applicable, install the PERC card on the riser.

Steps

1. Align the guide slot on the internal PERC riser with the guide pin on the chassis.
2. Align the edge connector of the internal PERC riser with the PCIe connector on the system board.
3. Press down to lock the riser bracket to the chassis.

Next steps

1. Reconnect all disconnected cables.
2. Install the cooling shroud.
3. If removed, reinstall the full length expansion card.
4. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Removing an expansion card from the internal PERC riser

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 connected, disconnect the cables from the expansion card(s).
4. If required, remove the dual riser module.

   NOTE: If required, close the expansion card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.
6. Remove the internal PERC riser.

NOTE: The internal riser can be used only when both the processors are installed.

Steps

1. Press the blue release tab to disengage the lock from the expansion card's locking notch.
2. Slide the expansion card out of the internal PERC riser, until the expansion card is free of the guide slot on the internal PERC riser.
3. Lift the expansion card away from the system.

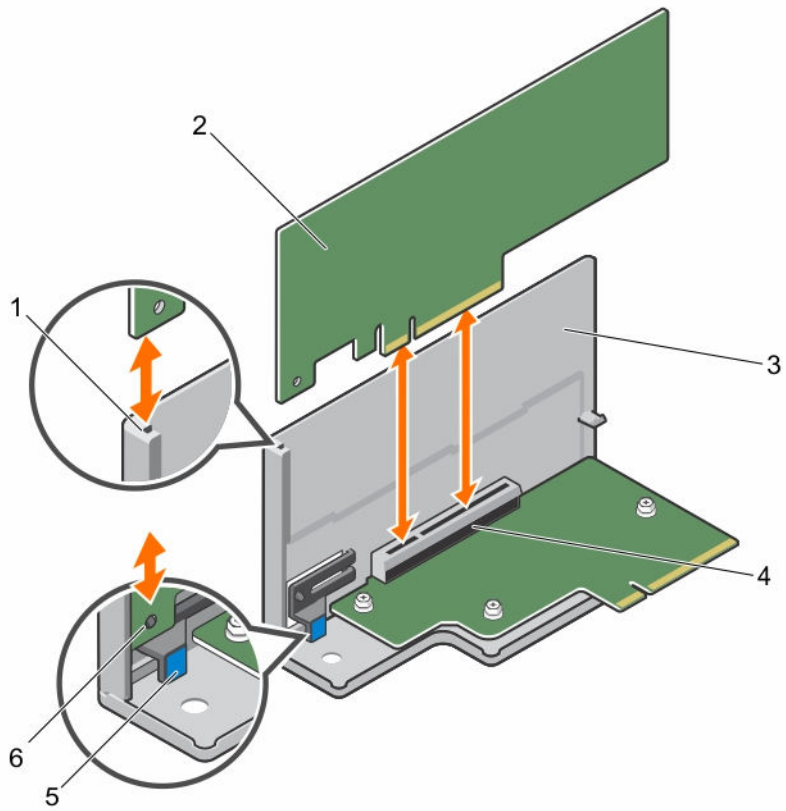


Figure 31. Removing and installing an expansion card on the internal PERC riser

1. expansion card guide slot on internal PERC riser
2. expansion card
3. internal PERC riser
4. PCIe connector on internal PERC riser card
5. release tab
6. locking notch on the expansion card

Next steps

1. Follow the procedure listed in After working inside your system.
2. Install the internal PERC riser on the system board.
3. Install the cooling shroud.
4. If removed, reinstall the dual riser module.

   NOTE: If required, open the expansion card latch on the cooling shroud to support the full length card.
5. Reconnect the disconnected cables to the expansion card(s).

Installing an expansion card into the internal PERC riser

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 connected, disconnect the cables from expansion card (s).
4. If required, remove the dual riser module.

   NOTE: If open, close the expansion card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.
6. If installed, remove the internal PERC riser

Steps

1. Locate the expansion card connector on the internal PERC riser.
2. Holding the card by its edges, position the card so that the card's edge connector aligns with the internal PERC expansion card connector.
3. Align the slot on the internal PERC riser with the expansion card.
4. Slide the expansion card into the internal riser connector until the card is fully seated and the blue release tab clicks into place.
5. If applicable, connect cables to the expansion card.
6. Install the expansion card riser on the system board.

Next steps

1. Follow the procedure listed in After working inside your system.
2. Install the internal PERC riser on the system board.
3. Install the cooling shroud.
4. Reconnect the disconnected cables to the expansion card(s).
5. If removed, reinstall the dual riser module.

   NOTE: If closed, open the expansion card latch on the cooling shroud to support the full length card.

Removing an expansion card from the dual riser 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 read 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 out of the server.

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

Steps

1. For expansion cards:
   a. Installed in PCIe slots 3 and 4 of the dual riser module, lift the expansion card lock up.
   b. Installed in PCIe slots 1 and 2 of the dual riser module, pull the expansion card lock down and away from the dual riser module.
2. Pull the expansion card away from the riser.
3. If you want to remove the expansion card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion card latch.
4. Close the expansion card lock.

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.

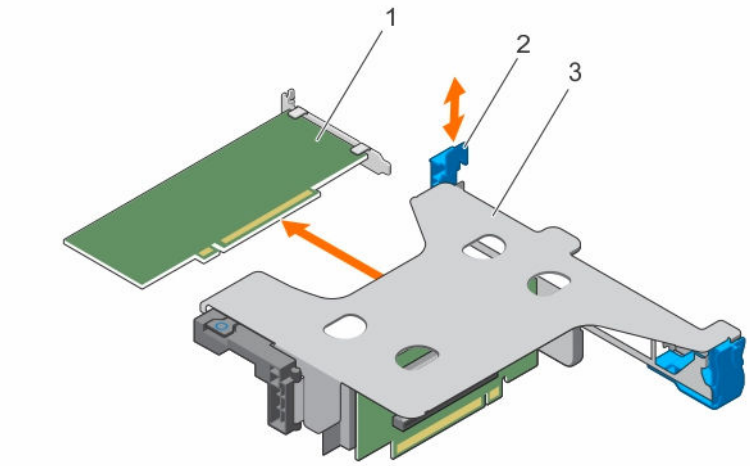


Figure 32. Removing and installing a low profile expansion card from the dual riser module

1. low profile expansion card
2. expansion card retention latch
3. dual riser module

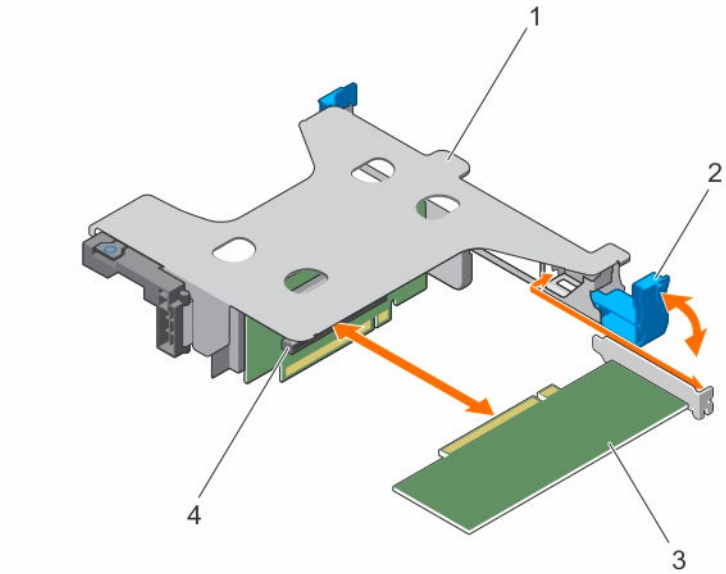


Figure 33. Removing and installing a low profile expansion card from the dual riser module

1. dual riser module
2. expansion card retention latch
3. full height, full length expansion card
4. PCIe slot on riser card

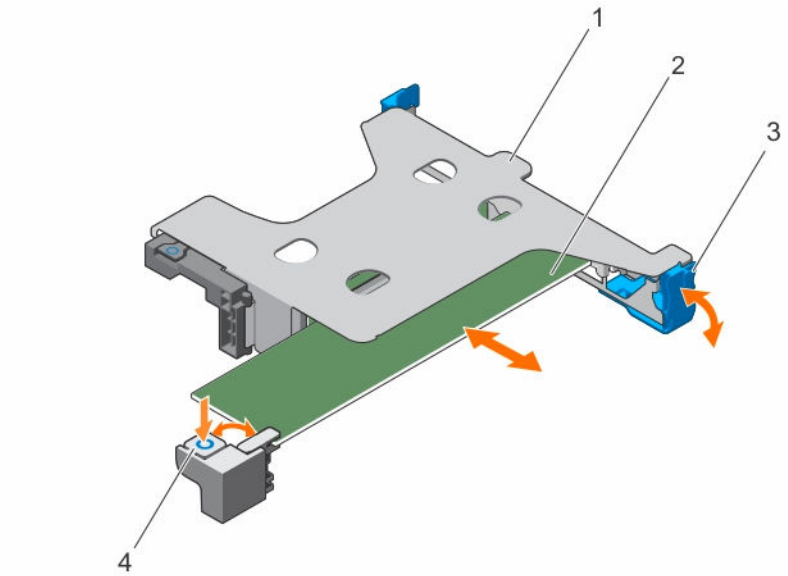


Figure 34. Removing and installing a full height, full length expansion card from the dual riser module

1. dual riser module
2. full height, full length expansion card
3. expansion card retention latch
4. full height, full length expansion card latch (on cooling shroud)

Next steps

1. If applicable, install the expansion card(s).
2. Install the dual riser module.

3. If applicable, open the expansion card latch on the cooling shroud to support a full length expansion card.
4. If disconnected, reconnect cables to the expansion card(s).
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Installing an expansion card into the dual riser module

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If opened, close the expansion card latch on the cooling shroud.
4. Remove the expansion card riser.
5. Unpack the expansion card and prepare it for installation.

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

Steps

1. For expansion cards:
   a. To be installed in PCIe slots 3 and 4 of the dual riser module, lift the expansion card lock up.
   b. To be installed in PCIe slots 1 and 2 of the dual riser module pull, the expansion card lock down and away from the dual riser module.
2. Holding the card by its edges, position the card so that the card's edge connector aligns with the expansion card connector.
3. Insert the card's edge connector firmly into the expansion card connector until the card is fully seated.
4. Close the expansion card retention latch.

Next steps

1. Install the expansion card riser.
2. If disconnected, connect the required power or data cables to the expansion card.
3. If required press the expansion card latch on the cooling shroud to support the full length expansion card .
4. Follow the procedure listed in After working inside your system.
5. Install any device drivers required for the expansion card as described in the documentation for the card.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing an expansion card into the dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

iDRAC ports card (optional)

The iDRAC ports card consists of the SD vFlash card slot and an iDRAC port. The iDRAC ports card is used for advanced management of the system.

An SD vFlash card is a Secure Digital (SD) card that plugs into the SD vFlash card slot in the system. It provides persistent on-demand local storage and a custom deployment environment that allows 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/esmmanuals**.

Removing the iDRAC ports 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. If applicable, disconnect the cables from expansion card (s).
4. Remove the expansion card riser.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.
6. Keep the #2 Phillips screwdriver ready.

Steps

1. Disconnect the management network cable from the iDRAC port.
2. Loosen the two screws securing the iDRAC ports card holder to the system board.
3. Pull the iDRAC ports card up and toward the front of the system to disengage it from the connector and remove the card from the chassis.

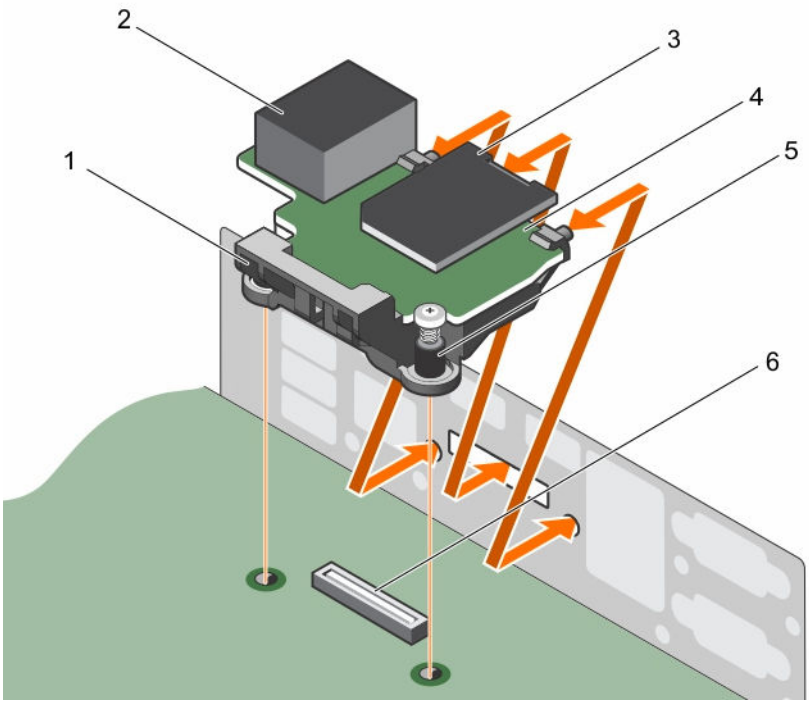


Figure 35. Removing and installing the iDRAC ports card

1. iDRAC ports card holder
2. iDRAC port
3. SD vFlash media card reader
4. iDRAC ports card
5. screws (2)
6. iDRAC ports card connector on system board

Next steps

1. Install the expansion card riser.
2. If applicable, connect the required power or data cables to the expansion card(s).
3. Install the cooling shroud.
4. If applicable, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Installing the (optional) dual riser module
Installing the cooling shroud

Installing the iDRAC ports 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.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
4. If applicable, disconnect the cables from expansion card (s).
5. If applicable, remove the expansion card riser

Steps

1. Align and insert the tabs on the iDRAC ports card on the slots on the chassis wall.
2. Insert the iDRAC ports card into the connector on the system board.
3. Tighten the screws to secure the iDRAC ports card.

Next steps

1. If removed, reinstall the PCIe expansion card riser.
2. If disconnected, connect the cables to the expansion card(s).
3. Reinstall the cooling shroud.
4. If required, open the expansion card latch on the cooling shroud to secure the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

SD vFlash media card

A vFlash SD card is a Secure Digital (SD) card that plugs into the vFlash SD card slot in the system. It provides persistent on-demand local storage and a custom deployment environment that allows 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/esmmanuals**.

Replacing an SD vFlash media card

1. Locate the SD vFlash media slot at the back of the chassis.
2. To remove the SD vFlash media card, push the card inward to release it, and pull the card from the card slot.

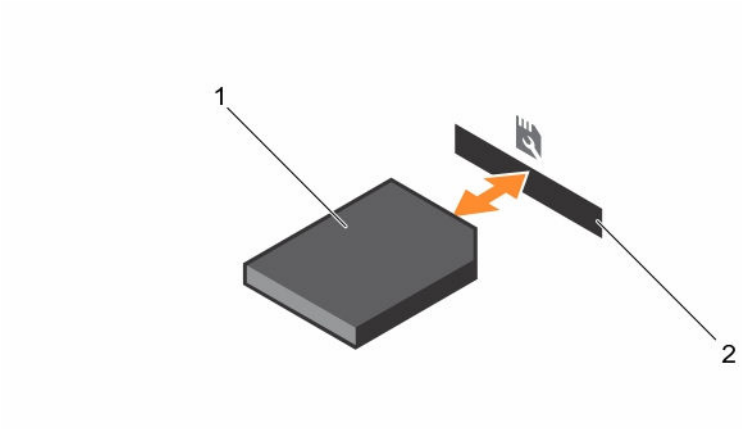


Figure 36. Removing and installing the SD vFlash media card

1. SD vFlash media card
2. SD vFlash media-card slot

3. To install an SD vFlash media card, 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.

Installing the SD vFlash 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 System Setup.

Steps

1. Locate the SD card connector on the internal dual SD module. Align 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.

Internal dual SD module

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

- Dual card operation — maintains a mirrored configuration by using SD cards in both the slots and provides redundancy.

  NOTE: When the **Redundancy** option is set to **Mirror Mode** in the **Integrated Devices** screen of System Setup, the information is replicated from one SD card to another.
- Single card operation — single card operation is supported, but without redundancy.

Removing an internal SD card

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from expansion card (s).
4. If installed, remove the expansion card riser(s).

   NOTE: If open, close the expansion-card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.

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

Steps

1. Locate the SD card slot on the internal dual SD module and press the card to release it from the slot.
2. Lift the SD card away from the system.

Next steps

1. If removed, reinstall the PCIe expansion card riser(s).
2. If disconnected, reconnect the required power or data cables to the expansion card.
3. Reinstall the cooling shroud.
4. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud

Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

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

   NOTE: If open, close the expansion card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.

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

1. If removed, reinstall the PCIe expansion card riser(s).
2. If disconnected, connect the required power or data cables to the expansion card(s).
3. Reinstall the cooling shroud.
4. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Removing the internal dual SD module

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.

   NOTE: If applicable, close the expansion-card latch on the cooling shroud to release the full length card.
4. If applicable, disconnect the power or data cables from expansion card (s).
5. If applicable, remove the expansion-card riser (s).

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 internal dual SD module on the system board.
2. If installed, remove the SD card(s).
3. Hold the plastic pull tab and pull the dual SD module out of the system board.

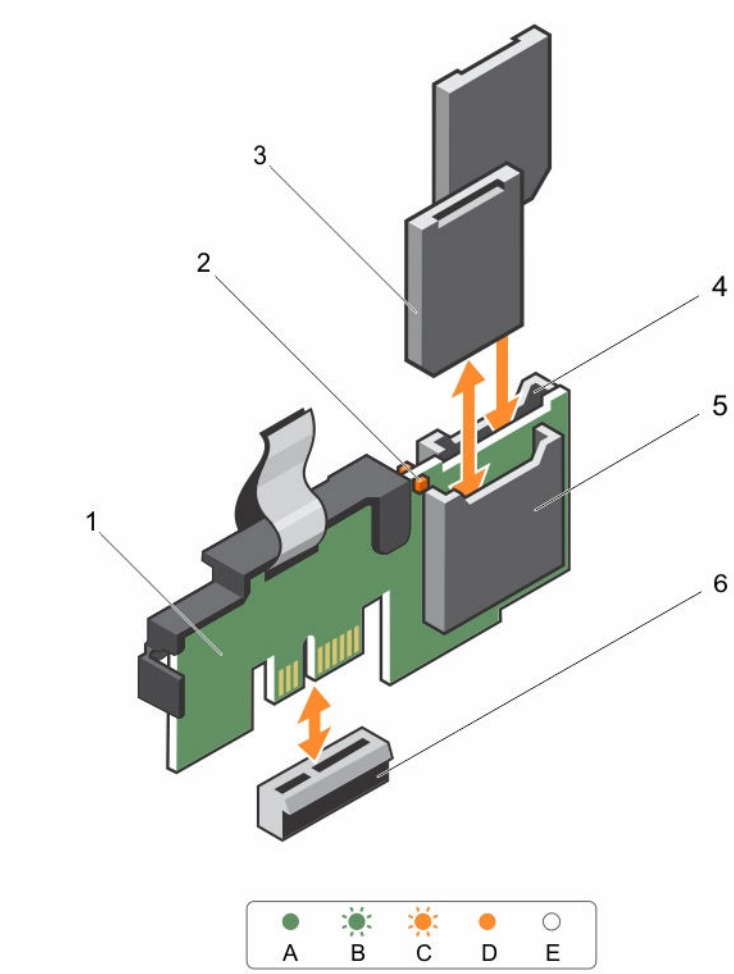


Figure 37. Removing and installing the Internal Dual SD Module (IDSDM)

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	Condition
A	Green	Indicates that the card is online
B	Flashing green	Indicates rebuild or activity
C	Flashing amber	Indicates a card mismatch or a card failure
D	Amber	Indicates that the card is offline, has failed, or is write-protected

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

Next steps

1. If removed, reinstall the PCIe expansion card riser(s).
2. If disconnected, connect the cables to the expansion card(s).
3. Reinstall the cooling shroud.
4. If required open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Installing the internal dual SD module

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from expansion card (s).
4. If installed, remove the expansion card riser (s).

   NOTE: If required, close the expansion card latch on the cooling shroud to release the full length card.
5. Remove the cooling shroud.

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

Steps

1. Locate the IDSDM connector on the system board.
2. Align the connectors on the system board and the dual SD module.
3. Push the dual SD module until it is firmly seated on the system board.

Next steps

1. Install the SD media card(s).
2. If removed, reinstall the PCIe expansion card riser (s).
3. If disconnected, reconnect the cables to the expansion card(s).
4. Reinstall the cooling shroud.
5. If required open the expansion card latch on the cooling shroud to support the full length expansion card.

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

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing an internal SD card
Installing the (optional) dual riser module
Installing the cooling shroud

Processors and heat sinks

Use the following procedure when:

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

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

Removing a 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.

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

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 read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If connected, disconnect the cables from expansion card (s).
4. If required, remove the PCIe expansion card riser.
5. Remove the cooling shroud.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
6. Keep the Phillips #2 screwdriver ready.

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.
   Allow some time (around 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.

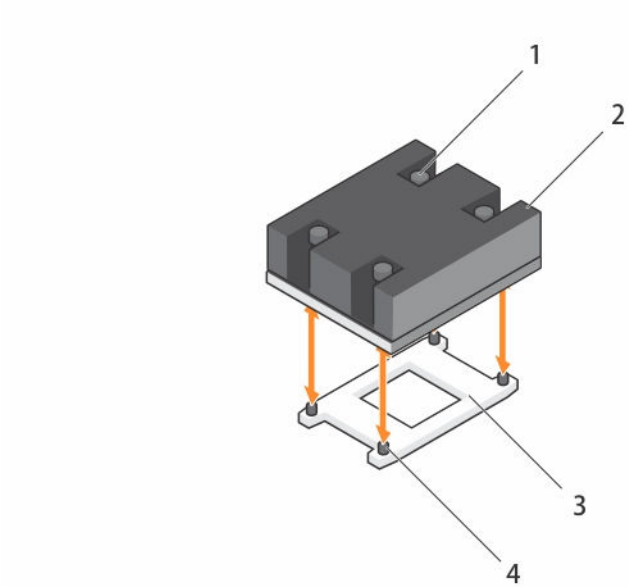


Figure 38. Removing and installing the heat sink

1. captive screw (4)
2. heat sink
3. processor socket
4. screw hole (4)

Next steps

1. Remove the processor.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Removing a processor

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

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.

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

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If you are upgrading your system (from a single processor system to a dual processor system or a processor with a higher processor bin), download the latest system BIOS version from **dell.com/support** and follow the instructions included in the compressed download file to install the update on your system.

   NOTE: You can update the system BIOS by using Lifecycle Controller.
4. If connected, disconnect the cables from expansion card (s).
5. If installed, remove the PCIe expansion card riser.
6. Remove the cooling shroud.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
7. Remove the heat sink.
8. Keep the Phillips #2 screwdriver ready.

Steps

1. Using a clean, lint-free cloth remove any thermal grease from the surface of the processor shield.

   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.
2. Position your thumb firmly over the socket-release lever 1 and lever 2 of the processor and release both the levers simultaneously from the locked position by pushing down and out from under the tab.

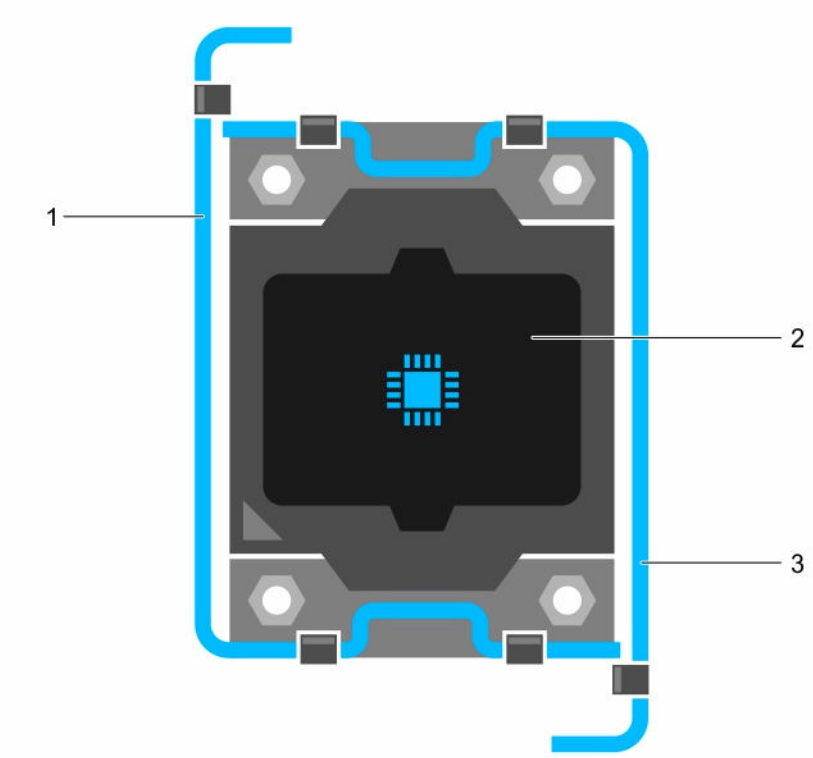


Figure 39. Processor shield opening and closing lever sequence

1. socket-release lever 1
2. processor
3. socket-release lever 2

3. Hold the tab on the processor shield and rotate the shield upward and out of the way.
4. Lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

CAUTION: If you are permanently removing a processor, you must install a socket protective cap and a processor blank in the vacant socket to ensure proper system cooling. The processor blank covers the vacant sockets for the DIMMs and the processor.

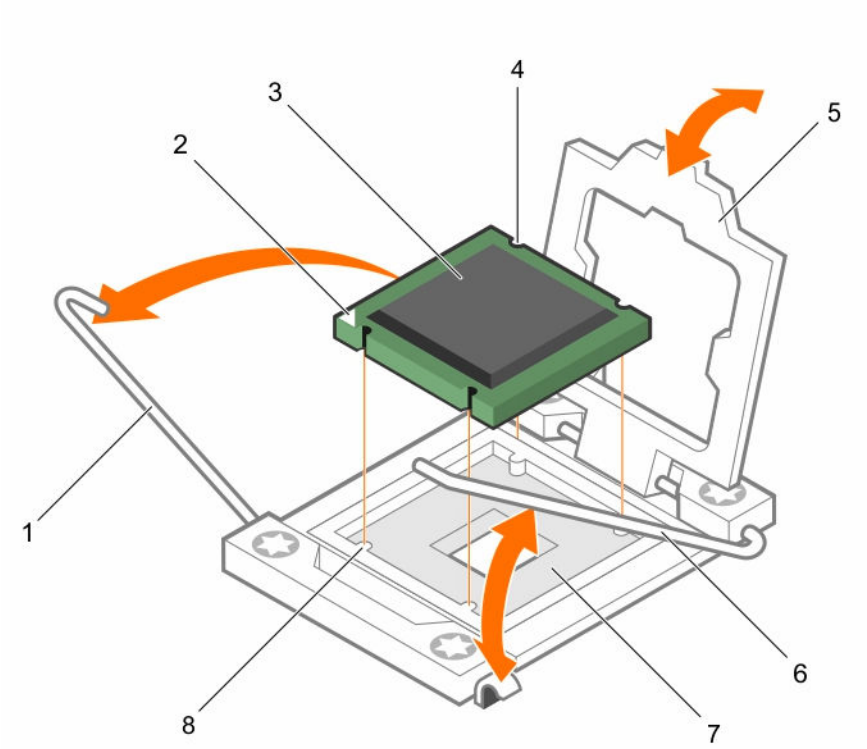


Figure 40. Installing and removing a processor

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

Next steps

1. If you are removing the processor permanently, install the processor blank.
2. Install a processor.
3. Install the heat sink.
4. If removed, reinstall the PCIe expansion card riser.
5. If disconnected, reconnect the cables to the expansion card(s).
6. Reinstall the cooling shroud.
7. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Removing a heat sink
Installing a processor
Installing a heat sink

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.

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

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. If you are upgrading your system (from a single processor system to a dual processor system or a processor with a higher processor bin) download the latest system BIOS version from **dell.com/support** and follow the instructions included in the compressed download file to install the update on your system.

   NOTE: You can update the system BIOS by using Lifecycle Controller.
4. Keep the Phillips #2 screwdriver ready.

NOTE: If you are installing a single processor, it must be installed in socket CPU 1.

Steps

1. Unpack the new processor.
2. Locate the processor socket.
3. Unlatch and rotate the socket-release levers 90 degrees upward and ensure that the socket-release lever is fully open.
4. Hold the tab on the processor shield and lift the shield and move it out of the way.
5. If installed, remove the socket protective cap from the processor shield. To remove the socket protective cap, push the cap from the inside of the processor shield and move it away from the socket pins.

   NOTE: It is recommended that you install/remove the socket protective cap from the processor shield with the processor shield in the open position.

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

   CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.
6. Install the processor in the socket:
   a. Identify the pin-1 corner of the processor by locating the tiny gold triangle on one corner of the processor. Place this corner in the same corner of the ZIF (Zero Insertion Force) socket identified by a corresponding triangle on the system board.
   b. Install the processor into the socket such that the slots on the processor align with the socket keys.

      CAUTION: The sled uses a ZIF processor socket. Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.
   c. Close the processor shield.

d. Rotate the socket-release lever 1 and lever 2 simultaneously until they are locked into position.

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.

Related Tasks

Installing a heat sink

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.

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

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Install the processor.
4. Keep the Phillips #2 screwdriver ready.

NOTE: If you are installing a single processor, it must be installed in socket CPU 1.

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. Using the thermal grease syringe included with your processor kit, apply the grease in a thin spiral on the top of the processor as shown in the 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.

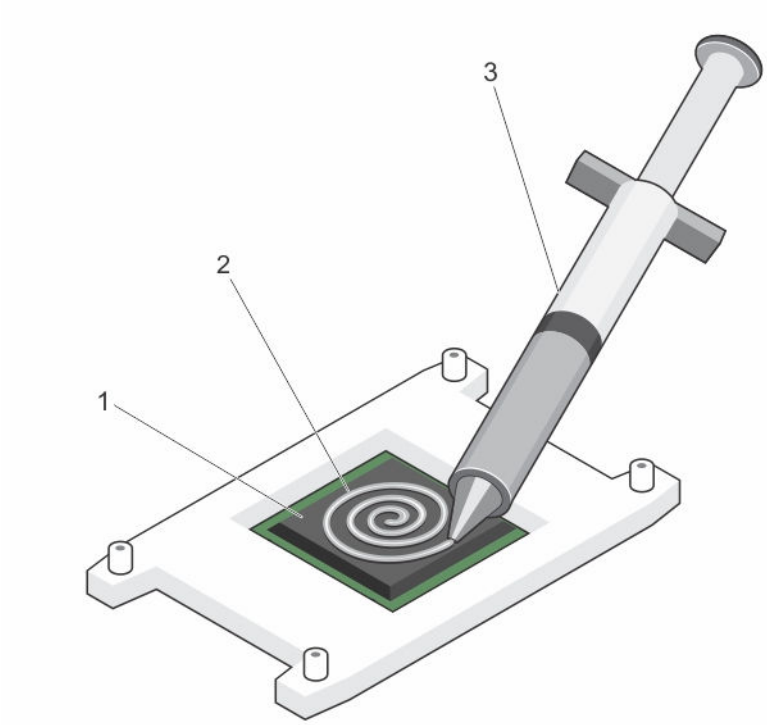


Figure 41. Applying thermal grease on the top of the processor

1. processor
2. thermal grease
3. thermal grease syringe

3. Place the heat sink on the processor.
4. Tighten one of the four screws to secure the heat sink to the system board.
5. Tighten the screw diagonally opposite to the first screw that 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. The screw tension should be not more than 6 in-lb (6.9 cm-kg).
6. Repeat the procedure for the remaining screws.

Next steps

1. If removed, reinstall the PCIe expansion card riser.
2. If disconnected, reconnect the cables to the expansion card(s).
3. Reinstall the cooling shroud.
4. If required, open the expansion card latch on the cooling shroud to support the full length expansion card.
5. Follow the procedure listed in After working inside your system.
6. While booting, press <F2> to enter System Setup and check that the processor information matches the new system configuration.
7. Run system diagnostics to verify that the new processor operates correctly.

Related Tasks

Installing a processor

Installing the (optional) dual riser module
Installing the cooling shroud

Power supplies

Your system supports:

- Two 495 W, 750 W, or 1100 W AC power supply modules
- Two 750 W DC power supply modules
  - When two identical power supplies are installed, the power supply configuration is redundant (1 + 1). In redundant mode, power is supplied to the system equally from both power supplies to maximize efficiency.
  - When only one power supply is installed, the power supply configuration is non-redundant (1 + 0). Power is supplied to the system only by the single power supply.
  - When configured in a 2+0 configuration, 1+1 redundancy will not be supported.

NOTE: If two power supplies are used, they must be of the same type and must have the same maximum output power.

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

Hot Spare feature

Your system supports the Hot Spare feature that significantly reduces the power overhead associated with power supply 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 a sleep state, the active PSU can also activate a 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 on iDRAC settings, see the Integrated Dell Remote Access Controller User's Guide at **dell.com/support/home**.

Removing the power supply unit blank

If you are installing a second power supply unit, remove the power supply unit 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 power supply bay in a non-redundant configuration. Remove the power supply blank only if you are installing a second power supply.

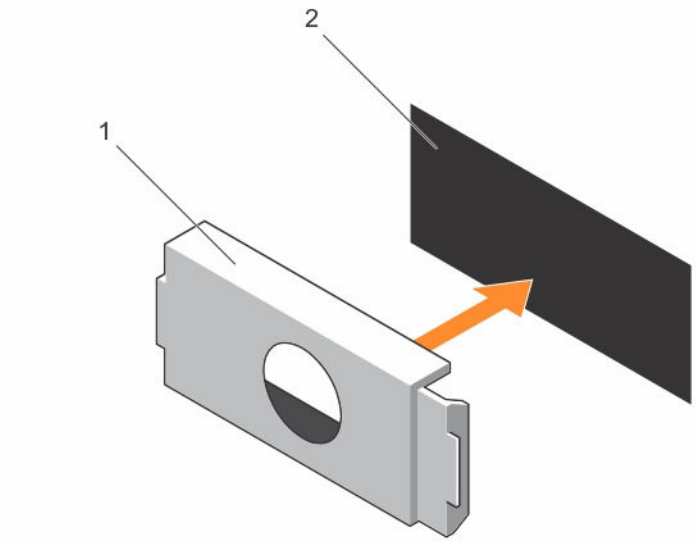


Figure 42. Removing and installing the power supply blank

1. power supply blank
2. power supply bay

Installing the power supply unit blank

Install the power supply unit blank only in the second power supply unit bay.

To install the power supply unit blank, align the blank with the power supply unit 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.

1. Ensure that you read the Safety instructions.

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

Steps

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

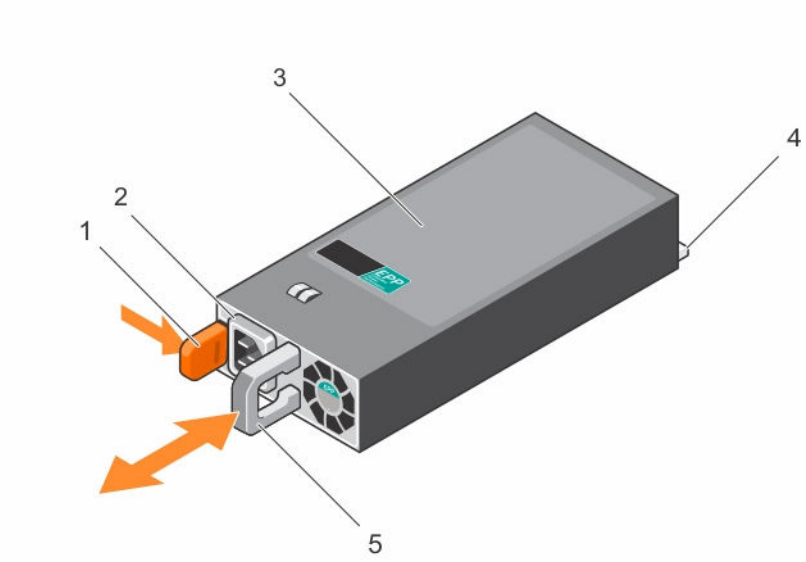


Figure 43. Removing and installing an AC power supply unit

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

Next steps

1. Install the AC power supply unit.
2. Follow the procedure listed in After working inside your system.

Related Tasks

Installing an AC power supply unit

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.

Steps

1. 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.

2. If installed, remove the power supply unit 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 unlatched the cable management arm, re-latch it. For information about the cable management arm, see the system's rack documentation.

4. 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 ºC 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 suitably approved and rated shall be incorporated in the field wiring.

Input requirements

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

Kit contents

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

Required tools

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

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

Required wires

- One UL 10 AWG, 2 m maximum (stranded) black wire [–(48–60) V DC]
- One UL 10 AWG, 2 m maximum (stranded) red wire (V DC return)
- One UL 10 AWG, 2 m maximum green/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/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 (Jeeson 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 using a #6-32 nut equipped with a locking washer.

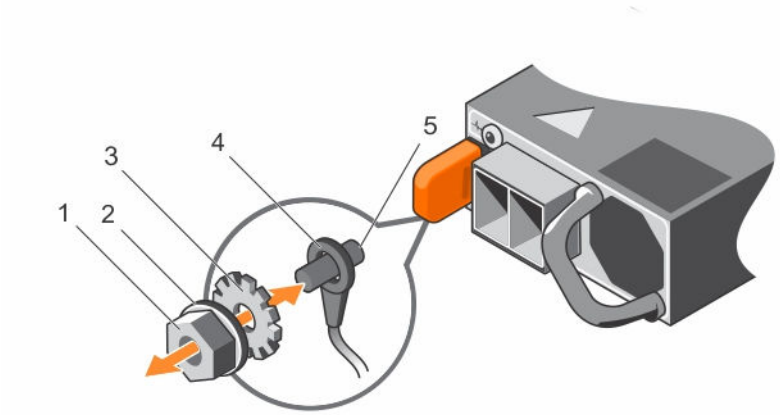


Figure 44. Assembling and connecting the safety ground wire

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.

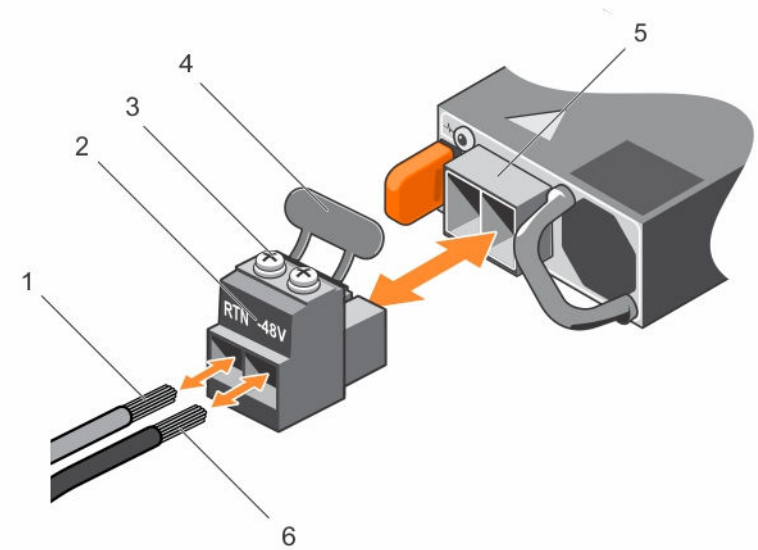


Figure 45. Assembling the DC input power wires

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 system's rack documentation.

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside 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.

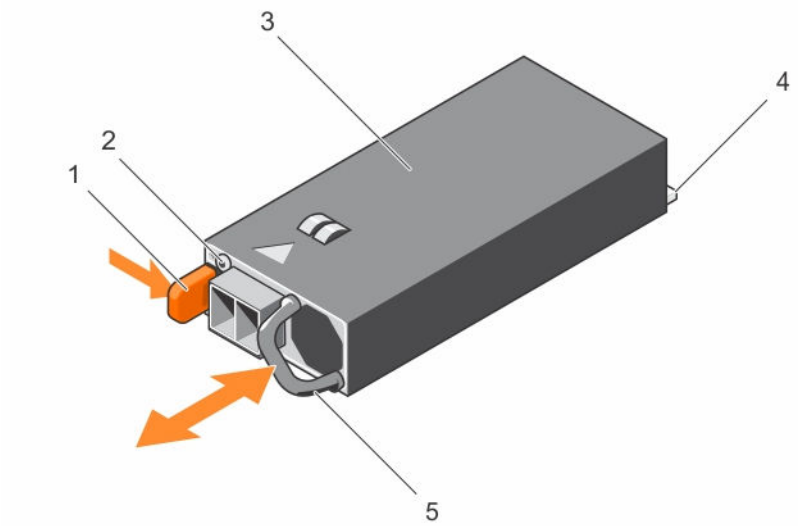


Figure 46. Removing and installing a DC power supply

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

Next steps

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

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.

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. 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 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, relatch it. For information about the cable management arm, see the system's rack documentation.
3. Connect the safety ground wire.
4. Install the DC power connector in the power supply unit.

   CAUTION: When connecting the power wires, secure the wires with the strap to the power supply handle.
5. 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.

Next steps

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

Power interposer board

The power interposer board (PIB) is only supported in systems with redundant power supplies.

Removing the power interposer board

Prerequisites

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

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
4. If applicable, disconnect the power or data cables from expansion card (s).
5. If applicable, remove the expansion card riser
6. Remove the internal hard drive carrier.
7. Remove the internal hard drive cage.

CAUTION: To prevent damage to the power interposer board, you must remove the power supply module(s) or power supply blank from the system before removing the power interposer board or power distribution board.

Steps

1. Remove the power supply module(s) from the back of the chassis.
2. Disconnect the power cables from the hard-drive backplane and the system board.
3. Press the release latch on the PIB to release it from the hooks on the power supply unit cage.
4. Lift the PIB up and out of the chassis.

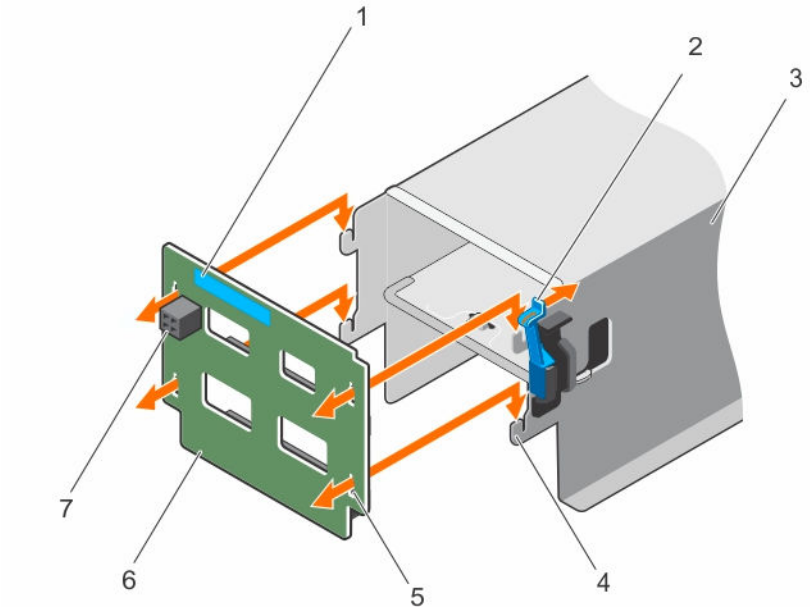


Figure 47. Removing and installing the power interposer board

1. touch point
2. release latch
3. power supply unit cage
4. hooks (4)
5. locking slots (4)
6. power interposer board
7. FAN1 power connector

Next steps

1. Install the replacement power interposer board and connect all the required cables to the system board and the hard drive backplane.
2. Install the internal hard drive cage.
3. Install the internal hard drive carrier.
4. If applicable, install the PCIe expansion card riser.
5. If applicable, connect the required power or data cables to the expansion card(s).
6. Reinstall the cooling shroud.
7. If applicable open the expansion card latch on the cooling shroud to secure the full length expansion card.
8. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the power interposer board
Installing the (optional) dual riser module
Installing the cooling shroud

Installing the power interposer board

Prerequisites

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

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
4. If applicable, disconnect the power or data cables from expansion card (s).
5. If applicable, remove the expansion card riser
6. Remove the internal hard drive carrier.
7. Remove the internal hard drive cage.

Steps

1. Align the locking slots on the power interposer board with the hooks on the power supply cage and slide it into place.
2. Route the power cables as applicable, and connect the power cables to the system board and hard drive backplane.
3. Install the power supply module(s) in their original locations.

Next steps

1. If applicable, install the PCIe expansion card riser.
2. If applicable, connect the required power or data cables to the expansion card(s).
3. Install the internal hard drive cage.
4. Install the internal hard drive carrier.
5. Reinstall the cooling shroud.
6. If applicable open the expansion card latch on the cooling shroud to secure the full length expansion card.
7. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

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.

   NOTE: If applicable, close the expansion card latch on the cooling shroud to release the full length card.
4. If applicable, disconnect the power or data cables from expansion card (s).
5. If applicable, remove the expansion card riser

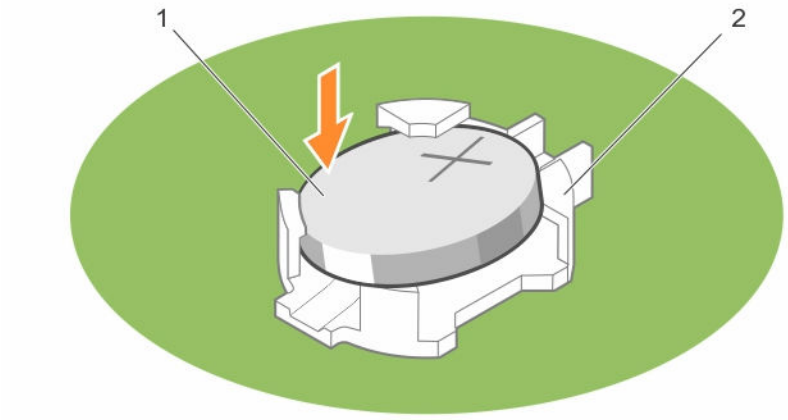
WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. For more information, see the safety information that shipped with your system.

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, 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. To eject the battery, press firmly on the edge of the positive side of the battery in the direction of the arrow as shown in the illustration below.



1. positive side of battery
2. socket

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

Next steps

1. If applicable, install the PCIe expansion card riser.
2. If applicable, connect the required power or data cables to the expansion card(s).
3. Reinstall the cooling shroud.
4. If applicable, open the expansion card latch on the cooling shroud to secure the full length expansion card.
5. Follow the procedure listed in After working inside your system.
6. While booting, press <F2> to enter the System Setup and ensure that the battery is operating properly.
7. Enter the correct time and date in the System Setup **Time** and **Date** fields.
8. Exit the System Setup.

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Installing the (optional) dual riser module
Installing the cooling shroud

Hard drive backplane

Removing the hard drive backplane

Prerequisites

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

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

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

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Remove all hard drives.

Steps

1. Disconnect the left ear control panel and right ear I/O module cables, SAS/SATA data cable(s), and power cables from the hard-drive backplane.

CAUTION: The I/O module is connected to the backplane using a Zero Insertion Force(ZIF) connector. To prevent damage to the I/O cable, you must release the locking tab of the ZIF connector on the hard drive backplane before removing or installing the I/O cable. Do not use excessive force when removing the I/O module cable as it can damage the connectors.

2. Press the hard drive backplane release tabs to disengage the backplane from the chassis.
3. Push the hard drive backplane away from the system until the securing hooks on the system chassis are free from the slots on the hard drive backplane.
4. Lift the backplane partially away from the system and disconnect the control panel cable, USB cable, and backplane signal cable.
5. Lift the backplane away from the system.

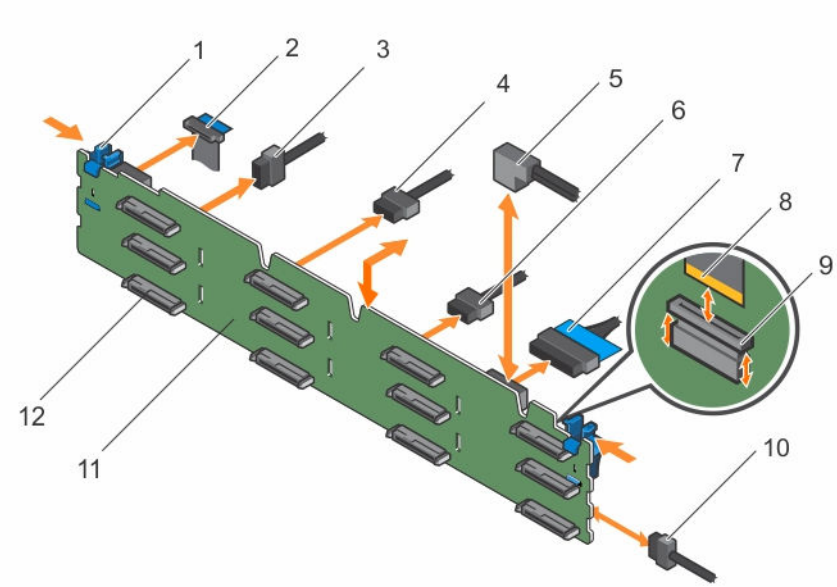


Figure 48. Removing and installing the SAS/SATA backplane

1. release tab (2)
2. left ear control panel flex cable
3. backplane signal cable
4. backplane power cable
5. SAS cable B1/A1
6. USB cable
7. control panel
8. right ear I/O panel flex cable
9. ZIF connector for right ear I/O panel flex cable
10. backplane power cable
11. hard drive backplane
12. hard drive backplane connector (12)

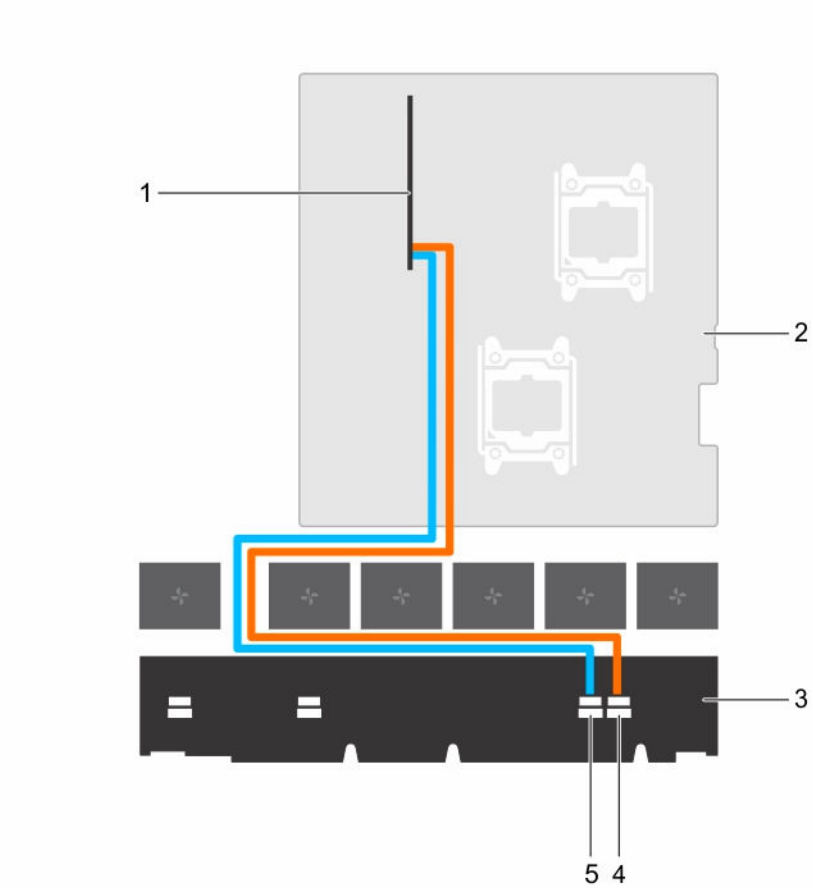


Figure 49. The figure shows cabling between the hard drive backplane and RAID controller card without any riser modules.

1. RAID controller
2. system board
3. backplane
4. SAS A connectors on backplane
5. SAS B connectors on backplane

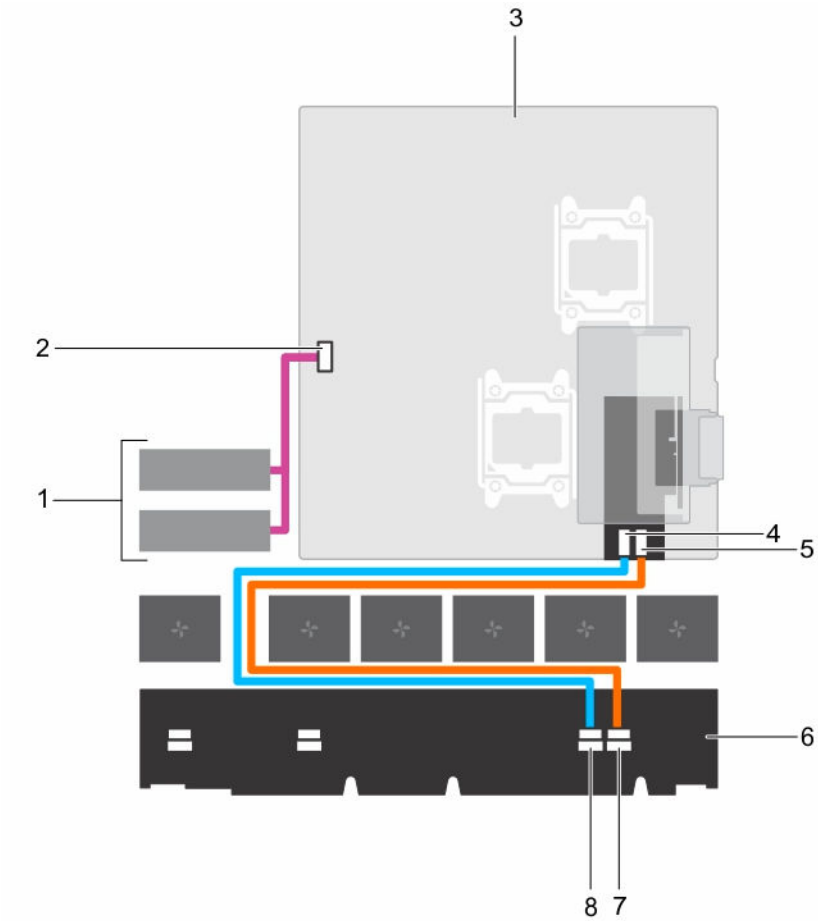


Figure 50. The figure shows cabling between the hard drive backplane and RAID controller on internal PERC riser and internal hard drive connections.

1. internal hard drives (2)
2. internal SATA connector
3. system board
4. SAS A connector on RAID controller
5. SAS B connector on RAID controller
6. backplane
7. SAS A connectors on backplane
8. SAS B connectors on backplane

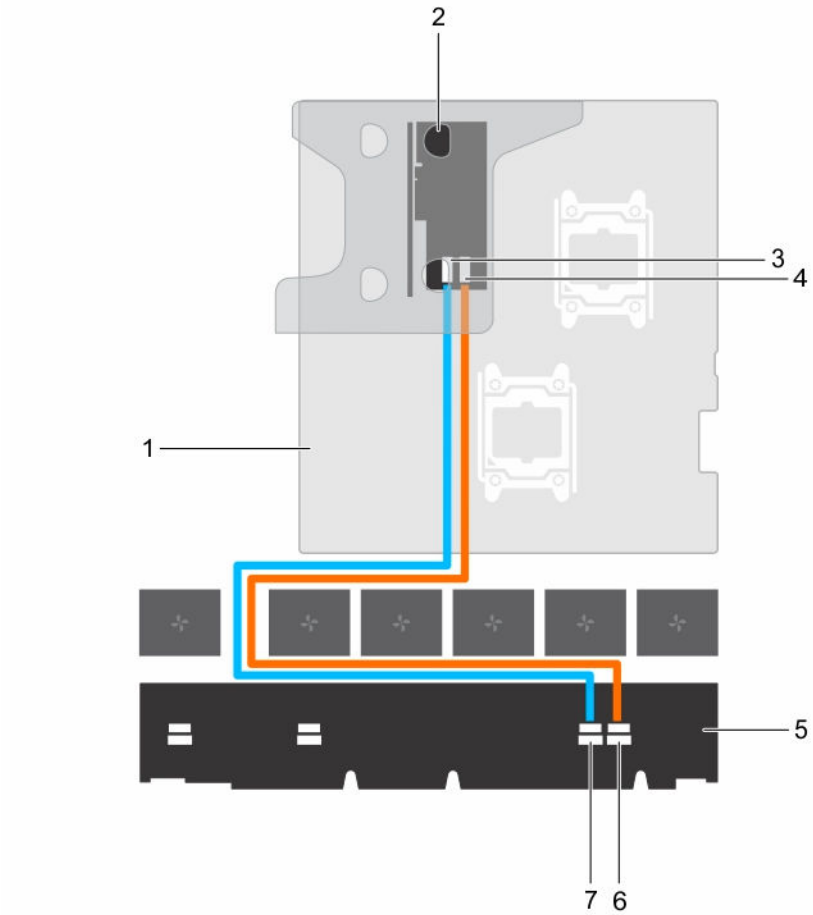


Figure 51. The figure shows cabling between the hard drive backplane RAID controller on dual riser module.

1. system board
2. RAID controller on dual riser module
3. SAS A connector on RAID controller
4. SAS B connector on RAID controller
5. backplane
6. SAS A connectors on backplane
7. SAS B connectors on backplane

Next steps

1. Reconnect the data cable(s) and power cable to the hard drive backplane
2. Install all SAS/SATA/SSD hard drives into their original locations.
3. 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.

3. Disconnect the data, signal and power cables to the backplane.
4. Remove all SAS/SATA/SSD 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.

Steps

1. Use the hooks on the chassis as guides to align the hard drive backplane to the chassis.
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. Install all SAS/SATA/SSD hard drives in their original locations.
2. Reconnect the data, signal and power cables to the backplane.
3. Follow the procedure listed in After working inside your system.

Related Tasks

Removing a hot-swappable hard drive carrier
Installing a hot-swap hard drive

Control panel and I/O module

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 T15 Torx 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.

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

Steps

1. Disconnect the control panel cable from the hard drive backplane by pulling on the plastic pull tab.
2. Remove the screws that secure the control panel to the chassis.
3. Fold the plastic pull tab close to the connector.
4. Pull out the control panel cable as you guide the connector and the plastic pull tab through the channel on the chassis.

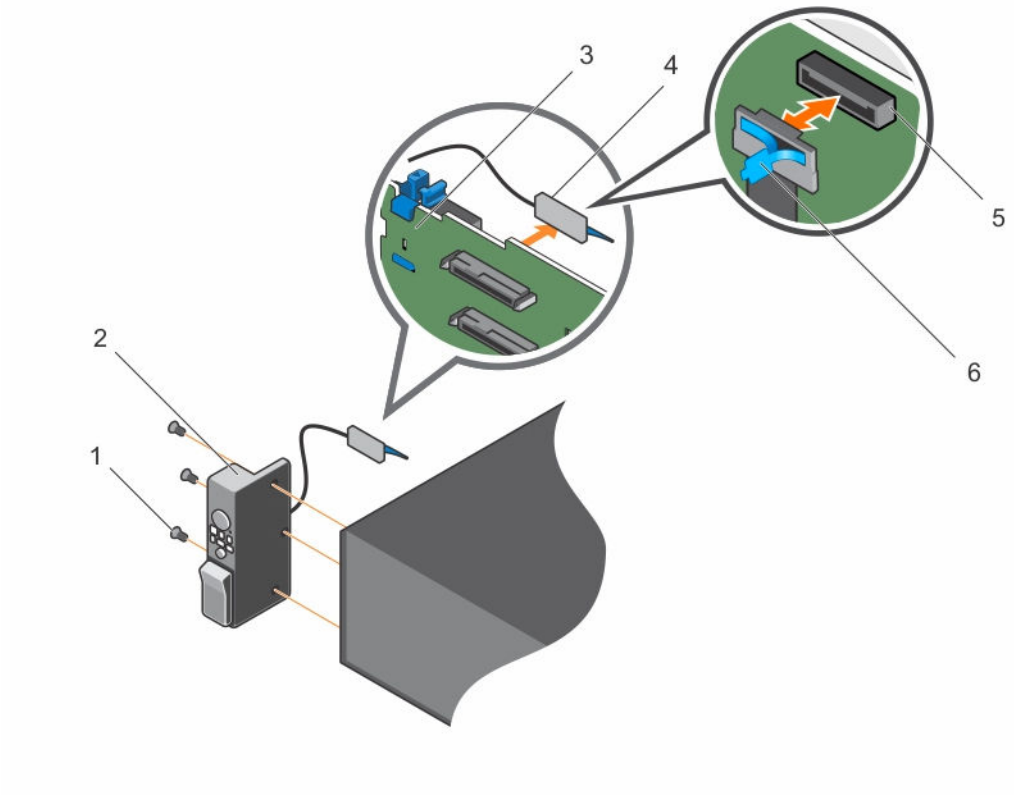


Figure 52. Removing and installing the control panel

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

Next steps

1. Replace the control panel.
2. Follow the procedure listed in After working inside your system.

Related Tasks

Removing the control panel
Installing the control panel

Installing 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 T15 Torx 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. Fold the PPID label around the cable.
2. Fold the pull tab close to the connector and guide the connector and pull tab into the channel.
3. Push the cable until the cable passes completely through the channel.
4. Tighten the screws to secure the control panel to the chassis.

   NOTE: You must route the cable properly to prevent it from being pinched or crimped.
5. Connect the cable connector to the hard drive backplane by pushing on the center of the connector.

Next steps

Follow the procedure listed in After working inside your system.

Removing the I/O panel

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Keep the T15 Torx 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.

CAUTION: The I/O module is connected to the backplane using a Zero Insertion Force(ZIF) connector. To prevent damage to the I/O cable, you must release the locking tab of the ZIF connector on the hard drive backplane before removing or installing the I/O cable. Do not use excessive force when removing the I/O module cable as it can damage the connectors.

Steps

1. Lift the locking tab on the I/O cable connector to release the lock.
2. Disconnect the I/O cable from the backplane.
3. Remove the screws securing the I/O panel to the chassis.
4. Pull out the I/O panel cable through the channel on the chassis.

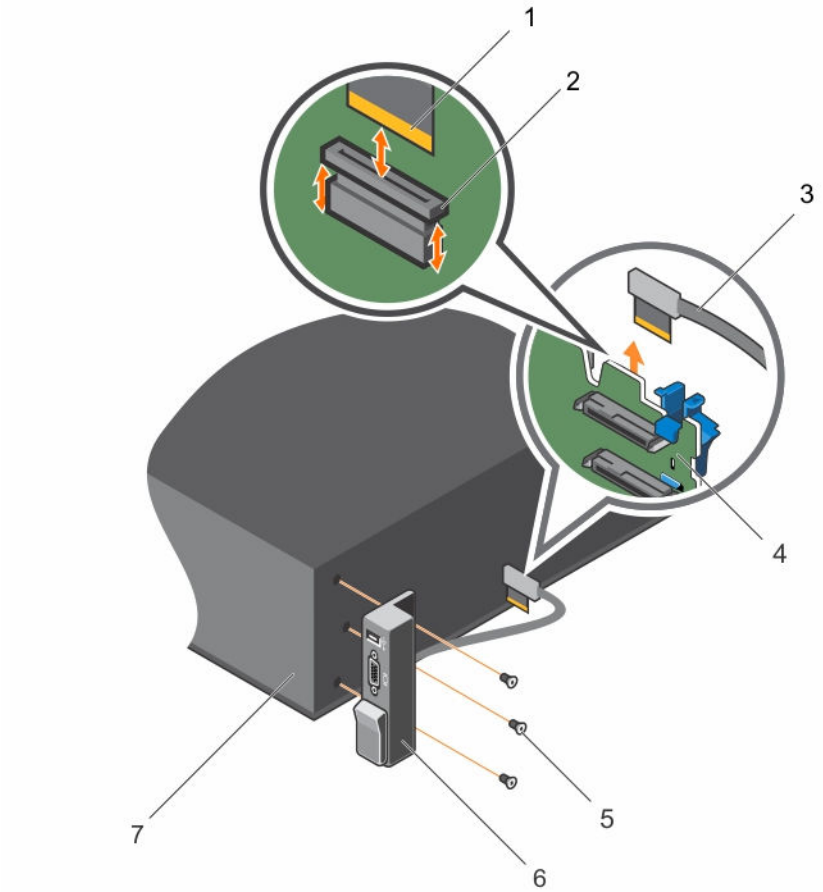


Figure 53. Removing and installing the I/O panel

1. I/O panel cable connector
2. ZIF connector on the hard drive backplane
3. I/O panel cable
4. hard drive backplane
5. screw (3)
6. I/O panel
7. chassis

Next steps

1. Replace the I/O panel. See Removing the I/O panel .
2. Follow the procedure listed in After working inside your system.

Installing the I/O panel

Prerequisites

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Keep the T15 Torx 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. Fold the PPID label around the cable.
2. Push the cable until the cable passes completely through the channel.

   CAUTION: To prevent damage to the I/O cable, you must release the locking tab before removing or installing the I/O cable from the connector on the hard-drive backplane.
3. If locked, rotate the locking tab on the I/O cable connector clockwise 90 degrees to release the lock.
4. Connect the I/O panel cable to the connector on the hard-drive backplane.
5. Rotate the locking tab on the I/O cable connector counter clockwise 90 degrees to secure the lock.
6. Tighten the screws to secure the control panel to the chassis.

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

Next steps

Follow the procedure listed in After working inside your system.

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.

1. Ensure that you read the Safety instructions.
2. Follow the procedure listed in Before working inside your system.
3. Remove / disconnect the following components:

   a. cooling shroud
   b. cooling fans
   c. power supply(s)
   d. expansion card riser (s)
   e. integrated storage controller card
   f. internal dual SD module
   g. internal USB key (if installed)
   h. heat sink(s)/heat-sink blank(s)
   i. 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.

j. memory modules and memory module blanks

4. Keep the #2 Phillips screwdriver ready.

Steps

1. Disconnect the SAS cable from the system board.
2. Disconnect all other data and power 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. Remove the screws securing the system board to the chassis.

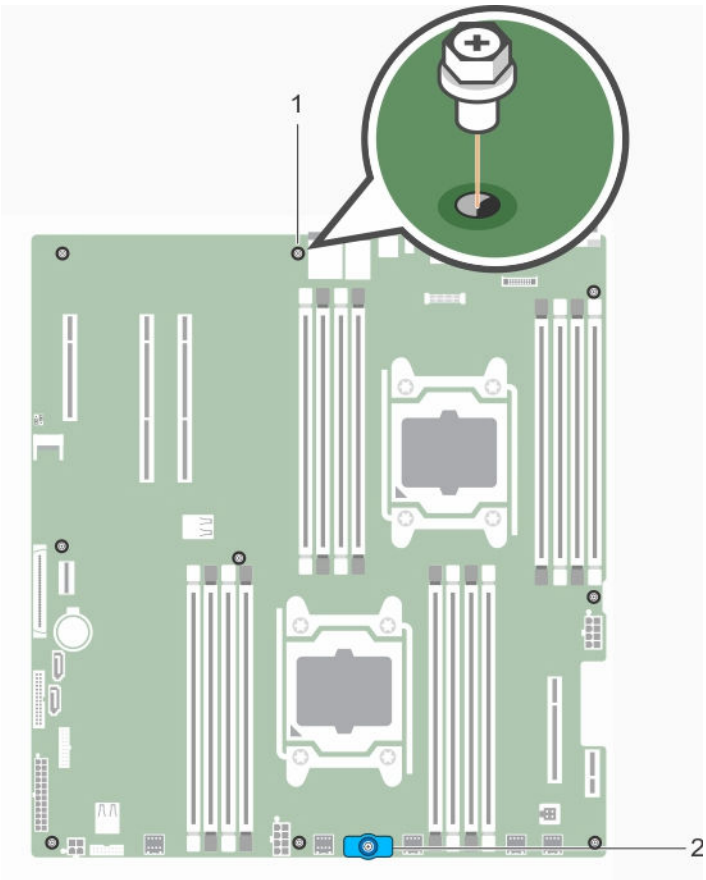


Figure 54. Screw location on the system board

1. system board screw (9)
2. system board holder

4. Hold the system-board holder, lift the system board and slide it toward the front of the chassis.

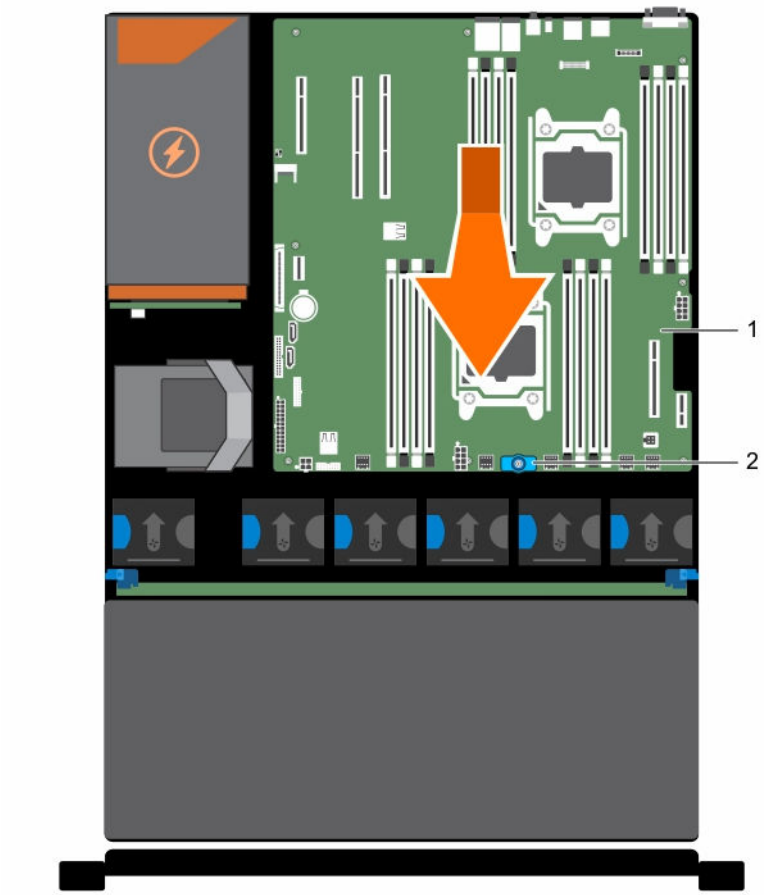


Figure 55. Removing and installing the system board

1. system board
2. system-board holder

Related Tasks

Removing the cooling shroud
Removing the (optional) dual riser module
Removing an AC power supply unit
Removing the internal dual SD module
Replacing the internal USB key
Removing a memory module

Installing the system board

Prerequisites

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

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 ready.

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 / connect the following components:
   a. integrated storage controller card
   b. internal USB key (if installed)
   c. internal dual SD module
   d. the expansion card riser (s)
   e. heat sink(s)/heat-sink blank(s) and processors(s)/processor blank(s)
   f. memory modules and memory module blanks
   g. cooling-fans
   h. cooling shroud
   i. power supply unit(s)
2. Reconnect all cables to the system board.

NOTE: Ensure that the cables inside the system are routed along the chassis wall .

3. Follow the procedure listed in After working inside your system.
4. Ensure that you:
   a. Use the Easy Restore feature to restore the service tag.
   b. If the service tag is not backed up in the backup flash device, enter the system service tag manually.
   c. Import your new or existing iDRAC Enterprise license. For more information, see Integrated Dell Remote Access Controller 8 (iDRAC8) User's Guide, at **dell.com/esmmanuals**.
   d. Update the BIOS and iDRAC versions.

Related Tasks

Replacing the internal USB key
Installing the internal dual SD module
Installing the (optional) dual riser module
Installing memory modules
Installing the cooling shroud
Installing an AC power supply unit
Restoring the Service Tag using the Easy Restore feature
Entering the system Service Tag using System Setup

Restoring the Service Tag using the Easy Restore feature

Use the Easy Restore feature if you do not know the Service Tag of your system. The Easy Restore feature allows 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 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.

Entering the system Service Tag 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 should 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. Once 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 Integrated Dell Remote Access Controller User's Guide, at **dell.com/esmmanuals**.

5

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 hangs. The reverse is also true. 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

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

Troubleshooting the video subsystem

1. Check the system and 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.

If the tests fail, see Getting help.

Troubleshooting a USB device

About this task

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 **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 working keyboard or mouse.

   If the problem is not resolved, proceed to the next step 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.
10. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.

    If your keyboard is not functioning, you can use remote access to enable or disable the USB options.
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 **USB Management Port Mode** is configured as **Automatic** or **Standard OS Use**.
13. Reconnect and power 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/esmanuals**.

Steps

1. Ensure your USB storage device is connect to the front USB Management Port, identified by  icon.
2. Ensure your USB storage device is configured with an NTFS or a FAT32 file system with only one partition.

3. Verify that the USB storage device is configured correctly. For more information on configuring the USB storage device, see the Integrated Dell Remote Access Controller User's Guide at **dell.com/esmanuals**.
4. In the **IDRAC Settings Utility**, ensure the **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
5. Make sure the **iDRAC Managed: USB XML Configuration** option is either **Enabled** or **Enabled only when the server has default credential settings**.
6. Remove and re-insert 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/esmanuals**.

Steps

1. Make sure 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 the **USB Management Port Mode** is configured as **Automatic** or **iDRAC Direct Only**.
3. If the laptop is running the Windows operating system, ensure the iDRAC Virtual USB NIC device driver is installed.
4. If the driver is installed, ensure 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 working cable, and turn on the system and the serial device.
   If the problem is resolved, replace the interface cable with a known good cable.
3. Turn off the system and the serial device, and swap the device with a comparable device.
4. Turn on the system and the serial device.

Next steps

If the problem persists, see Getting help.

Troubleshooting a NIC

Steps

1. Run the appropriate diagnostic test. See Using System Diagnostics for available diagnostic tests.
2. Reboot 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 light, check all cable connections.
   - If the activity indicator does not light, the network driver files might be damaged or missing. Remove and reinstall the drivers if applicable. See the NIC's documentation.
   - If applicable, change the autonegotiation setting.
   - Use another connector on the switch or hub.
4. Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.
5. Enter the System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.
6. Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed and duplex. 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.
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.

Steps

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

   If the date and time are not correct in the System Setup, check the SEL for system battery messages.

Next steps

If the problem persists, see Getting help.

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 kept in the System Setup, the problem may be caused by software rather than by a defective battery.

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 light up when the power button is pressed, press the power button firmly.
2. Plug in another working device 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, memory-module blank, 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 User's Guide at **dell.com/esmmanuals**.

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 your 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 diagnostic test. See Using system diagnostics for available diagnostic tests.

   If diagnostics indicate a fault, follow the corrective actions provided by the diagnostic program.
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 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 the next step.
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 good 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 the 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 different USB key that you know works properly.
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. Perform the rebuild of the SD card as necessary.

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 Lifecycle Controller, and then run the Hardware Configuration wizard to check the RAID configuration.

      See the 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, 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. Open the system.
4. Ensure that each expansion card is firmly seated in its connector.
5. Close the system.
6. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
7. Open the system.
8. Remove all expansion cards installed in the system.
9. Close the system.
10. Run the appropriate diagnostic test. For more information, see Using System Diagnostics .

    If the tests fail, see Getting Help.

11. 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. Open the system.
    c. Reinstall one of the expansion cards.
    d. Close the system.
    e. Run the appropriate diagnostic test. For more information, see Using System Diagnostics .

Next steps

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. Open the system.
4. Ensure that the processor and heat sink are properly installed.
5. Close the system.
6. Run the appropriate diagnostic test. For more information, see Using System Diagnostics.

Next steps

If the problem persists, see Getting Help.

System messages

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

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.

6

Using system diagnostics

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

Dell embedded system diagnostics

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

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

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

When to use the embedded system diagnostics

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

The embedded system diagnostics program is run from the Dell Lifecycle Controller.

Prerequisites

CAUTION: Use the embedded system diagnostics to test only your system. Using this program with other systems may cause invalid results or error messages.

Steps

1. As the system boots, press **<F11>**.
2. Use the up and down arrow keys to select **System Utilities → Launch Dell 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.

For information about Embedded System Diagnostics, see the *ePSA Diagnostics Guide (Notebooks, Desktops and Servers)* at **dell.com/support/home**.

7

Jumpers and connectors

System board jumper settings

For information on resetting the password jumper to disable a password, see Disabling a Forgotten Password.

Table 7. System board jumper settings

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

System board connectors

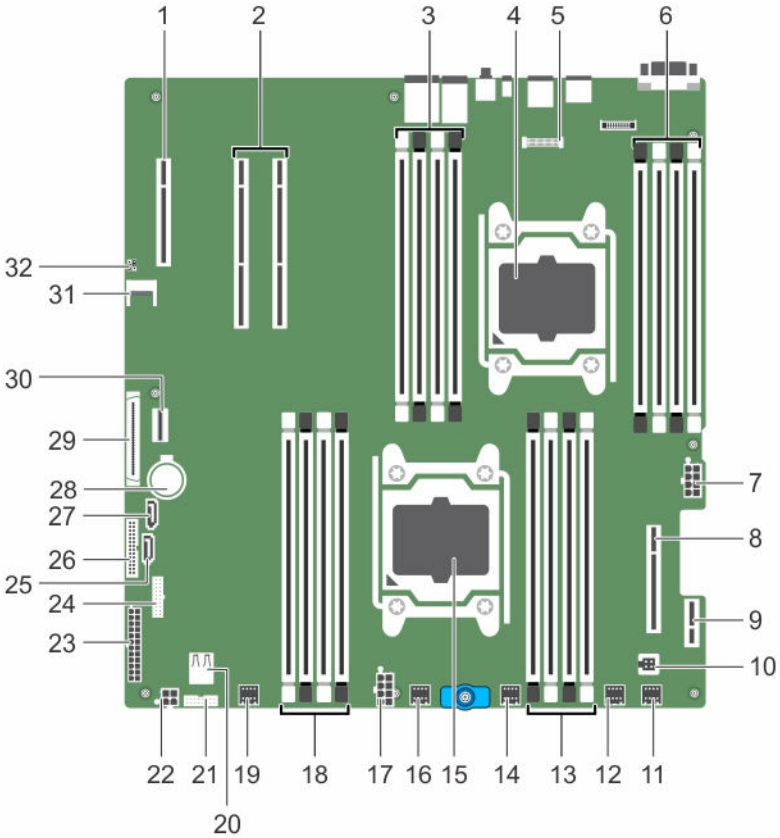


Figure 56. System board connectors and jumpers

Item	Connector	Description
1	PCIE _G2_X4 (PCH)	PCIE Slot 3 (x4)
2	PCIE_G3_X16 (CPU1)	PCIe Slot 2 and PCIe Slot 1 (PCIe Slot is closer to the CPU2 socket)
3	B1,B5,B2,B6	DIMMS for CPU2 channels 0&1
4	CPU2	Processor socket 2
5	J-AMEA	iDrac ports card connector
6	B8,B4,B7,B3	DIMMS for CPU2 channels 2&3
7	CPU2_PWR_C (P3)	CPU2 power connector
8	Int_PCIE_G3_X8 (CPU2)	Internal PCIe slot
9	IDSDM	Internal Dual SD Module
10	INTRUSION	Intrusion switch connector

Item	Connector	Description
11	FAN6	Cooling fan 6 connector
12	FAN5	Cooling fan 5 connector
13	A1,A5,A2,A6	DIMMS for CPU1 channels 0&1
14	FAN4	Cooling fan 4 connector
15	CPU1	Processor socket 1
16	FAN3	Cooling fan 3 connector
17	PWR_CONN B(P2)	CPU1 power connector
18	A8,A4,A7,A3	DIMMS for CPU1 channels 2&3
19	FAN2	Cooling fan 2 connector
20	INT_ USB3.0	Internal USB3 port
21	BP_SIG	Backplane signal connector
22	ODD_PWR	Power for the optical drive
23	SYS_PWR_CONN(P1)	24-pin power connector
24	FP_USB	Front USB connector
25	SATA_CDROM	Optical drive SATA connector
26	PIB_CONN	Power interface board signal connector
27	SATA_TBU	Tape backup unit SATA connector
28	BATTERY	System battery connector
29	CTRL_PNL	Control panel signal connector
30	SW_RAID_A	Internal SATA A connector
31	TPM_MODULE	Trusted Platform Module connector
32	J_PSWD_NVRAM	Clear password / NVRAM jumpers. See System board jumper settings.

Disabling a forgotten password

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

Prerequisites

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

Steps

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

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

   NOTE: If you assign a new system and/or setup password with the jumper on pins 2 and 4, the system disables the new password(s) the next time it boots.
5. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
6. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
7. Remove the system cover.
8. Move the jumper on the system board jumper from pins 2 and 4 to pins 4 and 6.
9. Install the system cover.
10. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
11. Assign a new system and/or setup password.

8

Technical specifications

Processor	
Processor type	One or two Intel Xeon E5 2600 V3 product family processors
Expansion Bus	
Bus type	PCI Express Generation 2 and PCI Express Generation 3 expansion slots with two optional riser cards.
Expansion slots (with optional expansion card risers)	
Dual riser module (uses PCIe slot 1 and PCIe slot 2 on system board)	(Slot 1) One full-height, full-length x16 link (from CPU1) (Slot 2) One half-length, low profile x8 link (from CPU1) NOTE: When a card installed in PCIe Slot2, the PCIe Slot1 will perform at PCIe x8 bandwidth only. The expansion card riser can be used with either two x8 PCIe cards or with one x16 PCIe card on PCIE slot 1. (Slot 3) One half-length, low profile x8 link (from CPU1) (Slot 4) One half-length, low profile x8 link (from CPU1)
Internal PERC riser	(Slot 5) One half-length, low-profile x8 (internal, for PERC only) (from CPU2)
Expansion slots (without expansion card risers)	(Slot 1) One half-length, low-profile x16 (from CPU1) (Slot 2) One half-length, low-profile x16 (from CPU1) (Slot 3) One half-length, low-profile x4 (from PCH)

Memory	
Architecture	1333 MT/s, 1600 MT/s, 1866 MT/s, or 2133 MT/s DDR4 registered, Error Correcting Code (ECC) Spare Rank, Single Device Data Correction (SDDC) DIMMs Support for advanced ECC or memory optimized operation
Memory module sockets	Sixteen 288-pin sockets
Memory module capacities (RDIMM)	4 GB, 8 GB, 16 GB, and 32 GB
Minimum RAM	4 GB with a single processor 8 GB with a dual processor (minimum one memory module per processor)
Maximum RAM	Up to 256 GB with a single processor Up to 512 GB with a dual processor

Power Supply Unit	Capacity
Power rating per power supply unit (hot swap)	1100 W (Platinum) AC (100-240 V, 50/60 Hz, 12 A-6.5 A) 750 W (Platinum) AC (100-240 V, 50/60 Hz, 10 A-5 A) 750 W (Platinum) DC (240 V DC, 4.5 A) NOTE: For China only 495 W (Platinum) AC (100-240 V, 50/60 Hz, 6.5 A-3 A)
Heat dissipation NOTE: Heat dissipation is calculated using the power supply wattage rating.	1908 BTU/hr maximum (495 W power supply) 2891 BTU/hr maximum (750 W power supply) 4100 BTU/hr maximum (1100 W power supply)
Voltage NOTE: This system is also designed to be connected to IT power systems with a phase to phase voltage not exceeding 230 V.	100–240 V AC, autoranging, 50/60 Hz

Storage Controller	
Storage Controller	PERC H330, PERC H730, PERC H730P, and 12Gb SAS HBA

Drives	
Hard drives	Up to twelve 3.5 inch or 2.5 inch(with 3.5 inch drive carrier adapters), hot-swappable SAS, SATA, or Nearline SAS hard drives
SSD	Up to twelve 3.5 inch or 2.5 inch(with hybrid drive carriers), hot-swappable SATA SSDs

Drives	
Internal hard drives	Up to two 2.5 inch, internal cabled SATA **NOTE:** These internal drives are used only for the operating system. They will not be controlled by the RAID controller. These hard drives are controlled by PCH chipset.

Connectors	
Back	
NIC	Two 10/100/1000 LAN ports
Serial	9-pin, DTE, 16550-compatible
USB	Two USB ports, 1 USB 3.0-compliant port and 1 USB2.0–compliant port
Video	15-pin VGA
iDRAC8	One optional vFlash memory card slot and one dedicated 1Gbe Ethernet port with iDRAC8 Enterprise card and up to two optional shared NIC ports. **NOTE:** The card slot is available for use only if the iDRAC8 Enterprise license is installed on your system.
Front	
USB	One 4-pin, USB 2.0-compliant One USB management port
Video	15-pin VGA
Internal	
SATA	One Mini-SAS connectors
USB	One 9-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	Integrated Matrox G200
Video memory	16 MB shared

Physical	
Height	8.68cm(3.41 inch)
Width	48.24 cm (18.99)
Depth	64.6 (25.43 inch) (with Bezel)

Physical	
Maximum configuration weight	27.3Kg / 60.18lb
Empty weight	11.4Kg / 25.13lb

Environmental specifications

NOTE: For additional information about environmental measurements for specific system configurations, see **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.
Fresh air	For information on fresh air, see 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.
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

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

Particulate 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 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.	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. NOTE: Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust NOTE: Applies to data center and non-data center environments.	Air must be free of conductive dust, zinc whiskers, or other conductive particles.
Corrosive dust NOTE: Applies to data center and non-data center environments.	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity.

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

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.

Expanded operating temperature	
	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). • Processors between 65 W to 120 W including 105 W (E5-2660;E5-2650), 90 W (E5-2640), 85 W (E5-2630, E5-2620, E5-2609, E5-2603) are all supported. • Processors below 65 W(E5-2630v3, E5-2650v3) and the 120 W processor are not supported. • Internal 2.5 inch hard drives are not supported. • Redundant power supplies are required. • Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.

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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 support, 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.

Quick Resource Locator (QRL)

Use the Quick Resource Locator (QRL) to get immediate access to system information and how-to videos. This can be done by visiting **www.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.


Quick Resource Locator
www.dell.com/QRL/Server/PER530xd