Dell PowerEdge Servers Troubleshooting Guide

Notes, cautions, and warnings

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

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

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

Contents

Introduction

Use this guide for troubleshooting information on the Dell PowerEdge servers.

Safety instructions

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

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

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

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

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

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Dell System E-Support Tool (DSET)

Dell System E-Support Tool (DSET) is a utility that collects configuration and log data of various chassis hardware, storage, software, and operating system components of a Dell PowerEdge server and consolidates the data into a **.zip** file. This section provides the steps to install, maintain, and upgrade the DSET application on Windows and Linux operating systems.

Downloading DSET

To download the Dell System E-Support Tool (DSET), go to **Dell.com/DSET**.

Installing, upgrading, and running the DSET application on Windows operating system

You can install and run the DSET application on the Windows operating system using either the GUI or the Command Line Interface (CLI).

If you install or upgrade the DSET application on a system having OpenManage Server Administrator (OMSA) version 5.5 or lower, then an error message is displayed and the installation is not completed. Install a compatible version of the Server Administrator or remove the incompatible application and then install or upgrade the DSET application.

If the DSET application version 3.7.0 is already installed in the system and you try to install a version that is earlier than 3.6.0 or greater than or equal to DSET 3.3, then an error message is displayed. Uninstall version 3.7.0 and then run the setup program.

Installation prerequisites for Windows operating system

Before installing the DSET application, make sure that:

* Windows Management Instrumentation (WMI) service is installed and running.

  – If WMI service is stopped, the application restarts the service automatically and continues with installation.
  – If WMI service is disabled, installation of application terminates with an error message.

For installing Remote Provider, in addition to WMI, make sure that:

* Operating system is Windows 2003 or later.
* OpenManage Server Administrator (if installed) version is 6.3 or later.

To enable the successful functioning of remote report collection from OpenManage Server Administrator, ensure the following:

* The managed system and the management station are on the same domain, or there is a trust relationship between the two domains.

- If you have Windows Firewall configured on the management station or the managed system, make the following configuration changes in order to make remote Server Administrator CLI and software updates work successfully.

  - Management Station:

    1. Open TCP port 135.
    2. Add the application "`omremote.exe`" (located in **InsallDirectory\bin\utils**) to the firewall exception list.

  - Managed System:

    1. If you have the Windows Firewall configured, enable remote administration by running the following command in the command prompt:
       ```
       netsh Firewall set service RemoteAdmin
       ```

For more information on connecting through the Windows Firewall, see Microsoft's MSDN website for Platform SDK:

- For Windows Management Instrumentation (Connecting through Windows Firewall), see **http://msdn.microsoft.com/en-us/library/aa389286 (VS.85).aspx** and **http://support.microsoft.com/kb/875605**.
- For Windows Server 2008 onwards, see **http://msdn.microsoft.com/en-us/library/aa822854 (VS.85).aspx**.

Creating one-time local system DSET report on Windows operating system

The DSET application enables you to generate a configuration report without permanently installing the application. This is also known as zero footprint report collection. After the report is generated and saved on the system, all the files that were used to create the report are removed from the system.

Using GUI for Windows operating system

About this task
To run DSET application and create one-time report:

📝 NOTE: You must be logged in as an Administrator or have administrator privileges to run the application. For Windows Server 2008 and later, you must be running Remote Provider with full administrator privileges.

Steps
1. Run the **Dell_DSET_(Version Number).exe** file.
   The **Welcome to the Dell System E-Support Tool (3.7.0) Installation Wizard** window is displayed.
2. Click **Next**.
   The **License Agreement** window is displayed.
3. Select **I accept the license agreement** and click **Next**.
   The **Installation Type** window is displayed.
4. Select **Create a One-Time Local System DSET Report** and click **Next**.
   The **Report Settings** window is displayed.
5. Do the following:
   - **Report Name or Full Path to Save the Report**—Enter only the filename or the complete path with the filename to save the generated report. If you mention only the filename, the report is saved to the default location.

     📝 NOTE: You can save the report only to an internal network path and not an HTTP path.

> **NOTE:** The default location for Windows (x86) systems is **C:\Program Files\Dell** and for Windows (x86_64) systems is **C:\Program Files (x86)\Dell**.

- **Enable Report Filtering** — Select this option to filter the data from the report. For the list of data that is filtered, see the "Report Filtering" section in the *Dell System E-Support Tool (DSET) User's Guide*.

- **Automatically Upload the Report to Dell** — Select this option to upload the report to Dell Technical Support when requested.

6. Click **Next**.

   The **Report Settings to Skip Specific Information** window is displayed.

7. Clear the options for which information is not required to be collected in the report. The options are:
   - Hardware Information
   - Storage Information
   - Software Information
   - Log Files

8. Select the **Gather Advanced Log Files Information** option to collect all the log information in the report.

   > **NOTE:** If you select the advanced log files option, by default, all the logs are collected and may create large size reports.

9. Click **Next**.

   The **Ready to Collect Report** window is displayed.

10. Click **Start**.

    The **Updating System** window is displayed indicating the status of report collection.

11. Click **Finish** in the **Dell System E-Support Tool (3.7.0) report has been successfully created** window.

The report is saved on the desktop or at the specified location.

Using CLI for Windows operating system

To run the DSET application, run the following command:

- `Dell_DSET_(version number).exe` — This invokes the GUI.
- `Dell_DSET_(version number).exe REPORTNAME=<name> COLLECT=<hw,sw,st,lg,ad> UPLOAD=auto PRIVACY='yes|no' /qn` — This is for silent Zero Footprint report collection.

where:

`<name>` is a valid Windows filepath, filename, or both filepath and filename

`<hw,sw,st,lg,ad>` are independent report options that can be specified together with a comma separator without any space.

`hw` = All hardware information

`sw` = All software (and operating system) information

`st` = All storage information

`lg` = All logs from the operating system and various applications

`ad` = Include advanced log items

`PRIVACY=yes` Filters data from the report. For the list of data that is filtered, see the "Report Filtering" section in the *Dell System E-Support Tool (DSET) User's Guide*.

Usage Examples on silent Zero Footprint report collection:

- Example 1: To collect the hardware, software data and upload the report automatically:
  ```
  Dell_DSET_(version number).exe REPORTNAME= ZFPReport1.zip COLLECT= hw,sw
  UPLOAD=auto
  ```
- Example 2: To collect the software, storage, logs and report filtering:
  ```
  Dell_DSET_(version number).exe REPORTNAME= ZFPReport2.zip COLLECT= sw,st,lg
  PRIVACY=yes
  ```

Permanently installing the DSET application and generating report on Windows operating system

Before installing the DSET application, make sure that the installation prerequisites are met. For more information, see Installation prerequisites for Windows operating system.

Using GUI for Windows operating system

Prerequisites
You must be logged in as an Administrator or have administrator privileges to run the application. For Windows Server 2008 and later, you must be running Remote Provider with full administrator privileges.

Steps
1. Run the **Dell_DSET_(Version Number).exe** file.
   The **Welcome to the Dell System E-Support Tool (3.7.0) Installation Wizard** window is displayed.
2. Click **Next**.
   The **License Agreement** window is displayed.
3. Select **I accept the license agreement** and click **Next**.
   The **Installation Type** window is displayed.
4. Select **Install DSET** and click **Next**.
   The **Select Installation Type** window is displayed.
5. Select one of the following options and click **Next**:
   - DSET and Remote Provider (Recommended)
   - DSET
   - Remote Provider

   The **Destination Folder** window is displayed.
6. Click **Browse** and select the folder to install the DSET application or use the default location and click **Next**.
   The **User Information** window is displayed.

   > **NOTE:** The default location for Windows (x86) systems is **<system drive>:\Program Files\Dell** and for Windows (x86_64) systems is **<system drive>:\Program Files (x86)\Dell**
7. Enter the following:
   - **Full Name** — Enter your full name.
   - **Organization** — Enter the name of your organization.
8. Click **Next**.
   The **Ready to Install the Application** window is displayed.

9. Click **Next**.

   The **Updating System** window is displayed indicating the installation status.

10. To generate and/or to upload the report (optional step) :

    - **Run and Collect DSET Report** — Select this option to generate the report.
    - **Automatically Upload the Report to Dell** — This option is enabled when **Run and Collect DSET Report** option is selected. Select this option to upload the report to Dell Technical Support when requested.

11. Click **Finish** to close the installer.

    The DSET application is now installed in the local system, and if you have performed step 11, the report is also generated and/or uploaded.

Using CLI for Windows operating system

To install the DSET application, run the following commands:

- `Dell_DSET_(version number).exe` — This invokes the GUI.
- `Dell_DSET_(version number).exe INSTALL=<full/collector/provider> INSTALLDIR=<location> /qn` — This performs silent installation that does not display any graphical progress bar.

Where:

`full` = Full installation of both DSET and Remote Provider on the local system

`collector` = Installation of DSET only for remote collection

`provider` = Installation of Remote Provider only for remote collection from a remote system

`location` = optional installation path

NOTE: To install the application permanently, the `INSTALL` parameter must be included in the command.

Clearing Dell hardware logs on Windows operating system

The DSET application clears Dell hardware logs (Embedded System Manager logs) from the system without permanently installing the application. You can clear hardware logs using the installer or from the **Start** menu.

Using installer for Windows operating system

About this task
To clear hardware logs from the system:

NOTE: Clearing the hardware logs from the system does not install the DSET application permanently.

Steps
1. Run the `Dell_DSET_(Version Number).exe` file.

   The **Welcome to the Dell System E-Support Tool (3.7.0) Installation Wizard** window is displayed.

2. Click **Next**.

   The **License Agreement** window is displayed.

3. Select **I accept the license agreement** and click **Next**.

   The **Installation Type** window is displayed.

4. Select **Clear Dell Hardware Logs** and click **Next**.

   The **User Information** window is displayed.

5. Enter the following:
   - **Full Name** — Enter your full name.
   - **Organization** — Enter the name of your organization.

6. Click **Next**.

   The **Ready to Install the Application** window is displayed.

7. Click **Next**.

   The **Updating System** window is displayed. After some time the command window is displayed with the following message:

   ```
   *Going to clear the ESM Logs now
   Do you want to continue? Y/N:
   ```

8. Enter Y to clear the logs.

   The following messages are displayed:

   ```
   System event logs are cleared.
   Press Any Key To Continue
   ```

9. Press any key.

   The command window closes and the **Click the Finish button to exit this installation.** window is displayed.

10. Click **Finish** to close the DSET application.

Using GUI for Windows operating system

About this task

To clear hardware logs:

Steps

1. Go to **StartDSET 3.7.0 → Clear ESM Logs**

   The **Clear ESM Logs** command window displays the following message:

   ```
   *Going to clear the ESM Logs now
   Do you want to continue? Y/N:
   ```

2. Enter Y to clear the logs.

   The following messages are displayed:

   ```
   System event logs are cleared.
   Press Any Key To Continue
   ```

3. Press any key.

   The command window closes.

Extracting MSI package for large site automated deployment

About this task

To extract the MSI file from DSET EXE:

Steps

1. Run the **Dell_DSET_(Version Number).exe** file.

   The **Welcome to the Dell System E-Support Tool (3.7.0) Installation Wizard** window is displayed.

2. The MSI is extracted to the following location:

   <system drive>:\Program Files\Common Files\Wise Installation Wizard

> **NOTE:** The MSI location for Windows (x86) systems is **<system drive>:\Program Files\Common Files\Wise Installation Wizard** and for Windows (x86_64) systems is **<system drive>:\Program Files (x86)\Common Files\Wise Installation Wizard**.

The folder must contain only one MSI file that can be copied and renamed if required.

Upgrading the DSET application on Windows operating system

You can upgrade to the DSET application version 3.7.0 from any of the following previous versions:

- DSET 1.8
- DSET 1.9
- DSET 2.0
- DSET 2.1
- DSET 2.2
- DSET 3.2
- DSET 3.3
- DSET 3.4
- DSET 3.5.0
- DSET 3.5.1
- DSET 3.6.0

> **NOTE:** For the DSET application versions below 1.8, automatic upgrade to version 3.7.0 is not possible. When version 3.7.0 installer is running, the installer terminates with an error message. In such cases, uninstall previous versions of the application and then install version 3.7.0.

> **NOTE:** Installation of the DSET application does not require a system reboot.

Using the installer

About this task

To automatically upgrade to the DSET application version 3.7.0 using the installer:

Steps

1. Run the **Dell_DSET_(Version Number).exe** file.
   The **Welcome to the Dell System E-Support Tool (3.7.0) Installation Wizard** window is displayed.
2. Click **Next**.
   The **DSET (Version Number) is already installed** window is displayed.

   > **NOTE:** If you do not want to upgrade, click **Cancel** to exit the installer.

3. Click **Upgrade** to upgrade to DSET version 3.7.0.
   The **License Agreement** window is displayed.

   > **NOTE:** For upgrading from versions 2.2 and lower, only DSET and the Remote Provider permanent installation options are available.

4. Follow steps 3 to 11 provided in <u>Using GUI For Windows Operating System</u>.

Using CLI

To automatically upgrade to the DSET application version 3.7.0 using CLI, at the prompt, run the command:

- `Dell_DSET_(Version Number.exe` — This invokes the GUI.

- `Dell_DSET_(version number).exe ADDLOCAL=<full/collector/provider> INSTALLDIR=<location> /qn` — This performs silent installation that does not display any graphical progress bar.

NOTE:

- `ADDLOCAL` parameter in the command is optional.
- For version 3.2 and later, while upgrading, if `ADDLOCAL` parameter is not included in the command, then only the installed component is upgraded.
- For version 2.2 or lower, if `Dell_DSET_(version number).exe /qn` is run, then both DSET applications are upgraded.

Where:

`full` = Full installation of both DSET and Remote Provider on the local system.

`collector` = Installation of DSET only for remote collection.

`provider` = Installation of Remote Provider only for remote collection from a remote system.

If DSET application version 3.2 or later is currently installed in the system, use the following options to upgrade to version 3.7.0:

Table 1. : Upgrading scenarios from DSET application version 3.2 or later to version 3.7.0

	DSET and Remote Provider	DSET	Remote Provider
DSET and Remote Provider	Yes	Yes	Yes
DSET	Yes	Yes	Yes
Remote Provider	Yes	Yes	Yes

Installing, upgrading, and running the DSET application on Linux operating system

This section provides information to install, upgrade and run the DSET application on Linux operating system.

If you install or upgrade the DSET application on a system having OpenManage Server Administrator version lower than 5.5, then an error message is displayed and the installation is not completed. Install a compatible version of the Server Administrator or remove the incompatible application and then install or upgrade the DSET application.

If the DSET application version 3.7.0 is already installed in the system and you try to install version 3.6, then an error message is displayed. Uninstall version 3.7.0 and then run the setup program.

During installation, the application checks if OpenPegasus CIMOM or SFCB service is installed or running. The following table provides more information.

Table 2. : Service and DSET application operation

Service	DSET Application Operation
OpenPegasus is not installed	Installs SFCB
OpenPegasus is installed and running	Uses OpenPegasus
OpenPegasus is installed but service is stopped	Installs SFCB
SFCB is not installed	Installs SFCB
SFCB is installed and running	Uses SFCB
SFCB is installed but service is stopped	Starts SFCB service

NOTE: The default port 5988 (for http) or 5989 (for https) is used by the system to install Remote Provider. If custom ports are used, update the configuration file available at **/opt/dell/advdiags/dset/config/dset.cfg**.

Installation prerequisite for Linux operating system

- Enable SSH services for remote report collection from Linux systems.
- Make sure that the user credentials supplied for remote report collection can initiate SSH connection and have root privileges.
- For installing Remote Provider, make sure that:

  - Operating system is RHEL 5, RHEL 6, RHEL 7, SLES 10, SLES 11, ESX 4.0 or ESX 4.1.
  - OpenManage Server Administrator (if installed) version is 6.3 or later.
  - The default port 5988 (for http) or 5989 (for https) is used by the system. If custom ports are used, update the configuration file available at /opt/dell/advdiags/dset/config/dset.cfg.

Device dependency on Linux operating system

The following table lists the devices and the dependencies that are required for Linux operating system to run the DSET application. If these device dependencies are not met, the DSET application exhibits the default behavior.

Table 3. : Device, dependency, and default behavior

Device	Dependency	Default Behavior (if dependency is not met)
Emulex Fibre Channel Controller	• HBAnywhere utility from Emulex. To download this utility, access the Emulex website at **emulex.com**. a. Click **Downloads → Dell**. b. Click the adapter model number. c. Click **Linux** from the Current Drivers section and download the **Applications Kit**.	Fibre Channel Controllers are not displayed in the DSET report

Device	Dependency	Default Behavior (if dependency is not met)
	• Install libhbaapi rpm available in the operating system DVD.	
QLogic Fibre Channel Controller	• SNIA API for Linux drivers. To download this, access the QLogic website at **qlogic.com**. a. Click **Downloads → Fibre Channel Adapters** . b. Select a model and an operating system and click **Go**. • Install libhbaapi rpm available in the operating system DVD.	Fibre Channel Controllers are not displayed in the DSET report

Credential-less CIMOM authentication on systems running Linux

When installing DSET or collecting the DSET report using DSET version 3.5.0 and earlier on systems running Linux, you must enter the password in the command line interface. If the credentials are correct and the CIMOM (SFCB or TogPegasus) authentication is successful, the installation or report collection process is successfully completed.

From DSET version 3.5.1 and later, DSET supports single sign-on for the logged-in user. Single sign-on allows you to run DSET without entering the password. CIMOM accepts a client certificate while establishing the HTTPS connection. If the certificate is signed by a trusted authority, a network connection is started. During installation, DSET generates and deploys its own certificate and key which is used later. The access to certificate and key is limited only to the `root` user.

A brief description about the DSET installation or report collection process:

1. Collecting DSET report without providing any username or password: DSET tries for CIMOM connections through certificates.

    a. If the connection is successful, the report collection continues without prompting for a password.
    b. If the connection is unsuccessful, DSET asks whether or not you want to provide password and continue.

        • If you choose to continue, DSET prompts you to enter root password and proceed.
        • If you decide not to proceed, credential-based authentication is not performed.
2. Collecting DSET report by providing username and/or password, DSET will not try for a certificate-based connection and prompts for a password (if not entered).

🖉 NOTE: The tasks mentioned earlier in Credential-less CIMOM Authentication On Systems Running Linux section are also applicable for DSET installation only when CIMOMs are pre-installed and operational.

Possible Reasons For Unsuccessful Certificate Connection

The following are the possible reasons for unsuccessful certificate connection:

• The DSET client certificate has expired. By default, the certificate is valid for one year from the time of generation.

- A particular version of operating system or CIMOM does not support certificate-based authentication.
- The DSET does not perform the certificate-based connections because there are known issues with a particular version of operating system or CIMOM for certificate-based authentication.
- The DSET client certificate or CIMOM Trust Store is corrupted.

Limitations

The following are the limitations:

- The Credential-less authentication does not work on ESX. Therefore, the DSET requires the credentials to run on ESX.
- For Credential-less authentication, the minimum supported version of Tog-pegasus is 2.11.0 and that of SFCB is 1.3.11. In case the server has CIMOM versions earlier than the versions specified, you will be prompted for a password.

Operating system check override option on Linux operating system

When you try to install DSET by running `./dell-dset-lx(bit)-(Version Number).bin`, the installer checks for the type of operating system. If you have customized the operating system, the installation is automatically stopped.

To resolve this issue, run the following command:

`./dell-dset-lx(bit)-(Version Number).bin --ostype=<Operating_System_Name>`

where `Operating_System_Name` can be any of the following five values:

- SLES
- RHEL5
- RHEL6
- RHEL7
- CENT
- ESX

NOTE: If any other value is entered apart from the OSs listed here, the installer throws an error message.

The strict type-checking is to make sure that only the correct packages required for DSET report collection are deployed on a server.

Creating one-time local system DSET report on Linux operating system

About this task

The DSET application enables you to generate configuration reports without permanently installing the application. This is also known as zero footprint report collection. After the report is generated and saved on the system, all files used to create the report are removed from the system.

To run the DSET application and create one-time report:

NOTE: You must be logged in as root user to run the DSET application.

Steps

1. At the Linux shell prompt, run the **./dell-dset-lx(bit)-(Version Number).bin** file.

   The **License Agreement** window is displayed along with the following message:

```
                    Do you agree to the above license terms? ('y' for yes | 'Enter' to exit):
```
2. Enter `y`.

   The installation types are displayed.

3. Enter `<option number>` to select **Create a One-time Local System DSET Report**.

4. Enter `y` or `n` for the following messages that are displayed one at a time to choose the category for which the data must be collected. To select the default option (underlined) press the Enter key.

   - `Do you want to collect info for all hardware categories [y|n]:`
   - `Do you want to collect info for all storage categories [y|n]:`
   - `Do you want to collect info for all software categories [y|n]:`
   - `Do you want to collect linux log files [y|n]:`
   - `Do you want to collect advanced log files [y|n]:`

   NOTE: If you select the advanced log files option, by default, all the logs are collected and may create large size reports.

5. Enter `y` if you want to use the default file name for the report when the following message is displayed. Else, enter `n` to specify a file name:

   `Do you want store this report in a default name and location [y|n]:`

   If you enter `n`, provide the report name or full path where the generated report must be saved. If the path is not specified, the report is saved in the root directory.

   NOTE: You can only save the report to an internal network path and not an HTTP path.

6. Enter `y` to enable report filtering when the following message is displayed. Else enter `n`.

   `Do you want to enable report filtering [y|n]:` Enter `y` to filter the data from the report. For the list of data that is filtered, see *Report Filtering* section in the user's guide.

7. To automatically upload the report to Dell site, enter `y` when the following message is displayed. Else, enter `n`:

   `Do you want to upload the report on request to Dell Technical Support after the report is generated [y|n]:`

8. If CIMOM already exists, the DSET validates the CIMOM in the following order:
   a. [Credential-less CIMOM authentication](#)
   b. If Credential-less CIMOM authentication is not successful, enter the root credentials of the system when the following message is displayed: `Please enter "root" password:`

   The data collection starts, the report is generated and saved as specified in step 5. If you chose to automatically upload the report, the report is uploaded and the **Report uploaded successfully** message is displayed.

   To view the report, see *Viewing DSET Report* section in the user's guide.

Creating one-time local system DSET report silently

For silent Zero Footprint report collection, run the command:

```
dell-dset-lx(bit)-(Version Number).bin –qn -d <options> -r <reportname> -v
<yes/no> -p <password> -a<auto>:
```

NOTE: The `-p` option must be included in the command to collect the report.

NOTE: The `-v yes` option filters data from the report. For the list of data that is filtered, see the "Report Filtering" section in the *Dell System E-Support Tool (DSET) User's Guide*.

Permanently installing the DSET application on Linux operating system

About this task

You can permanently install or upgrade the following components on the Linux operating system:

- DSET and Remote Provider
- DSET
- Remote Provider

NOTE: You must be logged in as root to install the DSET application.

Steps

1. At the Linux shell prompt, run the **./dell-dset-lx(bit)-(Version Number).bin** file.

   The **License Agreement** window is displayed along with the following message:

   ```
   Do you agree to the above license terms? ('y' for yes | 'Enter' to exit):
   ```

2. Enter y.

   The installation types are displayed. The following table provides the installation types:

   Table 4. :Installation types

Type	Installation Option	Description
1	Install/Upgrade DSET and Remote Provider (Recommended)	Select this option to permanently install DSET and Remote Provider to generate reports for local and remote systems and also remote report collection from this system.
2	DSET	Select this option to permanently install the required components to generate report from remote systems.
3	Remote Provider	Select this option to permanently install the required components to enable reports to be generated from a remote system against this system.

   NOTE:
   - For DSET application version 2.2 or lower, installation type 1 is displayed.
   - If version 3.2 or later of 'DSET and Remote Provider', or 'DSET', or 'Remote Provider' is currently installed in the system, then installation types 1, 2, and 3 are displayed.
   - For DSET application 3.5.1:
     - If DSET is currently installed in the system, then installation type 3 is displayed.
     - If Remote Provider is currently installed in the system, then installation type 2 is displayed.

3. Enter the `<option number>` to select the required installation type.

   If the `Install/Upgrade DSET and Remote Provider` or `Remote Provider` option is selected, during installation the following messages are displayed:

   a. If OpenPegaus is not running, the following message is displayed: `The Small Footprint CIM Broker (SFCB) is a network service that enables remote collection of system configuration information. To perform the option that you selected,`

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it is necessary to install and start this service and leave it running in
background for future configuration collection. Continue installing/
activating the SFCB on this system to listen for incoming collection
requests from clients. Do you want proceed[y|n]?.

Enter `y`.

If SFCB is installed, the following message is displayed: `DSET collects the Hardware data`
`via Common Information Model Object Model(CIMOM): sblim-sfcb, which is`
`already present on this system, please wait while DSET validates the`
`existing sblim-sfcb...`

b. If OpenPegasus is running, the following message is displayed: `DSET collects the Hardware`
`data via Common Information Model Object Model(CIMOM): tog-pegasus,which`
`is already present on this system, please wait while DSET validates the`
`existing tog-pegasus...`

4. If CIMOM already exists, DSET validates the CIMOM in the following order:

a. [Credential-less CIMOM authentication](#)

b. If Credential-less CIMOM authentication is not successful, enter the root credentials of the
system when the following message is displayed: `Please enter "root" password:`

Wait for the installation to complete. The following messages are displayed based on the selected
installation type:

- If you selected the `Install/Upgrade DSET and Remote Provider` option, the following
  message is displayed: `DSET installation completed successfully. Enter '/usr/`
  `sbin/dellsysteminfo' from a terminal shell prompt to create a report`
  `file`

- If you selected the `DSET` option, then the following message is displayed: `The DSET`
  `installation completed successfully. Enter '/usr/sbin/dellsysteminfo'`
  `from a terminal shell prompt to create a report file.`

- If you selected the `Remote Provider` option, the following message is displayed: `Remote`
  `Provider installation completed successfully.`

The DSET application is installed at the **/opt/dell** location by default.

Permanently installing the DSET application silently on Linux operating system

For silent installation, run the command:

`dell-dset-lx(bit)-(Version Number).bin -qi <full/collector/provider>`

NOTE:

- Case 1: On the Linux operating system, if no CIMOMs (SFCB / Tog-Pegasus) are present and
  DSET installer is executed in silent mode, then DSET Installer installs SFCB and registers the
  provider on the system as part of Provider Installation, but SFCB services are not started.

- Case 2: On the Linux operating system if any CIMOMs (SFCB / Tog-Pegasus) are present,
  services are disabled, and DSET installer is executed in silent mode, then

  - If Tog-Pegasus is present, then the DSET Installer installs SFCB and registers the provider on
    the system as part of installation, but its services are not started.

  - If SFCB is present, then DSET Installer registers provider under SFCB as part of installation,
    but its services are not started.

In both the cases, to collect the DSET report the user must start the SFCB services and also must
add SFCB as part of default start-up services. Also, CIMOM Validation check for pre-existing CIMOM
cannot be done in silent installation mode.

Clearing Dell hardware logs on Linux operating system

About this task

The DSET application clears Dell hardware logs (Embedded System Manager logs) from the system without permanently installing the application.

To clear hardware logs from the system:

📝 **NOTE:** You must be logged in as root to run the DSET application.

Steps

1. At the linux shell prompt, run the **./dell-dset-lx(bit)-(Version Number).bin** file.

   The **License Agreement** is displayed along with the following message:

   ```
   Do you agree to the above license terms? ('y' for yes | 'Enter' to exit):
   ```

2. Enter y.

   The installation types are displayed.

3. Enter `<option number>` to select **Clear Dell Hardware Logs** option. The following messages are displayed:

   ```
   *Going to clear the ESM Logs now

   Do you want to continue? Y/N:
   ```

4. Enter y to clear the logs. The following messages are displayed:

   ```
   System Event Logs are cleared.

   Press Enter to continue
   ```

5. Press **Enter**.

   The DSET application exits and the Linux shell prompt appears.

Upgrading the DSET application on Linux operating system

About this task

You can upgrade to the DSET application version 3.7.0 from any of the following previous versions:

- DSET 1.8
- DSET 1.9
- DSET 2.0
- DSET 2.1
- DSET 2.2
- DSET 3.2
- DSET 3.3
- DSET 3.4
- DSET 3.5.0
- DSET 3.5.1
- DSET 3.6.0

NOTE: For versions lower than 1.8, automatic upgrade to DSET application version 3.7.0 is not possible. When version 3.7.0 installer is run, the installer terminates with an error message.

In such cases, uninstall previous versions of the application and then install the DSET application version 3.7.0.

NOTE: DSET application does not require a system reboot.

To automatically upgrade to DSET application version 3.7.0 on Linux operating system:

Steps

1. At the Linux shell prompt, run the **./dell-dset-lx(bit)-(Version Number).bin** file.

    The **License Agreement** is displayed along with the following message:

    ```
    Do you agree to the above license terms? ('y' for yes | 'Enter' to exit):
    ```

2. Enter y.

    Dell System E-Support Tool (DSET) application options are displayed.

3. Enter the `<option number>` to select **Install/Upgrade DSET and Remote Provider (Recommended)** option. The following messages are displayed:

    ```
    DSET (Version number)is already installed.

    Do you want to upgrade to DSET 3.7.0 [y|n]?
    ```

4. Enter y.

    If SFCB or OpenPegasus is not installed or running, the following message is displayed:

    ```
    The Small Footprint CIM Broker (SFCB) is a network service that enables
    remote collection of system configuration information.

    To perform the option that you selected, it is necessary to install and
    start this service and leave it running in background for future
    configuration collection.

    Continue installing/activating the SFCB on this system to listen for
    incoming collection requests from clients. Do you want proceed[y|n]?
    ```

5. Enter y.

    If OpenPegasus is installed and running, the following message is displayed:

    ```
    DSET collects the Hardware data via Common Information Model Object
    Model(CIMOM): tog-pegasus, which is already present on this system, Please
    enter the Administrator/Root password to validate the existing tog-pegasus.
    ```

6. Enter the root credentials when the following message is displayed:

    ```
    Please enter "root" password:
    ```

    Wait for the installation to complete.

    The **DSET installation completed successfully** message is displayed. The DSET application is upgraded to version 3.7.0 and is installed at **/opt/dell** location by default.

Upgrading the DSET application silently on Linux operating system

To upgrade silently, run the command:

```
./dell/dset/lx(bit)/<version number>.bin —qi <full/collector/provider>
```

NOTE:

- If DSET application version 2.2 or lower is currently installed in the system and CIMOM services are not installed or running, then the application cannot be silently upgraded to version 3.7.0.
- For DSET application version 3.2 or later:
  - If `<full/collector/provider>` parameter is provided in the command, then the currently installed DSET application is uninstalled completely and the specified component of version 3.7.0 is installed.
  - If `<full/collector/provider>` parameter is not provided in the command, then the currently installed DSET application component is upgraded to version 3.7.0.

Deploying Dell OpenManage Server Administrator on VMware ESXi Using Dell Online Depot and VMware Update Manager

Introduction to OMSA and VUM

Dell OpenManage Server Administrator (OMSA) is a software agent that provides a comprehensive, one-to-one systems management solution. OMSA is designed for system administrators to manage server systems remotely on a network.

In the VMware ESXi context, a software depot is used to package and distribute VIBs (vSphere Installation Bundles). There are two types of depots – online and offline. An online software depot is accessed remotely by using HTTP. An offline software depot is downloaded and accessed locally. Dell hosts an Online depot of the latest revision of OMSA images specific for VMware EXSI hypervisor. End users can access and use these images to deploy OMSA on VMware ESXi. The depot contains multiple revisions of OMSA bits compatible for VMware ESXi 4.x and 5.x branches. This can be utilized by VMware Update Manager (VUM) for installing OMSA software on VMware ESXi hosts.

This section provides instructions to install OMSA on VMware ESXi by using VUM and Dell Online depot. The process is the same for both VMware ESXi 4.x and 5.x versions.

Prerequisites for installing OMSA using VUM

- Microsoft Windows system installed with VMware vCenter Server
- VMware Update Manager (VUM) Plugin
- Internet connectivity for the system installed with vCenter server and VUM— to access the Dell Online depot.

Refer to [VMware documentation](#) for installation steps of the above mentioned software. It is possible to create a local depot as well if there is no internet connectivity to the system where VUM is installed. Refer to the following **Maintaining local depot** section for details.

Maintaining Local Online VMware Depot

It is possible to have a local depot created for the users who do not want to have internet connectivity to the server where the VUM and other VMware components are installed. A local depot can be created by using a system running the Linux operating system which has apache webserver installed. After the webserver is set up, download all files from the Dell Online depot and save the files under the webserver

document in the root directory. Make sure that the directory structure is the same as the Dell Online depot. See VMware documentation to know more on creating a vSphere Update manager depot.

Deploying OMSA using VUM

About this task

The URL for accessing the Dell online depot is https://vmwaredepot.dell.com/index.xml. Perform the following steps to make the Dell Online depot available to VUM:

Steps

1. Set a proxy server in VUM to access the external sites from the local machine.

   > **NOTE:** If you use the local depot which does not require a proxy server to communicate, then skip this step. The proxy server can be set in **Configuration → Download Settings**section of **Update Manager** section as shown below.
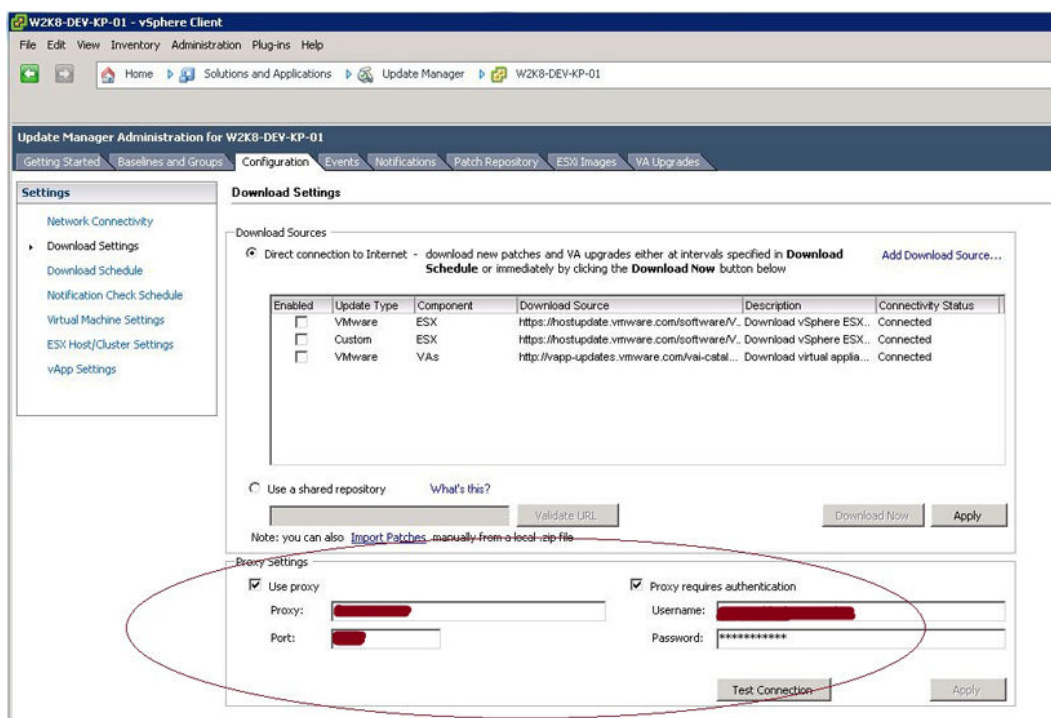
Figure 1. Setting up a proxy server

With a valid proxy server set in VUM, add the online depot URL and click **Validate URL**Validate URL. The status of the connection changes to **Connected**, which means that VUM is able to contact the Dell Online depot.
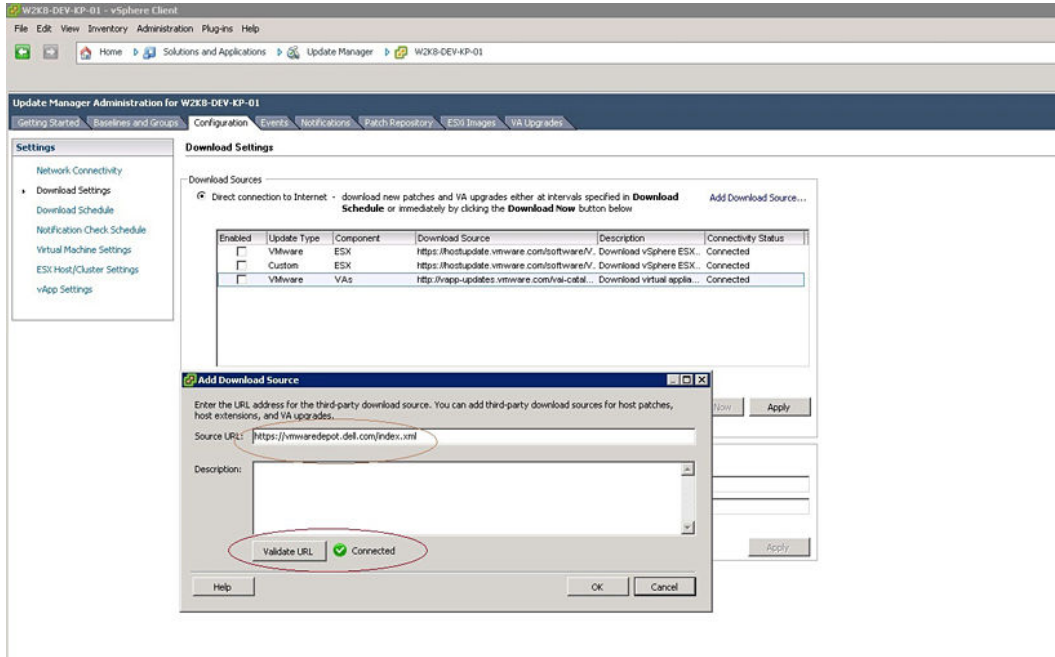
Figure 2. Adding the online depot URL

2. Click **OK** to continue.
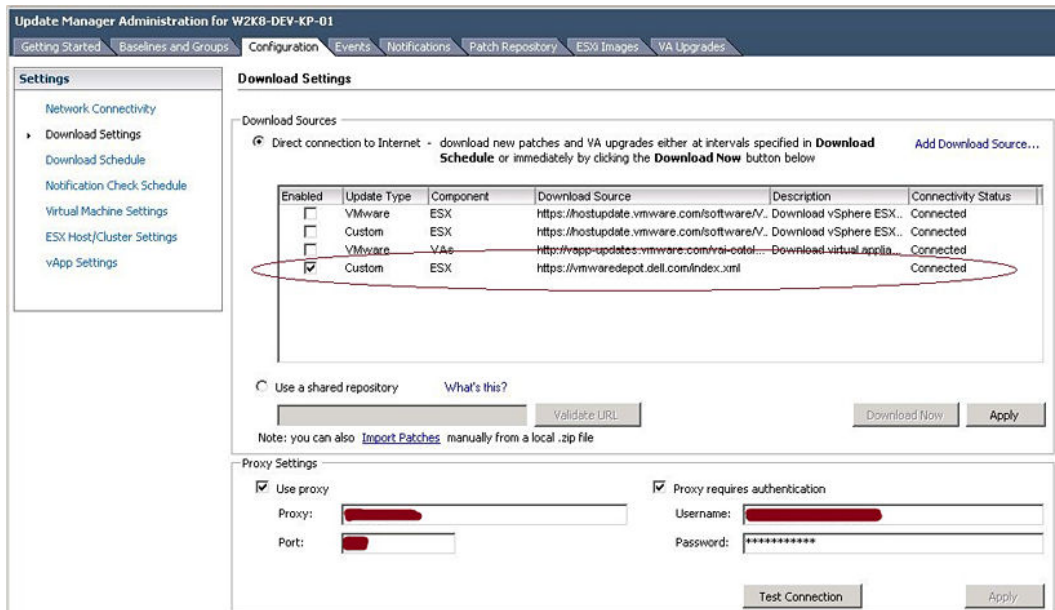
Figure 3. Connection status of the online depot

3. Click the **Download Schedule** section in VUM to download the available OpenManage extensions to VUM repository as shown below.

   As an example, the **Frequency** tab is set to **Once** and **Start Time** is set to **Now**. This task can be scheduled to a convenient time as well.
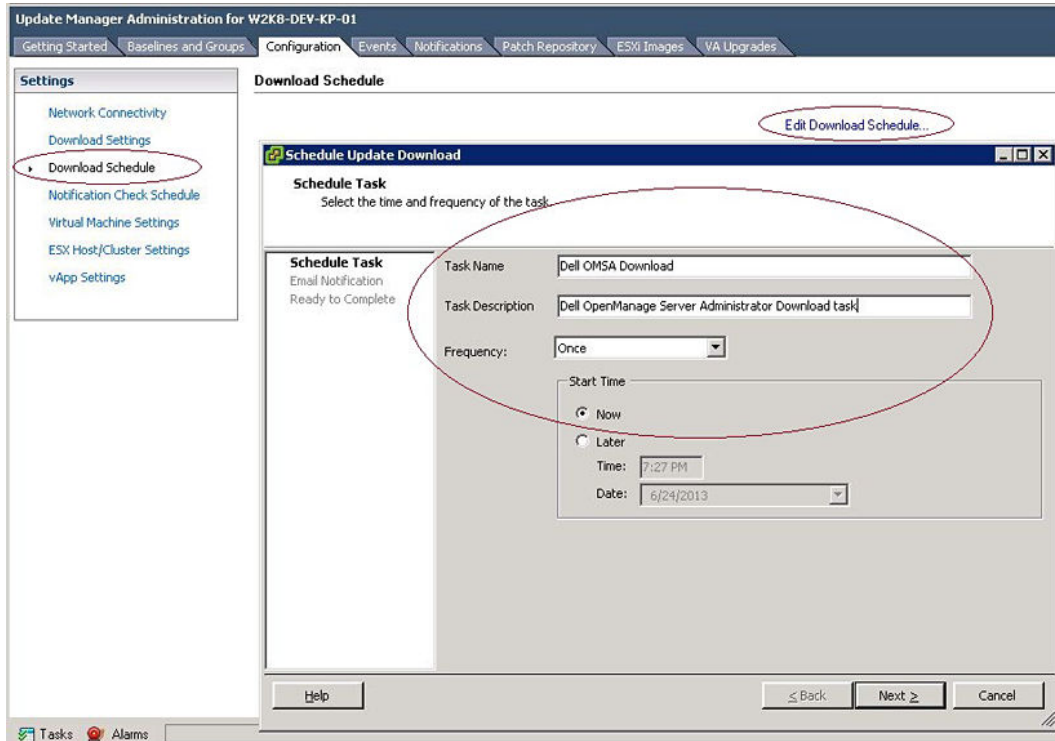
Figure 4. Schedule a task to download OpenManage extensions to VUM repository

4. After the download is complete, the packages and extensions downloaded can be viewed in the **Patch Repository** section as shown in figure 5.

Figure 5. Viewing the downloaded OpenManage packages or extensions

5. Create a baseline out of the OMSA extensions as shown in figure 6.

    📝 NOTE: A baseline in VUM is a package which is created out of multiple or single extensions/
    patches or upgrade patches. In this case, we create a baseline with an OMSA extension to
    deploy it to VMware ESXi hosts.
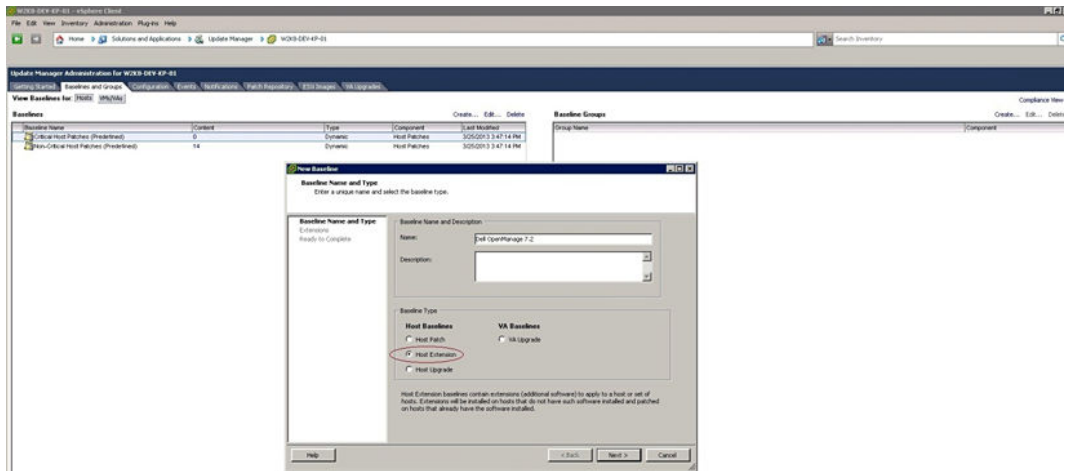
Figure 6. Creating a baseline from OMSA extensions

6. Click **Next**.
7. Select the Dell OMSA bundle that you want to deploy and click **Next** to continue.
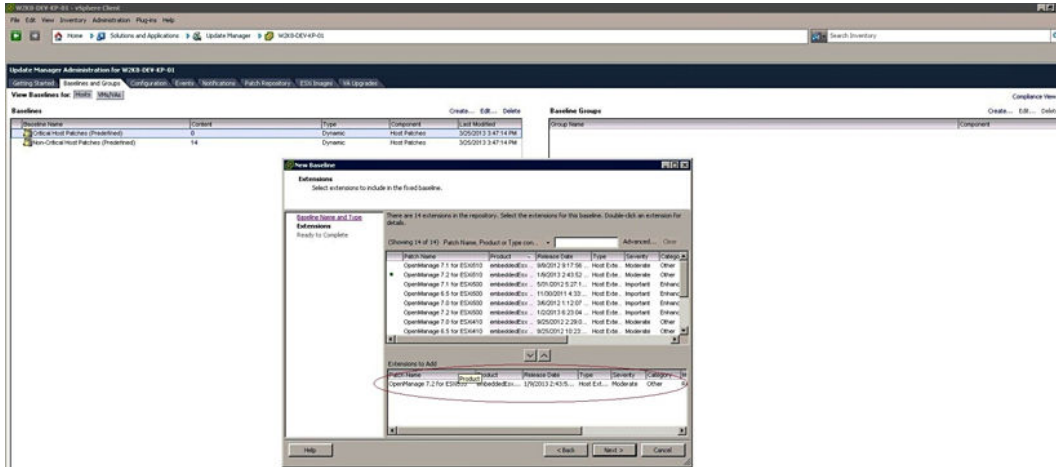
Figure 7. Selecting the OpenManage bundle to be deployed

8. Add the VMware ESXi host to vCenter server and attach the baseline created in the previous window to the host as shown in figure 8.
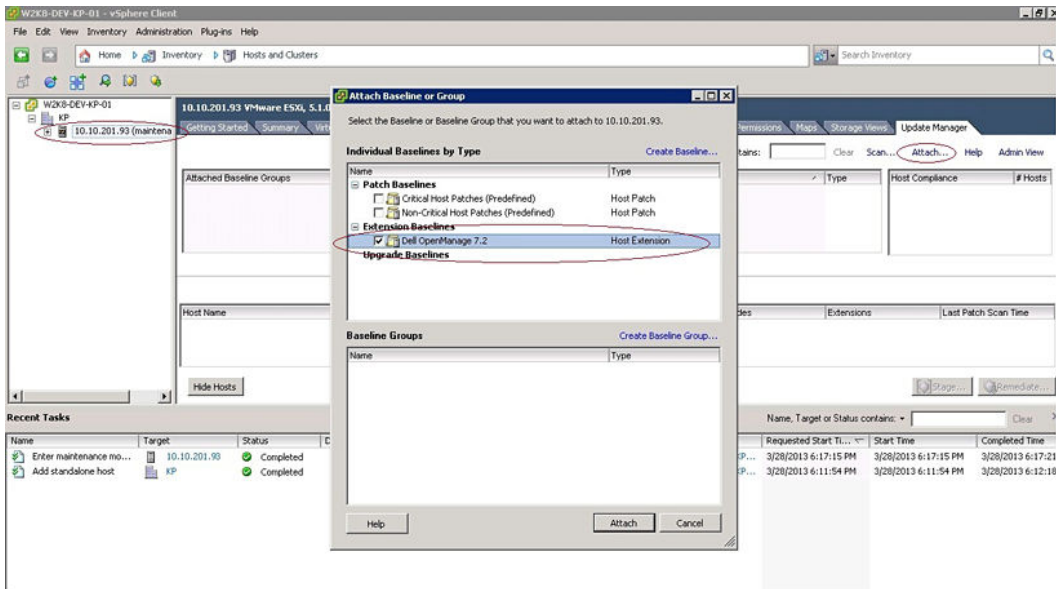
Figure 8. Adding the VMware ESXi host to vCenter and attaching the baseline

9. After the baseline is attached to the host, click **Scan** to make the host aware of the baseline attached.
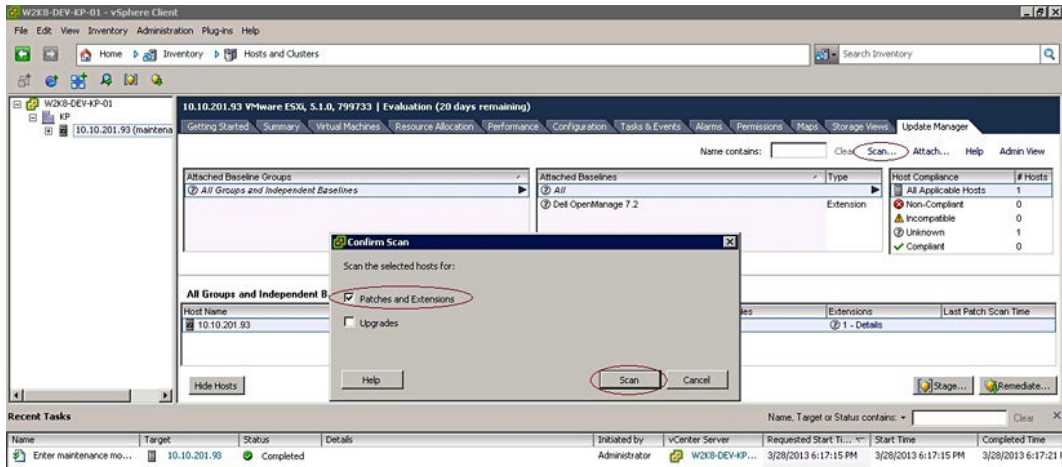
Figure 9. Scanning the host

10. After the scan is complete, the status of the **#Hosts** listed in the **Host Compliance** window is displayed as **Non-Compliant**.

    This is because of a new extension attached to the host and the installation of that is not complete.
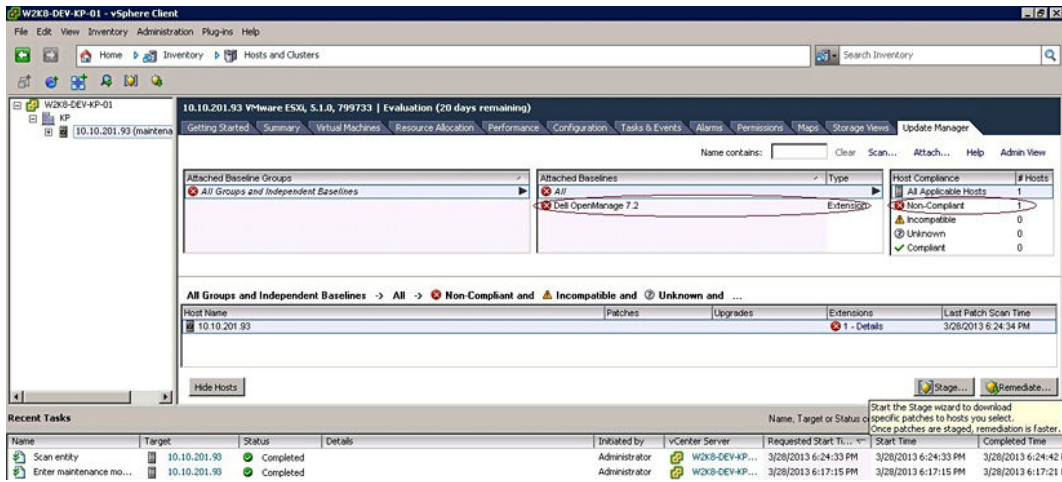
Figure 10. Host Compliance window displayed as non-compliant

11. Start staging so that VUM copies the OMSA extension package to the VMware ESXi host for installation.
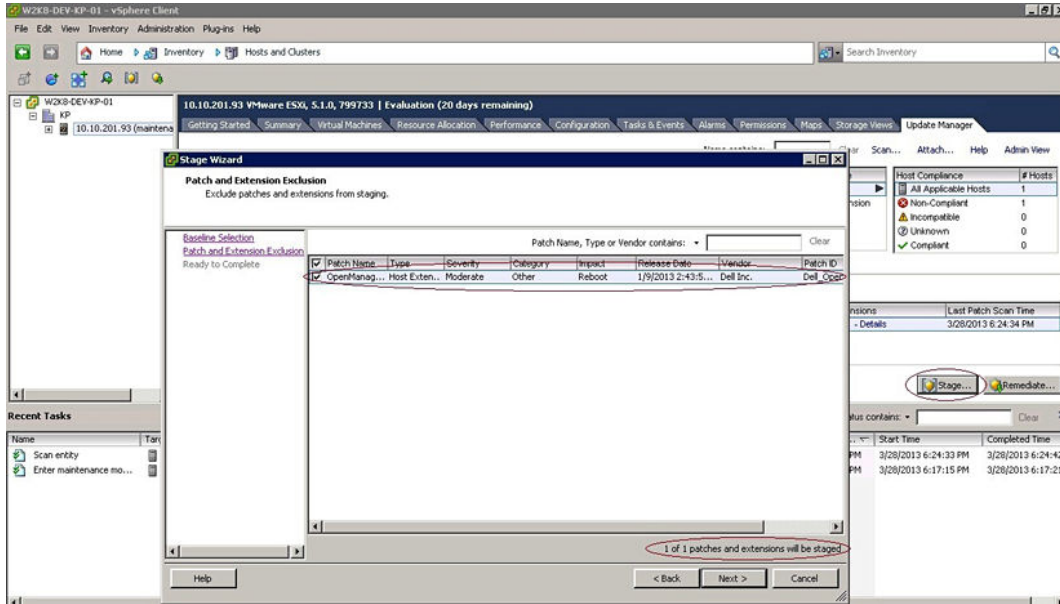
Figure 11. Staging task to copy the OMSA extension package to the VMware ESXi host

12. After the staging task is complete, the extension is staged to the host.
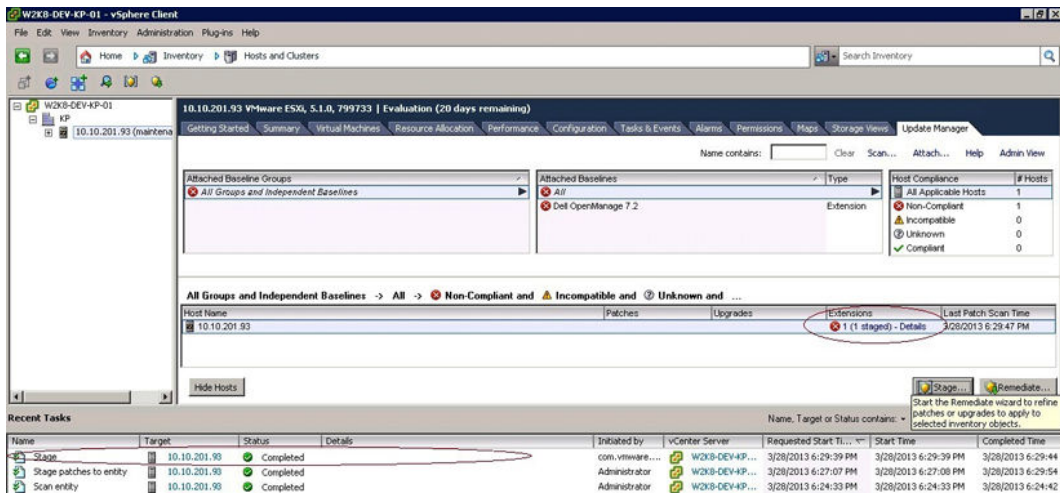
Figure 12. Viewing the status of the extension

13. Click **Remediate**. The extension copied to VMware ESXi host is installed.
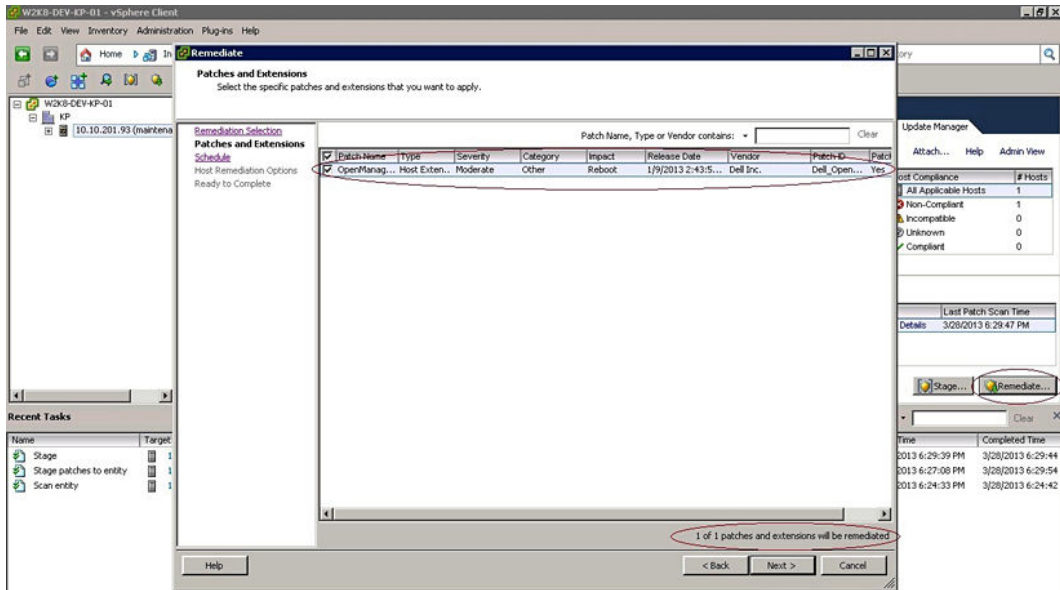
Figure 13. Installing the extension

14. Click **Next**.
15. In the Remediate > Schedule window, specify the time to start remediation.
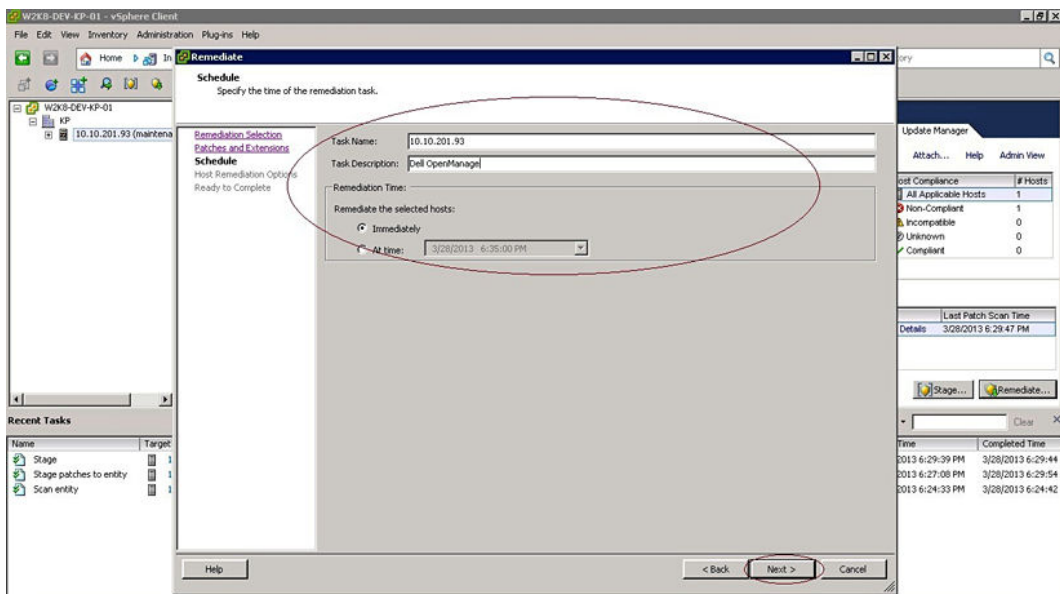
Figure 14. Specifying the remediation task schedule

At this point, the host goes for a reboot to complete the installation of OMSA. After the reboot is complete, you can view that the host is compliant and the OMSA extension has been installed successfully.
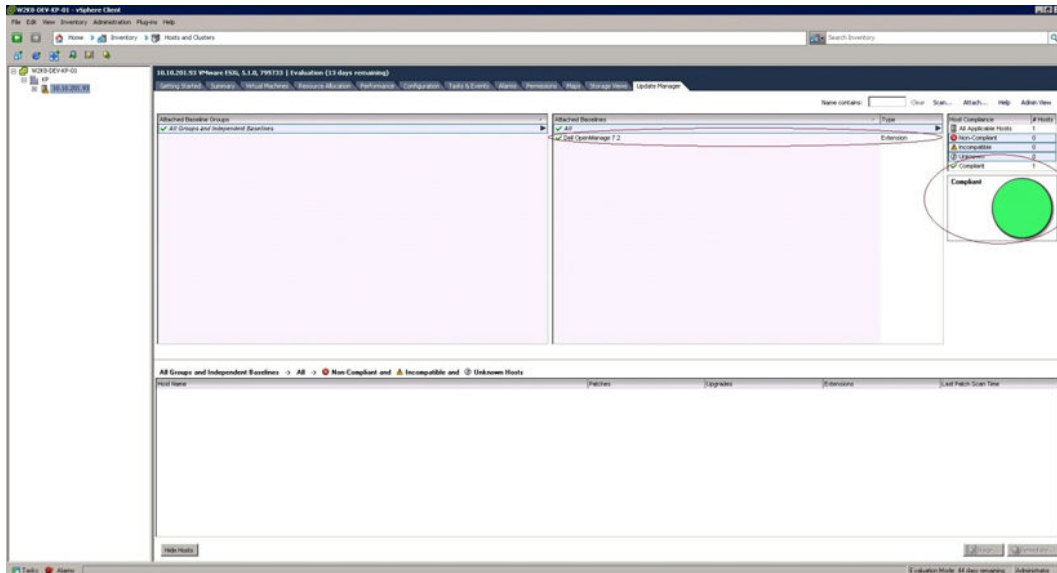
Figure 15. Status of OpenManage installation

16. Using the Dell Distributed Web Server (DWS), login to the OMSA agent on VMware ESXi.
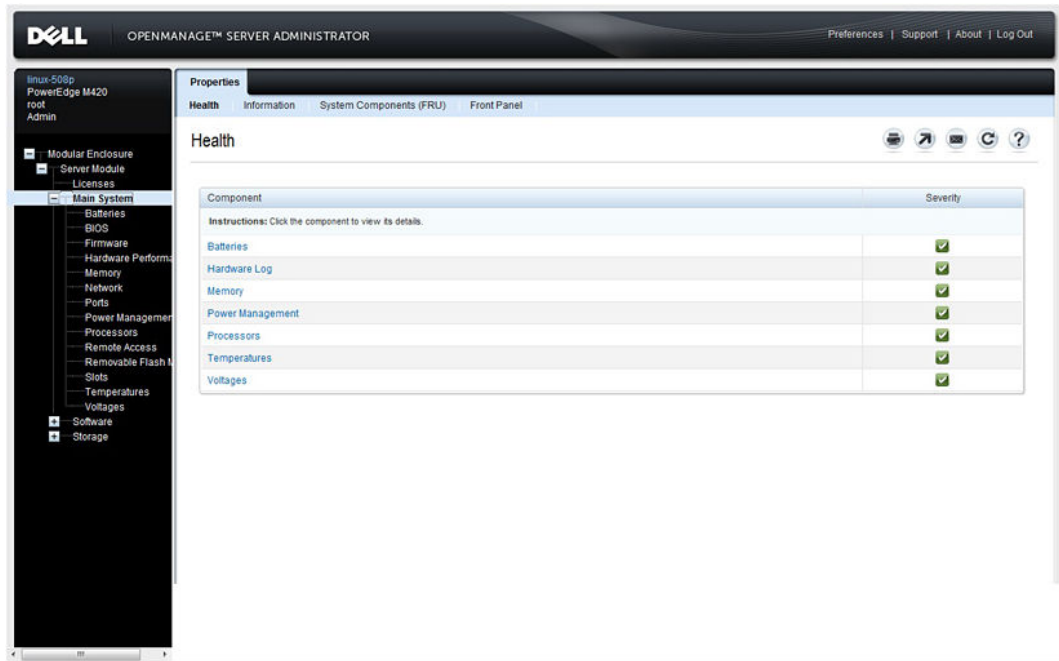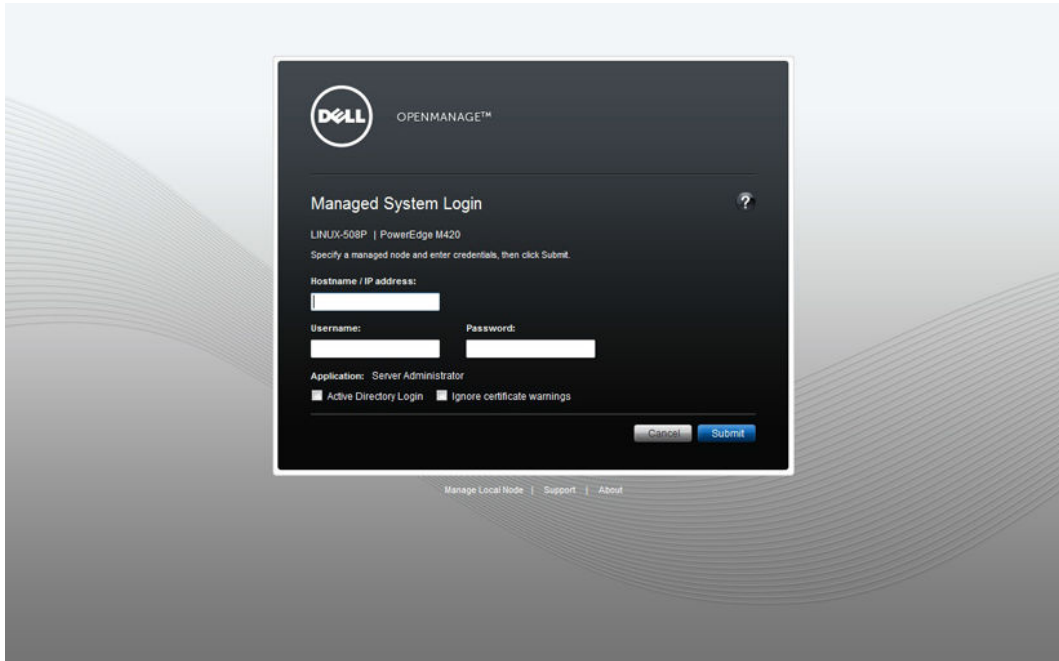
Figure 16. Logging in to OpenManage

Automation by using PowerCLI

The whole patching process might be cumbersome to manually perform on multiple servers. There are options available to automate the patching by using the VMware PowerCLI. Refer to VMware developer site to download the package. The command references and examples are available here. Note that there are no local command line interfaces available for OMSA in ESXi.

DSET and OMSA FAQs

While installing OMSA, the scan operation failed showing unknown error. What should I do?

Ensure that VMware ESXi host and vCenter servers are configured with DNS and both the servers can resolve the hostnames between each other.

Stage, remediate, and scan operations fail with different error codes. What should I do?

Refer to [VMware KB](#) to understand VUM log files and troubleshooting steps.

What are the other methods of deployment of OMSA on ESXi?

Refer to OpenManage Server Administrator User's Guide available at Dell OpenManage Systems Management Overview Guide at **Dell.com/openmanagemanuals** > **OpenManage software**.

Are there any third party programs that affect DSET installation or operation?

No third party programs affect DSET installation or operation.

Are there any compatibility guidelines for using DSET and OMSA?

No, there are no compatibility guidelines. You can use any DSET version with any version of OMSA. However, it is highly recommended that you use the latest version of both DSET and OMSA.

3

PSA/ePSA Diagnostics

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

Running the PSA/ePSA Diagnostics

1. As the system boots, press **<F11>** to enter **Boot Manager**. Alternatively, press **<F10>** to enter Lifecycle Controller.
2. Use the up and down arrow keys to select **System Utilities** → **Hardware Diagnostics**.

   > NOTE: For systems that do not have Lifecycle Controller, press **<F10>** to launch the **Utility Mode (diags)** option.

3. Note down the error code.

   The following table describes the PSA/ePSA diagnostics error messages.

PSA/ePSA Diagnostics error codes

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-0111	CPU - exception occurred	An error occurred during the tests that may involve the system board.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0112	CPU - machine check exception detected	An error occurred during the tests that may involve the system board.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0114	CPU - Cache integrity test discrepancy	An error occurred during the tests that may involve the system board.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. Check temperatures in system health and check that no airflow obstructed.

Error number (PSA and ePSA)	Error message	Description	Steps
			4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0115	CPU - Stress Thermal condition. Limit (d)C. Actual (d)C	An error occurred during the tests that may involve the system board.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. Check temperatures in system health and check that no airflow obstructed. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0121	Memory - memory errors were detected and repaired	An error occurred during the tests that may involve the system board or memory of the system. However, the system has self repaired.	1. Turn off the system and reseat the memory modules. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA 1000-0122 ePSA 2000-0122	PSA Memory - test initialization failure ePSA Memory - memory errors were detected and excessive errors were detected	An error occurred during the tests that may involve the system board or memory of the system. However, the system has self repaired.	1. Turn off the system and reseat the memory modules. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA 1000-0123 ePSA 2000-0123	Memory - integrity test failed	An error occurred during the tests that may involve the system board or memory of the system. However, the system has self repaired.	1. Turn off the system and reseat the memory modules. 2. Repeat the PSA diagnostics.
PSA NA ePSA 2000-0124	System Log - <Timestamp>, <Log message>	This is information in the system log to show time and messages related to system events.	1. Clear the system log. 2. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-0125	Event Log	The IPMI system event log is full for various reasons or logging has stopped because too many ECC errors have occurred.	1. Clear the IPMI system event log. 2. Repeat the PSA diagnostics.
PSA NA ePSA 2000-0126	Event Log	The event log(s) must be cleared before testing can continue.	1. Clear the system event log. 2. Repeat the PSA diagnostics.
PSA NA ePSA 2000-0131	Battery - the battery is not installed	An error occurred during the tests that may involve the main system board or battery of the system.	1. Turn off the system and reseat the system battery. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support.
PSA NA ePSA 2000-0132	Battery - the battery is reaching the end of its usable life	An error occurred during the tests that may involve the main system board or battery of the system.	1. Turn off the system and reseat the system battery. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support.
PSA NA ePSA 2000-0133	Battery - the battery cannot supply sufficient power	An error occurred during the tests that may involve the main system board or battery of the system.	1. Turn off the system and reseat battery. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support.
PSA 2000-0141 ePSA 2000-0141	Hard Drive - no drive detected	Your system BIOS is reporting that no Hard Disk Drive is being reported. If a Portable, reseat the hard drive, if a Desktop, reseat both ends of the data cable	1. If you don't have a hard disk drive (HDD), this may be an automatic message and requires no action. 2. If you have an HDD, reconnect your

Error number (PSA and ePSA)	Error message	Description	Steps
		and reseat the power cable to the drive. Repeat the PSA diagnostics. If a known good hard drive is available, see if the good drive can be detected in the system or try the suspect drive in a working system.	HDD to the system board. 3. Update to the latest BIOS. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Technical Support
PSA 1000-0142 ePSA 2000-0142	PSA Hard Drive - drive self test failed ePSA Hard Drive - self test unsuccessful	Your hard disk drive has indicated a failure.	1. Update to the latest BIOS. 2. Turn off your computer and reconnect your hard disk drive (HDD) to the system board for instructions.) 3. Repeat the PSA diagnostics.
PSA 1000-0143 ePSA 2000-0143	Hard Drive - SMART read command unsuccessful	Your hard disk drive has indicated a failure.	
PSA 1000-0144 ePSA 2000-0144	Hard Drive - no support for drive self test	Your hard disk drive has indicated a failure.	
PSA 1000-0145 ePSA 2000-0145	PSA Hard Drive - timeout waiting for Drive Self Test to complete ePSA Hard Drive - self test did not complete	The hard drive test did not complete the last test attempted.	1. Check **Dell.com/ support** for a firmware update for your hard drive. Update the firmware if one is available. 2. Reseat the drive, reseat the data cable and power connection at both ends if it is desktop. 3. Turn off your computer and reconnect your hard disk drive (HDD) to the system board. For more information, see your systems *Owners Manual* at **Dell.com/ poweredgemanuals**.

Error number (PSA and ePSA)	Error message	Description	Steps
			4. Update to the latest BIOS. 5. Repeat the PSA diagnostics. 6. If failure continues, contact Dell Technical Support
PSA 1000-0146 ePSA 2000-0146	Hard Drive - self test log contains previous errors	Your hard drive has indicated a failure.	1. Update to the latest BIOS version. 2. Run a Chkdsk /r or format your hard drive and reinstall your operating system. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA 1000-0147 ePSA 2000-0147	PSA Optical Drive - IDE status failed. ePSA Optical Drive - self test --(s)	Your CD or DVD drive has indicated a failure.	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your optical drive to the system board. 3. Repeat the PSA diagnostics.
PSA 1000-0148 ePSA 2000-0148 replaced by 2000-0151, 2000-0152	PSA Optical Drive - BIST --(s) ePSA Optical Drive - incorrect status	Your CD or DVD drive has indicated a failure	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your optical drive to the system board. 3. Repeat the PSA diagnostics.
PSA NA ePSA 2000-0149	Optical Drive - no drive detected	Your CD or DVD drive has indicated a failure.	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your optical drive to the system board. 3. Repeat the PSA diagnostics.
PSA NA	Hard Drive - No drive detected.	Your system BIOS is reporting that no Hard	1. If you don't have a hard disk drive

Error number (PSA and ePSA)	Error message	Description	Steps
ePSA 2000-0150 replaced 2000-0141		Disk Drive is being reported. If a Portable, reseat the hard drive, if a Desktop, reseat both ends of the data cable and reseat the power cable to the drive. Repeat the PSA diagnostics. If a replacement working hard drive is available, see if the working hard drive is detected by the system or try the suspect drive in a working system.	(HDD), this may be an automatic message and requires no action. 2. If you have an HDD, reconnect your hard disk drive (HDD) to the system board. 3. Update to the latest BIOS version. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0151	Hard Drive - BIST --(s)	The hard drive is showing an incorrect status in the diagnostic. Check for a firmware update for your hard drive.	1. If you have a replacement hard drive, install it. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0152	Optical Drive - BIST --(s)	The CD or DVD Drive is showing an incorrect status in the diagnostic.	1. Update to the latest BIOS. 2. Remove and reinstall your optical drive. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Technical Support
PSA NA ePSA 2000-0153	Hard Drive - Removable Hard Drive [d] - Incorrect status = [x] [s]	Check the installation of the removable drive, cables, and connections.	1. If you have an HDD, reconnect your hard disk drive (HDD) to the system board. 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-0154	Tape Drive - Tape Drive [s] - S/N [d], incorrect status = [d] [d]	Check installation of the tape drive, cables and connections. If the error persists, ensure that the drive firmware is current.	1. Update to the latest BIOS. 2. Remove and reinstall your tape drive. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Technical Support
PSA NA ePSA 2000-0155	Hard Drive - Not Installed	This is an error displayed when HDD is not inserted in the notebooks.	1. Update to the latest BIOS version. 2. Remove and reinstall your Hard drive. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA 1000-0212 ePSA 2000-0212 (Not used with UEFI BIOS)	System board - CMOS, Location = (x), Expected = (x), Found = (x)	An error occurred during the tests that may involve the main system board of the system.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support.
PSA 1000-0213 ePSA 2000-0213 (Not used with UEFI BIOS)	System board - CMOS battery failure detected	An error occurred during the tests involving the CMOS battery (This maintains all the settings in the BIOS when there is no power to the system) On desktop systems this is a easily replaceable watch size battery, some portable systems may have a replaceable battery too.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. Remove and replace your CMOS battery. 4. If failure continues, contact Dell Technical Support
PSA 1000-0221 ePSA 2000-0221 (Not used with UEFI BIOS)	PSA System board - Interval timer Channel 0 (mode 0) is not generating interrupts ePSA Timer - Interval timer not functional	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory	1. Update to the latest BIOS version. 2. Reseat the CMOS battery. 3. Repeat the PSA diagnostics

Error number (PSA and ePSA)	Error message	Description	Steps
		error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	4. If failure continues, contact Dell Technical Support
PSA 1000-0222 ePSA 2000-0222 (Not used with UEFI BIOS)	PSA System board - Interval timer Channel 0 (mode 0) is not generating interrupts ePSA Timer - Interval timer not functional	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 1000-0223 ePSA 2000-0223 (Not used with UEFI BIOS)	System board - Timer - Interval timer initial clock output level incorrect	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 1000-0224 ePSA 2000-0224 (Not used with UEFI BIOS)	System board - Interval timer had wrong time period in mode	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 1000-0231	System board - Failure in Interval timer in mode	An error occurred during the tests that may	1. Update to the latest BIOS version.

Error number (PSA and ePSA)	Error message	Description	Steps
ePSA 2000-0231 (Not used with UEFI BIOS)		involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 2000-0232 ePSA 2000-0232 (Not used with UEFI BIOS)	System board - the RTC did not generate periodic ticks	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 2000-0233 ePSA 2000-0233 (Not used with UEFI BIOS)	PSA System board - RTC 'seconds' count is not updating ePSA RTC - 'seconds' count is not updating	An error occurred during the tests that involve the Real Time Clock (RTC) of the main system board in the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 1000-0234 ePSA 2000-0234 (Not used with UEFI BIOS)	PSA System board - timeout waiting for RTC update flag to set ePSA System board - HPET incorrect time period.	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory	1. Update to the latest version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
		error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	
PSA 1000-0235 ePSA NA	System board - PM timer 1 had wrong time period.	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA 1000-0241 ePSA 2000-0241 (Not used with UEFI BIOS)	BIOS - A20 gate not enabled	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA 1000-0242 ePSA 2000-0242 (Not used with UEFI BIOS)	PSA System board - no interrupt detected for IRQ. ePSA- System board - Interrupt controller - IRQ (d) - %s not detected	An error occurred during the tests that may involve the main system board of the system. If a memory error is detected, try memory modules individually. If no 2000-0123 memory error & If diagnostics fail again after the BIOS is current, contact Technical Support to resolve the problem.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-0243	System board - USB device, IO board, Daughter Card	An error occurred during the tests that may involve the USB controller or ports of the main system board of the system. Disconnect any USB devices and run the diagnostic again. Test USB devices in a different port. Try a known good USB device.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0244	System board - USB device	An error occurred during the tests that may involve the USB controller or ports of the main system board of the system. Disconnect any USB devices and run the diagnostic again. Test USB devices in a different port. Try a known good USB device.	1. Update to the latest BIOS version 2. Repeat the PSA diagnostics 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0245	System board - USB device	An error occurred during the tests that may involve the USB controller or ports of the main system board of the system. Disconnect any USB devices and run the diagnostic again. Test USB devices in a different port. Try a known good USB device.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0251	Event Log - the log contains failing records.	This relates to BIOS events in servers only.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics.
PSA NA ePSA 2000-0261	System board - Data errors.	Multiple memory DIMMs failed, presumed to be caused by motherboard issues.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
			3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0313	Touchpad - pointing stick/touchpad not detected	The mouse, touchpad, or trackstick is not being detected by the diagnostic tools. Power the system off, reseat any cable connection and check the BIOS to ensure that the touchpad or mouse has not been disabled.	1. Update to the latest BIOS version. 2. If your mouse, touchpad, or pointing stick is disconnected, reconnect it. 3. For laptops, make sure that your touchpad is active. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0314	Thermal - the (s) reading (dc) exceeds the thermal limit.	The system board, heat sink, fan, or processor are failing the diagnostic tools.	1. Update to the latest BIOS version. 2. Check the logs, the fan and for any other signs of overheating. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0315	Sensor - the (s) reading (dc) is lower than expected	The system board or sensor is failing the diagnostic tools.	1. Update to the latest BIOS version 2. Check the system logs. 3. If failure continues, contact Technical Support
PSA 1000-0321 ePSA 2000-0321	PSA LCD EDID - unable to access EDID EEPROM ePSA Unable to detect LCD	LCD Extended Display Identification Data (EDID) - unable to access the EDID Electrically Erasable Programmable Read-Only Memory (EEPROM) in the LCD display is indicating a data failure. If there is video on the LCD, then the Display does not need replacement.	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the PSA diagnostics.. 4. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA 1000-0322 ePSA 2000-0322	PSA LCD Panel - Error accessing the LCD inverter ePSA LCD panel - unable to modify brightness	LCD panel - unable to modify brightness. Try to adjust the brightness in Windows using the hotkeys. Boot to the BIOS and see if brightness can be adjusted at that point outside of Windows	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0323	LCD panel - Unable to detect inverter lamp status.	Check LCD connector and cables.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0324	LCD panel - user reported LCD BIST colors were not displayed	You may get this error if you answered No to the LCD BIST test instead of Yes. If you were able to clearly see red, blue, green white and white screen with text without distortion, lines, or color problems, re-run the diagnostic and if the screens appear normal, click Yes	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the LCD BIST diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0325	LCD panel - user provided no input for LCD BIST	You may get this error if you answered No to the LCD BIST test instead of Yes. If you were able to clearly see red, blue, green white and white screen with text without distortion, lines, or color problems, re-run the diagnostic and if the screens appear normal, click Yes	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Technical Support
PSA 1000-0326 ePSA 2000-0326	LCD panel - unable to turn lamp on or off	The backlight lamp was not able to be turned on or off during the diagnostic testing	1. Update to the latest BIOS. 2. Turn off your computer and reconnect your LCD cable.

Error number (PSA and ePSA)	Error message	Description	Steps
			3. Repeat the PSA diagnostics.
			4. If failure continues, contact Technical Support
PSA NA ePSA 2000-0327	LCD panel - unable to use BIOS interface	The Liquid Crystal Display (LCD) panel does not display the BIOS screen correctly and the BIOS screen is not visible on the LCD.	1. Update to the latest BIOS. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0328	LCD panel - unable to detect variance in ambient light sensor	The Ambient light sensor that automatically dims the LCD in low light did not respond during the diagnostics.	1. Update to the latest BIOS version. 2. Turn off your computer and reconnect your LCD cable. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0331	Video controller - no video controller detected	The system is not detecting the graphics adapter. If you are using a desktop system and if a PCIe expansion card is installed, reseat the card and reconnect any internal power connections to the card. Then reconnect the video cable and repeat the PSA diagnostic.	1. Update to the latest BIOS version. 2. Desktop: Turn off your computer and if equipped with PCIe expansion card, reseat the card. 3. Reconnect your LCD cable. 4. Repeat the PSA diagnostics.. 5. If failure continues,, contact Dell Technical Support
PSA NA ePSA 2000-0332	Video memory - Video memory integrity test discrepancy	PSA diagnostics detected a video memory failure. Please reset the system memory and update the BIOS to most current version.	1. Update to the latest BIOS version. 2. Reseat the system memory 3. Turn off your computer and reconnect your LCD cable.

Error number (PSA and ePSA)	Error message	Description	Steps
			4. Repeat the PSA diagnostics.
			5. If failure continues,, contact Dell Technical Support
PSA 1000-0333 ePSA 2000-0333	PSA Video - Graphics test timed out waiting for keyboard response ePSA Video - User provided no input for graphics test	PSA diagnostics did not record the user input (Y or N) after the video test. Ensure that you accurately answer queries that are prompted during the diagnostic.	1. Error occurs when a graphics test times out while waiting for you to enter a response.
			2. Update to the latest BIOS version.
			3. Turn off your computer and reconnect your LCD cable.
			4. Repeat the PSA diagnostics.
			5. If failure continues, contact Dell Technical Support
PSA 1000-0334 ePSA 2000-0334	Video - user reported the patterns were not displayed correctly	You may get this error if you answered No to the color test instead of Yes. If you were able to clearly see both the vertical and horizontal color bars without distortion, lines, or color problems, re-run the diagnostic and if the bar appears normal, click Yes.	1. You may get this error if you answered No to the color test instead of Yes.
			2. Update to the latest BIOS version.
			3. Turn off your computer and reconnect your LCD cable.
			4. Repeat the PSA diagnostics..
			5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0411	Cables - not detected	Normally, the cable involved in the error (LCD LVDS CABLE for example) is indicated in the error message. Reseat the cable connection and inspect the cable and connections for damage.	1. Update to the latest BIOS.
			2. Turn off your system and reconnect the cable, jumper, or connection indicated in the error message.
			3. Replace damaged cables or devices.
			4. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
			5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0412	Cables - auxiliary cable not detected	Normally, the cable involved in the error (LCD LVDS CABLE for example) is indicated in the error message. Reseat the cable connection and inspect the cable and connections for damage.	1. Update to the latest BIOS version. 2. Turn off your system and reconnect the cable, jumper, or connection indicated in the error message. 3. Replace damaged cables or devices. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0413	Cables - LCD cable not detected	Normally, the cable involved in the error (LCD LVDS CABLE for example) is indicated in the error message. Reseat the cable connection and inspect the cable and connections for damage.	1. Update to the latest BIOS version. 2. Turn off your system and reconnect the cable, jumper, or connection indicated in the error message. 3. Replace damaged cables or devices. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0414	Cables - Invertor cable not detected	Normally, the cable involved in the error (LCD LVDS CABLE for example) is indicated in the error message. Reseat the cable connection and inspect the cable and connections for damage.	1. Update to the latest BIOS version. 2. Turn off your system and reconnect the cable, jumper, or connection indicated in the error message. 3. Replace damaged cables or devices. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-0415	Cables - Check the following cables, jumper, connection, or sensors: [s]	Normally, the cable involved in the error (LCD LVDS CABLE for example) is indicated in the error message. Reseat the cable connection and inspect the cable and connections for damage.	1. Update to the latest BIOS version. 2. Turn off your system and reconnect the cable, jumper, or connection indicated in the error message. 3. Replace damaged cables or devices. 4. Repeat the PSA diagnostics. 5. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0511	Fan - the (s) fan failed to respond correctly	The cooling fan is not responding to the diagnostics tool. Please check nothing is obstructing the fan.	1. Update to the latest BIOS version. 2. Check your system for any obstructions to the air vents or cooling fan. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0512	Fan - the (s) fan is running faster than expected.	This could be an issue with the system board, temperature sensor, or cooling fan. Please check everything is firmly seated.	1. Update to the latest BIOS version. 2. Check for any loose connections, any obstructed air vents, and for any other signs of overheating. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0620	Network - Network [d] - {Vendor supplied error}	The Network (Ethernet) device may be faulty. Depending on the system, this may be on the motherboard, an adapter, or a daughter card. Errors include `Register test failed` or `Packet`	1. Update to the latest BIOS/Firmware versions. 2. Check for any loose connections or any bent pins in the connectors. 3. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
		`loopback test failed.`	4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-0621	Network - Network [d] - Driver version [x] outdated. Version [x] or newer required for "[s]"	The Network (Ethernet) device Firmware may be out of date.	1. Update to the latest BIOS/Firmware versions. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Technical Support
PSA NA ePSA 2000-8001	BIOS - No BIOS support for software interrupt [x] function[x] [x]	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8002	BIOS - No BIOS support for SMI interface function(x) or Sensor [x] exceeded thermal zone [d]. Peak zone was [d].	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8003	BIOS - Fan - Unable to set Manufacturing Mode	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8004	BIOS - Fan - Unable to determine fan speeds	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8005	LCD - LCD BIST not supported	The LCD BIST may not exist on all systems.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
			3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8006	BIOS - Fan - Unable to set fans to ([d], [d], or [d]) speed or No chipset event timer.	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8007	BIOS - Log contains Fan events or Timer expected [d] observed [d]	This message is informational only – it provides a record of fan events.	1. Clear Log. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8008	Diagnostics - A. Out of memory! fMalloc() Failed! B. Unable to allocate memory for object data. Unable to [s] testable memory C. Unable to start application processors D. Unable to stop all APs	The system may be unstable and should be rebooted.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8009	Diagnostics - Software Error	The System may be unstable and should be rebooted.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-800B	BIOS - Retrieve vendor ID function error	The system may be unstable.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-800C	BIOS - Get/Set inverter mode function error. Vendor: [s] Revision: [d]	The motherboard BIOS revision may not be current. Update the	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics.

Error number (PSA and ePSA)	Error message	Description	Steps
		BIOS to the most current version and the issue should resolve.	3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-800D	BIOS - Set lamp off function error. Vendor: [s] Revision: [d]	The motherboard BIOS revision may not be current. Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-800E	BIOS - Set lamp on function error. Vendor: [s] Revision: [d]	The motherboard BIOS revision may not be current.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-800F	BIOS - Restore function error. Vendor: [s] Revision: [d].	The motherboard BIOS revision may not be current.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8010	System Board	High-Precision event timer not found.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8011	USB Device Diagnostics - Invalid status returned from the device	The attached USB device is returning an invalid status to the BIOS.	1. Reseat the USB Device. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8012	Diagnostics - Invalid parameter passed to the device. Unknown test [d] selected	An unexpected parameter was passed to a device under test.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-8013	Diagnostics - LCD [s] doesn't support test commands	Update the BIOS to the most current version and the issue should resolve.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8014	Diagnostics - ADDF module ([s]) device ([s]) failed with error code [x], number [x]. No EPSA beep code mapped!	The diagnostics program has run an external module, which has reported an unusual error.	1. Update to the latest BIOS. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8016	Diagnostics - Battery - unable to retrieve battery health	The motherboard BIOS revision may not be current.	1. Reseat the Battery 2. Update to the latest BIOS version. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8017	BIOS - Battery - BIOS has no support for battery health	This optional feature may not be supported.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8018	Diagnostics - Fatal: The module reported multiple test results!!	The system may be unstable.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8019	Diagnostics - Unable to log to NVRAM	The system may be unstable.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA	Diagnostics - Low memory. [d]k bytes free!	The system may be unstable.	1. Update to the latest BIOS version.

Error number (PSA and ePSA)	Error message	Description	Steps
ePSA 2000-8020			2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8115	Diagnostics - Unable to stop all APs	The system may be unstable.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8154	Tape Drive - Tape Drive [d] - S/N [s], ULTRIUM [d] media found but drive. Requires ULTRIUM [s] for [s]	Install the correct tape drive media.	1. Use correct tape drive media. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8155	Tape Drive - Tape Drive [d] - S/N [s], data read does not match data written	Try different tape drive media.	1. Use different tape drive media. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8156	Tape Drive - Tape Drive [d] - S/N [s], no media cannot test drive	Insert writable tape drive media.	1. Insert writable media. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8157	Tape Drive - Tape Drive [d] - S/N [s], drive is not a supported drive	Tape drive model is unknown and not supported by diagnostics.	1. Reseat the Drive. 2. Test with a known good drive if possible. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8158	Backplane - [DRIVE] Drive [d] - incorrect status = [x], [s]	The string indicates the backplane, expander, or removable hard drive is	1. Reseat the drives/ cables/ connections.

Error number (PSA and ePSA)	Error message	Description	Steps
		reporting an incorrect status.	2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8160	PERC - PERC Battery [d] - incorrect status = [x], [s]	The [s] string may be one of the following messages: • Battery missing or disconnected • Replace battery pack • Remaining capacity low	1. Reseat parts. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8165	OS - MBR code is unknown, possibly infected by a virus	The Master Boot Record on the Hard Disk Drive has unrecognized code present which is an indication of a virus infecting the system. It is recommended that you scan your system with an up-to-date antivirus application.	1. Update and run your anti-virus software. 2. Update or reinstall your OS.
PSA NA ePSA 2000-8166	OS - Detected virus (s)	A virus appears to be infecting the system. It is recommended that you scan your system with an up-to-date antivirus application.	1. Update and run your anti-virus software.
PSA NA ePSA 2000-8170	PCIe - Training error on device PciTag [s] VendorID [x] DeviceID [x] SVid [x] SDid [x] Link Degraded, maxLinkWidth = x[d], negotiatedLinkWidth = x[d]	The system is reporting an error on a PCIe adapter.	1. Reseat the PCIe adapter. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support
PSA NA ePSA 2000-8415	Cables - BIOS reports no testable cable/ jumper/connector/ sensor	An internal failure of the diagnostic tool, not a hardware failure.	1. Update to the latest BIOS version. 2. Repeat the PSA diagnostics. 3. If failure continues, contact Dell Technical Support

Error number (PSA and ePSA)	Error message	Description	Steps
PSA NA ePSA 2000-8611	Audio - User reported not hearing speaker tones	If the beep was not heard, verify that the internal speakers are connected properly. On some systems, internal speakers are a purchased option. For a given system, if the speaker is optional, it might not exist on that system. If audio is not heard, make sure to unplug anything plugged into an external headphone jack and re-run the test. External HP jacks can mute the internal speakers at the hardware level.	1. Unplug all external Audio Jacks. 2. Reseat the internal speaker connector. 3. Repeat the PSA diagnostics. 4. If failure continues, contact Dell Technical Support

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Diagnostic indicators

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

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

Table 5. Diagnostic LED indicators

Icon	Description	Condition	Corrective action
	Health indicator	If the system is on, and in good health, the indicator lights solid blue.	None required.
		The indicator blinks amber if the system is on or in standby, and if any error exists (for example, a failed fan or hard drive).	See the System Event Log or system messages for the specific issue. For more information on error messages, see the Dell Event and Error Messages Reference Guide at **Dell.com/esmmanuals**.
			Invalid memory configurations can cause the system to halt at startup without any video output. For further assistance, contact Dell Technical Support.
	Hard drive indicator	The indicator blinks amber if a hard drive experiences an error.	See the System Event Log to determine the hard drive that has an error. Run the appropriate Online Diagnostics test. Restart system and run embedded diagnostics (ePSA). If the hard drives are configured in a RAID array, restart the system and enter the host adapter configuration utility program.
	Electrical indicator	The indicator blinks amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply or voltage regulator).	See the System Event Log or system messages for the specific issue. If it is due to a problem with the power supply, check the LED on the power supply. Reseat the power supply by removing and reinstalling it. If the problem persists, contact Dell Technical Support.
	Temperature indicator	The indicator blinks amber if the system experiences a thermal error (for example, a temperature out of range or fan failure).	Ensure that none of the following conditions exist: • A cooling fan is removed or has failed. • System cover, cooling shroud, EMI filler panel, memory module blank, or expansion card filler bracket is removed. • Ambient temperature is too high.

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| | | | • External airflow is obstructed. |
| | | | If the problem persists, contact Dell Technical Support. |

Table 6. Diagnostic LED codes for legacy systems

Code	Condition	Corrective Action
①②③④	The system is turned off or a possible pre-BIOS failure has occurred.	Connect the system to a working electrical outlet and press the power button.
	The diagnostic lights are not lit after the system successfully boots to the operating system.	
①②③**④**	The system is in a normal operating condition after POST.	
①②③④	BIOS checksum failure detected; system is in recovery mode.	
①②**③**④	Possible processor failure	
①②**③**④	Memory failure.	
①**②**③④	Possible expansion card failure.	
①**②**③④	Possible video failure.	
①**②③**④	Hard drive failure.	
①**②③**④	Possible USB failure.	
①②③④	No memory modules detected.	
①②③**④**	System board failure.	
①②**③**④	Memory configuration error.	
①②**③**④	Possible system board resource and/or system board hardware failure.	
①②③④	Possible system resource configuration error.	Ensure that the optical drive and hard drives are properly connected.

Code	Condition	Corrective Action
①②③④	Other failure.	

Power supply unit indicator codes

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

Figure 17. AC PSU status indicator

1.   AC PSU status indicator/handle

Table 7. AC PSU status indicators

Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and the PSU is operational.
B	Flashing green	When the firmware of the PSU is being updated, the PSU handle flashes green.
C	Flashing green and turns off	When hot-adding a PSU, the PSU handle flashes green five times at 4 Hz rate and turns off. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. Replace the PSU with a PSU that matches the capacity of the other PSU.

Convention	Power indicator pattern	Condition
		⚠ CAUTION: For AC PSUs, use only PSUs with the Extended Power Performance (EPP) label on the back. Mixing PSUs from previous generations of Dell PowerEdge servers can result in a PSU mismatch condition or failure to power on.
D	Flashing amber	Indicates a problem with the PSU.
		⚠ CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a high output configuration to a low output configuration or vice versa, you must power down the system.
		⚠ CAUTION: AC PSUs support both 220 V and 110 V input voltages with the exception of Titanium PSUs, which support only 220 V. When two identical PSUs receive different input voltages, they can output different wattages, and trigger a mismatch.
		⚠ CAUTION: If two PSUs are used, they must be of the same type and have the same maximum output power.
		⚠ CAUTION: Combining AC and DC PSUs is not supported and triggers a mismatch.
E	Not lit	Power is not connected.

Figure 18. AC cabled PSU status indicator and self-diagnostic button

1.   self-diagnostic button   2.   PSU status indicator

✎ **NOTE:** Press the self-diagnostic button to perform a quick health check on the power supply unit (PSU) of the system.

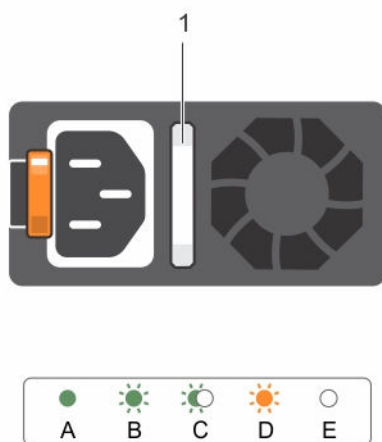| PSU status indicator	Condition
Not lit	Power is not connected or PSU is faulty.
Green	A valid power source is connected to the PSU and the PSU is operational.
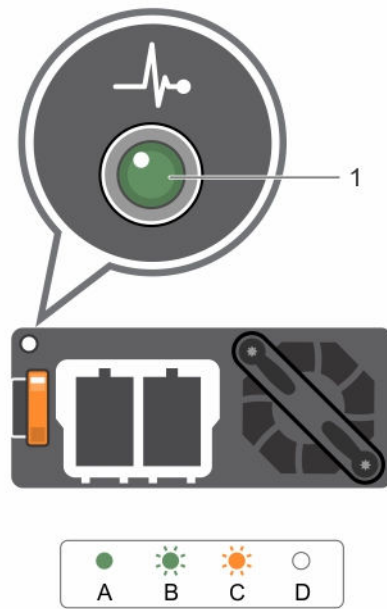
Figure 19. DC PSU status indicator

1. DC PSU status indicator

Table 8. DC PSU status indicators

Convention	Power indicator pattern	Condition
A	Green	A valid power source is connected to the PSU and that the PSU is operational.
B	Flashing green	When hot-adding a PSU, the PSU indicator flashes green. This indicates that there is a PSU mismatch with respect to efficiency, feature set, health status, and supported voltage. Replace the PSU with a PSU that matches the capacity of the other installed PSU.
C	Flashing amber	Indicates a problem with the PSU. ⚠ CAUTION: When correcting a PSU mismatch, replace only the PSU with the flashing indicator. Swapping the PSU to make a matched pair can result in an error condition and unexpected system shutdown. To change from a High Output configuration to a Low Output configuration or vice versa, you must power down the system.

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

6

Troubleshooting no boot issues for Windows operating systems

1. Check the hard drive status in the PERC BIOS. For more information, see Checking hard drive status in the PERC BIOS.
2. Boot the server in the safe mode.

   > **NOTE:** If the server is a domain controller, boot the server in Directory Services Repair Mode (DSRM).

   If the server boots successfully, the issue is with an installed driver, application, or service. Proceed to Step 4.
3. For Windows Server, you can perform the following recovery options:
   - Use the **bootrec** command to troubleshoot startup issues. For more information, see https://support.microsoft.com/en-in/kb/927392.
   - Use the **chkdsk** tool to determine whether there is a disk problem. For more information, see https://technet.microsoft.com/en-us/library/cc730714.aspx
   - Use **DiskPart** to verify the status of disk partitions. For more information. see https://technet.microsoft.com/en-in/library/bb490893.aspx.
   - Use the **bcdedit** utility to view or modify the boot configuration database (BCD). For more information, see https://technet.microsoft.com/en-us/library/cc731662.aspx.

   > **NOTE:** For additional recovery console commands, see https://support.microsoft.com/en-us/kb/326215.

   > **NOTE:** For more troubleshooting steps, see https://support.microsoft.com/en-us/kb/325375.
4. From within the safe mode or DSRM, use the **msconfig** utility to disable startup applications and non-Microsoft services on the server.
5. Reboot the server in the normal mode.
6. If the server boots, use the **msconfig** utility to identify the disrupting service or application by enabling services and startup applications one at a time and rebooting the server until the server fails to boot.
7. If the issue persists, use Dell's Linux-based OMSA LiveCD to boot the system and run diagnostic tests to determine whether any hardware is malfunctioning.

   OMSA LiveCD can also be used to recover data from a server whose operating system does not start.

No POST issues (iDRAC)

This section provides details on troubleshooting iDRAC issues.

"First Boot Device cannot be set" error message is displayed when configuring a boot device during POST.

Description

The error message "First Boot Device cannot be set. Either the system BIOS is out-of-date, or the server needs a reboot for the settings to take effect" displays in the POST mode.

Resolution

Allow the server to completely boot to the OS or turn off the server before setting a vFlash partition to the first boot device. This allows the server to boot to the vFlash partition and the error will no longer be seen.

"Alert! iDRAC6 not responding.. Power required may exceed PSU wattage…" error message is displayed at POST during a reboot.

Description

An error message "Alert! iDRAC6 not responding.. Power required may exceed PSU wattage. Alert! Continuing system boot accepts risk that system may power without warning. Strike the F1 key to continue, F2 to run the system setup program" is displayed at POST during a reboot.

Resolution

Perform the following steps:

1. Reboot the server to resolve the issue.
2. Remove the AC power for 30 seconds. Once AC power is re-applied, allow two minutes for the iDRAc to complete POST or initialize.
3. Check if the Network Adapter is updated to the latest firmware.

7

Debugging mini crash dump files using by WinDbg in Windows operating system

Prerequisites

1. Click **Start → Control Panel → System**.
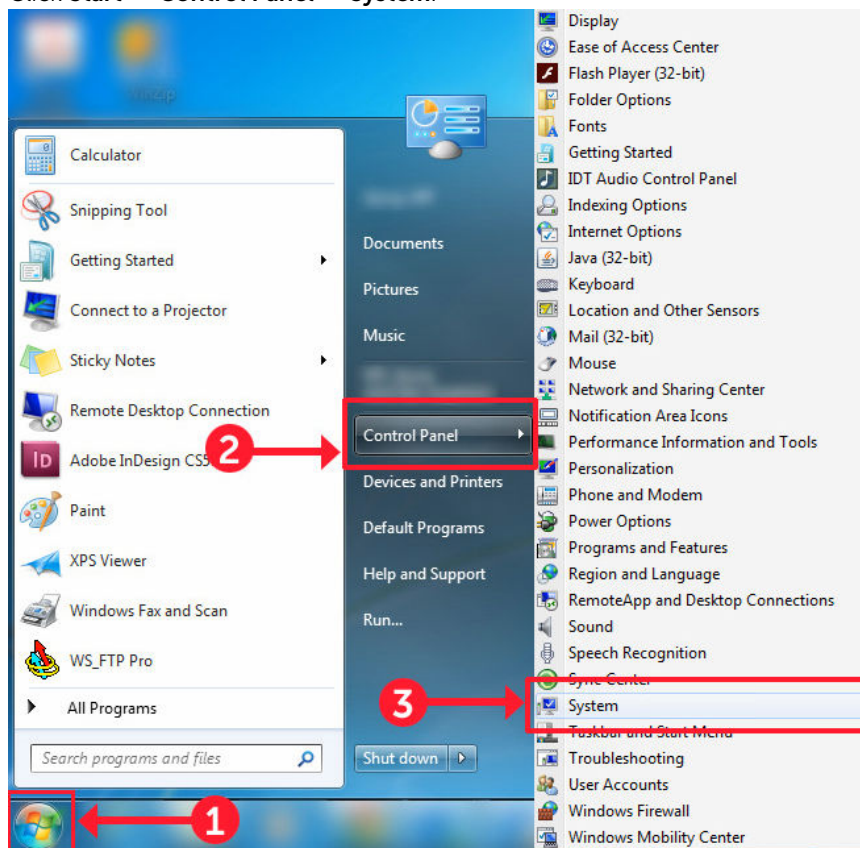
Figure 20. Opening the Systems page

2. In the **System** page, click **Advanced system settings** in the left pane.
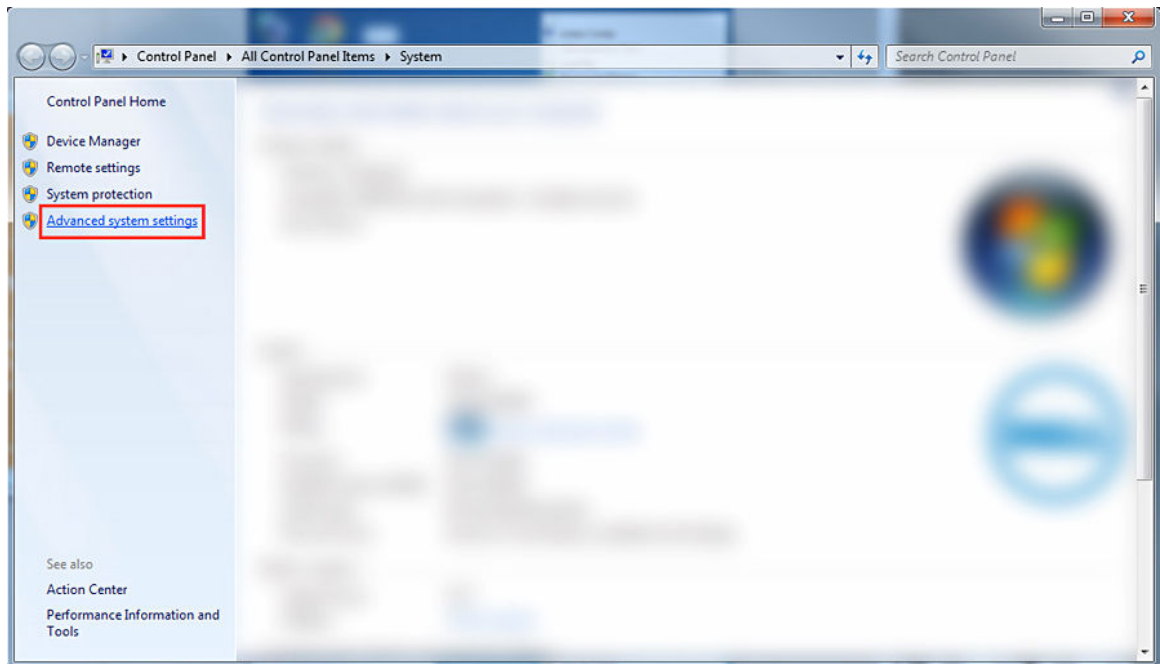
Figure 21. Advanced system settings page

3. In the **System Properties** window, click **Settings** under the **Startup and Recovery**section.
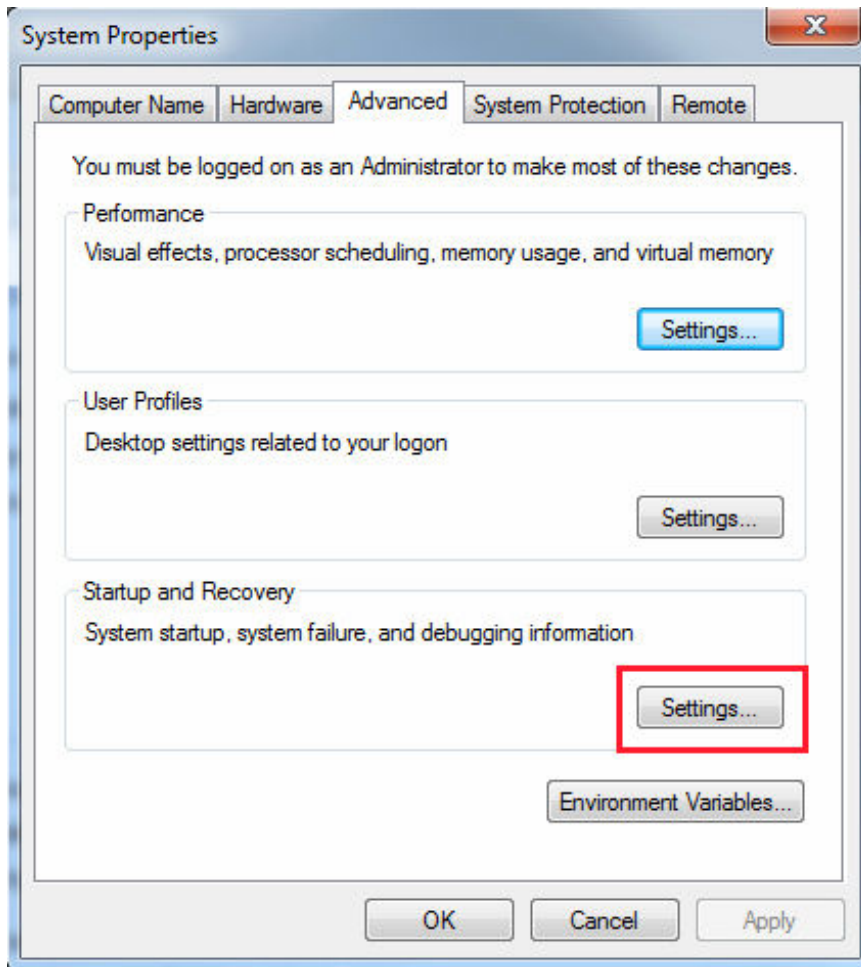
Figure 22. System Properties window

4. In the **Startup and Recovery** window, **System failure** section, do the following:

   a. Select **Write an event to the system log** to ensure that the minidump file is created in the event of a system failure.

   b. Select **Automatically restart** to restart the system after a blue screen of death (BSOD) occurs.

   > NOTE: For servers, it is recommended that you select the **Automatically restart** option so that the server can function if the error is not critical.

   c. Verify that the **Overwrite any existing file** option is not selected. This ensures that a record of failures is maintained if there are repeated occurrences of system failures.
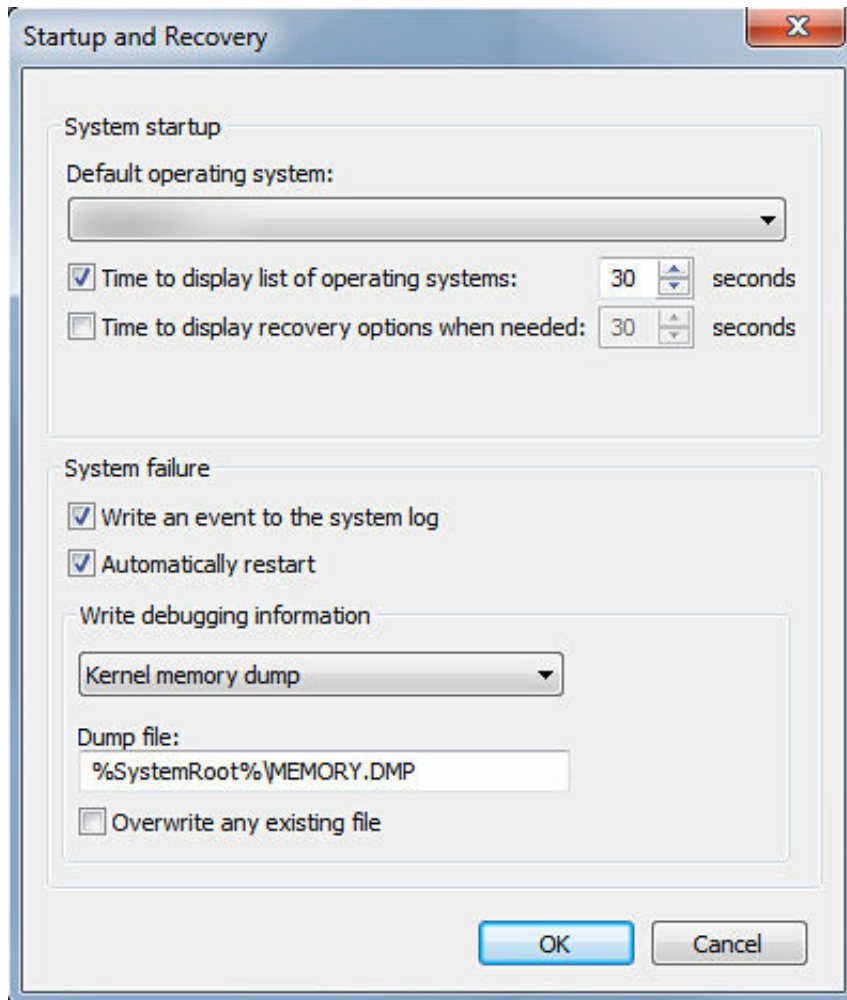
Figure 23. Startup and Recovery window

5. When a BSOD occurs, collect the minidump files by navigating to `C:\windows\minidump`.

6. Download and install the Windows Debugger (WinDbg) tool from**https://msdn.microsoft.com/en-us/windows/hardware/hh852365.aspx**.

Steps

1. Open WinDbg.
2. Click **File → Symbol File Path** or press **Ctrl + S** on the keyboard.
3. In the **Symbol Path** field, enter **SRV*<local path>*http://msdl.microsoft.com/download/symbols** where, **<local path>** is the path where you want to download the symbol files.
4. Click **OK**.
5. Click **File → Open Crash Dump** or press **Ctrl + D**.
6. Navigate to the folder where the mini dump file is saved.
7. Select the mini dump file and click **OK**.
8. Click **No** when the system prompts to save information for workspace.
   Debugging starts.
9. Click **!analyze –v** to get detailed debugging information.

10. Note down the values for the following parameters:
    a. **DEFAULT_BUCKET_ID**
    b. **MODULE_NAME**
    c. **IMAGE_NAME**
11. Call Dell Technical Support for further assistance.

Troubleshooting a No POST situation

Power On Self Test (POST) is a series of diagnostic tests that run automatically when you turn on your system. POST tests the memory, the keyboard and the disk drivers. If the test is successful, the computer boots itself, else the system displays an LED error or an error message in the LCD panel. This situation is called No POST.

Prerequisites

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

📝 **NOTE:** When removing or replacing parts, always turn off the server, remove the power cord, and wait for ten seconds for the static flea power to drain. Reconnect the power cord, wait for a minute and turn on the server. This allows time for the Baseboard Management Controller (BMC) to power up. Error messages may not be reported correctly if the static flea power is not fully drained. For more information on removing and installing hardware components, see your system's *Owner's Manual* at **Dell.com/poweredgemanuals**.

📝 **NOTE:** Ensure that you give enough time for the server to POST. Newer systems may take up to three minutes before any video appears during the POST. During this period, a message on the LCD screen is displayed, which indicates that the server is booting.

Steps

1. Check the LCD screen or LED indicators for any error messages.

   For more information about the error messages, see the *Dell Event and Error Messages Reference Guide* at **Dell.com/openmanagemanuals** > **OpenManage software**.

2. Ensure that the server is turned on by verifying that the power supply LED glows green.

   If the power LED is lit amber, see Power supply unit indicator codes.

3. Remove all the Electrostatic Discharge (ESD) from the server.
   a. Turn off the server.
   b. Disconnect all cables from the server including the power cable.
   c. Press and hold the power button for 60 seconds to discharge.
   d. Reconnect the power and video cable only.
   e. Turn on the server.

      If the server fails to POST, proceed to the next step.

4. Disconnect all cables from the server including the power cable.
5. Bring the server to the minimum configuration for the POST.

> **NOTE:** Minimum to POST configuration is the config that has the minimum components required to complete POST. Typically, the minimum to POST configuration for rack servers is PSU1, CPU1, memory module in A1 slot, and the default riser without expansion cards. For tower servers, the minimum to POST configuration is PSU1, CPU1, and memory module in A1 slot. For modular servers, the minimum to POST configuration is CPU1 and memory module in A1 slot.

6. Reconnect the power and video cable only.
7. Attempt to POST the server.
    a. If the server completes the POST, turn off the server and plug the components one at a time until the defective part is found.

    If you identify the defective part, contact Dell Technical Support with information about the defective part.

    b. If you are unable to identify the defective part, go to the next step.
8. Disconnect the hard drives, optical drives, and tape drives from the server and attempt to POST the server.
    a. If the server completes the POST, plug the hard drives back one at a time until the defective hard drives are found.

    If you identify the defective part, contact Dell Technical Support with information about the defective part.

    b. If you are unable to identify the defective part, go to the next step.
9. Reseat the control panel connector.
10. Ensure that the processors and heat sinks are seated correctly.
11. If the server does not complete the POST, clear the NVRAM using the jumper.

    For more information , see your system's *Owner's manual* at **Dell.com/poweredgemanuals**.

Next steps
If the issue still persists, contact Dell Technical Support for assistance.

Troubleshooting blue screen errors (BSODs)

1. Identify the stop code or the stop message when the system displays the blue screen of death.


```
A problem has been detected and windows has been shutdown to prevent damage to your computer.

DRIVER_IRQL_NOT_LES_OR_EQUAL

If this is the first time you've seen this stop error screen, restart your computer, If this screen appears again, follow
these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or
software manufacturer for any windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as
caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to
select Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x000000D1 (0x0000000C,0x00000002,0x00000000,0xF86B5A89)

*** gv3.sys - Address F86B5A89 base at F86B5000, DateStamp 3dd9919eb

Beginning dump of physical memory

Physical memory dump complete.

Contact your system administrator or technical support group for further assistance.
```

Figure 24. Blue screen of death

2. Run the PSA/ePSA diagnostics. For more information, see PSA/ePSA Diagnostics.
3. If the diagnostics pass and the issue persists, identify the stage in which the blue screen error occurs.
4. If the BSOD occurs during the boot process, check for minimum to POST components. For more information, see Troubleshooting a No POST situation.

   If the issue persists, call Dell Technical Support.
5. If the BSOD occurs during pre-logon, boot into Safe Mode and disable all startup entries. Isolate one startup entry at a time until you find the causing agent.

   ![NOTE] **NOTE:** If you are unable to boot into Safe Mode, call Dell Technical Support.
6. If the issue persists, check for minimum to POST components. For more information, see No POST .

   If the issue persists, call Dell Technical Support.
7. If the BSOD occurs intermittently or during post-logon, debug mini crash dump files using WinDbg. For more information, see Debugging mini crash dump files using by WinDbg in Windows operating system.

   After debugging, call Dell Technical Support with the minidump file.

Troubleshooting a Purple Screen of Death (PSOD)

For information on Troubleshooting a PSOD, see [Troubleshooting a Purple Screen of Death](#) and [Interpreting a purple screen of death](#).

Troubleshooting hard drive issues

Hard drive indicator codes
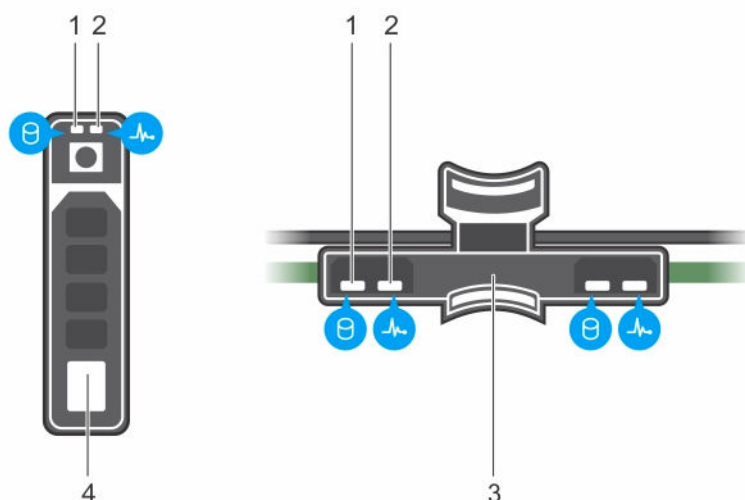
Figure 25. Hard drive indicators on the hard drive and the hard drive tray backplane

1. hard drive activity indicator
2. hard drive status indicator
3. hard drive backplane on hard drive tray
4. hard drive

NOTE: The hard drive tray backplane is available on the PowerEdge R730XD system.

NOTE: If the hard drive is in Advanced Host Controller Interface (AHCI) mode, the status indicator (on the right side) does not function and remains OFF.

Drive-status indicator pattern (RAID only)	Condition
Blinks green two times per second	Identifying drive or preparing for removal.
Off	Drive ready for insertion or removal. **NOTE:** The drive status indicator remains off until all hard drives are initialized after the system is turned on. Drives are not ready for insertion or removal during this time.
Blinks green, amber, and turns off	Predicted drive failure

Drive-status indicator pattern (RAID only)	Condition
Blinks amber four times per second	Drive failed
Blinks green slowly	Drive rebuilding
Steady green	Drive online
Blinks green three seconds, amber three seconds, and turns off six seconds	Rebuild aborted

Checking hard drive status in the PERC BIOS

1. Press **Ctrl + R** during the POST process to open **PERC BIOS Configuration Utility**.
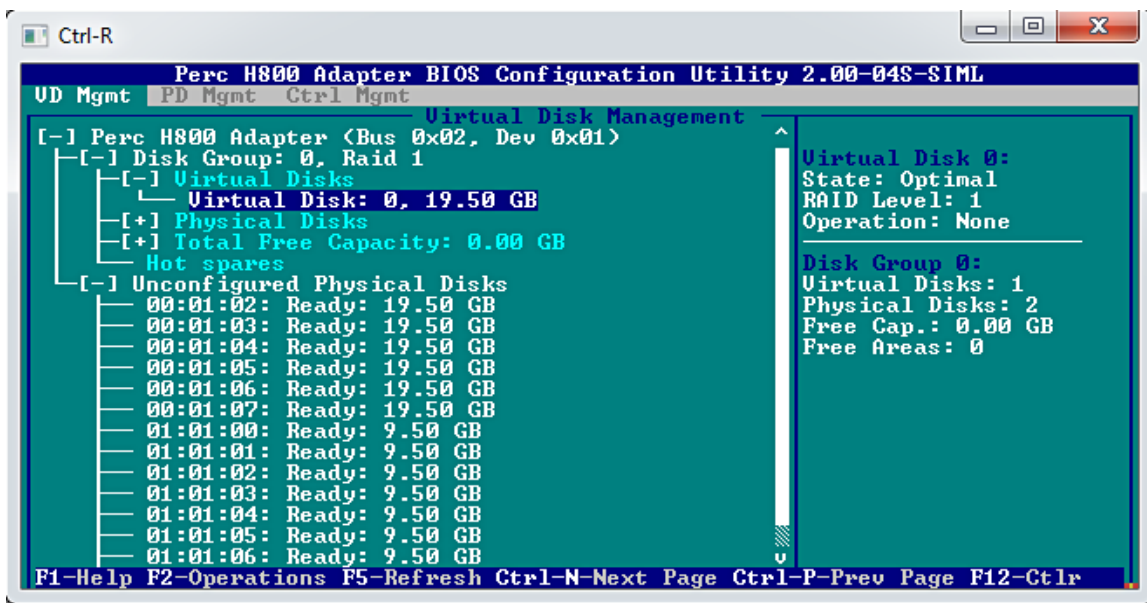
Figure 26. PERC Configuration Utility VD Mgmt screen

2. To check if the hard drive is participating in the RAID array, perform the following steps:
   a. Press **Ctrl + N** to go to the **PD Mgmt (Physical Disk Management)** screen and check if any hard drives are offline or missing.
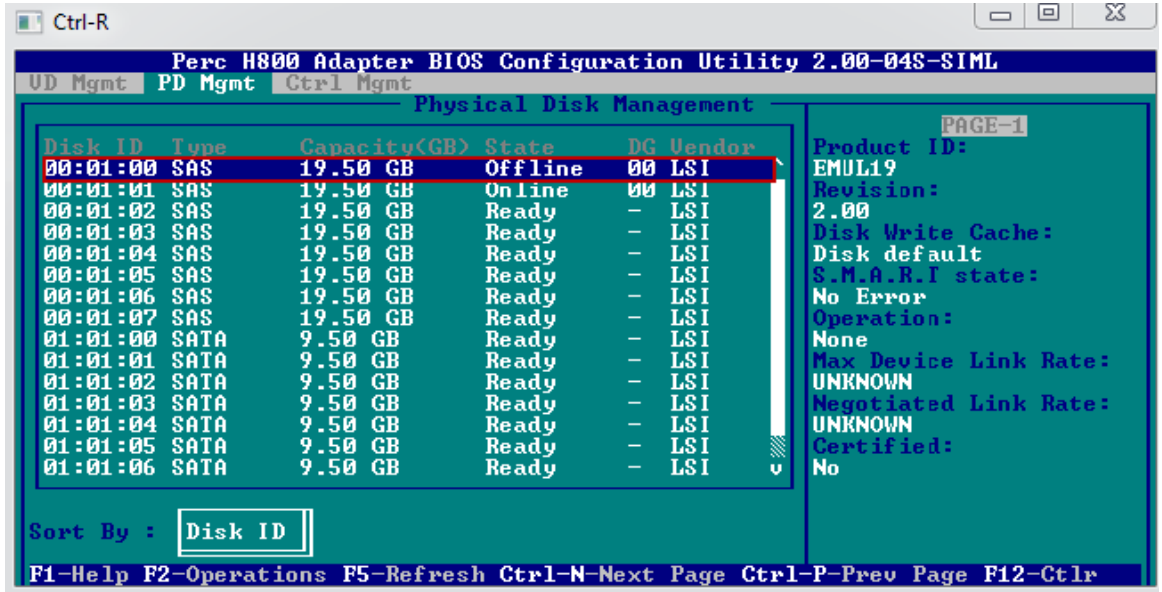
Figure 27. PERC Configuration Utility PD Mgmt screen

Hard drive status	Description
Offline	Hard drive is not part of the RAID array.
Online	Hard drive is part of the RAID array.
Ready	Hard dive is ready to be a part of the RAID array.

FAQs

How do I identify a hard drive failure?

Hard drive failures may occur because of logical, head, or mechanical failures. The following table describes the symptoms of failing hard drives:

Symptom	Description
Noisy hard drives	Noisy hard drives indicate head crash, noisy bearings, or a failed motor.
Data and disk errors	Files may not get saved or programs may stop responding.
Hard drive not detected	Operating system does not detect the hard drive.
System crash	Blue screen errors.
Slow read-write process	Delay in reading or writing data on the hard drive.

Perform the following steps if any of these symptoms occur:

1. Check if the hard drives are installed correctly.
2. Check the hard drive indicators. For more information, see Hard drive indicator codes.
3. For systems with LED indicators, check the diagnostic LEDs. For more information, see Diagnostic indicators.

   ✎ NOTE: The diagnostic LED indicators may be different for different systems.

4. For systems with LCD panel, check for the following error codes:

Error Code	Error Message	Description
E1810	Hard drive <number> fault.	Hard drive <number> has had a fault as determined by the SAS subsystem.
E1811	Hard drive <number> rebuild aborted.	Drive <number> has had its rebuild aborted.
E1812	Hard drive <number> removed.	Drive <number> has been removed from the system.

5. Perform the following steps to check the hard drive status in DSET:

   a. Download and install DSET from **Dell.com/DSET**.

   ✎ NOTE: For instructions on how to install, upgrade, and run the DSET application on Windows or Linux Operating System, see Dell System E-Support Tool (DSET).

   b. Extract the DSET report.
   c. Open the DSET report by double-clicking **dsetreport.hta**.
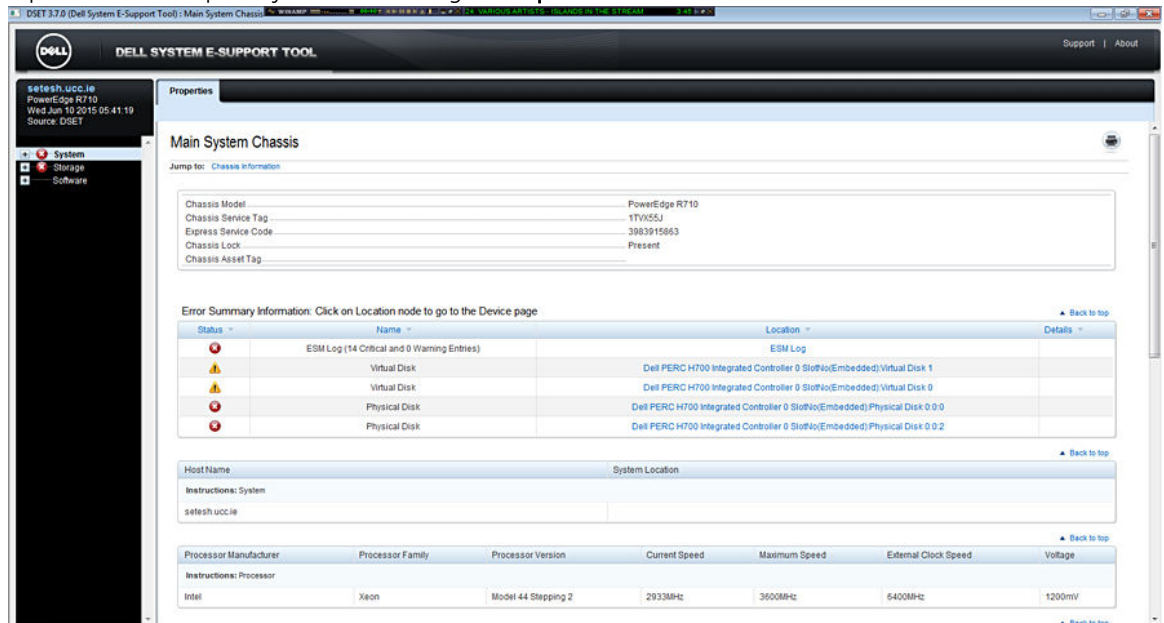
Figure 28. DSET main window

   d. Expand **Storage**.
   e. Expand the RAID controller(s).
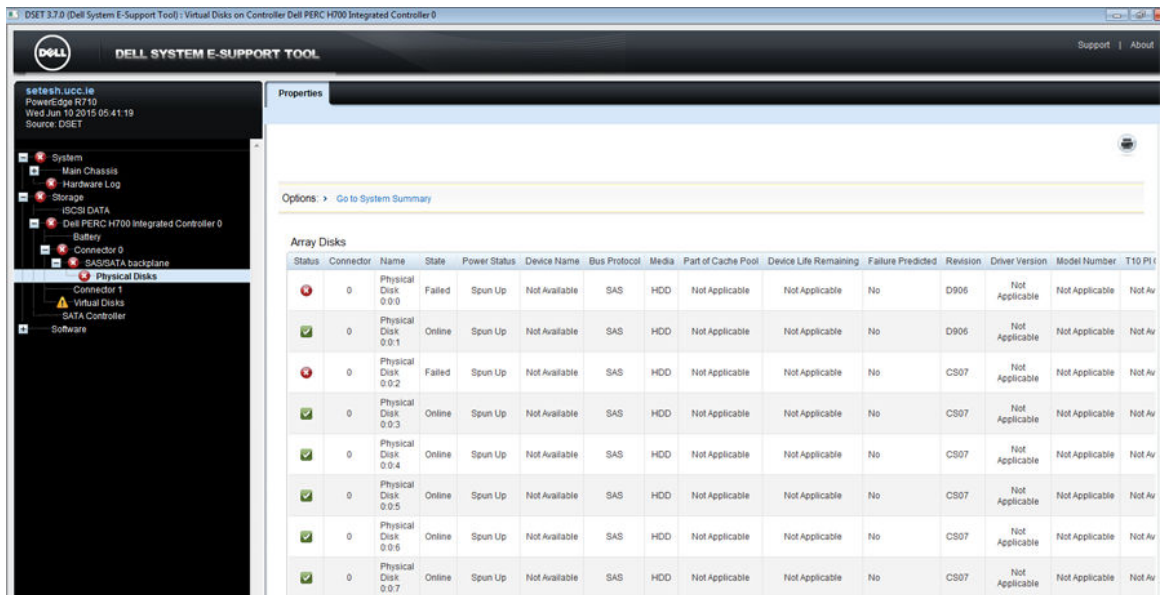
Figure 29. DSET main window— expanding RAID controller

f.   Click each array disk and check the hard drive state.

Hard drive state	Description
Online	Hard drive is participating in the RAID array.
Ready	The hard drive is ready to participate in the RAID array or the hard drive has been configured as a Hot Spare. For information on Hot Spare, see
Failed	Hard drive has failed.

g.   Note down **Failure Predicted State**.

Failure Predicted State	Description
Yes	The hard drive is likely to fail in the near future. Contact Dell Technical Support.
No	The hard drive is healthy.

6.   Check the hard drive status in the RAID BIOS. For more information, see Checking hard drive status in the PERC BIOS.

7.   Check the hard drive status in the controller log:

a.   In the extracted DSET report, go to **Log** → **Raid Controller** folder, and double click **Controller log** file.

b.   Note down sense key errors.

Sense key error code	Sense key error name	Sense key error description
3/xx/xx	MEDIUM ERROR	The disk in the hard drive has errors.
4/xx/xx	HARDWARE ERROR	The hard drive controller board has errors.

```
03/10/14 14:19:29: EVT#15994-03/10/14 14:19:29: 113=Unexpected sense:
PD 05(e0x20/s5) Path 5000c5003c082191, CDB: 28 00 17 a0 78 80 00 00 80
00, Sense: 4/32/00
03/10/14 14:19:29: Raw Sense for PD 5: f0 00 04 17 a0 78 e8 0a 00 00 00
00 32 00 9d 80 00 97

4/05/14 6:10:50: EVT#08851-04/05/14 6:10:50: 113=Unexpected sense: PD
00(e0x20/s0) Path 5000c500347bde3d, CDB: 28 00 00 31 84 f1 00 00 0f 00,
Sense: 3/11/00
04/05/14 6:10:50: Raw Sense for PD 0: f0 00 03 00 31 84 f6 0a 00 00 00
00 11 00 81 80 00 9d
```

c. Check for predictive failures.

```
03/26/14  4:26:29: EVT#16337-03/26/14  4:26:29:  96=Predictive failure:
PD 02(e0x20/s2)
02/11/14  5:32:29: EVT#15322-02/11/14  5:32:29:  96=Predictive failure:
PD 05(e0x20/s5)
12/18/12 10:52:14: EVT#02998-12/18/12 10:52:14:  96=Predictive failure:
PD 00(e0x20/s0)
02/19/14 14:19:39: EVT#70605-02/19/14 14:19:39:  96=Predictive failure:
PD 01(e0x20/s1)
02/19/14 14:19:39: EVT#70606-02/19/14 14:19:39:  96=Predictive failure:
PD 03(e0x20/s3)
```

d. Check for medium errors.

```
05/31/14 16:17:18: EVT#01781-05/31/14 16:17:18: 110=Corrected medium
error during recovery on PD 04(e0x20/s4) at 25036c99
05/31/14 16:17:18: EVT#01782-05/31/14 16:17:18:  93=Patrol Read
corrected medium error on PD 04(e0x20/s4) at 25036c99

02/26/14 20:29:18: EVT#02058-02/26/14 20:29:18: 111=Unrecoverable
medium error during recovery on PD 04(e0x20/s4) at 985f4d44
02/26/14 20:29:19: EVT#02062-02/26/14 20:29:19: 271=Uncorrectable
medium error logged for VD 01/1 at 1c91de744 (on PD 04(e0x20/s4) at
985f4d44)
```

e. Check for RAID punctures.

```
05/20/14  9:35:35: EVT#04236-05/20/14  9:35:35:  97=Puncturing bad
block on PD 0d(e0x20/s13) at 15c737b
05/20/14  9:35:36: EVT#04238-05/20/14  9:35:36:  97=Puncturing bad
block on PD 0c(e0x20/s12) at 15c7387

03/31/14  6:38:15: EVT#13742-03/31/14  6:38:15:  97=Puncturing bad
block on PD 02(e0x20/s2) at 2f3109
03/31/14  6:38:15: EVT#13743-03/31/14  6:38:15:  97=Puncturing bad
block on PD 02(e0x20/s2) at 2f3104
```

f. Check for the change in state of the virtual drive (VD).

```
03/25/12  3:18:34: EVT#17624-03/25/12  3:18:34: 114=State change on PD
01(e0xff/s1) from ONLINE(18) to FAILED(11)
03/25/12  3:18:34: EVT#17625-03/25/12  3:18:34:  81=State change on VD
00/0 from OPTIMAL(3) to DEGRADED(2)
```

g. Check for BadLBA.

```
03/25/12  3:18:25: ErrLBAOffset (0) LBA(709080) BadLba=709080
03/25/12  3:18:25: Read MED ERR!!! ErrLBA(0) LBA(709080) TotalBlks (20)
03/25/12  3:18:34: ErrLBAOffset (0) LBA(709080) BadLba=709080
03/25/12  3:18:34: Write MED ERR!!! ErrLBA(0) LBA(709080)
```

h. Check for faults on the backplane. The fault is indicated by *phy bad* on physical disk 20 (PD 20).

```
05/06/14 14:34:05: EVT#10796-05/06/14 14:34:05:185=Enclosure PD 20(c
None/p0) phy bad for slot 1
05/06/14 14:38:55: EVT#10817-05/06/14 14:38:55:185=Enclosure PD 20(c
None/p0) phy bad for slot 2
```

If you have any of the above error conditions, contact Dell Technical Support. When you call, keep the DSET report and the troubleshooting logs ready.

How to decode Sense Keys?

1. In the controller log available under the extracted DSET report, identify the sense value.
   ```
   Sense=f0 00 03 00 b4 70 21 28 00 00 00 00 11 01 00 00 00 3f
   ```
2. Identify the three parts of the sense value.

   📝 NOTE:

   The position locations starts after**Sense = f0**

   The following table describes the three parts of the sense key:

   Table 9. Position and description of Sense Keys

Position	Description
Position 3	Sense key
Position 12	Sense code
Position 13	Sense qualifier

3. Identify the error using the below table:

Code	Name
0h	NO SENSE
1h	RECOVERED ERROR
2h	NOT READY
3h	MEDIUM ERROR
4h	HARDWARE ERROR
5h	ILLEGAL REQUEST
6h	UNIT ATTENTION
7h	DATA PROTECT
8h	BLANK CHECK
9h	VENDOR SPECIFIC
Ah	COPY ABORTED
Bh	ABORTED COMMAND
Dh	VOLUME OVERFLOW

Code	Name
Eh	MISCOMPARE
Fh	COMPLETED

For

Sense=f0 00 03 00 b4 70 21 28 00 00 00 00 11 01 00 00 00 3f

Sense Key	`03`
Sense Code	`11`
Sense Qualifier	`01`

How do I extract RAID-Controller Logs using MegaCLI for Windows and Linux?

NOTE: To export information about the status of the RAID controller and the connected hard drives, use the MegaCLI tool by LSI (Avagotech).

To create the appropriate diagnostic files, perform the following steps:

1. Download the appropriate version of the MegaCli tool for Windows Operating systems from the [Avagotech support site](#).

   NOTE:

   For the most popular Linux operating systems, you also need the following file to ensure a smooth execution: **- Lib_Utils-1.00-09.noarch.rpm**

2. Unzip the downloaded files and copy them in any directory on the server or host system according your installed operating system. For example, on Windows the path can be `C:\temp\megacli`, and on Linux the path can be `/tmp/megacli`.

3. Open a terminal in Linux or a command prompt in Windows operating systems and navigate to the newly created directory.

4. Now, run the following commands:
   - To create the RAID controller logs in Windows, use the command `MegaCli.exe –FwTermLog -Dsply –aALL > ttylog.txt`.
   - To create the Event Log in Windows, use the command `MegaCli.exe –AdpEventLog – IncludeDeleted -f deleted.txt -aALL`.
   - To create the RAID controller logs in Linux, use the command `./MegaCli64 –FwTermLog – Dsply –aALL > /tmp/ttylog.txt`.
   - To create the Event Log in Linux, use the command `./MegaCli64 –AdpEventLog – IncludeDeleted -f deleted.txt -aALL`.

   NOTE: The **deleted.txt** file is always stored in the MegaCli folder.

Symptoms

Hard disk drive making noise

Description

Clicking or other loud noise is heard from the hard drive. The noise can be intermittent and may or may not coincide with read or write operations.

Resolution

1. Run the custom ePSA diagnostics and obtain the error code. For more information on ePSA diagnostics, see PSA/ePSA Diagnostics.
2. If the diagnostics fail, call Dell Technical Support for further assistance.
3. If the diagnostics pass, reseat the hard drive.
4. If the problem persists, call Dell Technical Support for further assistance.

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Troubleshooting operating system issues

Windows

FAQs

How to resolve the yellow bangs in device manager for Dell 12th Generation Servers?

Description

After installing Windows Server 2012 R2 on Dell PowerEdge 12th Generation Servers, two yellow bangs appear in the Device Manager under Hidden Devices: PCI SIMPLE COMMUNICATIONS CONTROLLER. These devices do not impact the server.

Resolution

Download and install chipset drivers from **Dell.com/support** for the respective servers.

Why are the USB keyboard and mouse not detected during the Windows Server 2008 R2 SP1 installation?

Cause

This issue occurs because Windows Server 2008 R2 SP1 does not have native USB 3.0 driver support.

Resolution

1. In **System Setup**, ensure that the USB 3.0 option on the **Integrated Device Settings** screen is set to **Disable**.

   📝 **NOTE:** By default, the USB 3.0 option is disabled. If enabled, the operating system fails to detect the USB devices such as keyboard, mouse, and USB DVD. Windows Server 2008 R2 SP1 supports out-of-box drivers for USB 3.0, and are available at **Dell.com/support**.

2. Install the drivers after installing the OS

3. Restart the system.

4. In **System Setup**, ensure that the USB 3.0 option on the **Integrated Device Settings** screen is set to **Enable**.

   📝 **NOTE:** Ensure that you first install the drivers, and then restart the system to enter **System Setup**,

Why does the installation wizard stop responding during the Windows OS installation?

Cause

This issue occurs because the Windows 2008 R2 SP1 does not support Secure Boot.

Resolution:

Before installing Windows 2008 R2 SP1, ensure that the **Secure Boot** option in **System Setup** is set to **Disable**.

> **NOTE:** Secure Boot is supported only on Windows 2012 R2 and Windows 2012 R2 with native storage controller and out-of-box drivers. Secure Boot is supported only in the UEFI mode.

Why does Windows OS installation using Lifecycle Controller, on PowerEdge Servers fail at times with an error message?

Cause

This issue occurs when the size of the drivers exceed the temporary storage space provided by the OS.

Resolution:

Before installing the OS, ensure that there are no add-on devices installed on the system. To avoid removing the hardware manually, you can also disable the PCIe slots in the BIOS configuration utility.

Why does Windows Server 2008 R2 SP1 display a blank screen in UEFI mode after installation?

After installing Windows Server 2008 R2 SP1 in the UEFI mode, either using Lifecycle Controller (LC) or manually, may display a blank screen while booting to the OS.

Cause

This issue occurs because the Windows Server 2008 R2 does not support Graphics Output Protocol (GOP).

Resolution

In the BIOS configuration utility, ensure that Load Legacy Option Rom on the Miscellaneous Settings screen is set to Enable.

Restart your system and boot to the operating system again.

Symptoms

Booting to iSCSI or FCoE fails

Description

When trying to install Windows Server 2012 R2 operating system on an iSCSI or FCOE LUN, you may see a failure either during the operating system installation or at first boot.

Resolution

This is a known issue. This issue has been fixed in operating systems pre-installed by Dell and in the recovery media shipped with your system. For more information, see the knowledge base article **KB2894179** at **support.microsoft.com**.

VMware

FAQs

Why are VMs configured with Fault Tolerance not in a protected state in ESXi 6.0?

For some PowerEdge systems with AMD 6300 series processor, VMs configured with Fault Tolerance (FT) might not be in a protected state. Sometimes, secondary VM takes more time to attain the protected state. This is a known issue. Affected systems include PowerEdge systems R815, R715 and M915.

Symptoms

Dell PowerEdge Express Flash NVMe PCIe SSD device is not detected during hot-plug in ESXi 6.0

Description

When the Express Flash NVMe PCIe SSD namespace is set as Offline and hot-plug operation is performed in the same slot, the SSD does not initialize and is not detected.

This is a known issue. Perform one of the following steps:

1. Reconnect the drive to a different drive slot, if available.
2. Restart the sfcbd-watchdog service and reinsert the drive.

Linux

FAQs

Why are network ports displayed as unknown in YaST2 network configuration in SUSE Linux Enterprise?

While configuring a bonding interface, the configured bond-slaves are listed as Unknown Network Device. The YaST installer is unable to write the device name in to the ifcfg files. Delete the existing configuration of previously configured network interfaces.

Symptoms

Unable to boot from iSCSI when static IPv6 address is assigned to the initiator

Description

The SUSE Linux Enterprise Server 12 does not boot from iSCSI over IPv6 address after successful installation, when static IPv6 address is assigned to the initiator.

Resolution

Use Dynamic Host Configuration Protocol (DHCP) address for the initiator.

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Troubleshooting no power issues

To resolve no power issues on the system, do the following:

1. Verify if the system has proper ventilation and cooling. Look for airflow obstruction to the power supply units (PSU)or fans. If a thermal trip occurred, it may take a little while for the system to cool off.

2. If the system has a Power Supply Voltage Selector switch (located on the Power Supply) verify that it is set to the correct region.

3. Check if the BMC/iDRAC is powering up. The LCD flashes ON and OFF when the BMC/iDRAC powers up.

4. Verify the power source by bypassing any power distribution units or uninterrupted power supplies. Plug the power cord directly into the outlet and verify that the outlet is supplying power by testing it with another known good device in the outlet.

5. Check the power supply LEDs if applicable. for more information, please see the appropriate server's Owner's Manual available at the support site.

6. Disconnect the power cable from the power source and from the PSU you intend to remove, and then remove the cables from the strap.

7. Disconnect all the external devices from the system.

8. Reseat the power supply cables to the system board.

9. Reseat the control panel cable.

   NOTE: On the server ,check the connections of the signal cable from the backplane to the motherboard and from the Power Distribution Board to the motherboard.

10. Remove all expansion cards and disconnect all hard drives and storage devices from the system.

11. Remove all the memory modules.

12. Reconnect the PSUs and test the system.

    NOTE: Observe the diagnostic LEDs or the LCD screen with all the memory modules taken out, the server will not POST but should display a No Memory in system error either with a Quadpack error or on an error on the LCD screen.

13. If the server does not power on, contact your Dell Technical Support team for further support.

Thermal issue

Thermal issues can occur because of the following; malfunctioning ambient temperature sensors, malfunctioning fans, dusty heat sinks, and malfunctioning thermal sensors etc.

To resolve the thermal issues:

1. Check the LCD and Embedded System Management (ESM) logs for any additional error messages to identify the faulty component.
2. Ensure that airflow to the machine is not blocked. Placing it in an enclosed area or blocking the air vent, can cause it to overheat. If installed in a rack, ensure that the rack cooling system is working fine.
3. Check for the ambient temperature is within acceptable levels.
4. Check the internal system fans for obstructions and ensure that all fans are spinning properly. Swap any failing fans with a known-good fan for testing.
5. Ensure that all the required shrouds and blanks are installed.
6. Check If all of the fans are functioning properly and the heatsink is installed correctly and thermal grease is applied.

Troubleshooting memory issues

Prerequisites to follow when installing or upgrading memory

- Identify the maximum memory capacity supported by the processor installed in the system.
- While installing the memory module, ensure that you follow the memory population rules. For more information, see the Memory population guidelines section.
- Ensure that the memory configurations set in the System BIOS matches with the memory modules installed in the system.

Memory population guidelines

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

- Populate DIMM sockets only if a processor is installed in the system.
- Populate all sockets with white release levers first, then black, and then green release levers.
- Mixing of different DIMM types is not supported. For example, only RDIMMs, only UDIMMs, or only LRDIMMs can be installed in a system.
- x4 and x8 DRAM based DIMMs can be mixed.
- Memory modules of different ranks can be mixed. For example, single rank and dual rank memory modules can be mixed. While mixing of DIMMs with different capacities, ensure that you populate the sockets by highest rank count in the following order—first in sockets with white release levers, then black, and then green. For example, if you want to mix single-rank and dual-rank memory modules, populate dual-rank memory modules in the sockets with white release tabs and single-rank memory modules in the sockets with black release tabs. You can only mix maximum of two different rank DIMMs in the system.
- Memory modules of different capacities can be mixed. For example, 4 GB and 8 GB memory modules can be mixed. While installing memory modules of different capacities, ensure that you populate the sockets with memory modules with highest capacity first. For example, if you want to mix 4 GB and 8 GB memory modules, populate 8 GB memory modules in the sockets with white release tabs and 4 GB memory modules in the sockets with black release tabs. You can mix maximum of two memory modules of different capacity.
- In a dual-processor configuration, the memory configuration for each processor should be identical through the first eight slots. For example, if you populate socket A1 for processor 1, then populate socket B1 for processor 2, and so on.

NOTE: For more information about the system memory guidelines specific to your system, see the Owner's Manual at Dell.com/poweredgemanuals.

Memory modes

There are four types of memory modes:

- Advanced ECC (Lockstep)
- Memory Optimized (Independent Channel)
- Memory Sparing
- Memory Mirroring

You can configure the memory modes in the System BIOS. For more information, see the Configuring memory modes section.

Configuring memory modes

About this task

To configure memory modes, follow the procedure listed below:

Steps

1. Turn on or restart your system.
2. Press F2 immediately after you see the following message: `<F2> = System Setup`.
3. Click **System Setup Main menu** > **System BIOS** > **Memory Settings**.
4. In the **Memory Operating Mode** field, select the memory mode you want.

Memory Mirroring

In the memory mirroring mode, half of the installed memory is used to mirror the active DIMMs. When an uncorrectable error is detected, the system switches over to the mirrored copy. This mode offers SDDC and multi-bit protection and also provides strongest DIMM reliability mode compared to all other modes.

Memory Sparing

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

With memory sparing enabled, the system memory available to the operating system is reduced by one rank per channel. For example, in a dual-processor configuration with sixteen 4 GB dual-rank DIMMs, the available system memory is: 3/4 (ranks/channel) $\times$ 16 (DIMMs) $\times$ 4 GB = 48 GB, and not 16 (DIMMs) $\times$ 4 GB = 64 GB.

> **NOTE:** Memory sparing does not offer protection against a multi-bit uncorrectable error.

> **NOTE:** Both Advanced ECC or Lockstep and Optimizer modes support Memory Sparing.

Memory optimized (independent channel)

This mode supports SDDC only for memory modules that use x4 device width, and the mode does not impose any specific slot population requirements.

Advanced ECC

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

Memory lane failure

The disabling of the memory module in the channel results in memory lane failure.

Memory lane failure may occur due to the following reasons:

- the system is not using latest BIOS
- the memory modules are not seated properly on the DIMM sockets in the system.
- the system has a faulty DIMM socket.

Correctable and uncorrectable errors

Correctable errors can be detected and corrected if the chipset and DIMM support this functionality. Correctable errors are generally single bit errors (SBE). Most of the Dell servers are capable of detecting and correcting single bit errors. In addition, Dell servers with Advanced ECC mode support can detect and correct multi-bit errors.

Correctable errors can be classified as hard errors and soft errors. Hard errors typically indicate a problem with the DIMM. Although hard correctable memory errors are corrected by the system and will not result in system downtime or data corruption, they indicate a problem with the hardware. Soft errors do not indicate any issue with the DIMM. A soft error occurs when the data or ECC bits or both data and ECC bits on the DIMM are incorrect, but the error will not continue to occur after the data or ECC bits or both data and ECC bits on the DIMM have been corrected.

Uncorrectable errors are always multi-bit memory errors. While correctable errors do not affect the normal operation of the system, uncorrectable memory errors will immediately result in a system crash or shutdown of the system when not configured for Mirroring or RAID AMP modes. Uncorrectable memory errors can typically be isolated down to a failed Bank of DIMMs, rather than the DIMM itself.

System stops responding during POST after upgrading or installing a memory module

Issue:
During POST, the system stops responding or displays MEMTEST lane failure error message.

Resolution

Ensure the following:

- The system is using the latest BIOS.
- The memory modules are seated properly on the DIMM sockets in the system.
- The system has a no faulty DIMM socket.

How to resolve unsupported or mismatched memory module error messages reported during POST on a PowerEdge system?

Description:
After installing or upgrading a memory module, when you try to boot the system, an error message appears reporting an unsupported or mismatched memory module.

Resolution:

- If the memory module was replaced or upgraded, ensure that the maximum memory capacity and the memory type are supported by the processor installed in the system.

- While installing the memory module, ensure that you follow the memory population rules. For more information, see the Memory population guidelines section.

Troubleshooting memory module issues

Following are guidelines to troubleshoot memory module issues:

- Check for the LCD status messages. The server's LCD screen displays text messages that indicate multi-bit and single-bit errors were detected in the System Event Log (SEL).
- Run the Dell System E-support Tool (DSET) to identify a faulty DIMM in the memory modules or in the System Event Logs (SEL) logs.
- Run the MPMemory diagnostics, which checks the logs first and then checks the DIMMs. If there is an issue, the test results display an error.
- Check for POST messaging error beep codes.
- Check for the POST status on the LCD screen.
- Check for memory and system compatibility.
- Delete the Single Bit Errors in the SEL log by using the OMSA, DSET and CTRL-E to clear the SEL logs.
- Clear the Single-Bit Error (SBE) Log and Multi-Bit Error (MBE) Log to resolve the memory issues.
- Check for CPU socket for any bent pins.
- Ensure that the system is using the latest BIOS version. If not, update the BIOS and check if the error occurs.

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Troubleshooting RAID

RAID configuration using OpenManage Server Administrator

For more information about the OpenManage Server Administrator RAID Configuration video, go to
https://www.youtube.com/playlist?list=PLe5xhhyFjDPfL6NsJ29FXLVsP9uE-AFO0.

Create virtual disk Express Wizard

The **Create Virtual Disk Wizard** allows you to select the wizard type and the RAID level. The **Create Virtual Disk Express Wizard** calculates the appropriate virtual disk configuration based on the available space and controller considerations. To make your own selections for the virtual disk configuration, select the **Advanced Wizard** option.

About this task
This task is not supported on PERC hardware controllers running in **HBA** mode. To create a virtual disk by using the **Create Virtual Disk Express Wizard**, perform the following steps:

Steps
1. On the upper-left corner of the **Server Administrator** page, expand **Storage** .
2. Click **PERC Controller**.
3. Click **Virtual Disks**.
   The **Virtual Disk(s) on Controller <Controller Name>** page is displayed.
4. Click **Go to the Create Virtual Disk Wizard**.
   The **Create Virtual Disk Wizard <Controller Name>** page is displayed.
5. Select the **Express Wizard** option and the **RAID level** from the drop-down menu.
6. Click **Continue**.
   The **Create Virtual Disk Express Wizard - <Controller Name>** page displays the summary of attributes of the selected RAID level. The attributes include **Bus Protocol**, **Stripe Element Size**, **Read Policy**, and the selected physical disk. The default values of the virtual disk attributes excluding the RAID level are recommended for the selected RAID level.
7. In the **Name** field, type a name for the virtual disk.
   The virtual disk name can contain only alphanumeric characters, spaces, dashes, and underscores. The maximum length of the virtual disk name depends on the controller. In most cases, the maximum length is 15 characters. The name cannot start with a space or end with a space.

   > **NOTE:** Dell recommends that you specify a unique name for each virtual disk. If you have virtual disks with the same name, it is hard to differentiate the generated alerts.

8. In the **Size** field, type the size of the virtual disk.
   The virtual disk size must be within the minimum and maximum values displayed against the **Size** field.

In some cases, the virtual disk is slightly larger than the size you specify. The **Create Virtual Disk Wizard** adjusts the size of the virtual disk to avoid rendering a portion of the physical disk space unusable.

9. If you want to change your selections, click **Go Back To Previous Page** to return to **Create Virtual Disk Express Wizard** page.

10. Click **Finish** to complete the virtual disk creation or click **Exit Wizard** to cancel the virtual disk creation.

   For PERC H700 and PERC H800 controllers, if any of the drives you selected is in the spun down state, the following message is displayed:

   ```
   The below listed physical drive(s) are in the Spun Down state. Executing
   this task on these drive(s) takes additional time, because the drive(s)
   need to spun up.
   ```

   The message displays the ID(s) of the spun down drive(s).

   > **NOTE:** When the hard drive is in the spun down state, the drive is not in active use.

   The virtual disk is displayed in the **Virtual Disk(s) on Controller <Controller Name>** page.

Create virtual disk Advanced Wizard

The **Create Virtual Disk Advanced Wizard** allows you to specify the read, write, cache policy, and parameters such as RAID level, bus protocol, media type, and encrypted disk for the virtual disk. You can also select the physical disks and the controller connector. You must have a good knowledge of RAID levels and hardware to use the Advanced Wizard. If you want the wizard to recommend a virtual disk configuration for you, select the **Express Wizard** option.

Prerequisites

> **NOTE:** This task is not supported on PERC hardware controllers running in **HBA** mode.

To create a virtual disk using the **Create Virtual Disk Advanced Wizard**:

Steps

1. On the upper-right corner of the **Server Administrator** page, click **Storage**.
2. Click **<PERC Controller>**.
3. Click **Virtual Disks**.
   The **Virtual Disk(s) on Controller <Controller Name>** page is displayed.
4. Click **Go to the Create Virtual Disk Wizard**.
   The **Create Virtual Disk Wizard <Controller Name>** page is displayed.
5. Select the **Advanced Wizard** option.
6. To make sure that only encrypted physical disks are used to create the virtual disk, select **Yes** from the **Create Encrypted Virtual Disk** drop-down list.
   The RAID levels are available for selection based on the number of encrypted physical disks.
   If you select **No**, the RAID levels are available based on the total number of physical disks present on the system.
7. Select the required RAID level from the drop-down menu.
8. Select **Bus Protocol**.
   The options are:
   - SAS

- SATA

9. Select **Media Type.**

   The available options are:

   - HDD
   - SSD

10. Click **Continue.**

    📝 **NOTE:** If you are creating an encrypted virtual disk, only the encrypted physical disks are displayed. Else, both encrypted and unencrypted physical disks are displayed.

    The following is an example of what might be displayed:

    Connector 0

    The **Connector** section of the page displays the connectors on the controller and the disks attached to each connector. Select the disks you want to include in the virtual disk. In this example, the controller has a single connector with five disks.

    - Physical disk 0:0
    - Physical disk 0:1
    - Physical disk 0:2
    - Physical disk 0:3
    - Physical disk 0:4

    Physical Disks Selected

    The **Physical Disks Selected** section of the page displays the disks you have chosen. In this example, two disks are selected.

    - Physical disk 0:0
    - Physical disk 0:1

    Each RAID level has specific requirements for the number of disks that must be selected. RAID 10, RAID 50, and RAID 60 also have requirements for the number of disks that must be included in each stripe or span.

    If the controller is a SAS controller with firmware version 6.1 and later and you selected RAID 10, RAID 50, and RAID 60, the user interface displays the following:

    - **All Disks**—Enables you to select all the physical disks in all the enclosures.
    - **Enclosure**—Enables you to select all physical disks in the enclosure.

      📝 **NOTE:** The **All Disks** and **Enclosure** options enable you to edit spans after selecting the physical disks that comprise them. You can remove a span and specify a span again with different physical disks before proceeding.

    - **Number of Disks per Span** — Enables you to select the number of disks in each span (default = 2). This option is available only on SAS controllers with firmware version 6.1 and later.

      📝 **NOTE:** This option is available only if **Intelligent Mirroring** on the **Create Virtual Disk Advanced Wizard** page is selected.

      📝 **NOTE:** On a SAS controller with firmware version 6.1 and later, RAID 10 supports only even number of disks per span and a maximum of 8 spans with 32 disks in each span.

Let us consider that the controller has three enclosures with six physical disks each (total number of available disks = 3 x 6 =18 disks). If you select four disks per span, the controller creates four spans (18 disks/4 disks per span = 4 spans). The last two disks of the last enclosure are not part of RAID 10.

- Select the **number of disks to create a single spanned virtual disk** list box — Enables you to create a single span virtual disk with 22 or 26 physical drives for PERC controllers. This list box option is displayed only if you have selected RAID 10 in step 1 and the system has 22 or more physical drives.

  NOTE: Only physical disks that comply with the virtual disk parameters, selected in the **Create Virtual Disk Wizard** page are displayed.

11. Select the required connector and the corresponding physical disk, and click **Continue**.
12. In the **Name** field, type a name for the virtual disk.

    The virtual disk name can contain only alphanumeric characters, spaces, dashes, and underscores. The maximum length depends on the controller. In most cases, the maximum length is 15 characters.

    The name cannot start with a space or end with a space. If you have virtual disks with the same name, it is hard to differentiate the generated alerts, Dell recommends that you specify a unique name for each virtual disk.

13. In the **Size** field, type the size of the virtual disk.

    The virtual disk size must be within the minimum and maximum values displayed near the **Size** field.

    In some cases, the virtual disk is slightly larger than the size you specify. The **Create Virtual Disk Wizard** adjusts the size of the virtual disk to avoid rendering a portion of the physical disk space unusable.

    NOTE: If a physical disk is receiving a SMART alert, it cannot be used in a virtual disk.

    NOTE: For a controller that has more than one channel, it may be possible to configure a virtual disk that is channel-redundant.

    Depending on the RAID level you selected and the virtual disk size, this page displays the disks and connectors (channels or ports) available for configuring the virtual disk.

    NOTE: The **Size** field displays the default size of the virtual disk depending upon the RAID configuration you selected. However, you can also specify a different size based on your requirement. The virtual disk size must be within the minimum and maximum values displayed against the **Size** field. In some cases, the virtual disk is slightly larger than the size you specify. The **Create Virtual Disk Wizard** adjusts the size of the virtual disk to avoid rendering a portion of the physical disk space unusable.

14. Select a stripe size from the **Stripe Element** Size drop-down list box. The stripe size refers to the amount of space that each stripe consumes on a single disk.
15. Select the required read, write, and disk cache policy from the respective drop-down list box. These selections can vary depending on the controller.

    NOTE: There is limited support for write policy on controllers that do not have a battery. The cache policy is not supported on controllers that do not have a battery.

    NOTE: If you have selected the **Create Encrypted Virtual Disk** option in **Create Virtual Disk Advanced Wizard**, then in the **Summary of Virtual Disk Attributes**, an **Encrypted Virtual Disk** attribute is displayed with a value **Yes**.

16. Click **Span Edit** to edit the spans created in **Create Virtual Disk Advanced Wizard**.

> ⚠ CAUTION: If you click Span Edit, Intelligent Mirroring that has already been applied becomes invalid.

> ✎ NOTE: The **Span Edit** option is available only if the controller is a SAS controller with firmware 6.1 and later and if you selected RAID 10 while using [Create virtual disk Advanced Wizard](#).

17. If you want to change your selections, click **Go Back To Previous Page** to return to **Create Virtual Disk Advanced Wizard** page.

18. Click **Finish** to complete the virtual disk creation or click **Exit Wizard** to cancel the virtual disk creation.

    The virtual disk is displayed in the **Virtual Disk(s) on Controller <Controller Name>** page.

    For PERC H700 and PERC H800 controllers, if any of the drives you selected is in the spun down state, the following message is displayed:

    ```
    The below listed physical drive(s) are in the spun down state. Executing
    this task on these drive(s) takes additional time, because the drive(s)
    need to spun up.
    ```

    The message displays the ID(s) of the spun down drive(s).

    The **Create Virtual Disk Advanced Wizard - <Controller Name>** page displays a check box next to each physical disk that is suitable as a dedicated hot spare. Select a **Physical Disk** check box if you want to assign a dedicated hot spare.

    The **Physical Disk** check box is not available if the controller does not have a physical disk that is a suitable hot spare for the virtual disk you are creating. For example, the available physical disks may be too small to protect the virtual disk. If the **Physical Disk** check box is not available, specify a smaller virtual disk, use a different RAID level, or change the disk selection.

    > ✎ NOTE: If you are creating an encrypted virtual disk, then encrypted physical disks are listed as candidates for hot spare.

RAID configuration by using Unified Server Configurator

The Unified Server Configurators (USC)'s main features include operating system deployment, firmware updates, hardware configuration, and diagnostics. The UEFI specification creates framework for many powerful applications that run without an operating system. The UEFI specification includes the Trusted Computing Troup (TCG) protocol that allows for Trusted Platform Module (TPM) measurements and secure updates which USC leverages to its fullest extent.

1. Select the **RAID configuration** tab to create the virtual disk as the boot device.
2. On the **View Current Configuration** screen, you can view a list of current controllers and virtual disks installed in the system.
   a. If the virtual disk or disks exist in the system, click **Exit** to exit the screen and continue with operating system installation. if the virtual disk or disks do not exist in the system, continue with the new virtual disk creation process.
3. On the **Select RAID Controller** screen, select the controller on which to configure a virtual disk.
   - If the selected controller contains a foreign configuration, the **Foreign Configuration Detected** screen is displayed.
   - Depending on the foreign configuration, you have the option to either **Clear**, **Import** or **Ignore** the foreign configuration.
   - If you select the **Clear Foreign Configuration** option, all the data gets deleted on the drives containing the foreign configuration, thereby allowing the drives to be used in a new configuration.

- Selecting **Import Foreign Configuration** attempts to import the foreign configuration.
- Selecting **Ignore Foreign Configuration** leaves the drives in their current state and uses free drives to create a new configuration.

   📝 **NOTE:** Selecting the **Ignore Foreign Configuration** causes the system to generate alerts and error messages every time the system is started.

4. Select either the **Express Wizard** or **Advanced Wizard** window on the **Select a Configuration Option** screen.
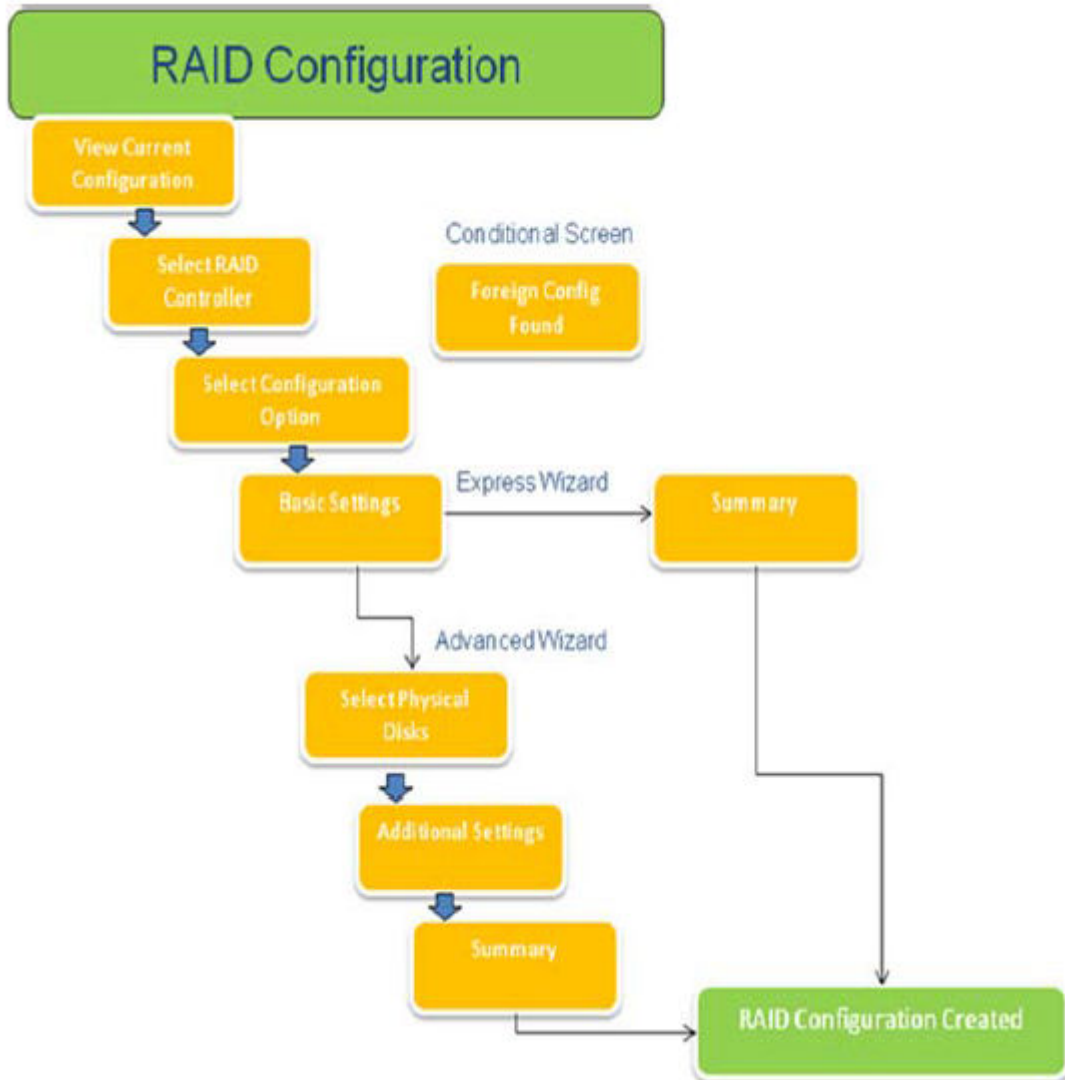

Figure 30. Flowchart of Unified Server Configurator's RAID configuration process

5. The Express option selects the appropriate disks depending upon the RAID type selected for virtual disk creation.

   The **Summary** screen is displayed. You can review the choices selected during the Express wizard.

6. Click **Finish** to create the virtual disk to be used for operating system installation.

7. The **Advanced** option takes you to a series of more screens. Select the RAID type on the **Basic Settings** screen. On the **Select Physical Disks** screen, select the physical disks that are the part of the virtual disk.

   The **Additional Settings** screen is displayed to define additional parameters for the virtual disk, such as stripe element size, read and write policy, and whether or not to assign a hot spare disk. The **Summary** of virtual disk attributes is displayed.

8. Click **Finish** to create virtual disk to be used for operating system installation.

Downloading and installing the RAID controller log export by using PERCCLI tool on ESXi hosts on Dell's 13th generation of PowerEdge servers

To export information about the status of the RAID controller and its attached hard drives, you can use the PERCCLI tool. To download and install the RAID controller log export by using PERCCLI tool on ESXi hosts on Dell's 13th generation of PowerEdge servers, perform the following steps:

1. Download the latest verion of PERCCLI for ESX tool from **Dell.com/support/home**.
2. To upload the PERCCLI tool to Datastore:
   a. Select the **host** (1), and then click on the **Configuration** tab (2).
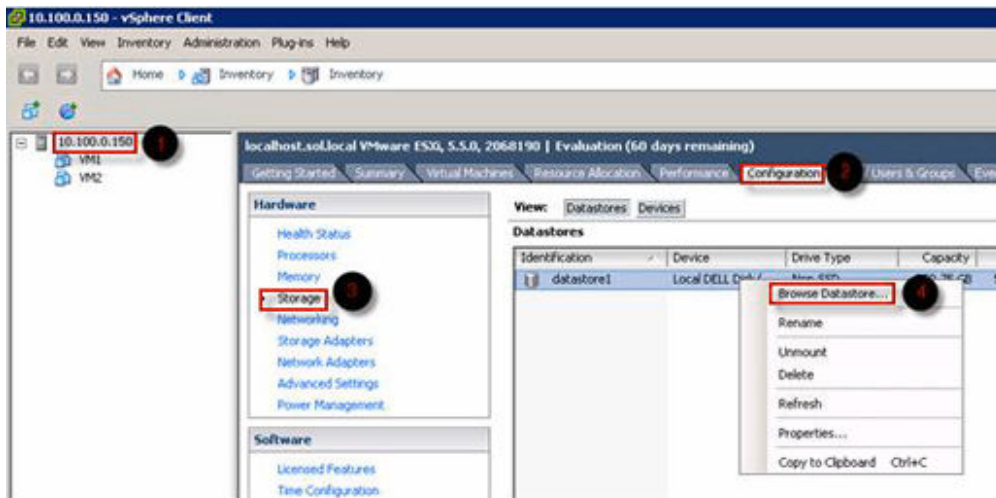   b. In the **Hardware** panel, select **Storage** (3) and right-click **datastore1**.

Figure 31. vSphere Client

   a. In **Datastore Browser**, click **Upload**, and then click **Upload File**.

Figure 32. Datastore Browser

3. To enable Secure Socket Shell (SSH) select **host** (1), and then click on the **Configuration** tab (2). In the **Software** panel, select **Security Profile** (3). **In Services**, click **Properties** (4) at the upper-right corner of the screen.
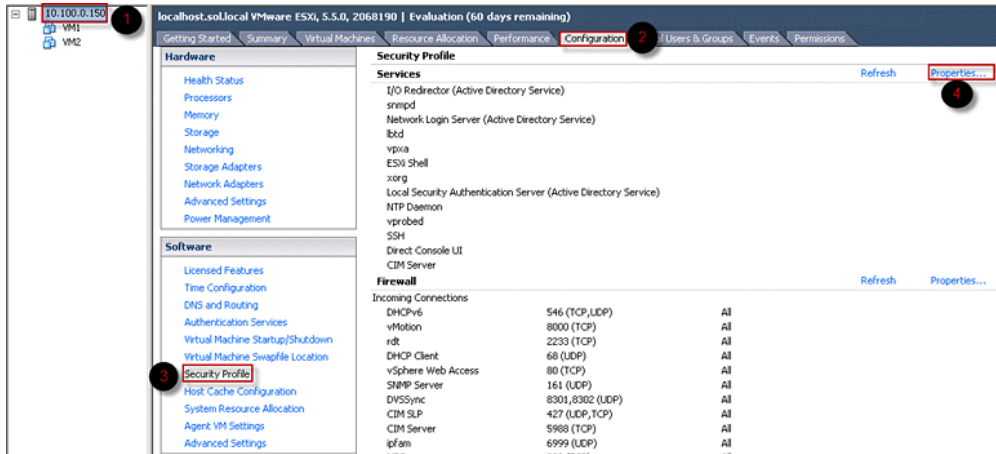
Figure 33. Configuration tab

a. In the **Services properties** window, select **SSH** (1), and then click **Options...** (2)
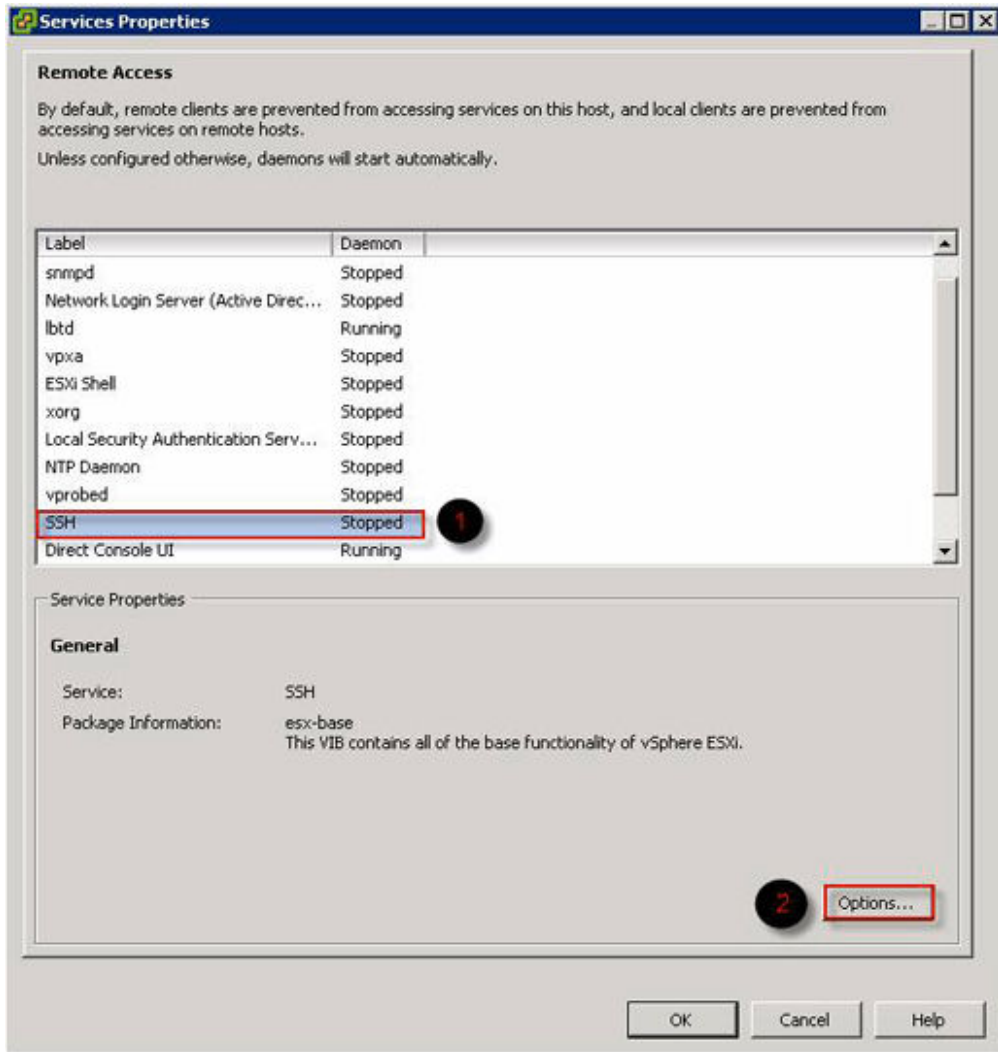
Figure 34. Open SSH Options

b. In the **SSH Options** window, click **Start** (1), and then click **OK** (2) to activate the service.
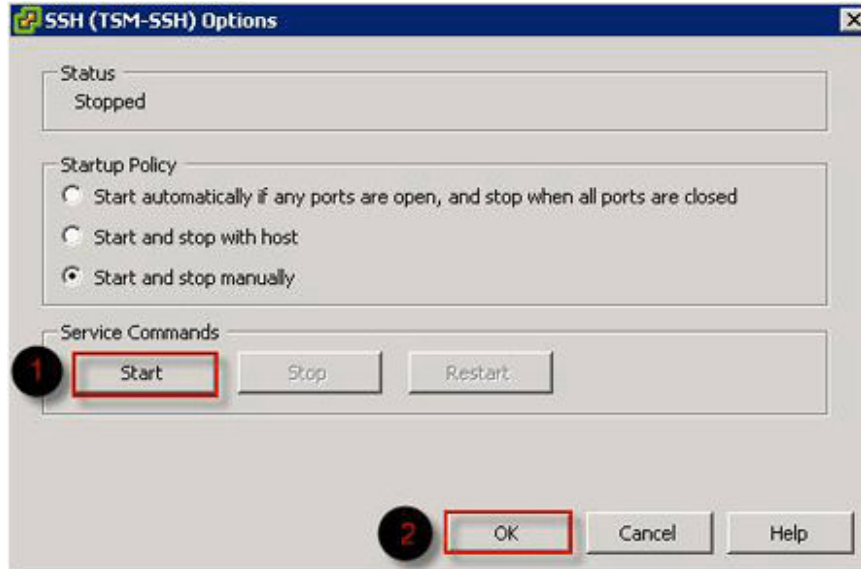
Figure 35. Start SSH Service

4. To unzip vmware-esx-perccli, open an SSH connection via PUTTY and run the command: `unzip / vmfs/volumes/datastore1/vmware-esx-perccli-1.05.08.zip`

   PUTTY is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin, and raw socket connection. You can download it from Google. The files vmware-esx-perccli-1.05.08.vib and Readme.txt are now extracted to: **/vmfs/volumes/datastore1/**

   > ⚠ **WARNING: Please check the correct path (e.g. datastore1) according to your installation package**

5. Install PERCCLI by using command: `esxcli software vib install -v /vmfs/volumes/ datastore1/vmware-esx-perccli-1.05.08.vib --no-sig-check`

Figure 36. Install PERCCLI

6. Go to directory **/opt/lsi/perccli** by using command: `cd /opt/lsi/perccli`
7. Collect the logs by using command: `./perccli /c0 show termlog`

   The log is created with the name: **#### MegaSAS.log**

Figure 37. Log creation

8. Copy MegaSAS.log to datastore by using command:`cp /opt/lsi/perccli/MegaSAS.log / vmfs/volumes/datastore1/`
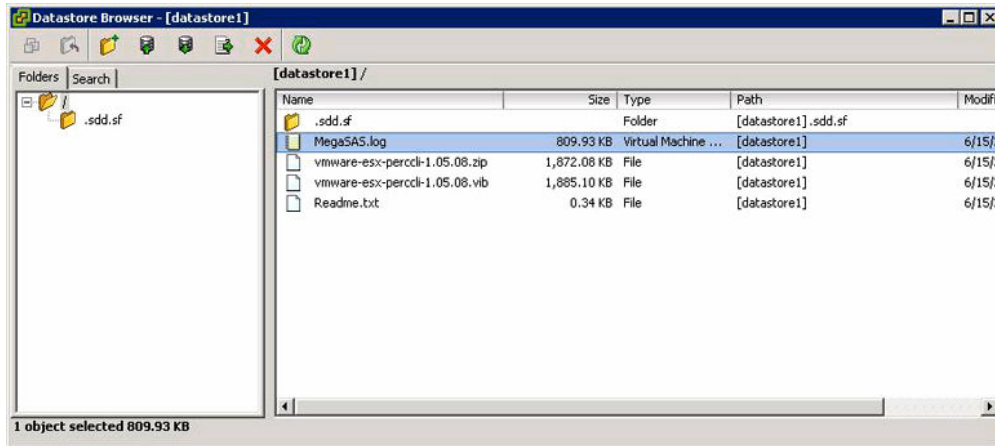9. Copy the file to desktop with **Datastore Browser**.

Figure 38. Log file in Datastore Browser

Now the logs are exported on ESXi hosts on the Dell 13th generation PowerEdge servers.

Configuring RAID by using Lifecycle Controller

Prerequisites

If your system has one or more supported PERC RAID controllers with PERC 8 firmware or later, or software RAID controllers, use the RAID Configuration wizard to configure a virtual disk as the boot device.

> **NOTE:** Create boot virtual disk only from a disk drive populated across slots 0−3 of the system. For slot information, see the server Owner's Manual at **Dell.com/poweredgemanuals**.

Steps

1. Launch the **Lifecycle Controller** home page, click **Hardware Configuration**, and then click **Configuration Wizards**.

   The **Configuration Wizards** window is displayed.

2. In **Storage Configuration Wizards**, click **RAID Configuration**.

3. Select the RAID controller to view its current virtual disk configuration and disk attributes. Click **Next**.

4. Select the RAID level for the virtual disk that you want to create and click **Next**.

5. On the **Select Physical Disks** screen, the default values for **Protocol**, **Media Type**, and **Encryption capability** are displayed.

6. Select the required physical disks that you want to include in the virtual disk, and then click **Next**.

7. On the **Virtual Disk Attributes** screen, type the virtual disk name.

   > **NOTE:** The virtual disk name should not contain any space or special characters.

8. Type the size of the physical disk.

   The values for **Stripe Element Size**, **Read Policy**, and **Write Policy** are displayed by default.

9. If you want to change the values for **Stripe Element**, **Read Policy** and **Write Policy**, select the required values from the respective drop-down lists.

   The **Summary** of virtual disk attributes is displayed.

10. Click **Finish** .

11. On the **RAID Configuration Warning** window, click **Yes** if you wish to continue with the creation of virtual disk.

The **RAID Configuration window** is displayed. Note that this operation might take approximately one minute to complete.

12. When the virtual disk is created successfully, the **RAID Configuration Success** window is displayed. Click **OK**.

    You are taken to the **Hardware configuration** window. Click **Back** to go to the home page.

13. You can verify, if the RAID operation was successful by checking the events in the **Lifecycle Log**.

    a. Click **View Lifecycle Log History**. The **View Lifecycle Log** window is displayed. Note that this operation might take few minutes.

    b. On the **View Log History** page, you can verify if the RAID operation is successful. For more information about Dell Lifecycle controller, go to**Dell.com/ techcenter/LC** .

    For more information about the Dell Lifecycle Controller RAID Configuration video, go to https://www.youtube.com/watch?v=JFPmeHNENV4

Starting and target RAID levels for virtual disk reconfiguration and capacity expansion

After you have created a virtual disk, the possibilities for reconfiguring the virtual disk depend on the controller, RAID level, and available physical disks.

Table 10. Possible scenarios for reconfiguring a virtual disk

Controller	Starting RAID Level	Target RAID Level	Comments
PERC 6/E, PERC 6/I, PERC H800 Adapter, PERC H700 Adapter, PERC H700 Integrated, and PERC H700 Modular, PERC H310 Adapter, PERC H310 Mini Monolithic, PERC H310 Mini Blades, PERC H710 Adapter, PERC H710 Mini Blades, PERC H710 Mini Monolithic, PERC H710P Adapter, PERC H710P Mini Blades, PERC H710P Mini Monolithic, PERC H810 Adapter, PERC H330 Adapter, PERC H330 Mini Monolithic, PERC H330 Mini Blades, PERC H330 Embedded, PERC H730 Adapter, PERC H730 Mini Monolithic, PERC H730 Mini Blades, PERC H730P Adapter, PERC H730P Mini Monolithic,	RAID 0	RAID 1	Add a single disk
	RAID 0	RAID 0, RAID 5	Add at least one additional disk.
	RAID 0	RAID 6	RAID 6 requires a minimum of 4 disks. Reconfiguration from RAID 0 to RAID 6 requires at least 2 additional disks even when this exceeds the 4-disk minimum required by RAID 6
	RAID 1	RAID 0	With or without adding additional disks
	RAID 1	RAID 5, RAID 6	Add at least one additional disk. RAID 6 requires a minimum of 4 disks.
	RAID 5	RAID 0	With or without adding additional disks
	RAID 5	RAID 5, RAID 6	Add at least one additional disk.

Controller	Starting RAID Level	Target RAID Level	Comments
PERC H730P Mini Blades, PERC H730P Slim, PERC H830 Adapter, PERC FD33xD/ FD33xS			RAID 6 requires a minimum of 4 disks.
	RAID 6	RAID 0, RAID 5	With or without adding additional disks
	RAID 6	RAID 6	Add at least one additional disk
	RAID 10	RAID 10	Without adding additional disks
SAS 6/iR	N/A	N/A	N/A
PERC S100, S110, S130, and S300	RAID 0	RAID 0	With or without additional disks
	RAID 1	RAID 1	Without additional disks
	RAID 5	RAID 5	With or without additional disks
	RAID 10	RAID 10	Without additional disks

NOTE: The order of the controllers displayed on Storage Management may differ from the order of the controllers displayed in the Human Interface (HII) and PERC Option ROM. The order of the controllers does not cause any limitation.

NOTE: When creating virtual disks using software RAID controllers, the information related to the physical disks linked to the virtual disk is enumerated or displayed on Storage Management after a short delay. This delay in displaying the information does not cause any functional limitation. If you are creating partial virtual disks, Dell recommends that you provide Storage Management adequate time between each partial virtual disk creation process.

NOTE: RAID 10 virtual disk reconfiguration operation is not supported with Intelligent Mirroring.

Reconfiguring or migrating virtual disks

About this task

Reconfiguring or migrating a virtual disk (VDs) enables you to increase the capacity or change the RAID level of the virtual disk.

NOTE: In the **PERC BIOS Configuration Utility** window, with software RAID S110 and S130 controllers, if a physical disk (SATA SSD or HDD) is removed from a virtual disk and the same physical disk is reinserted (hot plug) into the virtual disk instantly, then the virtual disk state is displayed as **Ready** or **Non RAID** (for the PERC S110 and S100) and the physical disk state is displayed as **Online**. However, if the same physical disk is reinserted after a short delay, then the virtual disk state is displayed as **Degraded** and the physical disk state is displayed as **Ready**.

To reconfigure a virtual disk:

Steps

1. Review the information in the Starting and Target RAID Levels for Virtual Disk Reconfiguration and Capacity Expansion section in this document.
2. In the tree view, locate the controller on which the virtual disk resides. Expand the controller object until the **Virtual Disks** object is displayed.
3. Select the **Reconfigure** task from the virtual disk's **Tasks** drop-down list box and click **Execute**.
4. Complete the **Reconfigure** task using the Reconfigure wizard.

Starting and target RAID levels for virtual disk reconfiguration and capacity expansion

After you have created a virtual disk, the possibilities for reconfiguring the virtual disk depend on the controller, RAID level, and available physical disks.

Table 11. Possible scenarios for reconfiguring a virtual disk

Controller	Starting RAID Level	Target RAID Level	Comments
PERC 6/E, PERC 6/I, PERC H800 Adapter, PERC H700 Adapter, PERC H700 Integrated, and PERC H700 Modular, PERC H310 Adapter, PERC H310 Mini Monolithic, PERC H310 Mini Blades, PERC H710 Adapter, PERC H710 Mini Blades, PERC H710 Mini Monolithic, PERC H710P Adapter, PERC H710P Mini Blades, PERC H710P Mini Monolithic, PERC H810 Adapter, PERC H330 Adapter, PERC H330 Mini Monolithic, PERC H330 Mini Blades, PERC H330 Embedded, PERC H730 Adapter, PERC H730 Mini Monolithic, PERC H730 Mini Blades, PERC H730P Adapter, PERC H730P Mini Monolithic, PERC H730P Mini Blades, PERC H730P Slim, PERC H830 Adapter, PERC FD33xD/FD33xS	RAID 0	RAID 1	Add a single disk
	RAID 0	RAID 0, RAID 5	Add at least one additional disk.
	RAID 0	RAID 6	RAID 6 requires a minimum of 4 disks. Reconfiguration from RAID 0 to RAID 6 requires at least 2 additional disks even when this exceeds the 4-disk minimum required by RAID 6
	RAID 1	RAID 0	With or without adding additional disks
	RAID 1	RAID 5, RAID 6	Add at least one additional disk. RAID 6 requires a minimum of 4 disks.
	RAID 5	RAID 0	With or without adding additional disks
	RAID 5	RAID 5, RAID 6	Add at least one additional disk. RAID 6 requires a minimum of 4 disks.
	RAID 6	RAID 0, RAID 5	With or without adding additional disks
	RAID 6	RAID 6	Add at least one additional disk

Controller	Starting RAID Level	Target RAID Level	Comments
	RAID 10	RAID 10	Without adding additional disks
SAS 6/iR	N/A	N/A	N/A
PERC S100, S110, S130, and S300	RAID 0	RAID 0	With or without additional disks
	RAID 1	RAID 1	Without additional disks
	RAID 5	RAID 5	With or without additional disks
	RAID 10	RAID 10	Without additional disks

✎ NOTE: The order of the controllers displayed on Storage Management may differ from the order of the controllers displayed in the Human Interface (HII) and PERC Option ROM. The order of the controllers does not cause any limitation.

✎ NOTE: When creating virtual disks using software RAID controllers, the information related to the physical disks linked to the virtual disk is enumerated or displayed on Storage Management after a short delay. This delay in displaying the information does not cause any functional limitation. If you are creating partial virtual disks, Dell recommends that you provide Storage Management adequate time between each partial virtual disk creation process.

✎ NOTE: RAID 10 virtual disk reconfiguration operation is not supported with Intelligent Mirroring.

Foreign Configuration Operations

Foreign configuration is virtual disk data residing on physical disks that have been moved from one controller to another.

The **Foreign Configuration Operations** task provides a preview of the foreign configurations that you can import.

✎ NOTE: On the **PERC BIOS Configuration Utility** screen, foreign configuration operations are not supported on PERC hardware controllers running in **HBA** mode.

✎ NOTE: **Foreign Configuration Operations** task is available only on PERC 6 and SAS controllers with firmware versions 6.1 and later.

✎ NOTE: It is not recommended to remove an external enclosure cable while the operating system is running on the system. Removing the cable could result in a foreign configuration when the connection is re-established.

The **Foreign Configuration Operations** task is displayed only when a controller detects a foreign configuration. Select this option and click **Execute** to display the **Foreign Configuration Preview** page.

The **Foreign Configuration Preview** page provides a preview of the foreign disks and enables you to perform operations such as, importing, recovering, or clearing the foreign disks. You can also import or clear a locked foreign configuration.

If any foreign configurations that are locked by using **Local Key manager (LKM)** are detected, the associated **Encryption Key Identifier** is displayed prompting you to provide the corresponding passphrase to unlock the drives.

To avoid unlocking foreign configurations and to proceed to preview, import, or clear a foreign configuration that has not been locked, on the **PERC BIOS Configuration Utility Foreign Configuration** screen, click **Skip** or **Continue**.

If you do not want to import or clear the foreign configurations, or in case of loss of the associated passphrase of the corresponding **Encryption Key Identifier**, execute the **Instant Encrypt Erase** task for the physical disks.

⚠ **CAUTION: Executing the Instant Encrypt Erase task erases all data on the physical disk.**

Some conditions, such as an unsupported RAID level or an incomplete disk group, can prevent the import or recovery of foreign virtual disks.

Foreign Configuration properties

The following table describes the properties that are displayed on the **PERC BIOS Configuration Utility Foreign Configuration** screen for the Foreign Disks and Global Hot Spares.

Table 12. Foreign Configuration Properties

Property	Definition
Status	These icons represent the severity or health of the storage component. • ✅—**Normal/OK** • ⚠—**Warning/Non-critical** • ❌—**Critical/Failure/Error**
Name	Displays the name of the foreign configuration and is available as a link. This link enables you to access the physical disks that constitute the foreign disk.
State	Displays the current state of the foreign configuration. Possible values are: • **Ready** — The foreign disk can be imported and functions normally after import. • **Degraded** — The foreign disk is in degraded state and rebuilds after import. • **Failed** — The foreign disk has encountered a failure and is no longer functioning. You cannot import the foreign configuration. The foreign configuration may be in degraded or failed state due to any of the following reasons: • Missing physical disk — One of the physical disk(s) in the potential virtual disk is missing or not available. • Missing span — One or more spans of a hybrid virtual disk is missing. • Stale physical disks — One or more physical disks in the configuration may contain out-of-date data relating to other disks of that virtual disk. Hence, the data integrity of the imported virtual disk is not intact.

Property	Definition
	• Unsupported configuration of the virtual disk — The virtual disk has an unsupported RAID level. • Import and Export — The virtual disks available for import exceed the number of virtual disks available for export. • Incompatible physical disks — Configuration on the physical disks is not recognized by the RAID firmware. • Orphan drive — A physical disk in the foreign configuration has configuration information that matches another physical disk that is already a part of an array (either a foreign or a native array).
Layout	Displays the RAID level of the foreign configuration.
Remarks	Provides information about the foreign virtual disk. If the virtual disk cannot be imported, the reason for failure is displayed. • Exceeded maximum — The number of virtual disks selected for import has exceeded the maximum number of supported disks. • Missing physical disk or Missing span — One or more physical disk(s) or span(s) in the virtual disk to be imported is missing. • Unsupported — The selected RAID level is not supported on this controller. • Orphan drive — The physical disk has been replaced and is no longer a part of the RAID volume. The configuration should be cleared. • Stale physical disk — The physical disk to be imported in the virtual disk has outdated data. • Partially foreign — The virtual disk is part of an already existing configuration. Some physical disks in this virtual disk are foreign.
Dedicated Hot Spare	Displays whether the foreign disk is a dedicated hot spare.

Based on the properties information, you can decide whether you want to import, recover, or clear the foreign configuration.

Viewing Patrol Read report

The patrol read report provides information on all the patrol reads performed on the controller in the chronological order. It provides information such as last run time and result. If a patrol read fails, the reason for the failure is displayed.

Setting Patrol Read mode

NOTE: This task is not supported on PERC hardware controllers running in **HBA** mode.

Patrol read identifies disk errors in order to avoid disk failures and data loss or corruption. The **Set Patrol Read** task is applicable only for disks used as virtual disks or hot spares.

The **Set Patrol Read** task runs in the background and corrects the disk errors, when possible. When the **Set Patrol Read mode** is set to **Auto**, patrol read is initiated when the controller is idle for a specific period of time and when no other background tasks are active. In this scenario, the patrol read enhances the system performance as disk errors can be identified and corrected when there is no input/output activity on the disk.

The controller adjusts the amount of system resources dedicated for patrol read based on the amount of controller activity that is competing with the Patrol Read task. When the controller activity is high, fewer system resources are dedicated to the patrol read task.

Patrol Read does not run on a physical disk in the following circumstances:

- The physical disk is not included in a virtual disk or is assigned as a hot spare.
- The physical disk is included in a virtual disk that is currently undergoing one of the following:
  - Rebuild
  - Reconfiguration or reconstruction
  - Background initialization
  - Check consistency

In addition, the Patrol Read is suspended during heavy I/O activity and resumes when the I/O is finished.

To set Patrol Read mode, select the desired Patrol Read Mode option. The options available are:

- **Auto** — Initiates the Patrol Read task. After the task is complete, it automatically runs again within a specified period. For example, on some controllers the Patrol Read runs every four hours and on other controllers, the Patrol Read runs every seven days. The Patrol Read task runs continuously on the system starting again within the specified period after each iteration of the task completes. If the system reboots while the Patrol Read task is running in **Auto** mode, the Patrol Read restarts at zero percent (0%). When the Patrol Read task is set to **Auto** mode, you cannot start or stop the task. **Auto** mode is the default setting.

  NOTE: For more information on how often the Patrol Read task runs when in Auto mode, see your controller documentation.

- **Manual** — Enables you to start and stop the Patrol Read task using **Start and Stop Patrol Read**. Setting the mode to **Manual** does not initiate the Patrol Read task. If the system reboots while Patrol Read is running in **Manual** mode, Patrol Read does not restart.
- **Disabled** — Prevents the Patrol Read task from running on the system.

To set Patrol Read mode

Select the desired Patrol Read Mode option. The options available are:

- **Auto** — Initiates the Patrol Read task. After the task is complete, it automatically runs again within a specified period. For example, on some controllers the Patrol Read runs every four hours and on other controllers, the Patrol Read runs every seven days. The Patrol Read task runs continuously on the system starting again within the specified period after each iteration of the task completes. If the system reboots while the Patrol Read task is running in **Auto** mode, the Patrol Read restarts at zero percent (0%). When the Patrol Read task is set to **Auto** mode, you cannot start or stop the task. **Auto** mode is the default setting.

  NOTE: For more information on how often the Patrol Read task runs when in Auto mode, see your controller documentation.

- **Manual** — Enables you to start and stop the Patrol Read task using **Start and Stop Patrol Read**. Setting the mode to **Manual** does not initiate the Patrol Read task. If the system reboots while Patrol Read is running in **Manual** mode, Patrol Read does not restart.
- **Disabled** — Prevents the Patrol Read task from running on the system.

Check Consistency report

The check consistency report provides information on all the consistency checks performed on the controller in a chronological order. It provides information such as last run time and result. If the consistency check fails, it provides the reason for the failure.

Performing a Check Consistency

The **Check Consistency** task verifies the accuracy of the redundant (parity) information. This task only applies to redundant virtual disks. When necessary, the **Check Consistency** task rebuilds the redundant data. If the virtual disk is in a Failed Redundancy state, running a check consistency may return the virtual disk to a Ready state.

Canceling a Check Consistency

The Cancel Check Consistency task stops a check consistency operation while it is in progress.

Pausing a Check Consistency

The Pause Check Consistency task pauses a check consistency while it is in progress.

> **NOTE:** The Pause Check Consistency task updates the virtual disk State property to Resynching Paused immediately. The Progress property may continue to increment for up to three seconds. This time delay occurs because the polling task may take up to three seconds to query the task information and update the display.

Resuming a Check Consistency

The Resume Check Consistency task resumes check consistency after it has been paused.

To locate view Check Consistency report in Storage Management:

1. In the **Server Administrator** window, under the system tree, click **Storage**.
2. Select **View Check Consistency Report** from the **Select Report** drop-down menu.
3. Click **Execute**.

To locate view Check Consistency report in Storage Management

1. In the **Server Administrator** window, under the system tree, click **Storage**.
2. Select **View Check Consistency Report** from the **Select Report** drop-down menu.
3. Click **Execute**.

Virtual disk troubleshooting

Rebuilding of virtual disk does not work

Rebuilding of virtual disk does not work in the following situations:

- The virtual disk is non redundant — For example, a RAID 0 virtual disk cannot be rebuilt because RAID 0 does not provide data redundancy.
- There is no hot spare assigned to the virtual disk — As long as the virtual disk is redundant, to rebuild it:

- Remove the failed physical disk and replace it. A rebuild automatically starts on the new disk.
- Assign a hot spare to the virtual disk and then perform a rebuild.
- You are attempting to rebuild onto a hot spare that is too small — Different controllers have different size requirements for hot spares.
- The hot spare is unassigned from the virtual disk — This occurs on some controllers if the hot spare is assigned to more than one virtual disk and is being used to rebuild a failed physical disk for another virtual disk.
- The virtual disk includes failed or corrupt physical disks — This situation may generate alert 2083. For information on alert messages, see the *Server Administrator Messages Reference Guide* at **Dell.com/ support/home**.
- The rebuild rate setting is too low — If the rebuild rate setting is quite low and the system is processing a number of operations, then the rebuild may take an unusual amount of time to complete.
- The rebuild is canceled — Another user can cancel a rebuild that you have initiated.

Rebuilding of virtual disk completes with errors

About this task

A rebuild completes with errors when a portion of the disk containing redundant (parity) information is damaged. The rebuild process can restore data from the healthy portions of the disk but not from the damaged portion.

When a rebuild is able to restore all data except data from damaged portions of the disk, it indicates successful completion while also generating alert 2163. For information on alert messages, see the *Server Administrator Messages Reference Guide* at **Dell.com/support/home**.

The rebuild may also report sense key errors. In this situation, take the following actions to restore the maximum data possible:

Steps

1. Back up the degraded virtual disk onto a fresh (unused) tape drive.
   - If the backup is successful — If the backup completes successfully, then the user data on the virtual disk has not been damaged. In this case, you can continue with step 2.
   - If the backup encounters errors — If the backup encounters errors then the user data has been damaged and cannot be recovered from the virtual disk. In this case, the only possibility for recovery is to restore from a previous backup of the virtual disk.
2. Perform Check Consistency on the virtual disk that you have backed up onto a tape drive.
3. Restore the virtual disk from the tape drive onto healthy physical disks.

Cannot create a virtual disk

You may be attempting a RAID configuration that is not supported by the controller. Check the following:

- How many virtual disks already exist on the controller? Each controller supports a maximum number of virtual disks.
- Is there adequate available space on the disk? The physical disks that you have selected for creating the virtual disk must have an adequate amount of free space available.
- The controller may be performing other tasks, such as rebuilding a physical disk, that must run to completion before the controller can create the new virtual disk.

A virtual disk of minimum size is not visible to Windows Disk Management

If you create a virtual disk using the minimum allowable size in Storage Management, the virtual disk may not be visible to Windows Disk Management even after initialization. This occurs because Windows Disk

Management is only able to recognize extremely small virtual disks if they are dynamic. It is advisable to create virtual disks of larger size when using Storage Management.

Virtual disk errors on systems running Linux

About this task

On some versions of the Linux operating system, the virtual disk size is limited to 1TB. If you create a virtual disk that exceeds the 1TB limitation, your system may experience the following behavior:

- I/O errors to the virtual disk or logical drive.
- Inaccessible virtual disk or logical drive.
- Virtual disk or logical drive size is smaller than expected.

If you have created a virtual disk that exceeds the 1TB limitation, you must:

Steps

1. Back up your data.
2. Delete the virtual disk.
3. Create one or more virtual disks that are smaller than 1TB.
4. Restore your data from backup.

    Irrespective of whether your Linux operating system limits the virtual disk size to 1TB, the virtual disk size depends on the version of the operating system and any updates or modifications that you have implemented. For more information on operating system, see your operating system documentation.

Problems associated with using the same physical disks for both redundant and nonredundant virtual disks

When creating virtual disks, you should avoid using the same physical disks for both redundant and nonredundant virtual disks. This applies to all controllers. Using the same physical disks for both redundant and nonredundant virtual disks can result in unexpected behavior including data loss.

> **NOTE:** SAS controllers do not allow you to create redundant and nonredundant virtual disks on the same set of physical disks.

Troubleshooting memory or battery errors on the PERC controller on Dell PowerEdge servers

Interpreting LCD and Embedded Diagnostic event messages

Issue: The server LCD presents a error message, or an error message is generated when running the Enhanced Pre-Boot System Assessment (ePSA).

Solution: For more information about error messages, see the Dell Event and Error Messages Reference Guide at **Dell.com/openmanagemanuals > OpenManage software**.

The Event Message Reference contains the error and event information generated by firmware and other agents that monitor system components. These events might be logged and displayed on one of the system management consoles, or both logged and displayed.

NOTE: To run the Embedded System Diagnostics (also known as Enhanced Pre-Boot System Assessment):

1. As the system boots, press F11.
2. Use the up-and-down arrows keys to select **System Utilities → Launch Dell Diagnostics**.

Troubleshooting conditions that lead to error message

NOTE: Troubleshooting the associated events may also prevent the error message from occurring. Error message can occur normally when one of the following conditions occur.

- OS indicates abnormal shutdown.
- OS indicates error occurred (blue screen occurred in Windows).
- Spontaneous power loss condition.

Try the following troubleshooting steps:

- Reboot to OS

  If the OS boot is successful, rebooting again should result in no message being displayed.

- Clear Controller Cache

  - Ctrl + M for SCSI controllers (PERC 3, PERC 4).
  - Ctrl + R for SAS/SATA controllers (PERC 5, PERC 6 and newer controllers).
  - Wait for five minutes to allow contents of cache to purge.
  - Reboot back to controller BIOS.

    NOTE: If error persists, the likelihood of a hardware error is increased. Contact Dell Technical Support for further troubleshooting steps.

  - If error is eliminated, boot to OS.
  - If OS boot is still not successful and/or the error persists, this may indicate a problem with the OS. Contact Technical Support for further troubleshooting steps.

- Check the Physical PERC Controller.

  a. Inspect the DIMM and DIMM Socket for Damage.

     1. Turn off the system and remove the power cable(s) from the system.
     2. Let the system sit for 30 seconds to allow any remaining flea power to drain.
     3. Remove the PERC controller. For information about removing and replacing parts in this system, refer to the user guide located at Dell.com/poweredgemanuals.
     4. Remove the RAID memory battery. Ensure to reinstall the memory battery after inserting the DIMM.
     5. Remove the memory DIMM from the controller, if applicable.
     6. Check DIMM socket for any bent pins or other damage. Check the edge connector of the memory DIMM for any damage.

  b. If the controller has embedded memory or the memory socket is damaged, contact Dell Technical Support.

  c. If the memory is damaged, the controller memory may need to be replaced, contact Dell Technical Support.

  d. If there is no damage, replace the memory DIMM and reinstall the controller.

e. Swap the controller memory a with known good memory, if possible.

1. If there is no known good memory available, contact Dell Technical Support.
2. if the error does not occur with the known good memory, contact Dell Technical Support.
3. If the error remains with a known good memory, contact Dell Technical Support.

Additional information for troubleshooting memory or battery errors on the PERC controller

A RAID Controller error message is displayed during POST to indicate that the controller's cache does not contain all of the expected information, or it contains data destined for a hard drive that cannot be or has not been written to the drive. The most common reasons why this error may occur are:

- Server did not perform a normal shutdown process – Power loss and/or spontaneous restarts can result in incomplete or corrupted data to remain in cache that cannot be written to a drive.
- Cache memory is defective – Bad cache memory can cause data to become corrupted. This can cause OS-related issues and spontaneous reboots.
- Loss of battery power while server is shutdown – Controllers that do not use NVCACHE (Non-Volatile Cache) memory utilize batteries that can retain the contents of cache for a limited time (24-72 hours) while the server is not powered on. Once the battery drains, the entire contents of cache is lost and the controller recognizes that the cache memory does not contain all of the information expected. Controllers that do utilize NVCache (some H700/H800 controllers and newer controllers such as H710, H710P, H810) are very unlikely to encounter this issue since the battery only needs to maintain power for 30 seconds or less in most cases.

- PERC Battery Maintenance

  A PERC battery that is suspected to have failed or has a warning symbol displayed in OpenManage Server Administrator should have a manual Learn Cycle performed. A Learn Cycle causes the battery to discharge and recharge, and restores the battery to a fully functional condition. In some cases, multiple Learn Cycle procedures may be required to restore the battery to an effectively charged state. To perform a manual Learn Cycle, select **Start Learn Cycle** from the **Battery Tasks** drop-down menu in Open Manage Server Administrator (OMSA).
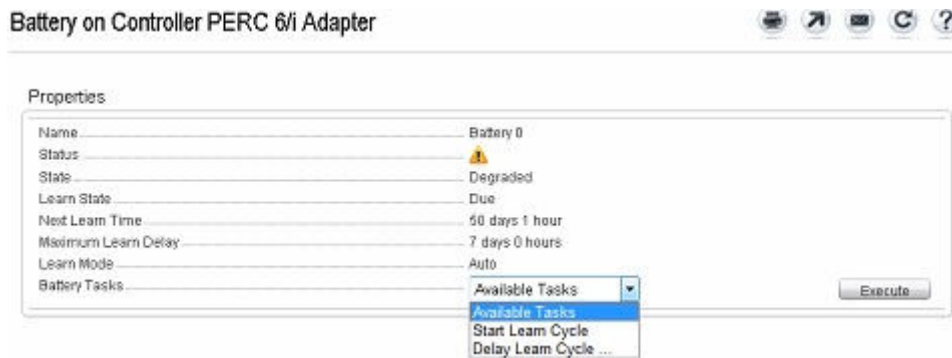
- Cache Use

  Hardware RAID controllers utilize cache (a temporary repository of information) for their normal operation. The normal operation cache comprises DRAM memory, which, like system memory, retains data only when powered on.

  Newer controllers utilize NVCache, which is utilized when the server is powered off. NVCache memory contains both DRAM memory (for normal operation) and flash memory (non-volatile). The

controllers battery (if operational) powers the DRAM memory during a power loss so that the contents can be copied into the flash memory for indefinite storage.

The contents of cache can essentially be broken into three parts:

- RAID configuration and metadata - Information about the RAID arrays including configuration information, disk members, role of disks, etc.
- Controller logs - RAID controllers maintain several log files. Dell technicians rely on the TTY log as the primary log for troubleshooting various RAID and hard drive issues.
- RAID data - This is the actual data destined to be written to the individual hard drives. Data is written into the cache of the controller in both Write Through and Write Back cache policy modes.

Slicing

Configuring multiple RAID arrays across the same set of disks is called Slicing.

Configuring PERC 5 RAID slices in OpenManage Server Administrator

1. Install OpenManage Server Administrator (OMSA)once the OS is running. Additional RAID slices can be created by going to the **Create Virtual Disk** window.
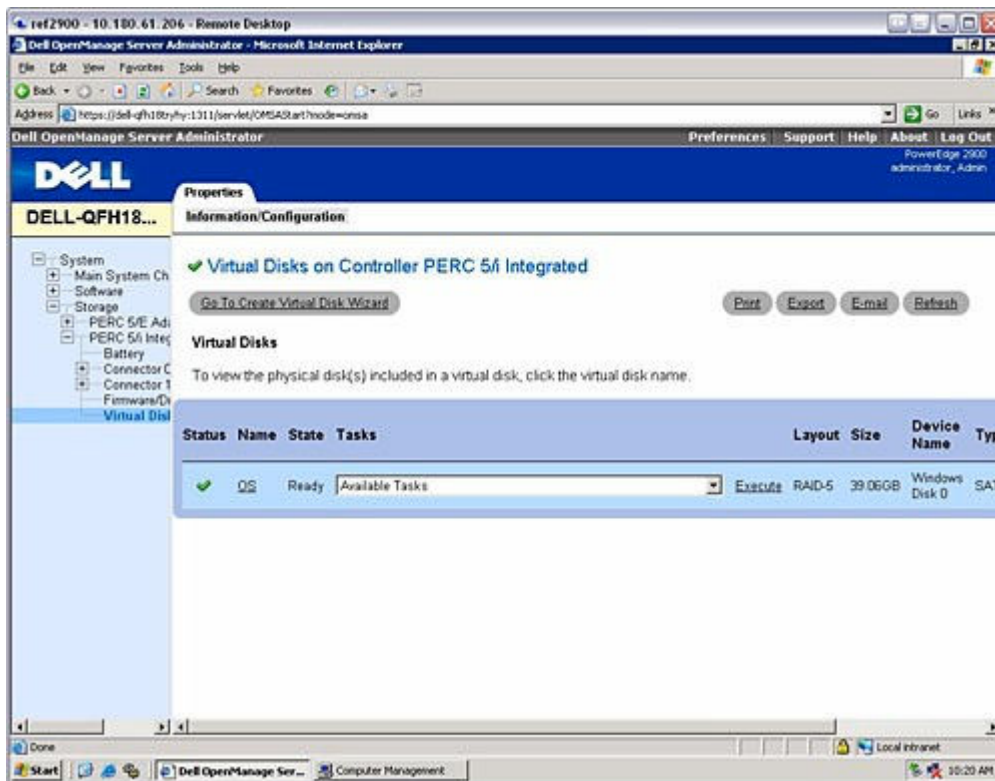

Figure 39. Configuring PERC 5 RAID slices

2. Select the RAID level from **Advanced Wizard**.

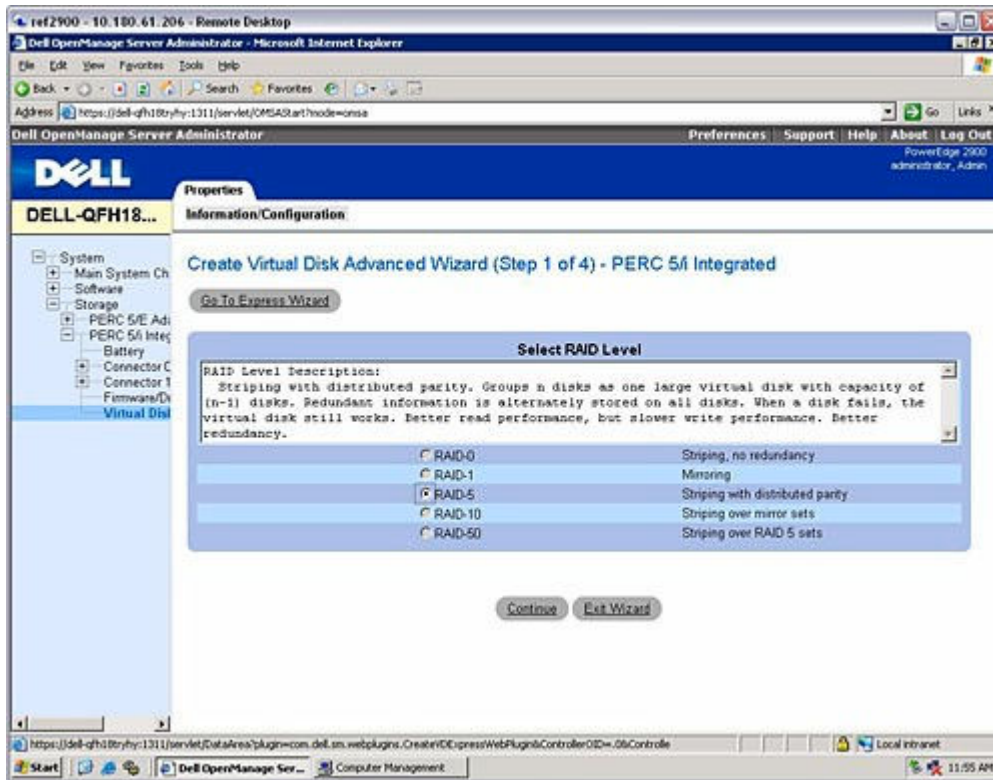   📝 NOTE: The Express Wizard also has the ability to create RAID slices.

Figure 40. Configuring PERC 5 RAID slices

The **Advanced Wizard** allows you to select the same drives that were included in the first RAID slice.

Figure 41. Configuring PERC 5 RAID slices
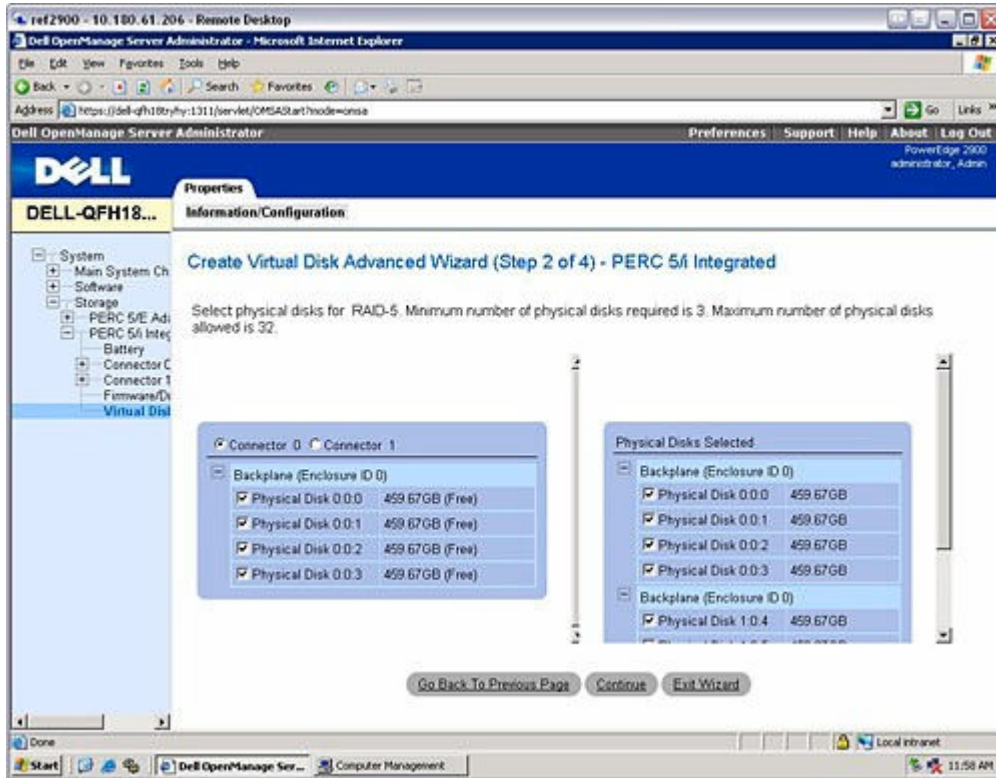
The remaining available free space is selected by default.
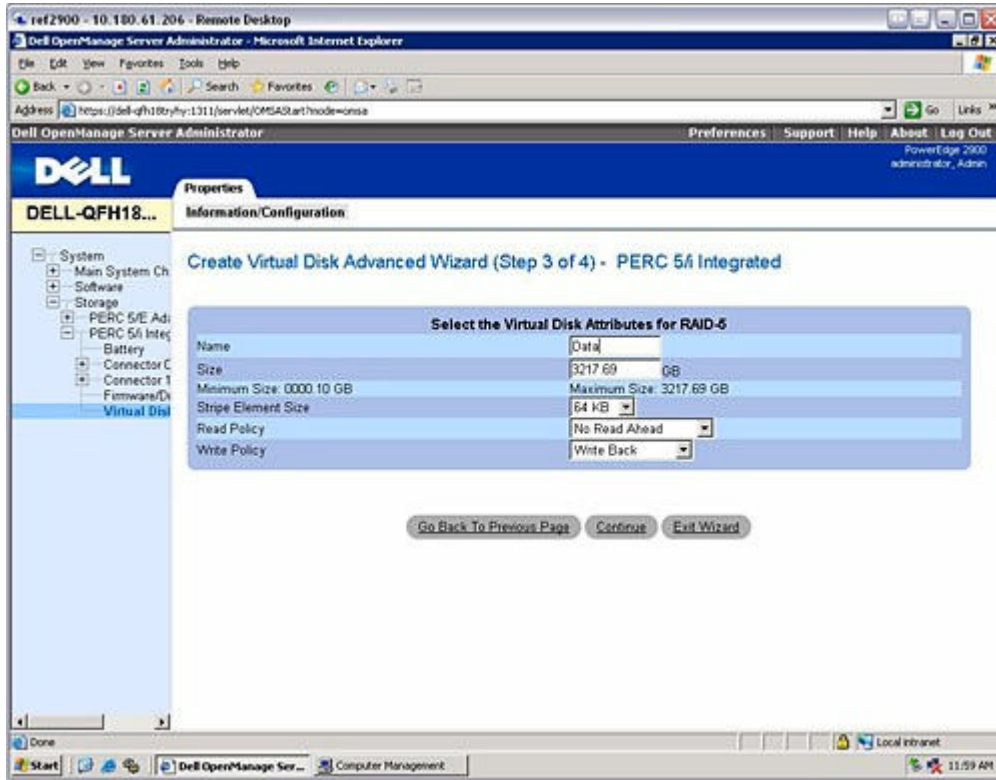
Figure 42. Configuring PERC 5 RAID slices

If the virtual drive is greater than 2 TB, OMSA displays a message warning that the drive may be incompatible with the operating system.
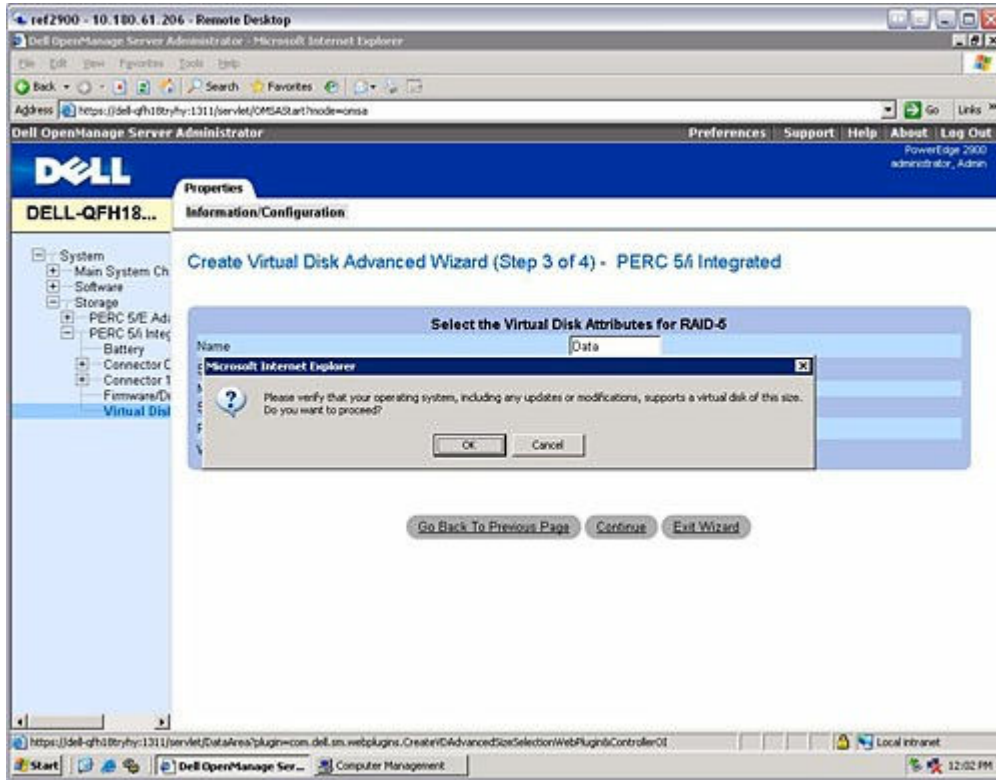
Figure 43. Configuring PERC 5 RAID slices

3. Click Finish to complete the RAID slice configuration and close the wizard.
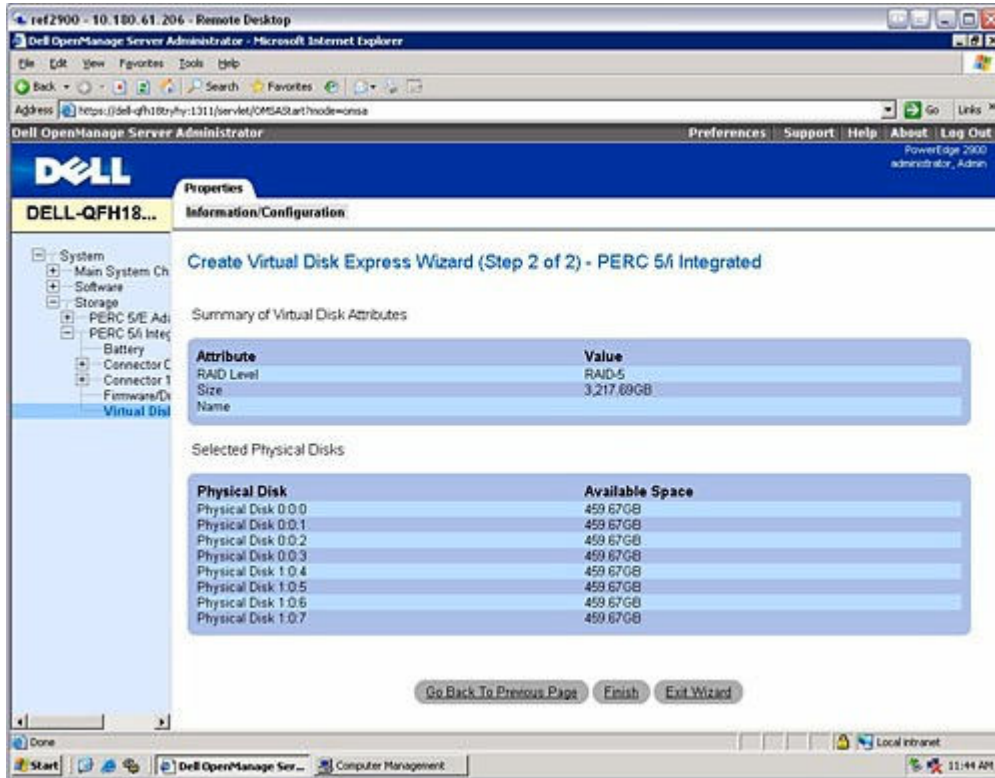
Figure 44. Configuring PERC 5 RAID slices

Configuring RAID slices in the PERC 5 BIOS

1. Highlight Controller 0 and Press F2.

2. Select **Create New VD**.

3. Create a RAID slice by selecting all of the hard drives and changing **VD Size** to the desired size for the OS files.
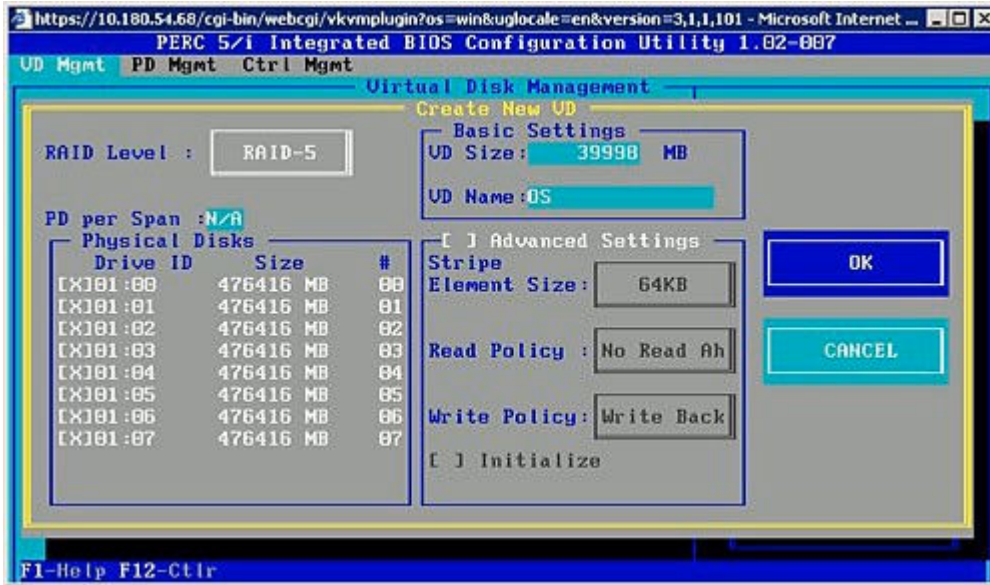
4. After the first RAID slice is created, additional slices can be created using the **Free Space** in **Disk Group**. Highlight **Free Space** and press enter.
5. Select **Add New VD**.
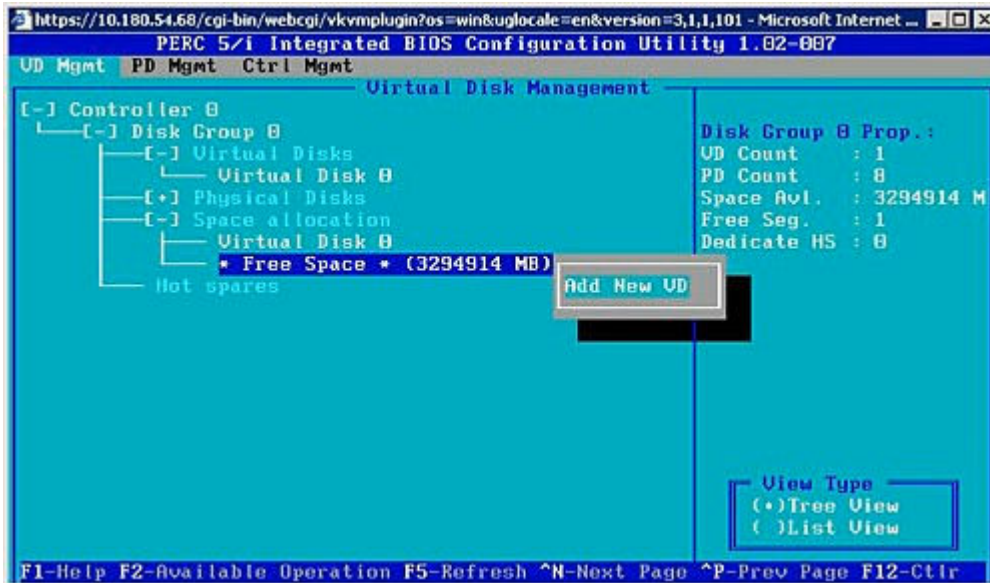
The wizard automatically selects all of the available free space. All RAID slices must be the same RAID
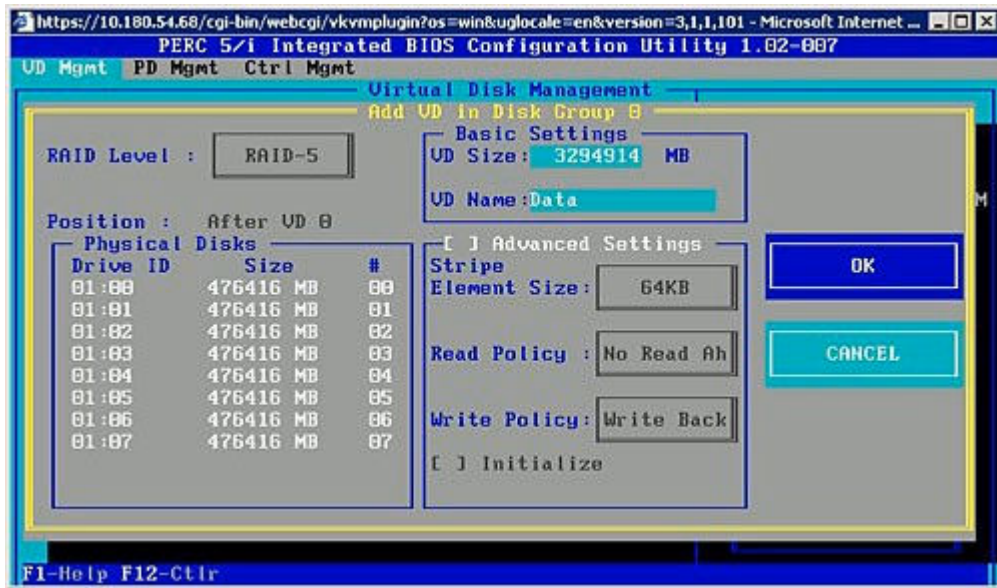
Level.

All of the RAID slices will exist within the same **Disk Group**.

RAID puncture

A RAID puncture is a feature of Dell PowerEdge RAID Controller (PERC) designed to allow the controller to restore the redundancy of the array despite the loss of data caused by a double fault condition. Another name for a RAID puncture is rebuild with errors. When the RAID controller detects a double fault and there is insufficient redundancy to recover the data in the impacted stripe, the controller creates a puncture in that stripe and enables the rebuild to continue.

- Any condition that causes data to be inaccessible in the same stripe on more than one drive is a double fault.

- Double faults cause the loss of all data within the impacted stripe.
- All RAID punctures are double faults but all double faults are NOT RAID punctures.

Causes of RAID puncture

Without the RAID puncture feature, the array rebuild would fail, and leave the array in a degraded state. In some cases, the failures may cause additional drives to fail, and cause the array to be in a non-functioning offline state. Puncturing an array has no impact on the ability to boot to or access any data on the array.

RAID punctures can occur in one of two situations:

- Double Fault already exists (Data already lost).
  Data error on an online drive is propagated (copied) to a rebuilding drive.
- Double Fault does not exist (Data is lost when second error occurs).
  While in a degraded state, if a bad block occurs on an online drive, that LBA is RAID punctured.

This advantage of puncturing an array is keeping the system available in production till the redundancy of the array is restored. The data in the affected stripe is lost whether the RAID puncture occurs or not. The primary disadvantage of this method is that while the array has a RAID puncture in it, uncorrectable errors will continue to be encountered whenever the impacted data (if any) is accessed.

A RAID puncture can occur in the following three locations:

- In blank space that contains no data. That stripe will be inaccessible, but since there is no data in that location, it will have no significant impact. Any attempts to write to a RAID punctured stripe by an OS will fail and data will be written to a different location.
- In a stripe that contains data that isn't critical such as a README.TXT file. If the impacted data is not accessed, no errors are generated during normal I/O. Attempts to perform a file system backup will fail to backup any files impacted by a RAID puncture. Performing a Check Consistency or Patrol Read operations will generate Sense code: 3/11/00 for the applicable LBA and/or stripes.
- In data space that is accessed. In such a case, the lost data can cause a variety of errors. The errors can be minor errors that do not adversely impact a production environment. The errors can also be more severe and can prevent the system from booting to an operating system, or cause applications to fail.

An array that is RAID punctured will eventually have to be deleted and recreated to eliminate the RAID puncture. This procedure causes all data to be erased. The data would then need to be recreated or restored from backup after the RAID puncture is eliminated. The resolution for a RAID puncture can be scheduled for a time that is more advantageous to needs of the business.

If the data within a RAID punctured stripe is accessed, errors will continue to be reported against the affected bad LBAs with no possible correction available. Eventually (this could be minutes, days, weeks, months, and so on), the Bad Block Management (BBM) Table will fill up causing one or more drives to become flagged as predictive failure. As seen in the figure, drive 0 will typically be the drive that gets flagged as predictive failure due to the errors on drive 1 and drive 2 being propagated to it. Drive 0 may actually be working normally, and replacing drive 0 will only cause that replacement to eventually be flagged predictive failure as well.

A Check Consistency performed after a RAID puncture is induced will not resolve the issue. This is why it is very important to perform a Check Consistency on a regular basis. It becomes especially important prior to replacing drives, when possible. The array must be in an optimal state to perform the Check Consistency.

A RAID array that contains a single data error in conjunction with an additional error event such as a hard drive failure causes a RAID puncture when the failed or replacement drive is rebuilt into the array. As an example, an optimal RAID 5 array includes three members: drive 0, drive 1 and drive 2. If drive 0 fails and is replaced, the data and parity remaining on drives 1 and 2 are used to rebuild the missing information on to the replacement drive 0. However, if a data error exists on drive 1 when the rebuild operation reaches that error, there is insufficient information within the stripe to rebuild the missing data in that stripe. Drive 0 has no data, drive 1 has bad data and drive 2 has good data as it is being rebuilt. There are multiple errors within that stripe. Drive 0 and drive 1 do not contain valid data, so any data in that stripe cannot be recovered and is therefore lost.The result as shown in Figure 3 is that RAID punctures (in stripes 1 and 2) are created during the rebuild. The errors are propagated to drive 0.
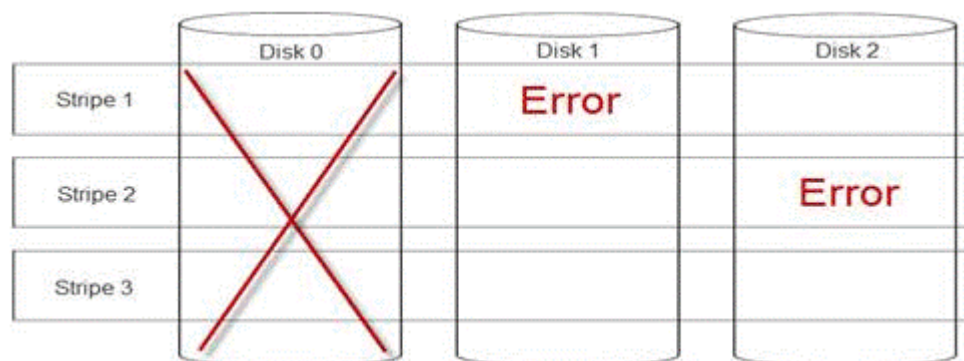
Puncturing the array restores the redundancy and returns the array to an optimal state. This provides for the array to be protected from additional data loss in the event of additional errors or drive failures.

How to fix a RAID puncture?

Issue: How to fix RAID arrays that have been subjected to a puncture?

Solution: Complete the following steps to resolve the issue:

⚠️ **WARNING: Following these steps will result in the loss of all data on the array. Ensure that you are prepared to restore from backup or other means prior to following these steps. Use caution so that following these steps does not impact any other arrays.**

1. Discard Preserved Cache, if it exists.
2. Clear foreign configurations, if any.
3. Delete the array.
4. Shift the position of the drives by one.
   Move Disk 0 to slot 1, Disk 1 to slot 2, and Disk 2 to slot 0.
5. Recreate the array as desired.
6. Perform a Full Initialization of the array (not a Fast Initialization).
7. Perform a Check Consistency on the array.

If the Check Consistency completes without errors, you can safely assume that the array is now healthy and the puncture is removed. Data can now be restored to the healthy array.

Preventing problems before they happen and solving punctures after they occur

Dell's RAID controllers contain a number of features to prevent many types of problems and to handle a variety of errors that do occur. The primary job of a RAID controller is to preserve the integrity of the data contained on its array(s). Even in the more extreme cases of damage (such as punctures), the array's data is often available and the server can remain in production. Part of any maintenance plan should be the proactive maintenance of the RAID arrays. Dell's RAID controllers are highly reliable and very good at managing its arrays without user intervention. Disregarding proper maintenance can cause even the most sophisticated technologies to experience problems over time. There are a number of things that can help maintain the health of arrays, and prevent the majority of data errors, double faults and punctures.

It is highly recommended to perform routine and regular maintenance. Proactive maintenance can correct existing errors, and prevent some errors from occurring. It is not possible to prevent all errors from occurring, but most serious errors can be mitigated significantly with proactive maintenance. For storage and RAID subsystems these steps are:

- Update drivers and firmware on controllers, hard drives, backplanes and other devices.
- Perform routine Check Consistency operations (Dell recommends every 30 days).
- Inspect cabling for signs of wear and damage and ensure good connections.
- Review logs for indications of problems.

  This doesn't have to be a high level technical review, but could simply be a cursory view of the logs looking for extremely obvious indications of potential problems. Contact Dell Technical Support with any questions or concerns.

Blank or skipped RAID configuration screen during SMTD DVD installation

Issue:

Some Seagate drives used as internal server storage shipped with the incorrect Dell firmware and may experience the following symptoms. (External storage is not affected)

1. During an installation from System Management Tool and Documentation (SMTD) DVD.

   - If there is no Redundant Array of Independent Disks (RAID) configuration from Ctrl + R and the DVD is booted, it will display a blank white screen where there should be array configuration setup.
   - If there is a RAID configuration from Ctrl + R already present on the drives, it boots to the SMTD DVD but skip the RAID configuration screen. The menu item for RAID configuration in the left window does not appear in the action list. Installation can be completed using this method.

2. Enclosure or server hard drives are being configured or added in an existing Linux installation.

   The drives may not be seen in the Linux browser that is using OpenManage Storage Management to configure the drives or the Vendor ID for the disk drive may appear with garbled characters.

Model	Capacity	Part Number	Correct FW	Shipped FW
ST936751SS	36GB	RN829	SM04	SM07
ST973451SS	73GB	XT764	SM04	SM07
ST973402SS	73GB	HT952	S229	S22B
ST9146802SS	146GB	CM318	S229	S22B
ST373355SS	73GB	GY582	T211	T213
ST3146755SS	146GB	TN938	T211	T213
ST3300555SS	300GB	HT954	T211	T213
ST3400755SS	400GB	GY583	NS25	NS27
ST373455SS	73GB	GY581	S528	S529
ST3146855SS	146GB	HT953	S528	S529
ST3300655SS	300GB	TN937	S528	S529

Solution:

If the shipped version in the above chart matches the current drive firmware version then a firmware flash is required.

For drives that are installed in a server with an existing operating system, use the latest Dell Update Package (DUP) to roll-back or update the drives.

For drives that are experiencing the installation problem, use Release R212231 to flash the drives. R212231 will roll-back the drives listed above to the correct firmware version without the need for user input. Create the bootable USB or CD using the dddp.exe included in the release.

> NOTE: If a drive has a version that is incrementally newer than the shipped version above then a roll-back is not required.

The update will take about 5 minutes plus 1 minute for each additional drive in the server. Restart the server installation after rolling-back the drives.

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Getting help

Contacting Dell

Dell provides several online and telephone-based support and service options. If you do not have an active internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical assistance, or customer-service issues:

1. Go to **Dell.com/support**.
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
   a. Enter your system Service Tag in the **Enter your Service Tag** field.
   b. Click **Submit**.

      The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.

      The support page that lists the various support categories is displayed.
5. For contact details of Dell Global Technical Support:
   a. Click [Global Technical Support](#).
   b. The **Contact Technical Support** page is displayed with details to call, chat, or e-mail the Dell Global Technical Support team.

Locating Service Tag of your system

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