

Dell™ PowerEdge™
R310 Systems
Hardware Owner's
Manual

Regulatory Model: E07S Series
Regulatory Type: E07S002



Notes, Cautions, and Warnings



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



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



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

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About Your System

Accessing System Features During Startup

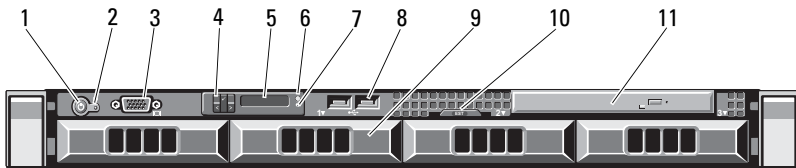
The following keystrokes provide access to system features during startup.


Keystroke	Description
<F2>	Enters the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 53.
<F10>	Enters System Services, which opens the Unified Server Configurator. The Unified Server Configurator allows you to access utilities such as embedded system diagnostics. For more information, see the Unified Server Configurator 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 53.
<F12>	Starts PXE boot.
<Ctrl><E>	Enters the Baseboard Management Controller (BMC) or iDRAC Configuration Utility, which allows access to the System Event Log (SEL) and configuration of remote access to the system. For more information, see the BMC or iDRAC user documentation at support.dell.com/manuals .
<Ctrl><C>	Enters the SAS Configuration Utility. For more information, see your SAS adapter documentation at support.dell.com/manuals .
<Ctrl><R>	Enters the RAID configuration utility. For more information, see the documentation for your SAS RAID card 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



NOTE: Depending on the configuration, your system may have an LCD panel or LED diagnostic indicators. The illustration in this section shows a system with an LCD panel.

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> <p>NOTE: To force an ungraceful shutdown, press and hold the power button for five seconds.</p>

Item	Indicator, Button, or Connector	Icon	Description
2	NMI button		Used to troubleshoot software and device driver errors when using certain operating systems. This button can be pressed using the end of a paper clip. Use this button only if directed to do so by qualified support personnel or by the operating system's documentation.
3	Video connector		Connects a monitor to the system.
4	Hard-drive activity indicator		Lights up when the hard drive is in use.
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 23.</p> <p>LCD panel: Provides system ID, status information, and system error messages.</p> <p>For more information on the LCD panel, see "LCD Panel Features (Optional)" on page 14.</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>

Item	Indicator, Button, or Connector	Icon	Description
6	system identification button		Turns the system ID modes on and off. 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.
7	System status indicator		Lights blue during normal system operation. Lights amber when the system needs attention due to a problem.
8	USB connectors (2)		Connect USB devices to the system. The ports are USB 2.0-compliant.
9	Hard drives (4)		Up to four 2.5-inch in 3.5-inch HDD hot-swappable carrier or up to four 3.5-inch cabled/hot-swappable hard drives.
10	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.
11	Optical drive (optional)		One optional slim-line SATA DVD-ROM drive or DVD+/-RW drive. NOTE: DVD devices are data only.

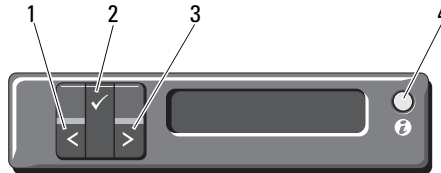
LCD Panel Features (Optional)

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 (Optional)" on page 25 for information on 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 switches off after five minutes of inactivity, and can be

turned on by pressing the Select button on the LCD panel. The LCD backlight remains off if LCD messaging is turned off through the BMC or iDRAC 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. • Press again to repeat the cycle.
4	System ID	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 turns off after five minutes of inactivity if there are no error messages. Press one of the three navigation buttons (Select, Left, or Right) to view the Home screen.

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

Setup Menu

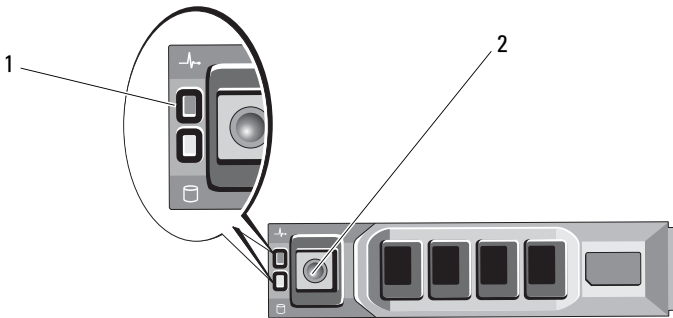
Option	Description
BMC or DRAC NOTE: If an iDRAC6 Express card is installed on the system, the BMC option is replaced by DRAC.	Select DHCP or Static IP to configure the network mode. If Static IP is selected, the available fields are IP , Subnet (Sub) , and Gateway (Gtw) . Select Setup DNS to enable 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 more user-friendly description. See "LCD Panel Features (Optional)" on page 14 for a list of messages in this format.
Set home	Select the default information to be displayed on the LCD Home screen. See "View Menu" on page 17 to see the options and option items that can be selected to display by default on the Home screen.

View Menu

Option	Description
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 optional 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 , iSCSI_n , or NET_n . NOTE: If the iDRAC6 Express card is not installed on the system, the MAC option displays the MAC addresses for BMC , iSCSI_n , or NET_n .
Name	Displays the name of the Host , Model , or User String for the system.
Number	Displays the Asset tag or the Service tag for the system.
Power	Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the Set home submenu of the Setup menu. See "Setup Menu" on page 16.
Temperature	Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the Set home submenu of the Setup menu. See "Setup Menu" on page 16.

Hard-Drive Status Indicators

Figure 1-3. Hard-Drive Indicators



1 drive-status indicator (green and amber)

2 drive-activity indicator (green)

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

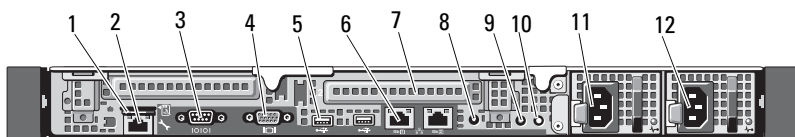
Drive-Status Indicator Pattern (RAID Only) Condition







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


Back-Panel Features and Indicators

Figure 1-4 shows the controls, indicators, and connectors located on the system's back panel.

Figure 1-4. Back-Panel Features and Indicators



Item	Indicator, Button, or Connector	Icon	Description
1	VFlash media slot (optional)		Connects an external SD memory card for the optional iDRAC6 Enterprise card.
2	iDRAC6 Enterprise port (optional)		Dedicated management port for the optional iDRAC6 Enterprise card.
3	Serial connector		Connects a serial device to the system.
4	Video connector		Connects a VGA display to the system.
5	USB connectors (2)		Connect USB devices to the system. The ports are USB 2.0-compliant.
6	Ethernet connectors (2)		Embedded 10/100/1000 NIC connectors.
7	PCIe slots (2)		PCI Express (generation 2) expansion slot (full-height, half-length).

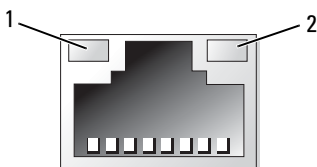
Item	Indicator, Button, or Connector	Icon	Description
8	Active ID CMA connector		Connector for attaching a system indicator extension cable that is used on a cable management arm.
9	System status indicator		<p>Lights blue during normal system operation.</p> <p>Both the systems management software and the identification buttons located on the front and back of the system can cause the indicator to flash blue to identify a particular system.</p> <p>Lights amber when the system needs attention due to a problem.</p>
10	System identification button		<p>Turns the system ID modes on and off.</p> <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 system status indicator on the chassis back panel light blue until one of the buttons is pushed again.</p>
11	Power supply 1 (PS1)		400 W (redundant power supply).
12	Power supply 2 (PS2)		400 W (redundant power supply).

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 "Entering the System Setup Program" on page 54.

NIC Indicator Codes

Figure 1-5. NIC Indicator Codes



1 link indicator

2 activity indicator

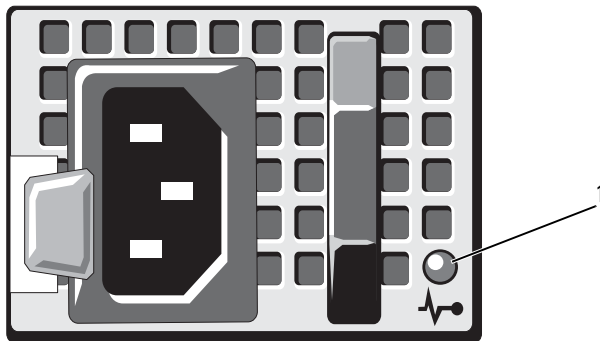
Indicator	Indicator Code
Link and activity indicators are off	The NIC is not connected to the network.
Link indicator is green	The NIC is connected to a valid network link at 1000 Mbps.
Link indicator is amber	The NIC is connected to a valid network link at 10/100 Mbps.
Activity indicator is green blinking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

Power Indicator Codes

The power supplies have an indicator that shows whether power is present or whether a power fault has occurred.

- Not lit—AC power is not connected.
- Green—In standby mode, indicates that a valid AC source is connected to the power supply, and that the power supply is operational. When the system is on, it 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.

Figure 1-6. Power Supply Status Indicator



- 1 Power Supply Status LED

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.

Table 1-1. Diagnostic Indicator Code

Code	Causes	Corrective Action
① ② ③ ④	The system is in a normal off condition or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the system successfully boots to the operating system.	Plug the system into a working electrical outlet and press the power button.
① ② ③ ④	The system is in a normal operating condition after POST.	Information only.
① ② ③ ④	BIOS checksum failure detected; system is in recovery mode.	See "Getting Help" on page 169.
① ② ③ ④	Possible processor failure.	See "Troubleshooting the Processor" on page 160.
① ② ③ ④	Memory failure.	See "Troubleshooting System Memory" on page 153.
① ② ③ ④	Possible expansion card failure.	See "Troubleshooting an Expansion Card" on page 159.
① ② ③ ④	Possible video failure.	See "Getting Help" on page 169.

Code	Causes	Corrective Action
① ② ③ ④	Hard drive failure.	Ensure that the diskette drive and hard drive are properly connected. See "Hard Drives" on page 83 for information on the drives installed in your system.
① ② ③ ④	Possible USB failure.	See "Troubleshooting a USB Device" on page 146.
① ② ③ ④	No memory modules detected.	See "Troubleshooting System Memory" on page 153.
① ② ③ ④	System board failure.	See "Getting Help" on page 169.
① ② ③ ④	Memory configuration error.	See "Troubleshooting System Memory" on page 153.
① ② ③ ④	Possible system board resource and/or system board hardware failure.	See "Getting Help" on page 169.
① ② ③ ④	Possible system resource configuration error.	See "Getting Help" on page 169.
① ② ③ ④	Other failure.	Ensure that the optical drive and hard drives are properly connected. See "Troubleshooting Your System" on page 145 for the appropriate drive installed in your system. If the problem persists, see "Getting Help" on page 169.

LCD Status Messages (Optional)

The system's control panel LCD provides status messages to signify when the system is operating correctly or when the system needs attention.

The LCD lights blue to indicate a normal operating condition, and lights amber to indicate an error condition. The LCD scrolls a message that includes a status code followed by descriptive text. The table that follows provides a listing of LCD status messages and the probable cause for each message. The LCD messages refer to events recorded in the System Event Log (SEL). For information on the SEL and configuring system management settings, see the systems management software documentation.



NOTE: If your system fails to boot, press the System ID button for at least five seconds until an error code appears on the LCD. Record the code, then see "Getting Help" on page 169.

Table 1-2. LCD Status Messages (Optional)

Code	Text	Causes	Corrective Actions
N/A	SYSTEM NAME	<p>A 62-character string that can be defined by the user in the System Setup program.</p> <p>The SYSTEM NAME is displayed under the following conditions:</p> <ul style="list-style-type: none">• The system is powered on.• The power is off and active errors are displayed.	<p>This message is for information only.</p> <p>You can change the system ID and name in the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 53.</p>
E1000	Failsafe voltage error. Contact support.	Check the system event log for critical failure events.	<p>Remove AC power to the system for 10 seconds and restart the system.</p> <p>If the problem persists, see "Getting Help" on page 169.</p>

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

Code	Text	Causes	Corrective Actions
E1114	Ambient Temp exceeds allowed range.	Ambient temperature has reached a point outside of the allowed range.	See "Troubleshooting System Cooling Problems" on page 151.
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 151. If the problem persists, see "Getting Help" on page 169.
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 150.
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 "Troubleshooting System Cooling Problems" on page 151.
E1216	3.3V Regulator failure. Reseat PCIe cards.	3.3 V voltage regulator has failed.	Remove and reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting an Expansion Card" on page 159.
E1229	CPU # VCORE Regulator failure. Reseat CPU.	Specified processor VCORE voltage regulator has failed.	Reseat the processor. See "Troubleshooting the Processor" on page 160. If the problem persists, see "Getting Help" on page 169.

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

Code	Text	Causes	Corrective Actions
E122A	CPU # VTT Regulator failure. Reseat CPU.	Specified processor VTT voltage regulator has failed.	Reseat the processor. See "Troubleshooting the Processor" on page 160. If the problem persists, see "Getting Help" on page 169.
E122C	CPU Power Fault. Power cycle AC.	A power fault was detected when powering up the processor.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 169.
E122D	Memory Regulator # Failed. Reseat DIMMs.	One of the memory regulators has failed.	Reseat the memory modules. See "Troubleshooting System Memory" on page 153.
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 169.
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 151.
E1311	Fan module ## RPM exceeding range. Check fan.	RPM of specified fan in specified module is outside of intended operating range.	See "Troubleshooting System Cooling Problems" on page 151.
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 152.

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

Code	Text	Causes	Corrective Actions
E1410	Internal Error detected. Check "FRU X".	Specified processor has an internal error. The error may or may not have been caused by the processor.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 169.
E1414	CPU # temp exceeding range. Check CPU heatsink.	Specified processor is out of acceptable temperature range.	Ensure that the processor heat sink is properly installed. See "Troubleshooting the Processor" on page 160 and "Troubleshooting System Cooling Problems" on page 151.
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 Processor" on page 160.
E141C	Unsupported CPU configuration. Check CPU or BIOS revision.	Processor is in an unsupported configuration.	Ensure that your processor matches and conforms 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 169.

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 169.
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 169.
E1610	Power Supply # (### W) missing. Check power supply.	Specified power supply was removed or is missing from the system.	See "Troubleshooting Power Supply" on page 151.
E1614	Power Supply # (### W) error. Check power supply.	Specified power supply has failed.	See "Troubleshooting Power Supply" on page 151.
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 Supply" on page 151.
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 Supply" on page 151.

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

Code	Text	Causes	Corrective Actions
E1620	Power Supply # (### W) AC power error. Check PSU cables.	Specified power supply's AC input is outside of the allowable range.	Check the AC power source for the specified power supply. If the problem persists, see "Troubleshooting Power Supply" on page 151.
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 Supply" on page 151.
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.
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 169.

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

Code	Text	Causes	Corrective Actions
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 an Expansion Card" on page 159.
	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 an Expansion Card" on page 159.
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 an Expansion Card" on page 159.
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 169.
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 reseat the PCIe expansion cards. If the problem persists, see "Troubleshooting an Expansion Card" on page 159.

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 158.
E1812	Hard drive ## removed. Check drive.	The specified hard drive has been removed from the system.	Information only.
E1920	iDRAC6 Upgrade Failed.	optional iDRAC6 upgrade has failed.	See "Getting Help" on page 169.
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 169.
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 169.
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 169.
E2010	Memory not detected. Inspect DIMMs.	No memory was detected in the system.	Install memory or reseat memory modules. See "Troubleshooting System Memory" on page 153.
E2011	Memory configuration failure. Check DIMMs.	Memory detected, but is not configurable. Error detected during memory configuration.	See "Troubleshooting System Memory" on page 153.

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

Code	Text	Causes	Corrective Actions
E2012	Memory configured but unusable. Check DIMMs.	Memory configured, but is unusable.	See "Troubleshooting System Memory" on page 153.
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 153.
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 169.
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 169.
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 169.
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 169.

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

Code	Text	Causes	Corrective Actions
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 169.
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 169.
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 169.
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 169.
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 169.

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

Code	Text	Causes	Corrective Actions
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 169.
E201E	POST memory test failure. Check DIMMs.	BIOS POST memory test failure.	See "Troubleshooting System Memory" on page 153. If the problem persists, see "Getting Help" on page 169.
E2020	CPU configuration failure. Check screen message.	Processor configuration failure.	Check screen for specific error messages. See "Troubleshooting the Processor" on page 160.
E2021	Incorrect memory configuration. Review User Guide.	Incorrect memory configuration.	Check screen for specific error messages. See "Troubleshooting System Memory" on page 153.
E2022	General failure during POST. Check screen message.	General failure after video.	Check screen for specific error messages.
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 153.

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

Code	Text	Causes	Corrective Actions
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 153.
I1910	Intrusion detected. Check chassis cover.	System cover has been removed.	Information only.
I1911	LCD Log Full. Check SEL to review all Errors.	LCD overflow message. A maximum of ten error messages can display sequentially on the LCD. The eleventh message instructs the user to check the SEL for details on the events.	Check the SEL for details on the events. Remove AC power to the system for 10 seconds or clear the SEL.
I1912	SEL full. Review & clear log.	The SEL is full of events and is unable to log any more.	Check the SEL for details on the events, then clear the SEL.
I1920	iDRAC6 Upgrade Successful.	optional iDRAC6 has been upgraded successfully.	Information only.
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 "Getting Help" on page 169.

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

Code	Text	Causes	Corrective Actions
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.
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.

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

Solving Problems Described by LCD Status Messages (Optional)

The code and text on the LCD can often specify a very precise fault condition that is easily corrected. For example, if the code E1418 CPU_1_Presence appears, you know that a microprocessor is not installed in socket 1.

In contrast, you might be able to determine the problem if multiple related errors occur. For example, if you receive a series of messages indicating multiple voltage faults, you might determine that the problem is a failing power supply.

Removing LCD Status Messages (Optional)

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 example, if temperature for a component goes out of range, the LCD displays the fault; when the temperature returns to the acceptable range, the message is removed from the LCD. 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.

Any of these actions will remove fault messages, and return the status indicators and LCD colors to the normal state. Messages will reappear under the following conditions:

- The sensor returns to a normal state but fails again, resulting in a new SEL entry.
- The system is reset and new error events are detected.
- A failure is recorded from another source that maps to the same display entry.

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 optional 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.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 optional iDRAC6 has hung. The optional iDRAC6 was remotely reset while system was booting. After AC recovery, the optional iDRAC6 takes longer than normal to boot.	Remove AC power to the system for 10 seconds and restart the system.
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, 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 High Output power supplies to use the components. See "Power Supplies" on page 125.
Alert! System fatal error during previous boot.	An error caused the system to reboot.	Check other system messages for additional information for possible causes.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 169.
Caution! NVRAM_CLR jumper is installed on system board. Please run SETUP.	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 53.
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
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 53.
Embedded NICx and NICy: OS NIC=<ENABLED /DISABLED>, Management Shared NIC=<ENABLED /DISABLED>	The OS NIC interface is set in BIOS. The Management Shared NIC interface is set in management tools.	Check the system management software or the System Setup program for NIC settings. If a problem is indicated, see "Troubleshooting a NIC" on page 147.
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 146.
Gate A20 failure.	Faulty keyboard controller; faulty system board.	See "Getting Help" on page 169.
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 53.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 "Getting Help" on page 169.
Keyboard fuse has failed.	Overcurrent detected at the keyboard connector.	See "Getting Help" on page 169.
Local keyboard may not work because all user accessible USB ports are disabled. If operating locally, power cycle the system and enter system setup program to change settings.	The USB ports are disabled in the system BIOS.	Power down and restart the system from the power button, and then enter the System Setup program to enable the USB port(s). See "Entering the System Setup Program" on page 54.
Manufacturing mode detected.	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
Maximum rank count exceeded. 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 106.
Memory Initialization Warning: Memory size may be reduced.	Invalid memory configuration. The system will run but with less memory than is physically available.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 106.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Memory set to minimum frequency.	<p>The memory frequency may be intentionally set lower for power conservation.</p> <p>The current memory configuration may support only the minimum frequency.</p>	<p>If not an intentional setting, check any other system messages for possible causes.</p> <p>Ensure that your memory configuration supports the higher frequency. See "General Memory Module Installation Guidelines" on page 106.</p>
Memory tests terminated by keystroke.	POST memory test was terminated by pressing the spacebar.	Information only.
MEMTEST lane failure detected on x.	Invalid memory configuration. Mismatched memory modules are installed.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 106.
No boot device available.	Faulty or missing optical drive subsystem, hard drive, or hard drive subsystem, or no bootable USB key installed.	Use a bootable USB key, optical drive, or hard drive. If the problem persists, see "Troubleshooting an Optical Drive" on page 156, "Troubleshooting a USB Device" on page 146, "Troubleshooting an Internal USB Key" on page 155, and "Troubleshooting a Hard Drive" on page 158. See "Using the System Setup Program and UEFI Boot Manager" on page 53 for information on setting the order of boot devices.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 53. 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 169.
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 an Expansion Card" on page 159. If the problem persists, see "Getting Help" on page 169.
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 an Expansion Card" on page 159.
Quad rank DIMM detected after single rank or dual rank DIMM in socket.	Invalid memory configuration.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 106.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 USB device. Ensure that the USB cables, SAS/SATA backplane cables, or optical drive cables are properly connected. See "Troubleshooting a USB Device" on page 146, "Troubleshooting an Optical Drive" on page 156, or "Troubleshooting a Hard Drive" on page 158 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.
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 146 or "Troubleshooting a Hard Drive" on page 158 for the appropriate drive(s) installed in your system.
Shutdown failure.	General system error.	See "Getting Help" on page 169.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
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 153.
The following DIMMs should match in geometry: <i>x, x, ...</i> The following DIMMs should match in rank count: <i>x, x, ...</i> The following DIMMs should match in size: <i>x, x, ...</i> The following DIMMs should match in size and geometry: <i>x, x, ...</i> The following DIMMs should match in size and rank count: <i>x, x, ...</i>	Invalid memory configuration. The specified memory modules do not match in size, number of ranks, or number of data lanes.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 106.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Thermal sensor not detected on x.	A memory module without a thermal sensor is installed in the specified memory slot.	Replace the memory module. See "System Memory" on page 106.
Time-of-day clock stopped.	Faulty battery or faulty chip.	See "Troubleshooting the System Battery" on page 150.
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 53. If the problem persists, replace the system battery. See "System Battery" on page 130.
Timer chip counter 2 failed.	Faulty system board.	See "Getting Help" on page 169.
TPM configuration operation honored. System will now reset.	A TPM configuration command has been entered. The system will reboot and execute the command.	Information only.
TPM 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 configuration command has been entered. User interaction is required to proceed.	Enter I or M to proceed.
TPM failure.	A Trusted Platform Module (TPM) function has failed.	See "Getting Help" on page 169.

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 optional iDRAC6 Enterprise card flash memory or BMC SPI flash may be corrupted.	Restart the system and update the Unified Server Configurator repository to the latest software to restore full functionality. See the Unified Server Configuration user documentation for more information. Restore the flash memory using the latest version on support.dell.com . See the iDRAC 6 User Guide for instructions on performing a field replacement of the flash memory.
Unexpected interrupt in protected mode.	Improperly seated memory modules or faulty keyboard/mouse controller chip.	Reseat the memory modules. See "Troubleshooting System Memory" on page 153. If the problem persists, see "Getting Help" on page 169.
Unsupported CPU combination. Unsupported CPU stepping detected.	Processor is not supported by the system.	Install a supported processor. See "Processor" on page 120.
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 106.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Unsupported memory configuration. DIMM mismatch across slots detected: x, x, ...	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 106.
Warning: A fatal error has caused system reset! Please check the system event log!	A fatal system error occurred and caused the system to reboot.	Check the SEL for information that was logged during the error. See the applicable troubleshooting section in "Troubleshooting Your System" on page 145 for any faulty components specified in the SEL.
Warning: Control Panel is not installed.	The control panel is not installed or has a faulty cable connection.	Install the control panel, or check the cable connections between the display module, the control panel board, and the system board. See "Control Panel Assembly" on page 132.
Warning! No micro code update loaded for processor n.	Micro code update failed.	Update the BIOS firmware. See "Getting Help" on page 169.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Warning! Power required exceeds PSU wattage. Check PSU and system configuration.	The system configuration of processor, 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 125.
Warning! Performance degraded. CPU and memory set to minimum frequencies to meet PSU wattage. System will reboot.		
Warning! PSU mismatch. PSU redundancy lost. Check PSU.	A High Output power supply and an Energy Smart power supply are installed in the system at the same time.	Install two High Output or two Energy Smart power supplies in the system. You can also run the system on one power supply until you can obtain two power supplies of the same type. See "Troubleshooting Power Supply" on page 151.
Warning! Unsupported memory configuration detected. The memory configuration is not optimal. The recommended memory configuration is: <message>.	Invalid memory configuration. The system will run but with reduced functionality.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 106. If the problem persists, see "Troubleshooting System Memory" on page 153.

Table 1-3. System Messages (continued)

Message	Causes	Corrective Actions
Write fault. Write fault on selected drive.	Faulty USB device, USB medium, optical drive assembly, hard drive, or hard drive subsystem.	Replace the USB medium or device. Ensure that the USB, SAS backplane, or SATA cables are properly connected. See "Troubleshooting a USB Device" on page 146, "Troubleshooting an Internal USB Key" on page 155, "Troubleshooting an Optical Drive" on page 156, and "Troubleshooting a Hard Drive" on page 158.

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 162 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 at support.dell.com/manuals.

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 65 for more information on this interface.

You must select the boot mode in the **Boot Mode** field of the **Boot Settings** screen of the System Setup Program. Once you specify the boot mode, the system boots in the specified boot mode and you then proceed to install your operating system from 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 another 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 38 for a description 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.
<Enter>, Spacebar, <+>, <->, left and right arrows	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the System Setup program and restarts the system if any changes were made.
<F1>	Displays the System Setup program's help file.



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

System Setup Options

Main Screen

Dell Inc. <www.dell.com> - PowerEdge R310 BIOS Version xx.yy.zz [This is DOS Setup]			
Service Tag: xxxxxxxx	Asset Tag: xxxxxxxxxxxx		
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 57.

Option	Description
Processor Settings	Displays information related to the processor (speed, cache size, and so on). See "Processor Settings Screen" on page 57.
SATA Settings	Displays a screen to enable or disable the integrated SATA controller and ports. See "SATA Settings Screen" on page 58.
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 59.
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 60.
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 61.
Serial Communication	Displays a screen to enable or disable the serial ports and specify related features and options. See "Serial Communication Screen" on page 61.
Power Management	Enables you to manage power usage of the processor, fans, and memory modules with preconfigured or customized settings. See "Power Management Screen" on page 62.
System Security	Displays a screen to configure the system password and setup password features. See "System Security Screen" on page 63, "Using the System Password" on page 68, and "Using the Setup Password" on page 70.
Keyboard NumLock (On default)	Determines whether your system starts up with the NumLock mode activated on 101- or 102-key keyboards (does not apply to 84-key keyboards).

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

Processor Settings Screen

Option	Description
64-bit	Specifies if the processor supports 64-bit extensions.
Core Speed	Displays the processor clock speed.
Bus Speed	Displays the processor bus speed.


Option	Description
Logical Processor (Enabled default)	On processors that support Simultaneous Multi-Threading (SMT) technology, each processor core supports up to two logical processors. If this field is set to Enabled , the BIOS reports both logical processors. If set to Disabled , only one logical processor is monitored by the BIOS.
Virtualization Technology (Disabled default)	Enabled permits virtualization software to use the virtualization technology incorporated in the processor. NOTE: Disable this feature if your system will not be running virtualization software.
Execute Disable (Enabled default)	Enables or disables Execute Disable Memory Protection Technology.
Number of Cores per Processor (All default)	If set to All , the maximum number of cores in each processor is enabled.
Turbo Mode (Enabled default)	If Turbo Boost technology is supported by the processor, enables or disables Turbo Mode .
C States (Enabled default)	When set to Enabled , the processor can operate in all available power states.
Processor X ID	Displays the family, model, level 2 cache size, level 3 cache size, and number of cores of the processor.

SATA Settings Screen

Option	Description
SATA Controller (ATA default)	Allows the embedded SATA to be set to Off , ATA , or RAID modes. NOTE: The UEFI support is disabled if SATA is set to the RAID mode.
Port A (Auto 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.

Option	Description
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 default)	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)	<p> CAUTION: Switching the boot mode could prevent the system from booting if the operating system was not installed in the same boot mode.</p> <p>If the operating system supports Unified Extensible Firmware Interface, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems.</p> <p>NOTE: Setting this field to UEFI disables the Boot Sequence, Hard-Disk Drive Sequence, and USB Flash Drive Emulation Type fields.</p>
Boot Sequence	If Boot Mode is set to BIOS , this field tells the system where the operating system files needed for startup are located. If Boot Mode is set to UEFI , you can access the UEFI boot manager utility by rebooting the system and pressing <F11> when prompted to do so.
Boot Sequence Retry (Disabled default)	If this field is enabled and the system has failed to boot, the system will reattempt to boot after 30 seconds.

Integrated Devices Screen

Option	Description
User Accessible USB Ports (All Ports On default)	Enables or disables the user-accessible USB ports. Options are All Ports On , Only Back Ports On , and All Ports Off .
Internal USB Port (On default)	Enables or disables the internal USB port.
Embedded NIC1 and NIC2 (Enabled default)	Enables or disables the operating system interface of the NIC1 and NIC2 controllers. (The NICs may also be accessed through the system's management controller).
Embedded Gb NIC1 (Enabled with PXE default)	Enables or disables the embedded NICs. PXE support allows the system to boot from the network. Enabled with iSCSI Boot option is available if the NIC on board supports iSCSI.
Embedded Gb NIC2 (Enabled default)	Enables or disables the embedded NICs.
MAC Address	Displays the MAC address for the NIC.
OS Watchdog Timer (Disabled default)	Sets a timer to monitor the operating system for activity, and aids in recovery if the system stops responding. When Enabled , the operating system is allowed to initialize the timer. When Disabled , the timer is not initialized. NOTE: This feature is usable only with operating systems that support WDAT implementations of the Advanced Configuration and Power Interface (ACPI) 3.0b specification.
Embedded Video Controller (Enabled default)	Enables or disables BIOS support for the integrated video controller. NOTE: This field can be disabled only if an add-in video card is present. If this field is disabled, remote access features such as virtual KVM are not available.

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)	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. Options are On without Console Redirection , On with Console Redirection via COM1 , On with Console Redirection via COM2 , and Off .
Serial Port Address (Serial Device 1=COM1, Serial Device2=COM2 default)	Sets the serial port addresses for the two serial devices. 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.
External Serial Connector (Serial Device 1 default)	Specifies whether Serial Device 1, Serial Device 2, or Remote Access Device has access to the external serial connector. NOTE: Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.
Failsafe Baud Rate (115200 default)	Displays the failsafe baud rate used for console redirection. BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails. This rate should not be adjusted.
Remote Terminal Type (VT 100/VT220 default)	Sets the remote console terminal type, either VT100/VT220 or ANSI.
Redirection After Boot (Enabled default)	Enables or disables BIOS console redirection when the operating system is loaded.

Power Management Screen

Option	Description
Power Management (Active Power Controller 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 68 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 Setup Password" on page 70 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 68 for more information.</p>
TPM Security (Off default)	<p>Sets the reporting of the Trusted Platform Module (TPM) in the system.</p> <p>If Off, the presence of the TPM is not reported to the operating system.</p> <p>If On with Pre-boot Measurements, the system reports the TPM to the operating system and stores the pre-boot measurements to the TPM during POST.</p> <p>If On without Pre-boot Measurements, the system reports the TPM to the operating system and bypasses pre-boot measurements.</p>
TPM Activation (No Change default)	<p>When set to Activate, the TPM is enabled to default settings. When set to Deactivate, the TPM is disabled. The No Change state initiates no action. The operational state of the TPM remains unchanged (all user settings for the TPM are preserved).</p> <p>NOTE: This field is read-only when TPM Security is set to Off.</p>

Option	Description
TPM Clear (No default)	<p> CAUTION: Clearing the TPM will lose all encryption keys in the TPM. This option prevents booting to the operating system and results in data loss if the encryption keys cannot be restored. Back up the TPM keys prior to enabling this option.</p> <p>When set to Yes, all TPM contents are cleared.</p> <p>NOTE: This field is read-only when TPM Security is set to Off.</p>
Power Button (Enabled default)	<p>If Enabled, the power button can turn the system's power off and on. On an ACPI-compliant operating system, the system performs an orderly shutdown before power is turned off.</p> <p>When Disabled, the button can only turn on system power.</p>
NMI Button (Disabled default)	<p> CAUTION: Use the NMI button only if directed to do so by qualified support personnel or by the operating system's documentation. Pressing this button halts the operating system and displays a diagnostic screen.</p> <p>Enables or disables the NMI feature.</p>
AC Power Recovery (Last default)	<p>Determines how the system reacts when power is restored. If set to Last, the system returns to the last power state. On turns on the system after power is restored. Off allows the system to remain off after power is restored.</p>
AC Power Recovery Delay	<p>Determines when the system restarts after power is restored. Options are Immediate, Random (a random value of 45 to 240 seconds), or a user-defined value of 45 to 240 seconds.</p>
User Defined Delay	<p>Allows the user to view the current AC Recovery Delay. This field also allows the user to define a new AC Recovery Delay.</p>

Exit Screen

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

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

Entering the UEFI Boot Manager



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



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

The UEFI Boot Manager enables you to:

- Add, delete, and arrange boot options
- Access the System Setup program and BIOS-level boot options without rebooting

To enter the UEFI Boot Manager:

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

UEFI Boot Settings Screen

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

System Utilities Screen

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

System and Setup Password Features



NOTE: For a forgotten password, see "Disabling a Forgotten Password" on page 168.

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 the system starts and only those with the password have full access to the system.

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 70), the system accepts your setup password as an alternate system password.

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

To leave the password security enabled:

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


To disable the password security:

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

When **Password Status** is **Locked**, 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 will shut down.

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

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

Deleting or Changing an Existing System Password

- 1 Enter the System Setup program and select the **System Security**.
- 2 Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.
- 3 The setting changes to **Not Enabled**.
- 4 If you want to assign a new setup password, perform the steps in "Assigning a Setup Password" on page 70.

Using the Setup Password

Assigning a Setup Password

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



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

You can use up to 32 characters in your password.

As you type, placeholders appear in the field.

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

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

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

Operating With a Setup Password Enabled

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

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



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

Deleting or Changing an Existing Setup Password

- 1 Enter the System Setup program and select the **System Security**.
- 2 Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.

The setting changes to **Not Enabled**.

- 3 If you want to assign a new setup password, perform the steps in "Assigning a Setup Password" on page 70.

Embedded System Management

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

The Unified Server Configurator 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 Unified Server Configurator.

The following features of Unified Server Configurator are supported on systems with Baseboard Management Controller (BMC):

- Installing an operating system
- Running diagnostics to validate the memory, I/O devices, processor, physical disks, and other peripherals

When an optional iDRAC6 Express card is installed, Unified Server Configurator provides the following additional features:

- Downloading and applying firmware updates
- Configuring hardware and firmware

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

Baseboard Management Controller Configuration

The BMC enables configuring, monitoring, and recovery of systems remotely. The BMC 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
- 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.

iDRAC Configuration Utility

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

The iDRAC 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
- Provides text console redirection for system setup, text-based utilities, and operating system consoles.

In addition the iDRAC 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.

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

Entering the iDRAC Configuration Utility

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

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

Installing System Components



WARNING: While moving or transferring the system, it is recommended that you use the packaging material that shipped with the system and/or take care to avoid any damage due to shock or vibration.



NOTE: Depending on the configuration, your system may have cabled or hot-swappable 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

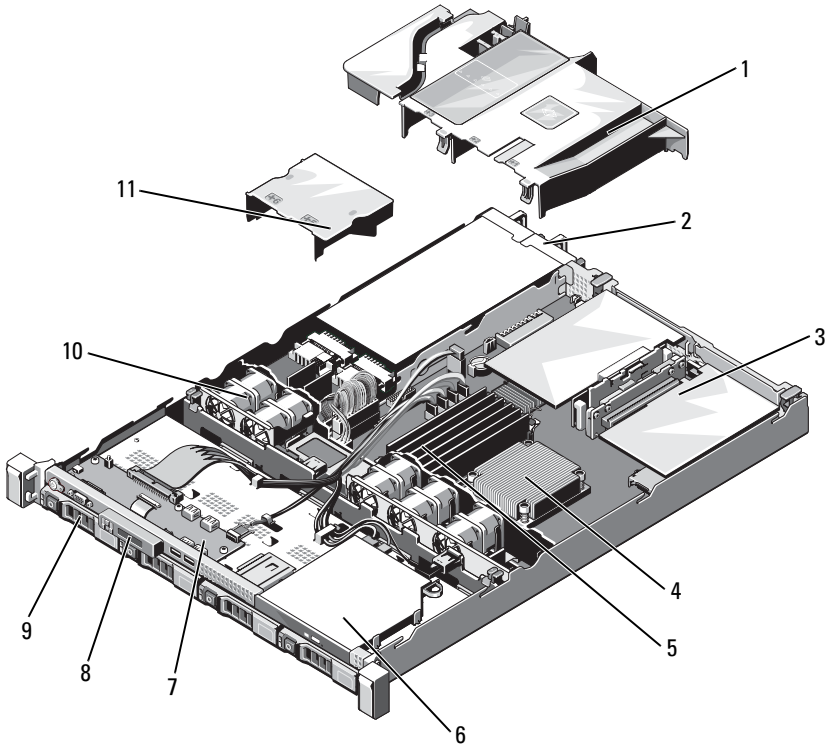
- Key to the system keylock
- #1 and #2 Phillips screwdrivers
- Wrist grounding strap

Inside the System



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

Figure 3-1. Inside the System

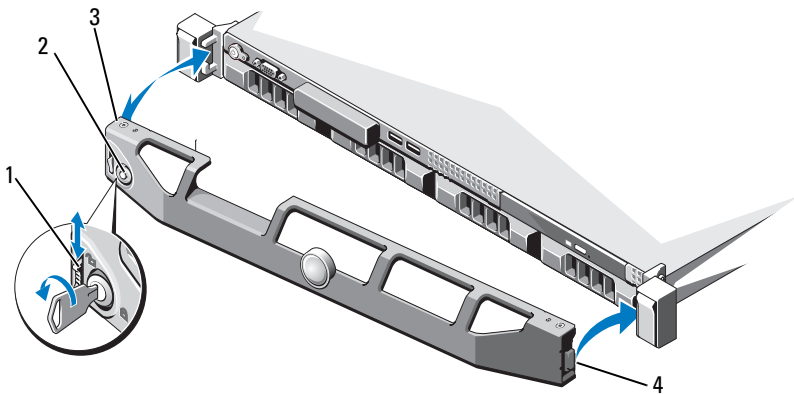


- | | | | |
|----|---------------------------|----|-------------------------|
| 1 | cooling shroud | 2 | power supply bays (2) |
| 3 | expansion-card risers (2) | 4 | heat sink/processor |
| 5 | memory modules (6) | 6 | optical drive |
| 7 | control panel board | 8 | display module |
| 9 | hard drives (4) | 10 | system cooling fans (5) |
| 11 | power supply shroud | | |

Front Bezel (Optional)

- 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.

Figure 3-2. Removing and Replacing the Optional Front Bezel





- 1 release latch
- 3 front bezel

- 2 keylock
- 4 hinge tab

To replace the optional bezel, hook the right end of the bezel onto the chassis, then fit the free end of the bezel onto the system. Secure the bezel with the keylock. See Figure 3-2.

Opening and Closing the System

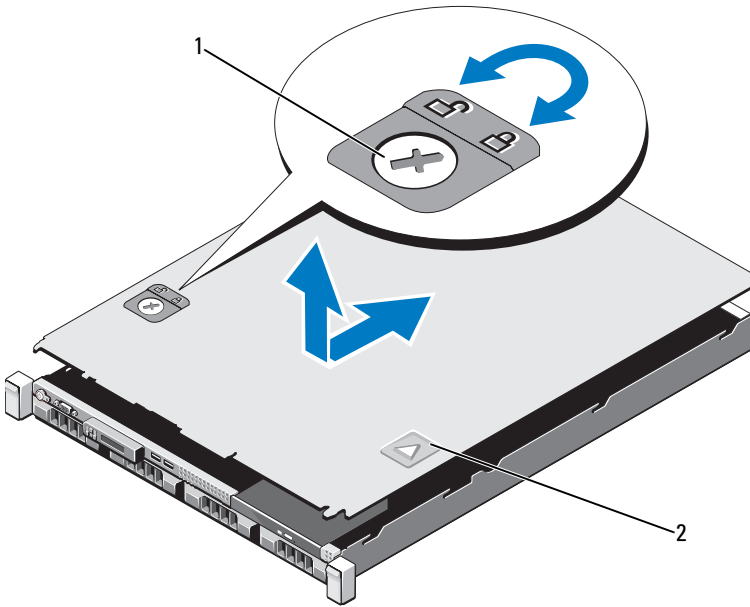
 **WARNING:** Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

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

Opening the System

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.
- 2 Rotate the latch release lock counter clockwise to the unlocked position. See Figure 3-3.
- 3 Grasp the cover on both sides while pressing your thumbs on the latch release lock and the indent. Carefully slide the cover toward 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 toward the back of the system, so that the two pins on the back edge of the cover fit over the corresponding slots on the back edge of the chassis. 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.

Optical Drive (Optional)


An optional slimline DVD 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

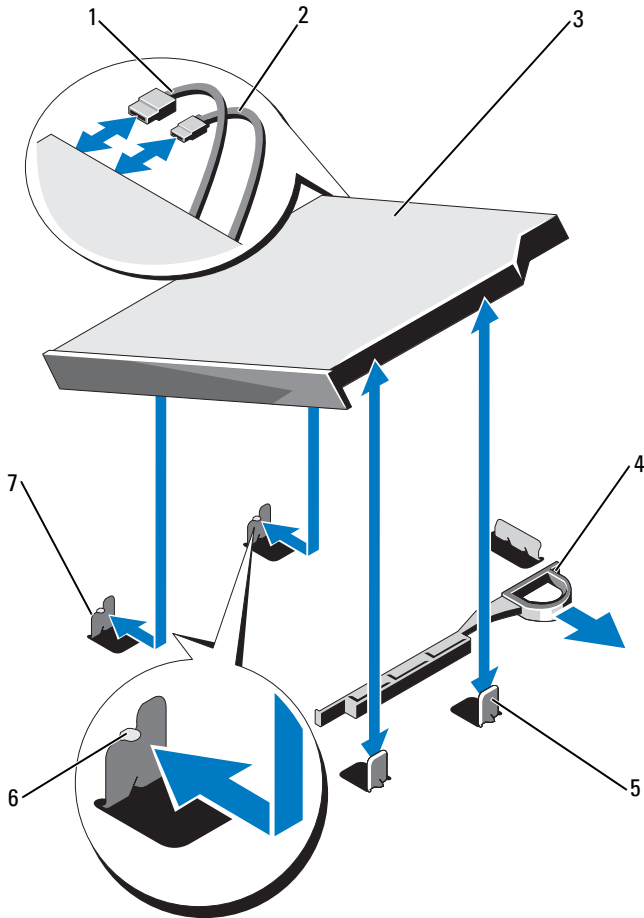
 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

- 1 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 78.
- 3 Disconnect the power and data cable from the back of the drive.

 **NOTE:** 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. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

- 4 Pull the release latch to the unlock position. Lift the drive to release it from the notch on the metal standoffs.
- 5 Lift the drive out of the chassis. See Figure 3-4.
- 6 Close the system. See "Closing the System" on page 79.

Figure 3-4. Removing and Installing the Optical Drive




- | | | | |
|---|----------------------------------|---|---------------|
| 1 | data cable | 2 | power cable |
| 3 | optical drive | 4 | release latch |
| 5 | metal standoffs (2) | 6 | notches (2) |
| 7 | metal standoffs with notches (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 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 78.
- 3 Align the two notches on the metal standoffs with the slots on the side of the drive.
- 4 Slide the drive into the notches until it is seated firmly and the release latch snaps into place. See Figure 3-4.
- 5 Connect the power cable.
- 6 Connect the data cable to the back of the drive and to the SATA connector on the system board.
 **NOTE:** Route these cables properly underneath the tab on the system chassis to prevent them from being pinched or crimped.
- 7 Close the system. See "Closing the System" on page 79.
- 8 Reconnect the system and peripherals to their electrical outlets.

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.

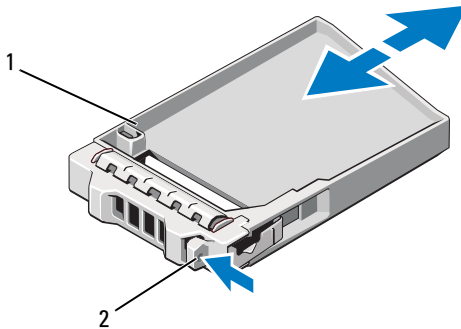
Removing a Drive Blank

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

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

- 1 If applicable, remove the front bezel. See "Front Bezel (Optional)" on page 77.
- 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 3-5.

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



1 hard-drive blank

2 release lever

Installing a Drive Blank

Align the hard-drive blank with the drive bay and insert the blank into the drive bay until the release lever clicks into place. See Figure 3-5.

Removing a Hard-Drive Carrier

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

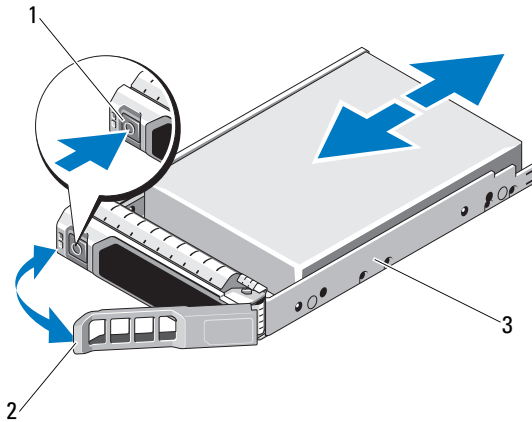
- 1 If applicable, remove the front bezel. See "Front Bezel (Optional)" on page 77.
- 2 Using the RAID management software, prepare the hard drive for removal. Wait until the hard-drive indicators on the hard-drive carrier signal that the drive can be removed safely. See your storage controller documentation for information about hot-swap hard drive removal.

If the hard drive has been online, the green activity/fault indicator flashes as the hard drive is powered down. When the hard-drive indicators are off, the hard drive is ready for removal. See Figure 1-3.

- 3 Press the release button and open the hard-drive carrier release handle to release the hard-drive carrier. See Figure 3-6.
- 4 Slide the hard-drive carrier out of the hard-drive bay.
- 5 Insert a drive blank in the vacated hard-drive bay. See "Installing a Drive Blank" on page 84.

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


Figure 3-6. Removing and Installing a Hard-Drive Carrier




- 1 release button
- 3 hard-drive carrier

- 2 hard-drive carrier handle

Installing a Hard-Drive Carrier

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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:** 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 "Front Bezel (Optional)" on page 77.
- 2 If a drive blank is present in the bay, remove it. See "Removing a Drive Blank" on page 83.
- 3 Press the release button on the front of the hard-drive carrier and open the handle.
- 4 With the lever on the hard-drive carrier open, slide the hard-drive carrier into the hard-drive bay until it contacts the backplane. See Figure 3-8.
- 5 Close the hard-drive carrier handle to lock the hard drive in place.

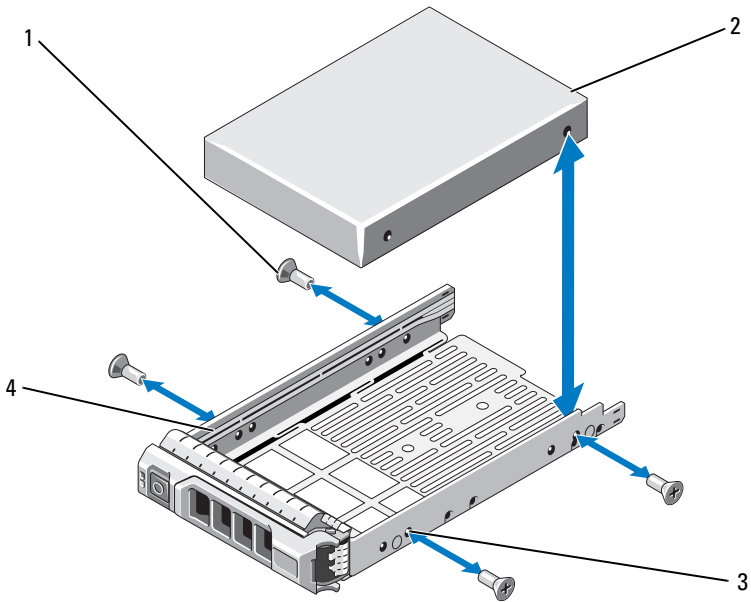
Removing a Hard Drive From a Hard-Drive Carrier

 **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.

Remove the screws from the slide rails on the hard-drive carrier and separate the hard drive from the carrier. See Figure 3-7.

Figure 3-7. Installing and Removing a Hard Drive



1 screws (4)

2 hard drive

3 SAS/SATA screw hole

4 hard-drive carrier

Installing a Hard Drive Into a Hard-Drive Carrier



NOTE: If you are upgrading from a 2.5" hard drive to a 3.5" hard drive, you need to remove the inserts inside the carrier before installing the 3.5" hard drive in the carrier.

- 1 Insert the hard drive into the hard-drive carrier with the connector end of the drive at the back. See Figure 3-7.
- 2 Align the screw holes on the hard drive with the back set of holes on the hard-drive carrier.

When aligned correctly, the back of the hard drive will be flush with the back of the hard-drive carrier.

- 3 Attach the four screws to secure the hard drive to the hard-drive carrier.

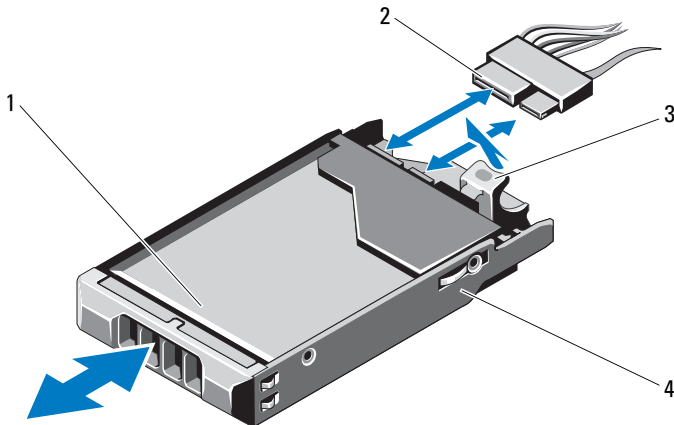
Removing a Cabled Hard Drive



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 and attached peripherals, and disconnect the system from the electrical outlet and from the peripherals.
- 2 Open the system. See "Opening the System" on page 78.
- 3 Disconnect the data/power cable from the hard drive in the hard-drive bay.
- 4 Lift the tab with the blue dot on the hard-drive bracket and slide the hard drive out of the bay. See Figure 3-8.

Figure 3-8. 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 "Removing a Hard Drive From a Hard-Drive Bracket" on page 91) and insert the empty bracket back into the drive bay.

- 5 Replace the system cover. See "Closing the System" on page 79.

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.

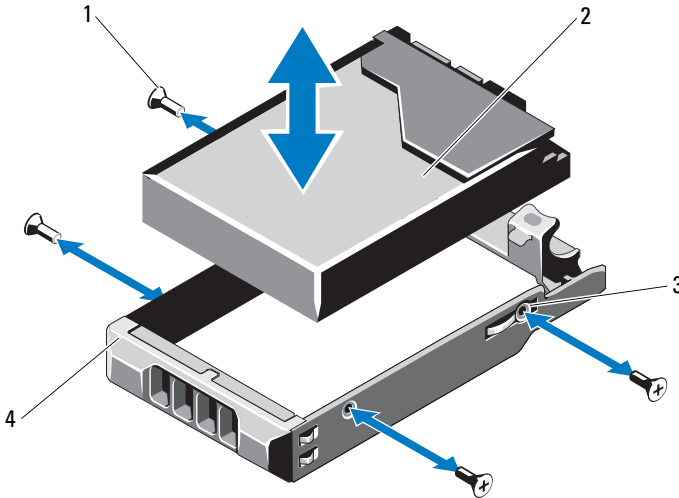
- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and from the peripherals.
- 2 Open the system. See "Opening the System" on page 78.

- 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 3-8.
- 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/data cable 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.
 - 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 94.
- 7** Replace the system cover. See "Closing the System" on page 79.
- 8** Reconnect the system to the electrical outlet and turn on the system and 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 54.
- 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 3-9.

Figure 3-9. Removing and Installing a Hard Drive From a Hard-Drive Bracket



- | | | | |
|---|--------------------------|---|--------------------|
| 1 | screws (4)* | 2 | hard drive |
| 3 | SAS/SATA screw holes (4) | 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 3-9.
- 2 Align the screw 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.

Expansion Card

Expansion Card Installation Guidelines

Your system supports two PCIe Generation 2 expansion cards installed on two expansion-card risers.

- Riser1: Supports PCIE_G2_x16 full-height half-length expansion card.
- Riser2: Supports PCIE_G2_x8 full-height half-length expansion card.
- The expansion-card slot is not hot-swappable.
- PCI Express Generation 1 and Generation 2 expansion cards are 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 Priority

Card Priority	Card Description	Slot Priority	Maximum Allowed
1	PERC S300 Modular	3	1
2	SAS 6/iR Modular	3	1
3	PERC H700 Adapter	2	1
4	PERC H200 Adapter	2	1
5	PERC H800 512 MB Adapter	1,2	2
6	6 Gbps SAS HBA	1,2	2
7	SAS 5/E Adapter	1,2	2
8	QLE2562 FC8 Dual Channel HBA	1,2	2
9	LPe12002 FC8 Dual Channel HBA	1,2	2
10	QLE2560 FC8 Single Channel HBA	1,2	2
11	LPe12000 FC8 Single Channel HBA	1,2	2
12	Quad port Intel® x4 PCIe copper GbE NIC	1,2	2
13	Dual port Intel x4 PCIe copper GbE NIC	1,2	2
14	Dual port Brem 5709 PCIe copper GbE NIC (Xinan-based) TOE	1,2	2
15	Dual port Breom 5709 PCIe copper GbE NIC (Xinan-based) TOE/Isoc	1,2	2
16	Single port Intel x1 PCIe copper GbE NIC	1,2	2
17	LSI2032 PCIe SCSI HBA	1,2	2

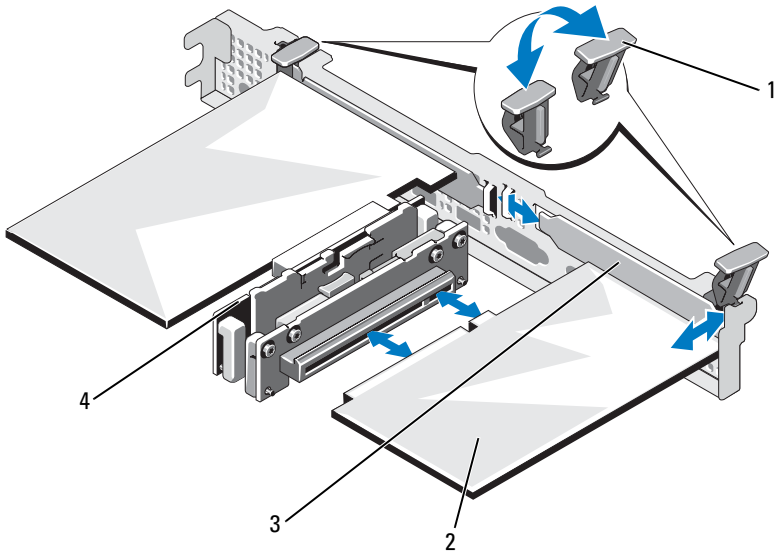
Installing an Expansion Card



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 78.
- 4** Lift the expansion-card latch and remove the filler bracket.
See Figure 3-10.
- 5** Holding the expansion card by its edges, position the card so that the card-edge connector aligns with the expansion-card connector on the expansion-card riser. See Figure 3-10.
- 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 3-10.

Figure 3-10. Installing and Removing an Expansion Card



- | | | | |
|---|----------------------|---|----------------------|
| 1 | expansion-card latch | 2 | expansion card |
| 3 | filler bracket | 4 | expansion-card riser |

- 8 Connect any cables to the expansion card.
- 9 Close the system. See "Closing the System" on page 79.
- 10 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals

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 78.
- 3 Disconnect all cables from the card.
- 4 Lift the expansion-card latch. See Figure 3-10.
- 5 Grasp the expansion card by its edges and carefully remove it from the connector on the expansion-card riser.
- 6 If you are removing the expansion card permanently, install a metal filler bracket over the empty expansion-card slot opening.
- 7 Replace the expansion-card latch.



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

- 8 Close the system. See "Closing the System" on page 79.
- 9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Expansion-Card Riser

The system's expansion-card risers support x8 and x16 link Generation 2 PCIe expansion cards.

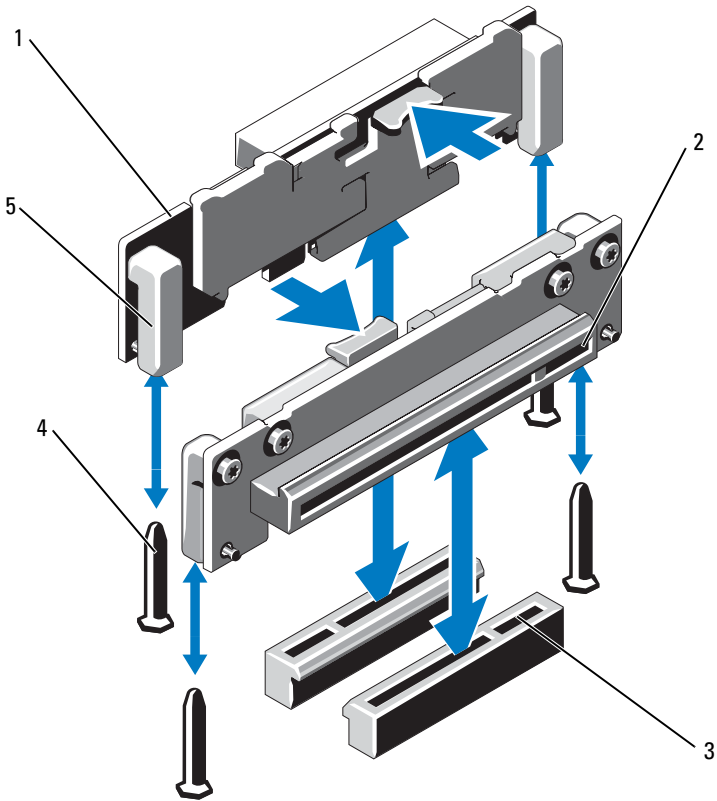
Removing an Expansion-Card Riser



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- 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 78.
- 3 If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 96.
- 4 To remove the expansion-card riser, press the release tab and lift the expansion-card riser from the connector on the chassis. See Figure 3-11.

Figure 3-11. Installing and Removing an Expansion-Card Riser



- | | | | |
|---|----------------------------------|---|-----------------------|
| 1 | expansion-card risers (2) | 2 | expansion-card slot |
| 3 | expansion-card riser sockets (2) | 4 | riser guide posts (2) |
| 5 | riser guides (2) | | |

Installing an Expansion-Card Riser


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- 1 Align the expansion-card riser with the riser guide posts on the system board. See Figure 3-11.
- 2 Lower the expansion-card riser into place until the expansion-card riser connector is fully seated.
- 3 If applicable, reinstall the expansion card.
See "Installing an Expansion Card" on page 94.
- 4 Close the system. See "Closing the System" on page 79.
- 5 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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.

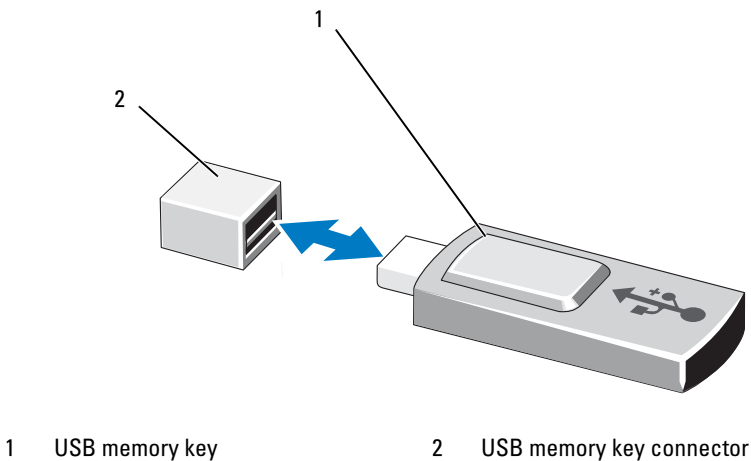
To boot from the USB memory key, you must configure the USB memory key with a boot image and then specify the USB memory key in the boot sequence in the System Setup program. See "Boot Settings Screen" on page 59. For information on creating a bootable file on the USB memory key, see the user documentation 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 (0.94") wide x 79 mm (3.11") long x 8.6 mm (0.33") 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 78.
- 3 Locate the USB connector on the control panel board. See Figure 6-1.
- 4 Insert the USB memory key into the USB connector.
- 5 Close the system. See "Closing the System" on page 79.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Figure 3-12. Removing and Installing a USB Memory Key



Cooling Shroud

The system board shroud covers the processor, heat sink, and memory modules, and provides air flow to these components. Airflow is facilitated by the cooling fan modules, which are positioned directly beneath the cooling shroud. The power distribution board shroud covers the power distribution board behind the power supply bay.

Removing the Cooling Shroud



WARNING: The memory modules and heat sink can get very hot during normal operation. Ensure that the memory modules and heat sink have had sufficient time to cool before you touch it.



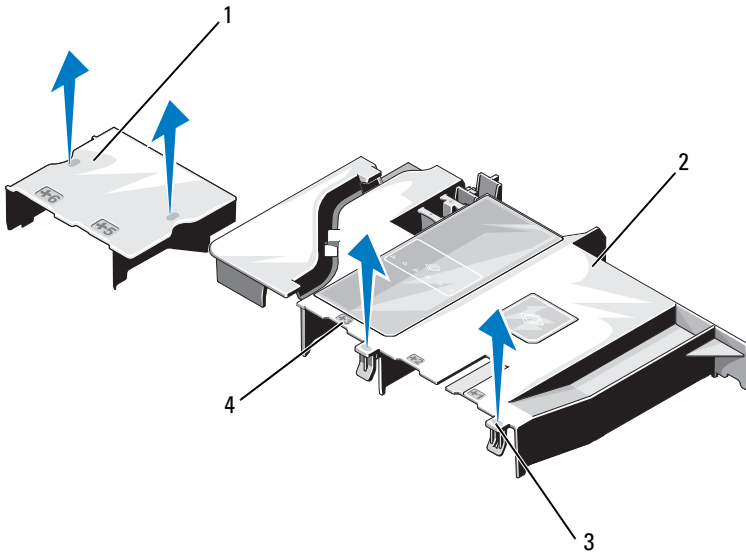
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CAUTION: Never operate your system with the cooling shroud removed. The system may get overheated quickly, resulting in shutdown of the system and loss of data.

- 1 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 78.
- 3 Remove the SAS backplane cables routed over the shroud from the system board.
- 4 Hold the touch points and gently lift the shroud straight up and away from the system board. See Figure 3-13.

Figure 3-13. Installing and Removing the Cooling Shroud



- | | | | |
|---|---------------------------------|---|---------------------|
| 1 | power distribution board shroud | 2 | system board shroud |
| 3 | tabs (2) | 4 | fan bay numbers |

Installing the Cooling Shroud

- 1** Orient the cooling shroud with the numbered fan bays as a guide.
- 2** Align the cooling shroud posts with the slots on the system board.
- 3** Push the cooling shroud down until all edges are secured to the system board.
- 4** Close the system. See "Opening and Closing the System" on page 78.

Integrated Storage Controller Card

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

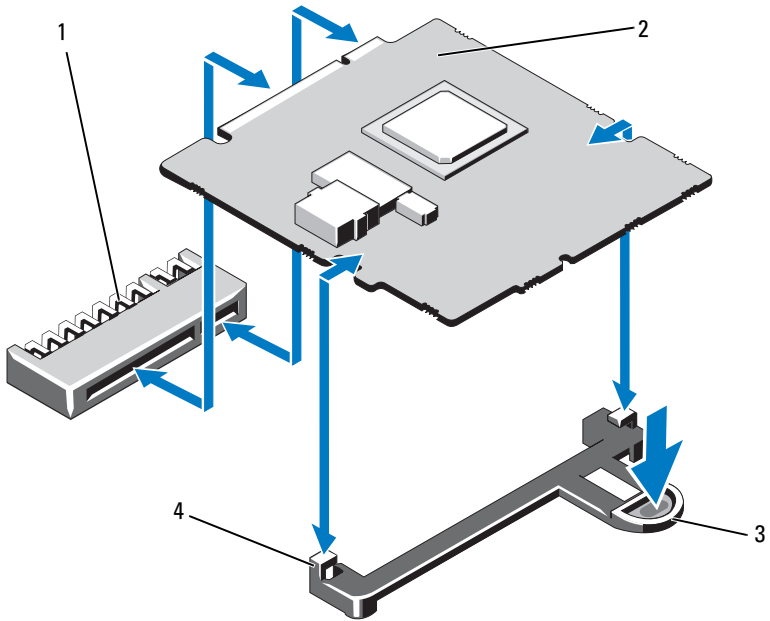
Removing the Integrated Storage Controller Card



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- 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 78.
- 3 If installed, remove the expansion card.
See "Removing an Expansion Card" on page 96.
- 4 Remove the second expansion-card riser.
See "Removing an Expansion-Card Riser" on page 97.
- 5 Press down on the card retention tab (marked with a blue dot) and pull the blue release tab.
- 6 Remove the card from the storage controller card slot. See Figure 3-14.

Figure 3-14. Removing and Installing the Integrated Storage Controller Card



- | | | | |
|---|--|---|------------------------------------|
| 1 | integrated storage controller card connector | 2 | integrated storage controller card |
| 3 | release tab | 4 | alignment guides (2) |

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 78.
- 3** If installed, remove the expansion card. See "Removing an Expansion Card" on page 96.
- 4** To install the integrated storage controller card:
 - a** Hold the card by its edges.
 - b** Align the card with the alignment guides.
 - c** Insert the card-edge connector firmly into the connector until the card is fully seated.
- 5** Close the system. See "Opening and Closing the System" on page 78.
- 6** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

System Memory

Your system supports DDR3 unbuffered ECC DIMMs (UDIMMs) and registered ECC DIMMs (RDIMMs). DIMMs can be 1066 or 1333 MHz.

The system contains six memory sockets organized into two DDR3 channels. The first socket of each channel is marked with white release levers.

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.

- Except for memory channels that are unused, all populated memory channels must have identical configurations.
- Memory modules of different sizes can be mixed in sockets 1 to 6 (for example, 2 GB and 4 GB), but all populated channels must have identical configurations.
- Memory modules are installed in the numeric order of the sockets beginning with 1 to 6.
- If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s).

Mode-Specific Guidelines

Your system supports both single-channel and dual-channel modes. A minimal single-channel configuration of one 1 GB memory module is also supported in this mode.

Table 3-2 shows sample memory configurations that follow the appropriate memory guidelines stated in this section. The samples show identical memory-module configurations and their physical and available memory totals. The table does not show mixed- or quad-rank memory-module configurations, nor does it address the memory speed considerations of any configuration.

Table 3-2. Sample UDIMM Memory Configuration

Memory Module Size	Memory Sockets						Physical Memory (GB)
	1	3	5	2	4	6	
	1 GB	X X X	X		X X	X	
2 GB	X X X	X		X X	X		2 4 8
4 GB	X X X	X		X X	X		4 8 16

Table 3-3. Sample RDIMM Memory Configuration

Memory Module Size	Memory Sockets						Physical Memory (GB)
	1	3	5	2	4	6	
1 GB	X						1
	X			X			2
	X	X		X	X		4
	X	X	X	X	X	X	6
2 GB	X						2
	X			X			4
	X	X		X	X		8
	X	X	X	X	X	X	12
4 GB	X						4
	X			X			8
	X	X		X	X		16
8 GB	X	X		X	X		32

Installing Memory Modules



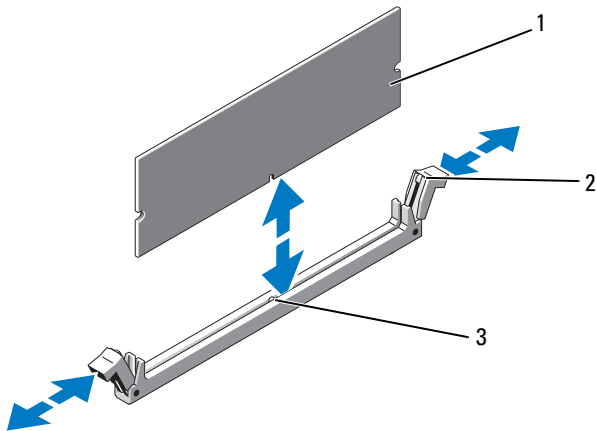
WARNING: The memory modules are hot to touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.



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- 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 78.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 101.
- 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 3-15, 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 3-15. Installing and Removing a Memory Module



- 1 memory module
- 2 memory module socket ejectors (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 3-2.

- 10 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 102.
- 11 Close the system. See "Closing the System" on page 79.
- 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 162.

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.

- 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 78.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 101.
- 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 3-15.
Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.
- 6 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 102.

- 7 Close the system. See "Closing the System" on page 79.
- 8 Reconnect the system and peripherals to their power sources, and turn them on.

Cooling Fans

Your system contains five single-motor fans and provides cooling for the processor, expansion card, power supplies, and memory modules.



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.



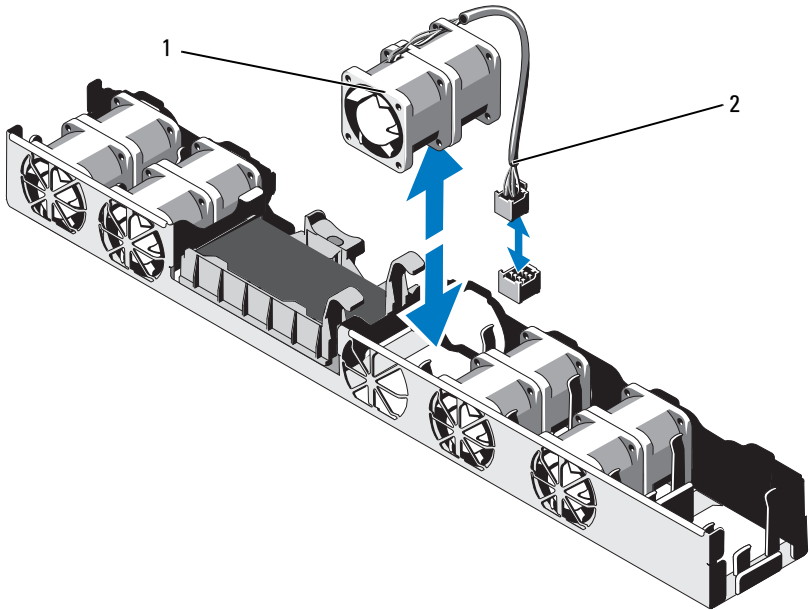
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell 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 78.
- 3 Remove the cooling shroud or power distribution board shroud as applicable. See "Cooling Shroud" on page 101.
- 4 Disconnect the fan's power cable from the system board. See Figure 3-16.
- 5 Grasp the fan and slide it away from the fan assembly. See Figure 3-16.

Figure 3-16. Removing and Installing a Fan



1 fan

2 power cable


Installing a Cooling Fan

- 1** Ensure that the fan is oriented correctly.
Orient the fan module so that the side with the power cable faces toward the back of the system.
- 2** Lower the fan into the fan assembly until the fan is fully seated.
See Figure 3-16.
- 3** Connect the fan's power cable to the power connector on the system board.
- 4** Replace the cooling shroud or power distribution board shroud as applicable.
See "Installing the Cooling Shroud" on page 102.

- 5 Close the system. See "Closing the System" on page 79.
- 6 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

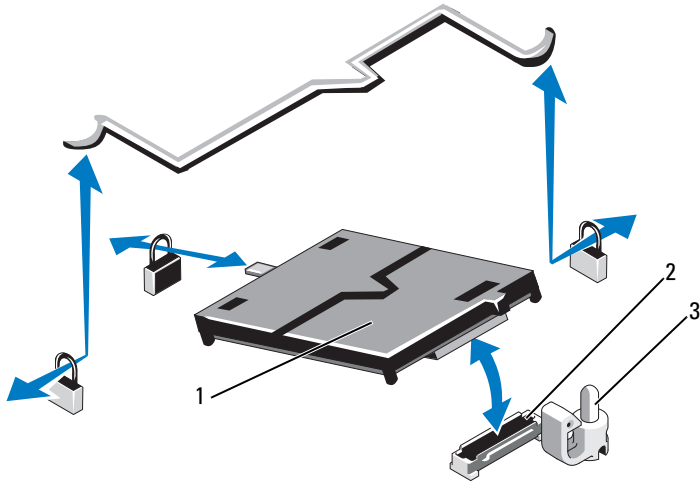
iDRAC6 Express Card (Optional)

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 78.
- 3 If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 96.
- 4 Insert the notch on the Integrated Dell Remote Access Controller 6 (iDRAC6) Express card into the clip on the system board.
- 5 Align the front edge of the card with the connector on the system board. See Figure 6-1 for the location of the connector.
- 6 Press the card down until it is fully seated. See Figure 3-17.
When the front of the card is fully seated, the plastic standoff tab snaps over the edge of the holder.

Figure 3-17. Installing or Removing an iDRAC6 Express Card



- 1 iDRAC6 Express card
- 2 iDRAC6 Express card connector
- 3 retention standoff tab

- 7 If applicable, replace the expansion card. See "Installing an Expansion Card" on page 94.
- 8 Close the system. See "Closing the System" on page 79.
- 9 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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 78.
- 3 If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 96.
- 4 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 3-17.

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

- 5 Angle the card so that the notch on the card slips through the clip on the system board.
- 6 If applicable, replace the expansion card. See "Installing an Expansion Card" on page 94.
- 7 Close the system. See "Closing the System" on page 79.
- 8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

iDRAC6 Enterprise Card (Optional)

Installing an iDRAC6 Enterprise Card

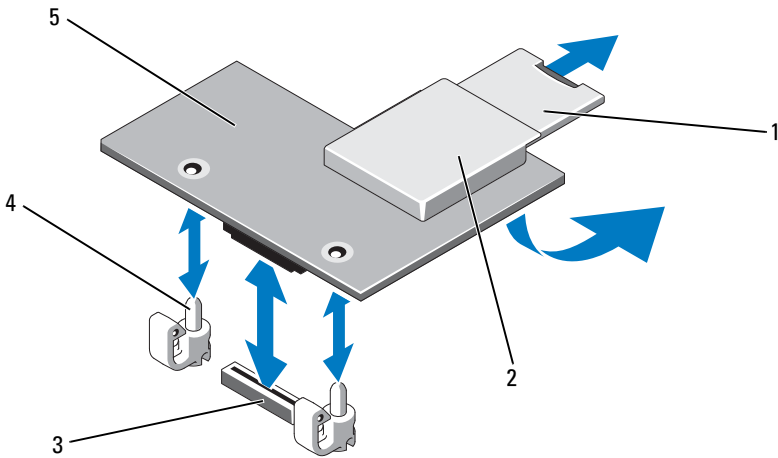


CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 78.
- 3 If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 96.
- 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 3-18.
- 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 3-18.

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

Figure 3-18. Installing and Removing an iDRAC6 Enterprise Card



- | | | | |
|---|----------------------------------|---|------------------------------|
| 1 | VFlash SD card | 2 | VFlash media slot |
| 3 | iDRAC6 Enterprise card connector | 4 | retention standoff posts (2) |
| 5 | iDRAC6 Enterprise card | | |
- 7** If applicable, replace the expansion card. See "Installing an Expansion Card" on page 94.
- 8** Close the system. See "Closing the System" on page 79.
- 9** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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 78.
- 4** If installed, remove the expansion card from the expansion-card slot. See "Removing an Expansion Card" on page 96.
- 5** Remove the VFlash media card (if installed) from the iDRAC6 Enterprise card. See "Removing a VFlash Media Card" on page 120.
- 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.
- 8** Lift the card out of the system.
- 9** If applicable, replace the expansion card. See "Installing an Expansion Card" on page 94.
- 10** Replace the plastic filler plug over the port at the system back-panel. See "Back-Panel Features and Indicators" on page 19 for the port location.
- 11** Close the system. See "Closing the System" on page 79.
- 12** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

VFlash Media (Optional)

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

Installing a VFlash Media Card

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



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

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

Removing a VFlash Media Card

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

Processor


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 on support.dell.com.
- 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 78.
- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 101.

 **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.

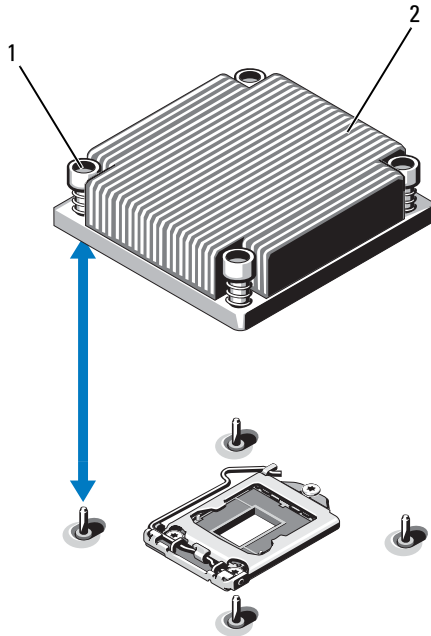
 **CAUTION:** Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.

- 5 Using a #2 Phillips screwdriver, loosen one of the heat-sink retention screws. See Figure 3-19.
- 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 of the processor and set the heat sink aside with the thermal grease side facing up.

 **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.
- 10 Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-20.

Figure 3-19. Installing and Removing the Heat Sink

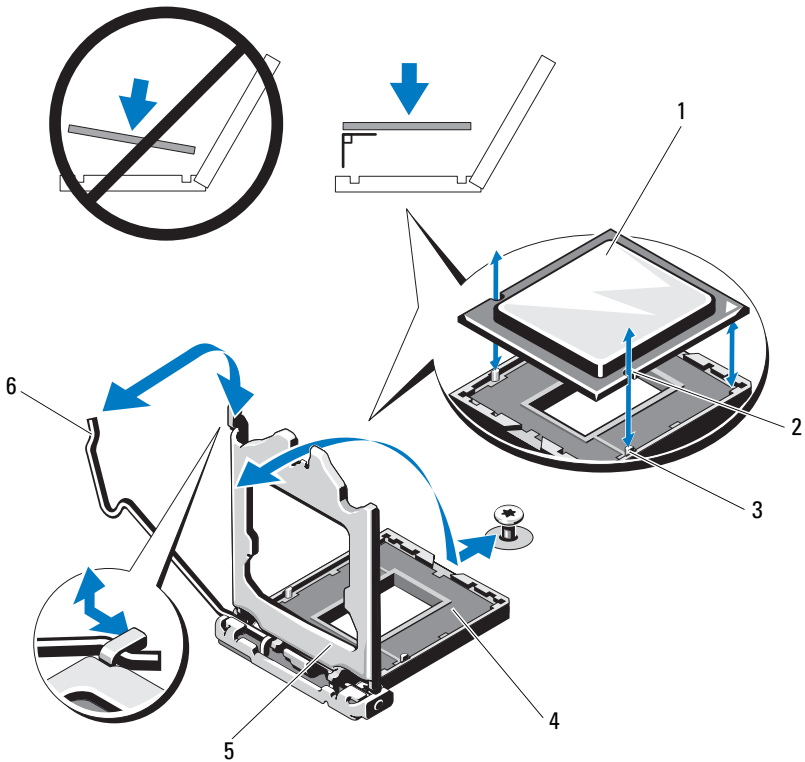


- 1 heat-sink retention screws (4) 2 heat sink

- 11** Rotate the processor shield upward and out of the way. See Figure 3-20.
- 12** Lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.


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.

Figure 3-20. Installing and Removing a Processor



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


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 processor, 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.
- 2 Unpack the processor if it has not been used previously.
If the processor has already been used, remove any thermal grease from the top of the processor using a lint-free cloth.
- 3 Align the processor with the socket keys on the ZIF socket.
See Figure 3-20.

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

- 4 With the release lever on the processor socket in the open position, align the processor with the socket keys and set the processor lightly in the socket.

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

- 5 Close the processor shield.
- 6 Rotate the socket-release lever down until it snaps into place.
- 7 Using a clean lint-free cloth, remove the thermal grease from the heat sink.
- 8 Open the grease packet included with your processor kit and apply thermal grease evenly to the center of the top of the new processor.

 **CAUTION: Using excess thermal grease can cause grease to contact the processor shield, which can cause contamination of the processor socket.**

- 9 Place the heat sink on the processor. See Figure 3-19.
- 10 Using a #2 Phillips screwdriver, tighten the heat-sink retention screws.
See Figure 3-19.

- 11 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 102.
- 12 Close the system. See "Closing the System" on page 79.
- 13 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 14 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 54.
- 15 Run the system diagnostics to verify that the new processor operates correctly.
See "Running the Embedded System Diagnostics" on page 162 for information about running the diagnostics.


Power Supplies


Your system supports the following power supply modules:

- 350 W (non-redundant power supply)
- 400 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

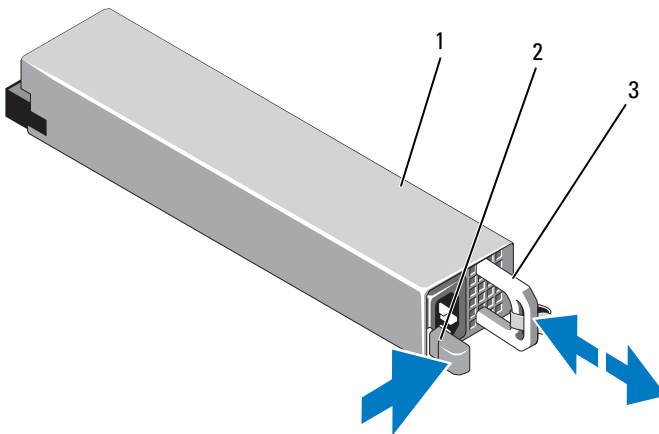
 **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell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

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

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

Figure 3-21. Removing and Installing a Redundant Power Supply



1 power supply

2 release latch

3 power supply handle

Installing a Redundant Power Supply

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



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

- 2 If applicable, remove the power supply blank. See "Removing the Power Supply Blank" on page 127.
- 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 3-21.



NOTE: If you unlatched the cable management arm in step 2 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.

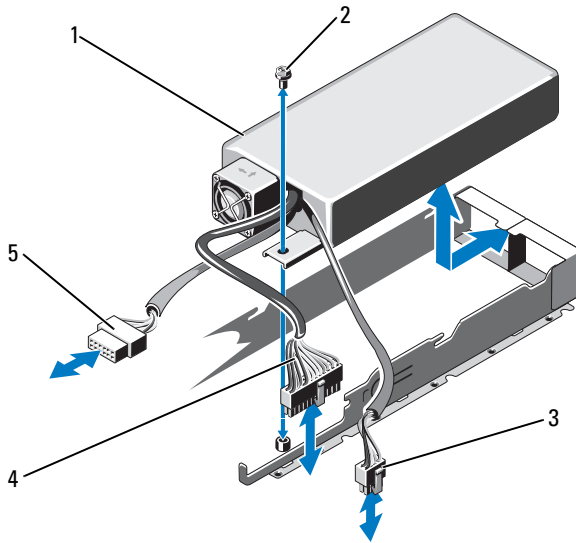
- 1 Turn off the system and all attached peripherals.
- 2 Disconnect the power cable from the power source.
- 3 Disconnect the power cable from the power supply and remove the Velcro straps that bundle and secure the system cables.



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.

- 4 Open the system. See "Opening the System" on page 78.
- 5 Disconnect all the power cables from the power supply to the system board, hard drives and optical drive. See Figure 3-22.
- 6 Loosen the screw securing the power supply to the chassis and lift the power supply to remove it from the chassis. See Figure 3-22.

Figure 3-22. Removing and Installing a Non-Redundant Power Supply



1 power supply

2 screw

3 8-pin power cable

4 24-pin power cable


5 SATA power cable


Installing a Non-Redundant Power Supply

- 1 Open the system. See "Opening the System" on page 78.
- 2 Place the power supply in the chassis. See Figure 3-22. 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 79.
- 5 Connect the power cable to the power supply and plug the cable into a power outlet.

System Battery

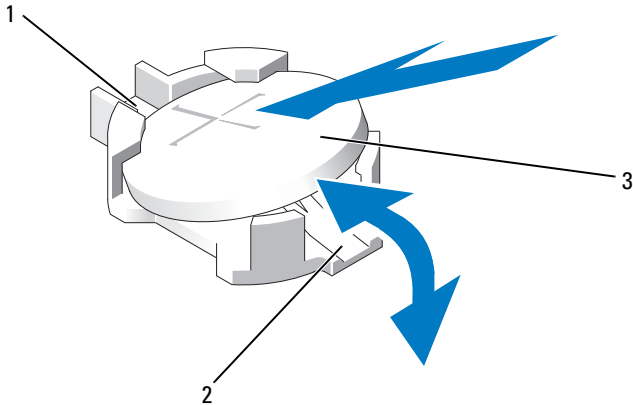
Replacing the System Battery

 **WARNING:** There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. See your safety information for additional info.

 **CAUTION:** Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support 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 78.

Figure 3-23. Replacing the System Battery



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


3 Locate the battery socket. See Figure 6-1.

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


- 4** To remove the battery, push the metal tab away from the battery until the battery pops out. See Figure 3-23.
- 5** To install the new system battery, hold the battery with the “+” facing up, and aligned to the metal tab on the socket.
- 6** Press the battery straight down into the socket until it snaps into place.
- 7** Close the system. See "Closing the System" on page 79.
- 8** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.
- 9** Enter the System Setup program to confirm that the battery is operating properly. See "Entering the System Setup Program" on page 54.

- 10 Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
- 11 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 Board Assembly and the Control Panel Display Module

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

- 1 If installed, remove the optional front bezel. See "Front Bezel (Optional)" on page 77.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and peripherals.
- 3 Open the system. See "Opening the System" on page 78.
- 4 Disconnect the control panel cable at the back of the control panel board. See Figure 3-24.

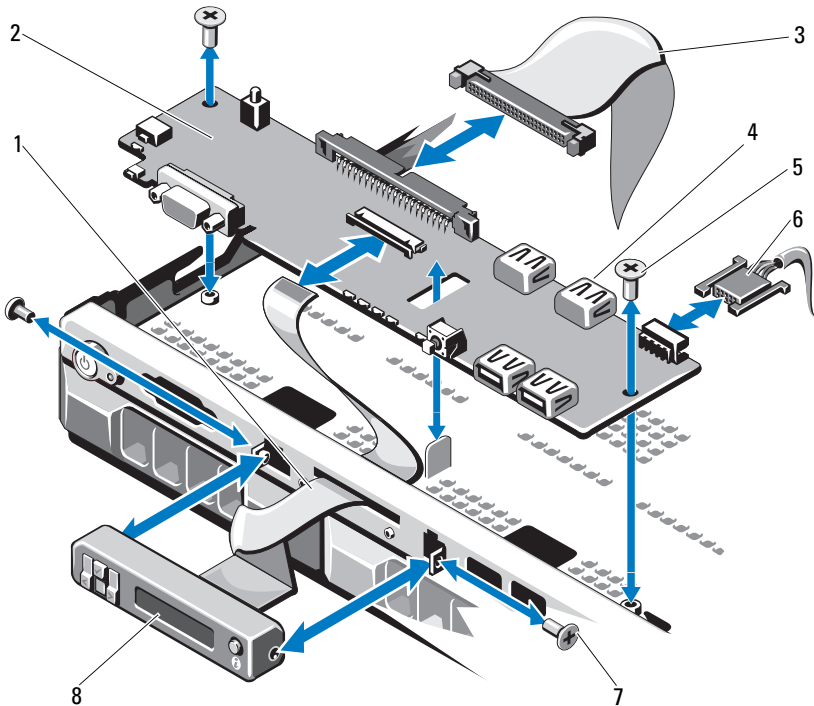
 **CAUTION:** Do not pull on the cable to unseat the connector. Doing so can damage the cable.

- a Press the metal tabs on the ends of the cable connector.
 - b Gently work the connector out of the socket.
 - c Remove the USB connector cable, the display module cable and the power cable.
- 5 Remove the two screws that secure the control panel board to the system chassis and remove the board.

This completes the removal procedure for the LED control panel.

- 6 Remove the two screws that secure the display module to the system chassis and remove the display module from the chassis cutout.

Figure 3-24. Removing and Installing Control Panel Assembly (Optional)



- | | | | |
|---|--------------------------|---|------------------------|
| 1 | display module cable | 2 | control panel board |
| 3 | control panel data cable | 4 | internal USB Connector |
| 5 | mounting screws | 6 | power cable |
| 7 | front panel screw (2) | 8 | LCD display module |


Installing the Control Panel Board Assembly and the Control Panel Display Module

For LED control panel, proceed to step 3. Insert the display module into the chassis cutout and secure with the two screws.

- 1** Affix the replacement panel to the front of the display module.
- 2** Align the slot in the control panel board with the standoff on the system chassis and secure with the two screws. See Figure 3-24. For LED control panel, skip step 4.
- 3** Connect the display module cable to the control panel board.
- 4** Connect the USB and control panel cables to the control panel board.
- 5** Close the system. See "Closing the System" on page 79.
- 6** If applicable, replace the optional front bezel. See "Front Bezel (Optional)" on page 77.
- 7** Reconnect the system to the power source and turn on the system and attached peripherals.

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.

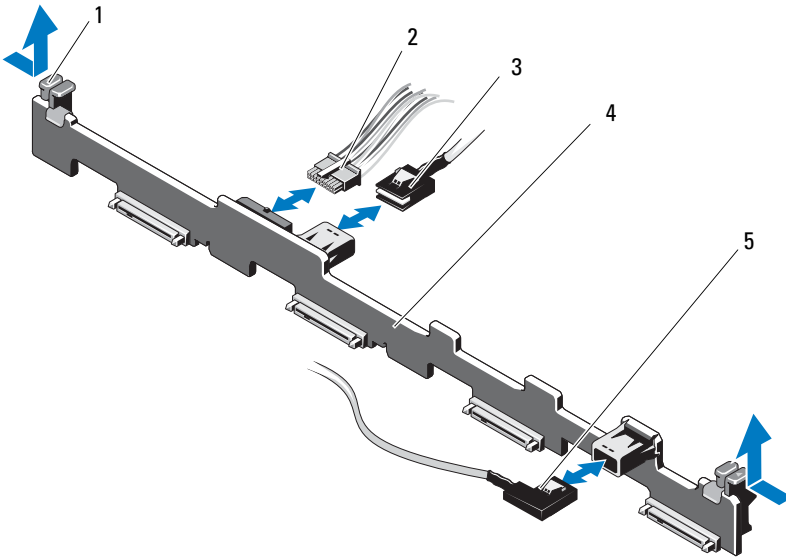
- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 78.

 **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.

- 3 Remove all hard drives. See "Removing a Hard-Drive Carrier" on page 84.
- 4 Disconnect the power cable from the SAS backplane.
- 5 Disconnect the SAS data cables from the backplane. See Figure 3-25.
- 6 Remove the optical drive cable, control panel cable, power cable, data cables, and USB cables.
- 7 Press the two blue retention latches at either ends of the SAS backplane and lift it upwards and out of the retention hooks. Be careful to avoid damaging the other components on the face of the board. See Figure 3-25.
- 8 Place the SAS backplane face down on a work surface.

Figure 3-25. Removing and Installing a SAS Backplane



- | | | | |
|---|---------------------------------|---|---------------------------|
| 1 | backplane retention latches (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** Install the SAS backplane:
 - a** Lower the backplane into the system, being careful to avoid damaging components on the face of the board.
 - b** Align the two blue retention latches on either ends with the guide posts on the system board. See Figure 3-25.
 - c** Slide the backplane downward until the two blue retention latches snap into place.
- 2** Connect the SAS data and power cables to the SAS backplane.
- 3** Reconnect the other device cables that you may have removed to uninstall the SAS backplane.
- 4** Install the hard drives in their original locations.
- 5** Close the system. See "Closing the System" on page 79.
- 6** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Power Distribution Board

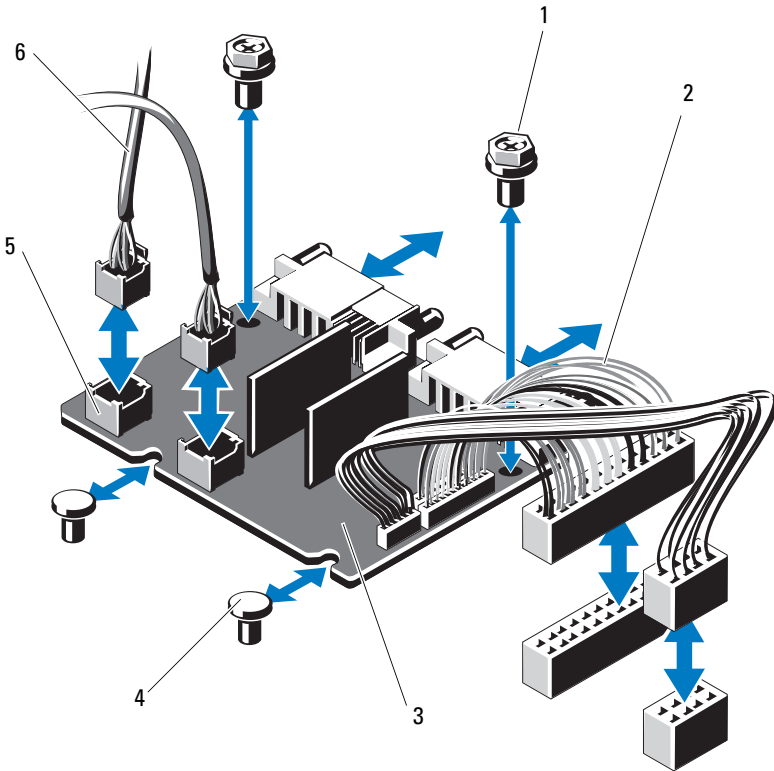
The power distribution board is located in your system directly behind the power supply fan modules. This feature provides additional cooling to the power supplies through the power distribution shroud that routes airflow to the power supplies. See Figure 3-26.

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 125.
- 2 Locate the power distribution board shroud cover and lift it out. See "Removing the Cooling Shroud" on page 101.
- 3 Disconnect the power distribution cables from the system board (see "System Board" on page 141) and disconnect the fan cable connectors.
- 4 Remove the two screws securing the power distribution board to the chassis and then lift the board out. See Figure 3-26.

Figure 3-26. Power Distribution Board



- | | | | |
|---|---------------------------------|---|-----------------------------|
| 1 | screws (2) | 2 | power supply cables (2) |
| 3 | power-distribution board | 4 | standoffs (2) |
| 5 | fan module cable connectors (2) | 6 | fan module power cables (2) |

Replacing the Power Distribution Board





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

- 1 Unpack the new power distribution board assembly.
- 2 Align the power distribution board with the standoffs on the chassis. See Figure 3-26.
- 3 Install the two screws that secure the power distribution board to the chassis. See Figure 3-26.
- 4 Connect the power distribution cables to the system board (see "System Board" on page 141) and fan cable connectors to the power distribution board as shown in Figure 3-26.
- 5 Locate the hinged interior catches on either side of the shroud and align and seat the power distribution board shroud, rotating it down and over the shroud. See "Installing the Cooling Shroud" on page 102.
- 6 Orient the power distribution board with the fan markings on the cover aligned to the fan modules and replace the shroud. See "Installing the Cooling Shroud" on page 102.
- 7 Close the system. See "Closing the System" on page 79.
- 8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

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 and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 78.
- 3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 101.
- 4 Remove any expansion card. See "Removing an Expansion Card" on page 96.
- 5 Remove the heat sink and the processor. See "Removing a Processor" on page 120.

 **WARNING:** The heat sink can get hot during operation. To avoid burns, ensure that the system has sufficient time to cool before removing the system board.

- 6 Remove the system battery. See "Replacing the System Battery" on page 130.
- 7 If installed, remove the iDRAC6 Enterprise card. See "Removing an iDRAC6 Enterprise Card" on page 119.
- 8 If installed, remove the iDRAC6 Express card. See "Removing an iDRAC6 Express Card" on page 116.
- 9 Disconnect all cables from the system board.
- 10 Remove all the memory modules. See "Removing Memory Modules" on page 111.

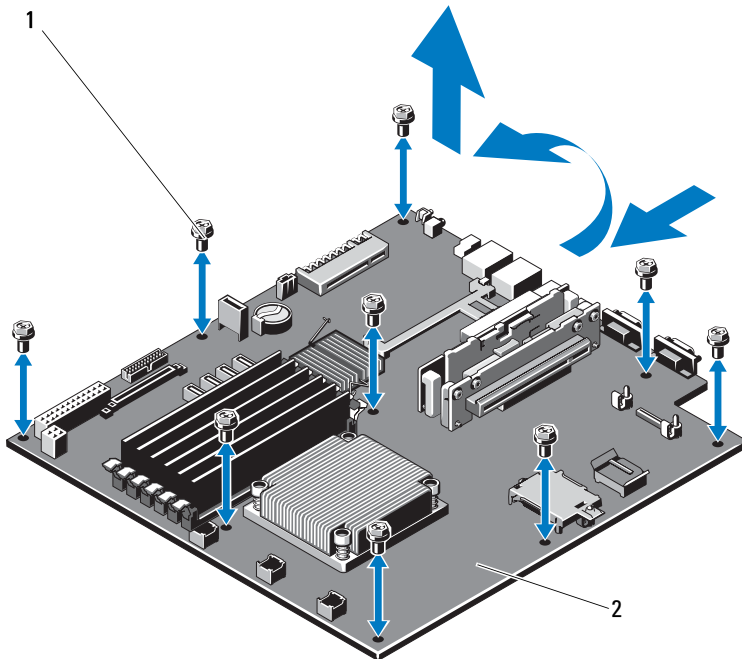
 **NOTE:** To ensure proper reinstallation of memory modules, record the memory module socket locations.

- 11 Carefully route any loose cables away from the edges of 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 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 3-27.

Figure 3-27. Removing and Installing the System Board



1 screws (9)

2 system board assembly

Installing the System Board

- 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 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.

- 4 Slightly lift up the front of the system board and maneuver the system board to the bottom of the chassis until it lays completely flat.
- 5 Push the system board toward the back of the chassis until the board is in place.
- 6 Tighten the ten screws that secure the system board to the chassis. See Figure 3-27.
- 7 Transfer the processor and the heat sink to the new system board. See "Removing a Processor" on page 120 and "Installing a Processor" on page 124.
- 8 Replace all the memory modules. See "Installing Memory Modules" on page 109.
- 9 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
 - Optical drive power cable
 - Control panel USB interface cable
 - System board power cables
- 10 Install the expansion card, if any. See "Installing an Expansion Card" on page 94.
- 11 Replace the system battery. See "Replacing the System Battery" on page 130.

- 12** If applicable, reinstall the iDRAC6 Enterprise card. See "Installing an iDRAC6 Enterprise Card" on page 117.
- 13** If applicable, reinstall the iDRAC6 Express card. See "Installing an iDRAC6 Express Card" on page 114.
- 14** Replace the cooling shroud. See "Installing the Cooling Shroud" on page 102.
- 15** Close the system. See "Closing the System" on page 79.
- 16** Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Troubleshooting Your System

Safety First—For You and Your System

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

Troubleshooting System Startup Failure

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

- If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system will hang. The reverse is also true. You must boot to the same boot mode in which you installed the operating system. See "Using the System Setup Program and UEFI Boot Manager" on page 53.
- Invalid memory configurations could cause the system to halt at startup without any video output. See "System Memory" on page 106.

For all other startup issues, note the system messages that appear onscreen. See "System Messages" on page 38 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-panel 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 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 161.

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

If the tests fail, see "Getting Help" on page 169.

Troubleshooting a USB Device

Use the following steps to troubleshoot a USB keyboard/mouse. For other USB devices, go to step 4.

- 1 Disconnect the keyboard and mouse cables from the system briefly and reconnect them.
- 2 Connect the keyboard/mouse to the USB port(s) on the opposite side of the system.
- 3 If the problem is resolved, restart the system, enter the System Setup program, and check if the non functioning USB ports are enabled.
- 4 Replace the keyboard/mouse with another working keyboard/mouse.
- 5 If the problem is resolved, replace the faulty keyboard/mouse.
- 6 If the problem is not resolved, proceed to the next step to begin troubleshooting the other USB devices attached to the system.
- 7 Power down all attached USB devices and disconnect them from the system.
- 8 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 60.

If your keyboard is not functioning, you can also use remote access. If the system is not accessible, see "Disabling a Forgotten Password" on page 168 for instructions on setting the NVRAM_CLR jumper inside your system and restoring the BIOS to the default settings.

- 9 Reconnect and power on each USB device one at a time.
- 10 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 169.

Troubleshooting a Serial I/O Device

- 1 Turn off the system and any peripheral devices connected to the serial port.
- 2 Swap the serial interface cable with 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 169.

Troubleshooting a NIC

- 1 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 161.
- 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 21.
 - 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 60.
- 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 169.

Troubleshooting a Wet System



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

- 1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 78.
- 3 Remove the following components from the system. See "Installing System Components" on page 75.
 - Hard drives
 - USB memory key
 - NIC hardware key
 - VFlash media
 - Expansion card and expansion-card riser
 - iDRAC6 Enterprise card

- iDRAC6 Express card
 - Power supply
 - Fans
 - Processor and heat sink
 - Memory modules
 - System Battery
- 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 79.
 - 7 Reconnect the system to the electrical outlet and turn on the system.
If the system does not start properly, see "Getting Help" on page 169.
 - 8 If the system starts properly, shut down the system and reinstall the expansion card that you removed. See "Installing an Expansion Card" on page 94.
 - 9 Restart the system.
 - 10 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 161.
If the tests fail, see "Getting Help" on page 169.

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 Open the system. See "Opening the System" on page 78.
- 2 Ensure that the following components are properly installed:
 - Expansion card and expansion-card riser
 - Power supply
 - Fans

- Processor and heat sink
 - Memory modules
 - Hard-drive brackets
 - Cooling shroud
- 3 Ensure that all cables are properly connected.
 - 4 Close the system. See "Closing the System" on page 79.
 - 5 Reconnect the system to the electrical outlet and turn on the system.
 - 6 Run the system board tests in the system diagnostics. See "Running the System Diagnostics" on page 161.
- If the tests fail, see "Getting Help" on page 169.

Troubleshooting the System Battery



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

- 1 Re-enter the time and date through the System Setup program. See "Using the System Setup Program and UEFI Boot Manager" on page 53.
- 2 Turn off the system and disconnect it from the electrical outlet for at least one hour.
- 3 Reconnect the system to the electrical outlet and turn on the system.
- 4 Enter the System Setup program.


If the date and time are not correct in the System Setup program, replace the battery. See "Replacing the System Battery" on page 130.

If the problem is not resolved by replacing the battery, see "Getting Help" on page 169.



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.

Troubleshooting Power Supply

 **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 Reseat the power supply by removing and reinstalling it. See "Power Supplies" on page 125.



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.

- 2 If the problem persists, replace the faulty power supply. If the problem is not resolved by replacing the power supply, see "Getting Help" on page 169.


Troubleshooting System Cooling Problems

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

Ensure that none of the following conditions exist:

- System cover, cooling shroud, drive blank, power-supply blank, or back filler bracket is removed.
- Ambient temperature is too high.
- External airflow is obstructed.
- An individual cooling fan is removed or has failed. See "Troubleshooting a Fan" on page 152.

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 Locate the faulty fan indicated by the diagnostic software.
- 2 Turn off the system and all attached peripherals.
- 3 Open the system. See "Opening the System" on page 78.
- 4 Reseat the fan's power cable.
- 5 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.


If the fan functions properly, close the system. See "Closing the System" on page 79.


- 6 If the fan does not function, turn off the system and install a new fan. See "Cooling Fans" on page 112.
- 7 Restart the system.

If the problem is resolved, close the system. See "Closing the System" on page 79.

If the replacement fan does not operate, see "Getting Help" on page 169.

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 106 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 161.
If diagnostics indicates a fault, follow the corrective actions provided by the diagnostic program.
- 2** If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least 10 seconds and then reconnect the system to power.
- 3** Turn on the system and attached peripherals and note the messages on the screen.
Go to step 12 if an error message appears indicating a fault with a specific memory module.
- 4** Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 57. Make any changes to the memory settings, if needed.
If the memory settings match the installed memory but a problem is still indicated, go to step 12.
- 5** Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 6** Open the system. See "Opening the System" on page 78.
- 7** Check the memory channels and ensure that they are populated correctly. See "General Memory Module Installation Guidelines" on page 106.
- 8** Reseat the memory modules in their sockets. See "Installing Memory Modules" on page 109.

- 9** Close the system. See "Closing the System" on page 79.
- 10** Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.
- 11** Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 57.
If the problem is not resolved, proceed with the next step.
- 12** Turn off the system and attached peripherals, and disconnect the system from the power source.
- 13** Open the system. See "Opening the System" on page 78.
- 14** If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module.
- 15** 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 109.
- 16** Close the system. See "Closing the System" on page 79.
- 17** Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.
- 18** As the system boots, observe any error message that appears and the diagnostic indicators on the front of the system.
- 19** If the memory problem is still indicated, repeat step 12 through step 18 for each memory module installed.
If the problem persists after all memory modules have been checked, see "Getting Help" on page 169.


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 60.
- 2 Turn off the system and attached peripherals.
- 3 Open the system. See "Opening the System" on page 78.
- 4 Locate the USB key and reseat it. See "Internal USB Memory Key" on page 99.
- 5 Close the system. See "Closing the System" on page 79.
- 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 79.
- 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 169.

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 Try using a different CD or DVD.
- 2 Enter the System Setup program and ensure that the drive's controller is enabled. See "Entering the System Setup Program" on page 54.
- 3 Run the appropriate online diagnostic test. See "Running the System Diagnostics" on page 161.
- 4 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 5 Open the system. See "Opening the System" on page 78.
- 6 Ensure that the interface cable is securely connected to the optical drive and to the controller.
- 7 Ensure that a power cable is properly connected to the drive.
- 8 Close the system. See "Closing the System" on page 79.

If the problem is not resolved, see "Getting Help" on page 169.

Troubleshooting a Tape Backup Unit



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

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

See the documentation for the tape drive for instructions on selecting the SCSI ID number and enabling or disabling termination.
- 6** Run the appropriate online diagnostics tests. See "Running the System Diagnostics" on page 161.
- 7** If you cannot resolve the problem, see "Getting Help" on page 169.
- 8** Reinstall the tape-backup software as instructed in the tape-backup software documentation. See your tape documentation for information about reinstalling the software and troubleshooting the tape drive.

Troubleshooting a Hard Drive

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


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


- 1 Run the appropriate online diagnostics test. See "Running the System Diagnostics" on page 161.

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

- 2 If your system has a RAID controller card 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 Cabled Hard Drive" on page 88.
 - d Exit the configuration utility and allow the system to boot to the operating system.
- 3 Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
- 4 Restart the system, enter the System Setup program, and verify that the drives appear in the System Setup program. See "Entering the System Setup Program" on page 54.


Troubleshooting 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.

 **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 "Running the System Diagnostics" on page 161.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 78.
- 4 Ensure that the expansion-card riser is firmly seated in its connector. See "Installing an Expansion Card" on page 94.
- 5 Ensure that the expansion card is firmly seated in its connector. See "Installing an Expansion Card" on page 94.
- 6 Close the system. See "Closing the System" on page 79.
- 7 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 8 If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 9 Open the system. See "Opening the System" on page 78.
- 10 Remove the expansion card. See "Removing an Expansion Card" on page 96.
- 11 Close the system. See "Closing the System" on page 79.
- 12 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 13 Run the appropriate online diagnostic test.
If the tests fail, see "Getting Help" on page 169.

Troubleshooting the 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 Run the appropriate online diagnostics test. See "Using Online Diagnostics" on page 161.
- 2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
- 3 Open the system. See "Opening the System" on page 78.
- 4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 101.
- 5 Ensure that the processor and heat sink are properly installed. See "Processor" on page 120.
- 6 Close the system. See "Closing the System" on page 79.
- 7 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
- 8 Run the appropriate online diagnostic test.
If a problem is still indicated, see "Getting Help" on page 169.

Running the System Diagnostics

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

Using Online Diagnostics

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

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

Embedded System Diagnostics Features

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

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

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

When to Use the Embedded System Diagnostics

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

Running the Embedded System Diagnostics

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

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

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

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

System Diagnostics Testing Options

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

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

Using the Custom Test Options

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

Selecting Devices for Testing

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



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

Selecting Diagnostics Options

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

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

Viewing Information and Results

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

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

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





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 system board.

System Board Jumpers

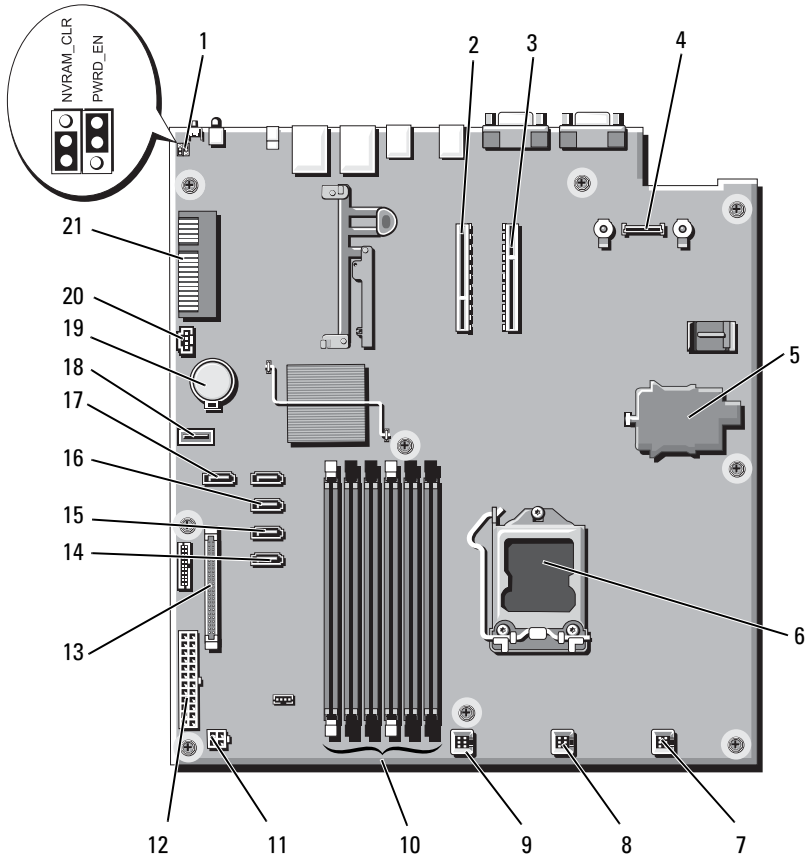
Figure 6-1 shows the location of the configuration jumpers on the system board. Table 6-1 lists the jumper settings.

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 (pins 4–6)
NVRAM_CLR	 (default)	The configuration settings are retained at system boot (pins 3–5)
		The configuration settings are cleared at the next system boot (pins 1–3)

System Board Connectors

Figure 6-1. System Board Connectors



Item	Connector	Description
1	PWRD_EN	Password enable jumper
	NVRAM_CLR	NVRAM clear jumper
2	RISER2	Expansion-card riser connector
3	RISER1	Expansion-card riser connector
4	iDRAC6 Enterprise	iDRAC6 Enterprise card connector
5	iDRAC6 Express	iDRAC6 Express card connector
6	CPU	Processor socket
7	FAN1	System fan 1 connector
8	FAN2	System fan 2 connector
9	FAN3	System fan 3 connector
10	5	Memory module slot 5
	3	Memory module slot 3
	1	Memory module slot 1 (white release lever)
	6	Memory module slot 6
	4	Memory module slot 4
11	2	Memory module slot 2 (white release lever)
	12 V	4-pin power connector
12	PWR_CONN	24-pin power connector
13	CTRL_PNL	Control panel connector
14	SATA_A	SATA connector A
15	SATA_B	SATA connector B
16	SATA_C	SATA connector C
17	SATA_D	SATA connector D
18	USB_CONN	Internal USB connector
19	BATTERY	Battery socket
20	HD_ACT_CARD	Expansion-card cable connector
21	PCIE-G2-X4	Internal storage controller card connector

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 53. The password jumper enables these password features or disables them and clears any password(s) currently in use.



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

- 1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 2 Open the system. See "Opening the System" on page 78.
- 3 Remove the jumper plug from the password jumper.
See Figure 6-1 to locate the password jumper (labeled "PWRD_EN") on the system board.
- 4 Close the system. See "Closing the System" on page 79.
- 5 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

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



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

- 6 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
- 7 Open the system. See "Opening the System" on page 78.
- 8 Install the jumper plug on the password jumper.
- 9 Close the system. See "Closing the System" on page 79.
- 10 Reconnect your system and peripherals to their electrical outlets, and turn on the system.
- 11 Assign a new system and/or setup password.
To assign a new password using the System Setup program, see "Assigning a Setup Password" on page 70.

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

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