

Dell™ PowerEdge™ R810

Hardware Owner's Manual

Regulatory Model: E05S
Regulatory Type: E05S001



Notes, Cautions, and Warnings



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



CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.



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

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February 2010

Rev. A00

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About Your System

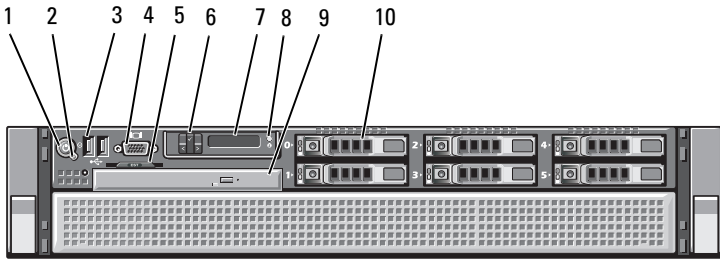
Accessing System Features During Startup


The following keystrokes provide access to system features during startup.




Keystroke	Description
<F2>	Enters the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
<F10>	Enters System Services, which opens the Lifecycle Controller. The Lifecycle Controller allows you to access utilities such as embedded system diagnostics. For more information, see the Lifecycle Controller documentation on the Dell Support website at support.dell.com/manuals .
<F11>	Enters the BIOS Boot Manager or the UEFI Boot Manager, depending on the system's boot configuration. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
<F12>	Starts PXE boot.
<Ctrl><E>	Enters the iDRAC Configuration Utility, which allows access to the System Event Log (SEL) and configuration of remote access to the system. For more information, see the iDRAC user documentation on the Dell Support website at support.dell.com/manuals .
<Ctrl><C>	Enters the SAS Configuration Utility. For more information, see the SAS adapter documentation on the Dell Support website at support.dell.com/manuals .
<Ctrl><R>	Enters the PERC configuration utility. For more information, see the PERC card documentation on the Dell Support website at support.dell.com/manuals .
<Ctrl><S>	Enters the utility to configure NIC settings for PXE boot. For more information, see the documentation for your integrated NIC on the Dell Support website at support.dell.com/manuals .


Front-Panel Features and Indicators

Figure 1-1. Front-Panel Features and Indicators



Item	Indicator, Button, or Connector	Icon	Description
1	Power-on indicator, power button		<p>The power-on indicator lights when the system power is on.</p> <p>The power button controls the DC power supply output to the system. When the system bezel is installed, the power button is not accessible.</p> <p>NOTE: When powering on the system, the video monitor can take from several seconds to over two minutes to display an image, depending on the amount of memory installed in the system. During this time, the LCD panel displays the following message: "System booting..."</p> <p>NOTE: On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.</p>

Item	Indicator, Button, or Connector	Icon	Description
2	NMI button		Used to troubleshoot software and device driver errors when using certain operating systems. This button can be pressed using the end of a paper clip. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.
3	USB connectors (2)		Connect USB devices to the system. The ports are USB 2.0-compliant.
4	Video connector		Connects a monitor to the system.
5	System identification panel		A slide-out panel for system information including the Express Service Tag, embedded NIC MAC address, and iDRAC6 Enterprise card MAC address. Space is provided for an additional label.
6	LCD menu buttons		Allows you to navigate the control panel LCD menu.
7	LCD panel		Provides system ID, status information, and system error messages. The LCD lights blue during normal system operation. The LCD lights amber when the system needs attention, and the LCD panel displays an error code followed by descriptive text. NOTE: If the system is connected to AC power and an error has been detected, the LCD lights amber regardless of whether the system has been powered on.

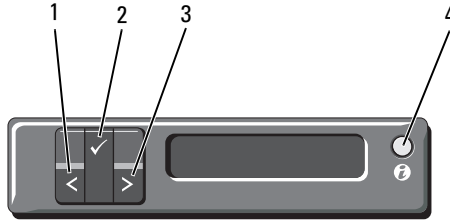
Item	Indicator, Button, or Connector	Icon	Description
8	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the blue system status indicator on the back blink until one of the buttons is pushed again.
9	Optical drive (optional)		One optional slim-line SATA DVD-ROM drive or DVD-RW drive. NOTE: DVD devices are data only.
10	Hard drives		Up to six 2.5", external hot-swappable SAS, SATA, or SSD hard drives.

LCD Panel Features

The system's LCD panel provides system information and status and error messages to signify when the system is operating correctly or when the system needs attention. See "LCD Status Messages" on page 22 for information about specific status codes.

The LCD backlight lights blue during normal operating conditions and lights amber to indicate an error condition. When the system is in standby mode, the LCD backlight is off and can be turned on by pressing the Select button on the LCD panel. The LCD backlight will remain off if LCD messaging is turned off through the iDRAC6 utility, the LCD panel, or other tools.

Figure 1-2. LCD Panel Features





Item	Buttons	Description
1	Left	Moves the cursor back in one-step increments.
2	Select	Selects the menu item highlighted by the cursor.
3	Right	Moves the cursor forward in one-step increments. During message scrolling: <ul style="list-style-type: none">• Press once to increase scrolling speed.• Press again to stop.• Press again to return to default scrolling speed.• Press again to repeat the cycle.
4	System identification	Turns the system ID mode on (LCD panel flashes blue) and off. Press quickly to toggle the system ID on and off. If the system hangs during POST, press and hold the system ID button for more than 5 seconds to enter BIOS Progress mode.

Home Screen

The Home screen displays user-configurable information about the system. This screen is displayed during normal system operation when there are no status messages or errors present. When the system is in standby mode, the

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

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

From the Home screen, press the **Select** button to enter the main menu. See the following tables for information on the **Setup** and **View** submenus.

Setup Menu



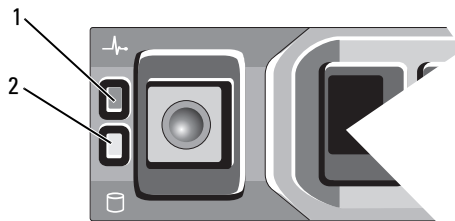
NOTE: When you select an option in the **Setup** menu, you must confirm the option before proceeding to the next action.

Option	Description
DRAC	Select DHCP or Static IP to configure the network mode. If Static IP is selected, the available fields are IP , Subnet (Sub) , and Gateway (Gtw) . Select Setup DNS to enable DNS and to view domain addresses. Two separate DNS entries are available.
Set error	Select SEL to display LCD error messages in a format that matches the IPMI description in the SEL. This can be useful when trying to match an LCD message with an SEL entry. Select Simple to display LCD error messages in a simplified user-friendly description. See "LCD Status Messages" on page 22 for a list of messages in this format.
Set home	Select the default information to be displayed on the LCD Home screen. See "View Menu" on page 17 to see the options and option items that can be selected to display by default on the Home screen.

View Menu

Option	Description
DRAC IP	Displays the IPv4 or IPv6 addresses for the iDRAC6. Addresses include DNS (Primary and Secondary), Gateway, IP, and Subnet (IPv6 does not have Subnet).
MAC	Displays the MAC addresses for DRAC, iSCSI <i>n</i> , or NET <i>n</i> .
Name	Displays the name of the Host, Model, or User String for the system.
Number	Displays the Asset tag or the Service tag for the system.
Power	Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the Set home submenu of the Setup menu. See "Setup Menu" on page 16.
Temperature	Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the Set home submenu of the Setup menu. See "Setup Menu" on page 16.

Hard-Drive Indicator Patterns



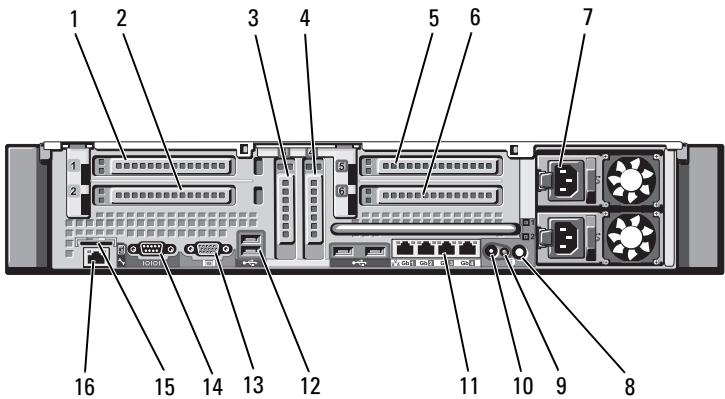
1 hard-drive status indicator (green and amber)



2 hard-drive activity indicator (green)






Drive-Status Indicator Pattern (RAID Only)	Condition
Blinks green two times per second	Identify drive/preparing for removal
Off	Drive ready for insertion or removal
	NOTE: The drive status indicator remains off until all hard drives are initialized after system power is applied. Drives are not ready for insertion or removal during this time.
Blinks green, amber, and off	Drive predicted failure
Blinks amber four times per second	Drive failed
Blinks green slowly	Drive rebuilding
Steady green	Drive online
Blinks green 3 seconds, amber 3 seconds, and off 6 seconds.	Rebuild aborted

Back-Panel Features and Indicators

Figure 1-3. Back-Panel Features and Indicators



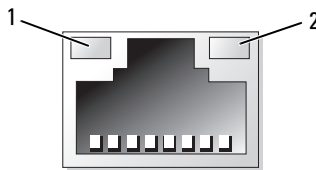
Item	Indicator, Button, or Connector	Icon	Description
1	PCIe slot 1		PCI Express (Generation 2) x8 link expansion slot (24.13 cm [9.5"] length).
2	PCIe slot 2		PCI Express (Generation 2) x4 link expansion slot (low-profile 24.13 cm [9.5"] maximum length, with a standard height bracket).
3	PCIe slot 3		PCI Express (Generation 2) x8 link expansion slot (low-profile 24.13 cm [9.5"] length).
4	PCIe slot 4		PCI Express (Generation 2) x8 link expansion slot (low-profile 24.13 cm [9.5"] length).
5	PCIe slot 5		PCI Express (Generation 2) x8 link expansion slot (24.13 cm [9.5"] length).
6	PCIe slot 6		PCI Express (Generation 2) x8 link expansion slot (24.13 cm [9.5"] length).
7	Power supplies (2)		1100 W power supplies.
8	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the blue system status indicator on the back blink until one of the buttons is pushed again.
9	System status indicator		Lights blue during normal system operation. Lights amber when the system needs attention due to a problem.
10	System identification connector		Connects the optional system status indicator assembly through the optional cable management arm.
11	Ethernet connectors (4)		Integrated 10/100/1000 NIC connectors.

Item	Indicator, Button, or Connector	Icon	Description
12	USB connectors (4)		Connect USB devices to the system. The ports are USB 2.0-compliant.
13	Video connector		Connects a monitor to the system.
14	Serial connector		Connects a serial device to the system.
15	VFlash media slot (optional)		Connects an external SD memory card for the optional iDRAC6 Enterprise card.
16	iDRAC6 Enterprise port (optional)		Dedicated management port for the optional iDRAC6 Enterprise card.

Guidelines for Connecting External Devices

- Turn off power to the system and external devices before attaching a new external device. Turn on any external devices before turning on the system (unless the documentation for the device specifies otherwise).
- Ensure that the appropriate driver for the attached device has been installed on the system.
- If necessary to enable ports on your system, use the "Using the System Setup Program and UEFI Boot Manager" on page 59.

NIC Indicator Codes



1 link indicator

2 activity indicator

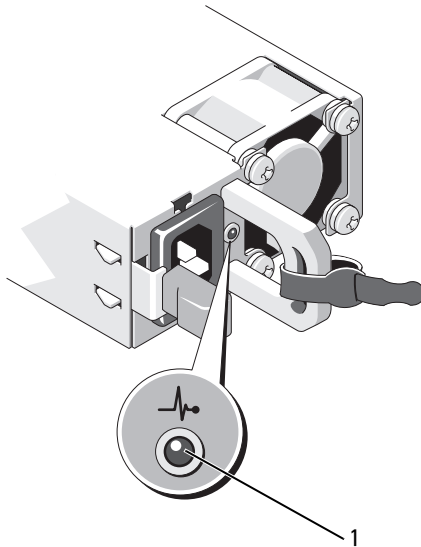
Indicator	Indicator Code
Link and activity indicators are off	The NIC is not connected to the network.
Link indicator is green	The NIC is connected to a valid network link at 1000 Mbps.
Link indicator is amber	The NIC is connected to a valid network link at 10/100 Mbps.
Activity indicator is green blinking	Network data is being sent or received.

Power Indicator Codes

The power supplies have indicators that show whether power is present or whether a power fault has occurred.

- Not lit — AC power is not connected.
- Green — In standby mode, a green light indicates that a valid AC source is connected to the power supply and that the power supply is operational. When the system is on, a green light also indicates that the power supply is providing DC power to the system.
- Amber — Indicates a problem with the power supply.
- Alternating green and amber — When hot-adding a power supply, this indicates that the power supply is mismatched with the other power supply. Replace the power supply that has the flashing indicator with a power supply that matches the capacity of the other installed power supply.

Figure 1-4. Power Supply Status Indicator



1 power supply status indicator

LCD Status Messages

The LCD messages consist of brief text messages that refer to events recorded in the System Event Log (SEL). For information on the SEL and configuring system management settings, see the systems management software documentation.



NOTE: If your system fails to boot, press the System ID button for at least 5 seconds until an error code appears on the LCD. Record the code, then see "Getting Help" on page 195.

Viewing Status Messages

If a system error occurs, the LCD screen will turn amber. Press the **Select** button to view the list of errors or status messages. Use the left and right buttons to highlight an error number, and press **Select** to view the error.

Removing LCD Status Messages

For faults associated with sensors, such as temperature, voltage, fans, and so on, the LCD message is automatically removed when that sensor returns to a normal state. For other faults, you must take action to remove the message from the display:

- Clear the SEL — You can perform this task remotely, but you will lose the event history for the system.
- Power cycle — Turn off the system and disconnect it from the electrical outlet; wait approximately 10 seconds, reconnect the power cable, and restart the system.



NOTE: The following LCD status messages are displayed in the Simple format. See "Setup Menu" on page 16 to select the format in which the messages are displayed.

Table 1-1. LCD Status Messages

Code	Text	Causes	Corrective Actions
E1000	Failsafe voltage error. Contact support.	Check the system event log for critical failure events.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1114	Ambient Temp exceeds allowed range.	Ambient temperature reached a point outside the allowed range.	See "Troubleshooting System Cooling Problems" on page 167.

Code	Text	Causes	Corrective Actions
E1116	Memory disabled, temp above range. Power cycle AC.	Memory exceeded allowable temperature and has been disabled to prevent damage to the components.	Remove AC power to the system for 10 seconds and restart the system. See "Troubleshooting System Cooling Problems" on page 167. If the problem persists, see "Getting Help" on page 195.
E1210	Motherboard battery failure. Check battery.	CMOS battery is missing or the voltage is outside the allowable range.	See "Troubleshooting the System Battery" on page 166.
E1211	RAID Controller battery failure. Check battery.	RAID battery is either missing, bad, or unable to recharge due to thermal issues.	Reseat the RAID battery connector. See "Installing the RAID Battery" on page 130 and "Troubleshooting System Cooling Problems" on page 167.
E1216	3.3V Regulator failure. Reseat PCIe cards.	3.3 V voltage regulator failed.	Remove and reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
E1222	CPU # VCACHE Regulator failure. Contact support.	Processor voltage regulator failed.	Reseat the processor(s). See "Troubleshooting the Processors" on page 178. If the problem persists, see "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E122C	CPU Power Fault. Power cycle AC.	A power fault detected when powering up the processor(s).	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E122D	Memory Regulator # Failed. Reseat DIMMs.	One of the memory regulators failed.	Reseat the memory modules. See "Troubleshooting System Memory" on page 169. If the problem persists, see "Getting Help" on page 195.
E122E	On-board regulator failed. Call support.	One of the on-board voltage regulators failed.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1243	CPU # VCORE Regulator failure. Contact Support	Processor voltage regulator failed.	Reseat the processor. See "Troubleshooting the Processors" on page 178. If the problem persists, see "Getting Help" on page 195.
E1245	CPU # VIO Regulator failure. Contact support	Processor voltage regulator failed.	Reseat the processor. "Troubleshooting the Processors" on page 178. If the problem persists, see "Getting Help" on page 195.
E1310	Fan ## RPM exceeding range. Check fan.	RPM of specified fan is outside the intended operating range.	See "Troubleshooting System Cooling Problems" on page 167.

Code	Text	Causes	Corrective Actions
E1313	Fan redundancy lost. Check fans.	The system is no longer fan redundant. Another fan failure would put the system at risk of over-heating.	Check LCD for additional scrolling messages. See "Troubleshooting a Fan" on page 168.
E1314	Critical system cooling loss. Check fans	All fans have been removed from the system.	Ensure that the fans are properly installed. See "Troubleshooting a Fan" on page 168.
E1410	System Fatal Error detected.	A fatal system error detected.	Check LCD for additional scrolling messages. Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1414	CPU # temp exceeding range. Check CPU heat sink.	Specified processor is out of acceptable temperature range.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting the Processors" on page 178 and "Troubleshooting System Cooling Problems" on page 167.
E1418	CPU # not detected. Check CPU is seated properly.	Specified processor is missing or bad, and the system is in an unsupported configuration.	Ensure that the specified processor is properly installed and is as per the supported configuration. See Table 3-5 and "Troubleshooting the Processors" on page 178.

Code	Text	Causes	Corrective Actions
E141C	Unsupported CPU configuration. Check CPU or BIOS revision.	Processors are in an unsupported configuration.	<p>Check if the processors are installed as per the supported configuration. For more information on supported processor configurations, see Table 3-5.</p> <p>Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's <i>Getting Started Guide</i>.</p>
E141F	CPU # protocol error. Power cycle AC.	The system BIOS reported a processor protocol error.	<p>Remove AC power to the system for 10 seconds and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>
E1420	CPU Bus parity error. Power cycle AC.	The system BIOS reported a processor bus parity error.	<p>Remove AC power to the system for 10 seconds and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>
E1421	CPU # initialization error. Power cycle AC	The system BIOS reported a processor initialization error.	<p>Remove AC power to the system for 10 seconds and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>

Code	Text	Causes	Corrective Actions
E1422	CPU # machine check error. Power cycle AC.	The system BIOS reported a machine check error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1610	Power Supply # (### W) missing. Check power supply.	Specified power supply removed or is missing from the system.	See "Troubleshooting Power Supplies" on page 167.
E1614	Power Supply # (### W) error. Check power supply.	Specified power supply failed.	See "Troubleshooting Power Supplies" on page 167.
E1618	Predictive failure on Power Supply # (### W). Check PSU.	A power supply fan failure, an over-temperature condition, or power supply communication error caused the predictive warning of an impending power supply failure.	See "Troubleshooting Power Supplies" on page 167.
E161C	Power Supply # (### W) lost AC power. Check PSU cables.	Specified power supply attached to the system, but lost its AC input.	Check the AC power source for the specified power supply. If the problem persists, see "Troubleshooting Power Supplies" on page 167.
E1620	Power Supply # (### W) AC power error. Check PSU cables.	Specified power supply's AC input is outside the allowable range.	Check the AC power source for the specified power supply. If the problem persists, see "Troubleshooting Power Supplies" on page 167.

Code	Text	Causes	Corrective Actions
E1624	Lost power supply redundancy. Check PSU cables.	The power supply subsystem is no longer redundant. If the remaining power supply fails, the system will shut down.	See "Troubleshooting Power Supplies" on page 167.
E1626	Power Supply Mismatch. PSU1 = ### W, PSU2 = ### W.	The power supplies in the system are not of the same wattage.	Ensure that power supplies with matching wattage are installed. See the Technical Specifications outlined in your system's <i>Getting Started Guide</i> .
E1629	Power required > PSU wattage. Check PSU and config.	The system configuration requires more power than the power supplies can provide, even with throttling.	Turn off power to the system, reduce the hardware configuration or install higher-wattage power supplies, and then restart the system.
E1631	System power draw exceeded threshold. Contact support.	The processors and memory throttling is not sufficient to keep system power consumption below the maximum safe level with current power supply configuration.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1632	PowerSafe event. Contact support.	The processors and memory have been throttled to keep system power consumption below the maximum safe level with current power supply configuration.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E1710	I/O channel check error. Review & clear SEL.	The system BIOS reported an I/O channel check.	Check the SEL for more information and then clear the SEL. Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E1711	PCI parity error on Bus ## Device ## Function ##	The system BIOS reported a PCI parity error on a component that resides in PCI configuration space at bus ##, device ##, function ##.	Remove and reseal the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
	PCI parity error on Slot #. Review & clear SEL.	The system BIOS reported a PCI parity error on a component that resides in the specified slot.	Remove and reseal the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
E1712	PCI system error on Bus ## Device ## Function ##	The system BIOS reported a PCI system error on a component that resides in PCI configuration space at bus ##, device ##, function ##.	Remove and reseal the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
	PCI system error on Slot #. Review & clear SEL.	The system BIOS reported a PCI system error on a component that resides in the specified slot.	Reinstall the expansion-card riser. See "Expansion Cards and Expansion-Card Risers" on page 114. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E1714	Unknown error. Review & clear SEL.	The system BIOS determined there has been an error in the system, but is unable to determine its origin.	<p>Check the SEL for more information and then clear the SEL. Remove AC power to the system for 10 seconds and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>
E1715	Fatal I/O Error. Review & clear SEL.	The system BIOS determined there has been a fatal error in the system.	<p>Check the SEL for more information, and then clear the SEL. Remove AC power to the system for 10 seconds, and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>
E1716	Chipset IERR Bus ## Dev ## Function ##. Review & clear SEL.	The system BIOS reported a chipset internal error that resides in bus ##, device ##, function ##.	<p>Check the SEL for more information, and then clear the SEL. Remove AC power to the system for 10 seconds, and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>
E1717	CPU # internal error. Review & clear SEL.	The system BIOS determined that the specified processor has had an internal error.	<p>Check the SEL for more information, and then clear the SEL. Remove AC power to the system for 10 seconds, and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 195.</p>

Code	Text	Causes	Corrective Actions
E171F	PCIe fatal error on Bus ## Device ## Function ##	The system BIOS reported a PCIe fatal error on a component that resides in PCI configuration space at bus ##, device ##, function ##.	Reinstall the expansion card and the corresponding expansion-card riser. See "Expansion Cards and Expansion-Card Risers" on page 114. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
	PCIe fatal error on Slot #. Review & clear SEL.	The system BIOS reported a PCIe fatal error on a component that resides in the specified slot.	Reinstall the expansion-card riser. See "Expansion Cards and Expansion-Card Risers" on page 114. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 195.
E1810	Hard drive ## fault. Review & clear SEL.	The specified hard drive experienced a fault.	See "Troubleshooting a Hard Drive" on page 174.
E1812	Hard drive ## removed. Check drive.	The specified hard drive is removed from the system.	Information only.
E1A11	PCI Riser hardware & configuration mismatch. Reconfigure.	PCIe risers are not configured correctly. Some invalid configurations prevent the system from powering on.	Reinstall the expansion-card riser. See "Expansion Cards and Expansion-Card Risers" on page 114 and "Expansion-Card Risers" on page 119. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E1A12	PCI Riser not detected. Check Riser.	One or both of the PCIe risers are missing. This prevents the system from powering on.	Reinstall the missing riser card(s). See "Installing Expansion-Card Riser 1" on page 121 and "Installing Expansion-Card Riser 2" on page 122.
E1813	Internal Dual SD Module Card # failed. Check SD card	The internal dual SD module card failed.	Reseat the internal dual SD module card. If the problem persists, see "Getting Help" on page 195.
E1814	Internal SD Module Card # write-protected. Check SD card	The internal dual SD module card is write-protected and cannot be used.	Change the write-protect switch setting on SD card.
E1815	Internal Dual SD Module redundancy lost. Check SD cards	The internal dual SD module bootable media is no longer redundant.	Reseat the internal dual SD module card. If the problem persists, see "Getting Help" on page 195.
E1A14	SAS cable A failure. Check connection.	SAS cable A is missing or bad.	Reseat the cable. If the problem persists, replace cable. If the problem persists, see "Getting Help" on page 195.
E1A15	SAS cable B failure. Check connection.	SAS cable B is missing or bad.	Reseat the cable. If the problem persists, replace cable. If the problem persists, see "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E1A1D	Control panel USB cable not detected. Check cable.	USB cable to the control panel is missing or bad.	Reseat the cable. If the problem persists, replace cable. If the problem persists, see "Getting Help" on page 195.
E2010	Memory not detected. Inspect DIMMs.	No memory detected in the system.	Install memory or reseat the memory modules. See "Installing Memory Modules" on page 105 or "Troubleshooting System Memory" on page 169.
E2011	Memory configuration failure. Check DIMMs.	Memory detected, but is not configurable. Error detected during memory configuration.	See "Troubleshooting System Memory" on page 169.
E2012	Memory configured but unusable. Check DIMMs.	Memory configured, but is unusable.	See "Troubleshooting System Memory" on page 169.
E2013	BIOS unable to shadow memory. Check DIMMs.	The system BIOS failed to copy its flash image into memory.	See "Troubleshooting System Memory" on page 169.
E2014	CMOS RAM failure. Power cycle AC.	CMOS failure. CMOS RAM not functioning properly.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E2015	DMA Controller failure. Power cycle AC.	DMA controller failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E2016	Interrupt Controller failure. Power cycle AC.	Interrupt controller failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E2017	Timer refresh failure. Power cycle AC.	Timer refresh failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E2018	Programmable Timer error. Power cycle AC.	Programmable interval timer error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E2019	Parity error. Power cycle AC.	Parity error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E201A	SuperIO failure. Power cycle AC.	SIO failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E201B	Keyboard Controller error. Power cycle AC.	Keyboard controller failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.

Code	Text	Causes	Corrective Actions
E201C	SMI initialization failure. Power cycle AC.	System management interrupt (SMI) initialization failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E201D	Shutdown test failure. Power cycle AC.	BIOS shutdown test failure.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 195.
E201E	POST memory test failure. Check DIMMs.	BIOS POST memory test failure.	See "Troubleshooting System Memory" on page 169. If the problem persists, see "Getting Help" on page 195.
E2020	CPU configuration failure. Check screen message.	Processor configuration failure.	Check screen for specific error messages. See "Troubleshooting the Processors" on page 178.
E2021	Incorrect memory configuration. Review User Guide.	Incorrect memory configuration.	Check screen for specific error messages. See "Troubleshooting System Memory" on page 169.
E2022	General failure during POST. Check screen message.	General failure after video.	Check screen for specific error messages.

Code	Text	Causes	Corrective Actions
E2023	BIOS unable to mirror memory. Check DIMMs.	The system BIOS could not enable memory mirroring because of a faulty memory module or an invalid memory configuration.	See "Troubleshooting System Memory" on page 169.
E2025	QPI initialization error. Contact support	QuickPath Interconnect (QPI) failure.	See "Getting Help" on page 195.
E2026	Memory initialization error. Contact support	Invalid memory configuration.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100. See "Getting Help" on page 195.
E2110	Multibit Error on DIMM ##. Reseat DIMM.	The memory module in slot "##" has had a multi-bit error (MBE).	Reseat the memory module in its socket. If the problem persists, see "Troubleshooting System Memory" on page 169.
E2111	SBE log disabled on DIMM ##. Reseat DIMM.	The system BIOS disabled memory single-bit error (SBE) logging and will not log any more SBEs until the system is rebooted. "##" represents the memory module implicated by the BIOS.	Reseat the memory module in its socket. If the problem persists, see "Troubleshooting System Memory" on page 169.

Code	Text	Causes	Corrective Actions
E2112	Memory spared on Card x DIMM ##. Power cycle AC	The system BIOS spared the memory because it determined that the memory has too many errors.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Troubleshooting System Memory" on page 169.
E2113	Mem mirror OFF on DIMM ## & ##. Power cycle AC.	The system BIOS disabled memory mirroring because it has determined one half of the mirror has had too many errors. "## & ##" represents the memory module pair implicated by the BIOS.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Troubleshooting System Memory" on page 169.
I1910	Intrusion detected. Check chassis cover.	System cover removed.	Information only.
I1911	LCD Log Full. Check SEL to review all Errors.	LCD overflow message. A maximum of ten error messages can display sequentially on the LCD. The eleventh message instructs the user to check the SEL for details on the events.	Check the SEL for details on the events. Remove AC power to the system for 10 seconds or clear the SEL.
I1912	SEL full. Review & clear log.	The SEL is full of events and is unable to log any more.	Check the SEL for more information and then clear the SEL.
W1228	RAID Controller battery capacity < 24hr.	Warns predictively that the RAID battery has less than 24 hours of charge left.	Allow RAID battery to charge to greater than 24 hours of sustained charge. If problem persists, replace the RAID battery. See "Installing the RAID Battery" on page 130.

Code	Text	Causes	Corrective Actions
W1630	Power supply redundancy degraded. Check PSU cables.	The power supply subsystem is no longer fully redundant, but at least one more supply can fail before the system is at risk of shutting down.	Reseat the power supplies. See "Troubleshooting Power Supplies" on page 167. If the problem persists, see "Getting Help" on page 195.

NOTE: For the full name of an abbreviation or acronym used in this table, see the *Glossary* on the Dell Support website at support.dell.com/manuals.

System Messages

System messages appear on the screen to notify you of a possible problem with the system.



NOTE: If you receive a system message not listed in the table, check the documentation for the application that is running when the message appears or the operating system's documentation for an explanation of the message and recommended action.

Table 1-2. System Messages

Message	Causes	Corrective Actions
Alert! iDRAC6 not responding. Rebooting.	The iDRAC6 is not responding to BIOS communication either because it is not functioning properly or has not completed initialization. The system will reboot.	Wait for the system to reboot.
Alert! iDRAC6 not responding. Power required may exceed PSU wattage. Alert! Continuing system boot accepts the risk that system may power down without warning.	The iDRAC6 is hung. The iDRAC6 was remotely reset while the system was booting. After AC recovery, the iDRAC6 takes longer than normal to boot.	Remove AC power to the system for 10 seconds and restart the system.

Message	Causes	Corrective Actions
Alert! Node Interleaving disabled! Memory configuration does not support Node Interleaving.	The memory configuration does not support node interleaving, or the configuration has changed (for example, a memory module has failed) so that node interleaving cannot be supported. The system will run but without node interleaving.	Ensure that the memory modules are installed in a configuration that supports node interleaving. Check other system messages for additional information for possible causes. For memory configuration information, see "General Memory Module Installation Guidelines" on page 100. If the problem persists, see "Troubleshooting System Memory" on page 169.
Alert! Power required exceeds PSU wattage. Check PSU and system configuration. Alert! Continuing system boot accepts the risk that system may power down without warning.	The system configuration of processor(s), memory modules, and expansion cards may not be supported by the power supplies.	If any system components were just upgraded, return the system to the previous configuration. If the system boots without this warning, then the replaced component(s) are not supported with this power supply. See "Power Supplies" on page 94.
Alert! Redundant memory disabled! Memory configuration does not support redundant memory.	Memory Mirroring was enabled in the system setup program, but the current configuration does not support redundant memory. A memory module may be faulty.	Check the memory modules for failure. See "Troubleshooting System Memory" on page 169. Reset the memory setting, if appropriate. See "Using the System Setup Program and UEFI Boot Manager" on page 59.

Message	Causes	Corrective Actions
Alert! System fatal error during previous boot.	An error caused the system to reboot.	Check other system messages for additional information for possible causes.
BIOS MANUFACTURING MODE detected. MANUFACTURING MODE will be cleared before the next boot. System reboot required for normal operation.	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
BIOS Update Attempt Failed!	Remote BIOS update attempt failed.	Retry the BIOS update. If the problem persists, see "Getting Help" on page 195.
Caution! NVRAM_CLR jumper is installed on system board	NVRAM_CLR jumper is installed in the clear setting. CMOS has been cleared.	Move the NVRAM_CLR jumper to the default position (pins 3 and 5). See Figure 6-1 for jumper location. Restart the system and re-enter the BIOS settings. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
CPU set to minimum frequency.	The processor speed may be intentionally set lower for power conservation.	If not an intentional setting, check any other system messages for possible causes.

Message	Causes	Corrective Actions
CPUs with different cache sizes detected. CPUs with different core sizes detected! System halted CPUs with different logical processors detected! System halted. CPUs with different power rating detected! System halted.	Mismatched processors have been installed in the system.	Ensure that all processors have the same cache size, number of cores and logical processors, and power rating. Ensure that the processors are properly installed. See "Processors" on page 133.
Current boot mode is set to UEFI. Please ensure compatible bootable media is available. Use the system setup program to change the boot mode as needed.	The system failed to boot because UEFI boot mode is enabled in BIOS and the boot operating system is non-UEFI.	Ensure that the boot mode is set correctly and that the proper bootable media is available. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
Embedded NICx and NICy: OS NIC=<ENABLED /DISABLED>, Management Shared NIC= <ENABLED /DISABLED>	The OS NIC interface is set in BIOS. The Management Shared NIC interface is set in management tools.	Check the system management software or the System Setup program for NIC settings. If a problem is indicated, see "Troubleshooting a NIC" on page 163.

Message	Causes	Corrective Actions
Error 8602 - Auxiliary Device Failure. Verify that mouse and keyboard are securely attached to correct connectors.	Mouse or keyboard cable is loose or improperly connected. Defective mouse or keyboard.	Reseat the mouse or keyboard cable. Ensure that the mouse or keyboard is operational. See "Troubleshooting a USB Device" on page 162.
Gate A20 failure	Faulty keyboard controller; faulty system board.	See "Getting Help" on page 195.
General failure	The operating system is unable to carry out the command.	This message is usually followed by specific information. Note the information, and take the appropriate action to resolve the problem.
Invalid configuration information - please run SETUP program.	An invalid system configuration caused a system halt.	Run the System Setup program and review the current settings. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
Invalid PCIe card found in the Internal_Storage slot!	The system halted because an invalid PCIe expansion card is installed in the dedicated storage controller slot.	Remove the PCIe expansion card and install the integrated storage controller in the dedicated slot. See "Integrated Storage Controller Card" on page 125.
Keyboard controller failure	Faulty keyboard controller; faulty system board	See "Getting Help" on page 195.
Keyboard data line failure Keyboard stuck key failure	Keyboard cable connector is improperly connected or the keyboard is defective.	Reseat the keyboard cable. If the problem persists, see "Troubleshooting a USB Device" on page 162.

Message	Causes	Corrective Actions
Keyboard fuse has failed	Overcurrent detected at the keyboard connector.	See "Getting Help" on page 195.
Local keyboard may not work because all user accessible USB ports are disabled. If operating locally, power cycle the system and enter system setup program to change settings.	The USB ports are disabled in the system BIOS.	Power down and restart the system from the power button, and then enter the System Setup program to enable the USB port(s). See "Entering the System Setup Program" on page 60.
DIMMs <x> disabled - Memory Buffer communication error	<p>The memory module is not properly seated.</p> <p>The memory module connector or the processor socket may be exposed to dust.</p> <p>The processor has bent pins.</p>	<p>Reseat the memory module. See "Removing Memory Modules" on page 107 and "Installing Memory Modules" on page 105.</p> <p>Ensure that the memory module connectors and processor sockets are clean.</p> <p>Verify that there are no bent pins on the processor. If the processor has bent pins, see "Getting Help" on page 195.</p>

Message	Causes	Corrective Actions
DIMMs <x> disabled - MemBIST error	The memory module is not properly seated.	Replace or reseal the memory module(s). See "Removing Memory Modules" on page 107 and "Installing Memory Modules" on page 105. Ensure that the memory module connectors are clean and supported memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100.
DIMMs <x> disabled - MemBIST timeout	The memory module connector or the processor socket may be exposed to dust.	
DIMMs <x> disabled - Rank not found	Unsupported memory module.	
DIMMs <x> disabled - DIMM communication error		
DIMMs <x> disabled - DDR training failure		
DIMMs <x> disabled - Simple memory test failure		
DIMMs <x> disabled - Simple memory test failure		
DIMMs <x> disabled - Invalid DIMM	Unsupported memory modules in the first locked step pair.	See "General Memory Module Installation Guidelines" on page 100. Replace the memory modules. See "Removing Memory Modules" on page 107 and "Installing Memory Modules" on page 105.

Message	Causes	Corrective Actions
DIMM unsupported: DIMM <x> Lockstep pair DIMM<y&z> disabled. Please replace the DIMM or remove the lockstep pair.	Unsupported memory modules.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100.
DIMM mismatch: DIMM <x> Lockstep pair DIMM<y&z> disabled. Please replace the lockstep pair with matching DIMM(s).	Locked step pairs do not match.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100.

Message	Causes	Corrective Actions
MemBIST timeout: DIMM <x> Lockstep Pair DIMM <x&y> disabled. Please replace the DIMM(s) or remove the lockstep pair.	The memory modules are not properly seated. The memory module connector may be exposed to dust. Faulty memory module.	Replace or reseat the memory module(s). See "Removing Memory Modules" on page 107 and "Installing Memory Modules" on page 105. Ensure that the memory module connectors are clean.
MemBIST error: DIMM <x> Lockstep Pair DIMM <x&y> disabled. Please replace the DIMM(s) or remove the lockstep pair.		
DDR training error: DIMM <x> Lockstep Pair DIMM <x&y> disabled. Please replace the DIMM or remove the lockstep pair.		

Message	Causes	Corrective Actions
DIMM population violation: DIMM <x> Lockstep Pair DIMM <x&y> disabled. Please populate DIMM(s) with largest number of ranks in the lowest slot.	Different rank memory modules are mixed following an invalid configuration.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100.
DIMM population violation: DIMM <x> Lockstep Pair DIMM <x&y> disabled. Please ensure each lockstep pair is installed correctly.		
The memory configuration is not optimal.	Invalid memory configuration. The system will run but with reduced functionality.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100. If the problem persists, see "Troubleshooting System Memory" on page 169.
Memory address line failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" on page 169.

Message	Causes	Corrective Actions
Memory double word logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" on page 169.
Memory Initialization Warning: Memory size may be reduced	Invalid memory configuration. The system will run but with less memory than is physically available.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100.
Memory odd/even logic failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" on page 169.
Memory write/read failure at <i>address</i> , read <i>value</i> expecting <i>value</i>	Faulty or improperly installed memory modules.	See "Troubleshooting System Memory" on page 169.
Memory set to minimum frequency.	The memory frequency may be intentionally set lower for power conservation.	If not an intentional setting, check any other system messages for possible causes.
Memory tests terminated by keystroke.	POST memory test was terminated by pressing the spacebar.	Information only.

Message	Causes	Corrective Actions
No boot device available	Faulty or missing optical drive subsystem, hard drive, or hard-drive subsystem, or non-bootable USB key installed.	Use a bootable USB key, CD, or hard drive. If the problem persists, see "Troubleshooting an Internal USB Key" on page 171, "Troubleshooting a USB Device" on page 162, "Troubleshooting an Optical Drive" on page 173, and "Troubleshooting a Hard Drive" on page 174. See "Using the System Setup Program and UEFI Boot Manager" on page 59 for information on setting the order of boot devices.
No boot sector on hard drive	Incorrect configuration settings in System Setup program, or no operating system on hard drive.	Check the hard-drive configuration settings in the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 59. If necessary, install the operating system on your hard drive. See your operating system documentation.
No timer tick interrupt	Faulty system board.	See "Getting Help" on page 195.
PCI BIOS failed to install	PCIe device BIOS (Option ROM) checksum failure detected during shadowing. Cables to expansion card(s) loose; faulty or improperly installed expansion card(s).	Reseat the expansion card(s). Ensure that all appropriate cables are securely connected to the expansion card(s). If the problem persists, see "Troubleshooting Expansion Cards" on page 177.

Message	Causes	Corrective Actions
PCIe Training Error: Expected Link Width is x, Actual Link Width is y.	Faulty or improperly installed PCIe card in the specified slot.	Reseat the PCIe card in the specified slot number. See "Troubleshooting Expansion Cards" on page 177. If the problem persists, see "Getting Help" on page 195.
Plug & Play Configuration Error	Error encountered in initializing PCIe device; faulty system board.	Install the NVRAM_CLR jumper in the clear position (pins 1 and 3) and reboot the system. See Figure 6-1 for jumper location. If the problem persists, see "Troubleshooting Expansion Cards" on page 177.
Read fault Requested sector not found	The operating system cannot read from the hard drive, optical drive, or USB device, the system could not find a particular sector on the disk, or the requested sector is defective.	Replace the optical medium, USB medium or device. Ensure that the SAS backplane, USB, or SATA cables are properly connected. See "Troubleshooting a USB Device" on page 162, "Troubleshooting an Optical Drive" on page 173, or "Troubleshooting a Hard Drive" on page 174 for the appropriate drive(s) installed in your system.
SATA Portx device not found	There is no device connected to the specified SATA port.	Information only.

Message	Causes	Corrective Actions
SATA port x device auto-sensing error	The drive connected to the specified SATA port is faulty.	Replace the faulty drive.
SATA port x device configuration error		
SATA port x device error		
Sector not found	Faulty hard drive, USB device, or USB medium.	Replace the USB medium or device. Ensure that the USB or SAS backplane cables are properly connected. See "Troubleshooting a USB Device" on page 162 or "Troubleshooting a Hard Drive" on page 174 for the appropriate drive(s) installed in your system.
Seek error		
Seek operation failed		
Shutdown failure	General system error.	See "Getting Help" on page 195.
The amount of system memory has changed	Memory has been added or removed or a memory module may be faulty.	If memory has been added or removed, this message is informative and can be ignored. If memory has not been added or removed, check the SEL to determine if single-bit or multi-bit errors were detected and replace the faulty memory module. See "Troubleshooting System Memory" on page 169.
Time-of-day clock stopped	Faulty battery or faulty chip.	See "Troubleshooting the System Battery" on page 166.

Message	Causes	Corrective Actions
Time-of-day not set - please run SETUP program	Incorrect Time or Date settings; faulty system battery.	Check the Time and Date settings. See "Using the System Setup Program and UEFI Boot Manager" on page 59. If the problem persists, replace the system battery. See "System Battery" on page 144.
Timer chip counter 2 failed	Faulty system board.	See "Getting Help" on page 195.
TPM or TCM configuration operation honored. System will now reset.	A Trusted Platform Module (TPM) or China Trusted Computing Model (TCM) configuration command has been entered. The system will reboot and execute the command.	Information only.
TPM or TCM configuration operation is pending. Press (I) to Ignore OR (M) to Modify to allow this change and reset the system. WARNING: Modifying could prevent security.	This message appears during system restart after a TPM or TCM configuration command has been entered. User interaction is required to proceed.	Enter I or M to proceed.
TPM or TCM failure	A TPM or TCM function has failed.	See "Getting Help" on page 195.

Message	Causes	Corrective Actions
Unable to launch System Services image. System halted!	System halted after F10 keystroke because System Services image is either corrupted in the system firmware or has been lost due to system board replacement. The iDRAC6 Enterprise card flash memory may be corrupted.	Restart the system and update the Lifecycle Controller repository to the latest software to restore full functionality. See the Lifecycle Controller user documentation for more information. Restore the flash memory using the latest version on support.dell.com . See the iDRAC6 user's guide for instructions on performing a field replacement of the flash memory.
Unexpected interrupt in protected mode.	Improperly seated memory modules or faulty keyboard/mouse controller chip.	Reseat the memory modules. See "Troubleshooting System Memory" on page 169. If the problem persists, see "Getting Help" on page 195.
Unsupported CPU combination Unsupported CPU stepping detected	Processor(s) is not supported by the system.	Install a supported processor or processor combination. See "Processors" on page 133.
Warning: A fatal error has caused system reset! Please check the system event log!	A fatal system error occurred and caused the system to reboot.	Check the SEL for information that was logged during the error. See the applicable troubleshooting section in "Troubleshooting Your System" on page 161 for any faulty components specified in the SEL.


Message	Causes	Corrective Actions
Warning: Control Panel is not installed.	The control panel is not installed or has a faulty cable connection.	Install the control panel, or check the cable connections between the display module, the control panel board, and the system board. See "Control Panel Assembly" on page 152.
Warning! No micro code update loaded for processor <i>n</i>	Micro code update failed.	Update the BIOS firmware. See "Getting Help" on page 195.
Warning! Power required exceeds PSU wattage. Check PSU and system configuration. Warning! Performance degraded. CPU and memory set to minimum frequencies to meet PSU wattage. System will reboot.	The system configuration of processor(s), memory modules, and expansion cards may not be supported by the power supplies.	If any system components were just upgraded, return the system to the previous configuration. If the system boots without this warning, then the replaced component(s) are not supported with this power supply. See "Power Supplies" on page 94.
The memory configuration is not optimal. The recommended memory configuration is: <message>	Invalid memory configuration. The system will run but with reduced functionality.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 100. If the problem persists, see "Troubleshooting System Memory" on page 169.

Message	Causes	Corrective Actions
Write fault Write fault on selected drive	Faulty USB device, USB medium, optical drive assembly, hard drive, or hard- drive subsystem.	Replace the USB medium or device. Ensure that the USB, SAS backplane, or SATA cables are properly connected. See "Troubleshooting a USB Device" on page 162, "Troubleshooting an Internal USB Key" on page 171, and "Troubleshooting a Hard Drive" on page 174.
Warning: QPI links operating in Slow Speed Mode.	The processor has bent pins. The processor is not properly seated on the processor socket.	Reseat the processors. See "Removing a Processor" on page 134 and "Installing a Processor" on page 138.
Warning: QPI link between <Agent X> Port <Y> and <Agent X1> <Port Y1> failed.		If the problem persists, see "Getting Help" on page 195.
Warning: QPI link between <Agent X> Port <Y> and <Agent X1> <Port Y1> degraded to half-width.		

NOTE: For the full name of an abbreviation or acronym used in this table, see the *Glossary* on the Dell Support website at support.dell.com/manuals.

Warning Messages

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

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

Diagnostics Messages

The system diagnostic utilities may issue messages if you run diagnostic tests on your system. See "Running the System Diagnostics" on page 181 for more information about system diagnostics.


Alert Messages

Systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation on the Dell Support website at support.dell.com/manuals.

Other Information You May Need

 **WARNING:** See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.

- The rack documentation included with your rack solution describes how to install your system into a rack.
- The *Getting Started Guide* provides an overview of system features, setting up your system, and technical specifications.
- Dell systems management application documentation at support.dell.com/manuals provides information about installing and using the systems management software.
- Any media that ships with your system that provides documentation and tools for configuring and managing your system, including those pertaining to the operating system, system management software, system updates, and system components that you purchased with your system.

 **NOTE:** Always check for updates on support.dell.com/manuals and read the updates first because they often supersede information in other documents.

Using the System Setup Program and UEFI Boot Manager

The System Setup program is the BIOS program that enables you to manage your system hardware and specify BIOS-level options. From the System Setup program, you can:

- Change the NVRAM settings after you add or remove hardware
- View the system hardware configuration
- Enable or disable integrated devices
- Set performance and power management thresholds
- Manage system security

Choosing the System Boot Mode

The System Setup program also enables you to specify the boot mode for installing your operating system:

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
- UEFI boot mode is an enhanced 64-bit boot interface based on Unified Extensible Firmware Interface (UEFI) specifications that overlays the system BIOS. See "Entering the UEFI Boot Manager" on page 72 for more information on this interface.

You must select the boot mode in the **Boot Mode** field of the "Boot Settings Screen" on page 65 of the System Setup program. After specifying the boot mode, proceed to install your operating system from that mode. Thereafter, boot the system to the same boot mode (BIOS or UEFI) to access the installed operating system. Trying to boot the operating system from another boot mode will cause the system to halt immediately at startup.



NOTE: Operating systems must be UEFI-compatible (for example, Microsoft® Windows Server® 2008 x64 version) 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.

Entering the System Setup Program

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

<F2> = System Setup

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

Responding to Error Messages

If an error message appears while the system is booting, make a note of the message. See "System Messages" on page 40 for an explanation of the message and suggestions for correcting errors.



NOTE: After installing a memory upgrade, it is normal for your system to display a message the first time you start your system.

Using the System Setup Program Navigation Keys

Keys	Action
Up arrow or <Shift><Tab>	Moves to the previous field.
Down arrow or <Tab>	Moves to the next field.
Spacebar, <+>, <->, left and right arrows	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the System Setup program and restarts the system if any changes were made.
<F1>	Displays the System Setup program's help file.



NOTE: For most of the options, any changes that you make are recorded but do not take effect until you restart the system.

System Setup Options

Main Screen

Dell Inc. <www.dell.com> - PowerEdge R810 BIOS Version xx.yy.zz [This is DOS Setup]			
Service Tag: xnnnnnn		Asset Tag: xnnnnnnnnn	
<pre> System Time 00:00:00 System Date DAY/MO/DATE/YR Memory Settings <Enter> Processor Settings <Enter> SATA Settings <Enter> Boot Settings <Enter> Integrated Devices <Enter> PCI IRQ Assignment <Enter> Serial Communication <Enter> Embedded Server Management <Enter> Power Management <Enter> </pre>			
Up,Down Arrow to select	SPACE, +, - to change	ESC to exit	F1 = Help




NOTE: The options for the System Setup program change based on the system configuration.



NOTE: The System Setup program defaults are listed under their respective options in the following sections, where applicable.

Option	Description
System Time	Sets the time on the system's internal clock.
System Date	Sets the date on the system's internal calendar.
Memory Settings	Displays information related to installed memory. See "Memory Settings Screen" on page 63.
Processor Settings	Displays information related to processors (speed, cache size, and so on). See "Processor Settings Screen" on page 64.

Option	Description
SATA Settings	Displays a screen to enable or disable the integrated SATA controller and ports. See "SATA Settings Screen" on page 65.
Boot Settings	Displays a screen to specify the boot mode (BIOS or UEFI). For BIOS boot mode, you can also specify the boot devices. See "Boot Settings Screen" on page 65.
Integrated Devices	Displays a screen to enable or disable integrated device controllers and ports, and to specify related features and options. See "Integrated Devices Screen" on page 66.
PCI IRQ Assignment	Displays a screen to change the IRQ assigned to each of the integrated devices on the PCI bus, and any installed expansion card that requires an IRQ. See "PCI IRQ Assignments Screen" on page 67.
Serial Communication	Displays a screen to enable or disable the serial ports and specify related features and options. See "Serial Communication Screen" on page 67.
Embedded Server Management	Displays a screen to configure the front-panel LCD options and to set a user-defined LCD string. See "Embedded Server Management Screen" on page 68.
Power Management	Enables you to manage power usage of the processor(s), fans, and memory modules with preconfigured or customized settings. See "Power Management Screen" on page 69.
System Security	Displays a screen to configure the system password and setup password features. See "System Security Screen" on page 70, "Using the System Password" on page 75, and "Using the Setup Password" on page 77 for more information.
Keyboard NumLock (On default)	Determines whether your system starts up with the NumLock mode activated on 101- or 102-key keyboards (does not apply to 84-key keyboards).

Option	Description
Report Keyboard Errors (Report default)	Enables or disables reporting of keyboard errors during the POST. Select Report for host systems that have keyboards attached. Select Do Not Report to suppress all error messages relating to the keyboard or keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the system.
F1/F2 Prompt on Error (Enabled default)	Enables the system to halt on errors during POST, which allows the user to observe events that may scroll by unnoticed during normal POST. The user can press <F1> to continue or <F2> to enter the System Setup program.  CAUTION: When setting this option to Disabled, the system will not halt if an error occurs during POST. Any critical errors will be displayed and logged in the system event log.

Memory Settings Screen

Option	Description
System Memory Size	Displays the amount of system memory.
System Memory Type	Displays the type of system memory.
System Memory Speed	Displays the system memory speed.
Video Memory	Displays the amount of video memory.
System Memory Testing (Disabled default)	Specifies whether system memory tests are run at system boot. Options are Enabled and Disabled .
Redundant Memory	Specifies whether redundant memory is enabled on the system. Options are Mirror and Spare . When Mirror mode is enabled, only half of the memory size is reported to the operating system. If Spare mode is enabled, the spare portion of the memory is not reported to the operating system.

Option	Description
Node Interleaving (Disabled default)	If this field is Enabled , memory interleaving is supported if a symmetric memory configuration is installed. If Disabled , the system supports Non-Uniform Memory architecture (NUMA) (asymmetric) memory configurations.

Processor Settings Screen


Option	Description
64-bit	Specifies if the processor(s) support 64-bit extensions.
Core Speed	Displays the processor clock speed.
Bus Speed	Displays the processor bus speed.
Logical Processor (Enabled default)	On processors that support Simultaneous Multi-Threading (SMT) technology, each processor core supports up to two logical processors. If this field is set to Enabled , the BIOS reports both logical processors. If set to Disabled , only one logical processor is monitored by the BIOS.
Virtualization Technology (Disabled default)	Enabled permits virtualization software to use the virtualization technology incorporated in the processor. NOTE: Disable this feature if your system will not be running virtualization software.
Adjacent Cache Line Prefetch (Enabled default)	Enable or disables system optimization for sequential memory access.
Hardware Prefetcher (Enabled default)	Enables or disables the hardware prefetcher.
Execute Disable (Enabled default)	Enables or disables Execute Disable Memory Protection Technology .
Number of Cores per Processor (All default)	If set to All , the maximum number of cores in each processor is enabled.
Turbo Mode	If Turbo Boost Technology is supported by the processor(s), enables or disables Turbo Mode .

Option	Description
C1E (Enabled default)	When set to Enabled , the processor(s) can switch to a minimum performance state when idle.
C States (Disabled default)	When set to Enabled , the processor can operate in all available power states.
Processor X Family- Model-Stepping	Displays the family and model number of each processor. A submenu displays the core speed, the amount of cache memory, and the number of cores of the processor(s).

SATA Settings Screen

Option	Description
Embedded SATA (Off default)	ATA Mode enables the integrated SATA controller. Off disables the controller.
Port A (Off default)	Auto enables BIOS support for the device attached to SATA port A. Off disables BIOS support for the device.

Boot Settings Screen

Option	Description
Boot Mode (BIOS default)	<p> CAUTION: Switching the boot mode could prevent the system from booting if the operating system was not installed in the same boot mode.</p> <p>If the system operating system supports Unified Extensible Firmware Interface, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems.</p> <p>NOTE: Setting this field to UEFI disables the Boot Sequence, Hard-Disk Drive Sequence, and USB Flash Drive Emulation Type fields.</p>
Boot Sequence	If Boot Mode is set to BIOS , this field tells the system where the operating system files needed for startup are located. If Boot Mode is set to UEFI , you can access the UEFI boot manager utility by rebooting the system and pressing <F11> when prompted to do so.

Option	Description
Hard-Disk Drive Sequence	Determines the order in which the BIOS attempts to boot from hard drives in the system during system startup.
USB Flash Drive Emulation Type	Determines the emulation type for a USB flash drive. If Boot Mode is set to UEFI , this field is disabled.
Boot Sequence Retry (Disabled default)	If this field is enabled and the system has failed to boot, the system reattempts to boot after 30 seconds.

Integrated Devices Screen

Option	Description
Integrated SAS Controller (Enabled default)	Enables or disables the integrated SAS controller.
User Accessible USB Ports (All Ports On default)	Enables or disables the user accessible USB ports. Options are All Ports On , Only Back Ports On , and All Ports Off .
Internal USB Port (On default)	Enables or disables the internal USB port.
Internal SD Card Port (On default)	Enables or disables the internal SD card port.
Redundancy (Disabled default)	Enables or disables the mirror mode.
Embedded NIC1 and NIC2 (Enabled default)	Enables or disables the operating system interface of the embedded NICs. The NICs can also be accessed through the system's management controller.
Embedded Gb NICx (Enabled default)	Enables or disables the integrated NIC. Options are Enabled and Enabled with PXE . PXE support allows the system to boot from the network.
MAC Address	Displays the MAC address for the integrated 10/100/1000 NIC.
Capability Detected (Disabled default)	Displays the NIC features of the LOM NIC hardware key. NOTE: Some LOM features may require the installation of an additional driver.

Option	Description
OS Watchdog Timer (Disabled default)	Aids recovery of the operating system, if your system stops responding. If set to Enabled , the operating system is allowed to initialize the timer.
I/OAT DMA Engine (Disabled default)	Enables/disables the I/O Acceleration technology option.
Embedded Video Controller (Enabled default)	Enables/disables BIOS support for the Embedded Video Controller.

PCI IRQ Assignments Screen

Option	Description
<PCIe device>	Use the <+> and <-> keys to manually select an IRQ for a given device, or select Default to allow the BIOS to select an IRQ value at system startup.

Serial Communication Screen

Option	Description
Serial Communication (On without Console Redirection default)	<p>Selects whether the serial communication devices (Serial Device 1 and Serial Device 2) are enabled in BIOS. BIOS console redirection can also be enabled and the port address used can be specified.</p> <p>Options are On without Console Redirection, On with Console Redirection via COM1, On with Console Redirection via COM2, and Off.</p>
Serial Port Address (Serial Device 1=COM1, Serial Device2=COM2 default)	<p>Sets the serial port addresses for the two serial devices.</p> <p>NOTE: Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.</p>

Option	Description
External Serial Connector	Specifies whether Serial Device 1 , Serial Device 2 , or Remote Access Device has access to the external serial connector. 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.
Failsafe Baud Rate (115200 default)	Displays the failsafe baud rate used for console redirection. BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails. This rate should not be adjusted.
Remote Terminal Type (VT 100/VT220 default)	Sets the remote console terminal type, either VT100/VT220 or ANSI .
Redirection After Boot (Enabled default)	Enables or disables BIOS console redirection when the operating system is loaded.

Embedded Server Management Screen



Option	Description
Front-Panel LCD Options	Options are User Defined String , Model Number , or None . If the LCD Home screen is set to an option other than these three choices, the option will be displayed as "Advanced" in the BIOS. In this event, the option cannot be changed in the BIOS unless it is changed back to User Defined String , Model Number , or None through another LCD configuration utility (such as the iDRAC6 Configuration Utility or the LCD panel menu).
User-Defined LCD String	You can enter a name or other identifier for the system, to be displayed on the LCD module screen.

Power Management Screen

Option	Description
Power Management	<p>Options are OS Control, Active Power Controller, Custom, or Maximum Performance. For all but the Custom setting, the BIOS pre-configures the power settings on this screen as follows:</p> <ul style="list-style-type: none">• OS Control sets the CPU power to OS DBPM, the fan power to Minimum Power, and the memory power to Maximum Performance. In this setting, all processor performance information is passed from the system BIOS to the operating system for control. The operating system sets the processor performance based on processor utilization.• Active Power Controller sets the CPU power to System DBPM, the fan power to Minimum Power, and the memory power to Maximum Performance. The BIOS sets the processor performance based on processor utilization.• Maximum Performance sets all fields to Maximum Performance. <p>If you select Custom, you can configure each option independently.</p>
CPU Power and Performance Management	Options are OS DBPM , System DBPM , Maximum Performance , or Minimum Power .
Fan Power and Performance Management	Options are Maximum Performance or Minimum Power .
Memory Power and Performance Management	Options are Maximum Performance , a specified frequency, or Minimum Power .

System Security Screen

Option	Description
System Password	<p>Displays the current status of the password security feature and allows a new system password assignment and verification.</p> <p>NOTE: See "Using the "Using the System Password" on page 75 for more information.</p>
Setup Password	<p>Restricts access to the System Setup program by using a setup password.</p> <p>NOTE: See "Using the System Password" on page 75 for more information.</p>
Password Status (Unlocked default)	<p>When Setup Password is assigned and this field is Locked, the system password cannot be changed or disabled at system start-up.</p> <p>See "Using the System Password" on page 75 for more information.</p>
TPM Security (Off default)	<p>Sets the reporting of the Trusted Platform Module (TPM) in the system.</p> <p>If Off, the presence of the TPM is not reported to the operating system.</p> <p>If On with Pre-boot Measurements, the system reports the TPM to the operating system and stores the pre-boot measurements to the TPM during POST.</p> <p>If On without Pre-boot Measurements, the system reports the TPM to the operating system and bypasses pre-boot measurements.</p>
TPM Activation (No Change default)	<p>When set to Activate, the TPM is enabled to default settings. When set to Deactivate, the TPM is disabled. The No Change state initiates no action. The operational state of the TPM remains unchanged (all user settings for the TPM are preserved).</p> <p>NOTE: This field is read-only when TPM Security is set to Off.</p>


Option	Description
TPM Clear (No default)	<p> CAUTION: Clearing the TPM will lose all encryption keys in the TPM. This option prevents booting to the operating system and results in data loss if the encryption keys cannot be restored. Back up the TPM keys prior to enabling this option.</p> <p>When set to Yes, all TPM contents are cleared.</p> <p>NOTE: This field is read-only when TPM Security is set to Off.</p>
Power Button (Enabled default)	<p>If Enabled, the power button can turn the system's power off and on. On an ACPI-compliant operating system, the system performs an orderly shutdown before power is turned off.</p> <p>When Disabled, the button can only turn on system power.</p>
NMI Button (Disabled default)	<p> CAUTION: Use the NMI button only if directed to do so by qualified support personnel or by the operating system's documentation. Pressing this button halts the operating system and displays a diagnostic screen.</p> <p>Enables or disables the NMI feature.</p>
AC Power Recovery (Last default)	<p>Determines how the system reacts when power is restored. If set to Last, the system returns to the last power state. On turns on the system after power is restored. Off allows the system to remain off after power is restored.</p>
AC Power Recovery Delay	<p>Determines when the system restarts after power is restored. Options are Immediate, Random (a random value of 30 to 240 seconds), or a user-defined value of 30 to 240 seconds.</p>
User Defined Delay	<p>Allows the user to view the current AC Recovery Delay. This field also allows the user to define a new AC Recovery Delay.</p>

Exit Screen

Press <Esc> to exit the System Setup program; the **Exit** screen displays:

- Save Changes and Exit
- Discard Changes and Exit
- Return to Setup

Entering the UEFI Boot Manager

 **NOTE:** Operating systems must be 64-bit UEFI-compatible (for example, Microsoft® Windows Server® 2008 x64 version) to be installed from the UEFI boot mode. DOS and 32-bit operating systems can only be installed from the BIOS boot mode.

 **NOTE:** The Boot Mode must be set to UEFI in the System Setup program to access the UEFI Boot Manager.

The UEFI Boot Manager enables you to:

- Add, delete, and arrange boot options
 - Access the System Setup program and BIOS-level boot options without rebooting
- 1 Turn on or restart your system.
 - 2 Press <F11> after you see the following message:

<F11> = UEFI Boot Manager

 **NOTE:** The system will not respond until the USB keyboard is active.

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

Using the UEFI Boot Manager Navigation Keys

Keys	Action
Up arrow	Moves to and highlights the previous field.
Down arrow	Moves to and highlights the next field.
Spacebar, <Enter>, <+>, <->	Cycles through the settings in a field.

Keys	Action
<Esc>	Refreshes the UEFI Boot Manager screen, or returns to the UEFI Boot Manager screen from the other program screens.
<F1>	Displays the UEFI Boot Manager help file.

UEFI Boot Manager Screen

Option	Description
Continue	The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system will continue with the next item in the boot order until the boot is successful or no more boot options are found.
<Boot options>	Displays the list of available boot options (marked with asterisks). Select the boot option you wish to use and press Enter. NOTE: If you hot-add a boot device, press <ESC> to refresh the list of boot options.
UEFI Boot Settings	Enables you to add, delete, enable, or disable boot options; change boot order; or execute a one-time boot option.
System Utilities	Enables you to access the System Setup program, System Services (Unified Server Configurator [USC]), Diagnostics, and BIOS-level boot options.

UEFI Boot Settings Screen

Option	Description
Add Boot Option	Adds a new boot option.
Delete Boot Option	Deletes an existing boot option.
Enable/Disable Boot Option	Disables and enables a boot option in the boot option list.
Change Boot Order	Changes the order of the boot option list.
One-Time Boot From File	Sets a one-time boot option not included in the boot option list.

System Utilities Screen

Option	Description
System Setup	Accesses the System Setup program without rebooting.
System Services	Restarts the system and access the Lifecycle Controller, which allows you to run utilities such as system diagnostics.
BIOS Boot Manager	Accesses the BIOS-level boot options list without rebooting. This option enables you to conveniently switch to BIOS boot mode if you need to boot to a device with a non-UEFI operating system, such as a bootable DOS media with diagnostics software.
Reboot System	Restarts the system.

System and Setup Password Features



NOTE: For a forgotten password, see "Disabling a Forgotten Password" on page 193.

Your system is shipped without the system password feature enabled. Operate the system only with system password protection.



CAUTION: The password features provide a basic level of security for the data on your system.



CAUTION: Anyone can access the data stored on your system if the system is running and unattended.

Using the System Password

When a system password is assigned, the system prompts for the password during start up.

Assigning a System Password

Before assigning a system password, enter the System Setup program and check the **System Password** option.

When a system password is assigned, **System Password** is **Enabled**. If **Password Status** is **Unlocked**, you can change the system password. If **Locked**, you cannot change the system password. Disabling the password jumper on the system board sets **System Password** to **Disabled**, and you cannot change or enter a new system password.

When a system password is not assigned and the password jumper on the system board is in the enabled position, **System Password** is **Not Enabled** and **Password Status** is **Unlocked**.


To assign a system password:

- 1 Verify that **Password Status** is **Unlocked**.
- 2 Highlight the **System Password** option and press <Enter>.
- 3 Type your new system password.

You can use up to 32 characters in your password.

As you type, placeholders appear in the field.

The password assignment is not case-sensitive. Certain key combinations are invalid and if you enter one, the system beeps. To erase a character, press <Backspace> or the left-arrow key.

 **NOTE:** To escape from the field without assigning a system password, press <Enter> to move to another field, or press <Esc> prior to completing step 5.

- 4 Press <Enter>.
- 5 To confirm your password, type it a second time and press <Enter>.

System Password changes to **Enabled**. Exit the System Setup program and begin using your system.

- 6 Either reboot the system now for the password protection to take effect or continue working.



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

Using Your System Password to Secure Your System



NOTE: If you have assigned a setup password (see "Using the Setup Password" on page 77), the system accepts your setup password as an alternate system password.

When **Password Status** is **Unlocked**, you have the option to leave the password security enabled or to disable password security.

To leave the password security enabled:

- 1 Turn on or reboot your system by pressing <Ctrl><Alt>.
- 2 Type your password and press <Enter>.

To disable the password security:

- 1 Turn on or reboot your system by pressing <Ctrl><Alt>.
- 2 Type your password and press <Ctrl><Enter>.

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

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

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



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

Deleting or Changing an Existing System Password

- 1 Enter the System Setup program and select the **System Security**.
- 2 Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.
The setting changes to **Not Enabled**.
- 3 If you want to assign a new setup password, perform the steps in "Assigning a Setup Password" on page 77.

Using the Setup Password

Assigning a Setup Password

You can assign a setup password only when the **Setup Password** is **Not Enabled**. To assign a setup password, highlight the **Setup Password** option and press the <+> or <-> key. The system prompts you to enter and verify the password.



NOTE: The setup password can be the same as the system password. If the two passwords are different, the setup password can be used as an alternate system password. The system password cannot be used in place of the setup password.

You can use up to 32 characters in your password.

As you type, placeholders appear in the field.

The password assignment is not case-sensitive. Certain key combinations are invalid and if you enter one, the system beeps. To erase a character, press <Backspace> or the left-arrow key.

When you verify the password, the **Setup Password** changes to **Enabled**. The next time you enter the System Setup program, the system prompts you for the setup password.

A change to the **Setup Password** option becomes effective immediately (restarting the system is not required).

Operating With a Setup Password Enabled

If **Setup Password** is **Enabled**, you must enter the correct setup password before modifying most of the System Setup options.

If you do not enter the correct password in three attempts, the system lets you view, but not modify, the System Setup screens. The following options are exceptions: If **System Password** is not **Enabled** and is not locked through the **Password Status** option, you can assign a system password. You cannot disable or change an existing system password.



NOTE: You can use the **Password Status** option in conjunction with the **Setup Password** option to protect the system password from unauthorized changes.

Deleting or Changing an Existing Setup Password

- 1 Enter the System Setup program and select the **System Security**.
- 2 Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.
The setting changes to **Not Enabled**.
- 3 If you want to assign a new setup password, perform the steps in "Assigning a Setup Password" on page 77.

Embedded System Management

The Lifecycle Controller is an embedded utility that enables systems management tasks from an embedded environment throughout the server's lifecycle.

Lifecycle Controller can be started during the boot sequence and can function independently of the operating system.



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

For more information about setting up the Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Lifecycle Controller documentation on the Dell Support website at support.dell.com/manuals.

iDRAC6 Configuration Utility

The iDRAC6 Configuration Utility is a pre-boot configuration environment that allows you to view and set parameters for the iDRAC6 and for the managed server.

The iDRAC6 Configuration Utility provides the following features:

- Enables fault logging and SNMP alerting
- Provides access to system event log and sensor status
- Functions independently of the system's operating system

In addition the iDRAC6 Configuration Utility enables you to:

- Configure, enable, or disable the iDRAC6 local area network through the dedicated iDRAC6 Enterprise card port or the embedded NIC1.
- Enable or disable IPMI over LAN
- Enable a LAN Platform Event Trap (PET) destination
- Attach or detach the Virtual Media devices
- Change the administrative user name and password and manage user privileges
- View System Event Log (SEL) messages or clear messages from the log
- Reset iDRAC6 settings to default

For additional information on using iDRAC6, see the documentation for iDRAC6 and systems management applications.

Entering the iDRAC6 Configuration Utility

- 1 Turn on or restart your system.
- 2 Press <Ctrl> <E> when prompted during POST.

If your operating system begins to load before you press <Ctrl><E>, allow the system to finish booting, and then restart your system and try again.

Installing System Components

Recommended Tools

You may need the following items to perform the procedures in this section:

- Key to the system keylock
- #1 and #2 Phillips screwdrivers
- T8 and T10 Torx drivers
- Wrist grounding strap

Inside the System

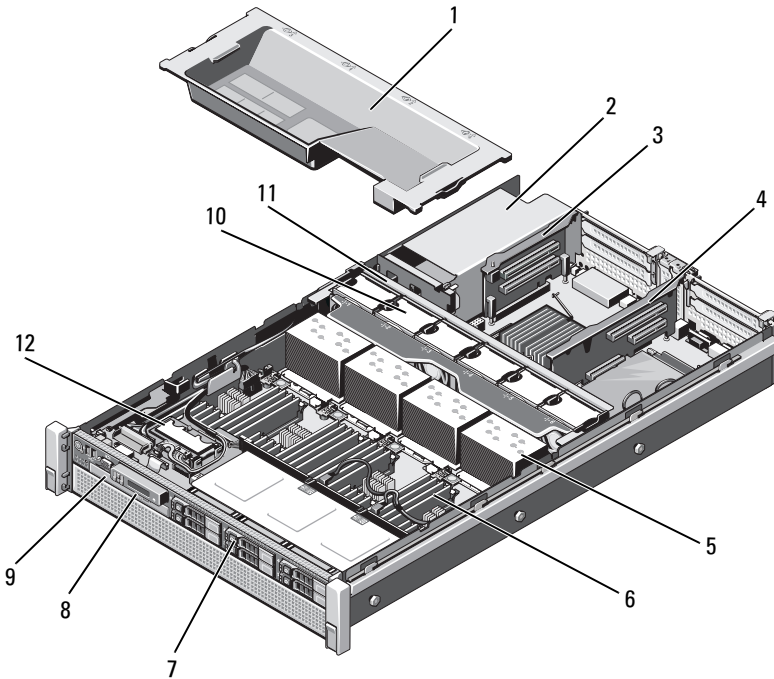


WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.



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

Figure 3-1. Inside the System



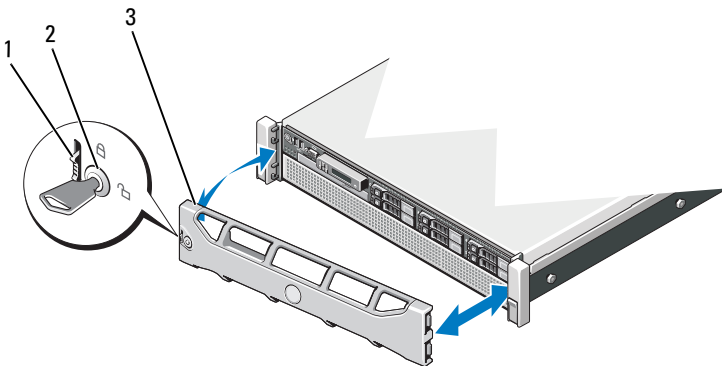
- | | | | |
|----|--------------------------|----|-------------------------|
| 1 | cooling shroud | 2 | power supply bays (2) |
| 3 | expansion-card riser 2 | 4 | expansion-card riser 1 |
| 5 | heat sinks (4) | 6 | memory modules (32) |
| 7 | hard drives (6) | 8 | control panel |
| 9 | optical drive (optional) | 10 | cooling fans (6) |
| 11 | cooling fan assembly | 12 | internal dual SD module |

Front Bezel (Optional)

Removing the Front Bezel

- 1 Unlock the keylock at the left end of the bezel.
- 2 Lift up the release latch next to the keylock.
- 3 Rotate the left end of the bezel away from the front panel.
- 4 Unhook the right end of the bezel and pull the bezel away from the system. See Figure 3-2.

Figure 3-2. Removing and Installing the Front Bezel




- 1 release latch
- 3 front bezel


2 key lock

Installing the Front Bezel

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

Opening and Closing the System

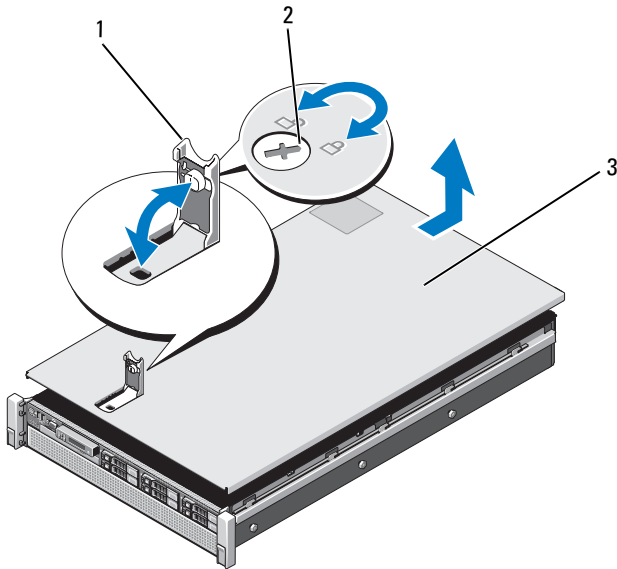
 **WARNING:** Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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.

Opening the System

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.
- 2 Rotate the latch release lock counter clockwise to the unlocked position. See Figure 3-3.
- 3 Lift the latch and slide the cover toward the back of the system.
- 4 Grasp the cover on both sides and lift the cover away from the system. See Figure 3-3.

Figure 3-3. Opening and Closing the System



- 1 latch
- 3 cover

- 2 latch release lock


Closing the System

- 1 Place the cover onto the chassis and offset it slightly toward the back of the system, so that the slots on the sides of the cover fit into the corresponding hooks on the sides of the chassis. See Figure 3-3.
- 2 Slide the cover toward the front of the chassis till it snaps in position.
- 3 Push down the latch to secure the cover into the closed position.
- 4 Rotate the latch release lock in the clockwise direction to secure the cover.

Hard Drives

All drives connect to the system board through the SAS/SATA backplane board mounted on the front-chassis assembly. Hard drives are supplied in hot-swappable drive carriers that fit in the hard-drive bays.

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

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



NOTE: Use only drives that have been tested and approved for use with the SAS/SATA backplane board.

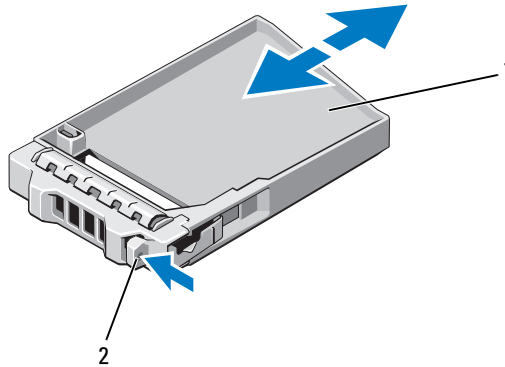
When you format a hard drive, allow enough time for the formatting to be completed. Be aware that high-capacity hard drives can take a number of hours to format.

Removing a Hard-Drive Blank

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

- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Grasp the front of the hard-drive blank, press the release button and slide the blank out until it is free of the drive bay. See Figure 3-4.

Figure 3-4. Removing or Installing a Hard-Drive Blank



1 hard-drive blank

2 release button

Installing a Hard-Drive Blank

- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Insert the drive blank into the drive bay until the release button clicks into place.
- 3 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

Removing a Hard-Drive Carrier

△ CAUTION: Ensure that your operating system supports hot-swap drive installation. See the documentation supplied with the operating system.

- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 From the management software, prepare the drive for removal. Wait until the hard-drive indicators on the drive carrier signal that the drive can be removed safely. See your controller documentation for information about hot-swap drive removal.

If the drive has been online, the green activity/fault indicator flashes as the drive is powered down. When the drive indicators are off, the drive is ready for removal.

- 3 Press the release button.

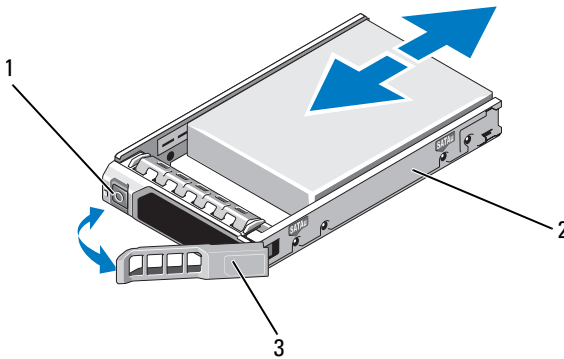
The hard-drive carrier handle lifts automatically.

- 4 Slide the hard-drive carrier out until it is free of the drive bay. See Figure 3-5.

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

- 5 Insert a drive blank in the empty drive bay. See "Installing a Hard-Drive Blank" on page 87.
- 6 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.


Figure 3-5. Removing and Installing a Hard-Drive Carrier




- | | | | |
|---|---------------------------|---|--------------------|
| 1 | release button | 2 | hard-drive carrier |
| 3 | hard-drive carrier handle | | |

Installing a Hard-Drive Carrier

 **CAUTION:** Use only hard drives that have been tested and approved for use with the SAS/SATA backplane.

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

 **CAUTION:** Ensure that your operating system supports hot-swap drive installation. See the documentation supplied with your operating system.

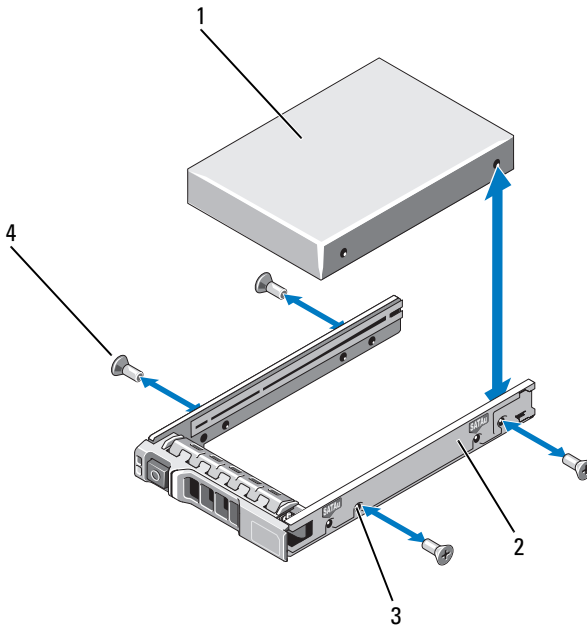
 **CAUTION:** Combining SATA and SAS hard drives in the same system configuration is not supported.

- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 If a drive blank is present in the bay, remove it. See "Removing a Hard-Drive Blank" on page 86.
- 3 Press the button on the front of the hard-drive carrier and open the handle.
- 4 Insert the hard-drive carrier into the drive bay until the carrier contacts the backplane.
- 5 Close the hard-drive carrier handle to lock the drive in place.

Removing a Hard Drive From a Hard-Drive Carrier

Remove the screws from the slide rails on the hard-drive carrier and separate the hard drive from the carrier. See Figure 3-6.

Figure 3-6. Removing or Installing a Hot-Swap Hard Drive Into a Hard-Drive Carrier



1 hard drive

2 hard-drive carrier

3 SAS/SATA screw hole

4 screws (4)

Installing a Hard Drive Into a Hard-Drive Carrier

- 1 Insert the hard drive into the hard-drive carrier with the connector end of the drive at the rear. See Figure 3-6.
- 2 Align the screw holes on the hard drive with the back set of holes on the hard-drive carrier.
- 3 Attach the four screws to secure the hard drive to the hard-drive carrier.

Optical Drive

An optional DVD-ROM or DVD+/-RW optical drive slides into the front panel and connects to the SATA controller on the system board.



NOTE: DVD devices are data only.

Removing an Optical 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 came with the product.

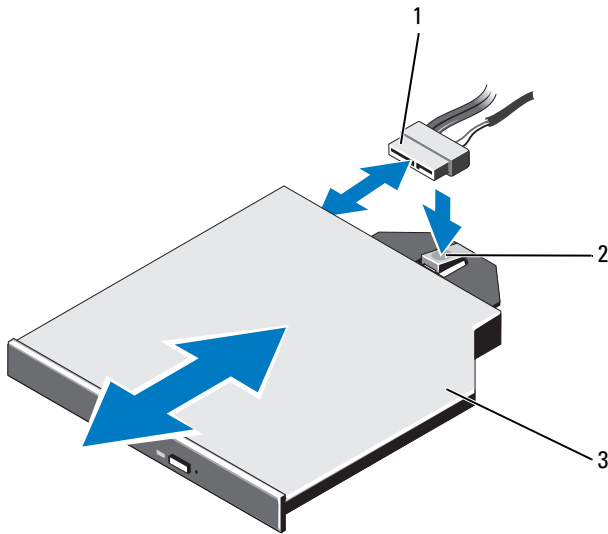
- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Disconnect the power/data cable from the back of the drive.

Note the routing of the power/data cable on the side on the system as you remove them from the system board and drive. You must route these cables properly when you replace them to prevent them from being pinched or crimped. For more information, see step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.

- 5 To remove the drive, press down and push the blue release tab toward the front of the system. See Figure 3-7.
- 6 Slide the optical drive out of the system until it is free of the drive bay.

- 7 If you are not adding a new optical drive, install the optical drive insert.
- 8 Close the system. See "Closing the System" on page 85.
- 9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 10 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

Figure 3-7. Removing and Installing the Optical Drive



- 1 power/data cable
- 3 optical drive

- 2 release tab

Installing an Optical 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 came with the product.

- 1** If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2** Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 3** Open the system. See "Opening the System" on page 84.
- 4** Slide the optical drive into the optical drive bay until the blue release tab snaps into place. See Figure 3-7.
- 5** Connect the power/data cable to the back of the drive.
You must route the cable properly on the side of the system to prevent it from being pinched or crimped. For more information, see step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 6** Close the system. See "Closing the System" on page 85.
- 7** Reconnect the system and peripherals to their electrical outlets.
- 8** If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

Power Supplies


Your system supports two 1100 W power supply modules.

If two power supplies are installed, the second power supply provides hot-swappable, power redundancy. In redundant mode, the system distributes the power load across both power supplies to maximize efficiency. When a power supply is removed with the system powered on, the full power load is picked up by the remaining power supply. Table 3-1 lists the power supply redundancy modes.


Table 3-1. Power Supply Redundancy Modes

Number of Power Supplies	Redundancy Mode	System Configuration
1	1+0	Nonredundant configuration
2	1+1	Redundant configuration

Removing a Power Supply

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

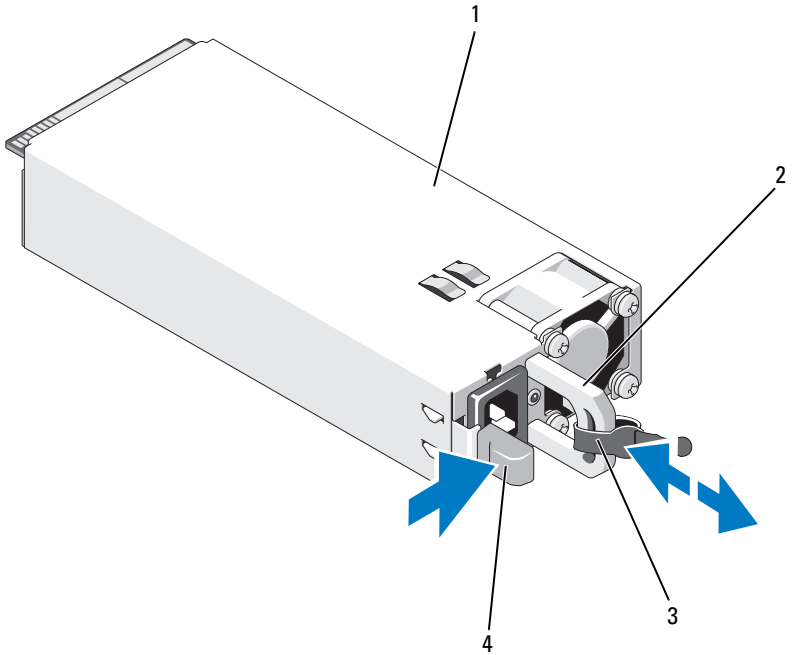
- 1 Disconnect the power cable from the power supply and remove the Velcro straps that bundle and secure the system cables.

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

- 2 Press the release latch and pull the power supply straight out to release it from the power distribution board and clear the chassis.

If you are permanently removing the power supply, you must install a power supply blank to ensure proper system cooling. See "Installing the Power Supply Blank" on page 96.


Figure 3-8. Removing and Installing a Power Supply



- | | | | |
|---|--------------|---|---------------------|
| 1 | power supply | 2 | power supply handle |
| 3 | velcro strap | 4 | release tab |

Installing a Power Supply

- 1 Verify that the power supplies are of the same type and have the same maximum output power.

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

- 2 If applicable, remove the power supply blank. See "Removing the Power Supply Blank" on page 96.

- 3 Slide the new power supply into the chassis until the power supply is fully seated and the release latch snaps into place. See Figure 3-8.



NOTE: If you unlatched the cable management arm in step 1 of the previous procedure, relatch it. For information about the cable management arm, see the system's rack documentation.

- 4 Connect the power cable to the power supply and plug the cable into a power outlet.



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



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

Removing the Power Supply Blank

If you are installing a power supply, remove the power supply blank by pulling outward on the blank.



CAUTION: To ensure proper system cooling, the power supply blank must be installed in power supply bay PS2 in a non-redundant configuration. Remove the power supply blank only if you are installing a second power supply.

Installing the Power Supply Blank

To install the power supply blank, align the blank with the power supply bay and insert the blank into the chassis until it clicks into place.

Cooling Shroud

The cooling shroud covers the memory modules and provides air flow to the system.

Removing the Cooling Shroud



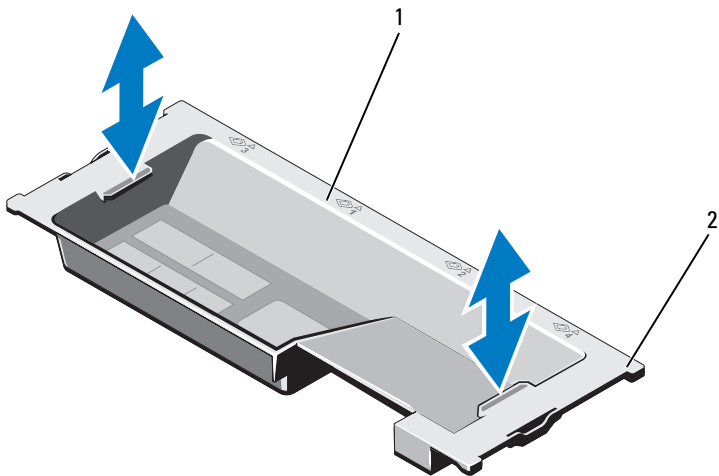
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and

support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening and Closing the System" on page 84.
- 3 Hold the touch points and gently lift the shroud straight up and away from the system. See Figure 3-9.

Figure 3-9. Removing and Installing the Cooling Shroud



1 cooling shroud

2 shroud tabs (4)

Installing the Cooling Shroud



NOTE: For proper seating of the cooling shroud in the system chassis, make sure that the cables inside the system are routed along the chassis wall. See Figure 3-10.

- 1 Route the power/data cables along the chassis wall. See step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 2 Lower the cooling shroud into the system and align the shroud tabs with the slots on the system chassis. See Figure 3-9.
- 3 Close the system. See "Opening and Closing the System" on page 84.

Front-Chassis Assembly

The front-chassis assembly houses the hard drives, SAS/SATA backplane, optical drive, control panel assembly, and the front panel display. The front-chassis assembly is mounted on the chassis walls with a sliding rail system.

Sliding the Front-Chassis Assembly

To slide the front-chassis assembly away from the chassis:

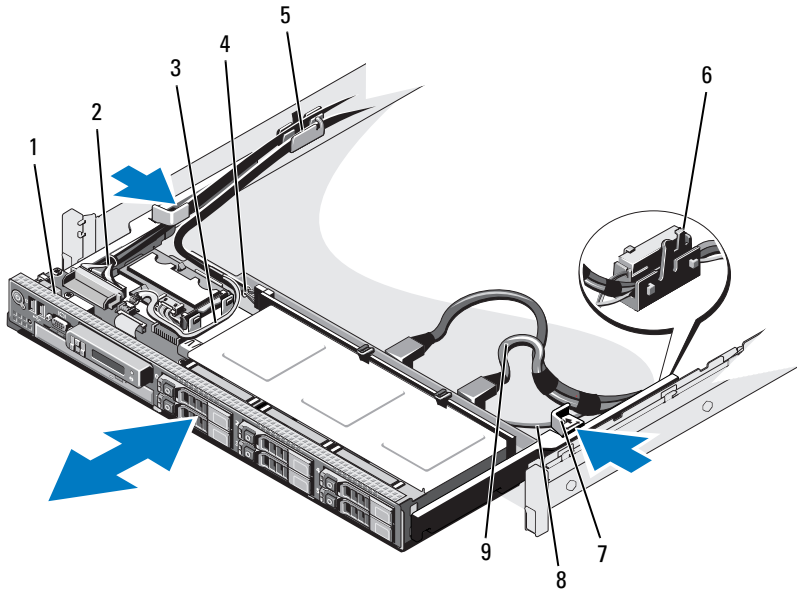
- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.



CAUTION: To prevent the memory modules from being damaged, ensure that all cables connected to the front-chassis assembly are free of obstructions.

- 4 If required, free the power/data cables from the chassis walls.
- 5 Press the release tabs inwards and slide the assembly forward and away from the chassis. See Figure 3-10.

Figure 3-10. Front-Chassis Assembly



- | | | | |
|---|------------------------|---|---------------------------|
| 1 | front-chassis assembly | 2 | control panel cable |
| 3 | USB cable | 4 | SAS backplane power cable |
| 5 | cable clamp | 6 | RAID battery carrier |
| 7 | release tabs (2) | 8 | SATA cable |
| 9 | SAS cables (2) | | |

To slide the front-chassis assembly back into the chassis:


- 1 Slide the assembly inside until the assembly snaps into position.



NOTE: For proper system cooling, make sure that the cables inside the system do not obstruct airflow.

- 2 Route the SAS and SATA cables along the chassis wall and the RAID battery carrier. See Figure 3-10.


- 3 Route the SAS backplane/USB/optical drive power cables through the cable clamp, and the control panel cable along the chassis wall. See Figure 3-10.

 **CAUTION:** To prevent the memory modules from being damaged, ensure that all cables connected to the front-chassis assembly are free of obstructions.

- 4 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 97.
- 5 Close the system. See "Closing the System" on page 85.
- 6 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

System Memory

Your system supports ECC DDR3 registered DIMMs (RDIMMs). Single-, dual-, and quad-rank DIMMs can be 1066 and 1333 MHz. RDIMMs of capacities 1 GB, 2 GB, 4 GB, 8 GB, and 16 GB are supported for a total of up to 512 GB.


 **NOTE:** The system bus speed is limited to 1066 MHz. DIMMs of speed 1333 MHz will thus operate at 1066 MHz only.

The system consists of 32 memory sockets split into four sets of eight sockets; one set for each processor. Each eight-memory socket set is further organized into four DDR3 memory channels. The first socket of each DDR3 memory channel is marked with a white release lever.

In one- or two-processor configurations, FlexMem Bridges are installed in the adjacent processor sockets to enable the processors installed in sockets 1 and 2 to access the adjacent memory set. For more information, see Table 3-5.

General Memory Module Installation Guidelines

To ensure optimal performance of your system, observe the following general guidelines when configuring your system memory:

 **NOTE:** Memory configurations that fail to observe these guidelines can prevent your system from starting and producing any video output.

- DIMMs must be populated in matched pairs for each processor (for example, A1/A2, A3/A4). Single DIMM operation is not supported.

- The memory configuration for each processor must be identical for optimal performance.
- Memory modules must be installed beginning with socket A1 or A2 for processor 1, B1 or B2 for processor 2, and C1 or C2 for processor 3, D1 or D2 for processor 4.
- In case of mixed-rank population, first populate the DIMM with the highest number of ranks (in sockets with white release levers).
- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s).

The system supports memory mirroring and memory sparing for limited configurations. For more information, see Table 3-2 and Table 3-3. Mirroring must be enabled in the System Setup program. In a mirrored configuration, the total available system memory is one-half of the total installed physical memory.



NOTE: The system supports memory mirroring if all DIMM sockets are populated.

Table 3-2. Memory Configurations (Same DIMM Size)



NOTE: DIMMs A1-A8 are assigned to processor 1, DIMMs B1-B8 are assigned to processor 2, and so on. For configurations with two processors, DIMMs A1-A8 and DIMMs C1-C8 are assigned to processor 1 while DIMMs B1-B8 and DIMMs D1-D8 are assigned to processor 2.

Number of Processors	System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	Sparing	Mirroring	Processors			
						CPU1	CPU2	CPU3	CPU4
1	4	1	4			A1,A2	-	C1,C2	-
1	16	2	8			A1,A3, A2,A4	-	C1,C3, C2,C4	-
1	64	4	16	X		A1,A2, A3,A4, A5,A6, A7,A8	-	C1,C2, C3,C4, C5,C6, C7,C8	-
1	128	8	16	X		A1,A2, A3,A4, A5,A6, A7,A8	-	C1,C2, C3,C4, C5,C6, C7,C8	-
2/4	8	1	8			A1,A2	B1,B2	C1,C2	D1,D2
2/4	16	1	16			A1,A3, A2,A4	B1,B3, B2,B4	C1,C3, C2,C4	D1,D3, D2,D4
2/4	16	2	8			A1,A2	B1,B2	C1,C2	D1,D2
2/4	32	2	16			A1,A3, A2,A4	B1,B3, B2,B4	C1,C3, C2,C4	D1,D3, D2,D4
2/4	32	4	8			A1,A2	B1,B2	C1,C2	D1,D2
2/4	64	2	32	X	X	A1,A2, A3,A4, A5,A6, A7,A8	B1,B2, B3,B4, B5,B6, B7,B8	C1,C2, C3,C4, C5,C6, C7,C8	D1,D2, D3,D4, D5,D6, D7,D8

Number of Processors	System Capacity (in GB)	DIMM Size (in GB)	Number of DIMMs	Sparing	Mirroring	Processors			
						CPU1	CPU2	CPU3	CPU4
2/4	64	4	16	X		A1,A3, A2,A4	B1,B3, B2,B4	C1,C3, C2,C4	D1,D3, D2,D4
2/4	96	4	24	X		A1,A3, A5,A2, A4,A6	B1,B3, B5,B2, B4,B6	C1,C3, C5,C2, C4,C6	D1,D3, D5,D2, D4,D6
2/4	128	4	32	X	X	A1,A2, A3,A4, A5,A6, A7,A8	B1,B2, B3,B4, B5,B6, B7,B8	C1,C2, C3,C4, C5,C6, C7,C8	D1,D2, D3,D4, D5,D6, D7,D8
2/4	128	8	16	X		A1,A3, A2,A4	B1,B2, B3,B4	C1,C2, C3,C4	D1,D2, D3,D4
2/4	192	8	24	X		A1,A3, A5,A2, A4,A6	B1,B3, B5,B2, B4,B6	C1,C3, C5,C2, C4,C6	D1,D3, D5,D2, D4,D6
2/4	256	8	32	X	X	A1,A2, A3,A4, A5,A6, A7,A8	B1,B2, B3,B4, B5,B6, B7,B8	C1,C2, C3,C4, C5,C6, C7,C8	D1,D2, D3,D4, D5,D6, D7,D8
2/4	256	16	16	X		A1,A3, A2,A4	B1,B3, B2,B4	C1,C3, C2,C4	D1,D3, D2,D4
2/4	512	16	32	X	X	A1,A2, A3,A4, A5,A6, A7,A8	B1,B2, B3,B4, B5,B6, B7,B8	C1,C2, C3,C4, C5,C6, C7,C8	D1,D2, D3,D4, D5,D6, D7,D8

Table 3-3. Memory Configurations (Mixed DIMM Sizes)





NOTE: DIMMs A1-A8 are assigned to processor 1, DIMMs B1-B8 are assigned to processor 2, and so on. For configurations with two processors, DIMMs A1-A8 and DIMMs C1-C8 are assigned to processor 1 while DIMMs B1-B8 and DIMMs D1-D8 are assigned to processor 2.

System Capacity (in GB)	Number of DIMMs	Memory Slot (DIMM Size Per Slot in GB)							
		Processors							
		CPU1		CPU2		CPU3		CPU4	
96	32	A1 (4*) A3 (4) A2 (4) A4 (4)	A5 (2) A6 (2) A7 (2) A8 (2)	B1 (4) B3 (4) B2 (4) B4 (4)	B5 (2) B6 (2) B7 (2) B8 (2)	C1 (4) C3 (4) C2 (4) C4 (4)	C5 (2) C6 (2) C7 (2) C8 (2)	D1 (4) D3 (4) D2 (4) D4 (4)	D5 (2) D6 (2) D7 (2) D8 (2)
160	32	A1 (8) A2 (8)	A3 (4) A4 (4) A5 (4) A6 (4) A7 (4) A8 (4)	B1 (8) B2 (8)	B3 (4) B4 (4) B5 (4) B6 (4) B7 (4) B8 (4)	C1 (8) C2 (8)	C3 (4) C4 (4) C5 (4) C6 (4) C7 (4) C8 (4)	D1 (8) D2 (8)	D3 (4) D4 (4) D5 (4) D6 (4) D7 (4) D8 (4)
192	32	A1 (8) A3 (8) A2 (8) A4 (8)	A5 (4) A6 (4) A7 (4) A8 (4)	B1 (8) B3 (8) B2 (8) B4 (8)	B5 (4) B6 (4) B7 (4) B8 (4)	C1 (8) C3 (8) C2 (8) C4 (8)	C5 (4) C6 (4) C7 (4) C8 (4)	D1 (8) D3 (8) D2 (8) D4 (8)	D5 (4) D6 (4) D7 (4) D8 (4)
<p>NOTE: All memory configurations listed in this table apply to 2/4 processor combinations and support sparing and mirroring modes.</p>									


*Size of the DIMM in GB

Installing Memory Modules

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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.
- 5 Slide the front-chassis assembly away from the chassis. See "Front-Chassis Assembly" on page 98.
- 6 Press out the ejectors on each end of the socket until the memory-module blank pops out of the socket. See Figure 3-11.
- 7 If applicable, remove the memory-module blanks from the sockets in which you plan to install memory modules.

 **NOTE:** Make sure to retain any removed memory-module blanks for future use.


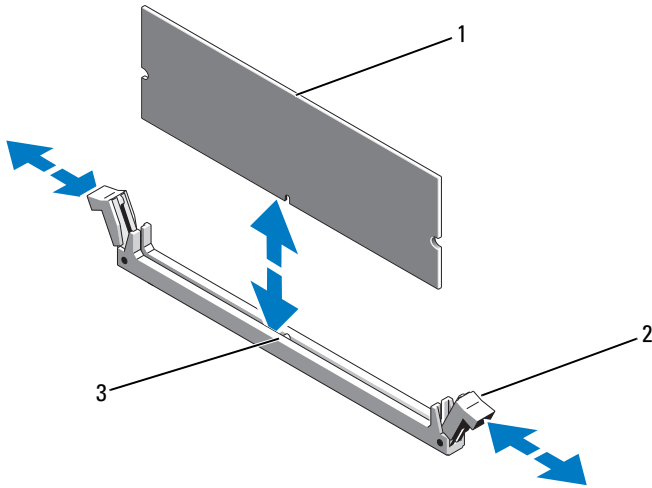
 **CAUTION:** Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

Figure 3-11. Installing and Removing a Memory Module



- 1 memory module
- 2 memory module socket ejectors (2)
- 3 alignment key

8 Align the memory module's edge connector with the alignment key of the memory module socket, and insert the memory module in the socket.

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

9 Press down on the memory module with your thumbs to lock the memory module into the socket.

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


10 Repeat step 6 through step 9 of this procedure to install the remaining memory modules. See Table 3-2 and Table 3-3.


11 Slide the front-chassis assembly into the chassis. See "Front-Chassis Assembly" on page 98.


12 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

- 13 Install the cooling shroud. See "Installing the Cooling Shroud" on page 97.
- 14 Close the system. See "Closing the System" on page 85.
- 15 Start up the system, press <F2> to enter the System Setup program, and check the **System Memory** setting on the main System Setup screen.
The system should have already changed the value to reflect the newly installed memory.
- 16 If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 3 through step 15 of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.
- 17 Run the system memory test in the system diagnostics. See "Running the Embedded System Diagnostics" on page 182.


Removing Memory Modules


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

 **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.


- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 3 Open the system. See "Opening the System" on page 84.

 **CAUTION:** Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.




- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.
- 5 Slide the front-chassis assembly away from the chassis. See "Front-Chassis Assembly" on page 98.
- 6 Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 3-11.
- 7 Lift out the memory module.
 -  **NOTE:** If you are not replacing the memory module, insert a memory module blank in the socket.
- 8 Slide the front-chassis assembly back into the chassis. See "Front-Chassis Assembly" on page 98.
- 9 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.
- 10 Close the system. See "Closing the System" on page 85.
- 11 Reconnect the system and peripherals to their power sources, and turn them on.

Cooling Fans

Your system contains six hot-swappable fans mounted in a cooling fan assembly and provides cooling for the processors, expansion cards, and memory modules.

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

Removing a Cooling Fan

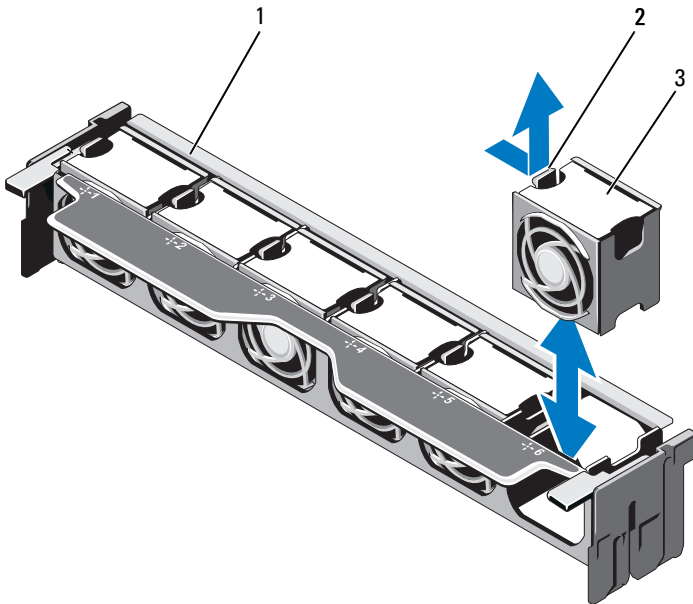
-  **WARNING:** Opening or removing the system cover when the system is on may expose you to a risk of electric shock. Exercise utmost care while removing or installing cooling fans.
-  **WARNING:** Allow time for the fan to stop spinning after removing it from the system.
-  **WARNING:** Do not attempt to operate the system without the cooling fans.

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

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

- 1 Open the system. See "Opening the System" on page 84.
- 2 Press the release tab and lift the fan out of the cooling fan assembly. See Figure 3-12.


Figure 3-12. Removing and Installing a Cooling Fan



- 1 fan assembly
- 3 fan module


- 2 release tab

Installing a Cooling Fan

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

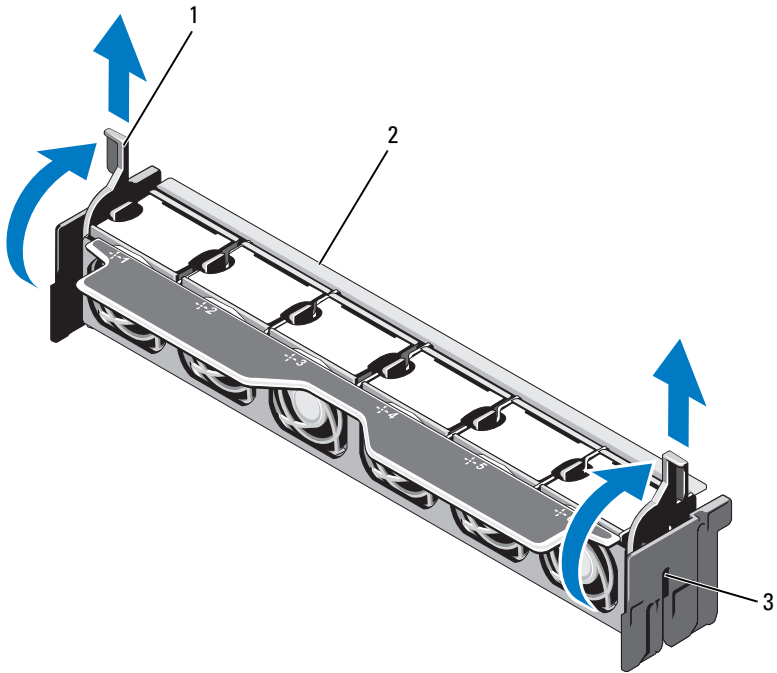
- 1 Align the connector on the fan with the connector on the system board.
- 2 Lower the fan into the cooling fan assembly until the release tab snaps into place. See Figure 3-12.
- 3 Close the system. See "Closing the System" on page 85.

Removing the Cooling Fan Assembly

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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Lift the blue release levers in the direction of the arrows to release the cooling fan assembly from the chassis. See Figure 3-13.
- 4 Grasp the blue release levers and lift the cooling fan assembly out of the system. See Figure 3-13.

Figure 3-13. Removing and Installing the Cooling Fan Assembly



- | | | | |
|---|--------------------|---|--------------|
| 1 | release levers (2) | 2 | fan assembly |
| 3 | slots (2) | | |

Installing the Cooling Fan Assembly


- 1 Orient the cooling fan assembly in the appropriate direction. See Figure 3-1.
- 2 Align the slots on the sides of the cooling fan assembly with the tabs on the system chassis. See Figure 3-13.
- 3 Insert the cooling fan assembly into the system and lower the blue release levers to lock it in place.
- 4 Close the system. See "Closing the System" on page 85.

- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Internal USB Memory Key

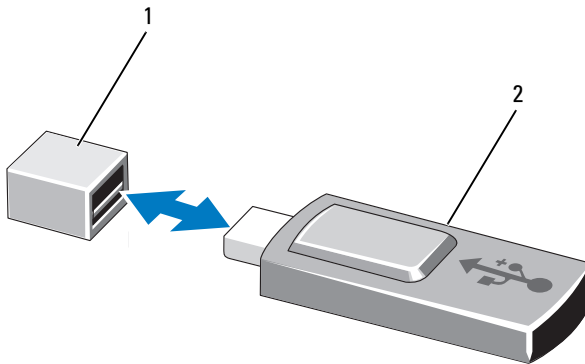
An optional USB memory key installed inside your system can be used as a boot device, security key, or mass storage device. The USB connector must be enabled by the **Internal USB Port** option in the **Integrated Devices** screen of the System Setup program.

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

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Locate the USB connector on the control panel board. See Figure 3-30.
- 4 Insert the USB memory key into the USB connector. See Figure 3-14.
- 5 Close the system. See "Closing the System" on page 85.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 7 Enter the System Setup program and verify that the USB key has been detected by the system. See "Using the System Setup Program and UEFI Boot Manager" on page 59.

Figure 3-14. Removing and Installing a USB Memory Key



1 USB memory key connector

2 USB memory key

Internal NIC Hardware Key

Any additional future functionalities for the system's integrated NICs are enabled by installing an optional NIC hardware key in the iSCSI KEY socket on the system board. See Figure 6-1.



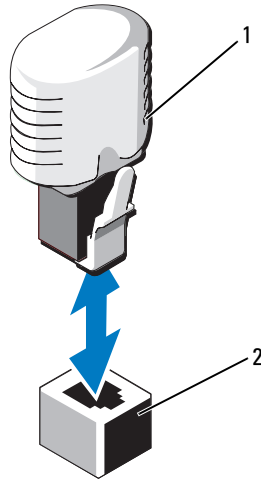
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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



NOTE: TOE operating system support and the Microsoft® scalable network pack are required for TOE functionality.

- 1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Locate the iSCSI KEY connector on the system board. See Figure 6-1.
- 4 Insert the NIC hardware key into the connector onto the board. See Figure 3-15.

Figure 3-15. Installing a NIC Hardware Key



1 NIC hardware key

2 ICSI KEY connector

- 5 Close the system. See "Closing the System" on page 85.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Expansion Cards and Expansion-Card Risers

Expansion Card Installation Guidelines

Your system supports up to six Generation 2 PCIe expansion cards installed in connectors on the system board and two expansion-card risers. To locate the expansion-card connectors on the system board, see Figure 6-1 and to locate the expansion-card connectors on the expansion-card risers, see Figure 6-4 and Figure 6-5.

The following are the slot configurations on the risers and the system board:

- **Riser 1**
Slot 1: x8 link expansion slot (24.13 cm [9.5"] length)
Slot 2: x4 link expansion slot (low-profile 24.13 cm [9.5"] maximum length, with a standard height bracket)
- **System Board**
Slot 3: x8 link expansion slot (low-profile 24.13 cm [9.5"] length)
Slot 4: x8 link expansion slot (low-profile 24.13 cm [9.5"] length)
- **Riser 2**
Slot 5: x8 link expansion slot (24.13 cm [9.5"] length)
Slot 6: x8 link expansion slot (24.13 cm [9.5"] length)



NOTE: It is recommended that you populate slot 3 or slot 4 with an x8 card having a low profile bracket before populating slot 2.




CAUTION: To ensure proper cooling, only two out of the six expansion cards can have a power consumption greater than 15 W (up to 25 W maximum), not including the integrated storage controller.

Table 3-4 provides a guide for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All other expansion cards should be installed in card priority and slot priority order.


Table 3-4. Expansion Card Installation Order

Card Priority	Card Type	Slot Priority	Max Allowed
1	PERC H800	6,5	2
2	PERC 6/E	6,5	2
3	SAS 5/E	6,5	2
4	6 Gbps SAS HBA	6,5,1,2	2
5	10 Gb NICs	6,5,1,2	2
6	Converged Network Adapters (CNA)	6,5,1,2	2
7	8G Fiber Channel (single port)	6,5,1,2	4
8	8G Fiber Channel (dual port)	6,5,1,2	2
9	4G Fibre Channel (single port)	2,1,6,5	2-4
10	4G Fibre Channel (dual port)	2,1,6,5	2-4
11	SCSI HBA	2,1,6,5	2
12	1 Gb NICs	2,1,6,5,3,4	2-4

Installing an Expansion Card

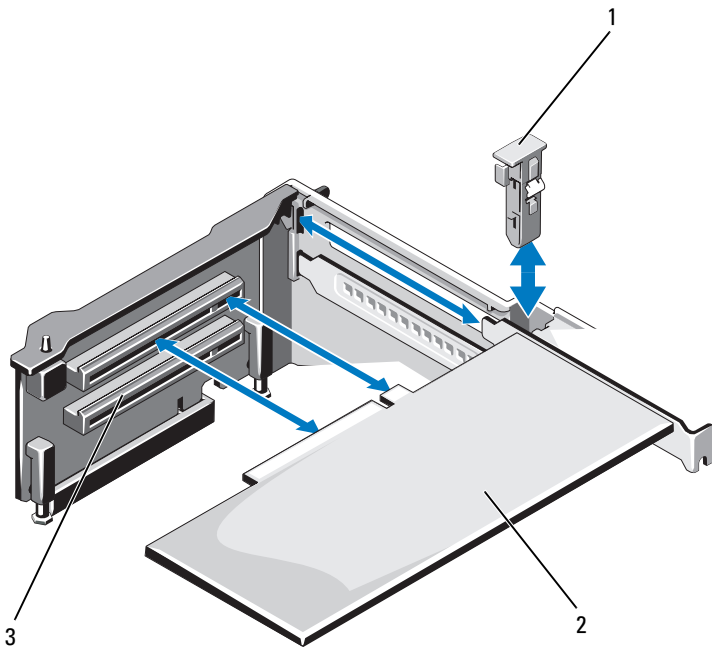
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

- 1 Unpack the expansion card and prepare it for installation.
For instructions, see the documentation accompanying the card.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Locate the expansion-card connector on the system board/riser.

 **NOTE:** To install an expansion card in the expansion-card connector on the system board, go to step 7.

- 5 Slide out the expansion-card latch and remove the filler bracket. See Figure 3-16.
- 6 Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion-card connector.
- 7 Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.
- 8 Slide the expansion-card latch into position. See Figure 3-16.

Figure 3-16. Installing and Removing an Expansion Card



- | | | | |
|---|--------------------------|---|----------------|
| 1 | expansion-card latch | 2 | expansion card |
| 3 | expansion-card connector | | |


- 9 Connect the cables to the expansion card.

- 10 Close the system. See "Closing the System" on page 85.
- 11 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 12 Install any device drivers required for the card as described in the documentation for the card.

Removing an Expansion Card



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Disconnect all cables from the card.
- 4 Slide the expansion-card latch out. See Figure 3-16.
- 5 Grasp the expansion card by its edges, and carefully remove it from the expansion-card connector.
- 6 If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion-card latch.
 -  **NOTE:** You must install a filler bracket over an empty expansion 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.
- 7 Close the system. See "Closing the System" on page 85.
- 8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Expansion-Card Risers

The system's expansion-card risers support Generation 2 PCIe expansion cards.



NOTE: Ensure that both riser 1 and riser 2 are installed in the system before you turn the system on.

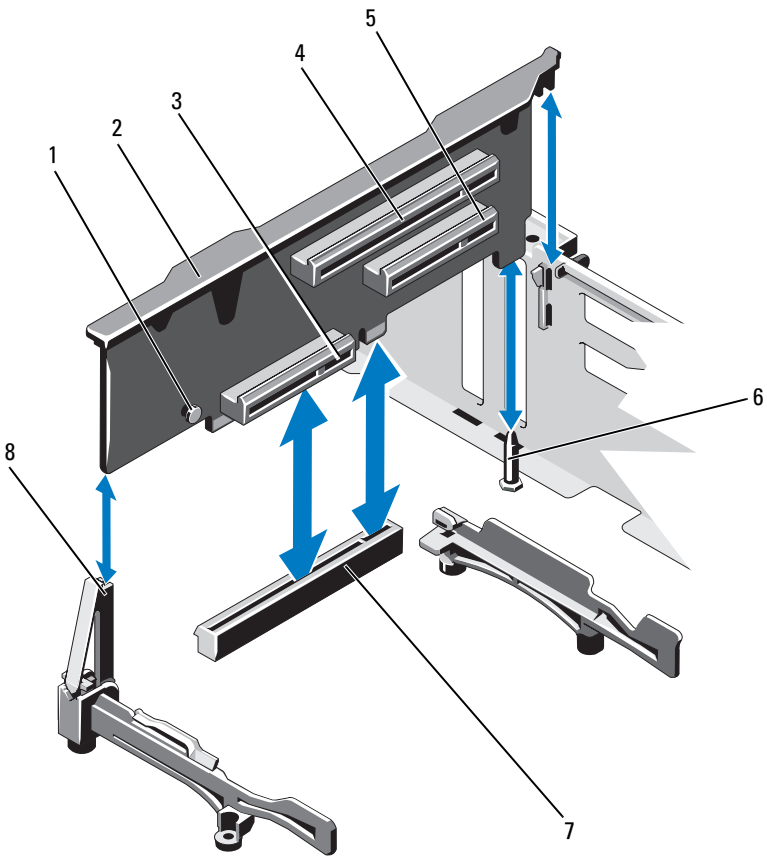
Removing Expansion-Card Riser 1



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 If installed, remove the expansion card(s) from the expansion-card slot(s). See "Removing an Expansion Card" on page 118.
- 4 If installed, remove the storage controller card. See "Removing the Integrated Storage Controller Card" on page 126.
- 5 To remove the expansion-card riser, press the blue tab on the riser and lift the expansion-card riser from the riser 1 connector on the system board. See Figure 3-17.

Figure 3-17. Installing or Removing Expansion-Card Riser 1



- | | | | |
|---|--|---|------------------------|
| 1 | blue tab | 2 | expansion-card riser 1 |
| 3 | integrated storage controller card connector | 4 | expansion-card slot 1 |
| 5 | expansion-card slot 2 | 6 | riser guide pin |
| 7 | riser 1 connector on system board | 8 | riser guide |

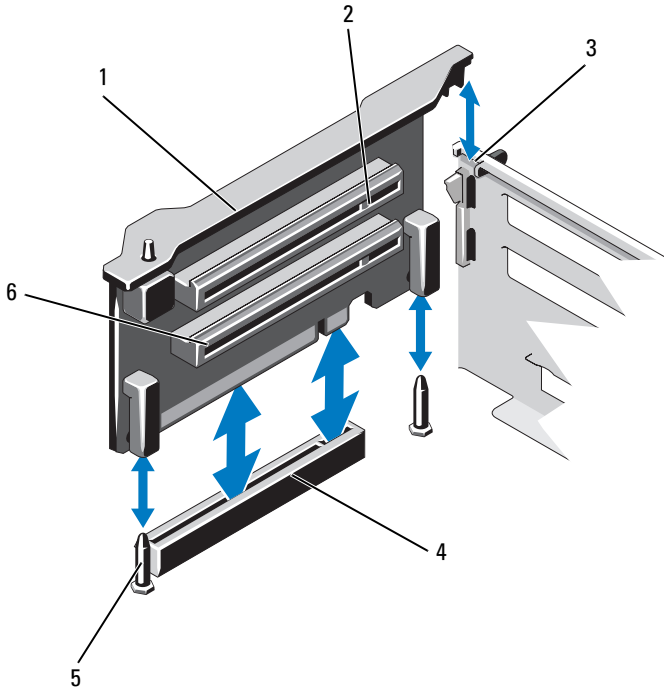
Installing Expansion-Card Riser 1

- 1** Align the expansion-card riser with the slot on the riser guide and the riser guide pin on the system board. See Figure 3-17.
- 2** Lower the expansion-card riser into place until the expansion-card riser connector is fully seated.
- 3** If applicable, reinstall the storage controller card. See "Installing the Integrated Storage Controller Card" on page 128.
- 4** If applicable, reinstall the expansion card(s). See "Installing an Expansion Card" on page 116.
- 5** Close the system. See "Closing the System" on page 85.
- 6** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Removing Expansion-Card Riser 2

- 1** Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2** Open the system. See "Opening the System" on page 84.
- 3** If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 118.
- 4** To remove the expansion-card riser, lift the expansion-card riser from the riser 2 connector on the system board. See Figure 3-17.

Figure 3-18. Installing or Removing Expansion-Card Riser 2



- | | | | |
|---|------------------------|---|-----------------------------------|
| 1 | expansion-card riser 2 | 2 | expansion-card slot 5 |
| 3 | slot on chassis | 4 | riser 2 connector on system board |
| 5 | riser guide pins (2) | 6 | expansion-card slot 6 |

Installing Expansion-Card Riser 2

- 1 Align the expansion-card riser with the riser guide pins on the system board and the slot on the chassis. See Figure 3-17.
- 2 Lower the expansion-card riser into place until the expansion-card riser connector is fully seated.
- 3 If applicable, reinstall the expansion card(s). See "Installing an Expansion Card" on page 116.

- 4 Close the system. See "Closing the System" on page 85.
- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

iDRAC6 Enterprise Card (Optional)

Installing an iDRAC6 Enterprise Card

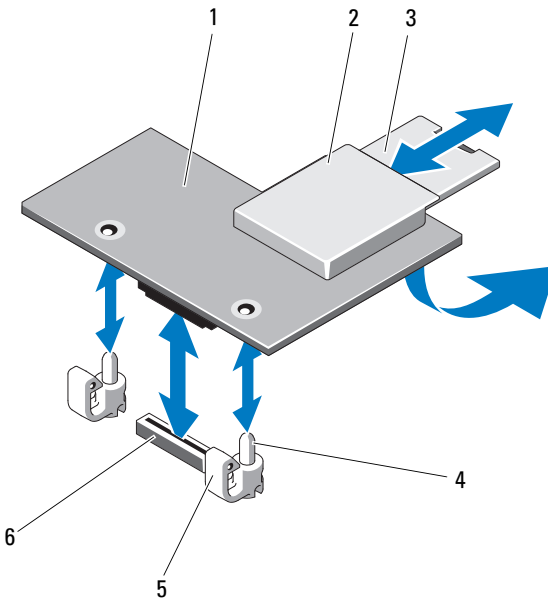


CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Remove the plastic filler plug for the iDRAC6 Enterprise port from the system back panel.
- 4 Align the front edge of the card with the two plastic retention standoffs next to the iDRAC6 connector on the system board, and lower the card into place. See Figure 3-19.

When the front of the card is fully seated, the plastic standoffs snap over the edge of the card.

Figure 3-19. Installing or Removing an iDRAC6 Enterprise Card (Optional)



- | | | | |
|---|-----------------------------|---|----------------------------------|
| 1 | iDRAC6 enterprise card | 2 | VFlash media slot |
| 3 | VFlash SD card | 4 | retention standoff posts (2) |
| 5 | retention standoff tabs (2) | 6 | iDRAC6 enterprise card connector |

- 5** If applicable, connect the Ethernet cable from the iDRAC6 Enterprise Card connector on the system back panel. See Figure 1-3.
- 6** Close the system. See "Closing the System" on page 85.
- 7** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 8** Enter the iDRAC6 configuration utility and set up the Ethernet mode. See "iDRAC6 Configuration Utility" on page 79.

Removing an iDRAC6 Enterprise Card



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 If applicable, disconnect the Ethernet cable from the iDRAC6 Enterprise Card connector on the system back panel. See Figure 1-3.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Remove the VFlash media card (if installed) from the iDRAC6 Enterprise Card. See "Removing a VFlash Media Card" on page 129.
- 5 Pull back slightly on the two tabs at the front edge of the card and gently lift the front edge of the card off the retention standoffs.

As the card releases from the standoffs, the connector under the card disengages from the system board connector.
- 6 Slide the card away from the back of the system until the RJ-45 connector is clear of the back panel and then lift the card out of the system.
- 7 Close the system. See "Closing the System" on page 85.
- 8 Reconnect the system and peripherals to its electrical outlet, and turn them on.

Integrated Storage Controller Card

Your system includes a dedicated expansion-card slot on expansion-card riser 1 for an integrated SAS or PERC controller card that provides the integrated storage subsystem for your system's internal hard drives. The controller supports SAS and SATA hard drives and also enables you to set up the hard drives in RAID configurations as supported by the version of the storage controller included with your system.

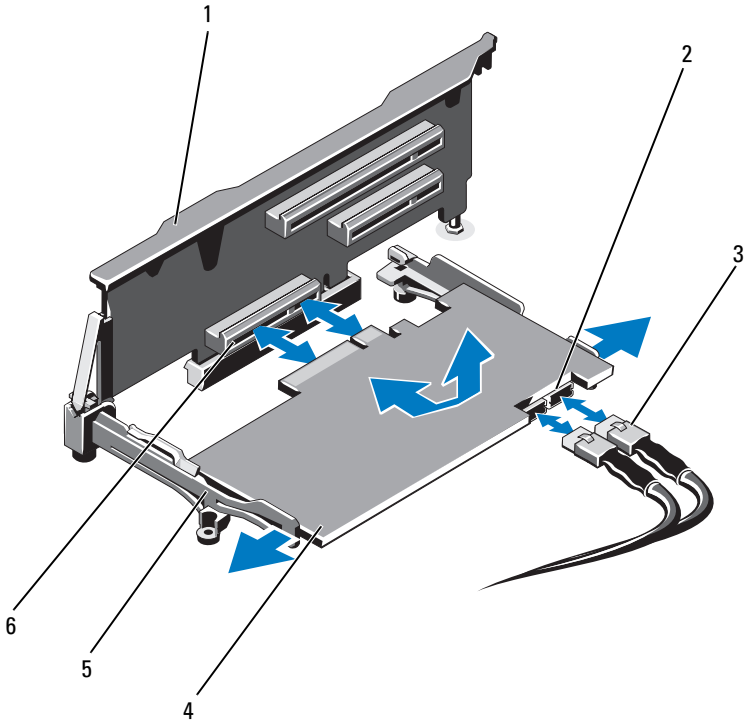
Removing the Integrated Storage Controller Card



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Disconnect the cables connected to the card.
- 4 Pull the card out from the connector on riser 1 and angle the card out of the plastic card guides.
- 5 Close the system. See "Closing the System" on page 85.

Figure 3-20. Installing the Integrated Storage Controller Card



- | | | | |
|---|------------------------|---|--|
| 1 | expansion card riser 1 | 2 | SAS data cable connectors (2) |
| 3 | SAS data cables (2) | 4 | integrated storage controller card |
| 5 | alignment guides (2) | 6 | integrated storage controller card connector |

Installing the Integrated Storage Controller Card



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Hold the card by its edges and angle it between the alignment guides on riser 1 until it is fully seated.
- 4 Connect the SAS data cable to the SAS data cable connector on the integrated storage controller card. See Figure 3-20.



NOTE: Ensure that you connect the cable according to the connector labels on the cable. The cable does not function properly if reversed.

- 5 Route the SAS data cable through the channel on the inner side of the chassis.
- 6 Attach the cable labeled "SAS A" to connector SAS A on the backplane, and attach the cable labeled "SAS B" to connector SAS B on the backplane. See Figure 3-20.
- 7 Close the system. See "Closing the System" on page 85.
- 8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

VFlash Media (Optional)

The VFlash media card is a Secure Digital (SD) card that plugs into the optional iDRAC6 Enterprise card at the back corner of the system.

Installing a VFlash Media Card

- 1 Locate the VFlash media slot at the back corner of the system.
- 2 With the label side facing up, insert the contact-pin end of the SD card into the card slot on the module.



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

- 3 Press inward on the card to lock it into the slot.

Removing a VFlash Media Card

To remove the VFlash media, push inward on the card to release it, and pull the card from the card slot.

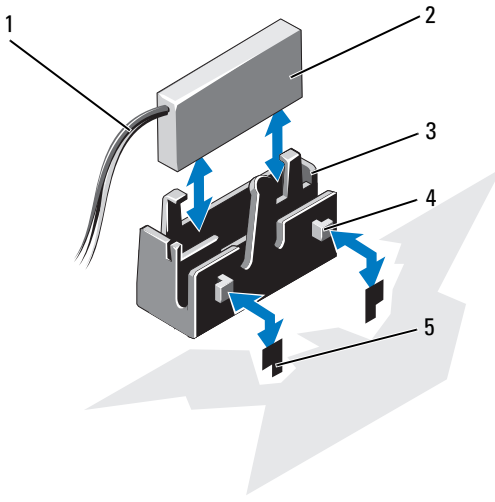
RAID Battery

The information in this section applies only to systems with the optional PERC controller cards without an integral battery backup unit.

Removing a RAID Battery

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 If required, free the power/data cables from the chassis walls.
- 4 Press the tab on the RAID battery cable connector and pull the cable connector out of the connector on the storage card. See Figure 3-21.
- 5 Pull the battery carrier release tab, and lift the battery carrier out of the battery carrier slots on the chassis. See Figure 3-21.
- 6 Pull back gently on the two tabs holding the RAID battery and lift the RAID battery from the battery carrier. See Figure 3-21.

Figure 3-21. Removing or Installing the RAID Battery



- | | | | |
|---|--------------------|---|--------------|
| 1 | RAID battery cable | 2 | RAID battery |
| 3 | battery carrier | 4 | tabs (2) |
| 5 | slots (2) | | |


Installing the RAID Battery

- 1** Insert the RAID battery into the battery carrier. See Figure 3-21.
- 2** Align the tabs on the battery carrier with the battery carrier slots on the chassis.
- 3** Slide the battery carrier into the battery carrier slots until it locks into place. See Figure 3-21.
- 4** If applicable, connect the battery cable to the connector on the storage card.
- 5** Route the power/data cables along the chassis wall. See step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 6** Close the system. See "Closing the System" on page 85.

- 7 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

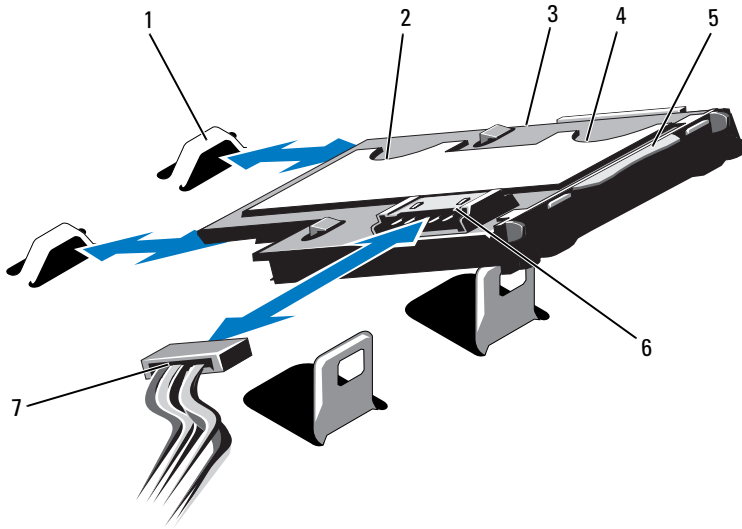
Internal Dual SD Module (Optional)

Removing the Internal Dual SD 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 came with the product.**

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 If installed, remove the SD cards from the internal dual SD module.
- 4 Disconnect the cable from the internal dual SD module. See Figure 3-22.
- 5 Lift upwards on the latch securing the internal dual SD module to the front-chassis assembly and lift the module out of the assembly. See Figure 3-22.
- 6 Close the system. See "Closing the System" on page 85.
- 7 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 3-22. Removing or Installing the Internal Dual SD Module



- | | | | |
|---|-------------------------|---|-----------------|
| 1 | hooks (2) | 2 | SD card slot 2 |
| 3 | internal dual SD module | 4 | SD card slot 1 |
| 5 | latch release tab | 6 | cable connector |
| 7 | power cable | | |

Installing the Internal Dual SD 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 came with the product.

NOTE: When the Redundancy option is set to Mirror mode in the **Integrated Devices** screen of the system setup, the information is replicated from one SD card to another. See "Integrated Devices Screen" on page 66.

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Position the module so the tabs on the underside of the tray fit into the hooks on the front-chassis assembly, then lower the opposite edge of the card into place. See Figure 3-22.
- 4 Connect the internal dual SD module cable to the connector on the control panel board.
- 5 Close the system. See "Closing the System" on page 85.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Processors

The system supports one-, two- and four-processor configurations. In one- or two-processor configurations, processors are installed in sockets 1 and 2, and FlexMem Bridges are installed in processor sockets 3 and 4 to enable the processors to access the adjacent memory set. For more information on installing a FlexMem Bridge, see "Installing a FlexMem Bridge" on page 141. Table 3-5 provides a guide for one-, two-, and four-processor configurations.

Table 3-5. Processor Configurations

Configuration	Processor Socket			
	1	2	3	4
One-processor	Processor and heat sink	Plastic socket cover * and heat-sink blank	FlexMem Bridge and heat-sink blank	FlexMem Bridge and heat-sink blank
Two-processor	Processor and heat sink	Processor and heat sink	FlexMem Bridge and heat-sink blank	FlexMem Bridge and heat-sink blank
Four-processor	Processor and heat sink	Processor and heat sink	Processor and heat sink	Processor and heat sink

*Optional

Removing a Processor



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Prior to upgrading your system, download the latest system BIOS version from support.dell.com and follow the instructions included in the compressed download file to install the update on your system.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet. When disconnected from AC power, press and hold the power button for three seconds to fully drain the system of stored power prior to removing the cover.



NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

- 3 Open the system. See "Opening the System" on page 84.
- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.



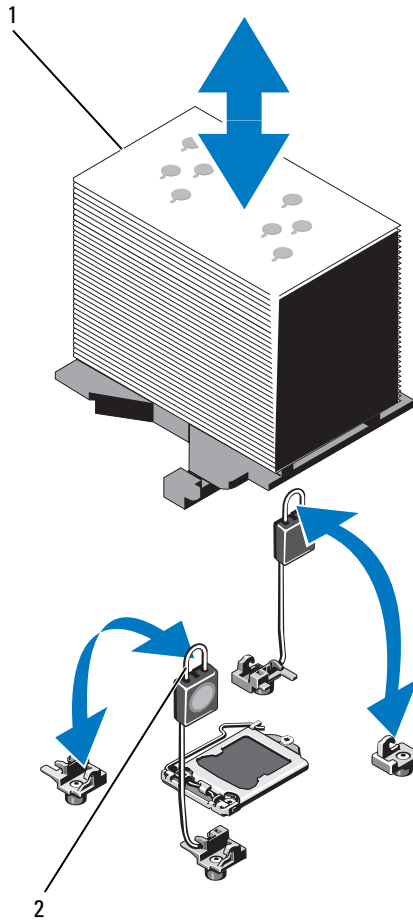
WARNING: The heat sink and processor are hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool before handling them.



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

- 5 Release one of the heat-sink release levers. See Figure 3-23.
- 6 Wait 30 seconds for the heat sink to loosen from the processor.
- 7 Release the other heat-sink release lever.
- 8 Gently lift the heat sink off the processor and keep it aside upside down (thermal grease side facing up).

Figure 3-23. Installing and Removing the Heat Sink



1 heat sink

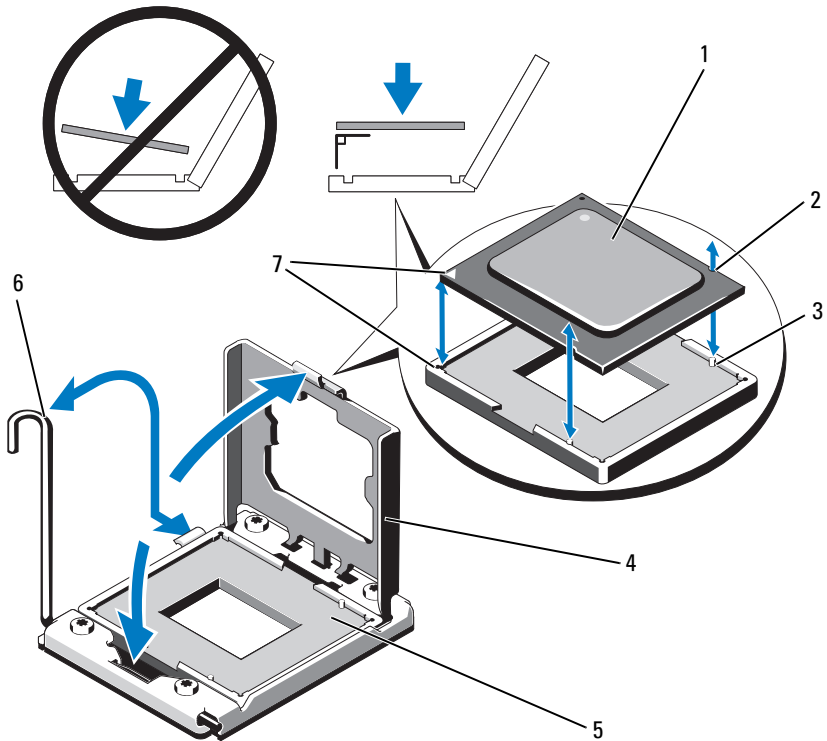
2 release levers (2)



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.

- 9 Position your thumb firmly over the processor socket-release lever and release the lever from the locked position by pushing down and pulling out from under the tab. Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-24.
- 10 Rotate the processor shield upward and out of the way. See Figure 3-24.

Figure 3-24. Removing and Installing a Processor



- | | | | |
|---|----------------------|---|--------------------------|
| 1 | processor | 2 | notches in processor (2) |
| 3 | socket keys (2) | 4 | processor shield |
| 5 | ZIF socket | 6 | socket-release lever |
| 7 | pin 1 indicators (2) | | |

CAUTION: Be careful not to bend any of the pins on the ZIF socket when removing the processor. Bending the pins can permanently damage the system board.

- 11** Carefully, lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

After removing the processor, place it in an antistatic container for reuse, return, or temporary storage. Do not touch the bottom of the processor. Touch only the side edges of the processor.

If you are permanently removing the processors from processor sockets 3 and 4, you must install a FlexMem Bridge and a heat-sink blank in the empty socket to ensure proper system cooling. See "Installing a FlexMem Bridge" on page 141. If you are removing the processor from processor socket 2, you must install a heat-sink blank in the empty socket.

Installing a Processor



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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.



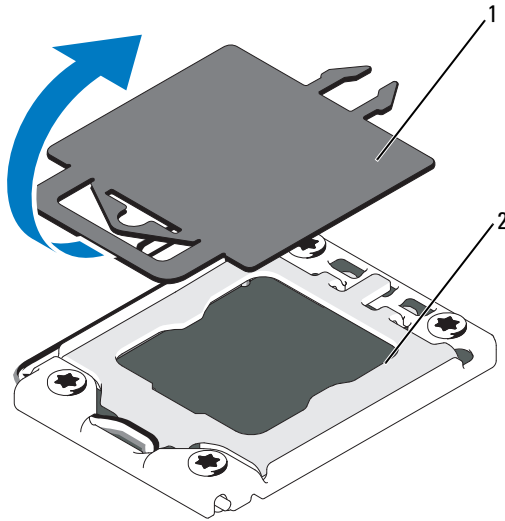
NOTE: See Table 3-5 for guidelines on different processor configurations.



NOTE: In a single-processor configuration, the CPU1 socket must be used.

- 1 If applicable, remove the plastic socket cover that covers the processor socket. See Figure 3-25.

Figure 3-25. Removing the Cover From the Processor Socket



1 plastic socket cover

2 processor socket

2 Remove the processor from the packing material by the processor's edges only. Do not touch the bottom of the processor. Handle the processor carefully with your fingers on the side edges. Place your hand beneath the processor when you are moving it to the system.

3 Locate the pin 1 indicator on the system board socket.

4 Locate the pin 1 indicator on the top of the processor. The pin 1 indicator is shown as a triangle on the top of the processor. See Figure 3-24.

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

5 Place the processor over the socket with each pin 1 aligned and level. See Figure 3-24.

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

- 6 Align the notches in the processor with the socket keys on the ZIF socket. See Figure 3-24.
- 7 Install the processor in the socket. Keep the processor level (see Figure 3-24) and insert it straight down into the socket. Allow the processor to float on the pins, allowing the processor shield to hold it in place.
- 8 Verify that the processor is properly aligned and seated.
- 9 Close the processor shield. See Figure 3-24.
- 10 Rotate the socket-release lever down until it snaps into place. See Figure 3-24.
- 11 Install the heat sink.



NOTE: Your kit may contain a replacement heat sink if you are installing a processor that consumes additional power. The new heat sink may not appear different than the original one; however, it has improved thermal dissipation specifications and must be used.

- a Using a clean lint-free cloth, remove the thermal grease from the heat sink.



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

- b Open the grease applicator included with your processor kit and apply all of the thermal grease in the applicator to the center of the top side of the new processor.
 - c Place the heat sink on the processor. See Figure 3-23.
 - d Close the heat-sink release levers. See Figure 3-23.
- 12 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 97.
 - 13 Close the system. See "Closing the System" on page 85.
 - 14 Reconnect your system and peripherals to their electrical outlets, and turn on the system.
 - 15 Press <F2> to enter the System Setup program, and check that the processor information matches the new system configuration. See "Entering the System Setup Program" on page 60.


- 16 Run the system diagnostics to verify that the new processor operates correctly.

For information about running the diagnostics, see "Running the Embedded System Diagnostics" on page 182.


FlexMem Bridge

FlexMem Bridges are installed in empty processor sockets 3 and 4 to support one- and two-processor configurations. With FlexMem Bridges installed, processor 1 can access DIMMs assigned to processor socket 3 and processor 2 can access DIMMs assigned to processor socket 4. For more information on different processor configurations, see Table 3-5.

Installing a FlexMem Bridge

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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.**

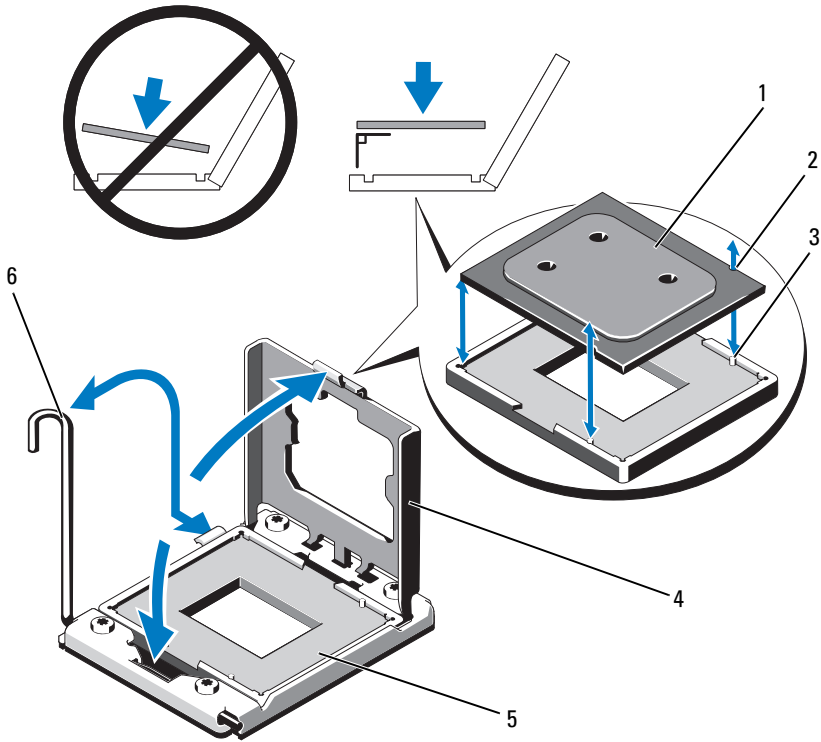
- 1 Open the processor shield. See Figure 3-26.
- 2 Align the notches on the FlexMem Bridge with the socket keys on the ZIF socket. See Figure 3-26.
- 3 Install the FlexMem Bridge in the socket. Keep the FlexMem Bridge level (see Figure 3-26) and insert it straight down into the socket.

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

- 4 Verify that the FlexMem Bridge is properly aligned and seated.
- 5 Close the processor shield. See Figure 3-26.
- 6 Rotate the socket-release lever down until it snaps into place. See Figure 3-26.
- 7 Install the heat-sink blank.
- 8 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 97.
- 9 Close the system. See "Closing the System" on page 85.

10 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Figure 3-26. Removing and Installing a FlexMem Bridge



- | | |
|------------------|---------------------------|
| 1 FlexMem Bridge | 2 notch in FlexMem Bridge |
| 3 socket key (2) | 4 processor shield |
| 5 ZIF socket | 6 socket-release lever |

Removing a FlexMem Bridge



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet. When disconnected from AC power, press and hold the power button for 3 seconds to fully drain the system of stored power prior to removing the cover.



NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

- 2 Open the system. See "Opening the System" on page 84.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.



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

- 4 Release the heat-sink release levers and lift the heat-sink blank off the FlexMem Bridge.



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


- 5 Position your thumb firmly over the socket-release lever and release the lever from the locked position by pushing down and pulling out from under the tab. Rotate the lever 90 degrees upward until the FlexMem Bridge is released from the socket. See Figure 3-26.
- 6 Close the processor shield. See Figure 3-26.
- 7 Rotate the socket-release lever down until it snaps into place. See Figure 3-26.
- 8 Replace the heat-sink blank on the empty processor socket. See "Processors" on page 133.
- 9 Close the system. See "Closing the System" on page 85.

- 10 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

System Battery

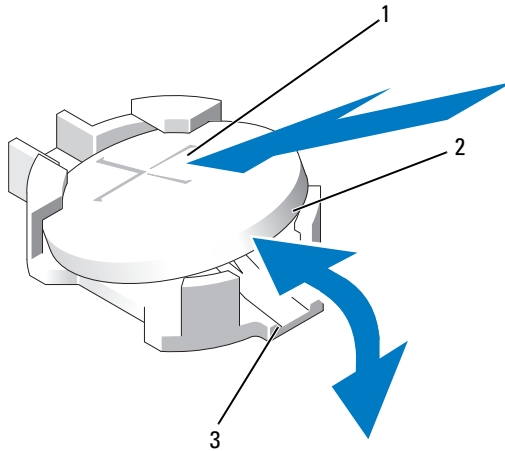
Replacing the System Battery

 **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. See your safety information for additional information.

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.

Figure 3-27. Replacing the System Battery



- 1 positive side of battery connector 2 system battery
3 negative side of battery connector

- 3** Locate the battery socket. See Figure 6-1.
4 If installed, remove the storage controller card. See "Removing the Integrated Storage Controller Card" on page 126.


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

- 5** To remove the battery, support the battery connector by pressing down firmly on the positive side of the connector.
6 Lift the battery out of the securing tabs at the negative side of the connector.
7 To install a new system battery, support the battery connector by pressing down firmly on the positive side of the connector.
8 Hold the battery with the "+" facing up and slide it under the securing tabs at the positive side of the connector.

- 9 Press the battery straight down into the connector until it snaps into place.
- 10 If applicable, install the storage controller card. See "Installing the Integrated Storage Controller Card" on page 128.
- 11 Close the system. See "Closing the System" on page 85.
- 12 Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.
- 13 Enter the System Setup program to confirm that the battery is operating properly. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
- 14 Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
- 15 Exit the System Setup program.

SAS Backplane

Removing the SAS Backplane

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.

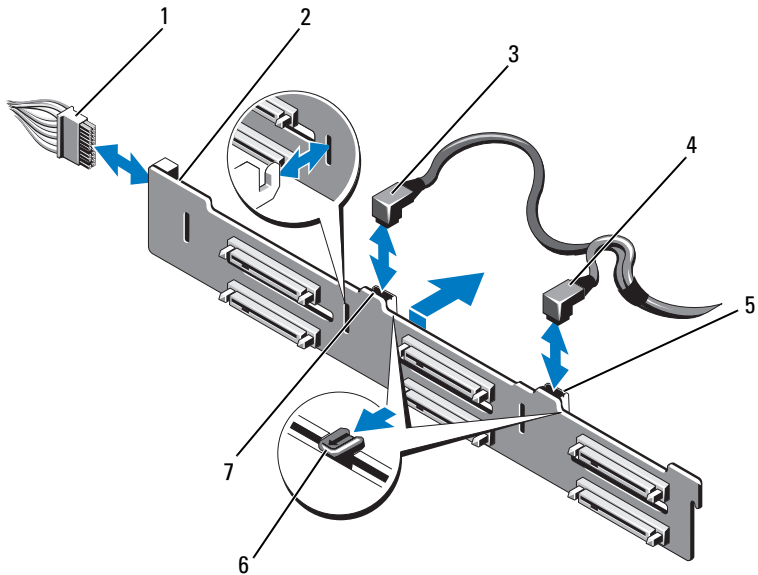
 **CAUTION: To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.**

 **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.**

- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.
- 5 Remove all hard drives. See "Removing a Hard-Drive Carrier" on page 87.

- 6 Disconnect the SAS data cable(s) and power cable from the backplane. See Figure 3-28.
- 7 If required, disconnect the power/data cable from the optical drive. See "Removing an Optical Drive" on page 91.
- 8 Push the blue release tabs in the direction of the arrows marked on the hard-drive housing and slide the backplane upwards.
- 9 Pull the backplane away from the system until the securing slots on the backplane are free from the tabs on the front-chassis assembly.

Figure 3-28. Removing and Installing a SAS Backplane



- | | | | |
|---|-----------------------|---|------------------|
| 1 | power cable | 2 | SAS backplane |
| 3 | SAS A cable | 4 | SAS B cable |
| 5 | SAS B cable connector | 6 | release tabs (2) |
| 7 | SAS A cable connector | | |

Installing the SAS Backplane

- 1** Align the slots on the SAS backplane with the tabs on the front-chassis assembly.
- 2** Slide down the SAS backplane until the blue release tabs snap into place.
- 3** Attach the SAS A cable to the SAS A connector on the backplane and the SAS B cable to the SAS B connector. See Figure 3-28.
- 4** Connect the power cable to the backplane. See Figure 3-28.
- 5** If applicable, connect the power/data cable to the optical drive. See "Installing an Optical Drive" on page 93.
- 6** Install the hard drives in their original locations. See "Installing a Hard-Drive Carrier" on page 89.
- 7** If required, route the power/data cables along the chassis wall. See step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 8** Replace the cooling shroud. See "Installing the Cooling Shroud" on page 97.
- 9** Close the system. See "Closing the System" on page 85.
- 10** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 11** If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

Power Distribution Board

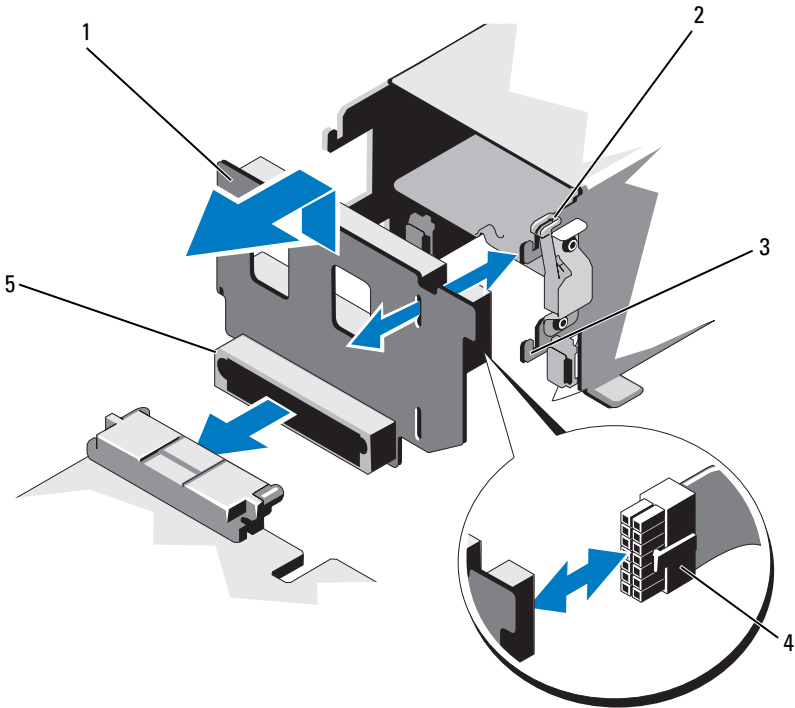
Removing the Power Distribution Board



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Remove the power supplies from the system. See "Removing a Power Supply" on page 94.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Remove the cooling fan assembly. See "Removing the Cooling Fan Assembly" on page 110.
- 5 Disconnect the cable connected to the power distribution board.
- 6 Separate the system board and the I/O board to disengage the interconnect between the power distribution board and the I/O board:
 - a Slightly lift the tab on the high-speed connector to free the release levers. See Figure 3-31.
 - b Push the release levers at an angle of 90 degrees away from the connector to separate the system board and the power distribution board from the I/O board. See Figure 3-31.
- 7 Pull the release tab securing the power distribution board and slide the board upwards. See Figure 3-29.
- 8 Pull the power distribution board up until the securing slots on the board are free from the tabs on the chassis. See Figure 3-29.

Figure 3-29. Power Distribution Board



- | | | | |
|---|------------------------------------|---|-------------|
| 1 | power distribution board | 2 | release tab |
| 3 | securing slot | 4 | power cable |
| 5 | power distribution board connector | | |

Replacing the Power Distribution Board



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Unpack the new power distribution board assembly.
- 2 Align the securing slots on the board with the tabs on the chassis.
- 3 Pull the release tab slightly to the back of the system and slide the board down till it snaps into place. See Figure 3-29.
- 4 Connect the system board and the I/O board to engage the interconnect between the power distribution board and the I/O board:
 - a Align the guide pins on one half of the connector with the slots on the other half of the connector. See Figure 3-29.
 - b Push the release levers inward until they lock into position. See Figure 3-29.
- 5 Connect the cable to the power distribution board.
- 6 Install the cooling fan assembly. See "Installing the Cooling Fan Assembly" on page 111.
- 7 Install the power supplies in the system. See "Installing a Power Supply" on page 95.
- 8 Close the system. See "Closing the System" on page 85.
- 9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Control Panel Assembly

Removing the Control Panel Display 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 came with the product.

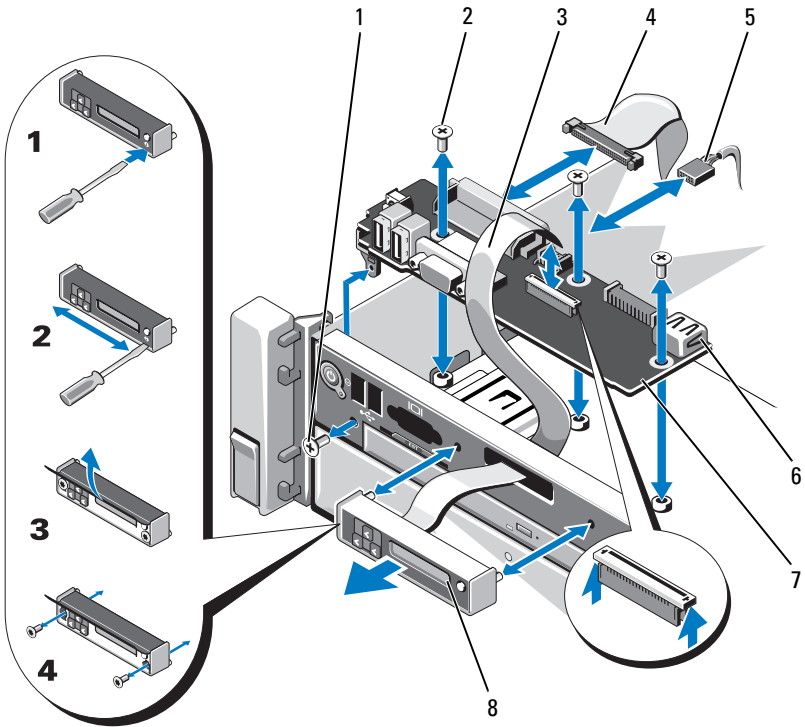
- 1 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Disconnect the display module cable from the control panel board. See Figure 3-30.
- 5 Using a knife or a small flat-blade screwdriver, insert the blade beneath the front panel of the display and slide the blade across the bottom to lift the panel outward. See Figure 3-30.
- 6 Bend the panel upward to access to the mounting screws.
- 7 Using a T10 Torx driver, remove the two screws that secure the display module to the system chassis.
- 8 Remove the display module from the chassis cutout.

Installing the Control Panel Display Module

- 1 Insert the display module into the chassis cutout and secure the module with the two Torx screws. See Figure 3-30.
- 2 Attach the replacement panel to the front of the display module.
- 3 Connect the display module cable to the control panel board. See Figure 3-30.
- 4 Close the system. See "Closing the System" on page 85.
- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

6 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.

Figure 3-30. Removing and Installing the Control Panel Display Module



- 1 T8 Torx screw
- 3 display module cable
- 5 power cable
- 7 control panel board

- 2 T10 Torx screw (3)
- 4 control panel cable
- 6 USB connector
- 8 display module

Removing the Control Panel Board



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Disconnect the cables connected to the control panel board. See Figure 3-30.
- 4 If applicable, remove the USB memory key. See "Internal USB Memory Key" on page 112.
- 5 Using a T10 Torx driver, remove the three screws that secure the control panel board to the front-chassis assembly. See Figure 3-30.
- 6 Using a T8 Torx driver, remove the screw that secures the control panel board on the front of the system. See Figure 3-30.
- 7 Slide the control panel assembly toward the back of the system and take it out.

Installing the Control Panel Board

- 1 Align the screw holes on the control panel board with the holes on the front-chassis assembly.
- 2 Using a T10 Torx driver, replace the three screws that secure the control panel board to the front-chassis assembly. See Figure 3-30.
- 3 Using a T8 Torx driver, replace the screw that secures the control panel board on the front of the system. See Figure 3-30.
- 4 If applicable, install the USB memory key. See "Internal USB Memory Key" on page 112.
- 5 Connect all the cables to the control panel board.
- 6 If required, route the power/data cables along the chassis wall. See step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 7 Close the system. See "Closing the System" on page 85.


- 8 If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.
- 9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.


System Board Assembly

The system board assembly is divided into two boards which are interconnected by a high-speed connector.

- Processor board — has the connectors for the memory modules, power supplies, and processors.
- I/O board — has the connectors for expansion-card risers and expansion card.

Removing the System Board Assembly

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

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 96.
- 4 If installed, remove the front bezel. See "Removing the Front Bezel" on page 83.
- 5 Slide the front-chassis assembly away from the system. See "Front-Chassis Assembly" on page 98.

- 6 Remove the cable clamp. See Figure 3-10.
- 7 If applicable, remove the RAID battery. See "Removing a RAID Battery" on page 129.
- 8 Remove the RAID battery carrier. See Figure 3-21.
- 9 Remove the memory modules. See "Removing Memory Modules" on page 107.
- 10 Remove the cooling fan assembly. See "Removing the Cooling Fan Assembly" on page 110.



WARNING: The heat sink is hot to touch for some time after the system has been powered down. Make sure that you do not touch the heat sink(s) while removing the system board.

- 11 Remove the heat sinks and processors. See "Removing a Processor" on page 134.
- 12 If installed, remove the heat-sink blanks. See "Removing a Processor" on page 134.
- 13 Remove all expansion cards and the integrated storage controller card. See "Removing an Expansion Card" on page 118, and "Removing the Integrated Storage Controller Card" on page 126.
- 14 Remove the expansion card risers. See "Removing Expansion-Card Riser 1" on page 119 and "Removing Expansion-Card Riser 2" on page 121.
- 15 If applicable, remove the NIC hardware key from the I/O board. See "Internal NIC Hardware Key" on page 113.
- 16 Disconnect the cables from the system board assembly, SAS backplane, control panel board, and the optical drive.
- 17 Slightly lift the tab on the high speed connector to free the release levers. See Figure 3-31.
- 18 Push the release levers at an angle of 90 degrees away from the connector to separate the processor board from the I/O board. See Figure 3-31.
- 19 Slightly push the processor board toward the front of the system to free the guide pins on one half of the connector from the slots on the other half of the connector.

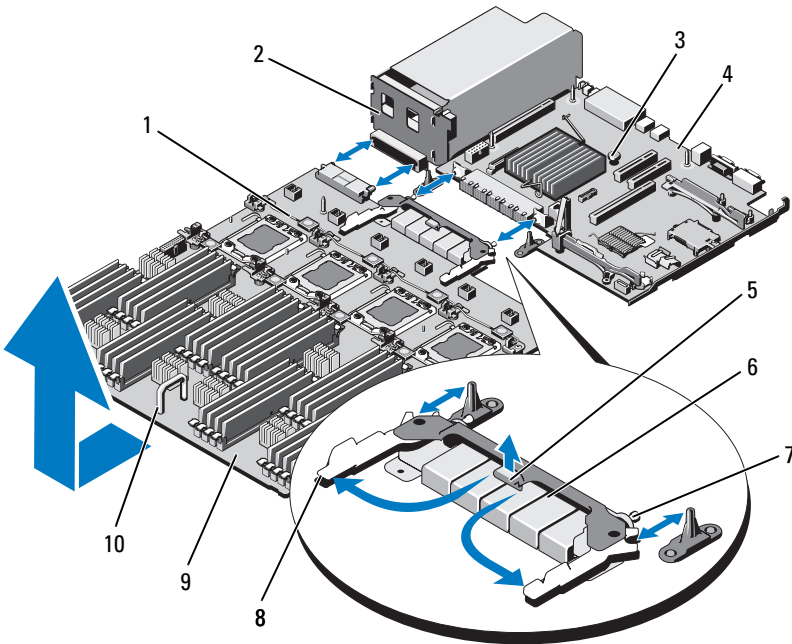


NOTE: The power distribution board connector disengages from the processor board when the processor board is separated from the I/O board.

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


- 20 Hold the processor board by the handle and a heat-sink release lever (see Figure 3-23). Angle the processor board out toward the back of the system and lift the board out of the chassis.
- 21 Pull the release pin and slide the I/O board forward and out of the chassis.

Figure 3-31. Removing and Installing the System Board



- | | | | |
|---|-------------------------|----|--------------------------|
| 1 | heat-sink release lever | 2 | power distribution board |
| 3 | release pin | 4 | I/O board |
| 5 | tab | 6 | high-speed connector |
| 7 | guide pins (2) | 8 | release levers (2) |
| 9 | processor board | 10 | handle |

Installing the System Board Assembly

- 1 Unpack the new system board assembly.
 - 2 Grasp the I/O board by its edge and the release pin and lower it into the chassis.
 - 3 Position the I/O board to the bottom of the chassis until it lays completely flat.
 - 4 Slide the I/O board toward the back of the system, inserting the connectors into the cutouts on the chassis back panel.
 - 5 Holding by the handle and a heat-sink release lever (see Figure 3-23), lower the processor board into the chassis. Maneuver the processor board to the bottom of the chassis until it lays completely flat.
 - 6 Slide the processor board backward so that the guide pins on one half of the high-speed connector engages with the holes on the other half of the connector. See Figure 3-31.
 - 7 Push the release levers inward until they lock into position. See Figure 3-31.
 - 8 If applicable, remove the plastic socket covers or the FlexMem Bridges from the processor sockets. For more information on installing processors and FlexMem Bridges for different processor configurations, see Table 3-5.
 - 9 Replace the processors and FlexMem Bridges as applicable, on the new processor board. See "Processors" on page 133 and "Installing a FlexMem Bridge" on page 141.
-  **NOTE:** See Table 3-5 for more information on installing processors and FlexMem Bridges for different processor configurations.
- 10 Replace the heat sinks and heat-sink blanks, as applicable. See Table 3-5.
 - 11 Replace the memory modules. See "Installing Memory Modules" on page 105.
 - 12 Replace the RAID battery carrier. See Figure 3-21.
 - 13 Replace the RAID battery. See "Installing the RAID Battery" on page 130.
 - 14 Replace the cable clamp. See Figure 3-10.
 - 15 Install the cooling fan assembly. See "Installing the Cooling Fan Assembly" on page 111.

- 16** If applicable, install the NIC hardware key on the system board. See "Internal NIC Hardware Key" on page 113.
- 17** Install the expansion card risers. See "Installing Expansion-Card Riser 1" on page 121 and "Installing Expansion-Card Riser 2" on page 122.
- 18** Install all expansion cards and the integrated storage controller card. See "Installing an Expansion Card" on page 116 and "Installing the Integrated Storage Controller Card" on page 128.
- 19** Slide the front-chassis assembly back into the system. See "Front-Chassis Assembly" on page 98.
- 20** Connect the cables to the system board assembly, SAS backplane, control panel board, and the optical drive.
- 21** Route the power/data cables along the chassis wall. See step 2 and step 3 of "Sliding the Front-Chassis Assembly" on page 98.
- 22** Replace the cooling shroud. See "Installing the Cooling Shroud" on page 97.
- 23** Close the system. See "Closing the System" on page 85.
- 24** If applicable, install the front bezel. See "Installing the Front Bezel" on page 83.
- 25** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Troubleshooting Your System

Safety First—For You and Your System

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

Troubleshooting System Startup Failure

If your system halts during startup prior to video imaging or LCD messaging, especially after installing an operating system or reconfiguring your system's hardware, check for the following conditions:

- If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system will hang. The reverse is also true. You must boot to the same boot mode in which you installed the operating system. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
- Invalid memory configurations could cause the system to halt at startup without any video output. See "System Memory" on page 100.

For all other startup issues, note the LCD panel messages and any system messages that appear onscreen. For more information, see "LCD Status Messages" on page 22 and "System Messages" on page 40.

Troubleshooting External Connections

Ensure that all external cables are securely attached to the external connectors on your system before troubleshooting any external devices. See Figure 1-1 and Figure 1-3 for the front- and back-panel connectors on your system.

Troubleshooting the Video Subsystem

- 1 Check the system and power connections to the monitor.
- 2 Check the video interface cabling from the system to the monitor.
- 3 If two monitors are attached to the system, disconnect one monitor. The system supports only one monitor attached to either the front or rear video connector.
- 4 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.

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

If the tests fail, see "Getting Help" on page 195.

Troubleshooting a USB Device

- 1 Use the following steps to troubleshoot a USB keyboard and/or mouse. For other USB devices, go to step 2.
 - a Disconnect the keyboard and mouse cables from the system briefly and reconnect them.
 - b Connect the keyboard/mouse to the USB port(s) on the opposite side of the system.

If the problem is resolved, restart the system, enter the System Setup program, and check if the nonfunctioning USB ports are enabled.
 - c Replace the keyboard/mouse with another working keyboard/mouse.

If the problem is resolved, replace the faulty keyboard/mouse.

If the problem is not resolved, proceed to the next step to begin troubleshooting the other USB devices attached to the system.
- 2 Power down all attached USB devices and disconnect them from the system.
- 3 Restart the system and, if your keyboard is functioning, enter the system setup program. Verify that all USB ports are enabled. See "Integrated Devices Screen" on page 66.

If your keyboard is not functioning, you can also use remote access. If the system is not accessible, see "Disabling a Forgotten Password" on page 193

for instructions on setting the NVRAM_CLR jumper inside your system and restoring the BIOS to the default settings.

- 4 Reconnect and power on each USB device one at a time.
- 5 If a device causes the same problem, power down the device, replace the USB cable, and power up the device.

If the problem persists, replace the device.

If all troubleshooting fails, see "Getting Help" on page 195.

Troubleshooting a Serial I/O Device

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

If the problem is resolved, replace the interface cable.

- 3 Turn off the system and the serial device, and swap the device with a comparable device.
- 4 Turn on the system and the serial device.

If the problem is resolved, replace the serial device.

If the problem persists, see "Getting Help" on page 195.

Troubleshooting a NIC

- 1 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.
- 2 Restart the system and check for any system messages pertaining to the NIC controller.
- 3 Check the appropriate indicator on the NIC connector. See "NIC Indicator Codes" on page 20.
 - If the link indicator does not light, check all cable connections.
 - If the activity indicator does not light, the network driver files might be damaged or missing.

Remove and reinstall the drivers if applicable. See the NIC's documentation.

- Change the autonegotiation setting, if possible.
- Use another connector on the switch or hub.

If you are using a NIC card instead of an integrated NIC, see the documentation for the NIC card.

- 4 Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.
- 5 Enter the System Setup program and confirm that the NIC ports are enabled. See "Integrated Devices Screen" on page 66.
- 6 Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed and duplex. See the documentation for each network device.
- 7 Ensure that all network cables are of the proper type and do not exceed the maximum length.

If all troubleshooting fails, see "Getting Help" on page 195.

Troubleshooting a Wet System



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

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Disassemble components from the system. See "Installing System Components" on page 81.
 - Hard drives
 - Cooling fan assembly
 - SD cards
 - USB memory key

- NIC hardware key
 - Internal Dual SD Module
 - Expansion cards and both expansion-card risers
 - Integrated storage controller
 - iDRAC6 Enterprise card
 - Power supplies
 - Processors and heat sinks
- 4 Let the system dry thoroughly for at least 24 hours.
 - 5 Reinstall the components you removed in step 3.
 - 6 Close the system. See "Closing the System" on page 85.
 - 7 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
If the system does not start properly, see "Getting Help" on page 195.
 - 8 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.
If the tests fail, see "Getting Help" on page 195.

Troubleshooting a Damaged System



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

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Ensure that the following components are properly installed:
 - Hard drives
 - Cooling fan assembly
 - SD cards

- USB memory key
 - NIC hardware key
 - Internal Dual SD Module
 - Expansion cards and both expansion-card risers
 - Integrated storage controller
 - iDRAC6 Enterprise card
 - Power supplies
 - Processors and heat sinks
- 4 Ensure that all cables are properly connected.
 - 5 Close the system. See "Closing the System" on page 85.
 - 6 Run the system board tests in the system diagnostics. See "Running the Embedded System Diagnostics" on page 182.
If the tests fail, see "Getting Help" on page 195.

Troubleshooting the System Battery



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.

- 1 Re-enter the time and date through the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
- 2 Turn off the system and disconnect it from the electrical outlet for at least one hour.
- 3 Reconnect the system to the electrical outlet and turn on the system.
- 4 Enter the System Setup program.


If the date and time are not correct in the System Setup program, replace the battery. See "Replacing the System Battery" on page 144.




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

If the problem is not resolved by replacing the battery, see "Getting Help" on page 195.

Troubleshooting Power Supplies

 **CAUTION:** At least one power supply must be installed for the system to operate. Operating the system with only one power supply installed for extended periods of time can cause the system to overheat.

- 1 Identify the faulty power supply by the power supply's fault indicator. See "Power Indicator Codes" on page 21.

 **CAUTION:** If troubleshooting a power supply mismatch error, replace only the power supply with the flashing indicator. Swapping the opposite power supply to make a matched pair can result in an error condition and unexpected system shutdown.

- 2 Reseat the power supply by removing and reinstalling it. See "Removing a Power Supply" on page 94 and "Installing a Power Supply" on page 95.




NOTE: After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly. The power indicator turns green to signify that the power supply is functioning properly.

If the problem persists, replace the faulty power supply.

- 3 If the problem persists, see "Getting Help" on page 195.

Troubleshooting System Cooling Problems


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

Ensure that none of the following conditions exist:

- System cover, cooling shroud, drive blank, memory-module blank, power-supply blank, or back filler bracket is removed.
- Heat-sink blank is removed (in single-processor configurations).
- Ambient temperature is too high. See your *Getting Started Guide* for your system's operating temperature requirements.
- External airflow is obstructed.

- Cables inside the system obstruct airflow.
- An individual cooling fan is removed or has failed. See "Troubleshooting a Fan" on page 168.
- The expansion card installation guidelines have not been followed. See "Expansion Card Installation Guidelines" on page 114.


Troubleshooting a Fan

 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Open the system. See "Opening the System" on page 84.

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

- 2 Locate the faulty fan indicated by the LCD panel or the diagnostic software.
- 3 Remove and reseat the fan. See "Removing a Cooling Fan" on page 108 and "Installing a Cooling Fan" on page 110.


 **NOTE:** Wait at least 30 seconds for the system to recognize the fan and determine whether it is working properly.


- 4 If the problem is not resolved, install a new fan. See "Removing a Cooling Fan" on page 108 and "Installing a Cooling Fan" on page 110.

If the replacement fan is working properly, close the system. See "Closing the System" on page 85.

If the replacement fan does not operate, see "Getting Help" on page 195.

Troubleshooting System Memory

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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:** Invalid memory configurations can cause your system to halt at startup without video output. See "General Memory Module Installation Guidelines" on page 100 and verify that your memory configuration complies with all applicable guidelines.

- 1 If the system is operational, run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.

If diagnostics indicates a fault, follow the corrective actions provided by the diagnostic program.

- 2 If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least 10 seconds and then reconnect the system to power.
- 3 Turn on the system and attached peripherals and note the messages on the screen.

Go to step 12 if an error message appears indicating a fault with a specific memory module.


- 4 Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 63. Make any changes to the memory settings, if needed.

If the memory settings match the installed memory but a problem is still indicated, go to step 12.

- 5 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 6 Open the system. See "Opening the System" on page 84.
- 7 Check the memory channels and ensure that they are populated correctly. See "General Memory Module Installation Guidelines" on page 100.
- 8 Reseat the memory modules in their sockets. See "Installing Memory Modules" on page 105.

- 9** Close the system. See "Closing the System" on page 85.
- 10** Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.
- 11** Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 63.
If the problem is not resolved, proceed with the next step.
- 12** If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module.
- 13** Open the system. See "Opening the System" on page 84.
- 14** 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. See "Installing Memory Modules" on page 105.
- 15** Close the system. See "Closing the System" on page 85.
- 16** Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.
- 17** As the system boots, observe any error message that appears and the diagnostic indicators on the front of the system.
- 18** If the memory problem is still indicated, repeat step 12 through step 15 for each memory module installed.
If the problem persists after all memory modules have been checked, see "Getting Help" on page 195.


Troubleshooting an Internal USB Key

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Enter the System Setup program and ensure that the internal USB key port is enabled. See "Integrated Devices Screen" on page 66.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Locate the USB key and reseal it. See "Internal USB Memory Key" on page 112.
- 5 Close the system. See "Closing the System" on page 85.
- 6 Turn on the system and attached peripherals and check if the USB key is functioning.
- 7 If the problem is not resolved, repeat step 2 and step 3.
- 8 Insert a different USB key that you know works properly.
- 9 Close the system. See "Closing the System" on page 85.
- 10 Turn on the system and attached peripherals and check if the USB key is functioning.

If the problem is not resolved, see "Getting Help" on page 195.

Troubleshooting an SD Card

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

- 1 Enter the System Setup program and ensure that the internal SD card port is enabled. See "Integrated Devices Screen" on page 66.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Reseat the SD module cable. See "Installing the Internal Dual SD Module" on page 132.

 **CAUTION:** If the Redundancy option is set to Mirror Mode in the Integrated Devices screen of the system setup, you must follow the instructions in step 5 to step 9 to avoid loss of data. If the Redundancy option is set to Disabled, proceed to step 10.



NOTE: When an SD card failure occurs, the internal dual SD module controller notifies the system. On the next reboot, the system displays a message indicating the failure.

- 5 If SD card 1 has failed, remove the card from SD card slot 1. See "Removing the Internal Dual SD Module" on page 131. If SD card 2 has failed, install a new SD card in SD card slot 2 and proceed to step 8.
- 6 Remove the card present in SD card slot 2 and insert it into SD card slot 1. See "Removing the Internal Dual SD Module" on page 131 and "Installing the Internal Dual SD Module" on page 132.
- 7 Insert the new SD card into SD card slot 2. See Figure 3-22.
- 8 Close the system. See "Closing the System" on page 85.
- 9 Turn on the system and attached peripherals and check if the SD card is functioning.
- 10 Insert a different SD card that you know works properly.
- 11 Close the system. See "Closing the System" on page 85.

- 12 Turn on the system and attached peripherals and check if the SD card is functioning.

If the problem is not resolved, see "Getting Help" on page 195.

Troubleshooting an Optical 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 came with the product.

- 1 If applicable, remove the bezel. See "Removing the Front Bezel" on page 83.
- 2 Try using a different CD or DVD.
- 3 Enter the System Setup program and ensure that the integrated SATA controller and the drive's SATA port are enabled. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
- 4 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.
- 5 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 6 Open the system. See "Opening the System" on page 84.
- 7 Ensure that the interface cable is securely connected to the optical drive and to the system board. See "Optical Drive" on page 91.
- 8 Ensure that a power cable is properly connected to the drive.
- 9 Close the system. See "Closing the System" on page 85.
- 10 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem is not resolved, see "Getting Help" on page 195.

Troubleshooting a Tape Backup Unit



NOTE: When troubleshooting a tape drive, see the tape drive documentation at support.dell.com/manuals or the documentation that shipped with the drive.

- 1 Ensure that the tape drive is turned on.
- 2 Try using a different tape cartridge.
- 3 Ensure that the device drivers for the tape drive are installed and are configured correctly. See your tape drive documentation for more information about device drivers.
- 4 Ensure that the tape drive's interface cable is fully connected to the external port on the controller card.
- 5 For SCSI tape drives, verify that the tape drive is configured for a unique SCSI ID number and that the tape drive is terminated or not terminated, based on the interface cable used to connect the drive.

See the documentation for the tape drive for instructions on selecting the SCSI ID number and enabling or disabling termination.

- 6 Run the appropriate online diagnostics tests. See "Using Online Diagnostics" on page 181.
If you cannot resolve the problem, see "Getting Help" on page 195.
- 7 Reinstall the tape-backup software as instructed in the tape-backup software documentation. See your tape documentation for information about reinstalling the software and troubleshooting the tape drive.

Troubleshooting a 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 came with the product.



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

- 1 Run the appropriate online diagnostics test. See "Using Online Diagnostics" on page 181.

Depending on the results of the diagnostics test, proceed as needed through the following steps.

- 2** If applicable, remove the bezel. See "Removing the Front Bezel" on page 83.
- 3** If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:
 - a** Restart the system and enter the host adapter configuration utility program by pressing <Ctrl><R> for a PERC controller or <Ctrl><C> for a SAS controller.
See the documentation supplied with the host adapter for information about the configuration utility.
 - b** Ensure that the hard drive(s) have been configured correctly for the RAID array.
 - c** Take the hard drive offline and reseal the drive. See "Removing a Hard-Drive Carrier" on page 87.
 - d** Exit the configuration utility and allow the system to boot to the operating system.
- 4** Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
- 5** Restart the system, enter the System Setup program, and verify that the controller is enabled and the drives appear in the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
If the problem persists, see "Troubleshooting a Storage Controller" on page 176.

Troubleshooting a Storage Controller



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

- 1 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.
- 2 Enter the System Setup program and ensure that the SAS or PERC controller is enabled. See "Using the System Setup Program and UEFI Boot Manager" on page 59.
- 3 Restart the system and press the applicable key sequence to enter the configuration utility program:
 - <Ctrl><C> for a SAS controller
 - <Ctrl><R> for PERC controller

See the controller's documentation for information about configuration settings.

- 4 Check the configuration settings, make any necessary corrections, and restart the system.



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

- 5 Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.
- 6 Open the system. See "Opening the System" on page 84.
- 7 Ensure that the controller card is firmly seated into the system board connector. See "Integrated Storage Controller Card" on page 125.
- 8 If you have a battery-cached PERC controller, ensure that the RAID battery is properly connected and, if applicable, the memory module on the PERC card is properly seated.
- 9 Verify that the cable connections between the SAS backplane and the integrated storage controller are correct. See "Installing the Integrated Storage Controller Card" on page 128 and Figure 6-2.

Ensure that the cables are firmly connected to the storage controller and the SAS backplane board.

- 10 Close the system. See "Closing the System" on page 85.
- 11 Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

If the problem persists, see "Getting Help" on page 195.

Troubleshooting Expansion Cards



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



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

- 1 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 181.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Verify that the installed expansion cards are compliant with the expansion card installation guidelines. See "Expansion Card Installation Guidelines" on page 114.
- 5 Ensure that each expansion card is firmly seated in its connector. See "Installing an Expansion Card" on page 116.
- 6 Close the system. See "Closing the System" on page 85.
- 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 Open the system. See "Opening the System" on page 84.

- 10 Remove all expansion cards installed in the system. See "Removing an Expansion Card" on page 118.
- 11 Close the system. See "Closing the System" on page 85.
- 12 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 13 Run the appropriate online diagnostic test.
If the tests fail, see "Getting Help" on page 195.
- 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 Open the system. See "Opening the System" on page 84.
 - c Reinstall one of the expansion cards.
 - d Close the system. See "Closing the System" on page 85.
 - e Run the appropriate diagnostic test.
If the tests fail, see "Getting Help" on page 195.

Troubleshooting the Processors



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Run the appropriate online diagnostics test. See "Using Online Diagnostics" on page 181.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 84.
- 4 Remove the cooling fan assembly. See "Removing the Cooling Fan Assembly" on page 110.

- 5** Ensure that each processor and heat sink are properly installed. See "Removing a Processor" on page 134.
- 6** Install the cooling fan assembly. See "Installing the Cooling Fan Assembly" on page 111.
- 7** Close the system. See "Closing the System" on page 85.
- 8** Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 9** Run the appropriate online diagnostic test.
If your system only has one processor and a problem is still indicated, see "Getting Help" on page 195.
- 10** For systems with multiple processors, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 11** Open the system. See "Opening the System" on page 84.
- 12** Remove the cooling fan assembly. See "Removing the Cooling Fan Assembly" on page 110.
- 13** Remove all processors except for processor 1 and processor 2. See "Removing a Processor" on page 134.
- 14** Install the cooling fan assembly. See "Installing the Cooling Fan Assembly" on page 111.
- 15** Close the system. See "Closing the System" on page 85.
- 16** Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 17** Run the appropriate online diagnostic test.
If the test fails, the processor is faulty. See "Getting Help" on page 195.
- 18** Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 19** Open the system. See "Opening the System" on page 84.
- 20** Remove the cooling fan assembly. See "Removing the Cooling Fan Assembly" on page 110.
- 21** Replace processor 1 and processor 2 with processor 3 and processor 4. See "Removing a Processor" on page 134.

- 22** Install the cooling fan assembly. See "Installing the Cooling Fan Assembly" on page 111.
- 23** Close the system. See "Closing the System" on page 85.
- 24** Repeat step 15 through step 17.

If your system has more than two processors, continue installing and testing each processor in the processor 1 slot until you determine the faulty processor, and then replace the faulty processor.

If you have tested all the processors and the problem persists, the system board is faulty. See "Getting Help" on page 195.

Running the System Diagnostics

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

Using Online Diagnostics

To assess a system problem, first use the online diagnostics. Online Diagnostics is a suite of diagnostic programs, or test modules, that include diagnostic tests on chassis and storage components such as hard drives, physical memory, communications and printer ports, NICs, CMOS, and more. If you are unable to identify the problem using the online diagnostics, then use the embedded system diagnostics.

The files required to run the online diagnostics for systems running supported Microsoft® Windows® and Linux operating systems are available at support.dell.com and on the CDs that came with your system. For information about using diagnostics, see the *Dell Online Diagnostics User's Guide*.

Embedded System Diagnostics Features

The system diagnostics provides a series of menus and options for particular device groups or devices. The system diagnostics menus and options allow you to:

- Run tests individually or collectively
- Control the sequence of tests
- Repeat tests
- Display, print, or save test results
- Temporarily suspend testing if an error is detected or terminate testing when a user-defined error limit is reached
- View help messages that briefly describe each test and its parameters

- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

When to Use the Embedded System Diagnostics

If a major component or device in the system does not operate properly, component failure may be indicated. As long as the processor and the system's input/output devices are functioning, you can use the embedded system diagnostics to help identify the problem.

Running the Embedded System Diagnostics

The embedded system diagnostics program is run from the Life Cycle Controller screen.

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

- 1 As the system boots, press <F10>.
- 2 Click **Diagnostics** in the left pane and click **Launch Diagnostics** in the right pane.

The **Diagnostics** menu allows you to run all or specific diagnostics tests or to exit.

System Diagnostics Testing Options

Click the testing option in the **Main Menu** window.

Testing Option	Function
Express Test	Performs a quick check of the system. This option runs device tests that do not require user interaction.
Extended Test	Performs a more thorough check of the system. This test can take an hour or longer.
Custom Test	Tests a particular device.
Information	Displays test results.

Using the Custom Test Options

When you select **Custom Test** in the **Main Menu** window, the **Customize** window allows you to select the device(s) to be tested, select specific options for testing, and view the test results.

Selecting Devices for Testing

The left side of the **Customize** window lists devices that can be tested. Click the (+) next to a device or module to view its components. Click (+) on any component to view the tests that are available. Clicking a device, rather than its components, selects all of the components of the device for testing.



NOTE: After you select all the devices and components that you want to test, highlight **All Devices** and then click **Run Tests**.

Selecting Diagnostics Options

From the **Diagnostics Options** area, select the test(s) you want to run on a device.

- **Non-Interactive Tests Only** — Runs only tests that require no user intervention.
- **Quick Tests Only** — Runs only the quick tests on the device.
- **Show Ending Timestamp** — Time stamps the test log.
- **Test Iterations** — Selects the number of times the test is run.
- **Log output file pathname** — Enables you to specify the diskette drive or USB memory key where the test log file is saved. You cannot save the file to a hard drive.

Viewing Information and Results

The following tabs in the **Customize** window provide information about the test and the test results.

- **Results** — Displays the test that ran and the result.
- **Errors** — Displays any errors that occurred during the test.
- **Help** — Displays information about the currently selected device, component, or test.

- **Configuration** — Displays basic configuration information about the currently selected device.
- **Parameters** — Displays parameters that you can set for the test.





6

Jumpers and Connectors

System Board Jumper

For information on resetting the password jumper to disable a password, see "Disabling a Forgotten Password" on page 193.

Table 6-1. System Board Jumper Settings

Jumper	Setting	Description
PWRD_EN	 (default)	The password feature is enabled (pins 2-4)
		The password feature is disabled, and iDRAC6 local access is unlocked at the next AC power cycle (pins 4-6)
NVRAM_CLR	 (default)	The configuration settings are retained at system boot (pins 3-5)
		The configuration settings are cleared at the next system boot (pins 1-3)

System Board Connectors

Figure 6-1. System Board Connectors

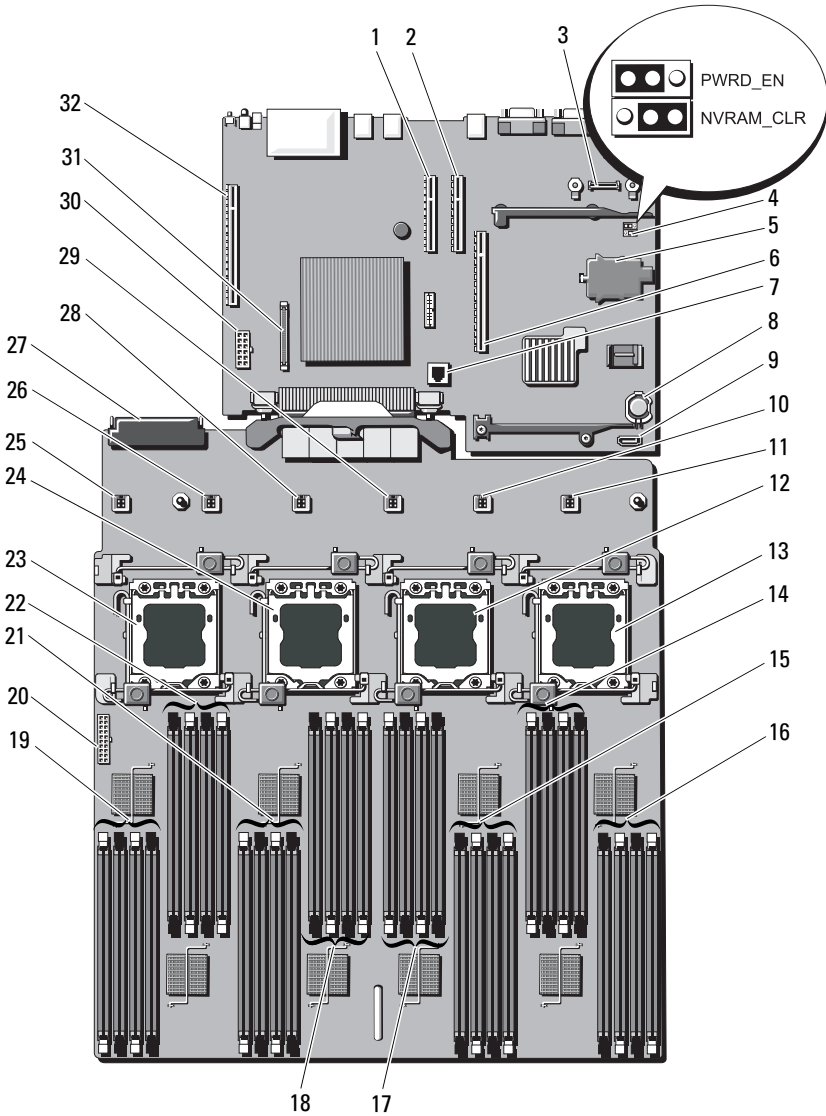


Table 6-2. System Board Jumpers and Connectors

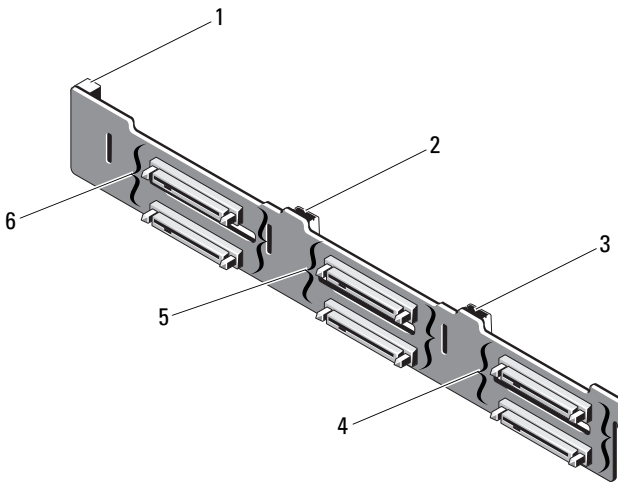
Item	Connector	Description
1	SLOT4_PCIE_G2_X8	Slot 4 PCIe - x8 link expansion slot (low-profile 24.13 cm [9.5"] length)
2	SLOT3_PCIE_G2_X8	Slot 3 PCIe - x8 link expansion slot (low-profile 24.13 cm [9.5"] length)
3	AMEA CONN	iDRAC6 Enterprise card connector
4	PWRD_EN	Password enable jumper
	NVRAM_CLR	NVRAM clear jumper
5	MASER CONN	iDRAC6 Express card connector
6	Center PCIE_G2_X8	Expansion-card riser 1 connector
7	ISCSI KEY	NIC hardware key
8	BATTERY	Battery socket
9	SATA	SATA signal connector
10	FAN5	System cooling fan 5 connector
11	FAN6	System cooling fan 6 connector
12	CPU2	Processor 2 socket
13	CPU4	Processor 4 socket
14	D8	Memory module slot D8
	D4	Memory module slot D4 (white release lever)
	D6	Memory module slot D6
	D2	Memory module slot D2 (white release lever)
15	B1	Memory module slot B1 (white release lever)
	B5	Memory module slot B5
	B3	Memory module slot B3 (white release lever)
	B7	Memory module slot B7
16	B2	Memory module slot B2 (white release lever)
	B6	Memory module slot B6
	B4	Memory module slot B4 (white release lever)
	B8	Memory module slot B8

Item	Connector	Description
17	D7	Memory module slot D7
	D3	Memory module slot D3 (white release lever)
	D5	Memory module slot D5
	D1	Memory module slot D1 (white release lever)
18	C2	Memory module slot C2 (white release lever)
	C6	Memory module slot C6
	C4	Memory module slot C4 (white release lever)
	C8	Memory module slot C8
19	A7	Memory module slot A7
	A3	Memory module slot A3 (white release lever)
	A5	Memory module slot A5
	A1	Memory module slot A1 (white release lever)
20	BP_PWR	Backplane power, SATA DVD power, and front panel USB connector
21	A8	Memory module slot A8
	A4	Memory module slot A4 (white release lever)
	A6	Memory module slot A6
	A2	Memory module slot A2 (white release lever)
22	C1	Memory module slot C1 (white release lever)
	C5	Memory module slot C5
	C3	Memory module slot C3 (white release lever)
	C7	Memory module slot C7
23	CPU3	Processor 3 socket
24	CPU1	Processor 1 socket
25	FAN1	System cooling fan 1 connector
26	FAN2	System cooling fan 2 connector
27	PDB_CON	Power distribution board connector
28	FAN3	System cooling fan 3
29	FAN4	System cooling fan 4

Item	Connector	Description
30	PWR_CONN	Power connector
31	CTRL_PNL	Control panel interface connector
32	Left PCIE_G2_X16	Expansion-card riser 2 connector

SAS Backplane Board Connectors

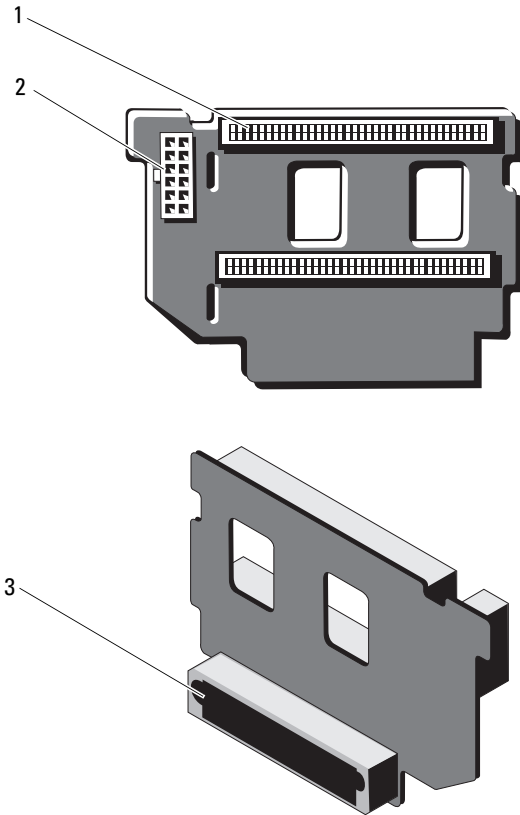
Figure 6-2. SAS Backplane Board Connectors



- | | | | |
|---|---------------------------|---|---------------------------|
| 1 | power connector | 2 | SAS A connector |
| 3 | SAS B connector | 4 | hard-drive connectors 4–5 |
| 5 | hard-drive connectors 2–3 | 6 | hard-drive connectors 0–1 |

Power Distribution Board Connectors

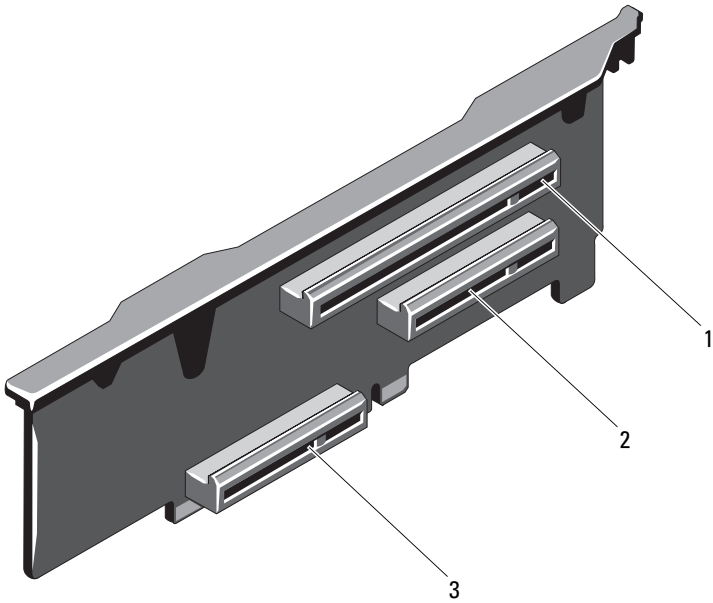
Figure 6-3. Power Distribution Board Connectors



- 1 power supply connectors (2)
- 2 12-pin power cable connector
- 3 mixed signal connector

Expansion-Card Riser-Board Components and PCIe Buses

Figure 6-4. PCIe Expansion-Card Riser 1 Components

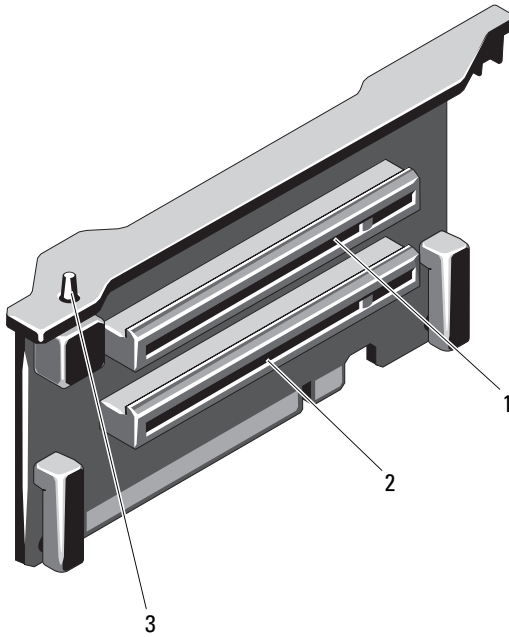


1 slot 1 PCIe - x8 link expansion slot (24.13 cm [9.5"] length)

2 slot 2 PCIe - x4 link expansion slot (low-profile 24.13 cm [9.5"] maximum length, with a standard height bracket)

3 integrated storage controller card connector

Figure 6-5. PCIe Expansion-Card Riser 2 Components



- 1 slot 5 PCIe - x8 link expansion slot (24.13 cm [9.5"] length)
- 2 slot 6 PCIe - x8 link expansion slot (24.13 cm [9.5"] length)
- 3 chassis intrusion switch

Disabling a Forgotten Password

The system's software security features include a system password and a setup password, which are discussed in detail in "Using the System Setup Program and UEFI Boot Manager" on page 59. The password jumper enables these password features or disables them and clears any password(s) currently in use.



CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions that came with the system.

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 84.
- 3 Remove the jumper plug from the password jumper.
See Figure 6-1 to locate the password jumper (labeled "PWRD_EN") on the system board.
- 4 Close the system. See "Closing the System" on page 85.
- 5 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

The existing passwords are not disabled (erased) until the system boots with the password jumper plug removed. However, before you assign a new system and/or setup password, you must install the jumper plug.



NOTE: If you assign a new system and/or setup password with the jumper plug still removed, the system disables the new password(s) the next time it boots.

- 6 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 7 Open the system. See "Closing the System" on page 85.
- 8 Install the jumper plug on the password jumper.
- 9 Close the system. See "Closing the System" on page 85.
- 10 Reconnect your system and peripherals to their electrical outlets, and turn on the system.
- 11 Assign a new system and/or setup password.
To assign a new password using the System Setup program, see "Assigning a System Password" on page 75.

Getting Help

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-33155).



NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

- 1 Visit support.dell.com.
- 2 Verify your country or region in the **Choose A Country/Region** drop-down menu at the bottom of the page.
- 3 Click **Contact Us** on the left side of the page.
- 4 Select the appropriate service or support link based on your need.
- 5 Choose the method of contacting Dell that is convenient for you.

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