

Dell PowerEdge R415 Systems

Hardware Owner's Manual

Regulatory Model E07S Series
Regulatory Type E07S003



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.

Information in this publication is subject to change without notice.

© 2010 Dell Inc. All rights reserved.

Reproduction of these materials in any manner whatsoever without the written permission of Dell Inc. is strictly forbidden.

Trademarks used in this text: Dell™, the DELL logo, and PowerEdge™ are trademarks of Dell Inc. Microsoft®, Windows®, MS-DOS®, and Windows Server® are either trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries.

Other trademarks and trade names may be used in this publication to refer to either the entities claiming the marks and names or their products. Dell Inc. disclaims any proprietary interest in trademarks and trade names other than its own.

Contents

1	About Your System	9
	Accessing System Features During Startup	9
	Front-Panel Features and Indicators	10
	LCD Panel Features (Optional).	12
	Hard-Drive Indicator Patterns	16
	Back-Panel Features and Indicators	17
	Guidelines for Connecting External Devices	19
	NIC Indicator Codes	19
	Power Indicator Codes	20
	Diagnostic Lights (Optional).	21
	LCD Status Messages	24
	System Messages	40
	Warning Messages	54
	Diagnostics Messages	54
	Alert Messages	54
	Other Information You May Need	55

2	Using the System Setup Program and UEFI Boot Manager	57
	Choosing the System Boot Mode	57
	Entering the System Setup Program	58
	System Setup Options	59
	Entering the UEFI Boot Manager.	70
	System and Setup Password Features.	72
	Embedded System Management.	76
	Baseboard Management Controller Configuration	76
	iDRAC6 Configuration Utility.	77
3	Installing System Components	79
	Recommended Tools	79
	Inside the System.	79
	Front Bezel (Optional)	81
	Opening and Closing the System	82
	Hard Drives.	84
	Optical Drive	92
	Power Supplies	95
	Expansion Card and Expansion-Card Riser	99
	Integrated Storage Controller Card	103
	Expansion-Card Riser	105

Internal USB Memory Key	107
System Board Shroud	109
Power Distribution Board Shroud	111
iDRAC6 Express Card (Optional)	112
iDRAC6 Enterprise Card (Optional)	114
VFlash Media (Optional)	116
Cooling Fans	117
RAID Battery (Optional)	119
System Memory	121
Processors	127
System Battery	133
Control Panel Assembly	135
SAS Backplane	140
Power Distribution Board	142
System Board	144
4 Troubleshooting Your System	149
Safety First—For You and Your System	149
Troubleshooting System Startup Failure	149
Troubleshooting External Connections	150
Troubleshooting the Video Subsystem	150
Troubleshooting a USB Device	150

Troubleshooting a Serial I/O Device	151
Troubleshooting a NIC	151
Troubleshooting a Wet System	152
Troubleshooting a Damaged System	154
Troubleshooting the System Battery	155
Troubleshooting Power Supplies	155
Troubleshooting System Cooling Problems	156
Troubleshooting a Fan	156
Troubleshooting System Memory	157
Troubleshooting an Internal USB Key	159
Troubleshooting an SD Card	160
Troubleshooting an Optical Drive	161
Troubleshooting an External Tape Drive	162
Troubleshooting a Hard Drive	163
Troubleshooting a Storage Controller	164
Troubleshooting Expansion Cards	165
Troubleshooting the Processors	166
5 Running the System Diagnostics	169
Using Dell Diagnostics	169
Embedded System Diagnostics Features	169
When to Use the Embedded System Diagnostics	170

	Running the Embedded System Diagnostics	170
	System Diagnostics Testing Options	170
	Using the Custom Test Options	171
6	Jumpers and Connectors	173
	System Board Jumpers	173
	System Board Connectors	174
	SAS Backplane Board Connectors	176
	Expansion-Card Riser-Board Components and PCIe Buses	177
	Power Distribution Board Connectors	178
	Disabling a Forgotten Password	179
7	Getting Help	181
	Contacting Dell	181
	Index	183

About Your System

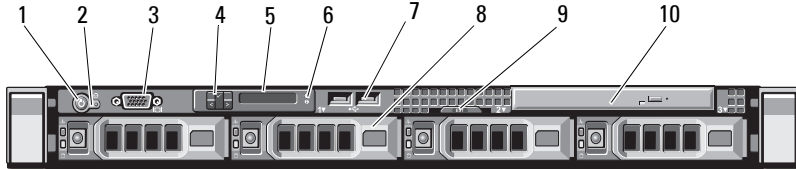
Accessing System Features During Startup



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 57.
<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 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 57.
<F12>	Starts PXE boot.
<Ctrl><E>	Enters the Baseboard Management Controller (BMC) or iDRAC6 Configuration Utility, which allows access to the System Event Log (SEL) and configuration of remote access to the system. For more information, see the BMC or iDRAC user documentation at support.dell.com/manuals .
<Ctrl><C>	Enters the SAS Configuration Utility. For more information, see the SAS adapter documentation at support.dell.com/manuals .
<Ctrl><R>	Enters the PERC configuration utility. For more information, see the PERC card documentation 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 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 optional 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 2 minutes to display an image, depending on the amount of memory installed in the system.</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>
2	NMI button		<p>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.</p> <p>Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.</p>

Item	Indicator, Button, or Connector	Icon	Description
3	Video connector		Connects a monitor to the system.
4	LCD menu buttons		Allows you to navigate the control panel LCD menu.
5	LED or LCD panel		<p>NOTE: Depending on the configuration, your system may have either LED diagnostic indicators or an LCD panel.</p> <p>LED panel: The four diagnostic indicator lights display error codes during system startup. See "Diagnostic Lights (Optional)" on page 21.</p> <p>LCD panel: Provides system ID, status information, and system error messages.</p> <p>The LCD lights during normal system operation. Both the systems management software and the identification buttons located on the front and back of the system can cause the LCD to flash blue to identify a particular system.</p> <p>The LCD lights amber when the system needs attention, and the LCD panel displays an error code followed by descriptive text.</p> <p>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.</p>
6	System identification button		<p>The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is 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.</p>

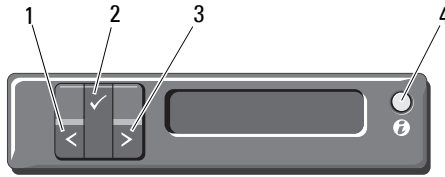
Item	Indicator, Button, or Connector	Icon	Description
7	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
8	hard-drives (4)		Up to four 2.5-inch in 3.5-inch HDD hot swap carrier or up to four 3.5-inch cabled/hot swap.
9	System identification panel		A slide-out panel 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.
10	Optical drive		One optional slim-line SATA DVD-ROM drive or DVD+/-RW drive. NOTE: DVD devices are data only.

LCD Panel Features (Optional)

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 24 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 BMC or 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 five 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
BMC or DRAC NOTE: If an iDRAC6 Express card is installed on the system, the BMC option is replaced by 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 format. See "LCD Status Messages" on page 24 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 15 to see the options and option items that can be selected to display by default on the Home screen.

View Menu

Option	Description
BMC IP or DRAC IP NOTE: If an iDRAC6 Express card is installed on the system, the BMC IP option is replaced by 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). NOTE: BMC IP supports only IPv4 addresses.
MAC	Displays the MAC addresses for DRAC , iSCSIn , or NETn . NOTE: If the iDRAC6 Express card is not installed on the system, the MAC option displays the MAC addresses for BMC , iSCSIn , or NETn .
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 14.
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 14).

Hard-Drive Indicator Patterns

Figure 1-3. Hard-Drive Indicators



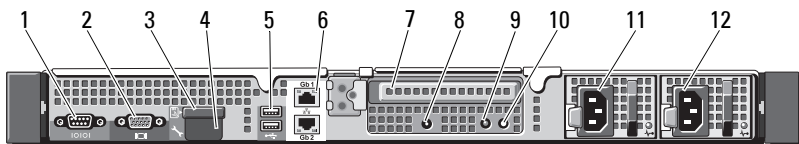
1 hard-drive activity indicator (green)




2 hard-drive status indicator (green and amber)





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 three seconds, amber three seconds, and off six seconds.	Rebuild aborted

Back-Panel Features and Indicators

Figure 1-4. Back-Panel Features and Indicators



Item	Indicator, Button, or Connector	Icon	Description
1	serial connector		Connects a serial device to the system.
2	video connector		Connects a VGA display to the system.
3	VFlash media slot (optional)		Connects an external SD memory card for the optional iDRAC6 Enterprise card.

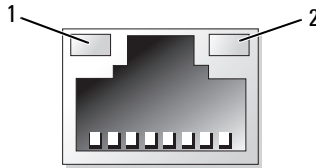
Item	Indicator, Button, or Connector	Icon	Description
4	iDRAC6 Enterprise port (optional)		Dedicated management port for the optional iDRAC6 Enterprise card.
5	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
6	Ethernet connectors (2)		Embedded 10/100/1000 NIC connectors.
7	PCIe slot 1		PCI Express (Generation 2) x16-wide expansion slot (full-height, half-length).
8	Active ID CMA connector		Connector for attaching a system indicator extension cable that is used on a cable management arm.
9	System status indicator		Lights blue during normal system operation. Lights amber when the system needs attention due to a problem.
10	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the system status indicator on the chassis back panel light blue until one of the buttons is pushed again.
11	Power supply 1(PS1)		500 W power supply (redundant).
12	Power supply 2(PS2)		500 W power supply (redundant) or 480 W power supply (non-redundant).

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 System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 57.

NIC Indicator Codes

Figure 1-5. NIC Indicators



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 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

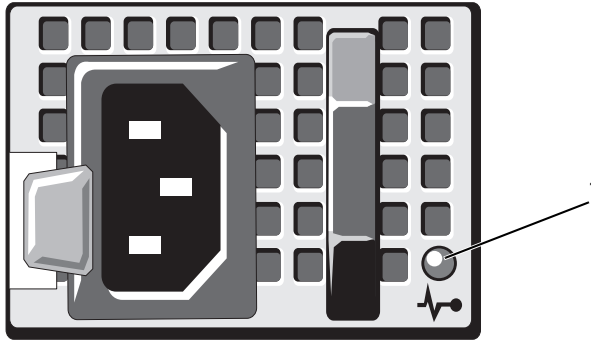
The power supplies have indicators that show whether power is present or whether a power fault has occurred.

- 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 (a high output power supply and an Energy Smart power supply are installed in the same system). Replace the power supply that has the flashing indicator with a power supply that matches the capacity of the other installed power supply.



CAUTION: When correcting a power supply mismatch, 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. To change from a High Output configuration to an Energy Smart configuration or vice versa, you must power down the system.

Figure 1-6. Power Supply Status Indicator



1 power supply status indicator

Diagnostic Lights (Optional)

The four diagnostic indicator lights on the system front panel display error codes during system startup. Table 1-1 lists the causes and possible corrective actions associated with these codes. A highlighted circle indicates the light is on; a non-highlighted circle indicates the light is off.



NOTE: The diagnostic LEDs are not present when the system is equipped with an LCD display.

Table 1-1. Diagnostic Indicator Codes (Optional)


Code	Causes	Corrective Action
① ② ③ ④	<p>The system is in a normal off condition or a possible pre-BIOS failure has occurred.</p> <p>The diagnostic lights are not lit after the system successfully boots to the operating system.</p> <p>The system is in a normal operating condition after POST.</p>	<p>Plug the system into a working electrical outlet and press the power button.</p> <p>Information only.</p>
① ② ③ ④	BIOS checksum failure detected; system is in recovery mode.	See "Getting Help" on page 181.
① ② ③ ④	Possible processor failure.	See "Troubleshooting the Processors" on page 166.
① ② ③ ④	Memory failure.	See "Troubleshooting System Memory" on page 157.
① ② ③ ④	Possible expansion card failure.	See "Troubleshooting Expansion Cards" on page 165.
① ② ③ ④	Possible video failure.	See "Getting Help" on page 181.
① ② ③ ④	Hard drive failure.	Ensure that the diskette drive and hard-drive are properly connected. See "Hard Drives" on page 84 for information on the drives installed in your system.
① ② ③ ④	Possible USB failure.	See "Troubleshooting a USB Device" on page 150.

Table 1-1. Diagnostic Indicator Codes (Optional) (continued)

Code	Causes	Corrective Action
① ② ③ ④	No memory modules detected.	See "Troubleshooting System Memory" on page 157.
① ② ③ ④	System board failure.	See "Getting Help" on page 181.
① ② ③ ④	Memory configuration error.	See "Troubleshooting System Memory" on page 157.
① ② ③ ④	Possible system board resource and/or system board hardware failure.	See "Getting Help" on page 181.
① ② ③ ④	Possible system resource configuration error.	See "Getting Help" on page 181.
① ② ③ ④	Other failure.	Ensure that the diskette drive, optical drive, and hard-drives are properly connected. See "Troubleshooting Your System" on page 149 for the appropriate drive installed in your system. If the problem persists, see "Getting Help" on page 181.

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 OpenManage Server Administrator documentation at support.dell.com/manuals.

 **NOTE:** If your system fails to boot, press the System ID button for at least five seconds until an error code appears on the LCD. Record the code, then see "Getting Help" on page 181.

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. Press 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 ten 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 14 to select the format in which the messages are displayed.

Table 1-2. LCD Status Messages (Optional)

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 181.
E1114	Ambient Temp exceeds allowed range.	Ambient temperature has reached a point outside of the allowed range.	See "Troubleshooting System Cooling Problems" on page 156.
E1116	Memory disabled, temp above range. Power cycle AC.	Memory has 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 156. If the problem persists, see "Getting Help" on page 181.
E1119	Chipset # temp out of range. Check motherboard heatsinks.	Chipset temperature reached a point outside the allowed range.	See "Troubleshooting System Cooling Problems" on page 156.
E1210	Motherboard battery failure. Check battery.	CMOS battery is missing or the voltage is outside of the allowable range.	See "Troubleshooting the System Battery" on page 155.
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 "RAID Battery (Optional)" on page 119, and "Troubleshooting System Cooling Problems" on page 156.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
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 181.
E1243	CPU # VCORE Regulator failure. Contact Support.	Processor voltage regulator failed.	Reseat the processor. See "Troubleshooting the Processors" on page 166. If the problem persists, see "Getting Help" on page 181.
E1310	Fan ## RPM exceeding range. Check fan.	RPM of specified fan is outside of the intended operating range.	See "Troubleshooting System Cooling Problems" on page 156.
E1311	RPM Fan ##x	RPM of fan x in the # module is out of acceptable operating range.	See "Troubleshooting System Cooling Problems" on page 156.
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 156.
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 156.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
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 181.
E1414	CPU # temp exceeding range. Check CPU heatsink.	Specified processor is out of acceptable temperature range.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting the Processors" on page 166 and "Troubleshooting System Cooling Problems" on page 156.
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 microprocessor is properly installed. See "Troubleshooting the Processors" on page 166.
E141C	Unsupported CPU configuration. Check CPU or BIOS revision.	Processors are in an unsupported configuration.	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> .
E141F	CPU # protocol error. Power cycle AC.	The system BIOS has reported a processor protocol error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E1420	CPU Bus parity error. Power cycle AC.	The system BIOS has reported a processor bus parity error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 181.
E1421	CPU # initialization error. Power cycle AC.	The system BIOS reported a processor initialization error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 181.
E1422	CPU # machine check error. Power cycle AC.	The system BIOS has 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 181.
E1610	Power Supply # (### W) missing. Check power supply.	Specified power supply was removed or is missing from the system.	See "Troubleshooting Power Supplies" on page 155.
E1614	Power Supply # (### W) error. Check power supply.	Specified power supply has failed.	See "Troubleshooting Power Supplies" on page 155.
E1618	Predictive failure on Power Supply # (### W). Check PSU.	An over-temperature condition or power supply communication error has caused the predictive warning of an impending power supply failure.	See "Troubleshooting Power Supplies" on page 155.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E161C	Power Supply # (### W) lost AC power. Check PSU cables.	Specified power supply is attached to the system, but it has lost its AC input.	Check the AC power source for the specified power supply. If the problem persists, see "Troubleshooting Power Supplies" on page 155.
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 155.
E1625	PS AC Current	Power source is out of acceptable range.	Check the AC power source.
E1626	Power Supply Mismatch. PSU1 = ### W, PSU2 = ### W.	The power supplies in the system are not 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.
E1632	FailSafe 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 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E1710	I/O channel check error. Review & clear SEL.	The system BIOS has 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 181.
E1711	PCI parity error on Bus ## Device ## Function ##	The system BIOS has reported a PCI parity error on a component that resides in PCI configuration space at bus ##, device ##, function ##.	Remove and reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 165.
	PCI parity error on Slot #. Review & clear SEL.	The system BIOS has reported a PCI parity error on a component that resides in the specified slot.	Remove and reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 165.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E1712	PCI system error on Bus ## Device ## Function ##	The system BIOS has reported a PCI system error on a component that resides in PCI configuration space at bus ##, device ##, function ##.	Remove and reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting Expansion Cards" on page 165.
	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.	Remove and reseat the expansion-card riser that provides the specified slot. See "Expansion Card and Expansion-Card Riser" on page 99. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 181.
E1714	Unknown error. Review & clear SEL.	The system BIOS has determined there has been an error in the system, but is unable to determine its origin.	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 181.
E1715	Fatal I/O Error. Review & clear SEL.	The system BIOS determined there has been a fatal error in the system.	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 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E1716	Chipset IERR Bus ## Dev ## Function ##. Review & clear SEL.	The system BIOS reported a chipset internal error that resides in bus ##, device ##, function ##.	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 181.
E1717	CPU # internal error. Review & clear SEL.	The system BIOS determined that the specified processor has had an internal error.	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 181.
E171F	PCIe fatal error on Bus ## Device ## Function ##	The system BIOS has reported a PCIe fatal 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 165.
	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.	Remove and reseal the expansion-card riser. See "Expansion Card and Expansion-Card Riser" on page 99. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E1810	Hard drive ## fault. Review & clear SEL.	The specified hard-drive has experienced a fault.	See "Troubleshooting a Hard Drive" on page 163.
E1812	Hard drive ## removed. Check drive.	The specified hard-drive has been removed from the system.	Information only.
E1920	iDRAC6 Upgrade Failed	The iDRAC6 Express card is not installed properly or the card is bad.	Reseat the iDRAC6 Express Card. See Installing an iDRAC6 Express Card. If the problem persists, see "Getting Help" on page 181.
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 Card and Expansion-Card Riser" on page 99. If the problem persists, the riser card or system board is faulty. See "Getting Help" on page 181.
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. See "Expansion Card and Expansion-Card Riser" on page 99.
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 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
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 181.
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 181.
E2010	Memory not detected. Inspect DIMMs.	No memory was detected in the system.	Install memory or reseat memory modules. See "Installing Memory Modules" on page 124 or "Troubleshooting System Memory" on page 157.
E2011	Memory configuration failure. Check DIMMs.	Memory detected, but is not configurable. Error detected during memory configuration.	See "Troubleshooting System Memory" on page 157.
E2012	Memory configured but unusable. Check DIMMs.	Memory configured, but is unusable.	See "Troubleshooting System Memory" on page 157.
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 157.
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 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
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 181.
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 181.
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 181.
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 181.
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 181.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
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 181.
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 181.
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 181.
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 181.
E201E	POST memory test failure. Check DIMMs.	BIOS POST memory test failure.	See "Troubleshooting System Memory" on page 157. If the problem persists, see "Getting Help" on page 181.
E2020	CPU configuration failure. Check screen message.	Processor configuration failure.	Check screen for specific error messages. See "Troubleshooting the Processors" on page 166.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E2021	Incorrect memory configuration. Review User Guide.	Incorrect memory configuration.	Check screen for specific error messages. See "Troubleshooting System Memory" on page 157.
E2022	General failure during POST. Check screen message.	General failure after video.	Check screen for specific error messages.
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 122. See "Getting Help" on page 181.
E2110	Multibit Error on DIMM ##. Reseat DIMM.	The memory module in slot "##" has had a multi-bit error (MBE).	See "Troubleshooting System Memory" on page 157.
E2111	SBE log disabled on DIMM ##. Reseat DIMM.	The system BIOS has disabled memory single-bit error (SBE) logging and will not log anymore SBEs until the system is rebooted. "##" represents the memory module 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 157.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
E2112	Memory spared on DIMM ##. Power cycle AC.	The system BIOS has spared the memory because it has determined the memory had too many errors. "##" represents the memory module 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 157.
I1910	Intrusion detected. Check chassis cover.	System cover has been removed.	Information only.
I1912	SEL full. Review & clear log.	The SEL is full of events and is unable to log any more.	Check the SEL for details on the events, then clear the SEL.
I1920	iDRAC6 Upgrade Successful	Optional iDRAC6 has been upgraded successfully.	
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 RAID battery. See "Installing the RAID Battery" on page 121.
W1627	Power required > PSU wattage. Check PSU and config.	The system configuration requires more power than what the power supply can provide.	Turn off power to the system, reduce the hardware configuration or install higher-wattage power supplies, and then restart the system.

Table 1-2. LCD Status Messages (Optional) (continued)

Code	Text	Causes	Corrective Actions
W1628	Performance degraded. Check PSU and system configuration.	The system configuration requires more power than what the power supply can provide, but it can boot if throttled.	Turn off power to the system, reduce the hardware configuration or install higher-wattage power supplies, and then restart the system.
W1630	Power supply redundancy degraded. Check PSU cables.	The power supply subsystem is no longer fully redundant.	Reseat the power supplies. See "Troubleshooting Power Supplies" on page 155. If the problem persists, see "Getting Help" on page 181.

NOTE: For the full name of an abbreviation or acronym used in this table, see the *Glossary* 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 1-3. 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 has stopped responding. 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.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Alert! Node Interleaving disabled! Memory configuration does not support Node Interleaving.	The memory 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 122. If the problem persists, see "Troubleshooting System Memory" on page 157.
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. If Energy Smart power supplies are installed, replace them with the High Output power supplies to use the components. See "Power Supplies" on page 95.
Alert! Redundant memory disabled! Memory configuration does not support redundant memory.	Redundant memory 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 157. Reset the memory setting, if appropriate. See "Using the System Setup Program and UEFI Boot Manager" on page 57.

Table 1-3. System Messages (continued)

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 181.
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 57.
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.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
CPUs with different cache sizes detected. CPUs with different core sizes 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 power rating. Ensure that the processors are properly installed. See "Processors" on page 127.
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 57.
Decreasing available memory.	Faulty or improperly installed memory modules.	Reseat the memory modules. See "Troubleshooting System Memory" on page 157.
Embedded NICx and NICy: OS NIC=<ENABLED DISABLED>, Management Shared NIC=<ENABLED DISABLED>	The operating system 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 151.

Table 1-3. System Messages (continued)

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 150.
Gate A20 failure.	Faulty keyboard controller; faulty system board.	See "Getting Help" on page 181.
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 57.
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 103.
Keyboard controller failure.	Faulty keyboard controller; faulty system board.	See "Getting Help" on page 181.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 150.
Keyboard fuse has failed.	Overcurrent detected at the keyboard connector.	See "Getting Help" on page 181.
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 using the power button, and then enter the System Setup program to enable the USB port(s). See "Entering the System Setup Program" on page 58.
Manufacturing mode detected.	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
Memory tests terminated by keystroke.	POST memory test was terminated by pressing the spacebar.	Information only.

Table 1-3. System Messages (continued)

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 159, "Troubleshooting a USB Device" on page 150, "Troubleshooting an Optical Drive" on page 161, and "Troubleshooting a Hard Drive" on page 163. See "Using the System Setup Program and UEFI Boot Manager" on page 57 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 57. 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 181.
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 165.

Table 1-3. System Messages (continued)

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 165. If the problem persists, see "Getting Help" on page 181.
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 165.
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 150, "Troubleshooting an Optical Drive" on page 161, or "Troubleshooting a Hard Drive" on page 163 for the appropriate drive(s) installed in your system.
SATA Port x device not found.	There is no device connected to the specified SATA port.	Information only.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
SATA port x device auto-sensing error. SATA port x device configuration error. SATA port 0 device failure.	The drive connected to the specified SATA port is faulty.	Replace the faulty drive.
Requested sector not found. Seek error. Seek operation failed.	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 150 or "Troubleshooting a Hard Drive" on page 163 for the appropriate drive(s) installed in your system.
Shutdown failure.	General system error.	See "Getting Help" on page 181.
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 157.
Time-of-day clock stopped.	Faulty battery or faulty chip.	See "Troubleshooting the System Battery" on page 155.

Table 1-3. System Messages (continued)

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 57. If the problem persists, replace the system battery. See "System Battery" on page 133.
Timer chip counter 2 failed.	Faulty system board.	See "Getting Help" on page 181.
TPM or TCM configuration operation honored. System will now reset.	A Trusted Platform Module (TPM) or China Trusted Platform Module (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 displays 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 181.

Table 1-3. System Messages (continued)

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 Lifecycle Controller by running the Lifecycle Controller Dell Update Package (DUP). For more information, see the <i>Dell Update Packages User's Guide</i> at support.dell.com/manuals . If the system still reports the same error, run the Lifecycle Controller Repair Package . Follow the instructions provided with the package to complete the installation.
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 157. If the problem persists, see "Getting Help" on page 181.
Unsupported CPU combination. Unsupported CPU stepping detected.	Processor(s) not supported by the system.	Install a supported processor or processor combination. See "Processors" on page 127.
Unsupported DIMM detected. The following DIMM has been disabled: x	Invalid memory configuration. The system will run but with the specified memory module disabled.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 122.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Unsupported memory configuration. DIMM mismatch across slots detected: <i>x, x, ...</i>	Invalid memory configuration. Memory modules are mismatched in the specified slots.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 122.
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 System Memory" on page 157 for any faulty components specified in the SEL.
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. If low wattage power supplies are installed, replace them with High Output power supplies to use the components. See "Power Supplies" on page 95.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Warning: Front 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 control panel board and the system board. See "Troubleshooting System Memory" on page 157.
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 150, "Troubleshooting an Internal USB Key" on page 159, and "Troubleshooting a Hard Drive" on page 163.
Incorrect memory configuration CPU <i>n</i> .	The DIMM group for CPU <i>n</i> is incorrectly configured and caused the system to halt.	See "General Memory Module Installation Guidelines" on page 122, for memory configuration information. If the problem persists, see "Troubleshooting System Memory" on page 157.
HyperTransport error caused a system reset! Please check the system event log for details!	A fatal system error occurred and caused the system to reboot.	Check the SEL for information that is logged during the error. See the applicable troubleshooting section in "Troubleshooting Your System" on page 149, for any faulty components specified in the SEL.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Warning: Following faulty DIMMs are ignored: DIMM <i>n1 n2</i> Total memory size is reduced.	Faulty or improperly seated memory module(s). Check both DIMMs in the same channel for a possible fault.	See "Troubleshooting System Memory" on page 157.
Warning: Following faulty DIMMs are disabled: DIMM <i>n1 n2</i> Total memory size is reduced.	Faulty or improperly seated memory module(s). Check both DIMMs in the same channel for a possible fault.	See "Troubleshooting System Memory" on page 157.
Warning: The installed memory configuration is not optimal. For more information on valid memory configurations, please see the system documentation on the technical support web site.	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 122. If the problem persists, see "Troubleshooting System Memory" on page 157.

NOTE: For the full name of an abbreviation or acronym used in this table, see the *Glossary* 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 Embedded System Diagnostics" on page 170 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.

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.
- 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 70 for more information on this interface.

You must select the boot mode from the Boot Mode field of the Boot Settings Screen in the System Setup screen. After specifying the boot mode, proceed to install your operating system in that mode. Thereafter, you must boot the system to the same boot mode (BIOS or UEFI) to access the installed operating system. Trying to boot the operating system from the other boot mode causes 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 help file of the System Setup program.



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

Figure 2-1. Main Screen

Dell Inc. <www.dell.com> - PowerEdge R415 BIOS Version xx.yy.zz [This is DOS Setup]			
Service Tag: <i>xxxxxxxx</i>		Asset Tag: <i>xxxxxxxx</i>	
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>			
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 61.
Processor Settings	Displays information related to processors (speed, cache size, and so on). See "Processor Settings Screen" on page 61.
SATA Settings	Displays a screen to enable or disable the integrated SATA controller and ports. See "SATA Settings Screen" on page 63.
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 63.
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 64.
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 65.
Serial Communication (Off default)	Displays a screen to enable or disable the serial ports and specify related features and options. See "Serial Communication Screen" on page 65.
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 66.
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 67.
System Security	Displays a screen to configure the system password and setup password features. See "System Security Screen" on page 68, "Using the System Password" on page 73, and "Using the Setup Password" on page 75 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: On setting this option to Disabled, the system does not halt if an error occurs during POST. Any critical errors are 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 (Enabled default)	Specifies whether system memory tests are run at system boot. Options are Enabled and Disabled .
Redundant Memory (Disabled default)	Specifies whether redundant memory is enabled on the system. Options are Spare Mode and Disabled .
Node Interleaving (Disabled default)	If this field is Enabled , memory interleaving is supported if a symmetric memory configuration is installed.

Processor Settings Screen


Option	Description
64-bit	Specifies if the processor(s) support 64-bit extensions.
Clock Speed	Displays the processor clock speed.
Bus Speed	Displays the processor bus speed.

Option	Description
Hyper Transport Technology (HT3 default)	Displays the HyperTransport link speed, and depending upon the system, this field may be read-only. HT3 capable systems ship with HT3 by default.
HT Assist (Enabled default)	Enables or disables the HT Assist.
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.
DMA Virtualization (Disabled default)	Enables additional hardware capabilities for DMA remapping and virtualization.
DRAM Prefetcher (Enabled default)	Enables or disables the DRAM Prefetcher.
Hardware Prefetch Training on Software Prefetch.	Enables or disables the hardware prefetcher training on software prefetcher.
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)	Controls the number of enabled cores in each processor.
C1E (Disabled default)	When set to Enabled, the processor(s) can switch to a minimum performance state when idle.
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.
Port B (Off default)	Auto enables BIOS support for the device attached to SATA port B. Off disables BIOS support for the device.
Port C (Off default)	Auto enables BIOS support for the device attached to SATA port C. Off disables BIOS support for the device.
Port D (Off default)	Auto enables BIOS support for the device attached to SATA port D. Off disables BIOS support for the device.
Port E	Auto enables BIOS support for the device attached to SATA port E. Off disables BIOS support for the device.

Boot Settings Screen

Option	Description
Boot Mode (BIOS default)	 CAUTION: Switching the boot mode could prevent the system from booting if the operating system was not installed in the same boot mode. 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. NOTE: Setting this field to UEFI disables the Boot Sequence , Hard-Disk Drive Sequence , and USB Flash Drive Emulation Type fields.
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 will attempt to boot from hard-drives in the system during system startup.
USB Flash Drive Emulation Type (Auto default)	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 1 (On default)	Enables or disables the internal USB port.
Internal USB Port 2 (On default)	Enables or disables the internal USB port.
Embedded NIC1 and NIC2 (Enabled default)	Enables or disables the operating system interface of the embedded NICs. The NICs may 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.

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.
Embedded Video Controller (Enabled default)	Enables or 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>
External Serial Connector (Serial Device1 default)	<p>Specifies whether Serial Device 1, Serial Device 2, or Remote Access Device has access to the external serial connector.</p> <p>NOTE: Only Serial Device 2 can be used for SOL. To use console redirection by SOL, configure the same port address for console redirection and the serial device.</p>

Option	Description
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 (VT100/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 (OS Control default)	<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 System Password" on page 73 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 73 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 73 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 data-bbox="426 236 999 384"> 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 data-bbox="426 395 999 424">When set to Yes, all TPM contents are cleared.</p> <p data-bbox="426 435 999 491">NOTE: This field is read-only when TPM Security is set to Off.</p>
Power Button (Enabled default)	<p data-bbox="426 507 999 624">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 data-bbox="426 635 999 699">When Disabled, the button can only turn on system power.</p>
NMI Button (Disabled default)	<p data-bbox="426 705 999 853"> 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 data-bbox="426 865 999 896">Enables or disables the NMI feature.</p>
AC Power Recovery (Last default)	<p data-bbox="426 903 999 1062">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 (Immediate default)	<p data-bbox="426 1069 999 1185">Determines when the system restarts after power is restored. Options are Immediate, Random (between 30 to 240 seconds), or a user-defined value of 30 to 240 seconds.</p>
User Defined Delay	<p data-bbox="426 1192 999 1240">The delay defined by the user.</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.
<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 devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found.
<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-swap 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 an 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 accesses 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 "Expansion-Card Riser-Board Components and PCIe Buses" on page 177.

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 system password after system 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 75), 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 disabled.

To enable the password security:

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

To disable password security:

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

When **Password Status** is **Locked**, you must 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 shuts 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 **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 75.

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. 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 **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 75.

Embedded System Management

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

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



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

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

Baseboard Management Controller Configuration



NOTE: If an iDRAC6 Express card is installed on the system, the Baseboard Management Controller (BMC) utility is replaced by the iDRAC6 utility.

The BMC enables configuring, monitoring, and recovering of systems remotely. BMC provides the following features:

- Uses the system's integrated NIC
- Enables fault logging and SNMP alerting
- Provides access to system event log and sensor status
- Allows control of system functions including power on and off

- Functions independently of the system's power state or the system's operating system
- Provides text console redirection for system setup, text-based utilities, and operating system consoles



NOTE: To remotely access the BMC through the integrated NIC, you must connect the network connection to integrated NIC1.

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

Entering the BMC Setup Module

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

iDRAC6 Configuration Utility

The iDRAC6 Configuration Utility is a pre-boot configuration environment that allows you to view and set parameters for the optional 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
- Allows control of system functions including power on and off
- Functions independently of the system's power state or 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, restart your system and try again.


Installing System Components


 **NOTE:** Depending on the configuration, your system may have hot-swappable or cabled hard-drives, redundant or non-redundant power supplies, and an LCD panel or diagnostic indicators. The illustrations in this section show a system with hot-swappable hard-drives and an LCD panel.

Recommended Tools

- Key to the system keylock
- #1 and #2 Phillips screw drivers
- Torx screw driver
- 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.


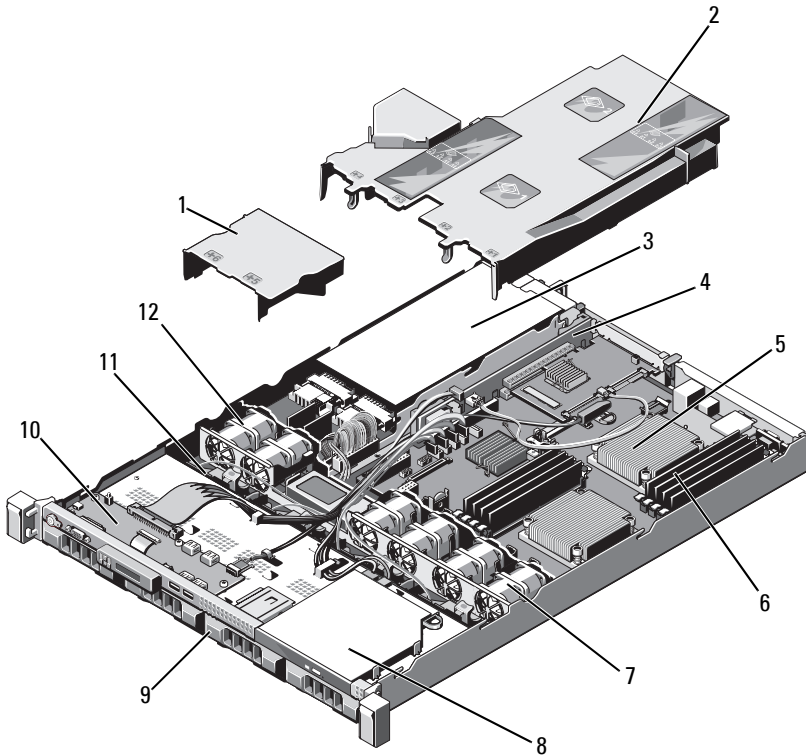
 **NOTE:** It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Figure 3-1. Inside the System



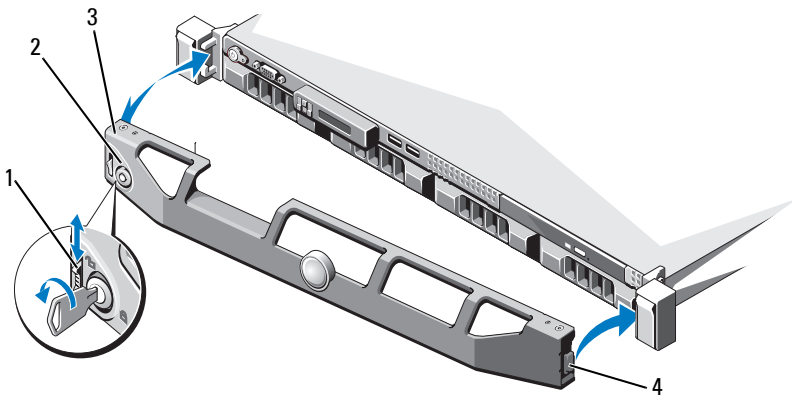
- | | | | |
|----|-------------------------|----|------------------------------|
| 1 | power supply shroud | 2 | system board shroud |
| 3 | power supply bay (2) | 4 | expansion-card riser |
| 5 | heat sink/processor (2) | 6 | memory module (8) |
| 7 | system cooling fan (4) | 8 | optical drive |
| 9 | hard-drive (4) | 10 | control panel board |
| 11 | SAS backplane | 12 | power supply cooling fan (2) |

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 key lock.
- 3 Rotate the left end of the bezel away from the front panel.
- 4 Unhook the right end of the bezel and pull the bezel away from the system. See Figure 3-2.

Figure 3-2. Removing and Replacing the Front Bezel



- | | | | |
|---|---------------|---|-----------|
| 1 | release latch | 2 | keylock |
| 3 | bezel | 4 | hinge tab |

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.

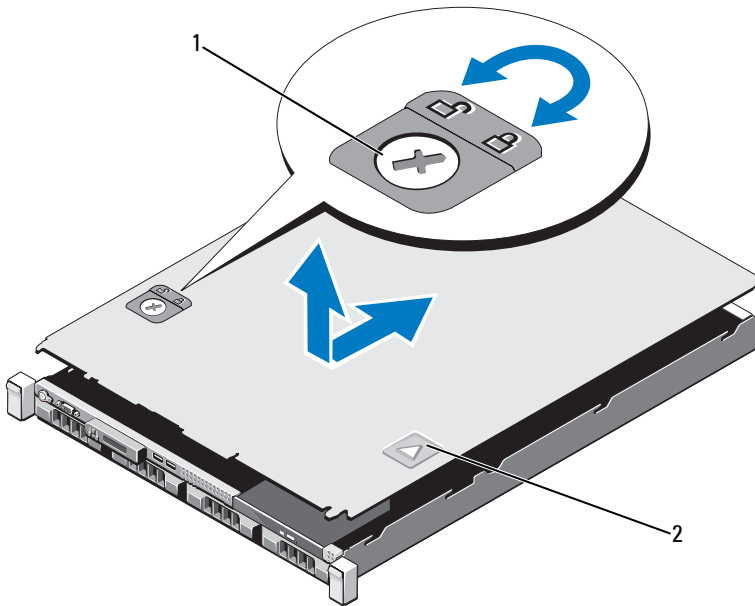


NOTE: It is recommended that you always use a static mat and static strap while working on components in the interior of the system.

Opening the System

- 1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2 Rotate the latch release lock counter clockwise to the unlocked position. See Figure 3-3.
- 3 Grasp the cover on both sides while pressing your thumbs on the latch release lock and the indent, carefully slide the cover towards the back of the system, and lift it away from the system. See Figure 3-3.

Figure 3-3. Opening and Closing the System



1 latch release lock


2 indent


Closing the System


- 1 Place the cover onto the chassis and offset it slightly towards the back of the system till it snaps in position. See Figure 3-3.
- 2 Slide the cover towards the front of the chassis till it snaps in position.
- 3 Rotate the latch release lock in a clockwise direction to secure the cover.
- 4 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Hard Drives

Your system supports up to four 3.5-inch (SAS or SATA) or 2.5-inch (SAS, SATA, or SSD) hard drives in 3.5-inch hot-swap hard-drive carrier or cabled internal drives. Depending on your chassis, the hard drives are installed internally or at the front of the system (see Figure 3-1). Internal hard drives are connected to the system board or an optional controller card. Front-mounted hard drives are connected to a SAS backplane through hard-drive carriers and can be configured as hot-swappable.


 **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.

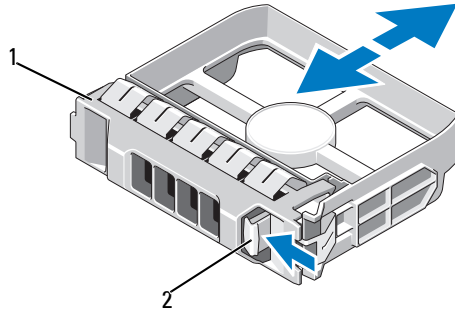
When you format a hard drive, allow enough time for the formatting to be completed. Be aware that high-capacity hard drives can take a number of hours to format.

Removing a Hard-Drive Blank

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

- 1 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 2 Grasp the front of the hard-drive blank, press the release lever on the right side, and slide the blank out until it is free of the drive bay. See Figure 3-4.

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



1 hard-drive blank

2 release lever

Installing a Hard-Drive Blank

- 1 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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 81.

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 applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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.

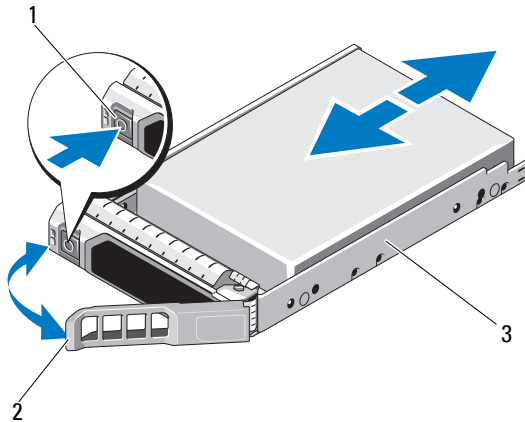
If the drive has been online, the green activity/fault indicator flashes as the drive is powered down. When the drive indicators are off, the drive is ready for removal.

- 3 Press the release button on the front of the hard-drive carrier and open the handle.
- 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 85.
- 6 If applicable, install the front bezel. See "Installing the Front Bezel" on page 81.


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



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

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 the operating system.

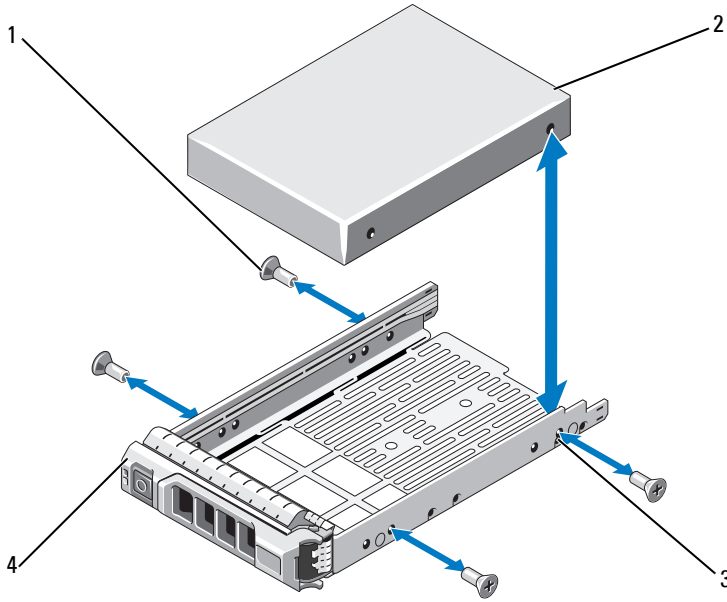
 **CAUTION:** Combining SATA and SAS hard drives in the same system configuration is not supported.

- 1 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 2 If a drive blank is present in the bay, remove it. See "Removing a Hard-Drive Blank" on page 84.
- 3 Press the release 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 and Installing a Hard Drive Into a Hard-Drive Carrier



- | | | | |
|---|---------------------|---|--------------------|
| 1 | screw (4) | 2 | hard drive |
| 3 | SAS/SATA screw hole | 4 | hard-drive carrier |

Installing a Hard Drive Into a Hard-Drive Carrier

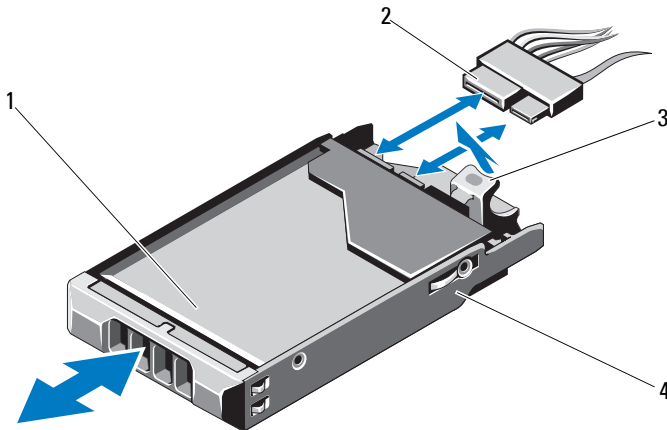
- 1 Insert the hard drive into the hard-drive carrier with the connector end of the drive at the back. See Figure 3-6.
- 2 Align the screw holes on the hard drive with the back set of holes on the hard-drive carrier.
- 3 Attach the four screws to secure the hard drive to the hard-drive carrier.

Removing a Cabled 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.

- 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 82.
- 3 Disconnect the data/power cable from the hard drive in the drive bay.
- 4 Lift the tab with blue dot on the hard-drive bracket and slide the drive out of the bay. See Figure 3-7.

Figure 3-7. Removing and Installing a Cabled Hard Drive



- | | | | |
|---|------------|---|------------------|
| 1 | hard drive | 2 | power/data cable |
| 3 | tab | 4 | drive bracket |

✎ NOTE: If you are not replacing the hard drive, remove the drive from the drive bracket (see Figure 3-8) and insert the empty bracket back into the drive bay.

- 5 Replace the system cover. See "Closing the System" on page 83.

Installing a Cabled 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.

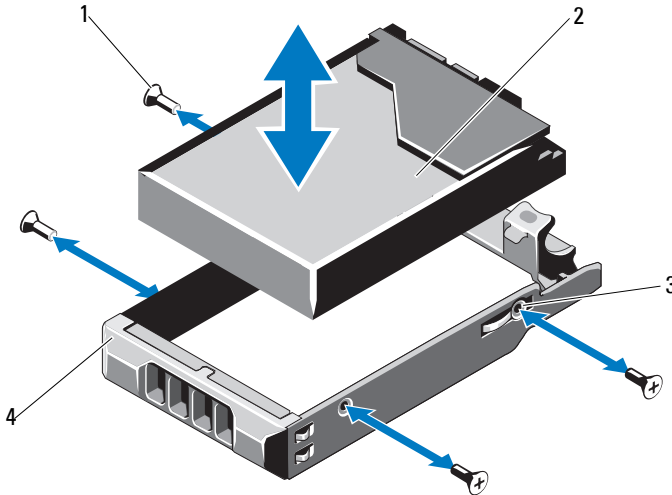
- 1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2 Open the system. See "Opening the System" on page 82.
- 3 Remove the existing hard-drive bracket by lifting the tab with blue dot on the bracket and sliding the bracket up and out of the system. See Figure 3-7.
- 4 Install the hard drive into the bracket. See "Installing a Hard Drive Into a Hard-Drive Bracket" on page 91.
- 5 Slide the hard drive into the drive bay.
- 6 Connect the power and data cables to the hard drive.
 - If connecting to the integrated SATA controller (SATA hard drives only), connect the SATA data cable to the SATA_A connector on the system board. See Figure 6-1.
 - If connecting to a SAS RAID controller card (SAS or SATA hard drives), connect the data cable to the connector on the card edge. For information on installing a SAS controller card, see "Installing an Expansion Card" on page 101.
- 7 Replace the system cover. See "Closing the System" on page 83.
- 8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 9 Enter the System Setup program and ensure that the hard drive's controller is enabled. See "Entering the System Setup Program" on page 58.
- 10 Exit the System Setup program and reboot the system.

See the documentation that came with the hard drive for instructions on installing any software required for drive operation.

Removing a Hard Drive From a Hard-Drive Bracket

Remove the screws from the slide rails on the hard-drive bracket and separate the hard drive from the bracket. See Figure 3-8.

Figure 3-8. Removing and Installing a Hard Drive Into a Hard-Drive Bracket



- | | | | |
|---|---------------------|---|--------------------|
| 1 | screw (4)* | 2 | hard drive |
| 3 | SAS/SATA screw hole | 4 | hard-drive bracket |

*Screws are supplied along with the hard drives ordered from Dell.

Installing a Hard Drive Into a Hard-Drive Bracket

- 1 Insert the hard drive into the hard-drive bracket with the connector end of the drive at the back. See Figure 3-8.
- 2 Align the holes on the hard drive with the back set of holes on the hard-drive bracket.
When aligned correctly, the back of the hard drive will be flush with the back of the hard-drive bracket.
- 3 Attach the four screws to secure the hard drive to the hard-drive bracket.

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



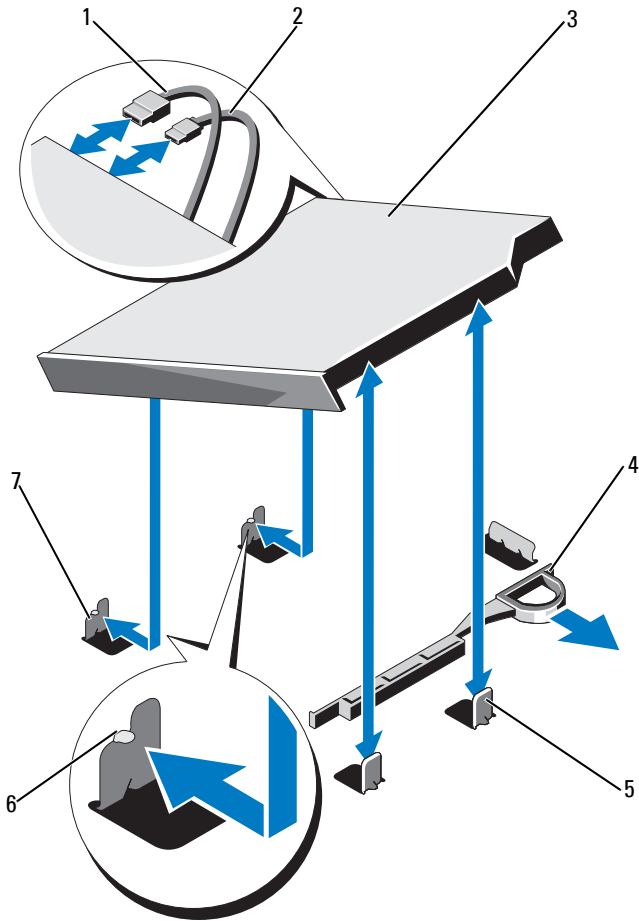
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

- 1 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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 82.
- 4 Disconnect the power and data cables from the back of the drive.

Note the routing of the power and data cables underneath the tabs on the chassis as you remove them from the system board and drive. Route these cables properly when you replace them to prevent them from being pinched or crimped.

- 5 To remove the drive, pull the release latch and lift and angle the drive to release it from the notch on the metal standoffs. Lift the drive out of the chassis. See Figure 3-9.
- 6 Close the system. See "Closing the System" on page 83.
- 7 If applicable, replace the front bezel. See "Installing the Front Bezel" on page 81.

Figure 3-9. Removing and Installing the Optical Drive



- 1 data cable
- 3 optical drive
- 5 metal standoff (2)
- 7 metal standoff with notch (2)

- 2 power cable
- 4 release latch
- 6 notch (2)

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 applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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 82.
- 4 Align the two notches of the metal standoffs on the chassis with the holes in the drive. See Figure 3-9.
- 5 Pull the release latch, place the optical drive in position, and release the release latch.
- 6 Connect the power and data cables to the back of the drive.
You must route these cables properly underneath the tabs on the system chassis to prevent them from being pinched or crimped. See Figure 3-1.
- 7 If not already done, connect the power cable to DVD_PWR and the interface cable to SATA_E on the system board. See Figure 6-1.
- 8 If applicable, replace the front bezel. See "Installing the Front Bezel" on page 81.
- 9 Close the system. See "Closing the System" on page 83.

Power Supplies

Your system supports the following power supply modules:

- 480 W (non-redundant power supply)
- 500 W (redundant power supply)

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.

Removing a Redundant Power Supply



CAUTION: The system requires one power supply to operate normally. 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 source.
- 2 Disconnect the power cable from the power supply and remove the Velcro straps that bundle and secure the system cables.

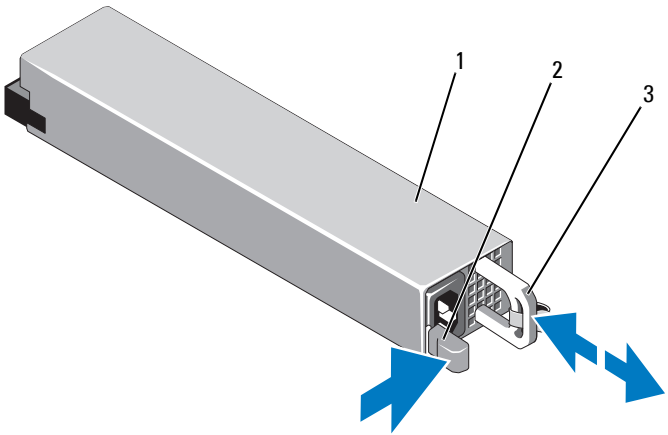


NOTE: You may have to unlatch and lift the optional cable management arm if it interferes with power-supply removal. For information about the cable management arm, see the system's rack documentation.

- 3 Press the retention bracket 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 97.

Figure 3-10. Removing and Installing a Redundant Power Supply



- 1 power supply
- 2 locking tab
- 3 cable retention bracket


Installing a Redundant Power Supply

- 1 Verify that both power supplies are of the same type and have the same maximum output power.
- 2 If applicable, remove the power supply blank. See "Removing the Power Supply Blank" on page 97.
- 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 3-10.

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 with two power supplies, 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. See Figure 1-6.

Removing the Power Supply Blank

If you are installing a second power supply, remove the power supply blank in bay PS2 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


 **NOTE:** Install the power supply blank only in power supply bay PS2.


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.

Removing a Non-Redundant Power Supply

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

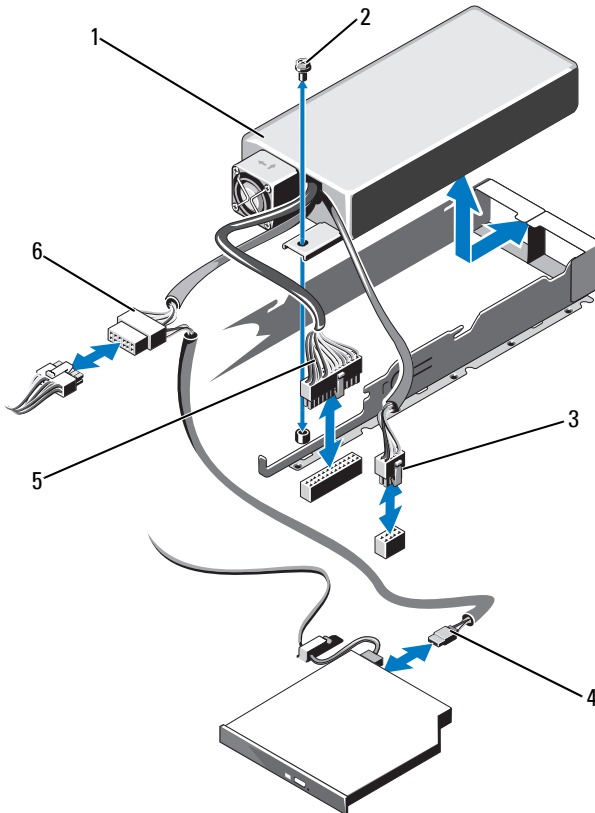
 **NOTE:** You may have to unlatch and lift the optional cable management arm if it interferes with power-supply removal. For information about the cable management arm, see the system's rack documentation.

 **NOTE:** Remove the power cord retention bracket that secures the system cables. See the *Getting Started Guide* that ships with your system for more information.

- 3 Open the system. See "Opening the System" on page 82.

- 4 Disconnect all the power cables from the power supply to the system board, hard drives and optical drive. See Figure 3-11.
- 5 Loosen the screw securing the power supply to the chassis and lift the power supply to remove it from the chassis. See Figure 3-11.

Figure 3-11. Removing and Installing a Non-Redundant Power Supply



- | | | | |
|---|---------------------|---|------------------|
| 1 | power supply | 2 | screw |
| 3 | power cable 8 pins | 4 | ODD power cable |
| 5 | power cable 24 pins | 6 | SATA power cable |

Installing a Non-Redundant Power Supply

△ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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.
- 1 Open the system. See "Opening the System" on page 82.
- 2 Place the power supply on the chassis. See Figure 3-11. Tighten the screw to secure the power supply to the chassis.
- 3 Connect all the power cables to the system board, hard drive(s), and optical drive.
- 4 Replace the system cover. See "Closing the System" on page 83.
- 5 Connect the power cable to the power supply and plug the cable into a power outlet.

Expansion Card and Expansion-Card Riser

Expansion Card Installation Guidelines

Your system supports one x16 Gen2 PCIe expansion card installed in the slot 1 connector on the expansion-card riser.

△ CAUTION: Expansion card can only be installed in the slots on the expansion-card riser. Do not attempt to install expansion cards directly into the riser connector on the system board.

- The expansion slot supports full-height, half-length cards.
- The expansion-card slot is not hot-swappable.
- PCI Express Generation 2 expansion card is supported in the slot.

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

- Table 3-1 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 3-1. Expansion-Card Installation Order

Card Priority	Card Type	Slot Priority	Max Allowed	25 W Card
1	SAS 6/iR Modular	2	1	Y
2	HPCC	1	1	Y
3	Fibre Channel	1	1	Y
4	10 Gb NIC	1	1	Y
5	All other Dell storage cards	1	1	Y
6	All other NICs	1	1	N*
7	Non-Dell storage cards	1	1	N*

* Refers to the expansion card's documentation to determine if the maximum power exceeds 15 W. Any cards that exceed 15 W will be affected by the restriction of one 25 W 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 82.
- 3 Disconnect all cables from the card.
- 4 Lift the expansion-card latch. See Figure 3-12.
- 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-card slot on the chassis.



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 83.

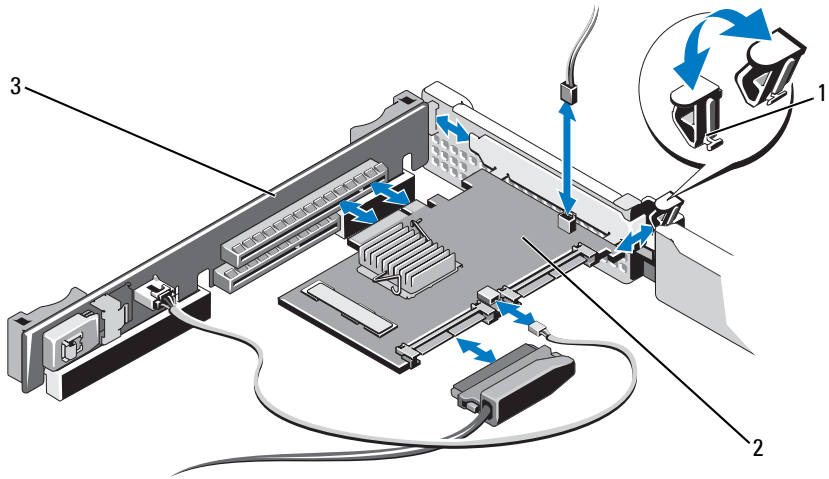
Installing an Expansion Card



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 82.
- 4 Open the expansion-card latch and remove the filler bracket. See Figure 3-12.
- 5 Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion-card connector on the expansion-card riser.
- 6 Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.
- 7 Replace the expansion-card latch. See Figure 3-12.

Figure 3-12. Removing and Installing an Expansion Card



- 1 expansion-card latch
- 2 expansion card
- 3 expansion-card riser

- 8 Connect any cables to the expansion card.
- 9 Close the system. See "Closing the System" on page 83.
- 10 Install any device drivers required for the card as described in the documentation for the card.

Integrated Storage Controller Card

Your system includes a dedicated expansion-card slot on the expansion-card riser 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.

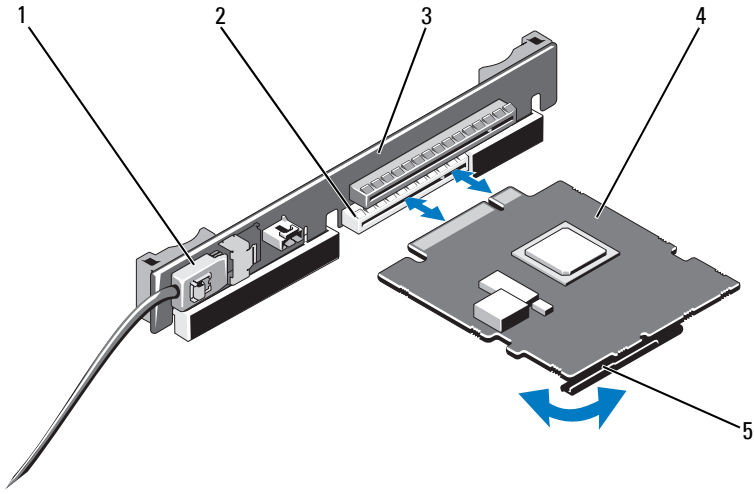
Removing the Integrated Storage Controller Card



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 82.
- 3 If applicable, remove the expansion card. See "Integrated Storage Controller Card" on page 103.
- 4 Pull the blue release lever to free the card from the connector on the expansion-card riser.
- 5 Lift to remove the card.

Figure 3-13. Removing and Installing the Integrated Storage Controller Card




- | | | | |
|---|--------------------------|---|------------------------------------|
| 1 | SAS data cable connector | 2 | storage connector |
| 3 | expansion-card riser | 4 | integrated storage controller card |
| 5 | release lever (blue) | | |

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 82.
- 3 If applicable, remove the expansion card. See "Integrated Storage Controller Card" on page 103.

- 4 Hold the card by its edges and insert the card-edge connector firmly into the expansion-card connector on the riser labeled SLOT 2 until the card is fully seated.
- 5 Connect the SAS data cable connector to the integrated storage controller card. See Figure 3-13.
 **NOTE:** Be sure to connect the cable according to the connector labels on the cable. The cable will not function properly if reversed.
- 6 Route the SAS data cable through the channel on the inner side of the chassis.
- 7 Attach the connector labeled "SAS A" to connector SAS A on the backplane, and attach the connector labeled "SAS B" to connector SAS B on the backplane. See Figure 3-13.
- 8 Close the system. See "Closing the System" on page 83.

Expansion-Card Riser

The system's expansion-card riser supports an x16 link Gen2 PCIe expansion card. An additional slot on the riser is reserved for use by the integrated storage controller card.

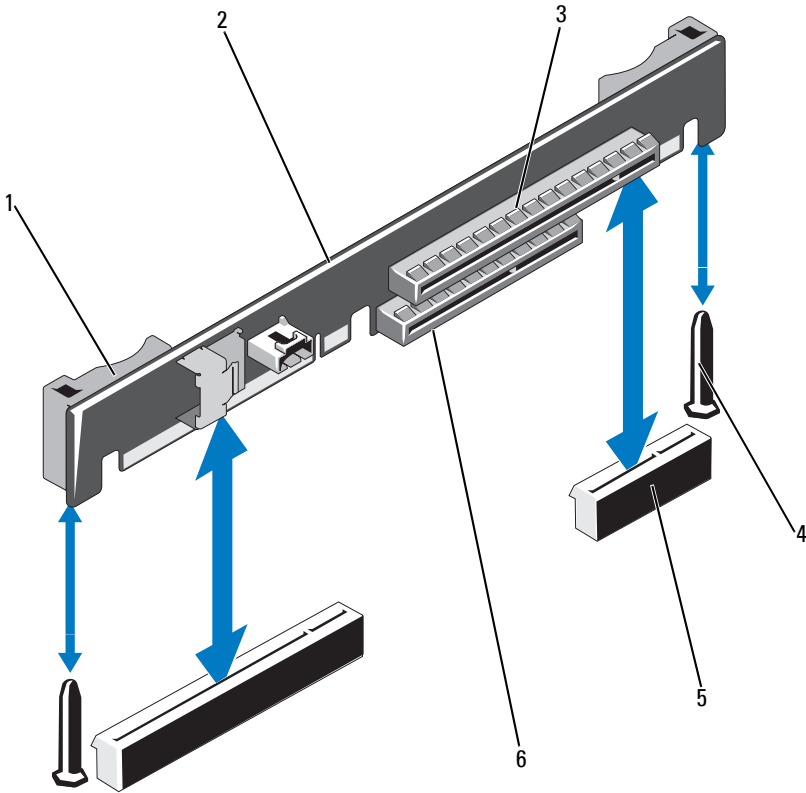
Removing an Expansion-Card Riser

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

- 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 82.
- 3 If applicable, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 100.
- 4 If applicable, remove the integrated storage controller card. See "Removing the Integrated Storage Controller Card" on page 103.

- 5 If applicable, remove any cables from the riser.
- 6 To remove the expansion-card riser, grasp the riser guides and lift the expansion-card riser from the chassis. See Figure 3-14.

Figure 3-14. Removing and Installing an Expansion-Card Riser



- | | | | |
|---|---------------------------------|---|------------------------------------|
| 1 | riser guide (2) | 2 | expansion-card riser |
| 3 | expansion card slot | 4 | riser guide post (2) |
| 5 | expansion-card riser socket (2) | 6 | integrated storage controller slot |

Replacing an Expansion-Card Riser

- 1 To install an expansion-card riser, align the riser guides with the riser guide posts on the system board. See Figure 3-14.
- 2 Lower the expansion-card riser into place until the expansion-card riser connector is fully seated.
- 3 If applicable, reinstall the integrated storage controller card. See "Installing the Integrated Storage Controller Card" on page 104.
- 4 If applicable, reinstall the expansion card. See "Installing an Expansion Card" on page 101.
- 5 If required, connect any cables to the riser.
- 6 Close the system. See "Closing the System" on page 83.

Internal USB Memory Key

The USB memory key can be used as a boot device, security key, or mass storage device. To use the internal USB connector, the **Internal USB Port** option must be enabled in the **Integrated Devices** screen of the System Setup program.

To boot from the USB memory key, you must 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. See "Boot Settings Screen" on page 63. For information on creating a bootable file on the USB memory key, see the user documentation that accompanied the USB memory 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.

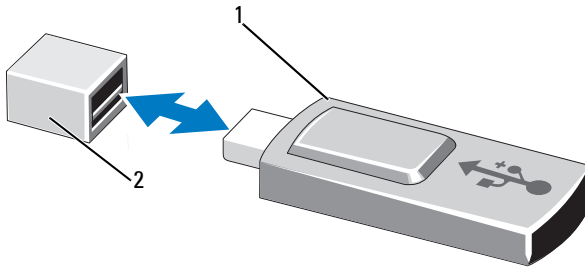


NOTE: To avoid interference with other components, the maximum allowable dimensions of the USB key are 24 mm (.94 in) wide x 79 mm (3.11 in) long x 8.6 mm (.33 in) high.

- 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 82.

- 3 Locate the USB connector on the control panel board. See Figure 3-15.
- 4 Insert the USB memory key into the USB connector.
- 5 Close the system. See "Closing the System" on page 83.

Figure 3-15. Removing and Installing a USB Memory Key




1 USB memory key


2 USB memory key connector

System Board Shroud

The system board shroud covers the processors, heat sinks, and memory modules, and provides air flow to these components. Airflow is facilitated by the cooling fan modules and the system board shroud directs the airflow over these components.

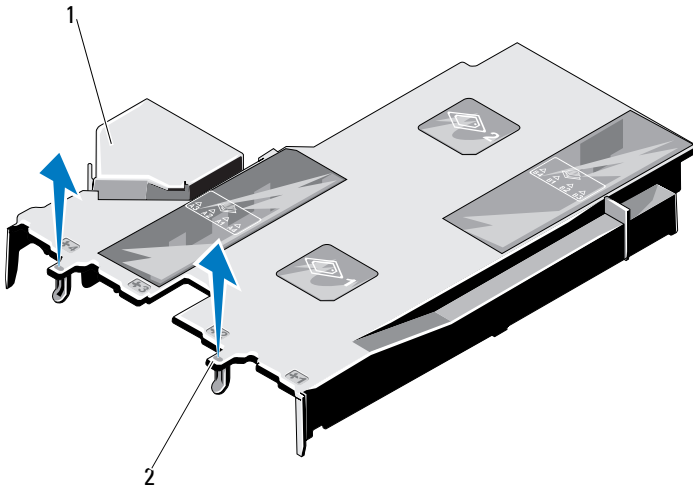
Removing the System Board Shroud

 **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 system board shroud removed. The system may get overheated quickly, resulting in shutdown and loss of data.**

- 1 Open the system. See "Opening the System" on page 82.
- 2 Remove the cables that are routed through the cable holders on the system board shroud.
- 3 Grasp the two shroud tabs with blue dots between the fan assemblies and gently lift the shroud. See Figure 3-16.
- 4 Grasping the shroud by its edges, gently remove the shroud straight up and away from the system board. See Figure 3-16.

Figure 3-16. Removing and Installing the System Board Shroud



- 1 system board shroud
- 2 shroud tab (2)

Installing the System Board Shroud

- 1 Open the system. See "Opening the System" on page 82.
- 2 Align the shroud using center of the numbered fan bays as a guide and locate the tab projection on the left side of the fan module numbered 3. See Figure 3-16.
- 3 Push the system board shroud down until all edges are seated in the slots, securing the shroud to the system board.
- 4 Route the cables appropriately through the cable holders on the system board shroud.
- 5 Close the system. See "Closing the System" on page 83.

Power Distribution Board Shroud

The power distribution board shroud covers the power distribution board and provides air flow to the power supply units. Airflow is facilitated by the cooling fan modules and the power distribution board shroud directs the airflow to the power supply units.

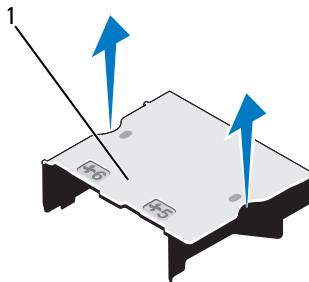
Removing the Power Distribution Board Shroud

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 power distribution board shroud removed. The system may get overheated quickly, resulting in shutdown and loss of data.

- 1 Open the system. See "Opening the System" on page 82.
- 2 Grasping the shroud by its edges near the blue tabs, gently remove the shroud straight up and away from the system. See Figure 3-17.

Figure 3-17. Removing and Installing the Power Distribution Board Shroud



- 1 power distribution board shroud

Installing the Power Distribution Board Shroud

- 1 Align the power distribution board shroud using center of the numbered fan bays 5 and 6 as a guide. See Figure 3-17.
- 2 Push the shroud down until it is aligned with the system chassis wall.
- 3 Close the system. See "Closing the System" on page 83.

iDRAC6 Express Card (Optional)

Removing an iDRAC6 Express Card



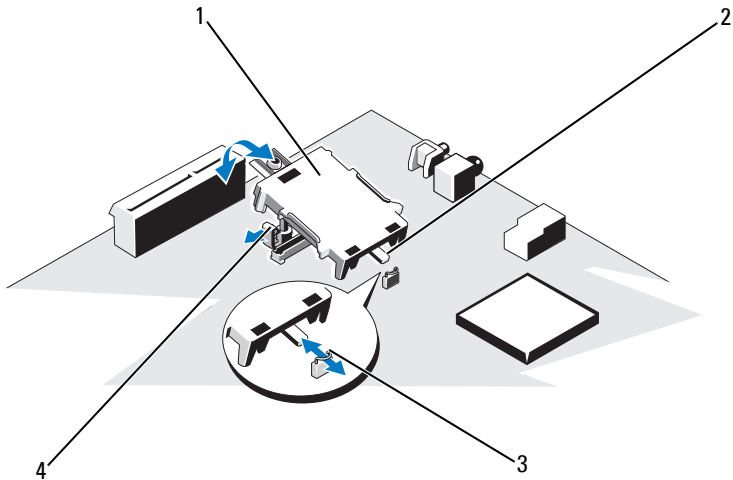
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 82.
- 3 Pull back slightly on the retention standoff tab at the front edge of the card and gently lift the card off the retention standoff. See Figure 3-18.

As the holder releases from the standoff, the connector under the card disengages from the system board connector.

- 4 Angle the card so that the notch on the card slips through the clip on the system board to remove the iDRAC6 Express card.
- 5 Close the system. See "Closing the System" on page 83.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 3-18. Installing or Removing an iDRAC6 Express Card



- | | | | |
|---|---------------------|---|----------------------|
| 1 | iDRAC6 Express card | 2 | notch |
| 3 | clip | 4 | plastic standoff tab |

Installing an iDRAC6 Express 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 82.
- 3 Insert the notch on the iDRAC6 Express card into the clip on the system board.

- 4 Align the front edge of the card with the connector on the system board. See Figure 6-1 for the location of the connector.
- 5 Press the card down until it is fully seated. See Figure 3-18.
When the front of the card is fully seated, the plastic standoff tab snaps over the edge of the holder.
- 6 Close the system. See "Closing the System" on page 83.
- 7 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

iDRAC6 Enterprise Card (Optional)

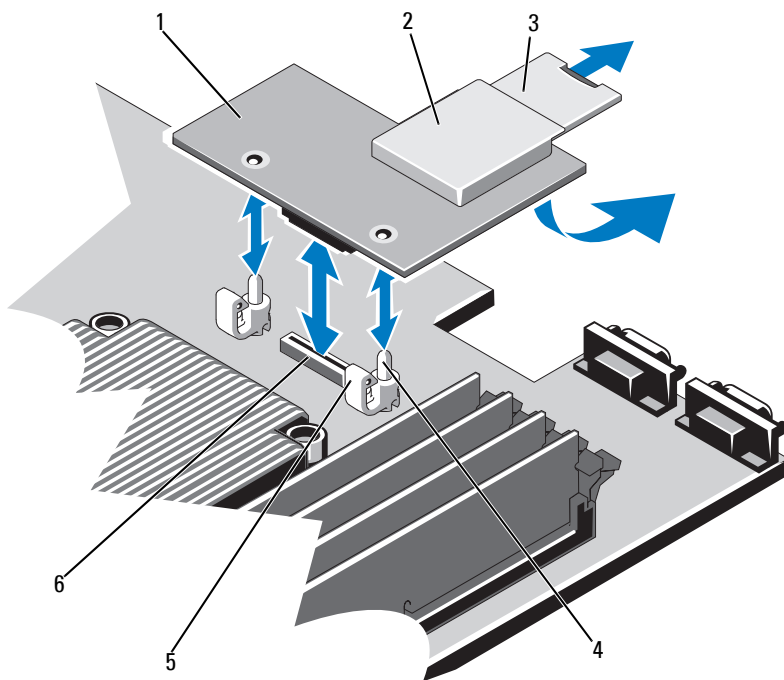
Removing an iDRAC6 Enterprise Card

 **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 present, disconnect the Ethernet cable from the iDRAC6 enterprise card connector on the system back panel. See Figure 1-4.
- 3 Open the system. See "Opening the System" on page 82.
- 4 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 5 Remove the VFlash media card (if applicable) from the iDRAC6 enterprise card. See "Removing a VFlash Media Card" on page 116.
- 6 Pull back slightly on the two tabs at the front edge of the card and gently lift the front edge of the card off of the retention standoffs.
As the card releases from the standoffs, the connector under the card disengages from the system board connector.
- 7 Slide the card away from the back of the system until the RJ-45 connector is clear of the back panel, then lift the card out of the system.

- 8 Replace the plastic filler plug over the port at the system back panel. See "Back-Panel Features and Indicators" on page 17 for the port location.
- 9 Replace the system board shroud. See "Installing the System Board Shroud" on page 110.
- 10 Close the system. See "Closing the System" on page 83.
- 11 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 3-19. Removing and Installing an iDRAC6 Enterprise Card



- | | | | |
|---|----------------------------|---|----------------------------------|
| 1 | iDRAC6 Enterprise card | 2 | VFlash media slot |
| 3 | VFlash SD card | 4 | retention standoff post (2) |
| 5 | retention standoff tab (2) | 6 | iDRAC6 Enterprise card connector |

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 82.
- 3 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 4 Remove the plastic filler plug for the iDRAC6 Enterprise port from the system back panel.
- 5 Angle the card so that the RJ-45 connector fits through the back-panel opening. See Figure 3-19.
- 6 Align the front edge of the card with the two front 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.
- 7 Close the system. See "Closing the System" on page 83.
- 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.

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.

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.

Cooling Fans

Your system contains four dual-motor fans and provides cooling for the processor and memory modules and two dual-motor fans for the redundant power supplies.



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



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 fan assembly.

Removing a Cooling Fan



WARNING: The cooling fan can continue to spin for some time after the system has been powered down. Allow time for the fan to stop spinning before removing it from the system.



WARNING: Do not attempt to operate the system without the cooling 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.

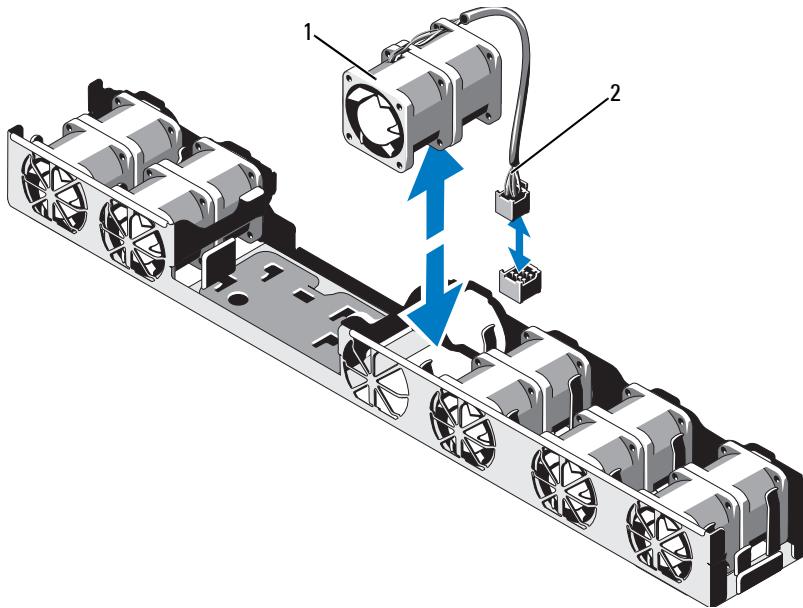


NOTE: The procedure for removing each individual fan module is the same.

- 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 82.

- 3 Remove the system board shroud or the power distribution board shroud as applicable. See "Removing the System Board Shroud" on page 109 or "Removing the Power Distribution Board Shroud" on page 111.
- 4 Disconnect the fan's power cable from the system board. See Figure 3-20.
- 5 Remove the faulty fan by grasping the fan and sliding the fan from the fan assembly. See Figure 3-20.

Figure 3-20. Removing and Installing a Fan



1 fan

2 power cable

Installing a Cooling 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 Ensure that the fan is oriented correctly.
Orient the fan module so that the side with the power cable faces towards the back of the system.
- 2 Slide the fan module into the fan assembly until the fan is fully seated. See Figure 3-20.
- 3 Connect the fan's power cable to the power connector on the system board.
- 4 Replace the system board shroud or the power distribution board shroud as applicable. See "Installing the System Board Shroud" on page 110 or "Installing the Power Distribution Board Shroud" on page 112.
- 5 Close the system. See "Closing the System" on page 83.

RAID Battery (Optional)

Removing the RAID Battery



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

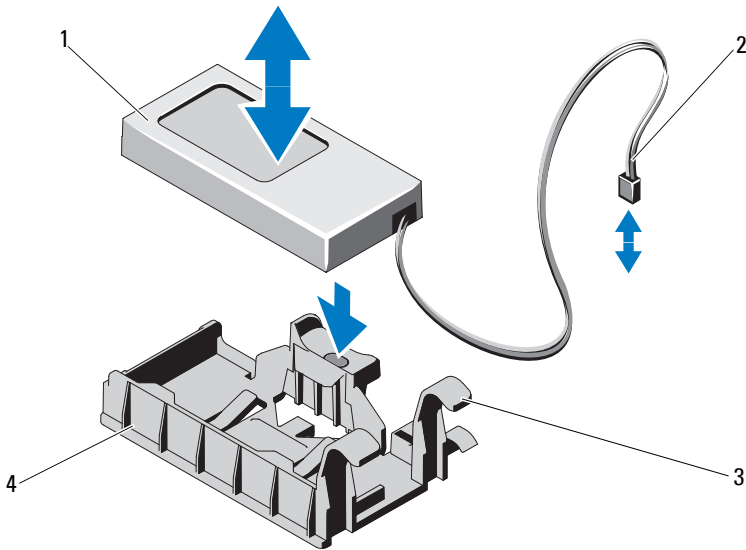


NOTE: The information in this section applies only to systems with the optional PERC controller card.

- 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 82.

- 3 To disconnect the RAID battery cable from the connector on the system board, press the tab on the RAID battery cable connector, and gently pull the cable connector out of the connector on the system board. See Figure 3-21.
- 4 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 and Installing the RAID Battery



- | | | | |
|---|-------------------------|---|-------------------------|
| 1 | RAID battery | 2 | battery cable connector |
| 3 | battery carrier tab (2) | 4 | battery carrier |

Installing the RAID Battery



CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 Insert the RAID battery into the battery carrier until it locks into place. See Figure 3-21.
- 2 Connect the battery cable to the connector on the system board. See Figure 6-1.
- 3 Close the system. See "Closing the System" on page 83.
- 4 Place the system upright on a flat, stable surface.
- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

System Memory

Your system supports DDR3 registered DIMMs (RDIMMs) or unbuffered ECC DIMMs (UDIMMs). Single and dual-rank DIMMs can be 1067 or 1333 MHz, and quad-rank DIMMs can be 1067 or 800 MHz.

The system contains 8 memory sockets split into two sets of four sockets, one set per each processor. Each four-socket set is organized into two channels. The first socket of each channel is marked with white release levers.

The maximum memory that is supported on your system varies according to the types and sizes of memory modules being used:

- Single-rank and dual-rank RDIMMs of sizes 2 GB, 4 GB, and 8 GB are supported for a total of up to 64 GB.
- Quad-rank RDIMMs are supported for a total of up to 64 GB.



NOTE: Quad-rank RDIMMs of size 16 GB when available will support for a total of up to 128 GB.

- 1 GB, 2 GB and 4 GB UDIMMs are supported for a total of up to 32 GB (per processor).

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.

- RDIMMs and UDIMMs cannot be mixed.
- Except for memory channels that are unused, all populated memory channels must have identical configurations.
- In a dual-processor configuration, the memory configuration for each processor must be identical.
- Memory modules of different sizes can be mixed in A1–A4 or B1–B4 (for example, 2 GB and 4 GB), but all populated channels must have identical configurations.
- For Optimizer Mode, memory modules are installed in the numeric order of the sockets beginning with A1 or B1.
- If quad-rank memory modules are mixed with single- or dual-rank modules, the quad-rank modules must be installed in the sockets with the white release levers.
- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s).

Table 3-2, Table 3-3, and Table 3-4 show sample memory configurations that follow the appropriate memory guidelines stated in this section.

The samples show identical memory-module configurations and the physical and available memory totals. The tables do not show mixed or quad-rank memory-module configurations, nor do they address the memory speed considerations of any configuration.

Table 3-2. Memory Rank Population Guidelines for Speed

	DIMM 1	DIMM 2	Max MHz, 1.5V DIMMs	Max MHz, 1.35V DIMMs (6-core only)	Max GB/Channel
UDIMM	Single-Rank or Dual-Rank	Empty	1333 MHz	1333 MHz	4 GB
	Single-Rank	Single-Rank	1333 MHz	1333 MHz	4 GB
	Dual-Rank	Single-Rank or Dual-Rank	1066 MHz	1066 MHz	8 GB
RDIMM	Single-Rank or Dual-Rank	Empty	1333 MHz	1333 MHz	8 GB
	Single-Rank	Single-Rank	1333 MHz	1333 MHz	8 GB
	Dual-Rank	Single-Rank or Dual-Rank	1066 MHz	1066 MHz	16 GB
	Quad-Rank	Empty	1333 MHz	1066 MHz	16 GB
	Quad-Rank	Single-Rank, Dual-Rank, or Quad-Rank	800 MHz	667 MHz	32 GB

Table 3-3. Sample RDIMM Single-, Dual-, and Quad-Rank Memory Configurations (Per Processor)


Memory Module Size	Memory Sockets				Single Processor		Dual Processor	
	1	3	2	4	Physical Memory (GB)	Available Memory (GB)	Physical Memory (GB)	Available Memory (GB)
2 GB	X				2	all	4	all
	X		X		4		8	
	X	X	X	X	8		16	
4 GB	X				4	all	8	all
	X		X		8		16	
	X	X	X	X	16		32	
8 GB	X		X		16	all	32	all
	X	X	X	X	32		64	
16 GB ¹	X		X		32	all	64	all
	X	X	X	X	64		128	


¹ When available.


Table 3-4. Sample UDIMM Memory Configurations (Per Processor)

Memory Module Size	Memory Sockets				Single Processor		Dual Processor	
	1	3	2	4	Physical Memory (GB)	Available Memory (GB)	Physical Memory (GB)	Available Memory (GB)
1 GB	X				1	all	2	all
	X		X		2		4	
	X	X	X	X	4		8	
2 GB	X				2	all	4	all
	X		X		4		8	
	X	X	X	X	8		16	
4 GB	X				4	all	8	all
	X		X		8		16	
	X	X	X	X	16		32	

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.

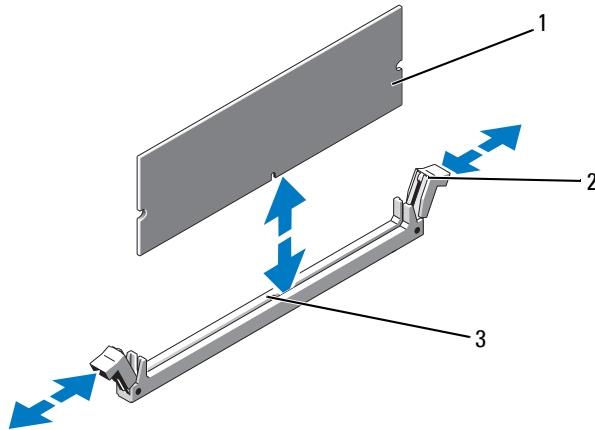
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

 **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 in those sockets.

- 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 82.
- 3 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 4 Locate the memory module sockets. See Figure 6-1.


- 5 Press the ejectors on the memory module socket down and out, as shown in Figure 3-22, to allow the memory module to be inserted into the socket.
- 6 Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

Figure 3-22. Installing and Removing a Memory Module



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

- 7 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.

- 8 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.

- 9 Repeat step 5 through step 8 of this procedure to install the remaining memory modules. See Table 3-3 and Table 3-4.

- 10 Replace the system board shroud. See "Installing the System Board Shroud" on page 110.
- 11 Close the system. See "Closing the System" on page 83.
- 12 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.
- 13 If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 2 through step 12 of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.
- 14 Run the system memory test in the system diagnostics. See "Running the Embedded System Diagnostics" on page 170.

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 in those sockets.

- 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 82.
- 3 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 4 Locate the memory module sockets. See Figure 6-1.

- 5 Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 3-22.
Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.
- 6 Replace the system board shroud. See "Installing the System Board Shroud" on page 110.
- 7 Close the system. See "Closing the System" on page 83.

Processors

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 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.

- 3 Open the system. See "Opening the System" on page 82.
- 4 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.



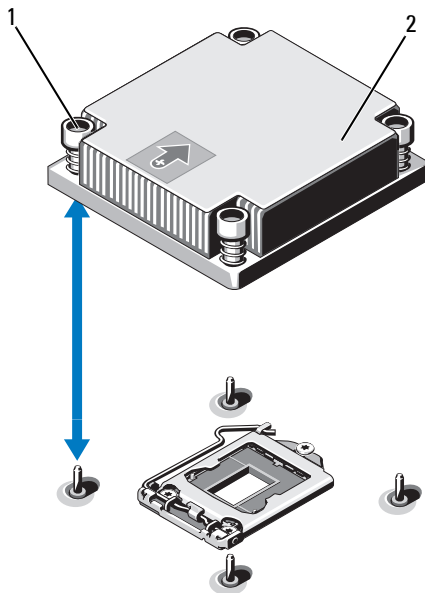
WARNING: The heat sink and processor are hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool before handling them.



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 Using a #2 Phillips screwdriver, loosen one of the heat-sink retention screws. See Figure 3-23.
- 6 Wait 30 seconds for the heat sink to loosen from the processor.
- 7 Loosen the other heat-sink retention screws.
- 8 Gently lift the heat sink off the processor and set the heat sink aside upside down (thermal grease side facing up).

Figure 3-23. Removing and Installing the Heat Sink



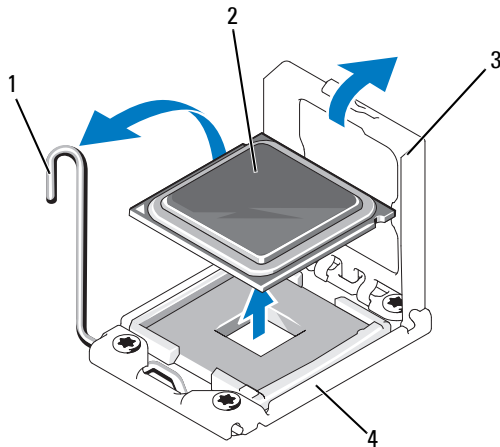
- 1 heat-sink retention screw (4) 2 heat sink

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. Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-24.

- 10 Use the tab on the processor shield to rotate the processor shield upward and out of the way. See Figure 3-24.

Figure 3-24. Removing a Processor



- | | | | |
|---|----------------------|---|------------|
| 1 | socket-release lever | 2 | processor |
| 3 | processor shield | 4 | ZIF socket |

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 a processor from socket CPU2, you must install a processor blank and a heat-sink blank to ensure proper system cooling. Adding the blanks is similar to adding a processor. See "Installing a Processor" on page 130.



NOTE: In single-processor configurations, a processor must be installed in socket CPU1. Install the blanks in socket CPU2 only.

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.

- 1 If you are upgrading your processors, prior to upgrading your system, download and install the latest system BIOS version from support.dell.com. Follow the instructions included in the file download to install the update on your system.



NOTE: In single-processor configurations, socket CPU1 must be used.

- 2 If you are adding a second processor for the first time, remove the heat-sink blank and the processor blank from the vacant processor socket. Removing the blanks is similar to removing a processor. See "Removing a Processor" on page 127.
- 3 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.
- 4 Locate the pin 1 indicator on the system board socket.
- 5 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 3-26.



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

- 6 Place the processor over the socket with each pin 1 aligned and level. See Figure 3-25 and Figure 3-26.



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

- 7 Align the processor with the socket keys on the ZIF socket. See Figure 3-25.
- 8 Install the processor in the socket. Keep the processor level (see Figure 3-25) 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.

Figure 3-25. Keeping the Processor Parallel to the Socket

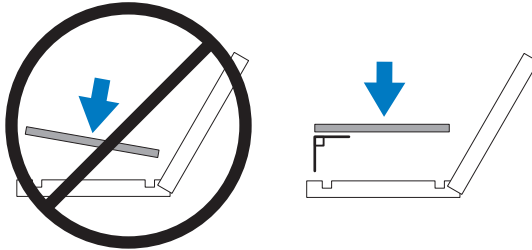
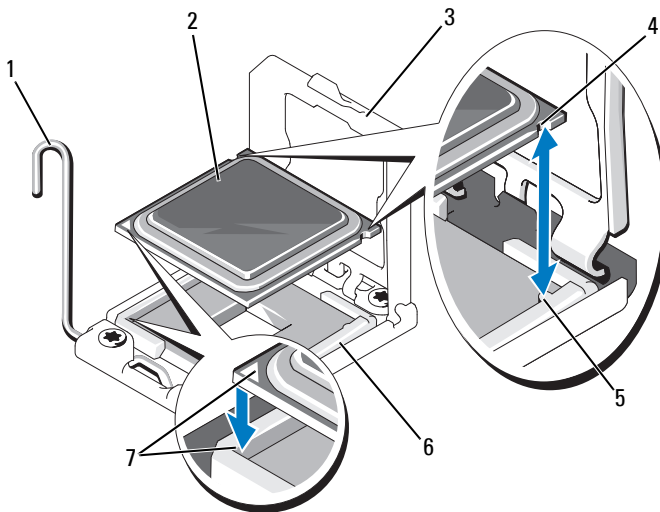



Figure 3-26. Aligning the Processor With the Socket Keys




- | | | | |
|---|----------------------|---|------------------------|
| 1 | socket-release lever | 2 | processor |
| 3 | processor shield | 4 | notch in processor (2) |
| 5 | socket key (2) | 6 | ZIF socket |
| 7 | pin 1 indicator (2) | | |

9 Verify that the processor is properly aligned and seated.


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

10 Close the processor shield.

11 Rotate the socket release lever down until it snaps into place. See "Installing a Processor" on page 130.

 **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.

12 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.**

13 Open the grease packet included with your processor kit and apply thermal grease evenly to the center of the top of the new processor.

14 Place the heat sink on the processor. See Figure 3-23.

15 Using a #2 Phillips screwdriver, tighten the heat-sink retention screws. See Figure 3-23.

16 If applicable, replace the system board shroud. See "Installing the System Board Shroud" on page 110.

17 Close the system. See "Closing the System" on page 83.

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


19 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 58.


20 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 170.

System Battery

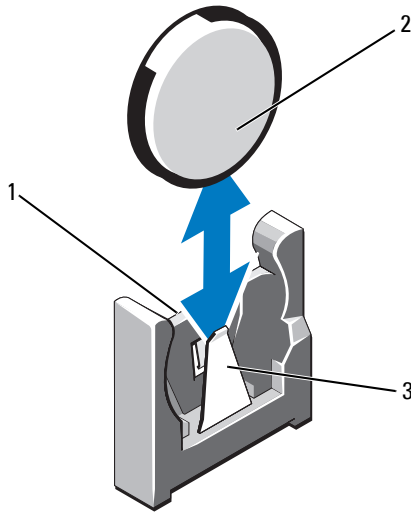
Replacing the System Battery

 **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.

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 82.
- 3 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 4 If required, disconnect the cables.

Figure 3-27. Replacing the System Battery



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

5 Locate the battery socket. See "Jumpers and Connectors" on page 173.

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

- 6 Support the battery connector by firmly holding the positive side of the connector.
- 7 Press the battery toward the negative side of the connector and lift it up out of the securing tab at the negative side of the connector.
- 8 To install the new system battery, support the battery connector by pressing down firmly on the positive side of the connector.
- 9 Hold the battery with the "+" facing the plastic connector on the system board and slide it under the securing tabs.
- 10 Press the battery straight down into the connector until it snaps into place.

- 11 If applicable, replace the system board shroud. See "Installing the System Board Shroud" on page 110.
- 12 If applicable, reconnect the cables.
- 13 Close the system. See "Closing the System" on page 83.
- 14 Enter the System Setup program to confirm that the battery is operating properly. See "Entering the System Setup Program" on page 58.
- 15 Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
- 16 Exit the System Setup program.

Control Panel Assembly



NOTE: The LCD control panel assembly consists of two separate modules—the display module and the control panel circuit board. Use the following instructions to remove and install either module.

Removing the Control Panel 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 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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 82.
- 4 Disconnect the control panel cable from the control panel board.
 - For LED control panel, see Figure 3-28.
 - For LCD control panel, see Figure 3-29.

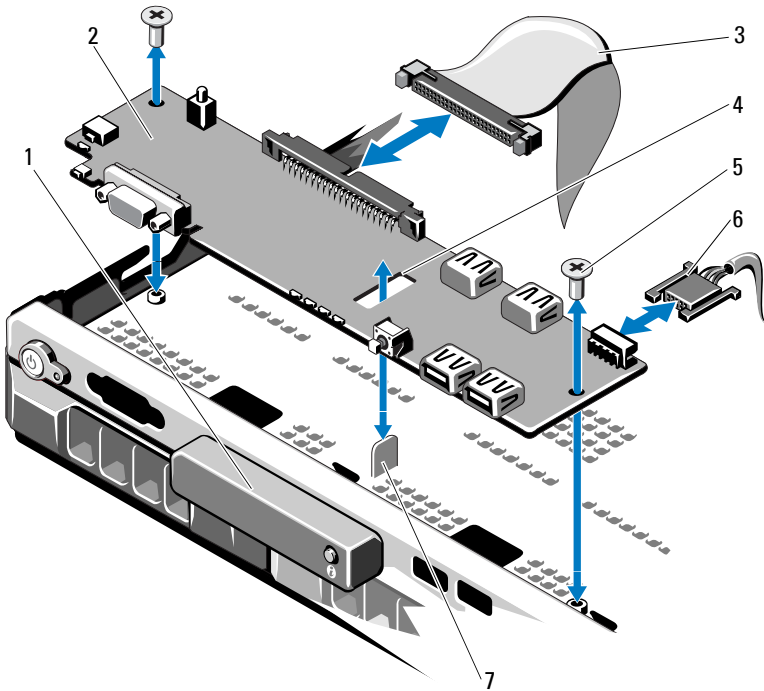


CAUTION: Do not pull on the cable to unseat the connector. Doing so can damage the cable.

- 5 Press the metal tabs on the ends of the cable connector.

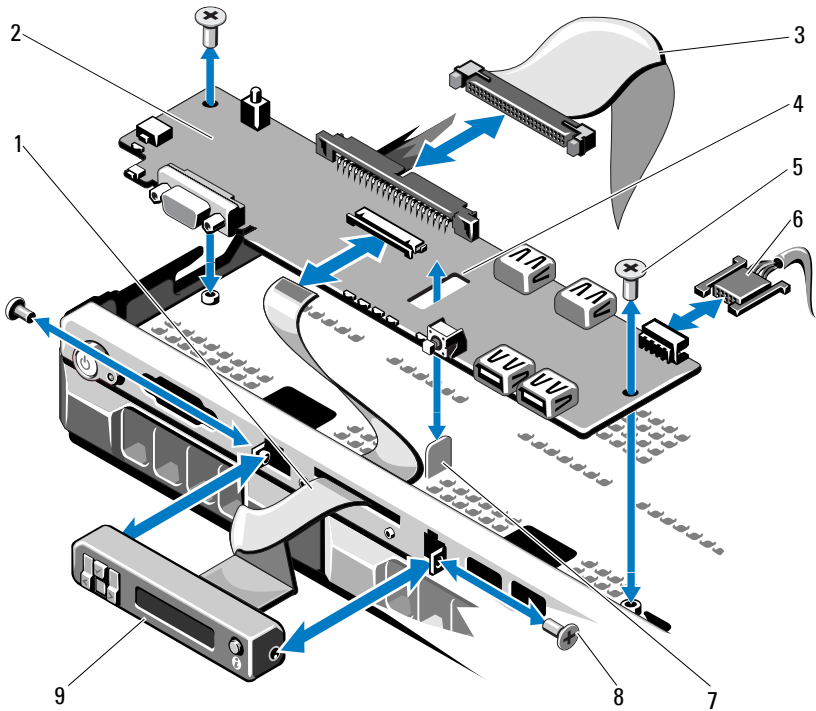
- 6** Gently work the connector out of the socket.
- 7** For LCD control panel, disconnect the display module cable from the control panel board. See Figure 3-29.
- 8** Remove the two screws that secure the control panel board to the system chassis and remove the board.
This completes the removal for LED control panel.
- 9** To remove the display module, use a knife or a small flat-blade screwdriver, and insert the blade beneath the front panel of the display and slide the blade across the bottom to lift the panel outward. See Figure 3-29.
- 10** Bend the panel upward to allow access to the mounting screws.
- 11** Remove the two screws that secure the display module to the system chassis.
- 12** Remove the display module from the chassis cutout.

Figure 3-28. Removing and Installing the Control Panel—LED



- | | | | |
|---|--------------------------|---|---------------------|
| 1 | LED display module | 2 | control panel board |
| 3 | control panel data cable | 4 | slot |
| 5 | mounting screw (2) | 6 | power cable |
| 7 | standoff | | |

Figure 3-29. Removing and Installing the Control Panel—LCD



- | | | | |
|---|--------------------------|---|-----------------------|
| 1 | display module cable | 2 | control panel board |
| 3 | control panel data cable | 4 | slot |
| 5 | mounting screw (2) | 6 | power cable |
| 7 | standoff | 8 | front panel screw (2) |
| 9 | LCD display module | | |

Installing the Control Panel 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** For LED control panel, proceed to step 3. Insert the display module into the chassis cutout and secure with the two screws.
- 2** Affix the replacement panel to the front of the display module.
- 3** Align the slot in the control panel board with the standoff on the system chassis and secure with the two screws. See Figure 3-29. For LED control panel, skip step 4.
- 4** Connect the display module cable to the control panel board.
- 5** Connect the control panel cable to the control panel board.
- 6** Close the system. See "Closing the System" on page 83.
- 7** If applicable, replace the front bezel. See "Installing the Front Bezel" on page 81.

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.

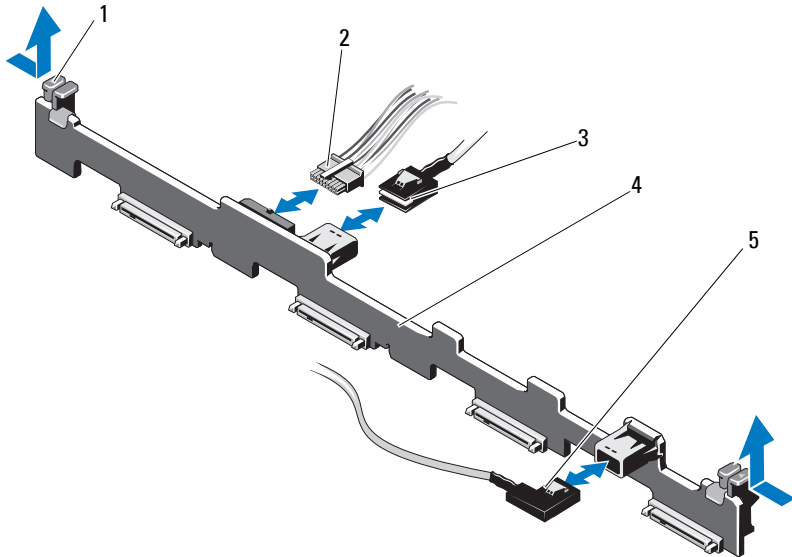
- 1 If applicable, remove the bezel. See "Removing the Front Bezel" on page 81.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 3 Open the system. See "Opening the System" on page 82.

△ 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 all hard drives. See "Removing a Hard-Drive Carrier" on page 85.
- 5 Disconnect the power cable from the end of the SAS backplane.
- 6 Disconnect the SAS data cables from the backplane.
- 7 Disconnect the power cable from the control panel board. See Figure 3-29.
- 8 While pulling the two blue latches towards the front of the system, slide the backplane upward. See Figure 3-30.
- 9 When the backplane cannot slide upward any farther, pull the backplane toward the back of the system to remove it from the retention hooks.
- 10 Lift the board out of the system, being careful to avoid damaging components on the face of the board.
- 11 Place the SAS backplane face down on a work surface.

Figure 3-30. Removing and Installing the SAS Backplane



- | | | | |
|---|-----------------------------------|---|---------------------------|
| 1 | SAS backplane retention latch (2) | 2 | SAS backplane power cable |
| 3 | SAS A cable | 4 | SAS backplane |
| 5 | SAS B cable | | |

Installing 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 To install the SAS backplane, lower the backplane into the system, being careful to avoid damaging components on the face of the board.
- 2 Align the slots in the backplane with the retention hooks on the back of the drive bays, then move the backplane forward until the retention hooks fit through the slots in the backplane. See Figure 3-30.

- 3 Slide the backplane downward until the two blue retention latches snap into place.
- 4 Connect the SAS data and power cables to the SAS backplane.
- 5 Reconnect the power cable to the control panel board. See Figure 3-29.
- 6 Install the hard drives in their original locations.
- 7 Close the system. See "Closing the System" on page 83.

Power Distribution Board

The power distribution board is located on your system directly behind the power supply fan modules. This feature provides additional cooling to the power supplies through the power distribution shroud that routes airflow to the power supplies. See Figure 3-31.

Removing the Power Distribution Board

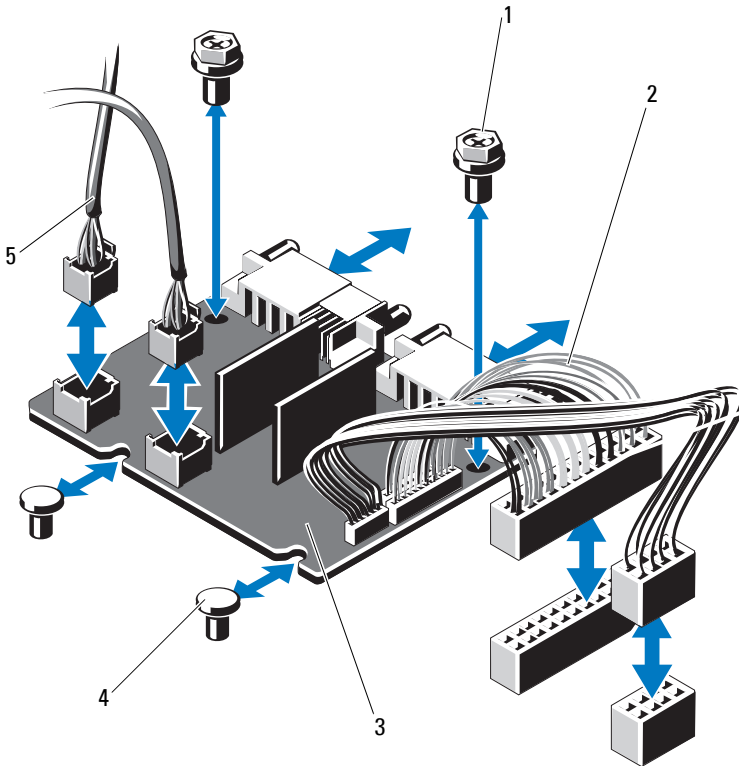


CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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


- 1 Remove the power supplies from the system. See "Removing a Redundant Power Supply" on page 95.
- 2 Locate the power distribution shroud and lift it out. See Figure 3-1.
- 3 Disconnect power distribution cables from the system board (see "System Board" on page 144) and disconnect the fan cable connectors. See Figure 3-31.
- 4 Remove the two screws securing the power distribution board to the chassis. See Figure 3-31.
- 5 Slide the power distribution board away from the standoffs, and then lift the board out. See Figure 3-31.

Replacing the Power Distribution Board

Figure 3-31. Removing and Replacing the Power Distribution Board




- | | | | |
|---|--------------------------------|---|----------------------------|
| 1 | screw (2) | 2 | power supply connector (2) |
| 3 | power-distribution board | 4 | standoff (2) |
| 5 | fan module cable connector (2) | | |


 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 power distribution board with the standoffs on the chassis and slide it in place. See Figure 3-31.
- 3 Install the two screws that secure the power distribution board to the chassis. See Figure 3-31.
- 4 Connect the power distribution cables to the system board (see "System Board" on page 144) and fan cable connectors to the power distribution board as shown in Figure 3-31.
- 5 Locate the hinged interior catches on either side of the shroud and align and seat the power distribution board cover, rotating it down and over the shroud. See Figure 3-31.
- 6 Install the power supplies in the system. See "Installing a Redundant Power Supply" on page 96.
- 7 Close the system. See "Closing the System" on page 83.

System Board

Removing the System 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.**

 **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.**


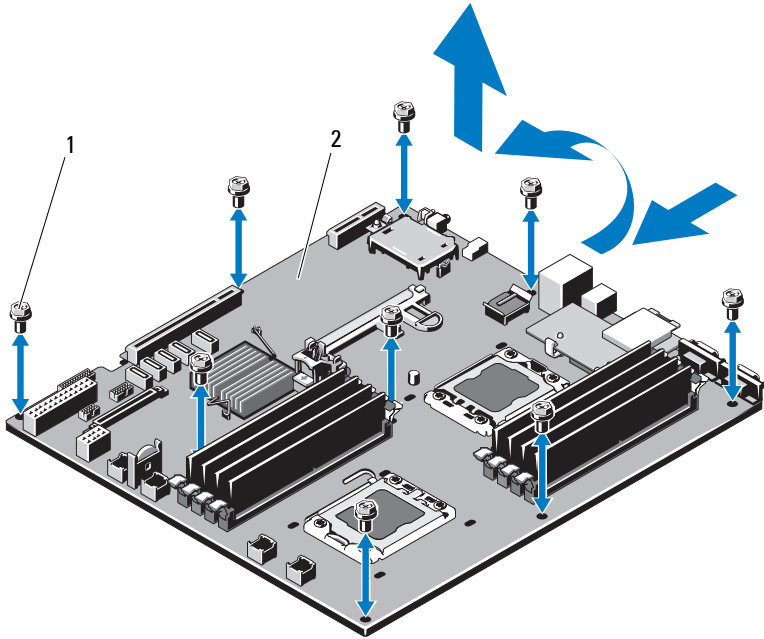
- 1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
 - 2 Open the system. See "Opening the System" on page 82.
 - 3 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
 - 4 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
 - 5 Remove the memory modules. See "Removing Memory Modules" on page 126.
 - 6 Remove the expansion card and the integrated storage controller card. See "Removing an Expansion Card" on page 100 and "Removing the Integrated Storage Controller Card" on page 103.
 - 7 Remove the expansion-card riser. See "Removing an Expansion-Card Riser" on page 105.
 - 8 Remove the heat sinks and processors. See "Removing a Processor" on page 127.
 - 9 If applicable, remove the optional iDRAC6 Enterprise card. See "iDRAC6 Enterprise Card (Optional)" on page 114.
 - 10 If installed, remove the optional iDRAC6 Express card. See "iDRAC6 Express Card (Optional)" on page 112.
 - 11 Disconnect all cables from the system board.
 - 12 Remove the nine screws securing the system board to the chassis and then slide the system board assembly toward the front end of the chassis.
-  **CAUTION: Do not lift the system board assembly by grasping a memory module, processor, or other components.**
- 13 Grasp the system board assembly by its edges and lift the assembly away from the chassis. See Figure 3-32.

Figure 3-32. Removing and Installing the System Board



1 screw (9)

2 system board assembly

Installing the System 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 system board.
- 2 Remove the labels from the processor shield and affix them to the system identification panel on the front of the system. See Figure 1-1.
- 3 Replace the processors to the new system board. See "Removing a Processor" on page 127 and "Installing a Processor" on page 130.

4 Replace all the memory modules. See "Removing Memory Modules" on page 126 and "Installing Memory Modules" on page 124.

5 Holding the system board by its edges, lower it into the chassis.

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

6 Slightly lift up the front of the system board and maneuver it to the bottom of the chassis until it lays completely flat.

7 Push the system board toward the back of the chassis until the board is in place.

8 Tighten the nine screws that secure the system board to the chassis. See Figure 3-32.

9 Replace the heat sinks and tighten the processor heat sink screws. See "Installing a Processor" on page 130.

10 Connect the cables in the order listed below (see Figure 6-1 for the locations of the connectors on the system board):

- SATA interface cable, if applicable
- Control panel interface cable connector
- Optical drive power cable connector
- Control panel USB interface cable connector
- SAS backplane power cable connector
- System board power cable connectors

11 Replace the expansion-card risers. See "Replacing an Expansion-Card Riser" on page 107.

12 If applicable, install the expansion card. See "Installing an Expansion Card" on page 101.


13 If applicable, re-install the integrated storage controller card. See "Installing the Integrated Storage Controller Card" on page 104.

After connecting the SAS cables to the controller, make sure to place the cables under the guide on the end of riser 1.

- 14** If applicable, reconnect the RAID battery cable to the PERC controller card.
- 15** If applicable, reinstall the iDRAC6 Enterprise card. See "Removing and Installing an iDRAC6 Enterprise Card" on page 115.
- 16** If applicable, reinstall the iDRAC6 Express card. See "Installing an iDRAC6 Express Card" on page 113.
- 17** Replace the system board shroud. See "Installing the System Board Shroud" on page 110.
- 18** Close the system. See "Closing the System" on page 83.
- 19** If applicable, replace the front bezel. See "Installing the Front Bezel" on page 81.

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 hangs. 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 57.
- Invalid memory configurations could cause the system to halt at startup without any video output. See "System Memory" on page 121.

For all other startup issues, note the LCD panel messages and any system messages that appear on screen. See "LCD Status Messages" on page 24 and "System Messages" on page 40 for more information.

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 1-4 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 If the problem persists, see "Getting Help" on page 181.

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 64.

If your keyboard is not functioning, you can also use remote access. If the system is not accessible, see "System Board Jumpers" on page 173 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 181.

Troubleshooting a Serial I/O Device

- 1 Turn off the system, including any attached peripherals connected to the serial port.
- 2 Swap the serial interface cable with another 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 181.

Troubleshooting a NIC

- 1 Run the appropriate online diagnostic test. See "Using Dell Diagnostics" on page 169.
- 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 19.

- 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 64.

6 Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed. 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 181.

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, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2** Open the system. See "Opening the System" on page 82.

- 3** Disassemble components from the system. See "Installing System Components" on page 79.
 - System board shroud
 - Power distribution board shroud
 - Hard drives
 - VFlash SD cards
 - USB memory keys
 - NIC hardware key
 - Expansion card
 - Integrated storage card
 - iDRAC6 Express card
 - iDRAC6 Enterprise card
 - Power supplies
 - Fans
 - Processors and heat sinks
 - Memory modules
- 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 83.
- 7** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

If the system does not start properly, see "Getting Help" on page 181.
- 8** If the system starts properly, shut down the system and reinstall all of the expansion cards that you removed. See "Installing an Expansion Card" on page 101.
- 9** Run the appropriate online diagnostic test. See "Using Dell Diagnostics" on page 169.


If the tests fail, see "Getting Help" on page 181.

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, including any attached peripherals, and disconnect the system from its electrical outlet.
- 2 Open the system. See "Opening the System" on page 82.
- 3 Ensure that the following components are properly installed:
 - Expansion card
 - Power supplies
 - Fans
 - Processors and heat sinks
 - Memory modules
 - Hard-drive carriers
 - System board shroud
 - Power distribution board shroud
- 4 Ensure that all cables are properly connected.
- 5 Close the system. See "Closing the System" on page 83.
- 6 Run the system board tests in the system diagnostics. See "Running the System Diagnostics" on page 169.
If the tests fail, see "Getting Help" on page 181.

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 "Entering the System Setup Program" on page 58.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet for at least one hour.
- 3 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 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 133.


 **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 181.

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 20.
- 2 Reseat the power supply by removing and reinstalling it. See "Power Supplies" 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 181.


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 exists:

- System cover, system board shroud, power distribution board shroud, hard-drive blank, or front or back filler panel is removed.
- Ambient temperature is too high.
- 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 156.

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 82.

-  **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 Turn off the system and all attached peripherals.
- 4 Remove and reseat the fan. See "Removing a Cooling Fan" on page 117.
- 5 Restart the system.



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

- 6 If the problem is not resolved, turn off the system and install a new fan. See "Removing a Cooling Fan" on page 117 and "Installing a Cooling Fan" on page 119.

- 7 Restart the system.

If the replacement fan is working properly, close the system. See "Closing the System" on page 83.

If the replacement fan does not operate, see "Getting Help" on page 181.

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 122 and verify that your memory configuration complies with all applicable guidelines.

- 1 If the system is operational, run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 169.
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, including any attached peripherals, and disconnect the system from its electrical outlet. 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 18 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 61. 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 18.
- 5** Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 6** Open the system. See "Opening the System" on page 82
- 7** If applicable, remove the cooling shroud. See "Removing the System Board Shroud" on page 109.
- 8** Check the memory channels and ensure that they are populated correctly. See "General Memory Module Installation Guidelines" on page 122.
- 9** Reseat the memory modules in their sockets. See "Installing Memory Modules" on page 124.
- 10** If applicable, replace the cooling shroud. See "Installing the System Board Shroud" on page 110.
- 11** Close the system. See "Closing the System" on page 83.
- 12** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 13** Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 61.
If the problem is not resolved, proceed with the next step.
- 14** If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module.
- 15** Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 16** Open the system. See "Opening the System" on page 82.
- 17** If applicable, remove the cooling shroud. See "Removing the System Board Shroud" on page 109.
- 18** 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 124.
- 19** Close the system. See "Closing the System" on page 83.

- 20 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 21 As the system boots, observe any error message that appears and the diagnostic indicators on the front of the system.
- 22 If the memory problem is still indicated, repeat step 14 through step 21 for each memory module installed.
If the problem persists after all memory modules have been checked, see "Getting Help" on page 181.


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 USB key port is enabled. See "Integrated Devices Screen" on page 64.
- 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 82.
- 4 Locate the USB key and reseat it. See "Internal USB Memory Key" on page 107.
- 5 Close the system. See "Closing the System" on page 83.
- 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 83.
- 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 181.

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 64.
- 2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Closing the System" on page 83.
- 4 Reseat the SD module cable. See "Removing a VFlash Media Card" on page 116 and "Installing a VFlash Media Card" on page 117.

 **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 prompts you with a message indicating the failure.

- 5 If SD card 1 has failed, remove the card from SD card slot 1. See "Removing a VFlash Media Card" on page 116. 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 a VFlash Media Card" on page 116 and "Installing a VFlash Media Card" on page 117.
- 7 Insert the new SD card into SD card slot 2.
- 8 Close the system. See "Closing the System" on page 83.
- 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 83.
- 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 181.

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 front bezel. See "Removing the Front Bezel" on page 81.
- 2 Try using a different media.
- 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 57.
- 4 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 169.
- 5 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 6 Open the system. See "Opening the System" on page 82.
- 7 Ensure that the interface cable is securely connected to the optical drive and to the controller. See "RAID Battery (Optional)" on page 119.
- 8 Ensure that a power cable is properly connected to the drive.
- 9 Close the system. See "Closing the System" on page 83.
- 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 181.

Troubleshooting an External Tape Drive

- 1 Try using a different tape cartridge.
- 2 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.
- 3 Reinstall the tape-backup software as instructed in the tape-backup software documentation.
- 4 Ensure that the tape drive's interface cable is fully connected to the tape drive and the external port on the controller card.
- 5 Run the appropriate online diagnostics tests. See "Running the System Diagnostics" on page 169.
- 6 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.



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

- 7 Open the system. See "Opening the System" on page 82.
- 8 Reseat the controller card in the expansion card slot.
- 9 Ensure that the tape drive's interface cable is fully connected to the tape drive and to the connector on the controller card (SAS or SCSI) or the SATA connector on the system board.
- 10 Ensure that a power cable is properly connected to the drive and to the power distribution board.
- 11 Close the system. See "Closing the System" on page 83.
- 12 Reconnect the system to the electrical outlet, and turn on the system, including attached peripherals.

If the problem is not resolved, see the documentation for the tape drive for additional troubleshooting instructions.

If you cannot resolve the problem, see "Getting Help" on page 181.

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 Dell Diagnostics" on page 169.

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

- 2** If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 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 85.
 - 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 57.

If the problem persists, see "Getting Help" on page 181.

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 Dell Diagnostics" on page 169.
- 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 57.
- 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 a 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.
- 5 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.



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

- 6 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 7 Open the system. See "Opening the System" on page 82.
- 8 Ensure that the controller card is firmly seated into the system board connector. See "VFlash Media (Optional)" on page 116.
- 9 If you have a PERC controller with battery-backed cache, ensure that the RAID battery is properly connected and, if applicable, the memory module on the PERC card is properly seated.
- 10 Verify that the cable connections between the SAS backplane(s) and the SAS controller are correct. See "Installing the SAS Backplane" on page 141.
Ensure that the cables are firmly connected to the SAS controller and the SAS backplane board.
- 11 Close the system. See "Closing the System" on page 83.
- 12 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
If the problem persists, see "Getting Help" on page 181.

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 Dell Diagnostics" on page 169.
- 2 If applicable, remove the front bezel. See "Removing the Front Bezel" on page 81.
- 3 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 4 Open the system. See "Opening the System" on page 82.

- 5 Ensure that the expansion card is firmly seated in its connector. See "Installing an Expansion Card" on page 101.
- 6 Close the system. See "Closing the System" on page 83.
- 7 Reconnect the system to its electrical outlet and turn the system on, including any 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 82.
- 10 Remove the expansion card installed in the system. See "Integrated Storage Controller Card" on page 103.
- 11 Close the system. See "Closing the System" on page 83.
- 12 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 13 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 169.
If the tests fail, see "Getting Help" on page 181.

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 Dell Diagnostics" on page 169.
- 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 82.
- 4 Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 5 Ensure that each processor and heat sink are properly installed. See "Installing a Processor" on page 130.

- 6** Close the system. See "Closing the System" on page 83.
- 7** Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 8** Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 169.
If your system only has one processor and a problem is still indicated, see "Getting Help" on page 181.
- 9** For systems with multiple processors, turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 10** Open the system. See "Opening the System" on page 82.
- 11** Remove the system board shroud. See "Removing the System Board Shroud" on page 109.
- 12** Remove processor 2. See "Removing a Processor" on page 127.
- 13** Close the system. See "Closing the System" on page 83.
- 14** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 15** Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 169.
If the test fails, the processor is faulty. See "Getting Help" on page 181.
- 16** Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
- 17** Open the system. See "Opening the System" on page 82.
- 18** Replace processor 1 with processor 2. See "Installing a Processor" on page 130.
- 19** Repeat step 13 through step 15.
If you have tested both the processors and the problem persists, the system board is faulty. See "Getting Help" on page 181.

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 Dell 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 Online Diagnostics for systems running supported Microsoft Windows and Linux operating systems are available at support.dell.com and on the media that came with your system. For information about using diagnostics, see the *Dell Online Diagnostics User's Guide* at support.dell.com/manuals located under systems management software.

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 microprocessor and the system's input/output devices are functioning, you can use the 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 emdedded 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.





Jumpers and Connectors

This section provides specific information about the system jumpers. It also provides some basic information on jumpers and switches and describes the connectors on the various boards in the system.

System Board Jumpers

Figure 6-1 shows the location of the configuration jumpers on the system board. Table 6-1 lists the jumper settings.

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

See Figure 6-1 and Table 6-2 for the location and description of the system board connectors.

Figure 6-1. System Board Connectors

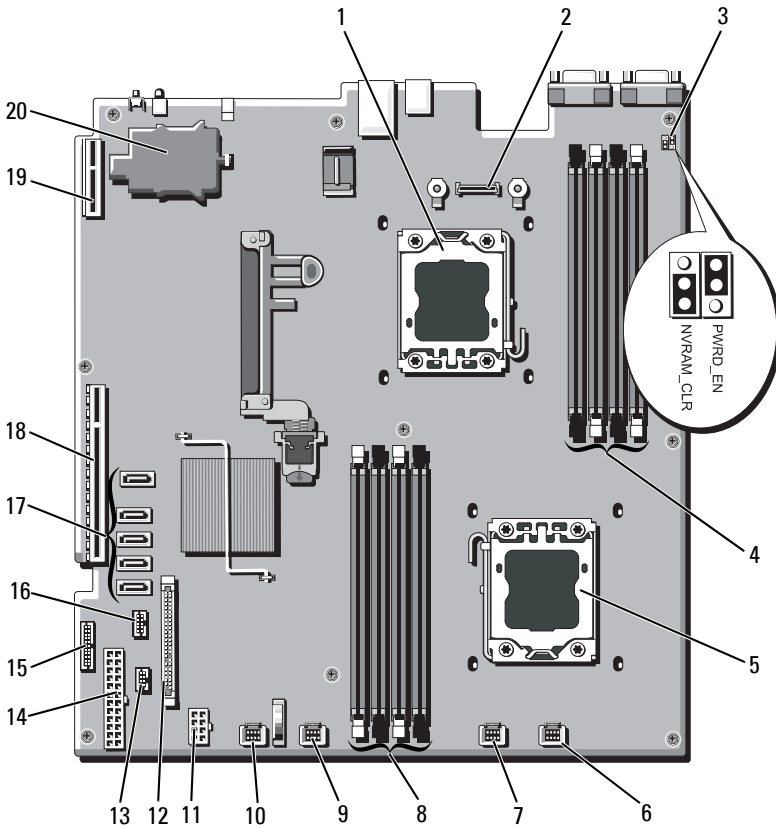


Table 6-2. System Board Connectors

Item	Connector	Description
1	CPU2	Processor 2
2	iDRAC6 Enterprise	iDRAC6 Enterprise card connector
3	PWRD_EN	Password enable jumper
	NVRAM_CLR	NVRAM clear jumper
4	B1	Memory module slot B1 (white release lever)
	B3	Memory module slot B3
	B2	Memory module slot B2 (white release lever)
	B4	Memory module slot B4
5	CPU1	Processor 1
6	FAN1	System fan 1 connector
7	FAN2	System fan 2 connector
8	A4	Memory module slot A4
	A2	Memory module slot A2 (white release lever)
	A3	Memory module slot A3
	A1	Memory module slot A1 (white release lever)
9	FAN3	System fan 3 connector
10	FAN4	System fan 4 connector
11	12V	8-pin power connector
12	FP_CONN	Control panel connector
13	BP_CONN	Backplane power connector
14	PWR_CONN	24-pin power connector
15	PDB_I2C	Power distribution board connector
16	FP USB_CONN	Control panel USB connector

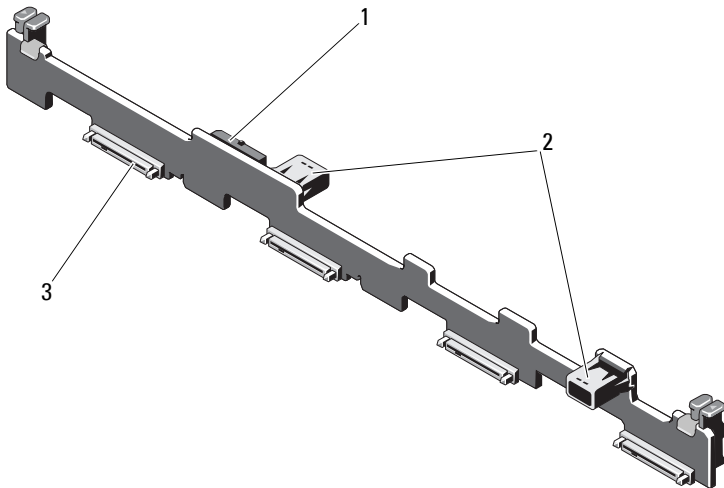
Table 6-2. System Board Connectors (continued)

17	SATA_A	SATA connector A
	SATA_B	SATA connector B
	SATA_C	SATA connector C
	SATA_D	SATA connector D
	SATA_E	SATA connector E
18	RISER	expansion-card riser connector
19	RISER	expansion-card riser connector
20	iDRAC6 Express	iDRAC6 Express card connector

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

SAS Backplane Board Connectors

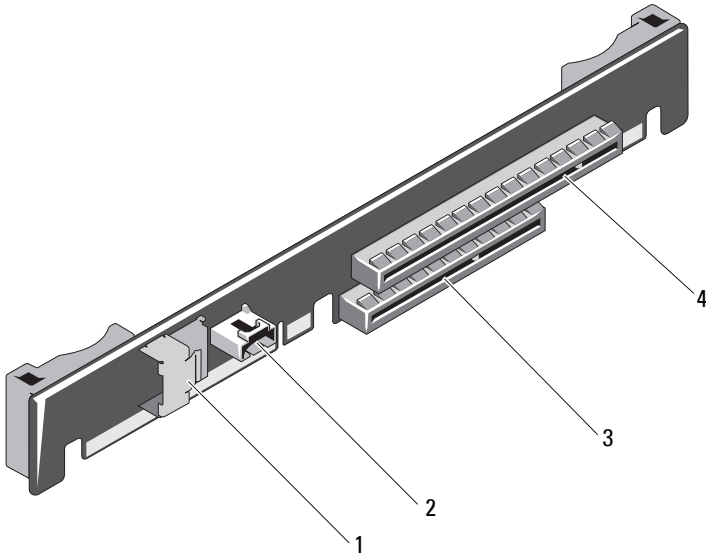
Figure 6-2. SAS Backplane Board Connectors



- 1 power cable connector
- 2 data cable connector (2)
- 3 hard-drive connector (4)

Expansion-Card Riser-Board Components and PCIe Buses

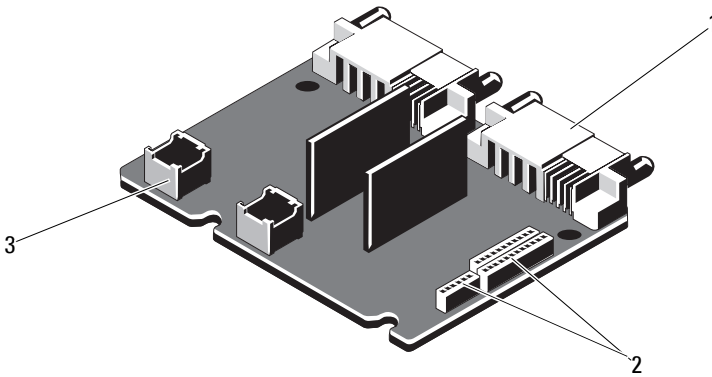
Figure 6-3. PCIe Expansion-Card Riser Components



- | | | | |
|---|---|---|---------------------------------------|
| 1 | data cable connector | 2 | SAS power cable connector |
| 3 | slot 2—integrated storage controller card connector | 4 | slot 1—PCIe - x16 link expansion slot |

Power Distribution Board Connectors


Figure 6-4. Power Distribution Board Connectors



- | | | | |
|---|--------------------------------------|---|--|
| 1 | power supply connector (2) | 2 | system board power cable connector (3) |
| 3 | fan module power cable connector (2) | | |


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 57. 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 and Closing the System" on page 82.
- 3 Move the password jumper to the "disabled" position to clear the password. See Table 6-1. See Figure 6-1 to locate the password jumper on the system board.
- 4 Close the system.
- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

The existing passwords are not disabled (erased) until the system boots with the password jumper plug in the "disabled" position. However, before you assign a new system and/or setup password, you must return the jumper plug to the enabled position.

 **NOTE:** If you assign a new system and/or setup password with the jumper plug still in the "disabled" position, 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 "Opening and Closing the System" on page 82.
- 8 Move the password jumper back to the enabled position to restore the password function. See Table 6-1.
- 9 Close the system.
- 10 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 11 Assign a new system and/or setup password.

To assign a new password using the System Setup program, see "System and Setup Password Features" on page 72.

Getting Help

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).



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 Click your country/region at the bottom of the page. For a full listing of country/region click **All**.
- 3 Click **All Support** from **Support** menu.
- 4 Select the appropriate service or support link based on your need.
- 5 Choose the method of contacting Dell that is convenient for you.

Index

B

- back-panel features, 17
- batteries
 - troubleshooting, 155
- battery
 - troubleshooting the RAID card battery, 164
- battery (system)
 - replacing, 133
- bezel, 81
- blank
 - hard drive, 84
 - power supply, 97
- BMC
 - configuring, 76

C

- cabling
 - optical drive, 92
- CD drive
 - troubleshooting, 161
- CD/DVD drive
 - See* optical drive.
- connectors
 - system board, 174, 177
 - USB, 10
 - video, 10

- contacting Dell, 181
- control panel assembly
 - features, 10
 - installing, 139
 - LCD panel features, 12
 - removing, 135
- cooling fan
 - replacing, 119
- cooling fans
 - troubleshooting, 156
- cooling shroud
 - installing, 110, 112
 - removing, 109, 111
- cover
 - closing, 83
 - opening, 82

D

- damaged systems
 - troubleshooting, 154
- Dell
 - contacting, 181
- Dell Online Diagnostics
 - using, 169
- diagnostics
 - advanced testing options, 171
 - testing options, 170

- using embedded system diagnostics, 169
- using Online Diagnostics, 169
- when to use, 170

DIMMs

See memory modules (DIMMs).

drive blank

- installing, 85
- removing, 84

E

Embedded system diagnostics

- using, 169

Embedded System

Management, 76

error messages, 58

expansion card

- troubleshooting, 165

expansion cards

- installing, 101
- removing, 100
- SAS controller, 103

expansion slots, 99

F

front-panel features, 10

G

guidelines

- connecting external devices, 19
- expansion card installation, 99
- memory installation, 122

H

hard drive

- troubleshooting, 163

hard drives (cabled)

- installing, 90
- removing, 89

hard drives (hot-pluggable)

- installing, 87
- removing, 85

heat sink, 128

I

iDRAC card

- installing, 112, 114
- system port, 17

iDRAC Configuration Utility, 77

indicators

- back-panel, 17
- front-panel, 10
- NIC, 19
- power, 10, 20

installing

- control panel assembly, 139
- cooling shroud, 110, 112
- expansion card, 101
- hard drive (cabled), 90
- hard drive (hot-pluggable), 87
- hard drive blank, 85
- iDRAC card, 112, 114
- memory modules, 124
- optical drive, 92
- power supply blank, 97
- processor, 130
- SAS backplane board, 141
- SAS controller, 104

J

- jumpers (system board), 173

K

- keyboards
 - troubleshooting, 150

L

- LCD panel
 - features, 12
 - menus, 13

M

- memory
 - troubleshooting, 157
- memory mode
 - Optimizer, 123
- memory modules (DIMMs)
 - configuring, 122
 - installing, 124
 - RDIMM configurations, 123
 - removing, 126
 - UDIMM configurations, 100
- messages
 - error messages, 58
 - status LCD, 24
 - system, 40
 - warning, 54
- microprocessor
 - See* processor.
- microprocessors
 - troubleshooting, 166

N

- NIC
 - indicators, 19
- NICs
 - back-panel connectors, 17
 - troubleshooting, 151

O

- optical drive
 - installing, 92
- Optimizer memory mode, 123

P

- password
 - setup, 75
 - system, 73
- passwords
 - disabling, 179
- phone numbers, 181
- POST
 - accessing system features, 9
- power indicators, 10, 20
- power supplies
 - indicators, 20
 - removing, 95, 97
 - replacing, 96, 99
- power supply blank, 97
- processor
 - installing, 130
 - removing, 127
 - upgrades, 127

R

- remote access controller
 - See* iDRAC.
- removing

- bezel, 81
- control panel assembly, 135
- cooling shroud, 109, 111
- cover, 82
- expansion card, 100
- hard drive (cabled), 89
- hard drive blank, 84
- hard drives (hot-pluggable), 85
- memory modules, 126
- power supply, 95, 97
- power supply blank, 97
- processor, 127
- SAS backplane board, 140
- SAS controller, 103
- system board, 144

- replacing
 - cooling fan, 119
 - power supply, 96, 99
 - system battery, 133

S

- safety, 149
- SAS backplane board
 - installing, 141
 - removing, 140
- SAS controller card
 - installing, 104
 - removing, 103
- SAS controller daughter card
 - troubleshooting, 164
- SAS hard drive. *See* hard drive.

- SAS RAID controller daughter card
 - troubleshooting, 164
- SATA hard drive. *See* hard drive.
- SD card
 - troubleshooting, 159-160
- securing your system, 68, 74
- service-only procedure
 - system board, 144
- setup password, 75
- slots
 - See* expansion slots.
- startup
 - accessing system features, 9
- support
 - contacting Dell, 181
- system
 - closing, 83
 - opening, 82
- system board
 - connectors, 174, 177
 - installing, 146
 - jumpers, 173
 - removing, 144
- system cooling
 - troubleshooting, 156
- system features
 - accessing, 9
- system messages, 40
- system password, 73
- system setup program
 - boot settings, 63
 - embedded server management options, 66
 - integrated devices options, 64
 - keystroke to enter, 58
 - memory settings, 61
 - PCI IRQ assignments, 65
 - power management options, 67
 - processor settings, 61
 - SATA settings, 63
 - serial communications options, 65
 - system security options, 68
- system setup screens
 - main, 59

T

- tape drive
 - troubleshooting, 162
- telephone numbers, 181
- TPM security, 68
- troubleshooting
 - battery, 155
 - CD drive, 161
 - cooling fans, 156
 - damaged system, 154
 - expansion card, 165
 - external connections, 150
 - hard drive, 163
 - internal USB key, 159-160
 - keyboard, 150
 - memory, 157
 - microprocessors, 166

- NIC, 151
- SAS RAID controller daughter card, 164
- SD card, 159-160
- system cooling, 156
- tape drive, 162
- video, 150
- wet system, 152

U

- UEFI Boot Manager
 - entering, 70
 - main screen, 71
 - System Utilities screen, 72
 - UEFI Boot Settings screen, 72
- Unified Server Configurator, 76
- upgrades
 - processor, 127
- USB
 - front-panel connectors, 10
- USB device
 - back-panel connectors, 17
- USB key
 - troubleshooting, 159-160
- USC, 76

V

- video
 - back-panel connector, 17
 - front-panel connectors, 10
 - troubleshooting, 150

W

- warning messages, 54
- warranty, 55
- wet system
 - troubleshooting, 152