Dell DSS 1500
Owner's Manual

Regulatory Model: E28S Series
Regulatory Type: E28S002

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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Contents

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Dell DSS 1500 system overview

The DSS 1500 is available in the following configurations:

- Two processors based on the Intel Xeon EP E5-2600 v3 or v4 family
- 16 DIMMs supporting up to 512 GB RAM
- One 450 W non-redundant or two 550 W redundant AC Power Supply Units (PSU)

Table 1. Supported hard drive configurations on DSS 1500 systems

System	Configuration
Four hard drive systems	Up to four 3.5-inch, cabled hard drives with nonredundant PSU.
	Up to four 3.5-inch, hot swappable hard drives with redundant PSU.
	Up to four 2.5-inch, hot swappable hard drives/SSDs with redundant PSU.
Eight hard drive systems	Up to eight 2.5-inch, hot swappable hard drives/SSDs with redundant PSU.

Supported configurations on Dell DSS 1500 systems

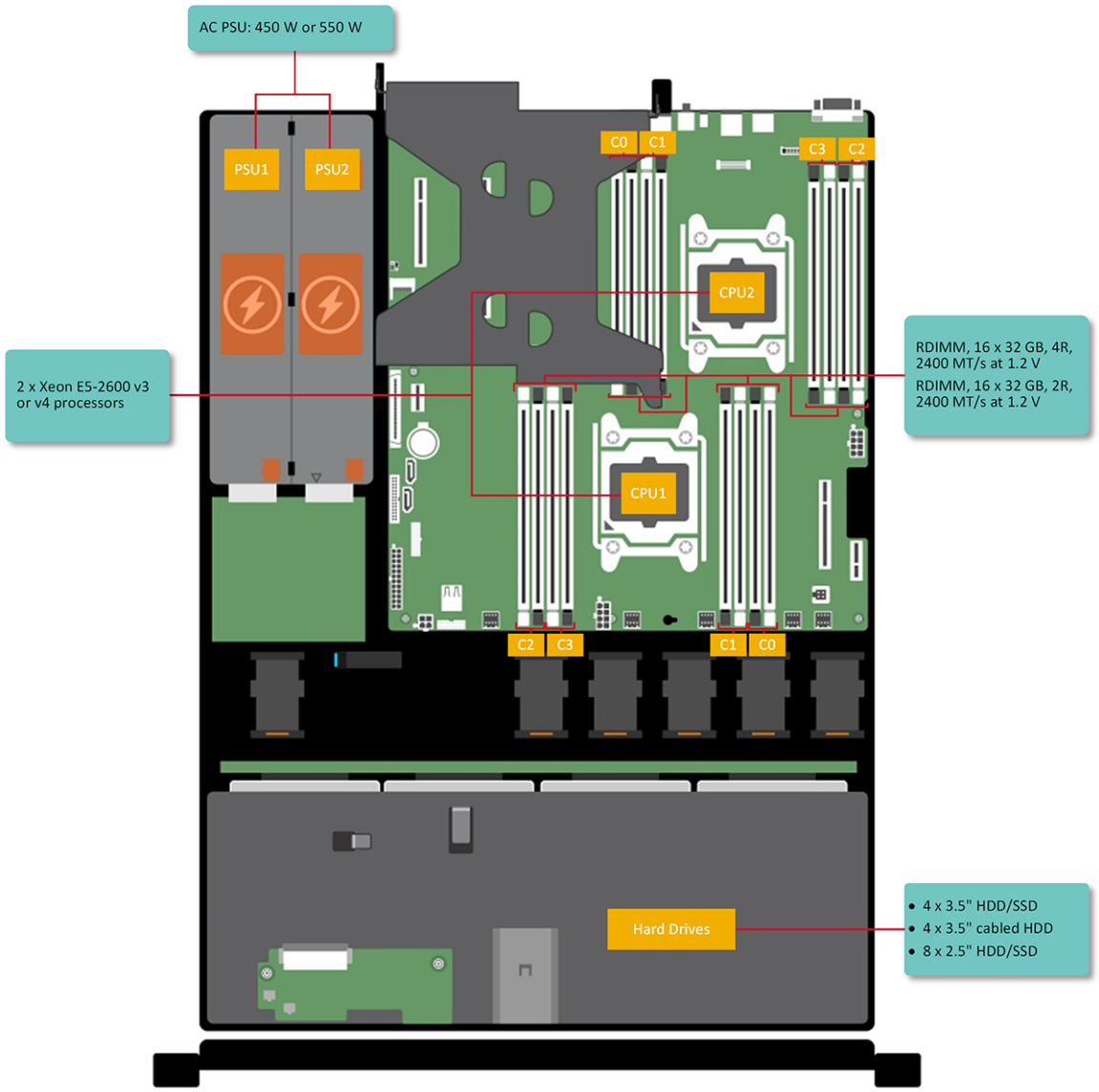

Figure 1. System view with supported configurations

Front panel features

The front panel provides access to the features available on the front of the server, such as the power button, NMI button, system identification tag, system identification button, and USB and VGA ports. The hot swappable hard drives are accessible from the front panel.

Front panel features of a 4 x 3.5-inch hot swappable hard drive chassis

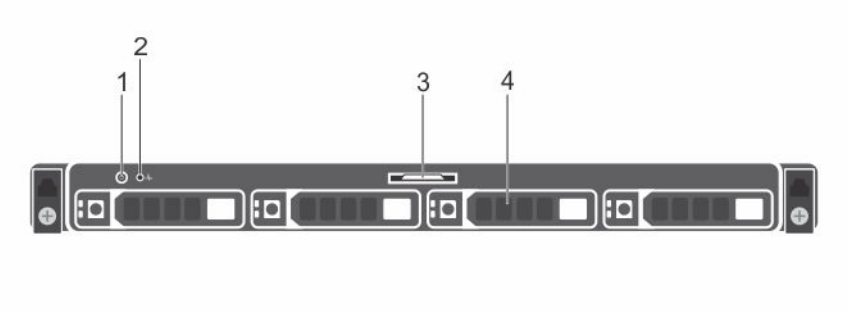

Figure 2. Front panel features of a 4 x 3.5-inch hot swappable hard drive chassis

1. power button
2. Diagnostic indicator
3. Information tag
4. Hard drive

Table 2. Front panel features of a 4 x 3.5-inch hot swappable hard drive chassis

Indicator, Button, or Connector	Icon	Description
power button		Press the power button to turn the system on or off. The indicator on the button indicates if the system is on or off. **NOTE:** To gracefully shut down an ACPI-compliant operating system, press the power button.
Diagnostic indicator		The diagnostic indicator lights up to display error status. For more information, see the Diagnostic indicators section.
Information tag		Displays system information such as service tag, NIC, and MAC address. **NOTE:** The information tag is a slide-out label panel.
Hard drives		Up to four 3.5-inch hot-swappable hard drives/SSDs. For information about the supported hard drives, see the Technical specifications section.

Related Links

Technical specifications
Diagnostic Indicators

Front panel features of a 8 x 2.5-inch hot swappable hard drive chassis

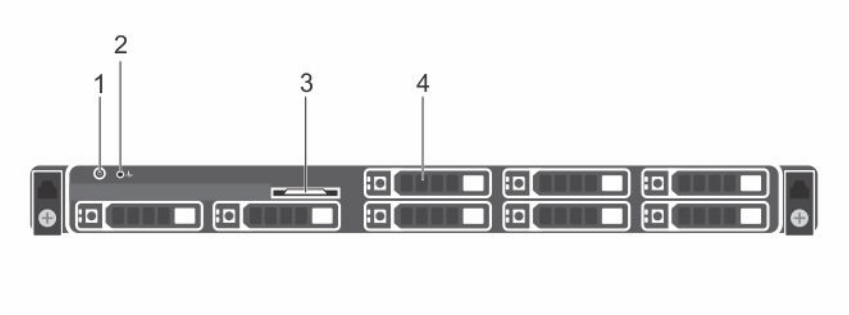

Figure 3. Front panel features of a 8 x 2.5-inch hot swappable hard drive chassis

1. power button
2. Diagnostic indicator
3. Information tag
4. Hard drive

Table 3. Front panel features of a 8 x 2.5-inch hot swappable hard drive chassis

Indicator, Button, or Connector	Icon	Description
power button	⏻	Press the power button to turn the system on or off. The indicator on the button indicates if the system is on or off. **NOTE:** To gracefully shut down an ACPI-compliant operating system, press the power button.
Diagnostic indicator		The diagnostic indicator lights up to display error status. For more information, see the Diagnostic indicators section.
Information tag		Displays system information such as service tag, NIC, and MAC address. **NOTE:** The information tag is a slide-out label panel.
Hard drives		Up to eight 2.5-inch hot swappable hard drives/SSDs. For information about the supported hard drives, see the Technical specifications section.

Related Links

Technical specifications
Diagnostic Indicators

Front panel features of a 4 x 3.5-inch cabled hard drive chassis

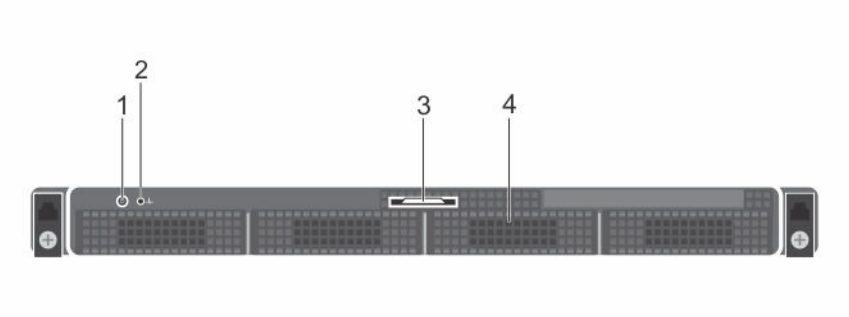

Figure 4. Front panel features of a 4 x 3.5-inch cabled hard drive chassis

1. power button
2. Diagnostic indicator
3. Information tag
4. Hard drive

Table 4. Front panel features of a 4 x 3.5-inch cabled hard drive chassis

Item	Indicator, Button, or Connector	Icon	Description
1	power button		Press the power button to turn the system on or off. The indicator on the button indicates if the system is on or off. **NOTE:** To gracefully shut down an ACPI-compliant operating system, press the power button.
2	Diagnostic indicators		The diagnostic indicator lights up to display error status. For more information, see the Diagnostic indicators section.
3	Information tag		Displays system information such as service tag, NIC, and MAC address. **NOTE:** The information tag is a slide-out label panel.
4	Hard drives		Up to four 3.5-inch cabled hard drives. For information about the supported hard drives, see the Technical specifications section.

Related Links

Technical specifications
Diagnostic Indicators

Back panel features

The back panel provides access to the features available on the back of the server, such as the system identification button, power supply sockets, cable management arm connectors, NIC ports, and USB and VGA ports. A majority of the expansion card ports can be accessed from the back panel. The hot swappable and cabled power supply units are accessible from the back panel.

Back panel features

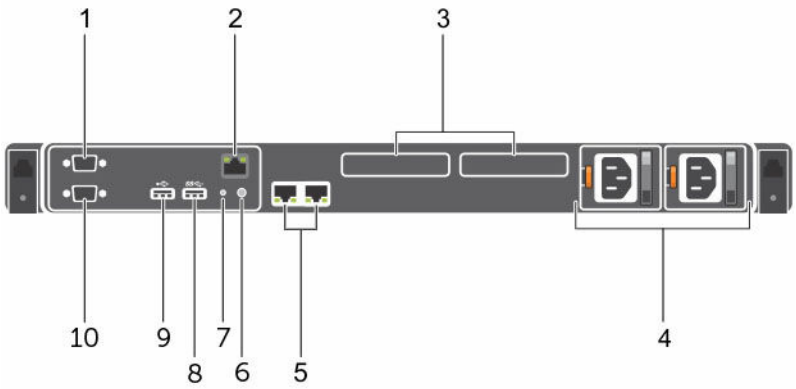

Figure 5. Back panel features

1. Serial connector
2. BMC port (optional)
3. PCIe expansion card slot (2)
4. Power supply unit (PSU1 and PSU2)
5. Ethernet port (2)
6. System identification button
7. System identification port
8. USB 3.0 port
9. USB 2.0 port
10. Video/VGA port

Table 5. Back panel features

Item	Indicator, Button, or Connector	Icon	Description
1	Serial connector		Use the serial port to connect a serial device to the system. For more information about the supported serial port, see the Technical specifications section.
2	BMC port (optional)		Dedicated management port on the BMC port card.
3	PCIe expansion card slot (2)		Allows you to connect a PCI Express expansion card.
4	Power supply unit (PSU1 and PSU2)		**Redundant power supply**: Up to two 550 W redundant AC PSUs. **Non-redundant power supply**: One 450 W non-redundant AC PSU. **NOTE:** Non-redundant PSU is supported in systems with cabled hard drives.

Item	Indicator, Button, or Connector	Icon	Description
			NOTE: For non-redundant PSUs, there is only one power supply socket.
5	Ethernet port (2)		Use the Ethernet port to connect Local Area Networks (LANs) to the system. For more information about the supported Ethernet ports, see the Technical specifications section.
6	System identification button		Press the system ID button: • To locate a particular system within a rack. • To turn the system ID on or off. NOTE: To reset the BMC (if not disabled in System Setup), press and hold the button for more than 15 seconds. NOTE: If the system stops responding during POST, press and hold the system ID button (for more than five seconds) to enter the BIOS progress mode.
7	System identification port		Use the system identification port to connect the system status indicator assembly through the optional cable management arm.
8	USB 3.0 port		Use the USB 3.0 port to connect USB devices to the system. These ports are 9-pin, USB 3.0 compliant.
9	USB 2.0 port		Use the USB 2.0 port to connect USB devices to the system. These ports are 4-pin, USB 2.0 compliant.
10	Video/VGA port		Use the video/VGA port to connect a display to the system. For more information about the supported video/VGA port, see the Technical specifications section.

Related Links

Technical specifications
Diagnostic Indicators

Diagnostic Indicators

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

Diagnostic indicators on the front panel

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

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

Table 6. Diagnostic indicators

Icon	Description	Condition	Corrective action
	Health indicator	The indicator turns solid blue if the system is in good health.	None required.
		The indicator blinks amber: • When the system is turned on. • When the system is in standby. • If any error condition exists. For example, a failed fan, power supply unit (PSU), or a hard drive.	Check the System Event Log or system messages for the specific issue. For more information about error messages, see the Dell Event and Error Messages Reference Guide at **Dell.com/openmanagemanuals > OpenManage software**. The POST process is interrupted without any video output due to invalid memory configurations. See the Getting help section.

Related Links

Getting help

Hot swappable hard drive indicator codes

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

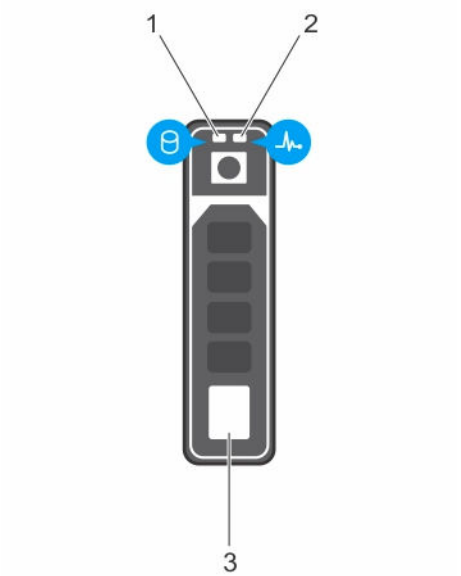

Figure 6. Hot swappable hard drive indicators

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.

Table 7. Hot swappable hard drive indicators

Drive-status indicator pattern (RAID only)	Condition
Flashes green two times per second	Identifying drive or preparing for removal.
OFF	Drive ready for insertion or removal. **NOTE:** The drive status indicator remains OFF until all hard drives are initialized after the system is turned on. Drives are not ready for insertion or removal during this time.
Flashes green, amber, and turns off	Predicted drive failure
Flashes amber four times per second	Drive failed
Flashes green slowly	Drive rebuilding
Turns green	Drive online
Flashes green three seconds, amber three seconds, and turns off six seconds	Rebuild stopped

NIC indicator codes

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

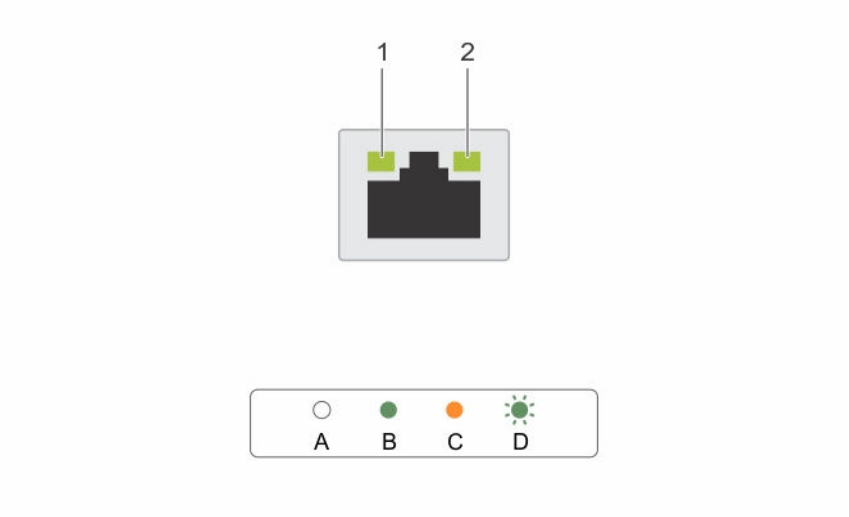

Figure 7. NIC indicators

1. link indicator
2. activity indicator

Table 8. NIC indicators

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

Redundant power supply unit indicator codes

Each AC power supply unit (PSU) has an illuminated translucent handle that indicates whether power is present or whether a power fault has occurred.

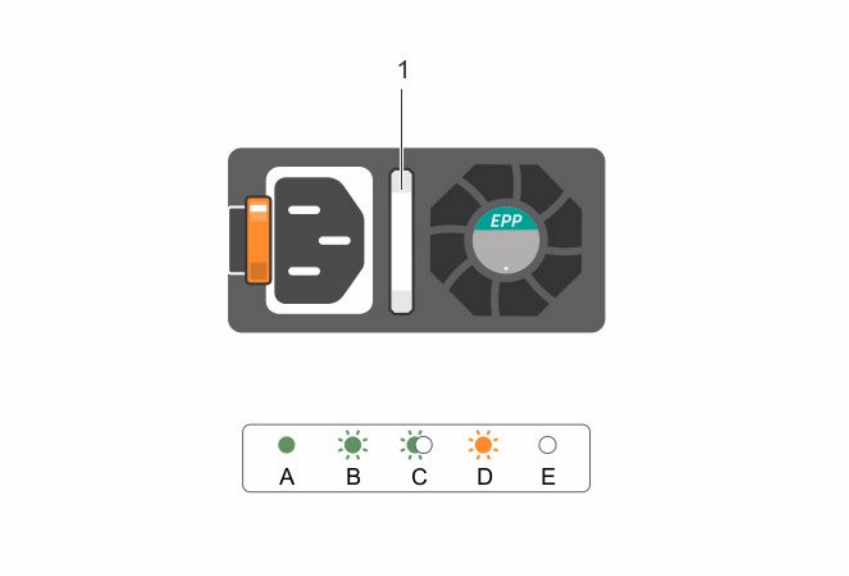

Figure 8. AC PSU status indicator

1. AC PSU status indicator/handle

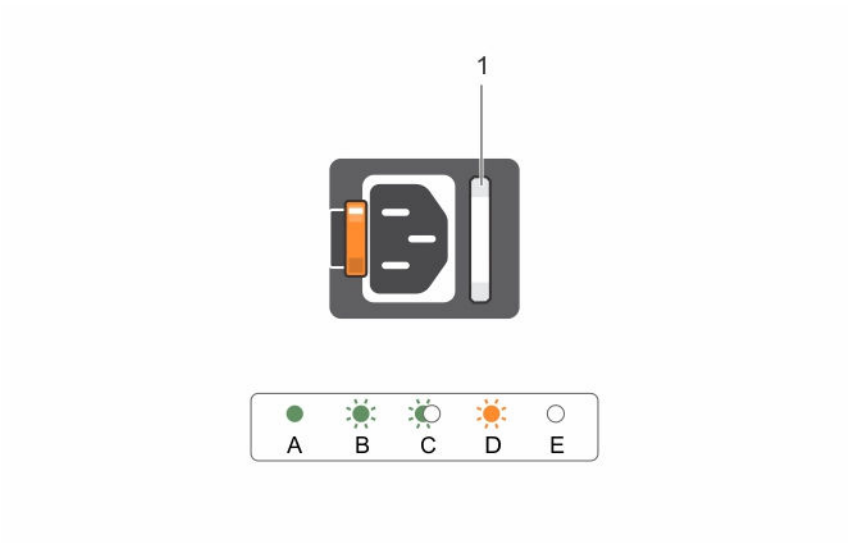

Figure 9. AC PSU status indicator

1. AC PSU status indicator/handle

Table 9. AC PSU status indicator

Convention	Power Indicator Pattern	Description
A	Green	A valid power source is connected to the PSU and the PSU is operational.
B	Flashing green	When the firmware of the PSU is being updated, the PSU handle flashes green. **CAUTION: Do not disconnect the power cord or unplug the PSU when updating firmware. If firmware update is interrupted, the PSUs will not function.**
C	Flashes green and turns off	When hot-adding a PSU, the PSU handle flashes green five times at 4 Hz rate and turns off. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. **CAUTION: For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back.** **NOTE:** Ensure that both the PSUs are of the same capacity. **NOTE:** Mixing PSUs from previous generations of Dell servers can result in a PSU mismatch condition or failure to turn the system on.
D	Flashing amber	Indicates a problem with the PSU.

Convention	Power Indicator Pattern	Description
		CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the other PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must turn off the system. **CAUTION: AC PSUs support both 220 V and 110 V input voltages with the exception of Titanium PSUs, which support only 220 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.** **CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.**
E	Not lit	Power is not connected.

Non-redundant power supply unit indicator codes

Press the self-diagnostic button to perform a quick health check on the non-redundant power supply unit (PSU) of the system.

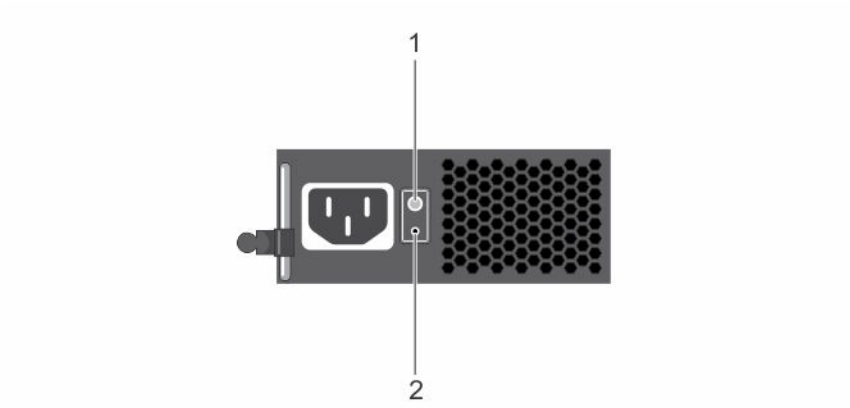

Figure 10. Non-redundant AC PSU status indicator and self-diagnostic button

1. self-diagnostic button
2. AC PSU status indicator

Table 10. Non-redundant AC PSU status indicator

Power Indicator Pattern	Condition
Not lit	Power is not connected or PSU is faulty.
Green	A valid power source is connected to the PSU and the PSU is operational.

Locating Service Tag of your system

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code and Service Tag are found on the front of the system by pulling out the information tag. Alternatively, the information may be on a sticker on the chassis of the system. This information is used by Dell to route support calls to the appropriate personnel.

2

Documentation resources

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

Table 11. Documentation resources for system

Task	Document	Location
Setting up your system	For information about installing the system into a rack, see the Rack documentation included with your rack solution.	Dell.com/dssmanuals
	For information about turning on the system and the technical specifications of your system, see the *Getting Started With Your System* that shipped with your system.	Dell.com/dssmanuals
Configuring your system	For information about BMC features, configuring and logging in to BMC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide.	Dell.com/idracmanuals
	For information about installing the operating system, see the operating system documentation.	Dell.com/operatingsystemmanuals
	For understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM Command Line Reference Guide for iDRAC.	Dell.com/idracmanuals
	For information about updating drivers and firmware, see the Methods to download firmware and drivers section in this document.	Dell.com/support/drivers
Working with Dell PowerEdge RAID controllers	For understanding the features of the Dell PowerEdge RAID controllers (PERC) and deploying the PERC cards, see the Storage controller documentation.	Dell.com/storagecontrollermanuals
Understanding event and error messages	For information about checking the event and error messages generated by the system firmware and agents that monitor system components, see the	Dell.com/openmanagemanuals > OpenManage software

Task	Document	Location
	Dell Event and Error Messages Reference Guide.	
BMC FAQs	For frequently asked questions about BMC, see the Dell BMC FAQ guide.	Dell.com/dssmanuals

3

Technical specifications

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

Chassis dimensions

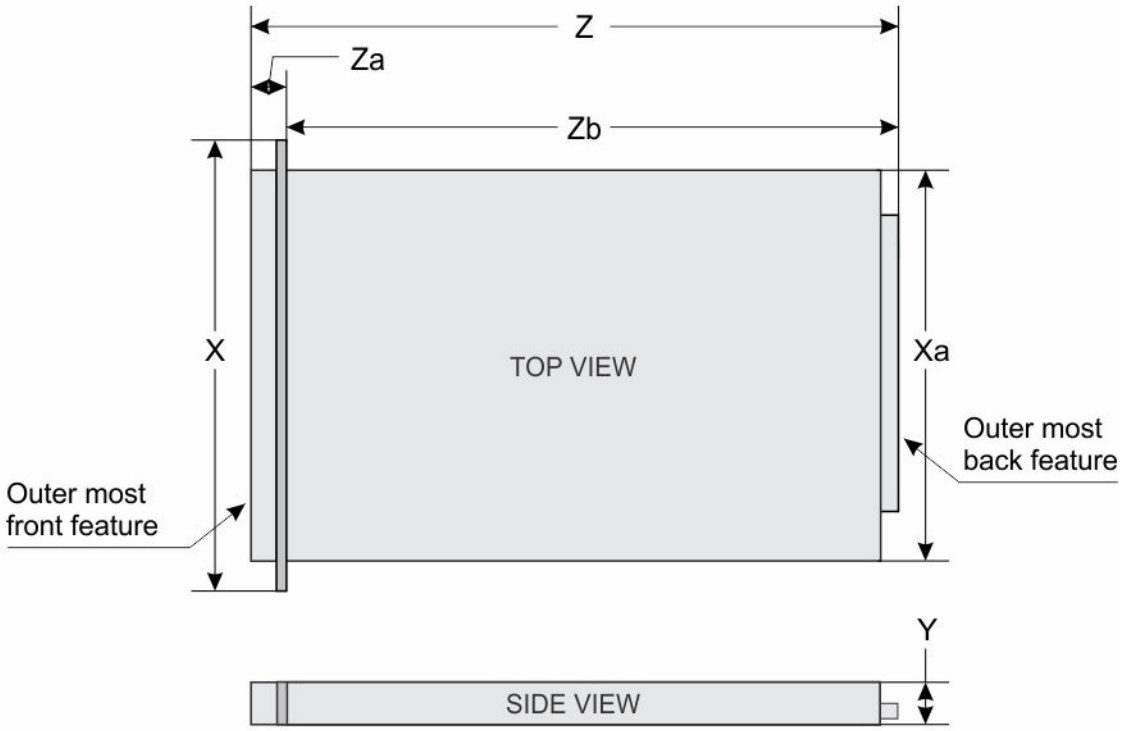

Figure 11. Chassis dimensions of Dell DSS 1500 system

Table 12. Dimensions of Dell DSS 1500 system

System	X	Xa	Y	Z	Za	Zb
Dell DSS 1500	482.4 mm (18.99 inches)	434.0 mm (17.09 inches)	42.8 mm (1.69 inches)	660.4 mm (26 inches)	18 mm (0.71 inch)	642.4 mm (25.29 inches)

Chassis weight

Table 13. Chassis weight

System	Maximum weight
Four hard drive systems	19.3 kg (42.6 lb)
Eight hard drive systems	19.9 kg (43.7 lb)

Processor specifications

The DSS 1500 system supports two Intel Xeon E5-2600 v3 or v4 product family processors.

Expansion bus specifications

The DSS 1500 system supports PCI express (PCIe) generation 1, 2 and 3 expansion cards. The following table provides riser configurations:

Table 14. Expansion card riser specifications

Expansion card riser	PCIe slot on the riser	Height	Length	Link
PCIE_G3_X8	Slot 1	Half Height	Half Length	x8
	Slot 2	Half Height	Half Length	x8

Memory specifications

The DSS 1500 system supports DDR4 registered, Error Correcting Code (ECC) Spare Rank, Single Device Data Correction (SDDC) DIMMs at 1333 MT/s, 1600 MT/s, 1866 MT/s, 2133 MT/s, or 2400 MT/s.

Table 15. Memory specifications

Memory module sockets	Memory capacity	Minimum RAM	Maximum RAM
Sixteen 288-pins	8 GB, 16 GB, or 32 GB single or dual rank (RDIMMs)	16 GB with single processor (minimum one memory module per processor)	up to 512 GB with a dual processor

Power specifications

The DSS 1500 system supports up to two AC power supply units (PSUs).

Table 16. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
450 W AC	Platinum	1871 BTU/hr	50/60 Hz	100–240 V AC, autoranging	6.5 A-3.5 A
550 W AC	Platinum	2107 BTU/hr	50/60 Hz	100–240 V AC, autoranging	7.4 A-3.7 A

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

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

Storage controller specifications

The DSS 1500 system supports PERC H330, PERC H730, and PERC H730P storage controllers.

Hard drive specifications

- Up to four 3.5-inch cabled hard drives
- Up to four 3.5-inch hot swappable SAS, SATA, SATA SSD, or Nearline SAS hard drives
- Up to eight 2.5-inch, hot swappable SAS, SATA, SATA SSD, or Nearline SAS hard drives

Ports and connectors specifications

USB ports

The DSS 1500 system supports USB 2.0, USB 3.0-compliant ports.

Table 17. USB specifications

System	Back panel	Internal
DSS 1500	• One 9-pin, USB 3.0-compliant port • One 4-pin, USB 2.0-compliant port	One 9-pin, USB 3.0-compliant port

NIC ports

The DSS 1500 system supports two 10/100/1000 Mbps Network Interface Controller (NIC) ports on the back panel.

Serial connector

The serial connector connects a serial device to the system. The DSS 1500 system supports one serial connector on the back panel, which is a 9-pin connector, Data Terminal Equipment (DTE), 16550-compliant.

VGA port

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The DSS 1500 system supports one 15-pin VGA ports on the back panel.

Remote management

The DSS 1500 system supports one dedicated 1Gbe Ethernet port with optional card and up to two optional shared NIC ports.

Video specifications

The DSS 1500 system supports Integrated Matrox G200 with iDRAC8 and 16 MB application memory.

Table 18. Supported video resolution options

Resolution	Refresh Rate (Hz)	Color Depth (bit)
640 x 480	60, 70	8, 16, 32
800 x 600	60, 75, 85	8, 16, 32
1024 x 768	60, 75, 85	8, 16, 32
1152 X 864	60, 75, 85	8, 16, 32
1280 x 1024	60, 75	8, 16, 32
1440 x 900	60	8, 16, 32

Environmental specifications

NOTE: For additional information about environmental measurements for specific system configurations, see **Dell.com/environmental_datasheets**.

Table 19. Temperature specifications

Temperature	Specifications
Storage	–40°C to 65°C (–40°F to 149°F)
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.
Maximum temperature gradient (operating and storage)	20°C/h (36°F/h)

Table 20. Relative humidity specifications

Relative humidity	Specifications
Storage	5% to 95% RH with 33°C (91°F) maximum dew point. Atmosphere must be non-condensing at all times.
Operating	10% to 80% relative humidity with 29°C (84.2°F) maximum dew point.

Table 21. Maximum vibration specifications

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

Table 22. Maximum shock specifications

Maximum shock	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axes of 40 G for up to 2.3 ms.
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms.

Table 23. Maximum altitude specifications

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

Table 24. Operating temperature de-rating specifications

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

Particulate and gaseous contamination specifications

The following table defines the limitations that help avoid any equipment damage or failure from particulates and gaseous contamination. If the levels of particulates or gaseous pollution exceed the

specified limitations and result in equipment damage or failure, you may need to rectify the environmental conditions. Re-mediation of environmental conditions is the responsibility of the customer.

Table 25. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. **NOTE:** This condition applies only to data center environments. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles. **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. **NOTE:** This condition applies to data center and non-data center environments.

Table 26. Gaseous contamination specifications

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

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

4

Initial system setup and configuration

Setting up your system

Complete the following steps to set up your system:

1. Unpack the system.
2. Install the system into the rack. For more information about installing the system into the rack, see your system *Rack Installation Placemat* at **Dell.com/dssmanuals**.
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.
6. Turn on the attached peripherals.

Options to set up BMC IP address

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

Interfaces	Document/Section
iDRAC Settings utility	See *Dell Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**
Dell Deployment Toolkit	See *Dell Deployment Toolkit User's Guide* at **Dell.com/openmanagemanuals**
Remote Access Controller Admin (RACADM)	See *RACADM Command Line Interface Reference Guide* and *Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**
Remote Services that include Web Services Management (WS-Man)	See *Dell Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**

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

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

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

Log in to BMC

You can log in to BMC as:

- BMC local user
- Microsoft Active Directory user
- Lightweight Directory Access Protocol (LDAP) user

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

NOTE: You must have BMC local credentials to log in to BMC local.

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

You can also access iDRAC by using RACADM. For more information, see the *RACADM Command Line Interface Reference Guide* and the *Integrated Dell Remote Access Controller User's Guide* available at **Dell.com/idracmanuals**.

Options to install the operating system

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

Table 27. Resources to install the operating system

Resources	Location
Dell Systems Management Tools and Documentation media	Dell.com/operatingsystemmanuals
Dell certified VMware ESXi	Dell.com/virtualizationsolutions
Supported operating systems on Dell DSS systems	Dell.com/ossupport

Methods to download firmware and drivers

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

Table 28. Firmware and drivers

Methods	Location
From the Dell Support site	Dell.com/support/home
Using BMC	Dell.com/idracmanuals

Downloading the drivers and firmware

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

Prerequisites

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

Steps

1. Go to **Dell.com/support/drivers**.
2. Under the **Drivers & Downloads** section, type the Service Tag of your system in the **Service Tag or Express Service Code** box.

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

   The drivers that are applicable to your selection are displayed.
4. Download the drivers you need to a USB drive, CD, or DVD.

5

Pre-operating system management applications

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

Options to manage the pre-operating system applications

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

- System Setup
- Boot Manager
- Preboot Execution Environment (PXE)

Related Links

System Setup
Boot Manager
PXE boot

System Setup

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

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

You can access system setup by using two methods:

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

Related Links

System Setup details
Viewing System Setup

Viewing System Setup

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

- System Setup
- System Setup details
- System BIOS
- iDRAC Settings utility
- Device Settings

System Setup details

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

Option	Description
System BIOS	Enables you to configure BIOS settings.
iDRAC Settings	Enables you to configure BMC settings. The iDRAC settings utility is an interface to set up and configure the BMC parameters by using UEFI. You can enable or disable various BMC parameters by using the iDRAC settings utility. For more information about this utility, see *Integrated Dell Remote Access Controller 8 User's Guide* at **Dell.com/idracmanuals**.
Device Settings	Enables you to configure device settings.

Related Links

- System Setup
- iDRAC Settings utility
- Device Settings
- Viewing System Setup

System BIOS

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

Related Links

System BIOS Settings details
Boot Settings
Network Settings
System Information
Memory Settings
Processor Settings
SATA Settings
Integrated Devices
Serial Communication
System Profile Settings
Miscellaneous Settings
iDRAC Settings utility
Device Settings
System Security
Viewing System BIOS

Viewing System BIOS

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

System BIOS
System BIOS Settings details

System BIOS Settings details

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

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

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

Related Links

System BIOS
Viewing System BIOS

Boot Settings

You can use the **Boot Settings** screen to set the boot mode to either **BIOS** or **UEFI**. It also enables you to specify the boot order.

Related Links

Boot Settings details
System BIOS
Viewing Boot Settings
Choosing the system boot mode
Changing the boot order

Viewing Boot Settings

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Boot Settings
Boot Settings details
Choosing the system boot mode
Changing the boot order

Boot Settings details

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

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

Related Links

Boot Settings
Viewing Boot Settings
Choosing the system boot mode
Changing the boot order

Choosing the system boot mode

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

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

1. From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.

2. Select the boot mode you want the system to boot into.

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

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

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

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

Related Links

Boot Settings
Boot Settings details
Viewing Boot Settings

Changing the boot order

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

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

Related Links

Boot Settings
Boot Settings details
Viewing Boot Settings

Network Settings

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

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

Related Links

UEFI iSCSI Settings
Network Settings screen details
UEFI iSCSI Settings details
System BIOS
Viewing Network Settings
Viewing UEFI iSCSI Settings

Viewing Network Settings

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Network Settings
Network Settings screen details

Network Settings screen details

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

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

Related Links

Network Settings
Viewing Network Settings

UEFI iSCSI Settings

You can use the iSCSI Settings screen to modify iSCSI device settings. The iSCSI Settings option is available only in the UEFI boot mode. BIOS does not control network settings in the BIOS boot mode. For the BIOS boot mode, the option ROM of the network controller handles the network settings.

Related Links

UEFI iSCSI Settings details
Viewing UEFI iSCSI Settings

Viewing UEFI iSCSI Settings

To view the **UEFI iSCSI Settings** screen, perform the following steps:

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

   ```
   F2 = System Setup
   ```

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

Related Links

UEFI iSCSI Settings

UEFI iSCSI Settings details

The **UEFI ISCSI Settings** screen details are explained as follows:

Option	Description
ISCSI Initiator Name	Specifies the name of the iSCSI initiator (iqn format).
ISCSI Device n (n = 1 to 4)	Enables or disables the iSCSI device. When disabled, a UEFI boot option is created for the iSCSI device automatically.

System Security

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

Related Links

System Security Settings details
Operating with a setup password enabled
System BIOS
Viewing System Security
Creating a system and setup password
Using your system password to secure your system
Deleting or changing system and setup password

Viewing System Security

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

System Security
System Security Settings details

System Security Settings details

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

Option	Description
Intel AES-NI	Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set (AES-NI). This option 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.

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

Related Links

System Security
Viewing System Security

Secure Boot Custom Policy Settings

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

Viewing Secure Boot Custom Policy Settings

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

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

   ```
   F2 = System Setup
   ```

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

Secure Boot Custom Policy Settings details

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

Option	Description
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).

Creating a system and setup password

Prerequisites

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

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

Steps

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

   Use the following guidelines to assign the system password:

   - A password can have up to 32 characters.

- The password can contain the numbers 0 through 9.
- Only the following special characters are allowed: space, (”), (+), (,), (-), (.), (/), (;), ([), (\), (]), (`).

A message prompts you to reenter the system password.

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

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

   A message prompts you to save the changes.

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

Related Links

System board jumper settings
System board connectors
System Security

Using your system password to secure your system

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

Steps

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

Next steps

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

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

Related Links

System Security

Deleting or changing system and setup password

Prerequisites

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

Steps

1. To enter System Setup, press F2 immediately after turning on or restarting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS** → **System Security**.
3. On the **System Security** screen, ensure that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, alter or delete the existing system password, and then press Enter or Tab.
5. In the **Setup Password** field, alter or delete the existing setup password, and then press Enter or Tab.

If you change the system and setup password, a message prompts you to reenter the new password. If you delete the system and setup password, a message prompts you to confirm the deletion.

6. Press Esc to return to the **System BIOS** screen. Press Esc again, and a message prompts you to save the changes.
7. Select **Setup Password**, change or delete the existing setup password and press Enter or Tab.

   NOTE: If you change the system password or setup password, a message prompts you to reenter the new password. If you delete the system password or setup password, a message prompts you to confirm the deletion.

Related Links

System Security

Operating with a setup password enabled

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

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

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

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

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

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

Related Links

Viewing System Security

System Security

System Information

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

Related Links

System Information details

System BIOS

Viewing System Information

Viewing System Information

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

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

   ```
   F2 = System Setup
   ```

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

4. On the **System BIOS** screen, click **System Information**.

Related Links

System Information

System Information details

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

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

Related Links

System Information
System Information details
Viewing System Information

Memory Settings

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

Related Links

Memory Settings details
System BIOS
Viewing Memory Settings

Viewing Memory Settings

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

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

   ```
   F2 = System Setup
   ```

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

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

Related Links

Memory Settings
Memory Settings details

Memory Settings details

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

Option	Description
System Memory Size	Specifies the memory size in the system.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the system memory speed.
System Memory Voltage	Specifies the system memory voltage.
Video Memory	Specifies the amount of video memory.
System Memory Testing	Specifies whether the system memory tests are run during system boot. Options are **Enabled** and **Disabled**. This option is set to **Disabled** by default.
Memory Operating Mode	Specifies the memory operating mode. The options available are **Optimizer Mode**, **Advanced ECC Mode**, **Mirror Mode**, **Spare Mode**, **Spare with Advanced ECC Mode**. This option is set to **Optimizer Mode** by default. NOTE: The **Memory Operating Mode** option can have different default 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 set to **Enabled**, memory interleaving is supported if a symmetric memory configuration is installed. If the field is set to **Disabled**, the system supports NUMA (asymmetric) memory configurations. This option is set to **Disabled** by default.
Snoop Mode	Specifies the Snoop Mode options. The Snoop Mode options available are **Home Snoop**, **Early Snoop**, and **Cluster on Die**. This option is set to **Early Snoop** by default. This field is available only when the **Node Interleaving** is set to **Disabled**.

Related Links

Memory Settings
Viewing Memory Settings

Processor Settings

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

Related Links

Processor Settings details
System BIOS
Viewing Processor Settings

Viewing Processor Settings

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Processor Settings
Processor Settings details

Processor Settings details

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

Option	Description
Logical Processor	Enables or disables the logical processors and displays the number of logical processors. If this 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. This option is set to **Enabled** by default.
Alternate RTID (Requestor Transaction ID) Setting	Modifies Requestor Transaction IDs, which are QPI resources. This option is set to **Disabled** by default. NOTE: Enabling this option may negatively impact the overall system performance.
Virtualization Technology	Enables or disables the additional hardware capabilities provided for virtualization. This option is set to **Enabled** by default.
Address Translation Service (ATS)	Defines the Address Translation Cache (ATC) for devices to cache the DMA transactions. This option provides an interface between CPU and DMA Memory Management to a chipset's Address Translation and Protection Table to translate DMA addresses to host addresses. This option is set to **Enabled** by default.
Adjacent Cache Line Prefetch	Optimizes the system for applications that need high utilization of sequential memory access. This option is set to **Enabled** by default. You can disable this option for applications that need high utilization of random memory access.
Hardware Prefetcher	Enables or disables the hardware prefetcher. This option is set to **Enabled** by default.
DCU Streamer Prefetcher	Enables or disables the Data Cache Unit (DCU) streamer prefetcher. This option is set to **Enabled** by default.
DCU IP Prefetcher	Enables or disables the Data Cache Unit (DCU) IP prefetcher. This option is set to **Enabled** by default.
Logical Processor Idling	Enables you to improve the energy efficiency of a system. It uses the operating system core parking algorithm and parks some of the logical processors in the system which in turn allows the corresponding processor cores to transition into a

Option	Description
	lower power idle state. This option can only be enabled if the operating system supports it. It is set to **Disabled** by default.
Configurable TDP	Enables you to reconfigure the processor Thermal Design Power (TDP) levels during POST based on the power and thermal delivery capabilities of the system. TDP verifies the maximum heat the cooling system is needed to dissipate. This option is set to **Nominal** by default. NOTE: This option is only available on certain stock keeping units (SKUs) of the processors.
X2Apic Mode	Enables or disables the X2Apic mode.
Number of Cores per Processor	Controls the number of enabled cores in each processor. This option is set to **All** by default.
Processor 64-bit Support	Specifies if the processor(s) support 64-bit extensions.
Processor Core Speed	Specifies the maximum core frequency of the processor.
Process 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 CPUs, there may be up to four processors listed. The following settings are displayed for each processor installed in the system:

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

Related Links

Processor Settings
Viewing Processor Settings

SATA Settings

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

Related Links

SATA Settings details
System BIOS
Viewing SATA Settings

Viewing SATA Settings

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

SATA Settings
SATA Settings details

SATA Settings details

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

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

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.
Capacity	Specifies the total capacity of the hard drive. This field is undefined for removable media devices such as optical drives.

Port B	Sets the drive type of the selected device. For **Embedded SATA settings** in **ATA** mode, set this field to **Auto** to enable BIOS support. Set it to **OFF** to turn off BIOS support. For **AHCI** or **RAID** mode, BIOS support is always enabled.

Option	Description
Model	Specifies the drive model of the selected device.
Drive Type	Specifies the type of drive attached to the SATA port.

Option	Description

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

Related Links

SATA Settings
Viewing SATA Settings

Integrated Devices

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

Related Links

Integrated Devices details
System BIOS
Viewing Integrated Devices

Viewing Integrated Devices

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Integrated Devices
Integrated Devices details

Integrated Devices details

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

Option	Description
USB 3.0 Setting	Enables or disables the USB 3.0 support. Enable this option only if your operating system supports USB 3.0. If you disable this option, devices operate at USB 2.0 speed. USB 3.0 is enabled by default.
User Accessible USB Ports	Enables or disables the USB ports. Selecting **Only Back Ports On** disables the front USB ports, selecting **All Ports Off** disables all USB ports. The USB keyboard and mouse operate during boot process in certain operating systems. After the boot process is complete, the USB keyboard and mouse do not work if the ports are disabled. NOTE: Selecting **Only Back Ports On** and **All Ports Off** disables the USB management port and also restricts access to iDRAC features.

Option	Description
Embedded NIC1 and NIC2	NOTE: The Embedded NIC1 and NIC2 options are only available on systems that do not have **Integrated Network Card 1**. Enables or disables the Embedded NIC1 and NIC2 options. If set to **Disabled**, the NIC may still be available for shared network access by the embedded management controller. The embedded NIC1 and NIC2 options are only available on systems that do not have Network Daughter Cards (NDCs). The Embedded NIC1 and NIC2 option is mutually exclusive with the Integrated Network Card 1 option. Configure the Embedded NIC1 and NIC2 option by using the NIC management utilities of the system.
I/OAT DMA Engine	Enables or disables the I/OAT option. Enable only if the hardware and software support the feature.
Embedded Video Controller	Enables or disables the **Embedded Video Controller** option. This option is set to **Enabled** by default.
Current State of Embedded Video Controller	Displays the current state of the embedded video controller. The **Current State of Embedded Video Controller** option is a read-only field. If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the **Embedded Video Controller** setting is set to **Disabled**.
SR-IOV Global Enable	Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to **Disabled** by default.
OS Watchdog Timer	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to **Enabled**, the operating system initializes the timer. When this option is set to **Disabled** (the default), the timer does not have any effect on the system.
Memory Mapped I/O above 4 GB	Enables or disables the support for PCIe devices that need large amounts of memory. This option is set to **Enabled** by default.
Slot Disablement	Enables or disables the available PCIe slots on your system. The slot disablement feature controls the configuration of PCIe cards installed in the specified slot. Slots must be disabled only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled.

Related Links

Integrated Devices

Viewing Integrated Devices

Serial Communication

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

Related Links

Serial Communication details

System BIOS

Viewing Serial Communication

Viewing Serial Communication

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Serial Communication
Serial Communication details

Serial Communication details

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

Option	Description
Serial Communication	Selects serial communication devices (Serial Device 1 and Serial Device 2) in BIOS. BIOS console redirection can also be enabled and the port address can be specified. This option is set to **Auto** by default.
Serial Port Address	Enables you to set the port address for serial devices. This option is set to **Serial Device 1=COM2, Serial Device 2=COM1** by default. **NOTE:** You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device. **NOTE:** Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1.
External Serial Connector	Enables you to associate the External Serial Connector to Serial Device 1, Serial Device 2, or the Remote Access Device by using this option. **NOTE:** Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device. **NOTE:** Every time the system boots, the BIOS syncs the serial MUX setting saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert this setting to the default setting of Serial Device 1.
Failsafe Baud Rate	Specifies the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the

Option	Description
	attempt fails, and the value must not be changed. This option is set to `115200` by default.
Remote Terminal Type	Sets the remote console terminal type. This option is set to `VT 100/VT 220` by default.
Redirection After Boot	Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to **Enabled** by default.

Related Links

Serial Communication
Viewing Serial Communication

System Profile Settings

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

Viewing System Profile Settings

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

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

   ```
   F2 = System Setup
   ```

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

System Profile Settings details

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

Option	Description
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**. This option is set to **Performance Per Watt Optimized (DAPC)** by default. DAPC is Dell Active Power Controller. NOTE: All the parameters on the system profile setting screen are available only when the **System Profile** option is set to **Custom**.
CPU Power Management	Sets the CPU power management. This option is set to **System DBPM (DAPC)** by default. DBPM is Demand-Based Power Management.
Memory Frequency	Sets the speed of the system memory. You can select **Maximum Performance**, **Maximum Reliability**, or a specific speed.
Turbo Boost	Enables or disables the processor to operate in the turbo boost mode. This option is set to **Enabled** by default.
Energy Efficient Turbo	Enables or disables the **Energy Efficient Turbo** option.

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

Miscellaneous Settings

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

Viewing Miscellaneous Settings

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

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

   ```
   F2 = System Setup
   ```

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

Related Links

Miscellaneous Settings
Miscellaneous Settings details

Miscellaneous Settings details

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

Option	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	Specifies 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. This option is set to **On** by default. NOTE: This option does not apply to 84-key keyboards.
F1/F2 Prompt on Error	Enables or disables the F1/F2 prompt on error. This option is set to **Enabled** by default. The F1/F2 prompt also includes keyboard errors.
Load Legacy Video Option ROM	Enables you to determine whether the system BIOS loads the legacy video (INT 10H) option ROM from the video controller. Selecting **Enabled** in the operating system does not support UEFI video output standards. This field is available only for UEFI boot mode. You cannot set the option to **Enabled** if **UEFI Secure Boot** mode is enabled.
In-System Characterization	Enables or disables **In-System Characterization**. This option is set to **Disabled** by default. The two other options are **Enabled** and **Enabled - No Reboot**. NOTE: The default setting for **In-System Characterization** is subject to change in future BIOS releases. When enabled, In-System Characterization (ISC) executes during POST upon detecting relevant change(s) in system configuration to optimize system power and performance. ISC takes about 20 seconds to execute, and system reset is needed

Option	Description
	for ISC results to be applied. The **Enabled - No Reboot** option executes ISC and continues without applying ISC results until the next time system reset occurs. The **Enabled** option executes ISC and forces an immediate system reset so that ISC results can be applied. It takes the system longer to be ready due to the forced system reset. When disabled, ISC does not execute.

Related Links

Miscellaneous Settings
Viewing Miscellaneous Settings

iDRAC Settings utility

The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI. You can enable or disable various iDRAC parameters by using the iDRAC settings utility.

NOTE: Accessing some of the features on the iDRAC settings utility needs the iDRAC Enterprise License upgrade.

For more information about using iDRAC, see *Dell Integrated Dell Remote Access Controller User's Guide* at **Dell.com/idracmanuals**.

Related Links

Device Settings
System BIOS
Entering the iDRAC Settings utility
Changing the thermal settings

Entering the iDRAC Settings utility

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

Related Links

iDRAC Settings utility

Changing the thermal settings

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

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

Related Links

iDRAC Settings utility

Device Settings

Device Settings enables you to configure device parameters.

Related Links

System BIOS

Boot Manager

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

Related Links

Boot Manager main menu

System BIOS

Viewing Boot Manager

Viewing Boot Manager

To enter **Boot Manager**:

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

   ```
   F11 = Boot Manager
   ```

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

Related Links

Boot Manager

Boot Manager main menu

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	Enables you to access boot menu, where you can select a one-time boot device to boot from.
Launch System Setup	Enables you to access System Setup.
System Utilities	Enables you to launch System Utilities menu such as System Diagnostics and UEFI shell.

Related Links

Boot Manager

Viewing Boot Manager

One-shot BIOS boot menu

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

Related Links

Boot Manager

System Utilities

System Utilities contains the following utilities that can be launched:

- Launch Diagnostics
- BIOS Update File Explorer
- Reboot System

Related Links

Boot Manager

PXE boot

The Preboot Execution Environment (PXE) is an industry standard client or interface that allows networked computers that are not yet loaded with an operating system to be configured and booted remotely by an administrator.

6

Installing and removing system components

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

Safety instructions

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

WARNING: Opening or removing the system cover while the system is powered on may expose you to a risk of electric shock.

CAUTION: Do not operate the system without the cover for a duration exceeding five minutes.

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

NOTE: Dell recommends that you always use a static mat and static strap while working on components inside the system.

NOTE: To ensure proper operation and cooling, all bays in the system and system fans must be populated always with either a component or with a blank.

Before working inside your system

Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

Steps

1. Turn off the system, including any attached peripherals.
2. Disconnect the system from the electrical outlet and disconnect the peripherals.
3. If applicable, remove the system from the rack.
4. Remove the system cover.

Related Links

Safety instructions

Removing the system cover

After working inside your system

Prerequisites

Follow the safety guidelines listed in the Safety instructions section.

Steps

1. Install the system cover.
2. If applicable, install the system into the rack.
3. Reconnect the peripherals and connect the system to the electrical outlet.
4. Turn on the system, including any attached peripherals.

Related Links

Safety instructions

Installing the system cover

Recommended tools

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

- Phillips #1 screwdriver
- Phillips #2 screwdriver
- #T15 Torx screwdriver
- Plastic scribe
- Wrist grounding strap

System cover

The system cover protects the components inside the system and helps in maintaining air flow inside the system.

Removing the system cover

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Turn off the system, including any attached peripherals.
3. Disconnect the system from the electrical outlet and peripherals.

Steps

1. Loosen the screw that secures the system cover to the chassis.
2. Hold the cover on both sides, and lift the cover away from the system.

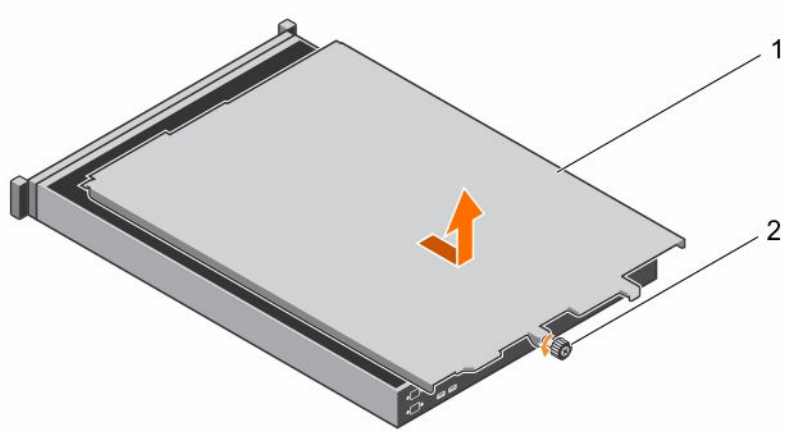

Figure 12. Removing the system cover

1. system cover
2. screw

Related Links

Safety instructions
Installing the system cover

Installing the system cover

Prerequisites

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

Follow the safety guidelines listed in the Safety instructions section.

Steps

1. Align the slots of the system cover with the tabs on the chassis and slide the cover forward.
2. Tighten the screw securing the system cover to the chassis.

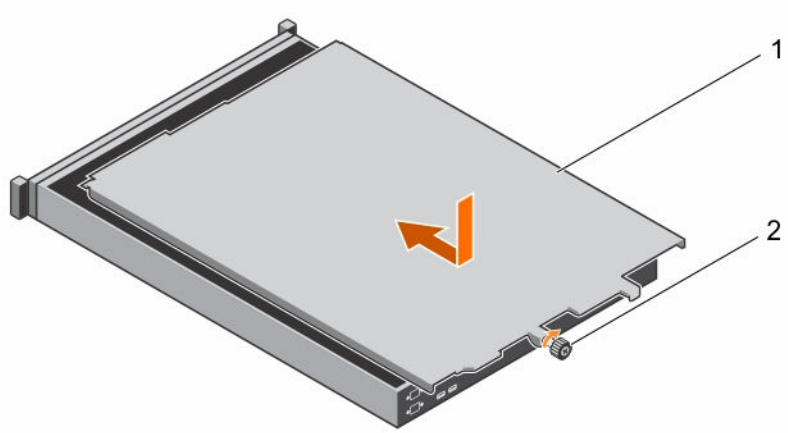

Figure 13. Installing the system cover

1. system cover
2. screw

Related Links

Safety instructions
After working inside your system
Removing the system cover

Inside the system

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

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

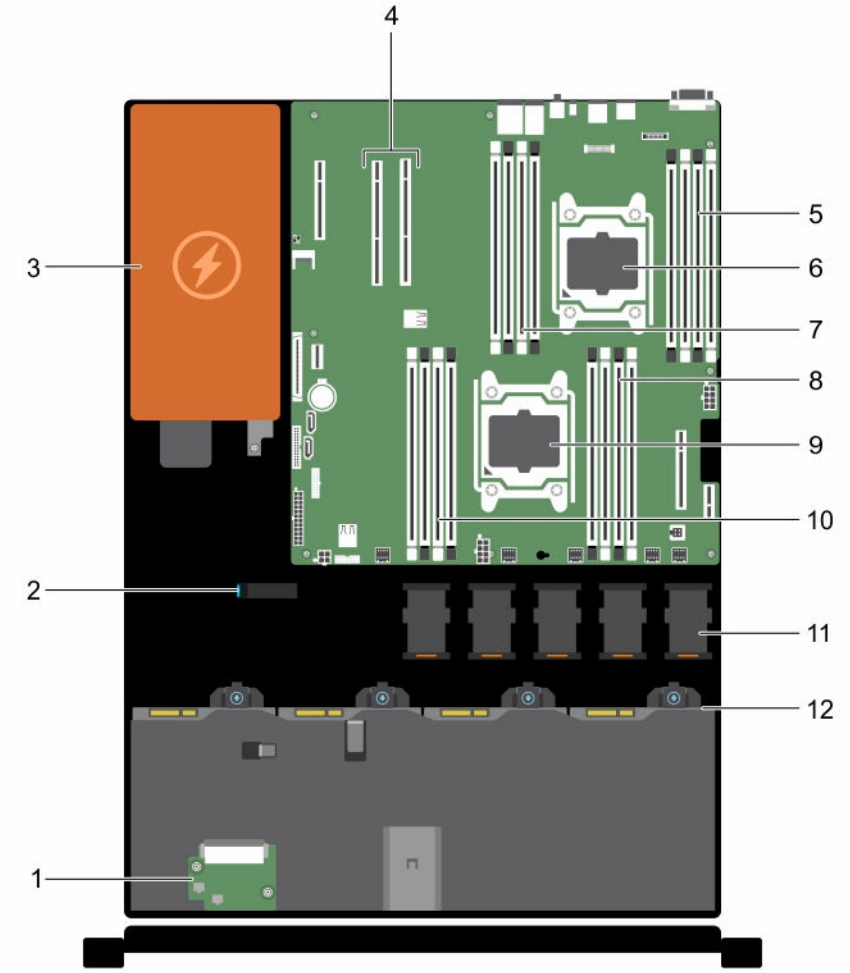

Figure 14. Inside the system— with a non-redundant power supply

1. control panel
2. cable routing latch
3. power supply unit
4. PCIe card connector (2)
5. memory module socket (B8, B4, B7, B3)
6. CPU2
7. memory module socket (B1, B5, B2, B6)
8. memory module socket (A1, A5, A2, A6)
9. CPU1
10. memory module socket (A8, A4, A7, A3)
11. cooling fan (5)
12. hard drive (4)

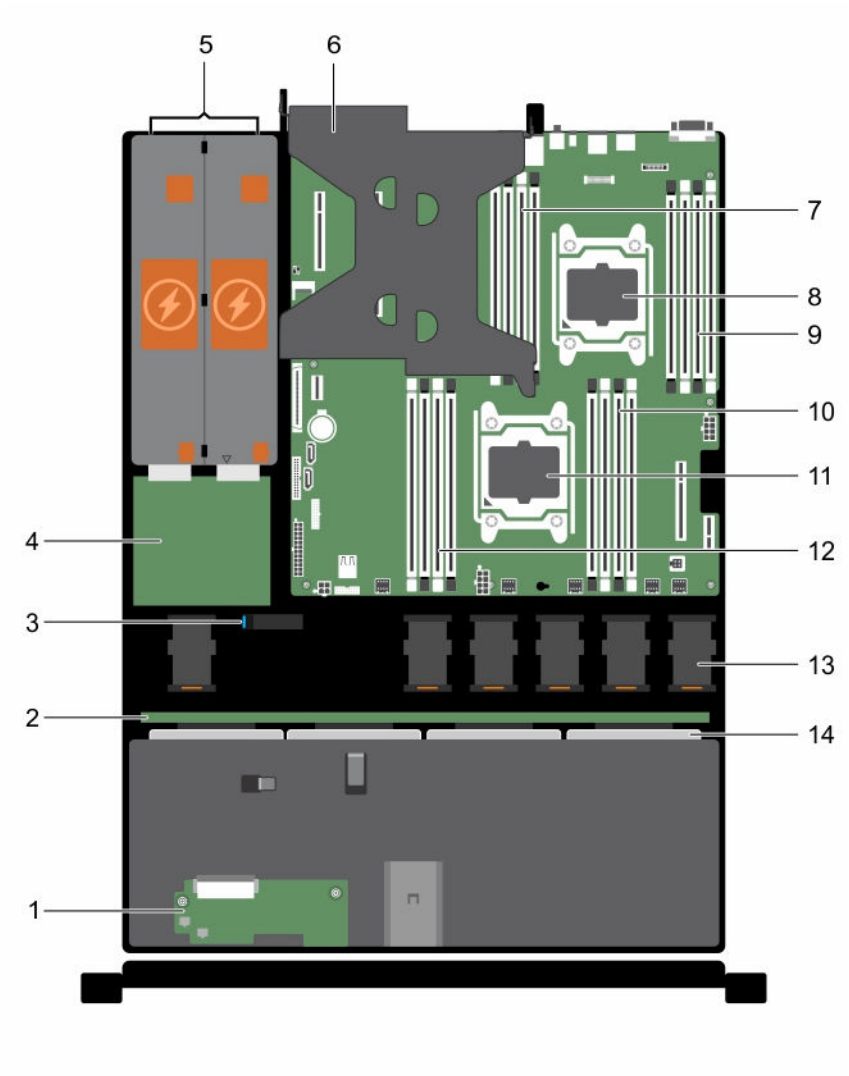

Figure 15. Inside the system— with a redundant power supply

1. control panel
2. hard drive backplane
3. cable routing latch
4. power interposer board
5. power supply units (2)
6. expansion card riser
7. memory module socket (B1, B5, B2, B6)
8. CPU2
9. memory module socket (B8, B4, B7, B3)
10. memory module socket (A1, A5, A2, A6)
11. CPU1
12. memory module socket (A8, A4, A7, A3)
13. cooling fan (6)
14. hard drive (4)

Cooling shroud

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

Removing the cooling shroud

Prerequisites

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

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

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

Steps

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

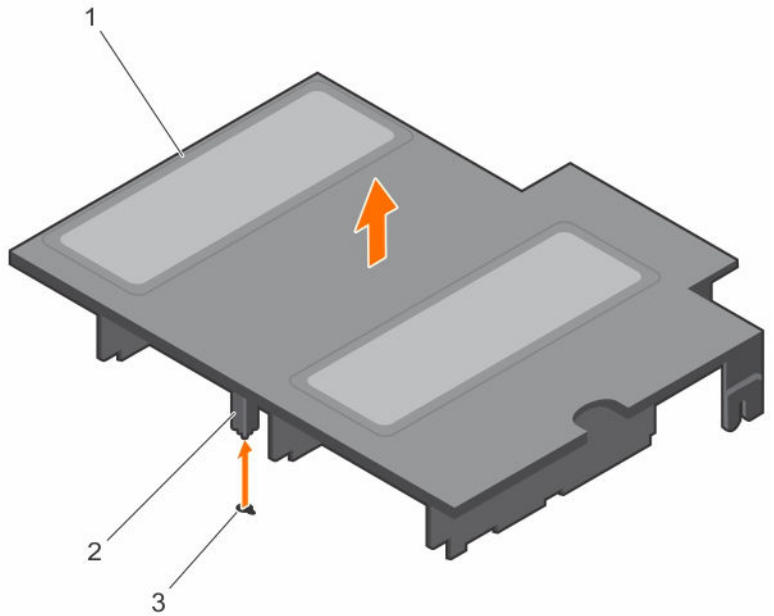

Figure 16. Removing the cooling shroud

1. cooling shroud
2. guide on the cooling shroud
3. slot on the system board

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the system cover
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 are shipped with your product.

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

Steps

1. Align the guide on the cooling shroud with the slot on the system board.
2. Lower the cooling shroud into the chassis until it is firmly seated.

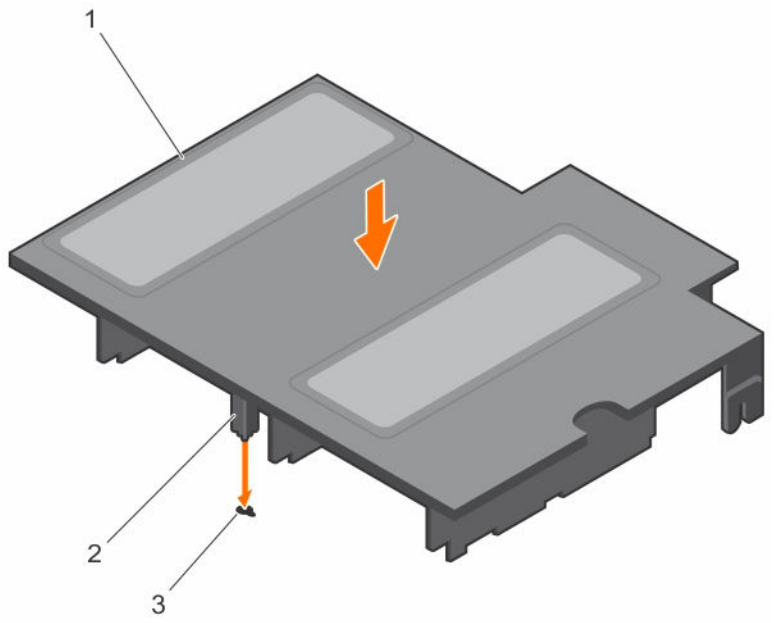

Figure 17. Installing the cooling shroud

1. cooling shroud
2. guide on the cooling shroud
3. slot on the system board

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing the system cover
Removing 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 2400 MT/s, 2133 MT/s, or 1866 MT/s depending on:

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

Your system contains 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.

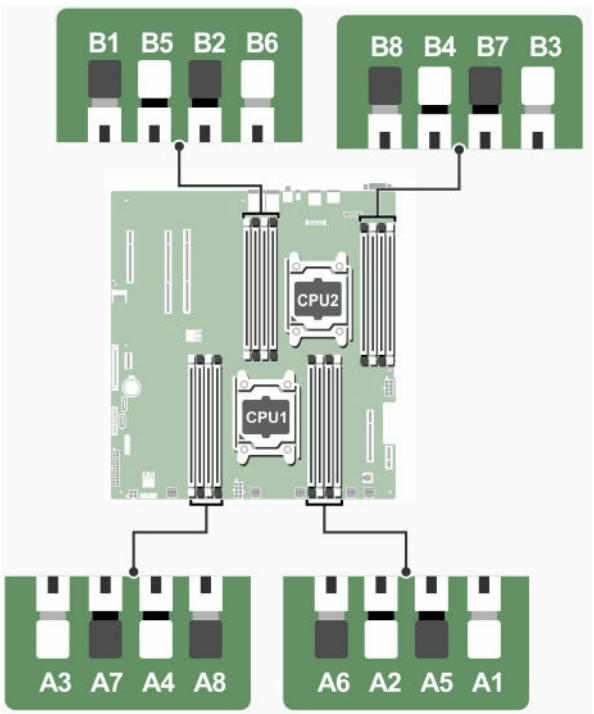

Figure 18. Memory socket locations

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

Table 29. Memory populations and operating frequencies

DIMM Type	DIMMs Populated/ Channel	Voltage	Operating Frequency (in MT/s)	Maximum DIMM Rank/Channel
RDIMM	1 2	1.2 v	2400, 2133, and 1866	Single rank or dual rank

General memory module installation guidelines

Your system supports Flexible Memory Configuration, enabling the system to be configured and run in any valid chipset architectural configuration. The following are the recommended guidelines for installing memory modules:

- x4 and x8 DRAM based DIMMs can be mixed. For more information, see the Mode specific guidelines section.
- 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.

Related Links

Mode-specific guidelines

Mode-specific guidelines

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

Advanced Error Correction Code (lockstep)

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

The installation guidelines for memory modules are as follows:

- Memory modules must be identical in size, speed, and technology.

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

Memory optimized (independent channel) mode

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

Memory sparing

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

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

With memory sparing enabled, the system memory available to the operating system is reduced by one rank per channel. For example, in a dual-processor configuration with sixteen 4 GB single-rank memory modules, the available system memory is: 3/4 (ranks/channel) × 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 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 30. Memory configurations—two processors

System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	DIMM Rank, Organization, and Frequency	DIMM Slot Population
16	8	2	1R, x8, 2400 MT/s	A1,B1
32	8	4	1R, x8, 2400 MT/s	A1, A2, B1, B2
	16	2	2R, x8, 2400 MT/s	A1, B1
48	8	6	1R, x8, 2400 MT/s	A1, A2, A3, B1, B2, B3
64	8	8	1R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
	16	4	2R, x8, 2400 MT/s	A1, A2, B1, B2
	32	2	2R, x4, 2400 MT/s	A1, B1
96	8	12	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6

System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	DIMM Rank, Organization, and Frequency	DIMM Slot Population
	16	6	2R, x8, 2400 MT/s	A1, A2, A3, B1, B2, B3
112	8	14	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
128	8	16	1R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	16	8	2R, x8, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
	32	4	2R, x4, 2400 MT/s	A1, A2, B1, B2
192	16	12	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
	32	6	2R, x4, 2400 MT/s	A1, A2, A3, B1, B2, B3
224	16	14	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
256	16	16	2R, x8, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8
	32	8	2R, x4, 2400 MT/s	A1, A2, A3, A4, B1, B2, B3, B4
384	32	12	2R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6
448	32	14	2R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7
512	32	16	2R, x4, 2400 MT/s	A1, A2, A3, A4, A5, A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8

Removing memory modules

Prerequisites

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

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

3. Remove the cooling shroud.

   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, ensuring not to touch the middle of the memory module or metallic contacts.

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

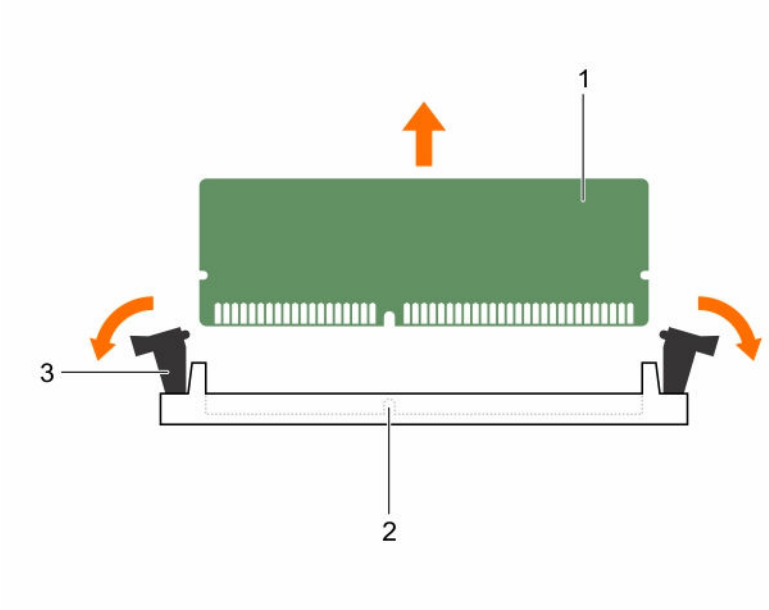

Figure 19. Removing the memory module

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

Next steps

1. Install the memory module.

   NOTE: If you are removing the memory module permanently, install a memory module blank.

2. If removed, install the PCIe expansion card riser.
3. If disconnected, reconnect the cables to the expansion card(s).
4. Install 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 the After working inside your system section.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Installing memory modules
Installing the cooling shroud
Installing the expansion card riser

Installing memory modules

Prerequisites

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

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

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

Steps

1. Locate the appropriate memory module socket.

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

2. 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. Open the ejectors on the memory module socket outward to allow the memory module to be inserted into the socket.
4. Align the edge connector of the memory module with the alignment key of the memory module socket, and insert the memory module in the socket.

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

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

5. Press the memory module with your thumbs until the socket levers firmly click into place.

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

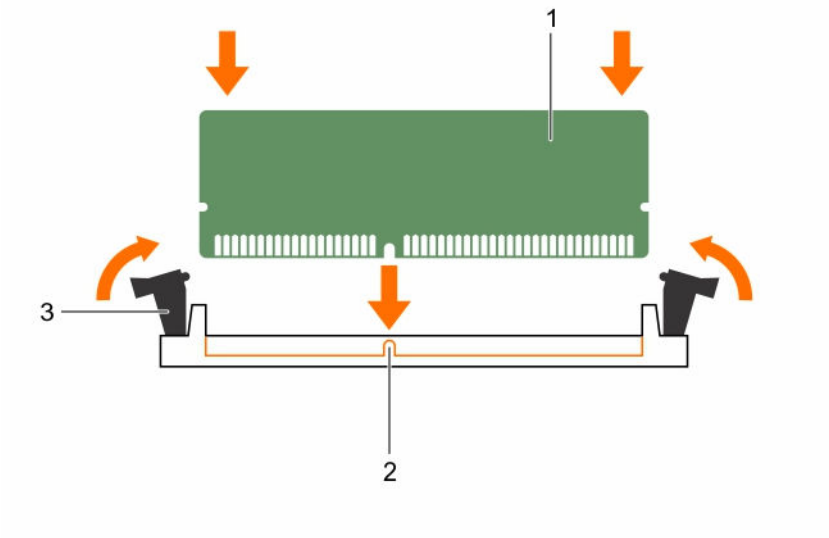

Figure 20. Installing the memory module

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

Next steps

1. If removed, reinstall the PCIe expansion card riser.
2. Install the cooling shroud.
3. Follow the procedure listed in the After working inside your system section.
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. Ensure that the memory module is firmly seated in the memory module socket.
6. Run the system memory test in system diagnostics.

Related Links

- Safety instructions
- Before working inside your system
- After working inside your system
- Removing the cooling shroud
- Installing the cooling shroud
- Viewing System Setup
- Using system diagnostics
- Removing memory modules
- Removing the expansion card riser
- Installing the expansion card riser

Hard drives

The DSS 1500 system supports one of the following::

Four hard drive systems	Up to four 3.5-inch cabled hard drives Up to four 3.5-inch hot swappable SAS hard drives or SATA/SSD hard drives
Eight hard drive systems	Up to eight 2.5-inch hot swappable SAS hard drives, SATA hard drives, or SATA SSD hard drives

The hot swappable hard drives connect to the system board through the hard drive backplane. Hot swappable hard drives are supplied in hot swappable hard drive carriers that fit in the hard drive slots.

CAUTION: Before attempting to remove or install a hot swappable 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 time for the formatting to be completed. Be aware that high-capacity hard drives can take a number of hours to format.

Removing a 3.5-inch hard drive blank

Prerequisites

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

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

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

Steps

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

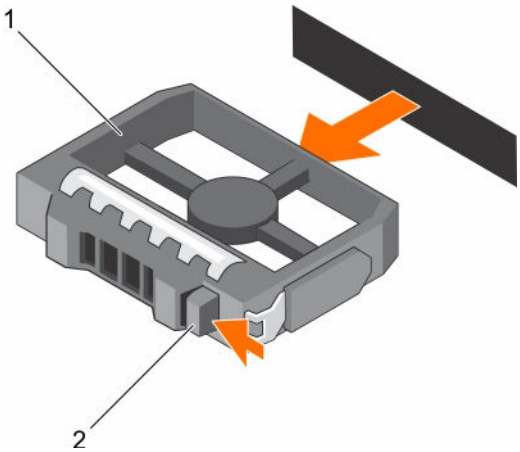

Figure 21. Removing a 3.5-inch hard drive blank

1. hard drive blank
2. release button

Related Links

Safety instructions

Installing a 3.5-inch hard drive blank

Installing a 3.5-inch hard drive blank

Prerequisites

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

Steps

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

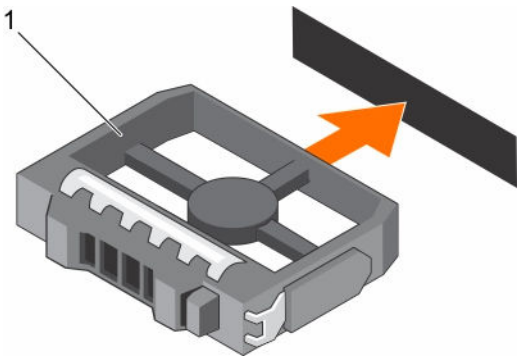

Figure 22. Installing a 3.5-inch hard drive blank

1. hard drive blank

Related Links

Safety instructions

Removing a 3.5-inch hard drive blank

Removing a 3.5-inch cabled hard drive carrier

Prerequisites

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

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

Steps

1. Disconnect the data or power cable from the hard drive.
2. Press the release tab on the hard drive carrier and 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. Insert a hard drive blank in the empty hard drive slot.

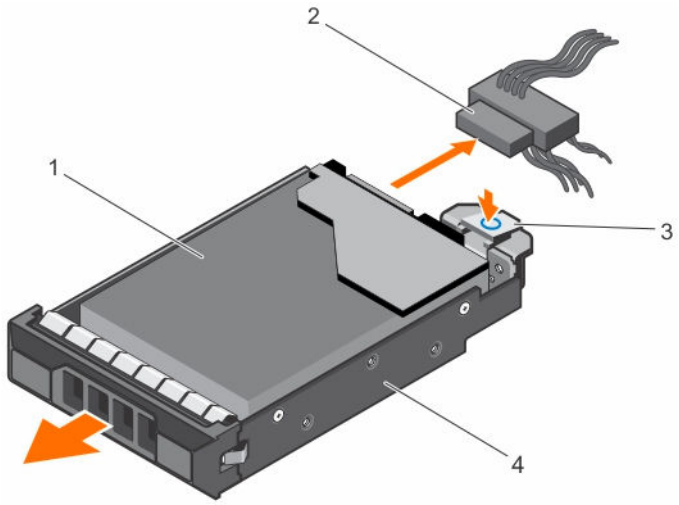

Figure 23. Removing a 3.5-inch cabled hard drive carrier

1. hard drive
2. power or data cable
3. release tab
4. hard drive carrier

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing a 3.5-inch cabled hard drive carrier

Installing a 3.5-inch cabled hard drive carrier

Prerequisites

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

Follow the safety guidelines listed in the Safety instructions section.

Steps

1. Press the release tab on the hard drive carrier and slide the carrier out of the system.
2. Install the hard drive into the hard drive carrier.
3. Insert the hard drive carrier into the hard drive slot until it clicks into place.
4. Connect the power/data cable to the hard drive.
   - If you are connecting to the integrated SATA controller (SATA hard drives only), connect the SATA data cable to the SATA_A-D connector on the system board.
   - If you are connecting to a SAS RAID controller card (SAS or SATA hard drives), connect the data cable to the connector on the card.

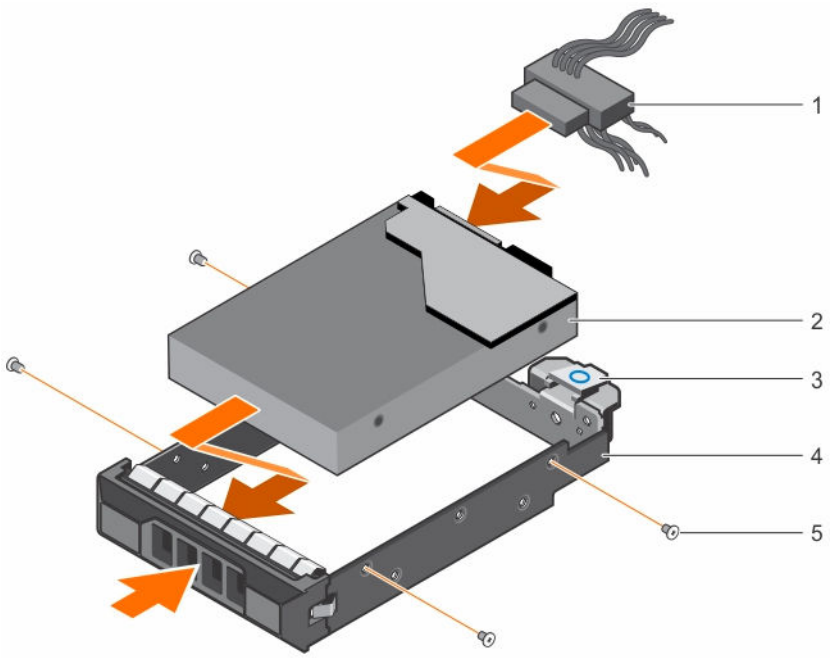

Figure 24. Installing a 3.5-inch cabled hard drive carrier

1. power or data cable
2. hard drive
3. release tab
4. hard drive carrier
5. screw (4)

Next steps

1. Follow the procedure listed in the After working inside your system section.
2. Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.
3. Enter the System Setup and ensure that the hard drive's controller is enabled.
4. Exit the System Setup program and reboot the system.
5. Install any software required for the hard drive operation as described in the documentation for the hard drive.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing a 3.5-inch cabled hard drive carrier

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. Follow the safety guidelines listed in the Safety instructions section.
2. 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.

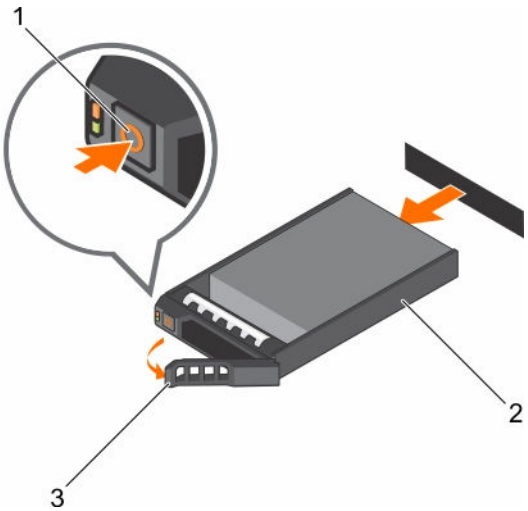

Figure 25. Removing a hot swappable hard drive carrier

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

Related Links

Safety instructions

Installing a hot-swappable hard drive carrier

Installing a hot-swappable hard drive carrier

Prerequisites

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

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. Insert the hard drive carrier into the hard drive slot until the carrier comes in contact with the backplane.
5. Close the hard drive carrier handle to lock the hard drive in place.

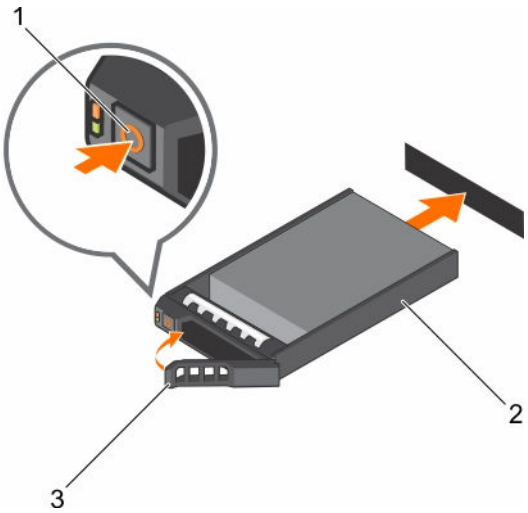

Figure 26. Installing a hot-swappable hard drive carrier

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

Related Links

Safety instructions

Removing a hot swappable hard drive carrier

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

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Remove a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier.

Steps

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

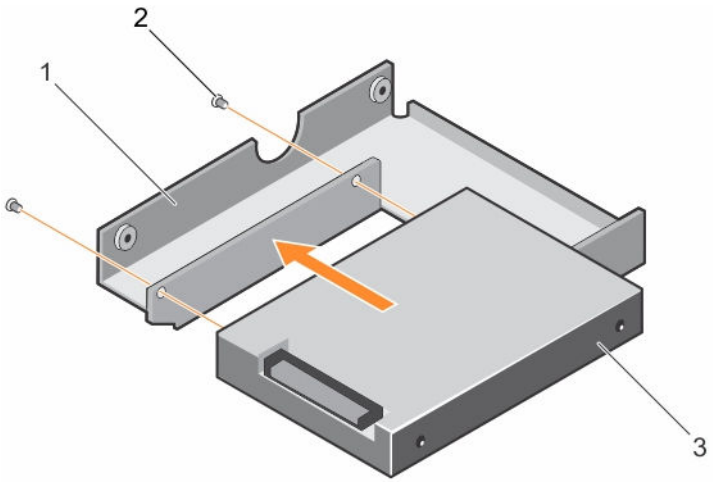

Figure 27. Installing a 2.5-inch hard drive into a 3.5-inch hard drive adapter

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

Next steps

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

Related Links

Safety instructions

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

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

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Remove the 3.5-inch hard drive adapter from the 3.5-inch hot swappable hard drive carrier.

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

Steps

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

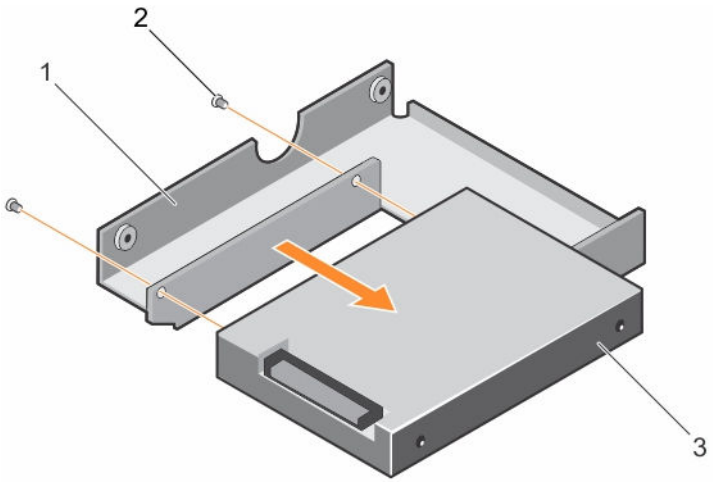

Figure 28. Removing a 2.5-inch hard drive from a 3.5-inch hard drive adapter

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

Next steps

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

Related Links

Safety instructions

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

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

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Keep the Phillips #2 screwdriver ready.
3. Install the 2.5-inch hot swappable hard drive into the hot swappable hard drive adapter.

Steps

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

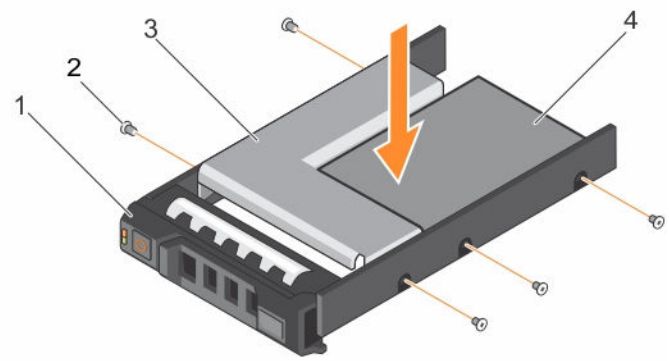

Figure 29. Installing a 3.5-inch hard drive adapter into a hot swappable hard drive carrier

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

Next steps

1. Install the hot swappable hard drive carrier into the system.

Related Links

Safety instructions

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

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

Prerequisites

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

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

Steps

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

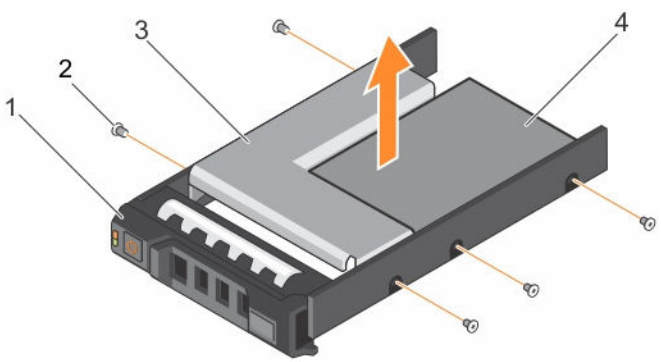

Figure 30. Removing a 3.5-inch hot swappable hard drive adapter from a 3.5-inch hot swappable hard drive carrier

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

Related Links

Safety instructions

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

Removing a hot swappable hard drive from a hard drive carrier

Prerequisites

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

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

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

Steps

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

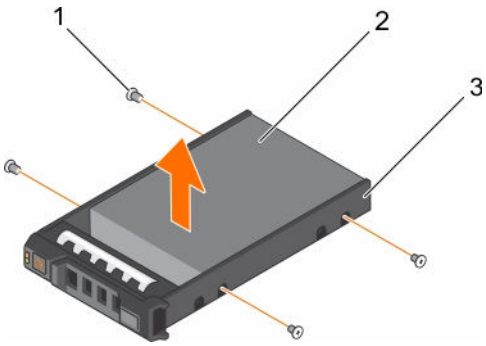

Figure 31. Removing a hot swappable hard drive from a hard drive carrier

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

Next steps

1. Install the hot swappable hard drive into the hard drive carrier.
2. Install the hot swappable hard drive carrier into the system.

Related Links

Safety instructions

Installing a hot swappable hard drive into a hard drive carrier

Installing a hot swappable hard drive into a hard drive carrier

Prerequisites

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

Keep the Phillips #2 screwdriver ready.

Steps

1. Insert the hard drive into the hard drive carrier with the connector end of the hard drive facing 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. Install the screws to secure the hard drive to the hard drive carrier.

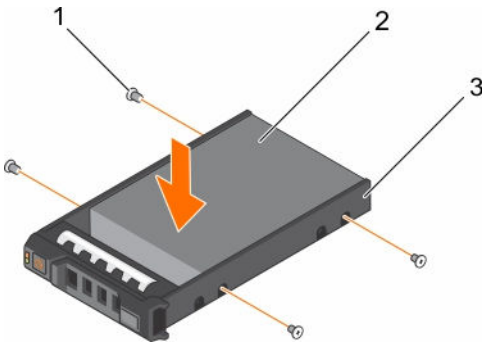

Figure 32. Installing a hard drive into a hard drive carrier

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

Related Links

Safety instructions

Removing a hot swappable hard drive from a hard drive carrier

Cooling fans

Your system supports:

- Up to four cooling fans in a non-redundant power supply unit (PSU) configuration.
- Up to five cooling fans in a redundant PSU configuration.

NOTE: Fan 1 must be installed in a redundant PSU configuration.

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

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

Removing a cooling fan

Prerequisites

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

NOTE: The procedure for removing each fan is identical.

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

Steps

1. Disconnect the power cable from the power cable connector on the system board or power interposer board as applicable.
2. Lift the fan out of the cooling fan bracket.

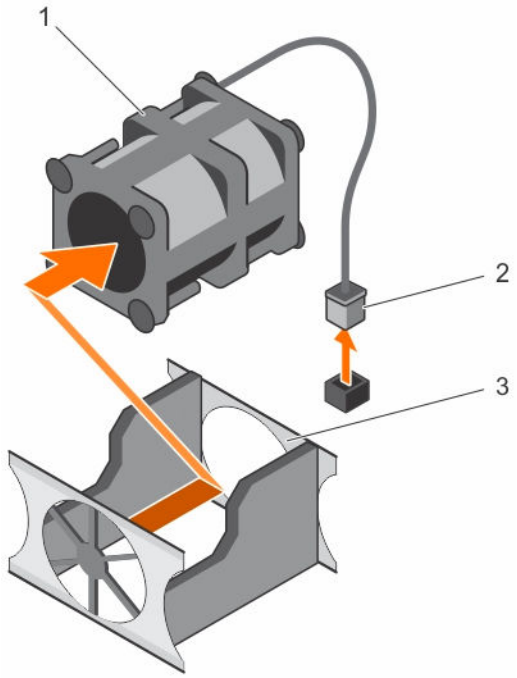

Figure 33. Removing a cooling fan

1. cooling fan
2. power cable connector
3. cooling fan bracket

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Installing a cooling fan

Installing a cooling fan

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Remove the cooling shroud.

Steps

1. Lower the fan into the cooling fan bracket.
2. Connect the power cable to the power cable connector on the system board or power interposer board as applicable.

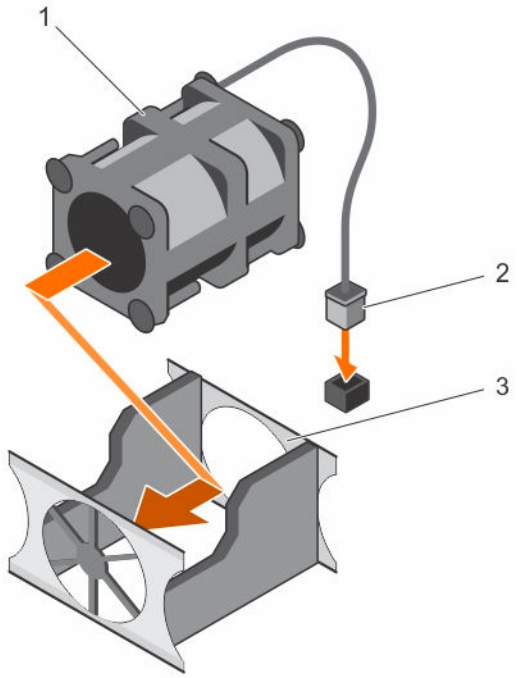

Figure 34. Installing a cooling fan

1. cooling fan
2. power cable connector
3. cooling fan bracket

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Installing the cooling shroud
Removing a cooling fan

Expansion cards and expansion card riser

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

NOTE: You can install an expansion card on the system board only using an expansion card riser.

Expansion card installation guidelines

Your system supports Generation 1, 2, and 3 cards. The following table provides riser configurations for DSS 1500 systems:

Table 31. Expansion card slots available on the expansion card riser

Expansion-card riser	PCIe slot on the expansion-card riser	Processor connection	Height	Length	Link width	Slot width
PCIE_G3_X8	1	Processor 1	Half height	Half length	x8	x16
	2	Processor 1	Half height	Half length	x8	x16

NOTE: The expansion cards are not hot swappable.

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

Table 32. Expansion card installation order

Card priority	Card type	Slot priority	Maximum allowed
1	RAID	2	1
2	10 Gb NICs	2, 1	2

Removing the expansion card 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 are shipped with your product.

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

Steps

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

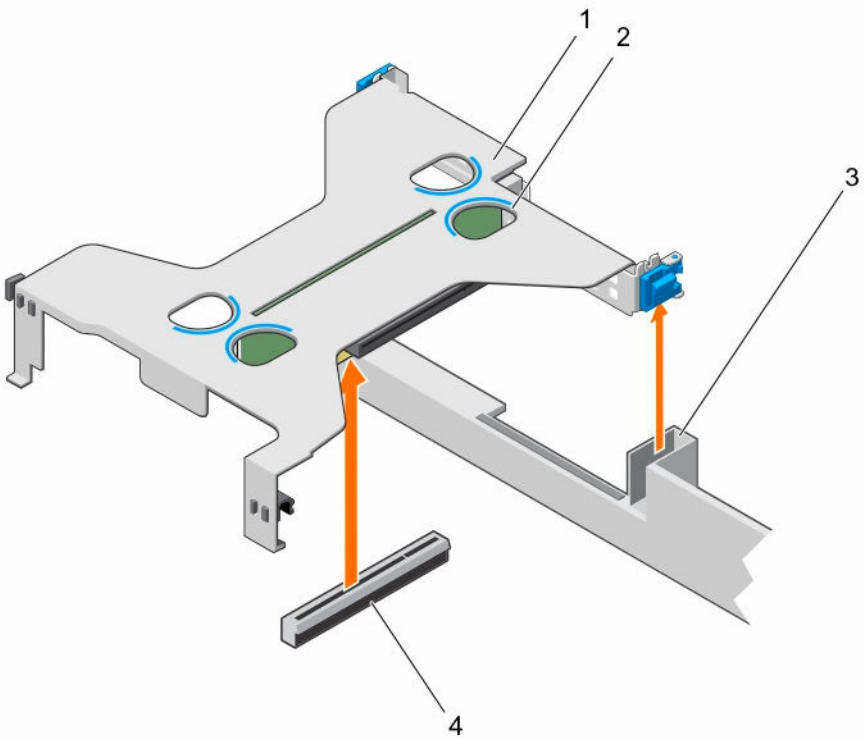

Figure 35. Removing the expansion card riser

1. expansion card riser
2. touch points on the riser
3. slot on the chassis
4. riser connector on the system board

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing an expansion card
Installing an expansion card
Installing the expansion card riser

Installing the expansion card 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 are shipped with your product.

1. Follow the safety guidelines listed in the Safety instructions section.
2. If applicable, reinstall the expansion card into the expansion card riser.

Steps

1. Align the expansion card riser latch with the slot on the chassis.
2. Lower the expansion card riser until the expansion card riser is firmly seated in the connector, on the system board.

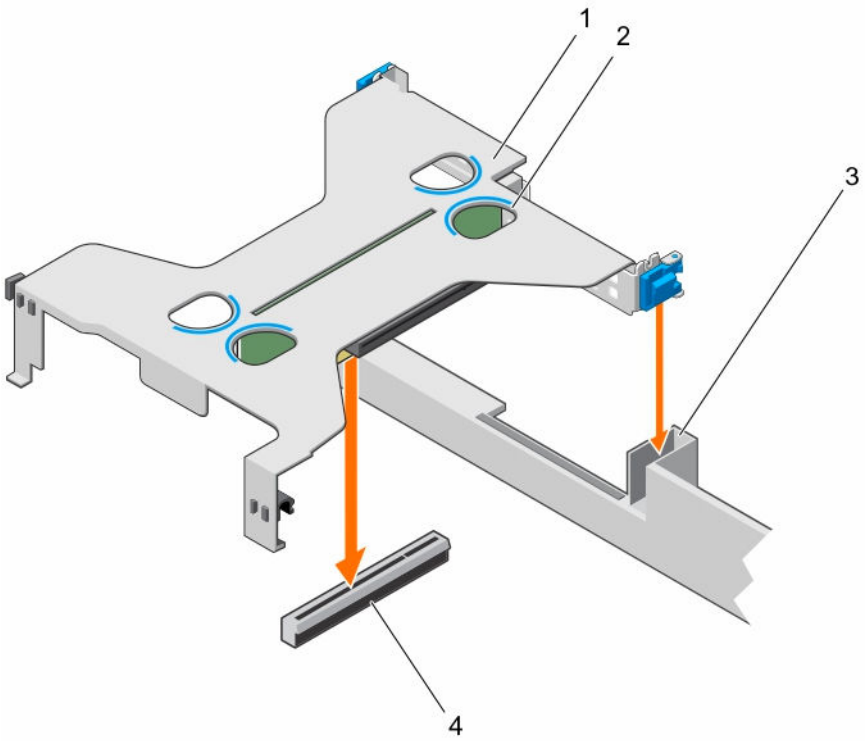

Figure 36. Installing the expansion card riser

1. expansion card riser
2. touch points on the riser
3. slot on the chassis
4. riser connector on the system board

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing an expansion card
Installing an expansion card
Removing the expansion card riser

Removing an expansion card

Prerequisites

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

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

Steps

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

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

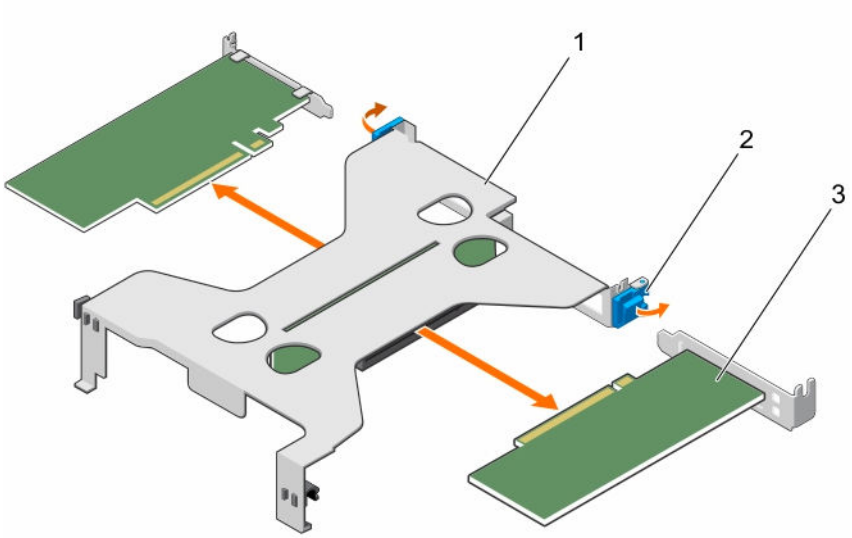

Figure 37. Removing the expansion card

1. expansion card riser
2. expansion card latch
3. expansion card

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the expansion card riser
Installing the expansion card riser
Installing an expansion card

Installing an expansion card

Prerequisites

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

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

Steps

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

   NOTE: Ensure that the expansion card is properly seated along the chassis, so that expansion card latch can be closed.
4. If applicable, connect the cables to the expansion card.
5. Install the expansion card riser on the system board.

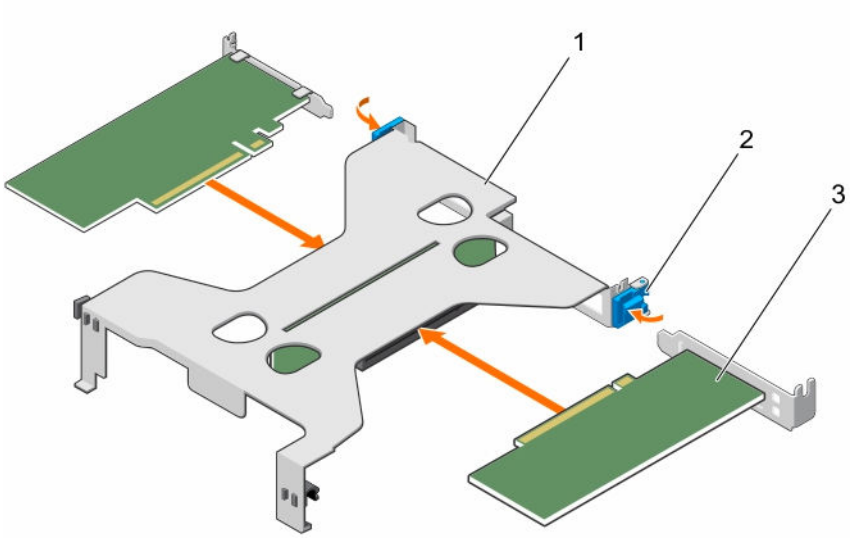

Figure 38. Installing an expansion card

1. expansion card riser
2. expansion card latch

3. expansion card

Next steps
Follow the procedure listed in the After working inside your system section.
Related Links
Safety instructions
Before working inside your system
After working inside your system
Removing the expansion card riser
Installing the expansion card riser
Removing an expansion card

Remote management port card (optional)

The remote management port card is used for advanced management of the system.

Removing the optional remote management port card

Prerequisites

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

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

Steps

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

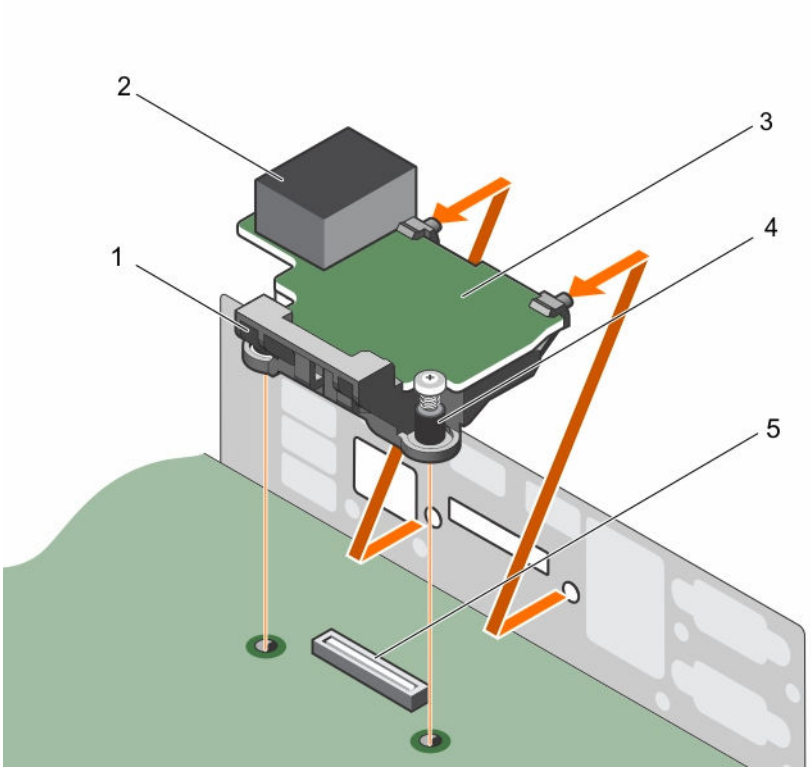

Figure 39. Removing the optional remote management port card

1. remote management port card holder
2. remote management port
3. remote management port card
4. screw (2)
5. remote management port card connector on the 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 the After working inside your system section.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Removing the expansion card riser
Removing an expansion card
Installing an expansion card
Installing the expansion card riser
Installing the cooling shroud

Installing the optional remote management port card

Prerequisites

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

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

   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 remote management port card on the slots on the chassis wall.
2. Insert the remote management port card into the connector on the system board.
3. Tighten the screws to secure the remote management port card.

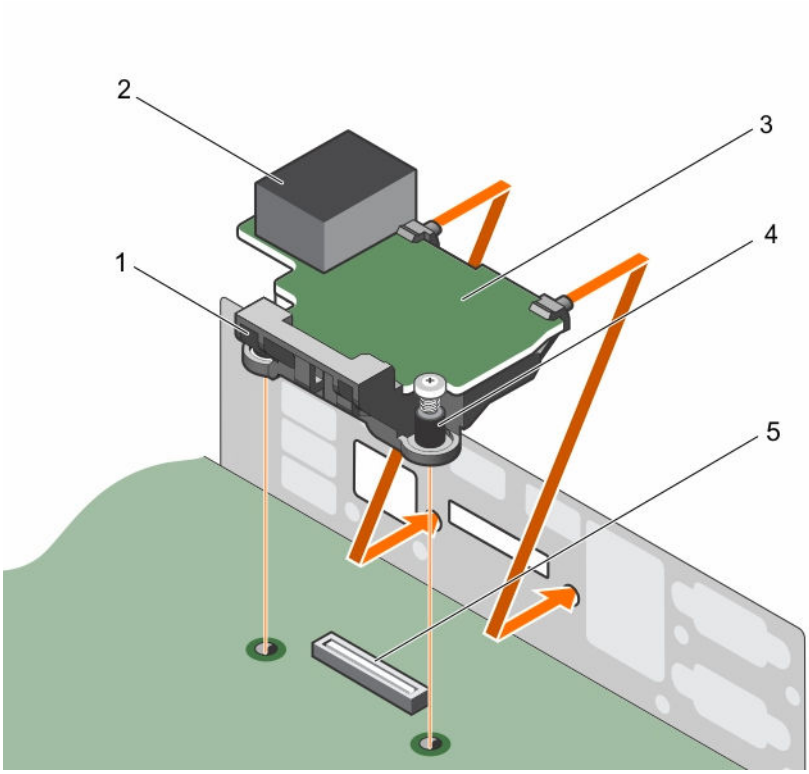

Figure 40. Installing the optional remote management port card

1. remote management port card holder
2. remote management port

3. remote management port card
4. screw (2)
5. remote management port card connector on the system board

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 the After working inside your system section.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Removing the expansion card riser
Removing an expansion card
Installing an expansion card
Installing the expansion card riser
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

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.

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

5. If required, 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.

WARNING: The heat sink is 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 (approximately 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.

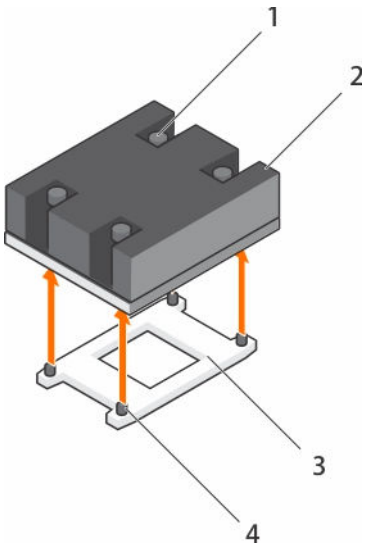

Figure 41. Removing the heat sink

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

Next steps

1. Remove the processor.
2. Install the heat sink.
3. Follow the procedure listed in the After working inside your system section.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing a heat sink
Removing the expansion card riser
Removing a processor

Removing a processor

Prerequisites

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

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

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

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

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

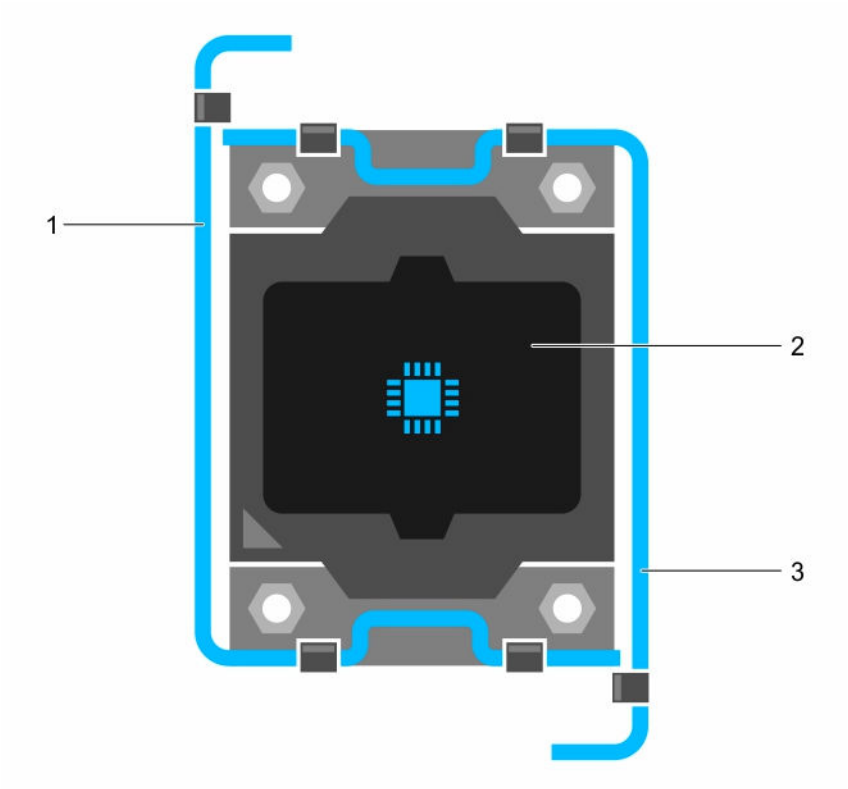

Figure 42. Processor shield opening and closing lever sequence

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.

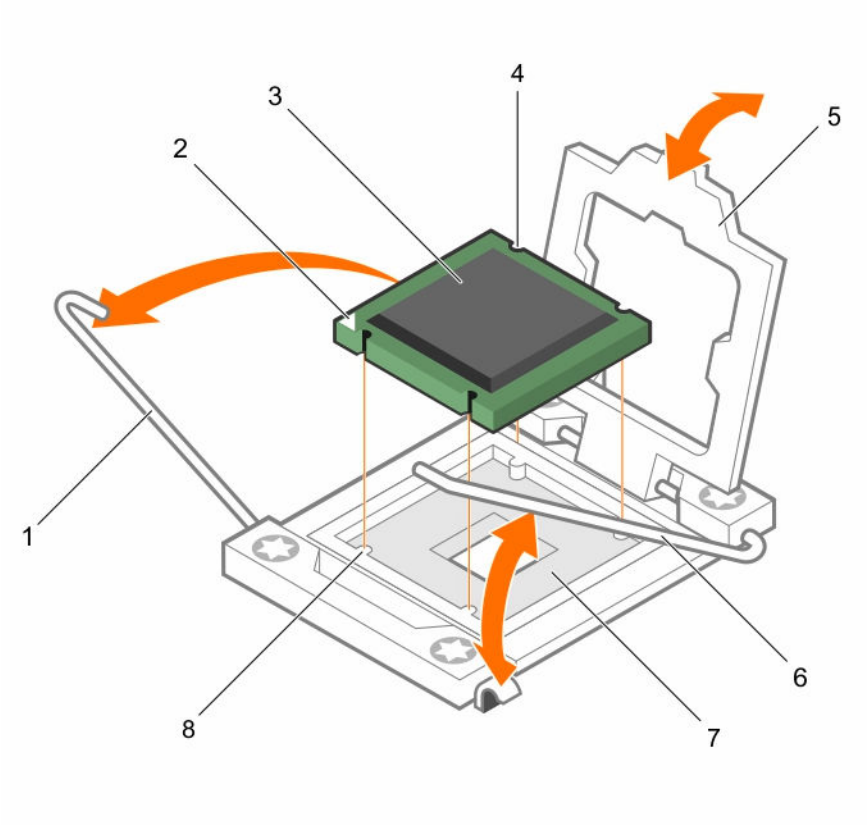

Figure 43. Removing a processor

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. Install a processor.
2. Install the heat sink.
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. Follow the procedure listed in the After working inside your system section.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Installing the cooling shroud
Removing a heat sink
Installing a processor
Installing the expansion card riser

Installing a processor

Prerequisites

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

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

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

   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.

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

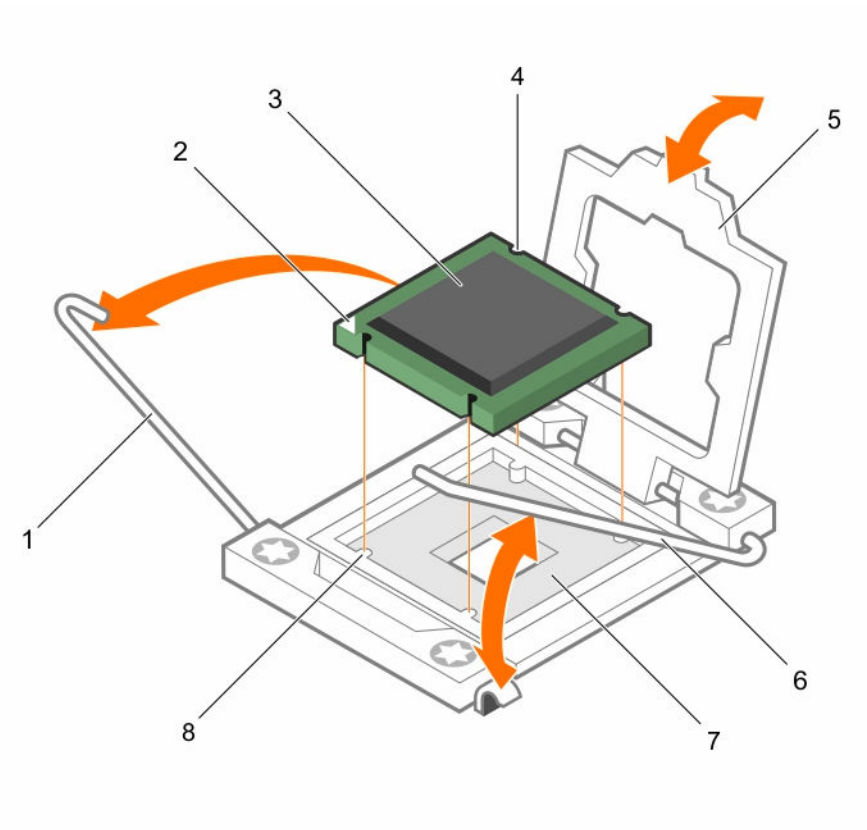

Figure 44. Installing a processor

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

Next steps

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

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the cooling shroud
Installing the cooling shroud
Installing a heat sink
Removing a processor

Installing a heat sink

Prerequisites

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

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

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

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

Steps

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

   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.

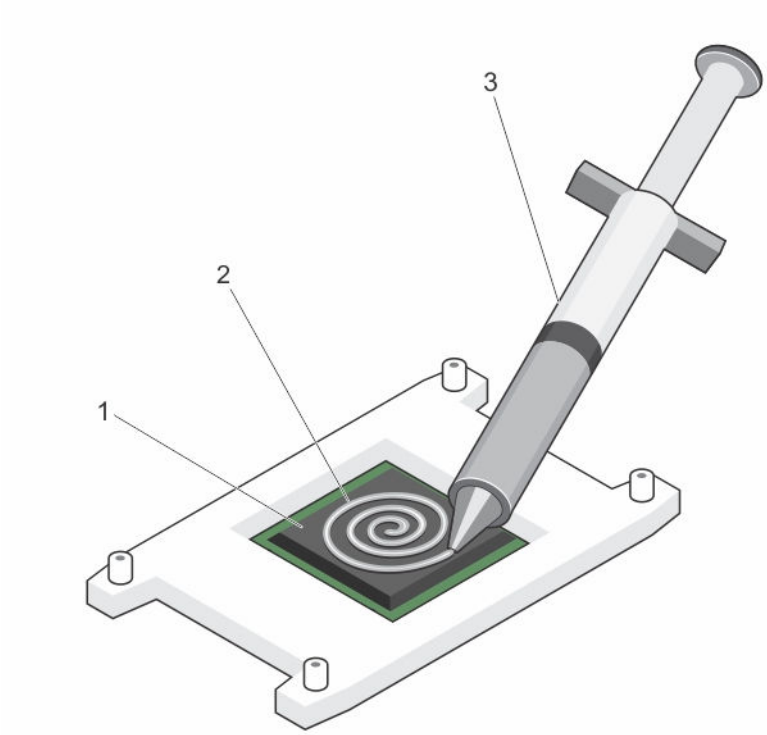

Figure 45. Applying thermal grease on the top of the processor

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

3. Place the heat sink onto the processor.
4. Tighten one of the four screws to secure the heat sink to the system board.
5. Tighten the screw diagonally opposite to the first screw you have tightened.

   NOTE: Do not over-tighten the heat sink retention screws when installing the heat sink. To prevent over-tightening, tighten the retention screw until resistance is felt, and stop after the screw is seated. The screw tension should not be more than 6 in-lb (6.9 kg-cm).
6. Repeat the procedure for the remaining two screws.

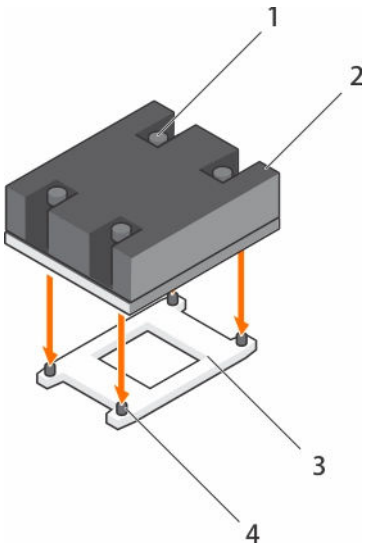

Figure 46. Installing the heat sink

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

Next steps

1. If removed, reinstall the PCIe expansion card riser.
2. If disconnected, reconnect the cables 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 the After working inside your system section.
5. While booting, press F2 to enter System Setup and verify that the processor information matches the new system configuration.
6. Run the system diagnostics to verify that the new processor operates correctly.

Related Links

Safety instructions
Before working inside your system
System Setup
Installing a processor
Installing the expansion card riser
Removing a heat sink
Installing the cooling shroud
After working inside your system

Power supply units

Your system supports the following power supply units (PSUs):

- 450 W AC (non-redundant)
- 550 W AC (redundant)

When two identical PSUs are installed, the power supply configuration is redundant (1 + 1). In redundant mode, power is supplied to the system equally from both PSUs to maximize efficiency.

When only one PSU is installed, the power supply configuration is non-redundant (1 + 0). Power is supplied to the system only by the single PSU.

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

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

Hot spare feature

Your system supports the hot spare feature that significantly reduces the power overhead associated with power supply unit (PSU) redundancy.

When the hot spare feature is enabled, one of the redundant PSUs is switched to the sleep state. The active PSU supports 100 percent of the load, thus operating at higher efficiency. The PSU in the sleep state monitors output voltage of the active PSU. If the output voltage of the active PSU drops, the PSU in the sleep state returns to an active output state.

If having both PSUs active is more efficient than having one PSU in the sleep state, the active PSU can also activate the sleeping PSU.

The default PSU settings are as follows:

- If the load on the active PSU is more than 50 percent, then the redundant PSU is switched to the active state.
- If the load on the active PSU falls below 20 percent, then the redundant PSU is switched to the sleep state.

You can configure the hot spare feature by using the iDRAC settings. For more information about iDRAC settings, see the *Integrated Dell Remote Access Controller User's Guide* available at **Dell.com/idracmanuals**.

Removing a redundant power supply unit

Prerequisites

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

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Disconnect the power cable from the power source.
3. Disconnect the power cable from the PSU and remove the straps that bundle and secure the system cables.

4. Unlatch and lift the optional cable management arm if it interferes with PSU removal. For information about the cable management arm, see the systems rack documentation at **Dell.com/poweredgemanuals**.

Steps

Press the release latch and pull the PSU out of the chassis.

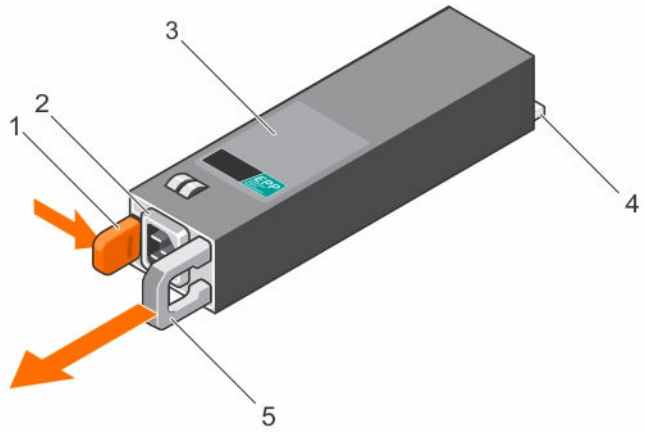

Figure 47. Removing a redundant PSU

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

Next steps

Install the PSU.

NOTE: If you are removing the PSU permanently, install a PSU blank.

Related Links

Safety instructions
Installing a redundant power supply unit
Installing the power supply unit blank

Installing a redundant power supply unit

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Verify that both power supply units (PSUs) are of the same type and have the same maximum output power.

   NOTE: The maximum output power (shown in Watt) is listed on the PSU label.
3. If installed, remove the PSU blank.

Steps

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

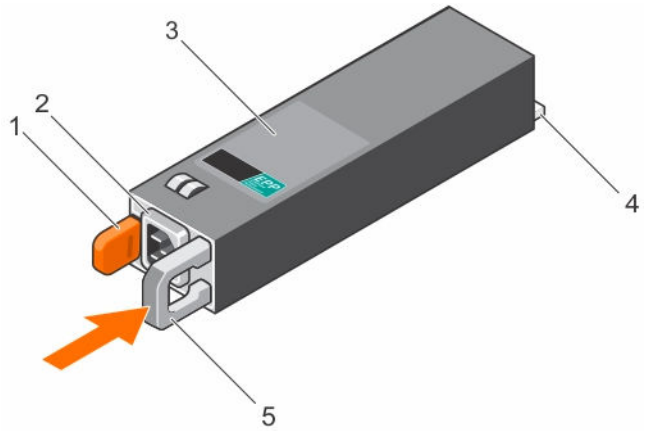

Figure 48. Installing a redundant PSU

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

Next steps

1. If you have unlatched the cable management arm, relatch it. For information about the cable management arm, see the rack documentation of the system.
2. Connect the power cable to the PSU and plug the cable into a power outlet.

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

NOTE: When installing, hot-swapping, or hot-adding a new PSU in a system with two PSUs, allow several seconds for the system to recognize the PSU and determine its status. The PSU status indicator turns green to signify that the PSU is functioning properly.

Related Links

Safety instructions
Removing a cabled power supply unit
Removing the power supply unit blank

Removing a cabled power supply unit

Prerequisites

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

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Disconnect the power cable from the power source.
4. Disconnect the power cable from the power supply unit (PSU) and remove the straps that bundle and secure the system cables.

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

Steps

1. Disconnect all the power cables from the PSU to the system board, hard drives.
2. Remove the screw securing the PSU to the chassis, slide and lift the PSU out of the chassis.

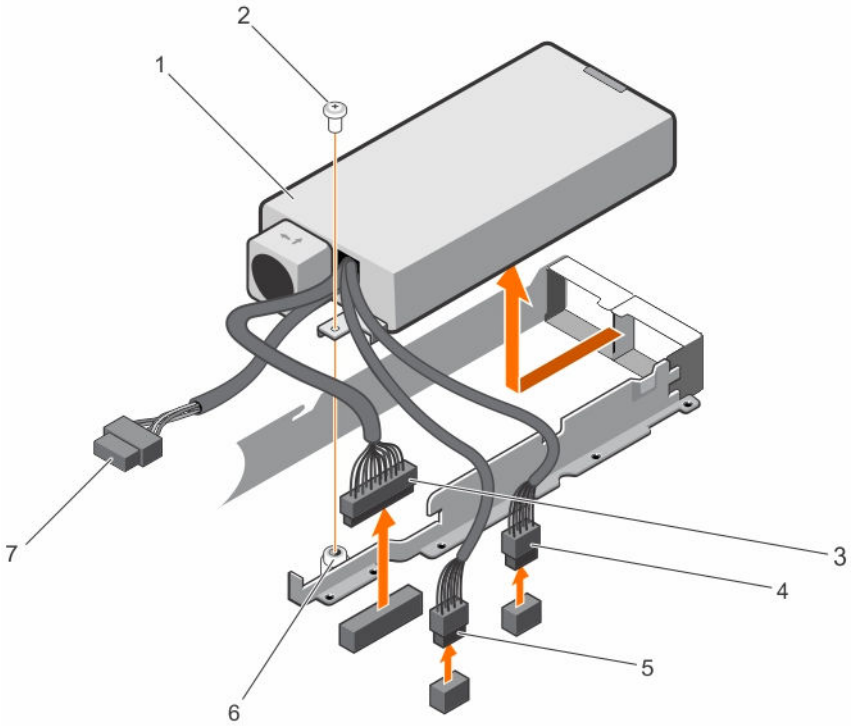

Figure 49. Removing a cabled PSU

1. PSU
2. screw
3. P1 cable connector
4. P2 cable connector
5. P3 cable connector
6. standoff
7. Backplane connector

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing a non-redundant power supply

Installing a non-redundant power supply

Prerequisites

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

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

NOTE: A hot swappable non-redundant PSU must be installed in Slot 1 of the PSU slot.

Steps

1. Slide the PSU into to PSU slot.
2. Align the screw hole on the PSU with the standoff on the chassis.
3. Tighten the screw to secure the PSU to the chassis.
4. Connect all the power cables to the system board, hard drives, and optical drive.

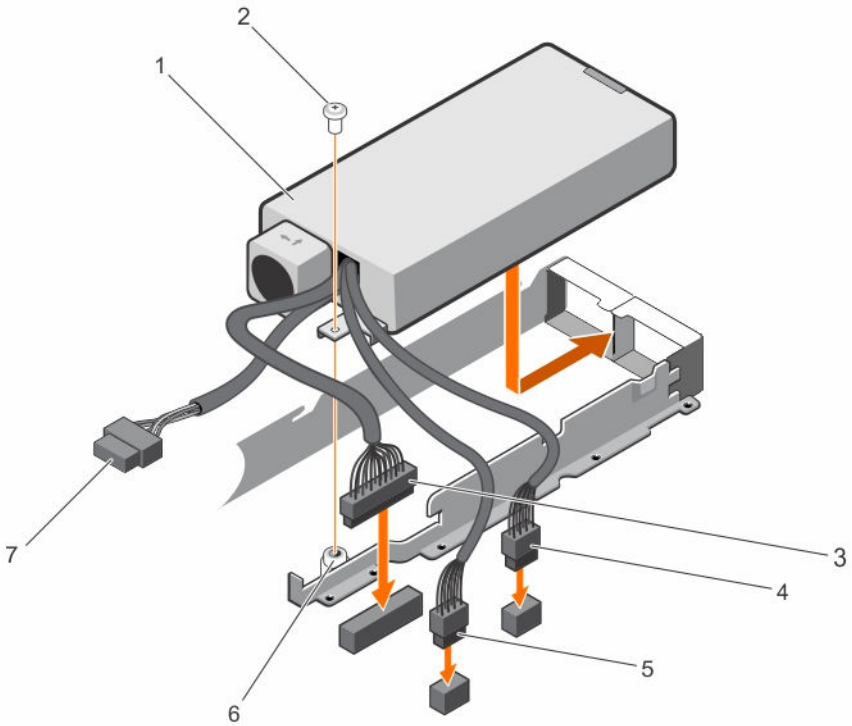

Figure 50. Installing a non-redundant PSU

1. PSU
2. screw
3. P1 cable connector
4. P2 cable connector
5. P3 cable connector
6. standoff
7. Backplane connector

Next steps

1. Follow the procedure listed in the After working inside your system section.
2. Connect the power cable to the PSU and plug the cable into a power outlet.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing a cabled power supply unit

Removing the power supply unit blank

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

Prerequisites

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

Follow the safety guidelines listed in the Safety instructions section.

Steps

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

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

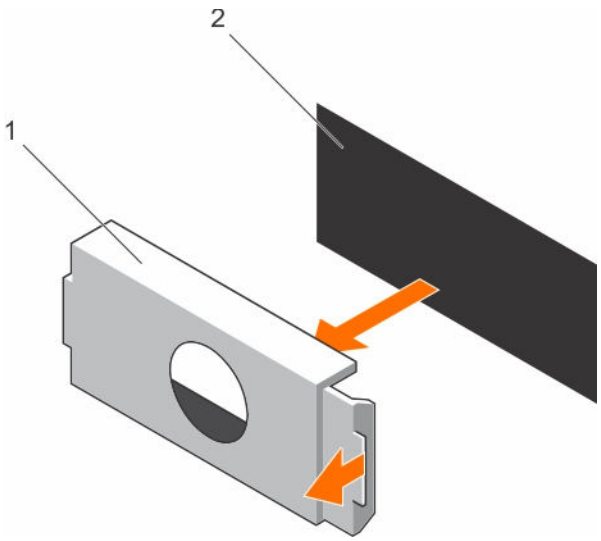

Figure 51. Removing the PSU blank

1. PSU blank
2. PSU bay

Next steps

Install the PSU or PSU blank.

Related Links

Safety instructions
Installing the power supply unit blank
Installing a redundant power supply unit

Installing the power supply unit blank

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

Prerequisites

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

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

Steps

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

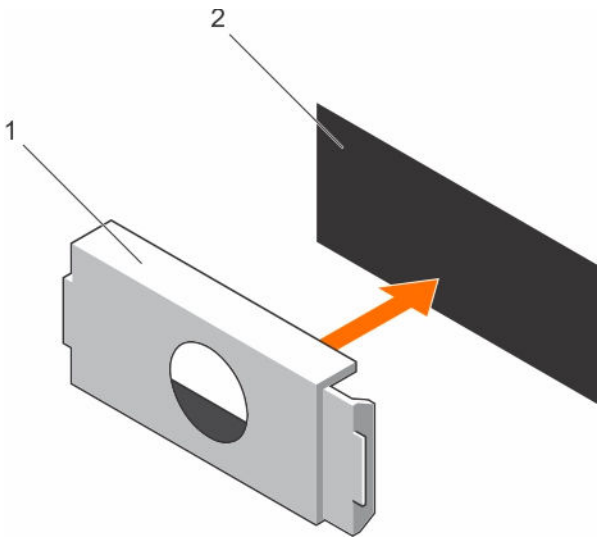

Figure 52. Installing the PSU blank

1. PSU blank
2. PSU bay

Related Links

Safety instructions
Removing the power supply unit blank

System battery

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

Replacing the system battery

Prerequisites

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

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

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

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

Steps

1. Locate the battery socket, see the System board connectors section.

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

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

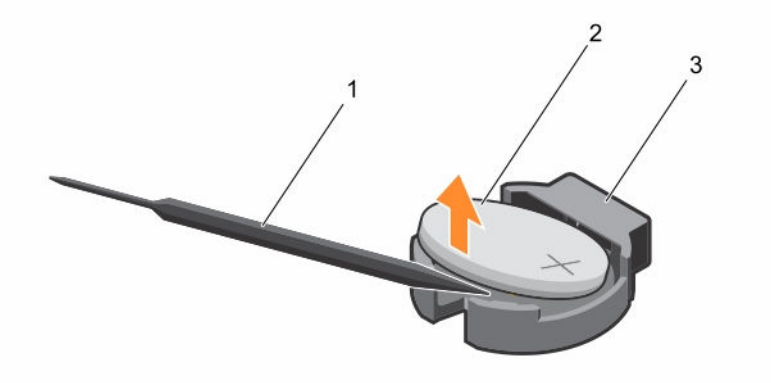

Figure 53. Removing the system battery

1. plastic scribe
2. positive side of battery
3. 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.

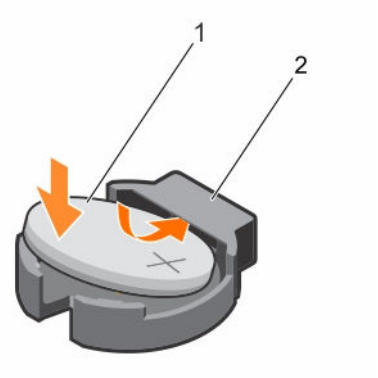

Figure 54. Installing the system battery

1. positive side of battery
2. socket

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 the After working inside your system section.

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 Links

Safety instructions
Before working inside your system
After working inside your system
System board connectors
Removing the expansion card riser
Installing the cooling shroud
Removing the cooling shroud
Removing an expansion card
Installing an expansion card
Installing the expansion card riser
System Setup

Hard drive backplane

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

Dell DSS 1500 supports	Four 3.5-inch or 2.5-inch SAS/SATA backplane
	Eight 2.5-inch SAS/SATA 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 are shipped with your product.

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

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

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

Steps

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

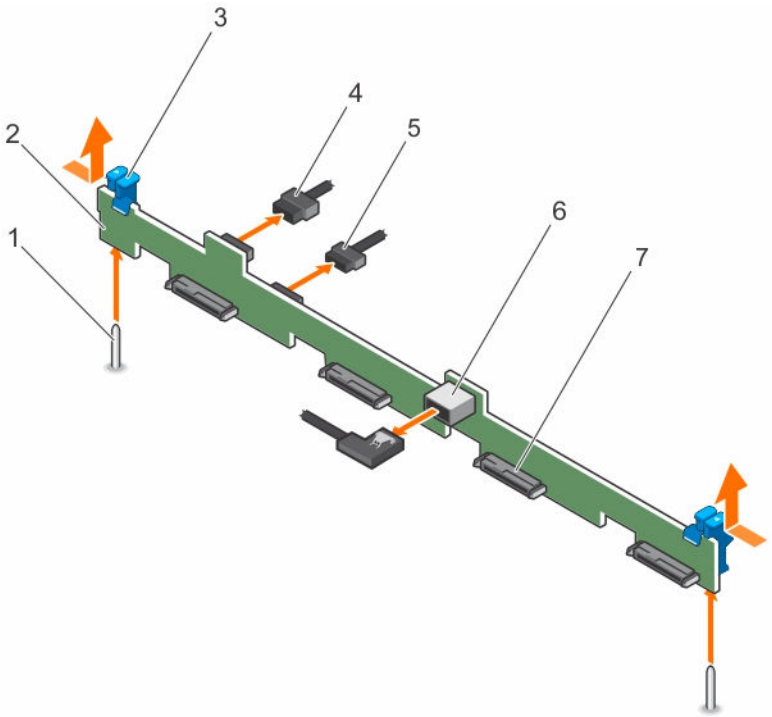

Figure 55. Removing the four 3.5-inch hard drive SAS/SATA backplane

1. guide (2)
2. hard drive/SSD backplane
3. release tab (2)
4. backplane power cable
5. backplane signal cable
6. SAS_A connector on the backplane
7. hard drive/SSD connector (4)

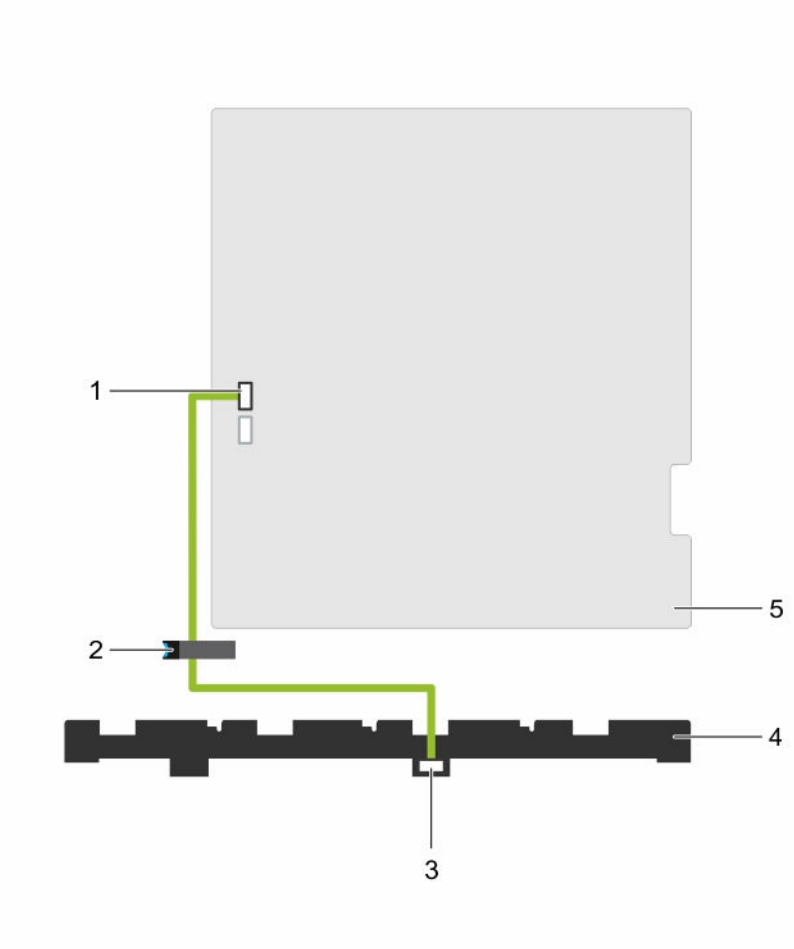

Figure 56. Cabling diagram—Four 3.5-inch (x4) hard drive SAS/SATA backplane

1. SW_RAID_A connector on the system board
2. cable routing latch
3. SAS_A connector on the backplane
4. hard drive backplane
5. system board

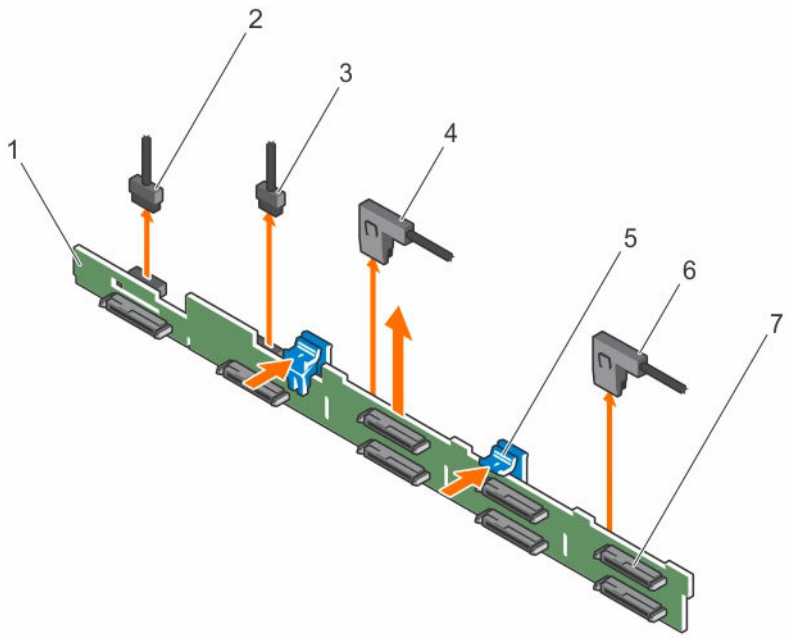

Figure 57. Removing the eight 2.5-inch SAS/SATA backplane

1. hard drive/SSD backplane
2. backplane power cable
3. backplane signal cable
4. SAS_A cable connector
5. release tab (2)
6. SAS_B cable connector
7. hard drive/SSD connector (8)

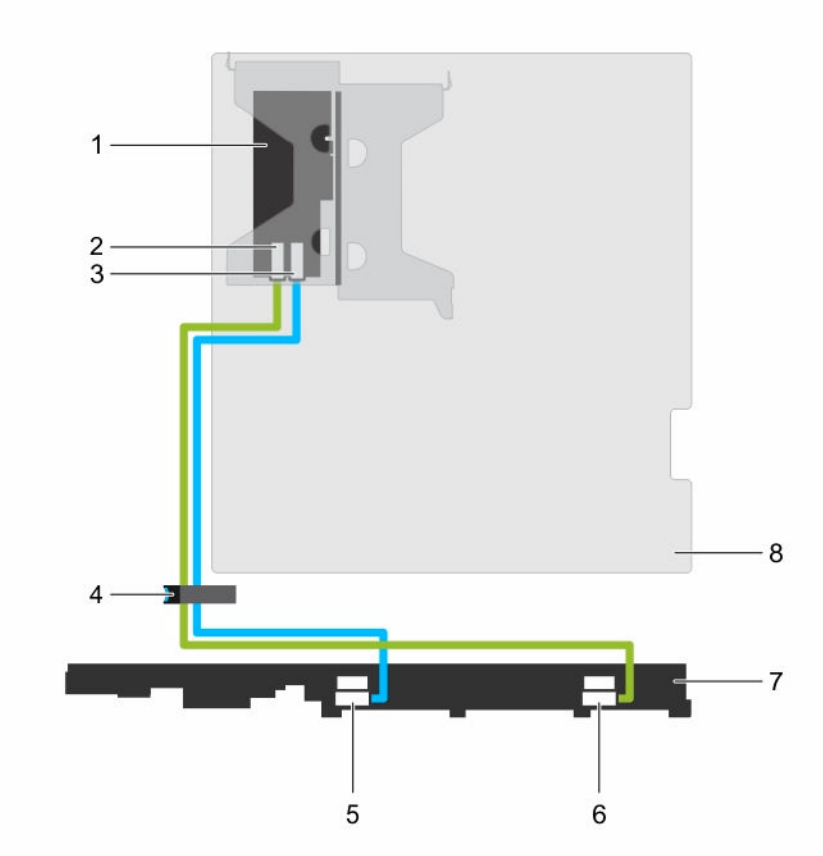

Figure 58. Cabling diagram—Eight 2.5-inch SAS/SATA backplane

1. expansion card
2. SAS_ B connector on the expansion card
3. SAS_ A connector on the expansion card
4. cable routing latch
5. SAS_A connector on the backplane
6. SAS_ B connector on the backplane
7. hard drive/SSD backplane
8. system board

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing a hot swappable hard drive carrier
Installing the hard drive backplane

Installing the hard drive backplane

Prerequisites

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

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

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

Steps

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

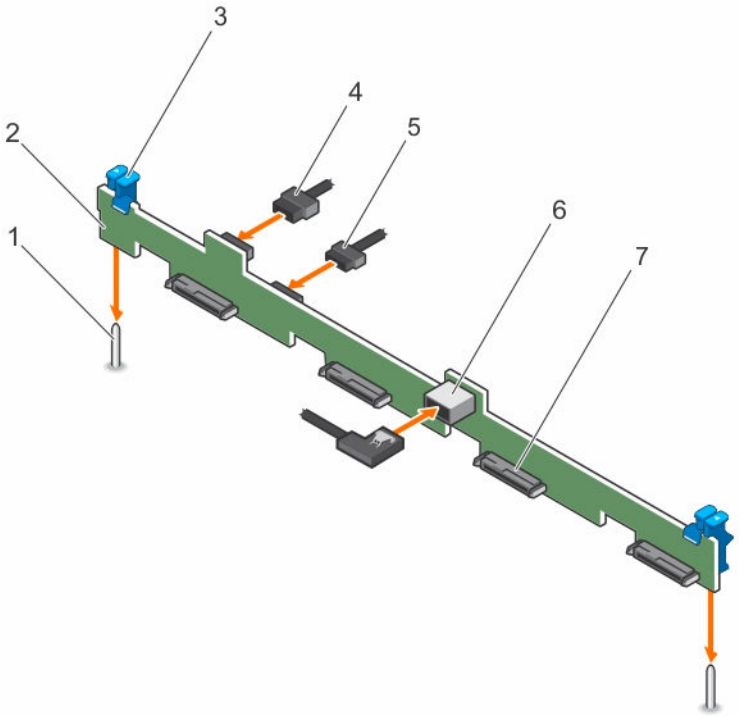

Figure 59. Installing the four 3.5-inch hard drive SAS/SATA backplane

1. guide (2)
2. hard drive/SSD backplane
3. release tab (2)
4. backplane power cable
5. backplane signal cable
6. SAS_A connector on the backplane
7. hard drive/SSD connector (4)

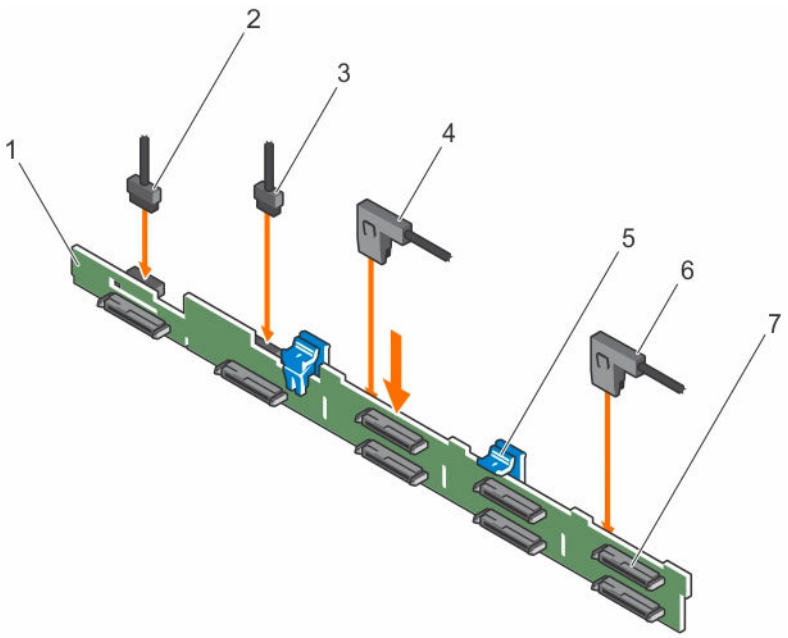

Figure 60. Installing the eight 2.5-inch SAS/SATA backplane

1. hard drive/SSD backplane
2. backplane power cable
3. backplane signal cable
4. SAS_A cable connector
5. release tab (2)
6. SAS_B cable connector
7. hard drive/SSD connector (8)

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing a hot-swappable hard drive carrier

Control panel

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

Removing the control panel

Prerequisites

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

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

Steps

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

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

2. Release the locking tabs of the control panel by angling up the control panel and away from the system.

3. Remove all the cables connecting the control panel to the chassis.

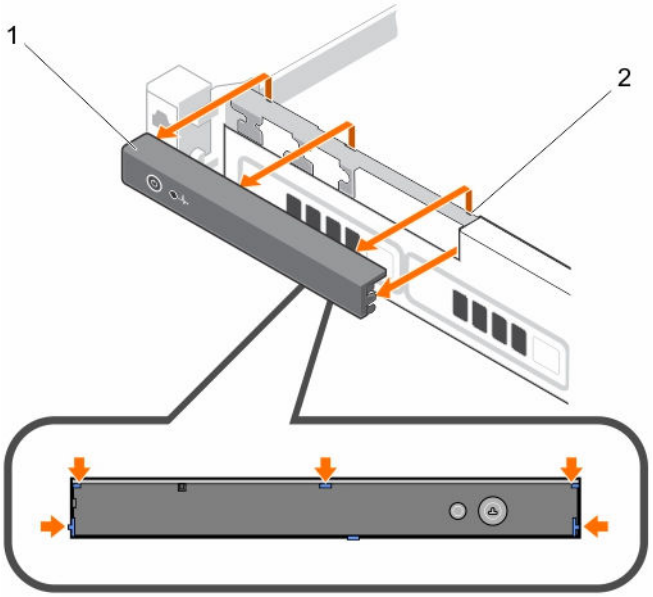

Figure 61. Removing the control panel—four 3.5-inch hard drive chassis

1. control panel
2. notches (6)

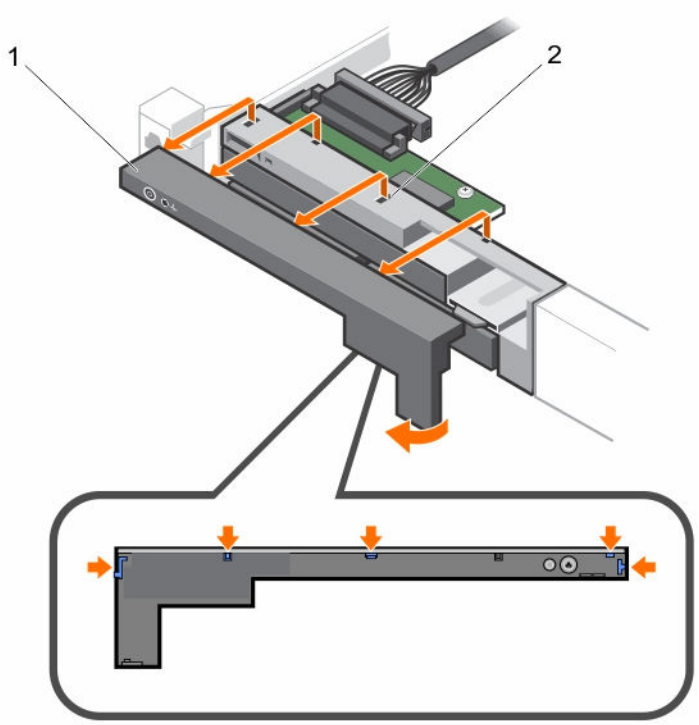

Figure 62. Removing the control panel—eight 2.5-inch hard drive chassis

1. control panel
2. notches (6)

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing the control panel

Installing the control panel

Prerequisites

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

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

Steps

Align the locking tabs on the control panel with the notches on the chassis and angle the control panel until it snaps into place.

When properly seated, the control panel is flush with the front panel.

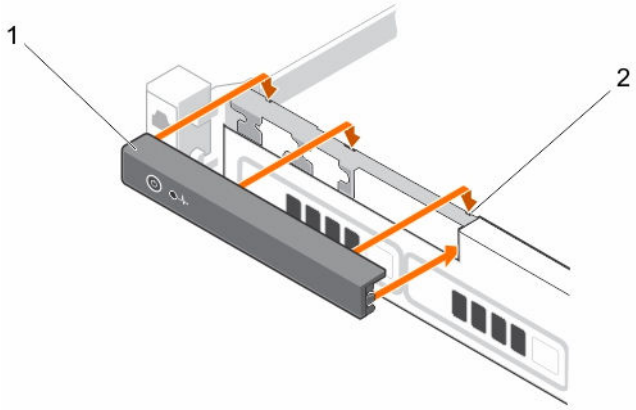

Figure 63. Installing the control panel—four 3.5-inch hard drive chassis

1. control panel
2. notches (6)

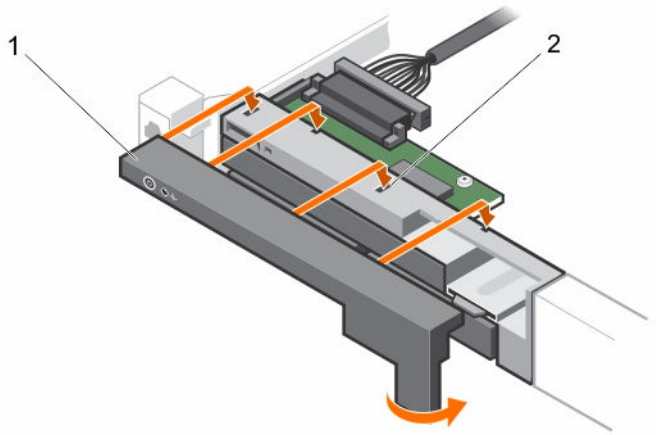

Figure 64. Installing the control panel—eight 2.5-inch hard drive chassis

1. control panel
2. notches (6)

Next steps

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

Related Links

Safety instructions

Before working inside your system

After working inside your system

Removing the control panel

Removing the control panel module

Prerequisites

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

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

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

Steps

1. Remove the screw(s) securing the control panel module to the chassis.
2. Disconnect all the cables connecting the control panel module to the chassis.
3. Slide the control panel module and lift it away from the system.

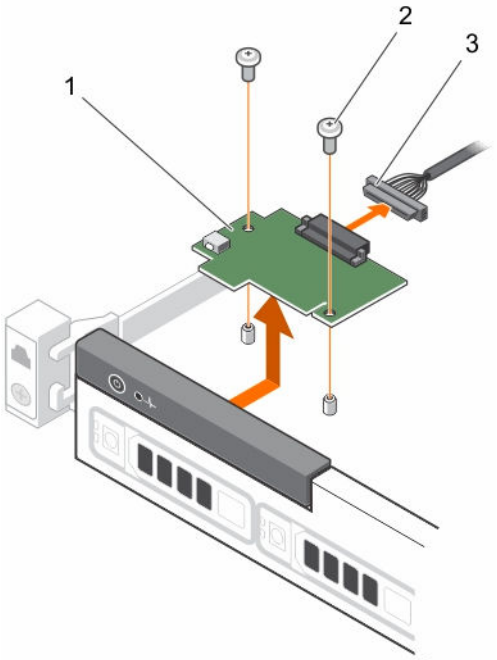

Figure 65. Removing the control panel module—four hard drive chassis

1. control panel module
2. screw (2)
3. control panel module connector cable

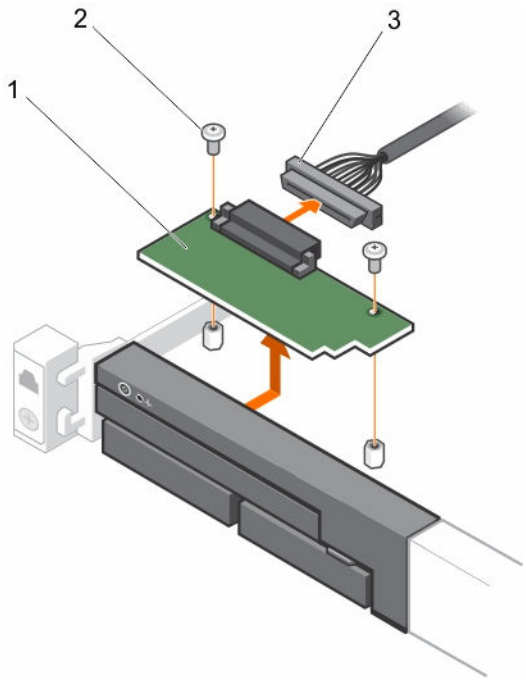

Figure 66. Removing the control panel module—eight hard drive chassis

1. control panel module
2. screw (2)
3. control panel module connector cable

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing the control panel module

Installing the control panel module

Prerequisites

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

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

Steps

1. Insert the control panel module into the slot in the chassis and align the two screw holes on the control panel module with the corresponding holes on the chassis.
2. Secure the control panel module with the screws.
3. Connect all the applicable cables to the control panel module.

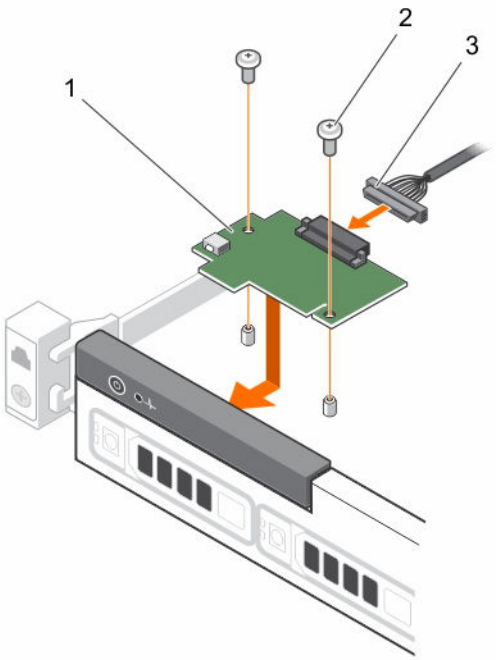

Figure 67. Installing the control panel module—four hard drive chassis

1. control panel module
2. screw (2)
3. control panel module connector cable

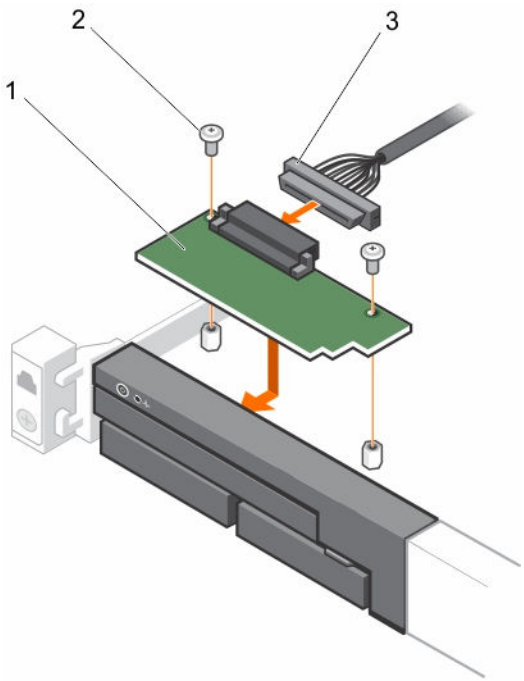

Figure 68. Installing the control panel module—eight hard drive chassis

1. control panel module
2. screw (2)

3. control panel module connector cable

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the control panel module

Power interposer board

The power interposer board (PIB) is a board that connects the redundant power supply units (PSUs) to the system board. The PIB is only supported in systems with redundant PSUs.

Removing the power interposer board

Prerequisites

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

NOTE: The power interposer board (PIB) is present only in systems that support redundant power supply units (PSUs).

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

Steps

1. Disconnect the power distribution cables from the system board.
2. Disconnect the fan cable.
3. Remove the two screws securing the PIB to the chassis and lift the board out of the chassis.

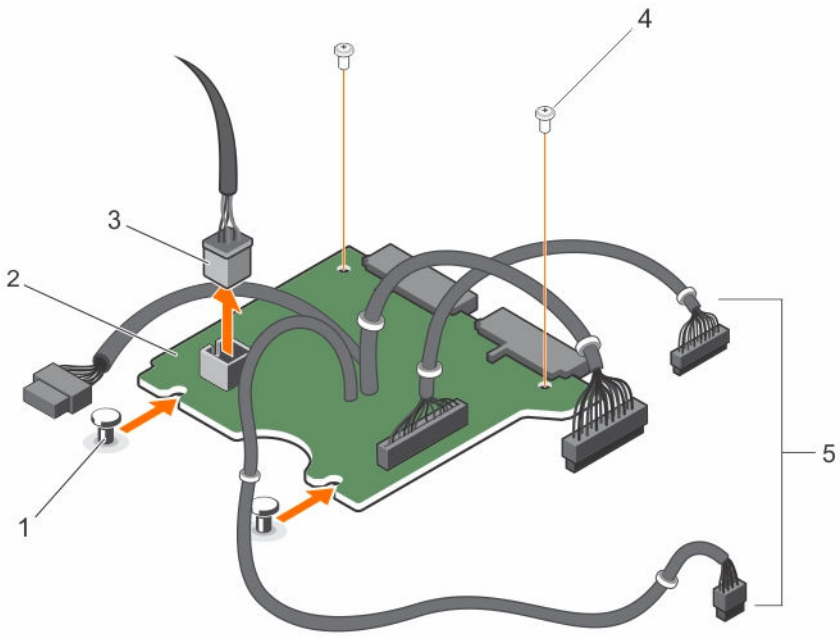

Figure 69. Removing the PIB

1. standoffs (2)
2. PIB
3. fan cable connector
4. screw (2)
5. PSU cables to the system board (3)

Related Links

Safety instructions
Before working inside your system
After working inside your system
Installing the power interposer board

Installing the power interposer board

Prerequisites

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

Follow the safety guidelines listed in the Safety instructions section.

Steps

1. Align the power interposer board (PIB) with the standoffs on the chassis.
2. Install the two screws that secure the PIB to the chassis.
3. Connect the power distribution cables to the system board and fan cable connector to the PIB.

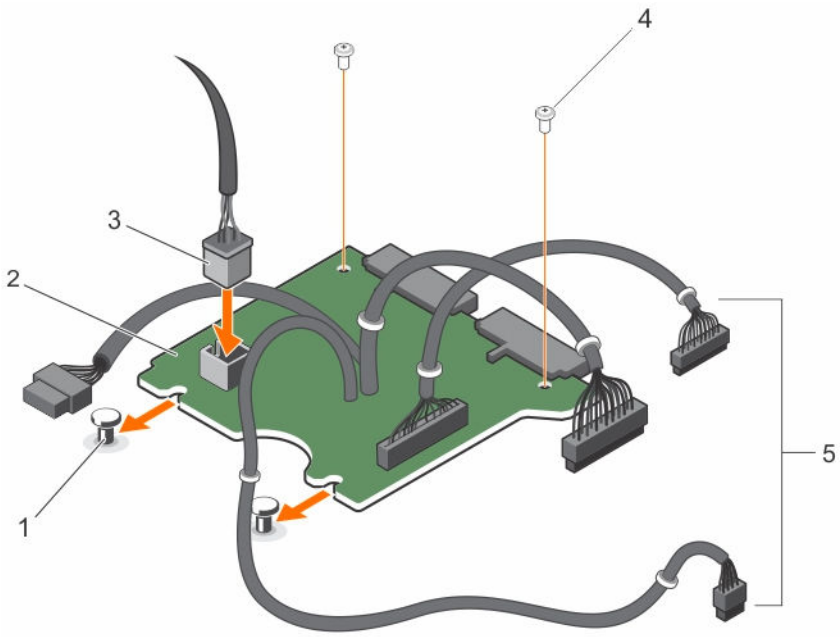

Figure 70. Installing the PIB

1. standoffs (2)
2. PIB
3. fan cable connector
4. screw (2)
5. power supply cables to the system board (3)

Next steps

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

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the power interposer board

System board

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

Removing the system board

Prerequisites

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

CAUTION: If you are using the Trusted Program Module (TPM) with an encryption key, you may be prompted to create a recovery key during program or System Setup. Be sure to create and safely store this recovery key. If you replace this system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your hard drives.

CAUTION: Do not attempt to remove the TPM plug-in module from the system board. Once the TPM plug-in module is installed, it is cryptographically bound to that specific system board. Any attempt to remove an installed TPM plug-in module breaks the cryptographic binding, and it cannot be re-installed or installed on another system board.

1. Follow the safety guidelines listed in the Safety instructions section.
2. Follow the procedure listed in the Before working inside your system section.
3. Remove the following:
   a. cooling shroud
   b. memory modules
   c. cooling fan cables
   d. expansion cards
   e. expansion card riser
   f. heat sink and processor

Steps

1. Disconnect all other cables from the system board.

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

2. Remove the nine screws on the system board and slide the system board toward the front of the system.
3. Hold the system board and lift it out of the chassis.

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

   NOTE: To prevent damage to the system board, ensure that you hold the system board by its edges only.

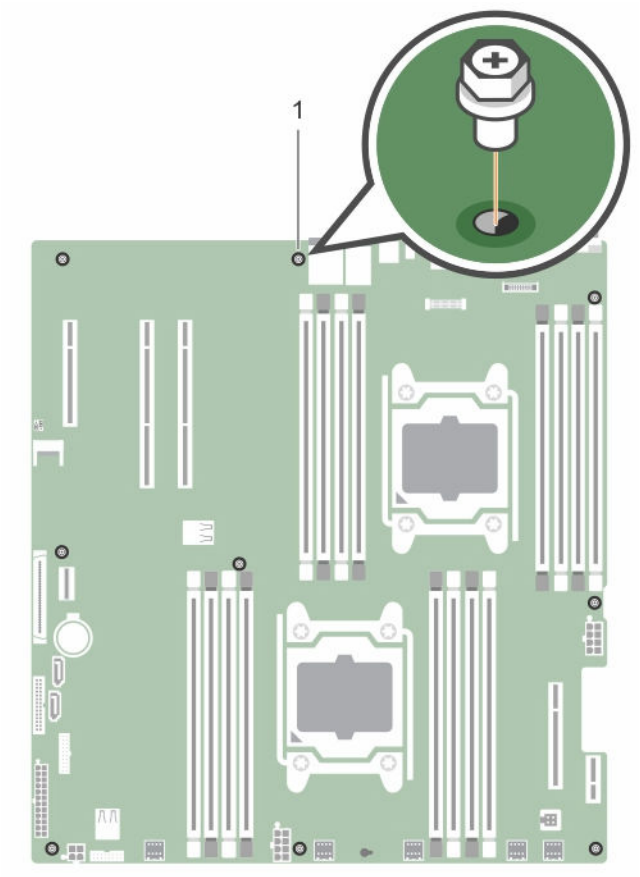

Figure 71. Screw location on the system board

1. screw (9)

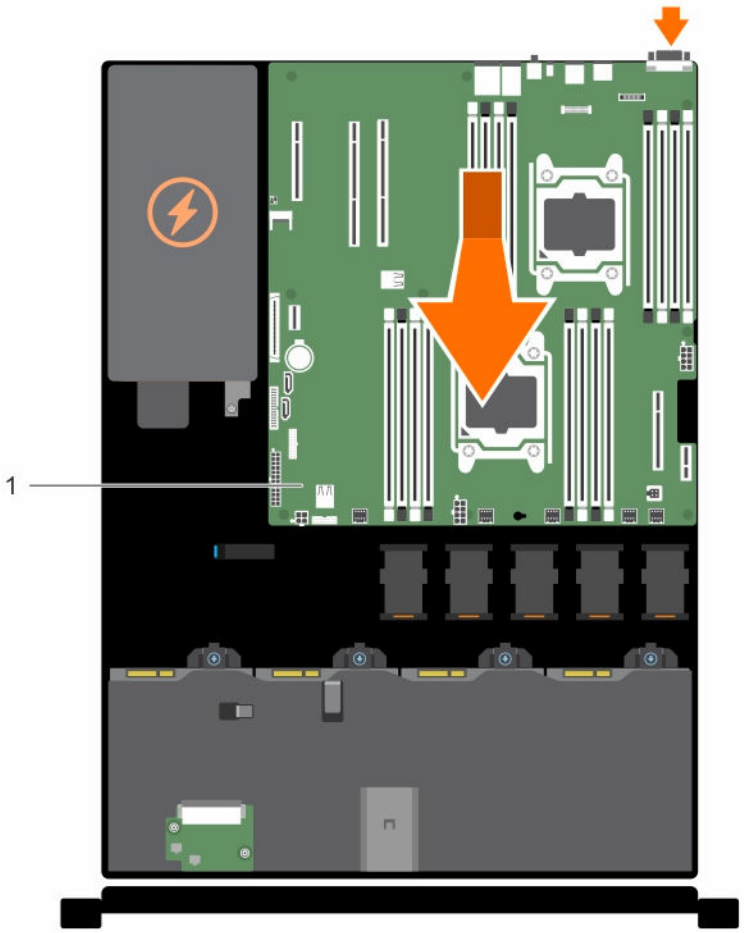

Figure 72. Removing the system board

1. system board

Related Links

- Safety instructions
- Before working inside your system
- After working inside your system
- Installing the system board
- Removing the cooling shroud
- Removing an expansion card
- Removing memory modules
- Removing the expansion card riser
- Removing a processor
- Removing a cooling fan
- Removing a heat sink

Installing the system board

Prerequisites

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

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

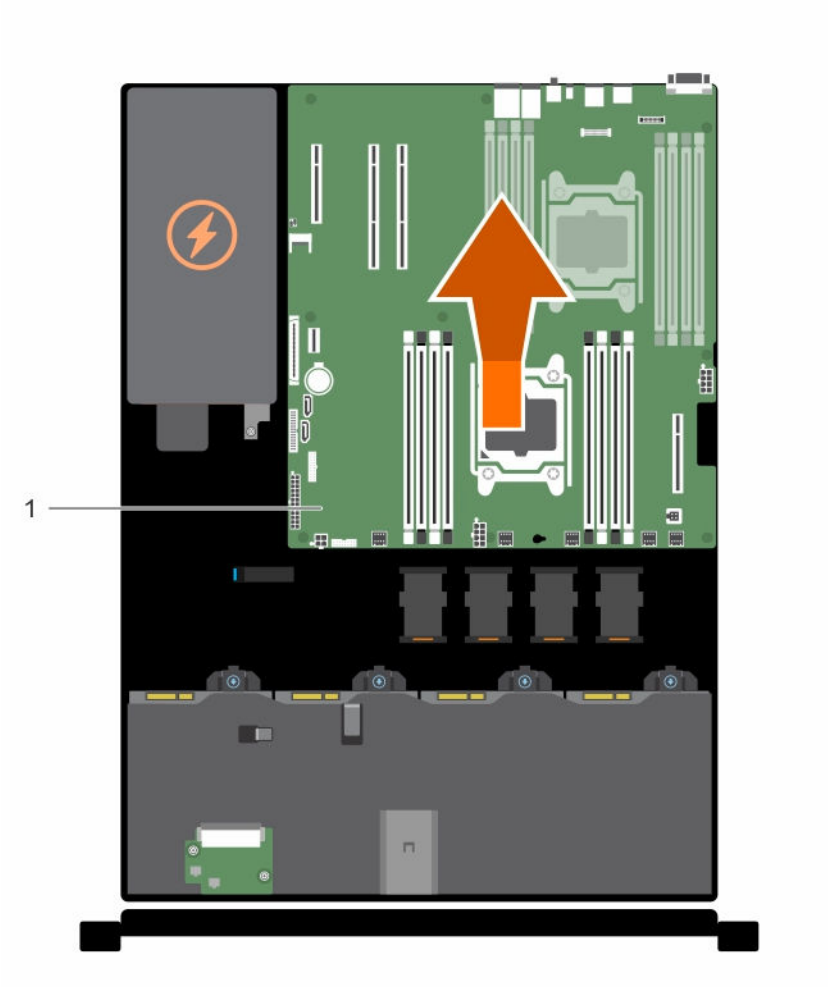

Figure 73. Installing the system board

1. system board

4. Tighten the screws to secure the system board to the chassis.

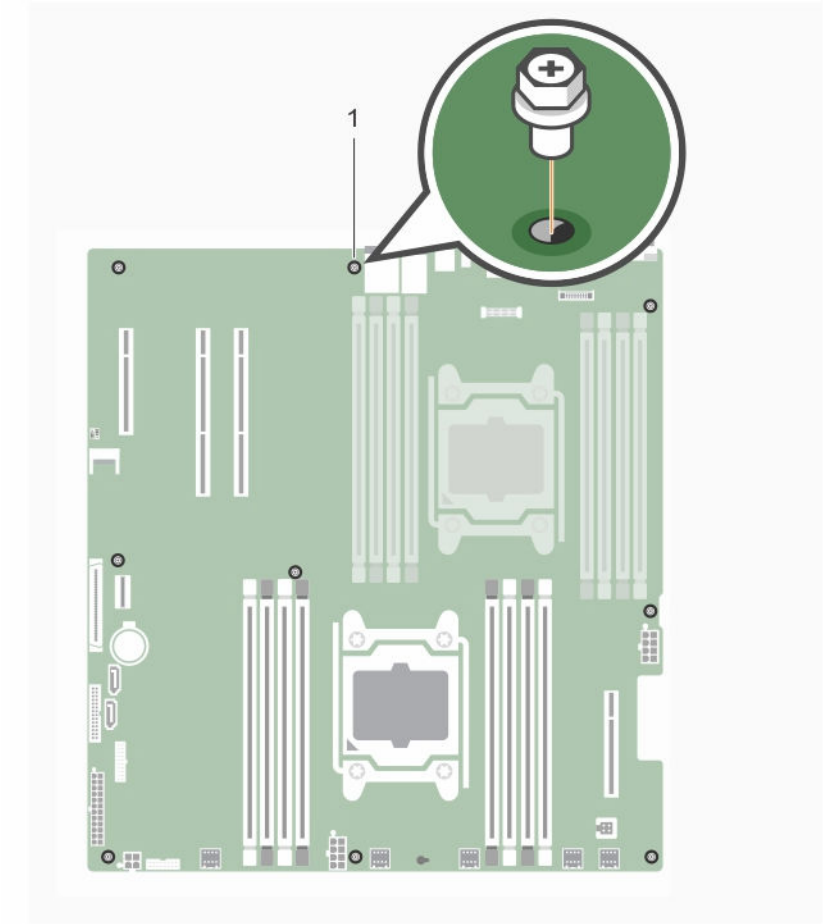

Figure 74. Screw location on the system board

1. screw (9)

Next steps

1. Install / connect the following components:
   a. the expansion card riser
   b. heat sink(s) and processors(s)
   c. processor blank(s) and heat sink blank(s), if installed
   d. memory modules and memory module blanks
   e. cooling fans
   f. cooling shroud
   g. 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 the After working inside your system section.
4. Ensure that you:

a. Use the Easy Restore feature to restore the service tag.
b. Update the BIOS and iDRAC versions.

Related Links

Safety instructions
Before working inside your system
After working inside your system
Removing the system board
Installing an expansion card
Installing the expansion card riser
Installing the cooling shroud
Installing memory modules
Installing a processor
Installing a heat sink
Installing a cooling fan
Installing a redundant power supply unit

Restoring the Service Tag by using the Easy Restore feature

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

1. Turn on the system.
   If BIOS detects a new system board, and if the Service Tag is present in the backup flash device, BIOS displays the Service Tag, the status of the license, and the **UEFI Diagnostics** version.
2. Press **Y** to restore the Service Tag, license, and diagnostics information.
   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 by using System Setup

If Easy Restore fails to restore the service tag, use System Setup to enter the service tag.

1. Turn on the system.
2. Press F2 to enter System Setup.
3. Click **service tag Settings**.
4. Enter the service tag.

   NOTE: You can enter the service tag only when the **service tag** field is empty. Ensure that you enter the correct service tag. After the service tag is entered, it cannot be updated or changed.
5. Click **Ok**.

7

Troubleshooting your system

Safety first — for you and your system

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

NOTE: Solution validation was performed by using the factory shipped hardware configuration.

Troubleshooting system startup failure

If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system stops responding. To avoid this issue, you must boot to the same boot mode in which you installed the operating system.

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

Troubleshooting external connections

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

Troubleshooting the video subsystem

Prerequisites

Steps

1. Check the cable connections (power and display) to the monitor.
2. Check the video interface cabling from the system to the monitor.
3. Run the appropriate diagnostic test.

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

Next steps

If the tests fail, see the Getting help section.

Related Links

Getting help

Troubleshooting a USB device

Prerequisites

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

Steps

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

   NOTE: Older operating systems may not support USB 3.0.
4. Check if USB 3.0 is enabled in System Setup. If enabled, disable it and see if the issue is resolved.
5. If the problem is not resolved, replace the keyboard and/or mouse with a known working keyboard or mouse.

   If the problem is not resolved, proceed to step 7 to troubleshoot other USB devices attached to the system.
6. Turn off all attached USB devices, and disconnect them from the system.
7. Restart the system.
8. If your keyboard is functioning, enter System Setup, verify that all USB ports are enabled on the **Integrated Devices** screen. If your keyboard is not functioning, use remote access to enable or disable the USB options.
9. Check if USB 3.0 is enabled in System Setup. If it is enabled, disable it and restart your system.
10. If the system is not accessible, reset the NVRAM_CLR jumper inside your system and restore the BIOS to the default settings. See the System board jumper setting section
11. Reconnect and turn on each USB device one at a time.
12. If a USB device causes the same problem, turn off the device, replace the USB cable with a known good cable, and turn on the device.

Next steps

If all troubleshooting fails, see the Getting help section.

Related Links

Getting help
System Setup
System board jumper settings

Troubleshooting a serial I/O device

Steps

1. Turn off the system and any peripheral devices connected to the serial port.
2. Swap the serial interface cable with a known working cable, and turn on the system and the serial device.

   If the problem is resolved, replace the interface cable with a known working cable.
3. Turn off the system and the serial device, and swap the serial device with a compatible device.
4. Turn on the system and the serial device.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help

Troubleshooting a NIC

Steps

1. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section for the available diagnostic tests.
2. Restart the system and check for any system messages pertaining to the NIC controller.
3. Check the appropriate indicator on the NIC connector:
   - If the link indicator does not glow, the cable connected might be disengaged.
   - If the activity indicator does not glow, the network driver files might be damaged or missing. Install or replace the drivers as necessary. For more information, see the NIC documentation.
   - Try another known good network cable.
   - If the problem persists, use another connector on the switch or hub.
4. Ensure that the appropriate drivers are installed and the protocols are bound. For more information, see the NIC documentation.
5. Enter System Setup and confirm that the NIC ports are enabled on the **Integrated Devices** screen.
6. Ensure that all the NICs, hubs, and switches on the network are set to the same data transmission speed and duplex. For more information, see the documentation for each network device.
7. Ensure that all network cables are of the proper type and do not exceed the maximum length.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help

Using system diagnostics

Troubleshooting a wet system

Prerequisites

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

Steps

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Remove the following components (if installed) from the system:
   - Power supply unit(s)
   - Optical drive

- Hard drives
- Hard drive backplane
- USB memory key
- Hard drive tray
- Cooling shroud
- Expansion card risers (if installed)
- Expansion cards
- Cooling fan assembly (if installed)
- Cooling fans
- Memory modules
- Processor(s) and heat sink(s)
- System board

4. Let the system dry thoroughly for at least 24 hours.
5. Reinstall the components you removed in step 3 except the expansion cards.
6. Install the system cover.
7. Turn on the system and attached peripherals.

   If the problem persists, see the Getting help section.
8. If the system starts properly, turn off the system, and reinstall all the expansion cards that you removed.
9. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Next steps

If the tests fail, see the Getting help section.

Related Links

Getting help
Using system diagnostics
Removing the system cover
Removing the hard drive backplane
Removing the cooling shroud
Removing a cooling fan
Removing a redundant power supply unit
Removing a cabled power supply unit
Removing a hot swappable hard drive carrier
Removing the expansion card riser
Removing a heat sink
Removing a processor
Removing memory modules
Removing an expansion card
Removing the system board
Installing the system cover

Troubleshooting a damaged system

Prerequisites

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

Steps

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the system cover.
3. Ensure that the following components are properly installed:
   - cooling shroud
   - expansion card risers (if installed)
   - expansion cards
   - power supply unit(s)
   - cooling fan assembly (if installed)
   - cooling fans
   - processor(s) and heat sink(s)
   - memory modules
   - hard drive carriers/cage
   - hard drive backplane
4. Ensure that all cables are properly connected.
5. Install the system cover.
6. Run the appropriate diagnostic test. For more information, see the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help
Using system diagnostics
Removing the system cover
Installing the cooling shroud
Installing a cooling fan
Installing the expansion card riser
Installing an expansion card
Installing a redundant power supply unit
Removing a cabled power supply unit
Installing a heat sink
Installing a processor
Installing memory modules
Installing a hot-swappable hard drive carrier
Installing the hard drive backplane
Installing the system cover

Troubleshooting the system battery

Prerequisites

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

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

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

Steps

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

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

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help

System Setup

Troubleshooting power supply units

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

Troubleshooting power source problems

1. Press the power button to ensure that your system is turned on. If the power indicator does not glow when the power button is pressed, press the power button firmly.
2. Plug in another working power supply unit to ensure that the system board is not faulty.
3. Ensure that no loose connections exist.

   For example, loose power cables.
4. Ensure that the power source meets applicable standards.
5. Ensure that there are no short circuits.
6. Have a qualified electrician check the line voltage to ensure that it meets the needed specifications.

Power supply unit problems

1. Ensure that no loose connections exist.

   For example, loose power cables.
2. Ensure that the power supply unit (PSU) handle or LED indicates that the PSU is working properly.

   For more information about PSU indicators, see the Power indicator codes section.
3. If you have recently upgraded your system, ensure that the PSU has enough power to support the new system.
4. If you have a redundant PSU configuration, ensure that both the PSUs are of the same type and wattage.

   You may have to upgrade to a higher wattage PSU.
5. Ensure that you use only PSUs with the Extended Power Performance (EPP) label on the back.
6. Reseat the PSU.

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

   If the problem persists, see the Getting help section.

Related Links

Getting help
Redundant power supply unit indicator codes
Non-redundant power supply unit indicator codes

Troubleshooting cooling problems

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

Ensure that the following conditions exist:

- System cover, cooling shroud, EMI filler panel, memory module blank, or back filler bracket is not removed.
- Ambient temperature is not higher than the system specific ambient temperature.
- External airflow is not obstructed.
- A cooling fan is not removed or has not failed.
- The expansion card installation guidelines have been followed.

Additional cooling can be added by one of the following methods:

From the iDRAC web GUI:

1. Click **Hardware → Fans → Setup**.
2. From the **Fan Speed Offset** drop-down list, select the cooling level required or set the minimum fan speed to a custom value.

From F2 System Setup:

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

From RACADM commands:

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

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

Troubleshooting cooling fans

Prerequisites

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

NOTE: The fan number is referenced by the systems management software. In the event of a problem with a particular fan, you can easily identify and replace it by noting down the fan numbers on the cooling fan assembly.

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

Steps

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

Next steps

1. Follow the procedure listed in the After working inside your system section.
2. If the problem persists, see the Getting help section.

Related Links

Safety instructions
Getting help
Before working inside your system
Removing the system cover
Installing a cooling fan
Installing the system cover

Troubleshooting system memory

Prerequisites

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

Steps

1. If the system is operational, run the appropriate system diagnostic test. See the Using system diagnostics section for the available diagnostic tests.

   If the diagnostic tests indicate a fault, follow the corrective actions provided by the diagnostic tests.
2. If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least for 10 seconds, and then reconnect the system to the power source.
3. Turn on the system and attached peripherals, and note the messages on the screen.

   If an error message is displayed indicating a fault with a specific memory module, go to step 12.
4. Enter System Setup, and check the system memory setting. Make any changes to the memory settings, if needed.

   If the memory settings match the installed memory but the problem still persists, go to step 12.
5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Remove the system cover.
7. Check the memory channels and ensure that they are populated correctly.

   NOTE: See the system event log or system messages for the location of the failed memory module. Reinstall the memory device.
8. Reseat the memory modules in their sockets.
9. Install the system cover.
10. Enter System Setup and check the system memory setting.

    If the problem is not resolved, proceed with step 11.
11. Remove the system cover.
12. If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module with a known working memory module.
13. To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity.

    If an error message is displayed on the screen, this may indicate a problem with the installed DIMM type(s), incorrect DIMM installation, or defective DIMM(s). Follow the on-screen instructions to resolve the problem.
14. Install the system cover.
15. As the system boots, observe any error message that is displayed and the diagnostic indicators on the front of the system.
16. If the memory problem persists, repeat step 12 through step 15 for each memory module installed.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help
System Setup
Using system diagnostics
Removing the system cover
Removing memory modules
Installing memory modules
Installing the system cover

Troubleshooting a hard drive

Prerequisites

CAUTION: This troubleshooting procedure can erase data stored on the hard drive. Before you proceed, back up all files on the hard drive.

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

Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.

   Depending on the results of the diagnostics test, proceed as needed through the following steps.
2. If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:
   a. Ensure that the hard drives are configured correctly for the RAID array.
   b. Take the hard drive offline and reseat the drive.
   c. Exit the configuration utility and allow the system to boot to the operating system.
3. Ensure that the needed device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
4. Restart the system and enter the System Setup.
5. Verify that the controller is enabled and the drives are displayed in the System Setup.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help
Using system diagnostics
System Setup

Troubleshooting a storage controller

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

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

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Verify that the installed expansion cards are compliant with the expansion card installation guidelines.

5. Ensure that each expansion card is firmly seated in its connector.
6. Install the system cover.
7. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
8. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
9. Remove the system cover.
10. Remove all expansion cards installed in the system.
11. Install the system cover.
12. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
13. Run the appropriate diagnostic test. See the Using system diagnostics section. If the tests fail, see the Getting help section.
14. For each expansion card you removed in step 10, perform the following steps:
    a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
    b. Remove the system cover.
    c. Reinstall one of the expansion cards.
    d. Install the system cover.
    e. Run the appropriate diagnostic test. See the Using system diagnostics section.

If the problem persists, see the Getting help section.

Related Links

Getting help
Using system diagnostics
Removing the system cover
Removing an expansion card
Installing an expansion card
Installing the system cover

Troubleshooting expansion cards

Prerequisites

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

Steps

1. Run the appropriate diagnostic test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Ensure that each expansion card is firmly seated in its connector.
5. Install the system cover.
6. Turn on the system and attached peripherals.

7. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
8. Remove the system cover.
9. Remove all expansion cards installed in the system.
10. Install the system cover.
11. Run the appropriate diagnostic test. See the Using system diagnostics section.

    If the tests fail, see the Getting help section.
12. For each expansion card you removed in step 8, perform the following steps:
    a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
    b. Remove the system cover.
    c. Reinstall one of the expansion cards.
    d. Install the system cover.
    e. Run the appropriate diagnostic test. See the Using system diagnostics section.

Next steps

If the problem persists, see the Getting help section.

Related Links

Getting help
Using system diagnostics
Removing the system cover
Removing an expansion card
Installing an expansion card
Installing the system cover

Troubleshooting processors

Prerequisites

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Steps

1. Run the appropriate diagnostics test. See the Using system diagnostics section.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Remove the system cover.
4. Ensure that the processor and heat sink are properly installed.
5. Install the system cover.
6. Run the appropriate diagnostic test. See the Using system diagnostics section.
7. If the problem persists, see the Getting help section.

Related Links

Getting help
Using system diagnostics
Removing the system cover
Installing the system cover

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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

Running the Embedded System Diagnostics from Boot Manager

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

Steps

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

System diagnostic controls

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

Menu	Description
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.

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Jumpers and connectors

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

System board jumper settings

For information about resetting the password jumper to disable a password, see the Disabling a forgotten password section.

Table 33. 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).

Related Links

Disabling a forgotten password

Disabling a forgotten password

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

Prerequisites

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Steps

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

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

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

Related Links

Removing the system cover
Installing the system cover

System board connectors

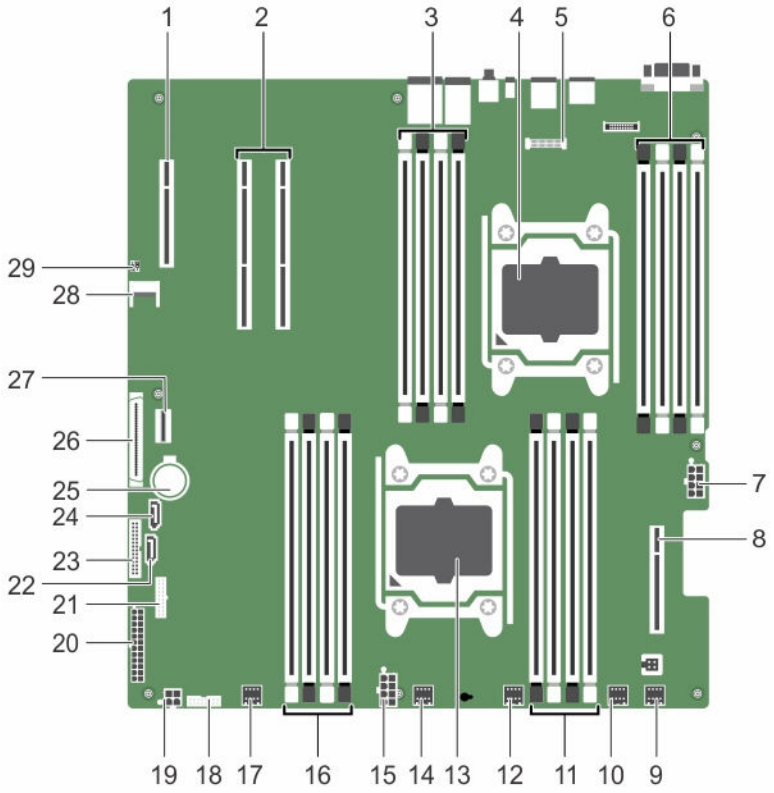

Figure 75. System board jumpers and connectors

Table 34. System board jumpers and connectors

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 and 1
4	CPU2	Processor socket 2
5	J-AMEA	Remote management port card connector
6	B8, B4, B7, B3	DIMMS for CPU2 channels 2 and 3
7	PWR_CONN_C(P3)	CPU2 power connector
8	PCIE_G3_X8 (CPU2)	Internal PCIe slot
9	FAN6	Cooling fan 6 connector
10	FAN5	Cooling fan 5 connector
11	A1, A5, A2, A6	DIMMS for CPU1 channels 0 and 1

Item	Connector	Description
12	FAN4	Cooling fan 4 connector
13	CPU1	Processor socket 1
14	FAN3	Cooling fan 3 connector
15	PWR_CONN_B (P2)	CPU1 power connector
16	A8, A4, A7, A3	DIMMS for CPU1 channels 2 and 3
17	FAN2	Cooling fan 2 connector
18	BP_SIG	Backplane signal connector
19	HDD_PWR	Hard drive power connector
20	SYS_PWR_CONN(P1)	24-pin power connector
21	FP_USB	Front-panel USB connector
22	SATA_CDROM	SATA connector CDROM
23	PIB_CONN	Power interposer board signal connector
24	SATA_TBU	SATA connector tape backup unit
25	BATTERY	System battery connector
26	CTRL_PNL	Control panel signal connector
27	J_SATA_A	MINI SAS connector
28	TPM_MODULE	Trusted Platform Module connector
29	J_PSWD_NVRAM	Clear password or NVRAM jumpers

Related Links

Removing the system cover
Installing the system cover

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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 about your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer-service issues:

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

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