Dell™ Server PRO Management Pack 2.0
For Microsoft® System Center
Virtual Machine Manager

User's Guide

Notes and Cautions

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

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

Contents

1

Introduction

This document is intended for system administrators who use the Dell™ Server PRO Management Pack (Dell PRO Pack) to monitor Dell systems and take remedial action when an inefficient system is identified.

The Dell PRO Pack integrates with the following:

- Microsoft® System Center Operations Manager (SCOM) 2007 SP1
- SCOM 2007 R2
- System Center Essentials (SCE) 2007 version1
- System Center Virtual Machine Manager (SCVMM) 2008
- SCVMM 2008 R2

This integration enables you to proactively manage virtual environments and ensure high availability of your Dell systems.

To implement PRO Pack, see "Getting Started with Dell PRO Pack".

⚠ **CAUTION: Due to the possibility of data corruption and/ or data loss, it is recommended that the procedures in this document should be performed only by personnel with knowledge and experience of using the Microsoft Windows® operating system and Systems Center Operations Manager 2007/ System Center Essentials 2007.**

📝 **NOTE:** The Readme file, **DellPROMP2.0_Readme.txt** contains the latest information about the software and management station requirements, as well as information about known issues. It is posted on the Systems Management documentation page on the Dell Support website at **support.dell.com/manuals**. The readme file is also packaged in the self-extracting executable **Dell_ PROPack_2.0.0_A00.exe**.

What's New in this Release?

This release of PRO Pack supports the following:

- SCOM 2007 R2
- SCVMM 2008 R2
- Virtual machine live migration with no downtime
- Feature to Override Dell PRO Pack default recovery actions
- Additional Dell OpenManage™ alerts
- Change in the names of recovery actions from "Maintenance mode" and "VM Migration" in PRO Pack 1.0 to "Restrict", and "Restrict and Migrate" mode
- Improvements on the resolutions of some old alerts

For more information on the alerts and their resolutions, see "Alert Cause and Recovery Action."

Overview

SCOM 2007/SCE 2007 uses PRO-enabled Management Pack to collect and store information on Dell hardware along with a description of their health status. Dell PRO Pack works with SCOM/SCE (henceforth, referred to as Operations Manager) and SCVMM 2008 to manage Dell physical devices and their hosted virtual machines using this available health information. Dell PRO Pack recommends remedial actions when monitored objects transition to an unhealthy state (for example, virtual disk failure or predictive drive error), by leveraging the monitoring and alerting capabilities of Operations Manager and remediation capabilities of SCVMM.

Related Terms

- A *managed system* is a Dell system running Dell™ OpenManage™ System Administrator, which is monitored and managed using Operations Manager and SCVMM. It can be managed locally or remotely using supported tools.
- A *management station* (or) *managing station* can be a Microsoft Windows - based Dell System that has the Operations Manager and SCVMM installed to manage virtual workloads.

What is a PRO Tip?

PRO (Performance and Resource Optimization) Tip is a feature that enables monitoring of your virtualized infrastructure and alerting when there is an opportunity to optimize the usage of these resources. A PRO Tip window contains the description of the event that produced the PRO Tip and the suggested remedial action. This feature allows you to perform a load-balance of virtual machines between physical hosts when specific threshold values are reached. Alternatively, you can migrate virtual machines when a hardware failure is detected.

The PRO Tip window in the SCVMM Administrator console enables you to view active PRO Tips for the host groups. The Operations Manager console displays the corresponding alerts as well, to ensure a consistent monitoring experience.

You can implement the recommended action mentioned in the PRO Tip manually. You can also configure PRO tip to implement the recommended action automatically.

Feature Highlights

Dell PRO Pack:

- Performs PRO-management of Dell PowerEdge™ systems running Microsoft Hyper-V™ platforms, by continually monitoring the health of your physical and virtual infrastructure.

- Works with Operations Manager and SCVMM to detect events such as loss of power supply redundancy, higher temperature than threshold values, system storage battery error, virtual disk failure, and so on. For more information on events supported by Dell PRO Pack, see "Alert Cause and Recovery Action".

- Generates PRO Tip when the monitored hardware moves to an unhealthy state.

- Minimizes downtime by implementing the remedial action provided on PRO Tips. The two remedial actions are:

  - **Restrict:** In this mode, it is recommended that the server should be temporarily unavailable for placement of new virtual machines until the maintenance tasks have been completed.

- **Restrict and migrate:** In this mode, in order to prevent loss of service from the virtual workloads, it is recommended that all running virtual machines be migrated from the server to another healthy server immediately.

Understanding PRO Tip Management

To help you understand how Dell PRO Pack works, this section explains a typical setup and the sequence of events involved.

Figure 1-1.   Interaction of Components
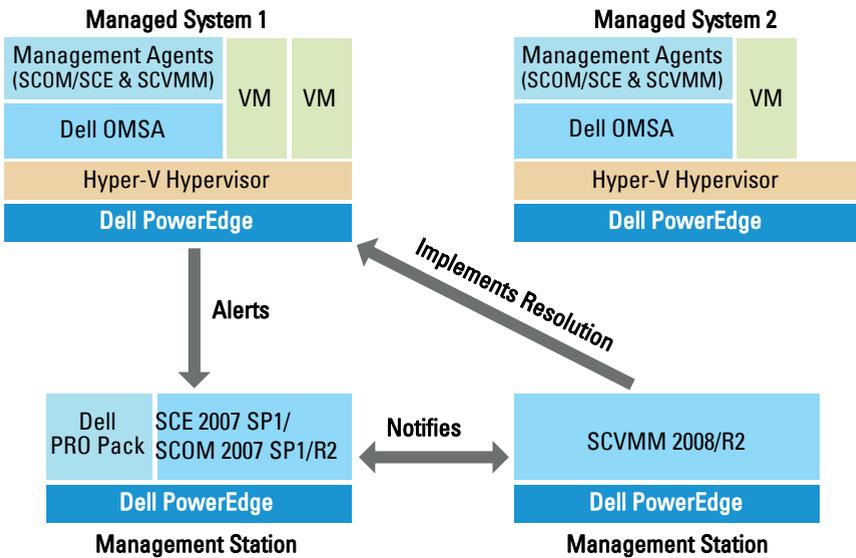
In the figure, a group of PowerEdge systems are the managed systems. Two PowerEdge systems act as management stations hosting the Operations Manager and SCVMM. Dell OpenManage Server Administrator generates alerts with corresponding severity when there is a transition to an unhealthy state and the same alerts are monitored by Dell PRO Pack for PRO.

Dell PRO Pack contains a mapping between Server Administrator alerts and the associated remedial action.

The following table describes the sequence of events that occur in generating and handling of a typical PRO Tip.

Table 1-1.   Sequence of events with description

Sequence Number	Event
1	Operations Manager agents on the host enable to detect the warning, error, or failure alerts that are logged by Dell OpenManage Server Administrator.
2	Alert is sent to Operations Manager.
3	Operations Manager console displays active PRO specific alerts.
4	Operations Manager notifies the alert and the associated PRO Tip ID to SCVMM.
5	SCVMM displays a corresponding entry in the PRO Tip window with remedial action.
6	Implement the PRO Tip to enable recovery action on the managed system that is, either placing the managed system in the restricted mode, or restrict and migrate virtual machines from the managed system.
7	SCVMM notifies Operations Manager about the successful completion of the recovery action.
8	The SCVMM console displays the status of the PRO Tip as "Resolved" after it is successfully implemented.
9	PRO Tip disappears from SCVMM PRO tip window.
10	PRO Active alert disappears from SCOM.

For more information on the types of events and the associated remedial actions, see "Alert Cause and Recovery Action".

Supported Operating Systems

For the detailed Operating Systems support matrix, see the Dell PRO Pack readme file, **DellPROMP2.0_Readme.txt**. You can find the readme packaged in the self-extracting executable - **Dell_ PROPack_2.0.0_A00.exe.** It is also posted on the Systems Management documentation page on the Dell Support website at **support.dell.com/manuals**.

Other Documents You May Need

Besides this guide, you can find the following guides on the Systems

Management and Systems documentation pages on the Dell Support website at **support.dell.com/manuals**:

- The *Dell OpenManage Server Administrator CIM Reference Guide* documents the Common Information Model (CIM) provider, an extension of the standard management object format (MOF) file. The CIM provider MOF documents supported classes of management objects.

- The *Dell OpenManage Server Administrator Messages Reference Guide* lists the messages that are displayed in your Server Administrator home page Alert log or on your operating system's event viewer. This guide explains the text, severity, and cause of each service alert message that Server Administrator issues.

- The *Dell OpenManage Server Administrator Command Line Interface User's Guide* documents the complete command line interface for Server Administrator, including an explanation of the command line interface (CLI) commands to view system status, access logs, create reports, configure various component parameters, and set critical thresholds.

- The *Dell OpenManage Server Administrator Storage Management User's Guide* is a comprehensive reference guide for configuring and managing local and remote storage attached to a system. This document is also available in HTML and PDF formats on the *Dell Systems Management Tools and Documentation* DVD and from the Storage Management console as online help.

The *Dell Systems Management Tools and Documentation* DVD contains a readme file for Server Administrator and additional readme files for other systems management software applications found on the DVD.

For documentation on virtualization solutions, see the Dell Support website at **support.dell.com/manuals**.

Obtaining Technical Assistance

If at any time you do not understand a procedure described in this guide, or if your product does not perform as expected, different types of help are available. For more information see "Getting Help" in your system's *Installation and Troubleshooting Guide* or the *Hardware Owner's Manual*.

Additionally, Dell Enterprise Training and Certification is available; see **www.dell.com/training** for more information. This service might not be offered in all locations.

2

Getting Started with Dell PRO Pack

Minimum Requirements

To implement the Dell™ PRO Pack, you must ensure that the following minimum execution environment exists:

- Management Station:
    - Microsoft® System Center Operations Management (SCOM) 2007 SP1/R2 or System Center Essentials (SCE) 2007 installed on supported hardware and operating system
    - System Center Virtual Machine Manager (SCVMM) 2008/R2 installed on supported hardware and operating system
    - Integration of SCOM and SCVMM
- Managed System:
    - Microsoft Hyper-V™ hosts on any Dell PowerEdge™ systems ranging from x9xx to xx1x (both inclusive)
    - Dell OpenManage™ Server Administrator (including the Server Administrator Storage Management Service.)
        - It is recommended that you install the latest version of Dell OpenManage Server Administrator(OMSA) 6.2
        - Minimum supported version of OMSA is 5.3
- Live Migration:
    - SCVMM R2 with Windows Server 2008 R2 or Microsoft Hyper-V Server 2008 R2
    - OpenManage 6.2

    You can download the latest version of OMSA from the Dell Support website at **support.dell.com**.

> **NOTE:** For the list of supported operating systems for Operations Manager and SCVMM, see the Microsoft website at **http://technet.microsoft.com/hiin/library/bb309428(en-us).aspx**.

Installing SCOM/SCE and SCVMM Agents

When you use the setup to monitor your infrastructure, SCOM/SCE (Operations Manager) and SCVMM agents installed on the managed hosts enable data transfer between the managed system and management stations. Agents of both SCVMM and Operations Manager are installed manually or automatically during the discovery process on all Hyper-V hosts.

Integrating Operations Manager with SCVMM

For the setup to support Dell PRO Pack, Operations Manager must be integrated with SCVMM. For detailed description of the steps, see the Microsoft TechNet Library.

For SCOM & VMM 2008 Integration, see **http://technet.microsoft.com/hi-in/library/cc956099(en-us).aspx.**

For SCE & VMM 2008 Integration, see **http://go.microsoft.com/fwlink/?LinkId=148206.**

For SCOM & VMM R2 Integration, see **http://technet.microsoft.com/hi-in/library/ee236463(en-us).aspx.**

Importing Dell PRO Pack

Dell PRO Pack version 2.0 is provided in a sealed format as a **.mp** file. To import Dell PRO Pack:

1 Download the **Dell_ PROPack_2.0.0_A00.exe** from the Dell Support website to a removable media or a local repository.

2 Extract the contents of the file to a suitable folder on your system.

3 Launch the Operations Manager console.

4 Right-click **Management Packs** in the **Administration** tab.

   The **Select Management Pack to import** screen is displayed.

5 Browse to the location where you extracted the **Dell_PROPack_2.0.0_A00.exe** file and select the **Dell.Connections.hyperv.PROPack.mp** file.

6 Click **Open.**

The **Import Management Packs** screen is displayed with a warning message in the **Management Pack Details** section, as shown in Figure 2-1. Operations Manager displays this generic warning as a part of the security process when you manually install a management pack. For more information on how you can change the security settings for installing Management Packs manually, see the Microsoft TechNet Library.

Figure 2-1.   Security Warning Message
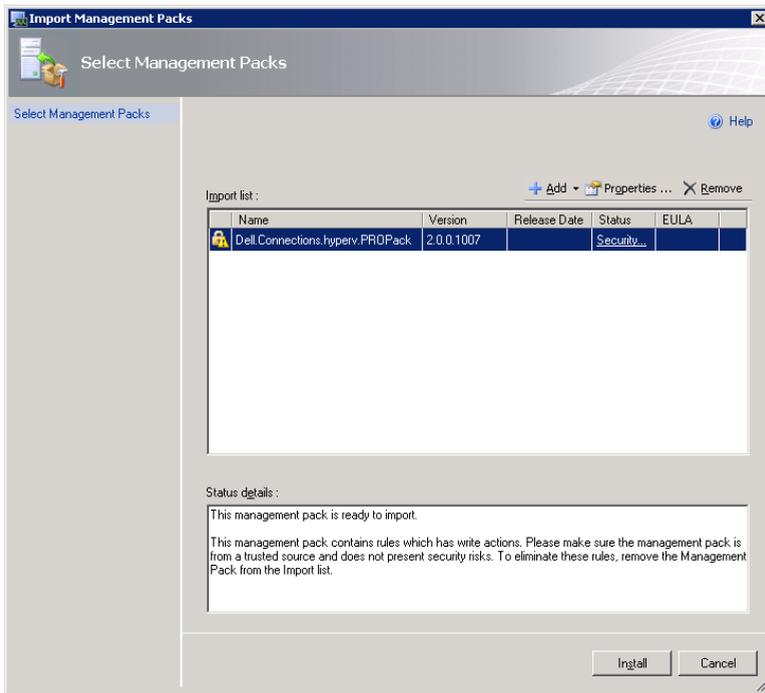
7 Click **Install**.

A confirmation dialog box is displayed.

8 Click **Yes**.

For alerts and PRO Tips to be generated, ensure that SCVMM discovers the managed objects and displays them in the State View.

Configuring PRO Tips

The Dell systems and virtual infrastructure are monitored for either Critical only, or both Critical and Warning alerts.

- A **Warning** alert is generated when a reading for the component is above or below the acceptable level. For example, the component may still be functioning, but it could potentially fail, or the component may be functioning in an impaired state.

- A **Critical** alert is generated when the component has either failed or failure is imminent. By default, the monitoring level is set to "Warning and Critical".

To enable PRO Tips for both **Warning** and **Critical** alerts and automatic implementation of Pro Tips:

1 Launch the SCVMM console.

2 In the **Host Groups** section, right-click **All Hosts** and select **Properties**.

The **Host Groups Properties for All Hosts** window appears, as shown in Figure 2-2.

Figure 2-2.   Configuring PRO Tips
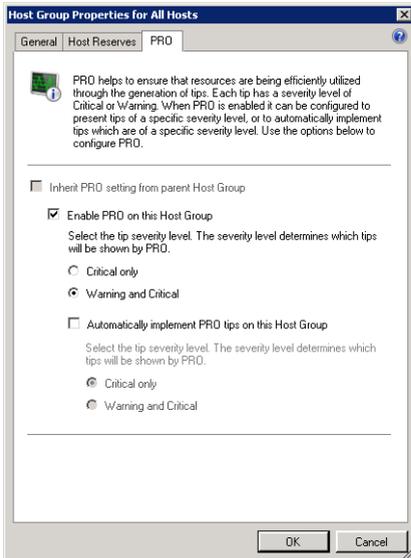
3 Select the **PRO** tab and select the **Enable PRO on this Host Group** option.

4 By default, the monitoring level is set to **Warning and Critical**, which means that the application will display PRO Tips generated for both Warning and Critical alerts. To restrict the PRO Tips to Critical alerts only, select the **Critical only** option.

5 Select the **Automatically implement PRO tips on this Host Group** option.

   🖉 **NOTE:** By default, the automation level is set to **Critical** only, which means that PRO Tips with a Critical severity level are automatically implemented.

To implement all PRO Tips automatically, select the **Warning and Critical** option.

6 Click **OK** to save your settings.

Testing the Setup Using Scenarios

To confirm that the imported Dell PRO Pack is fully functional, create the scenarios listed in the two tables and check if the activities listed under Expected System Response column are carried out.

Scenario 1 - The backplane board temperature exceeds its warning threshold value on a managed system.

Table 2-1. Checking recovery action for warning alert conditions.

Your Actions	Expected System Response
Generate a temperature alert warning on the managed system, such that the backplane board temperature exceeds its warning threshold limit. The event id is 1053 with the source being OpenManage Server Administrator.	• Dell PRO Pack generates the corresponding alert in Operations Manager. • Operations Manager passes an alert associated with the PRO Tip to SCVMM. • PRO Tip appears in the SCVMM PRO Tip window.
Select the **Implement** option in the PRO Tip window.	Places the host in Restrict mode.

Table 2-1.   Checking recovery action for warning alert conditions. *(continued)*

Your Actions	Expected System Response
Verify that the host is placed in the **Restrict** mode and the PRO Tip resolved the alert.	• After successful implementation of the PRO Tip, the status changes to "Resolved" and the PRO Tip entry is moved out of the PRO Tip window. • Corresponding alert disappears in the Operations Manager Alert View.
Select the **Dismiss** option instead of the **Implement** option in the PRO Tip window.	The PRO Tip is dismissed. No recovery task is performed. The corresponding PRO Tip entry is moved out of the PRO Tip window.

Scenario 2 - the backplane board temperature exceeds its failure threshold value on a managed system.

Table 2-2.   Checking recovery action for failure alert conditions.

Your Actions	Expected System Response
Generate a temperature alert on the managed system, such that the backplane board temperature exceeds its failure threshold limit. The event id is 1054 with the source being OpenManage Server Administrator.	• Dell PRO Pack generates the corresponding alert in Operations Manager. • Operations Manager passes an alert associated with the PRO Tip to SCVMM. • PRO Tip appears on the SCVMM PRO Tip window.

Select the **Implement** option in the PRO Tip window.	SCVMM generates the following recovery actions:
	
	  a Sets the host in Restrict mode.
	  b Determines the list of virtual systems running on the unhealthy host.
	  c Determines the best-rated healthy host.
	  d Migrates the virtual machine to best-rated host.
	  e Repeats this action until all the running virtual machines are migrated from the unhealthy host.

Table 2-2. Checking recovery action for failure alert conditions. *(continued)*

Your Actions	Expected System Response
Verify that the virtual systems are moved to a healthy host and PRO Tip resolved the alert.	• After successful implementation of the PRO Tip, the status changes to "Resolved" and the PRO Tip entry is moved out of the PRO Tip window.
	• Corresponding alert disappears in the Operations Manager Alert View.
Select the **Dismiss** option instead of the **Implement** option in the PRO Tip window.	No action is taken and virtual systems are not moved. The corresponding PRO Tip entry is moved out of the PRO Tip window.
	For more information, see "Using Health Explorer to Reset Alerts".

Uninstalling PRO Pack

You can uninstall PRO Pack by deleting it in the Operations Manager console. When you delete PRO Pack, all the settings and thresholds associated with it are removed from Operations Manager.

To uninstall PRO Pack:

1 Launch the Operations Manager console.

2 Select **Administration→Management Packs**.

3 In the **Management Packs** pane, right-click Dell PRO-enabled Management Pack and click **Delete**.

Security Considerations

Operations Console access privileges are handled internally by SCOM/SCE. This can be setup using the **User Roles** option under **Administration →Security** feature on the SCOM/SCE console. The profile of the role assigned to you determines what actions you can perform and which objects you are able to manage. For more information on security considerations see the *Microsoft System Center Operations Manager SP1/R2 and Microsoft Systems Centre Essentials 2007 online help.*

3

Using Dell PRO Pack

Monitoring Using SCVMM

You can manage the health of your virtualized environment using PRO Tips displayed on the SCVMM console.

To see the PRO Tip window, click the **PRO Tips** menu on the toolbar located below the main menu, as shown in Figure 3-1. The menu also shows the number of active PRO Tips in brackets.

Figure 3-1.   PRO Tip Button on the SCVMM Console

Alternatively, if you select the **Show this window when new PRO Tips are created** option in the PRO Tip window, the window opens automatically on the SCVMM console when a PRO Tip is generated.

The PRO Tip window displays information in a tabular format about the source, tip (a concise statement of the problem associated with the host machine), and state.

You can see a description of the problem that triggered the alert, the cause, and suggested remedial action for recovery below the table.

Figure 3-2.   PRO Tip Window
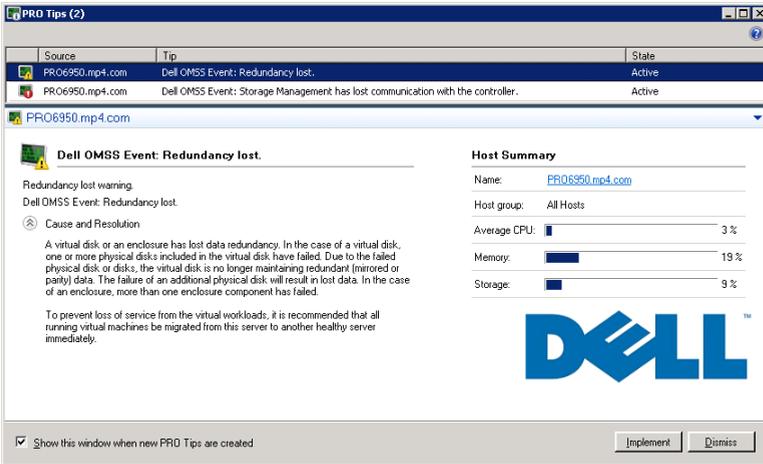
Implementation of Recovery Actions

The PRO Tip window provides an option to either implement or dismiss the recommended action. If you select the **Implement** option, SCVMM implements one of the recovery tasks described below, based on the nature of the alert.

Placing the host in Restrict mode

Placing a host in **Restrict** mode prevents future assignment of workload to the host until the problem is resolved.

When a host is placed in the **Restrict** mode, it still receives alerts in the Operations Manager and associated PRO Tips in SCVMM.

The system health conditions that can trigger the maintenance mode tasks are non-critical hardware alerts on the virtualization host such as, ambient chassis temperature warning alert on a Dell™ PowerEdge™ virtualization host system.

Migration of virtual machines

The PRO Tip management pack uses SCVMM algorithms to move virtual machines from the affected system to a healthy one. The two SCVMM algorithms are **Load Balance** and **Resource Maximization**.

Select the **Load Balance** algorithm if you want SCVMM to evenly distribute virtual machines (VMs) across a pool of hosts.

Select the **Resource Maximization** algorithm if you prefer to saturate the host completely before moving to a new one.

The placement requirements for identifying a healthy system and moving the virtual machines are as follows:

- **Hardware requirements** are requirements that a machine hosting the virtual machines must meet in order to run such as sufficient memory and storage.

- **Software requirements** are requirements that if met by the host, allows a virtual machine to perform more optimally such as CPU allocation, network bandwidth, network availability, disk IO bandwidth, and free memory.

SCVMM assigns a star rating to hosts in a range of zero to five. If a hardware requirement is not met, for example, not enough hard disk and memory capacity, the host automatically gets zero stars and SCVMM does not allow you to place a VM on that host.

The system health conditions that trigger migration of VMs are hardware failure alerts on a virtualization host, such as virtual disk failure and predictive drive error. Dell PRO Pack migrates VMs with the **Running** status. It does not migrate VMs with status such as **Stop**, **Pause**, and **Saved**.

After you successfully implement the recovery task the following changes take place:

- The status of PRO Tip changes to **Resolved** and the PRO Tip entry moves out of the PRO Tip window.

- Corresponding alert disappears in the Operations Manager Alert View.

- An entry is displayed in the **Jobs** section on the SCVMM console. This entry shows the status of the job as **Completed**, as shown in the Figure 3-3.

Figure 3-3. Completed Job

PRO Tip implementation of moving VMs can fail if no other healthy hosts are available in the host group or host cluster. In such a case, the PRO Tip window displays the **state** of the corresponding PRO Tip as **Failed**, and the reason is elaborated in the **Error** section. The status of the corresponding entry in the **Jobs** section on the SCVMM console also displays as **Failed**.

NOTE: In the PRO Tip window the failure message is updated dynamically. However, to refresh the data you have to click outside the PRO Tip window and then click again to bring the window in focus.

If you select the **Dismiss** option, the PRO Tip is not executed and the following changes take place:

• The PRO Tip is removed from the SCVMM PRO Tip console.

• The alert in Operations Manager is removed from the **Dell Server PRO Alerts**.

  For more informartion, see "Using Health Explorer to Reset Alerts."

VM Live Migration

With live migration, you can migrate a VM from one node of a Windows Server 2008 R2 failover cluster to another node in the same cluster without any downtime. As a connected user, you will not experience any interruption during live migration.

The difference in quick migration and live migration is that there is a downtime in quick migration whereas, there is no downtime in live migration.

NOTE: Windows Server 2008 Hyper-V supports Quick Migration. Windows Server 2008 R2 Hyper-V supports both Quick Migration and Live Migration.

Figure 3-4.   Live Migration
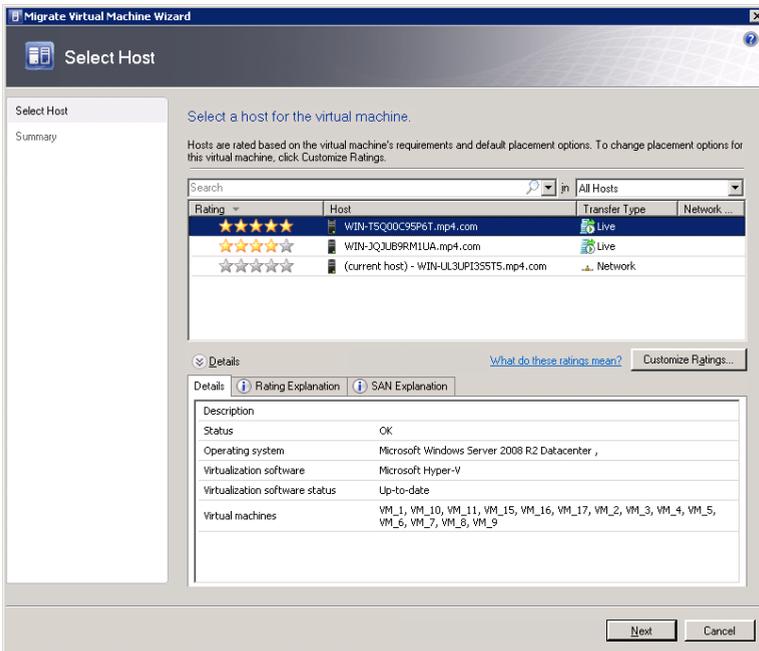
For more information about Hyper-V live migration, see

http://go.microsoft.com/fwlink/?LinkId=147115.

Monitoring Using PRO Specific Alerts on SCOM/SCE

You can monitor the physical devices in your network using the Operations Manager console.

The Operations Manager console provides the following views:

- **Alert View** - Displays Dell PRO specific alerts in a tabular format with information on the severity level, source, name, resolution state, along with the date and time of creation. To access the Alert View do the following:

  a Launch the Operations Manager console.

  b Select the **Monitoring** tab.

  c Select **Dell Server PRO Alerts** from **Dell Server PRO Pack.**

  The alerts are displayed on the right-side of the screen, as shown in Figure 3-5.

Figure 3-5.   Alert View
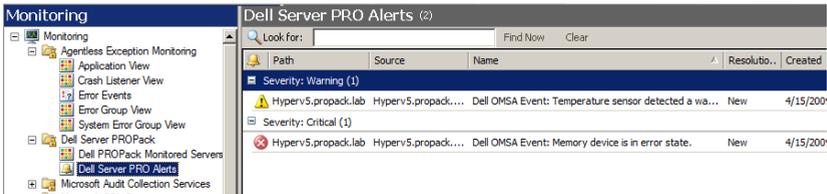
- **State View** - Displays the Dell system objects discovered in a tabular format. The State View displays objects with the name, path, storage health of the Dell system, and so on. You can personalize the State View by defining which objects you want displayed and customizing how the data looks.

Figure 3-6.   State View
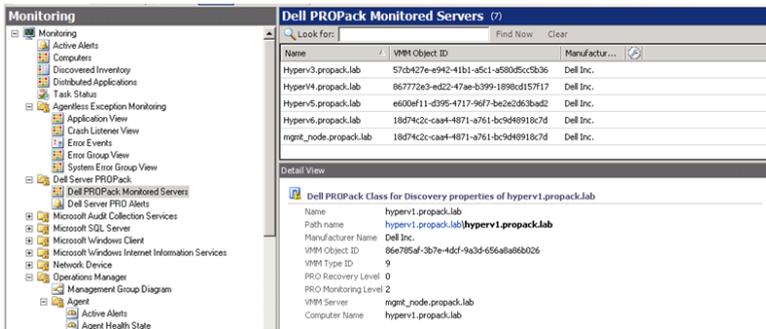
For more information on creating a State view see the Microsoft website.

Using Health Explorer to Reset Alerts

Health Explorer enables you to view and take action on alerts. When you select the **Dismiss** option in the PRO Tip window the alert is removed from the PRO Tip window. However, to reset this alert manually in the Health Explorer do the following:

1. Launch the **Health Explorer** window from the **Actions** pane.
2. Right-click the alert that you want to close.
3. Select **Reset Health**.

Recovery Action Overrides

PRO Pack 2.0 supports two recovery actions. The following flag values trigger the respective recovery action:

- 1: For migration recovery action
- 2: For placing the server in restricted mode

You can override the default recovey actions by changing the default recovery action flag value. For example, change the recovery flag value from '2' to '1' with the overrides option provided in SCOM

After overriding the default value to '1', and on implementation of PRO Tip, recovery action will trigger migration of virtual machines from the host.

PRO Pack 2.0 supports only two override values, '1' and '2'. If you enter any other value, PRO Tip implementation fails and an error message is displayed.

To override the recovery action,

1 Click the **Authoring** tab in SCOM.
2 Search for the Dell PRO Pack monitors.
3 Select the monitor which you intended to override.
4 Right click and select **Override Recovery.**
5 Select the **Override** check box.
6 Change the value of RecoveryOverrideFlag.

   📝 **NOTE:** When you select **Enable**, SCOM performs an auto-implementation for the unit monitor. Since, this involves VMM migration, review and set the values accordingly.

7 Select **Enforce** check box.
8 Click **Apply**

⚠ **CAUTION: Saving the settings in the default management pack, creates a dependency between PRO Pack and the management pack. When you remove or delete PRO Pack, you must delete the default management pack as well, as it contains default settings for SCOM. Hence, it is recommended that you save settings using a new MP.**

9 Click **Save** overrides.
10 Generate an alert and PRO Tip.
11 Select **Implement PRO Tip**.

This verifies that the overridden recovery action is successful.

Figure 3-7.   Override Recovery Action
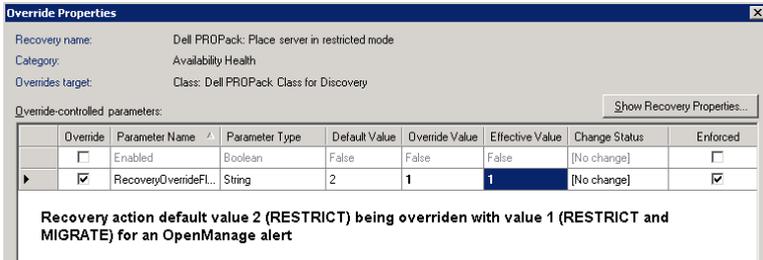
Alert Cause and Recovery Action

The following table lists the alerts and the corresponding recommended remedial action:

Restrict: It is recommended that the server should be temporarily unavailable for placement of new VMs until the maintenance tasks have been completed.

Restrict and Migrate: In this mode, in order to prevent loss of service from the virtual workloads, it is recommended that all running VMs be migrated from the server to another healthy server immediately.

Table 3-1.   Alert Cause and Recovery Action

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
1053	Temperature sensor detected a warning value	Warning	A temperature sensor on the backplane board, system board, CPU, or drive carrier in the specified system exceeded its warning threshold value.	Restrict

Table 3-1. Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
1054	Temperature sensor detected a failure value	Error	A temperature sensor on the backplane board, system board, CPU, or drive carrier in the specified system exceeded its failure threshold value.	Restrict and Migrate
1104	Fan sensor detected a failure value.	Error	A fan sensor in the specified system detected the failure of one or more fans.	Restrict
1154	Voltage sensor detected a failure value.	Error	A voltage sensor in the specified system exceeded its failure threshold value.	Restrict and Migrate
1203	Current sensor detected a warning value.	Warning	A current sensor in the specified system exceeded its warning threshold value.	Restrict
1204	Current sensor detected a failure value.	Error	A current sensor in the specified system exceeded its failure threshold value.	Restrict and Migrate
1305	Redundancy degraded.	Warning	A power supply sensor reading in the specified system exceeded a warning threshold.	Restrict
1306	Redundancy lost.	Error	A power supply has been disconnected or has failed.	Restrict

Table 3-1. Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
1353	Power supply detected a warning.	Warning	A power supply sensor reading in the specified system exceeded definable warning threshold.	Restrict
1354	Power supply detected a failure.	Error	A power supply has been disconnected or has failed.	Restrict
1403	Memory Device Status Warning	Warning	A memory device correction rate exceeded an acceptable value.	Restrict
1404	Memory Device Error.	Error	A memory device correction rate exceeded an acceptable value, a memory spare bank was activated, or a multibit ECC error occurred.	Restrict and Migrate
1703	Battery sensor detected a warning value.	Warning	A battery sensor in the specified system detected that a battery is in a predictive failure state.	Restrict

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2048	Device Failed Error.	Critical	A storage component such as a physical disk or an enclosure has failed. The failed component may have been identified by the controller while performing a task such as a rescan or a check consistency.	Restrict and Migrate
2056	Virtual Disk Failed.	Critical	One or more physical disks included in the virtual disk have failed.	Restrict and Migrate
2057	Virtual Disk Degraded Warning	Warning	This alert message occurs when a physical disk included in a redundant virtual disk fails.	Restrict
2076	Virtual Disk Check Consistency Failed.	Critical	A physical disk included in the virtual disk failed or there is an error in the parity information.	Restrict
2082	Virtual Disk Rebuild Failure	Error	A physical disk included in the virtual disk has failed or is corrupt.	Restrict

Table 3-1. Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2083	Physical Disk Rebuild Failed	Critical	A physical disk included in the virtual disk has failed or is corrupt.	Restrict
2094	Predictive Failure reported	Warning	The physical disk is predicted to fail.	Restrict
2100	Temperature exceeded Maximum Warning Threshold	Warning	The physical disk enclosure is too hot. A variety of factors can cause the excessive temperature.	Restrict
2101	Temperature dropped below Minimum Warning Threshold	Warning	The physical disk enclosure is too cool.	Restrict
2102	Temperature exceeded Maximum Failure Threshold.	Critical	The physical disk enclosure is too hot. A variety of factors can cause the excessive temperature.	Restrict and Migrate
2103	Temperature dropped below the Minimum Failure Threshold.	Critical	The physical disk enclosure is too cool.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2112	Enclosure shutdown	Critical	The physical disk enclosure is either hotter or cooler than the maximum or minimum allowable temperature range.	Restrict and Migrate
2122	Redundancy degraded	Warning	One or more of the enclosure components has failed. For example, a fan or power supply may have failed.	Restrict
2123	Redundancy Lost	Warning	A virtual disk or an enclosure has lost data redundancy.	Restrict and Migrate
2125	Controller cache pinned for missing or offline VD	Warning	Controller getting disconnected from its VD, while IO is happening	Restrict
2129	BGI (Back Ground Initialization) Failed Error	Critical	BGI of a virtual disk has failed.	Restrict
2137	Communication Time-out Warning	Warning	The controller is unable to communicate with an enclosure.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2145	Controller battery low	Warning	The controller battery charge is low.	Restrict
2169	The controller battery needs to be replaced	Critical	The controller battery cannot recharge. The battery may have been already recharged the maximum number of times. In addition, the battery charger may not be working.	Restrict and Migrate
2171	The controller battery temperature is above normal.	Warning	The room temperature may be too hot. The system fan may also be degraded or failed.	Restrict
2174	The controller battey has been removed.	Warning	The controller cannot communicate with the battery. The battery may be removed or the contact point maye degraded	Restrict and Migrate
2178	The controller battery Learn cycle has timed out	Warning	The controller battery must be fully charged before the Learn cycle can begin.	Restrict
2187	Single-bit ECC error limit exceeded on the controller DIMM	Warning	The controller memory is malfunctioning.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2201	A global hot spare failed	Warning	The controller is not able to communicate with a disk that is assigned as a global hot spare. The disk may have failed or been removed.	Restrict
2203	A dedicated hot spare failed	Warning	The controller is not able to communicate with a disk that is assigned as a dedicated hot spare.	Restrict
2206	The only hot spare available is a SATA disk. SATA disks cannot replace SAS disks	Warning	The only physical disk available to be assigned as a hot spare is using SATA technology.	Restrict
2207	The only hot spare available is a SAS disk. SAS disks cannot replace SATA disks	Warning	The only physical disk available to be assigned as a hot spare is using SAS technology.	Restrict
2213	Recharge count maximum exceeded	Warning	A virtual disk or an enclosure has lost data redundancy. In the case of a virtual disk, one or more physical disks included in the virtual disk have failed.	Restrict

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2246	The controller battery is degraded	Warning	The temperature of the the battery is high. This maybe due to the battery being charged.	Restrict
2264	A device is missing	Warning	The controller cannot communicate with a device. The device may be removed.	Restrict
2265	A device is in an unknown state	Warning	The controller cannot communicate with a device. The state of the device cannot be determined.	Restrict and Migrate
2268	Storage Management communication Error	Critical	Storage Management has lost communication with a controller. This may occur if the controller driver or firmware is experiencing a problem.	Restrict and Migrate
2272	Patrol Read found an uncorrectable media error	Critical	The Patrol Read task has encounted an error that cannot be corrected. There may be a bad disk block that cannot be remapped.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2273	A block on the physical disk has been punctured by the controller	Critical	The controller encountered an unrecoverable medium error when attempting to read a block on the physical disk and marked that block as invalid.	Restrict and Migrate
2282	Hot spare SMART polling failed	Critical	The controller firmware attempted to do SMART polling on the hot spare but was not able to complete the SMART polling.	Restrict and Migrate
2283	A redundant path is broken	Warning	The controller has two connectors that are connected to the same enclosure.	Restrict and Migrate
2289	Multi-bit ECC error on controller DIMM	Critical	An error involving multiple bits has been encountered during a read or write operation.	Restrict and Migrate
2290	Single-bit ECC error on controller DIMM	Warning	An error involving a single bit has been encountered during a read or write operation.	Restrict

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2292	Communication with the enclosure has been lost	Critical	The controller has lost communication with an enclosure management module (EMM). The cables may be loose or defective.	Restrict and Migrate
2293	EMM (Enclosure Management Module) Failure	Error	The failure may be caused by a loss of power to the EMM.	Restrict and Migrate
2298	The enclosure has a bad sensor	Warning	The enclosure has a bad sensor. The enclosure sensors monitor the fan speeds, temperature probes, and so on.	Restrict
2299	Bad PHY	Critical	There is a problem with a physical connection or PHY.	Restrict
2300	Unstable Enclosure Failure	Critical	The controller is not receiving a consistent response from the enclosure.	Restrict and Migrate
2301	Enclosure Hardware Error	Critical	The enclosure or an enclosure component is in a Failed or Degraded state.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2302	The enclosure is not responding	Critical	The enclosure or an enclosure component is in a Failed or Degraded state.	Restrict and Migrate
2306	Bad block table is full	Warning	The bad block table is the table used for remapping bad disk blocks. This table fills as bad disk blocks are remapped.	Restrict
2307	Bad block table is full.	Critical	The bad block table is the table used for remapping bad disk blocks.	Restrict
2310	A virtual disk is permanently degraded	Critical	A redundant virtual disk has lost redundancy. This may occur when the virtual disk suffers the failure of more than one physical disk.	Restrict and Migrate
2312	A power supply in the enclosure has an AC failure	Warning	The power supply has an AC failure	Restrict
2313	A power supply in the enclosure has a DC failure	Warning	The power supply has a DC failure.	Restrict

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2314	The initialization sequence of SAS components failed during system startup. SAS management and monitoring is not possible.	Critical	Storage Management is unable to monitor or manage SAS devices.	Restrict and Migrate
2318	Problems with the battery or the battery charger have been detected. The battery health is poor.	Warning	The battery or the battery charger is not functioning properly.	Restrict
2319	Single-bit ECC error on controller DIMM.	Warning	The dual in-line memory module (DIMM) is beginning to malfunction.	Restrict and Migrate
2320	Single-bit ECC error.	Critical	The dual in-line memory module (DIMM) is malfunctioning.	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2321	Single-bit ECC error. The controller DIMM is nonfunctional. There will be no further reporting.	Critical	The dual in-line memory module (DIMM) is malfunctioning. Data loss or data corruption is eminent.	Restrict and Migrate
2322	The DC power supply is switched off.	Critical	The power supply unit is switched off. Either a user switched off the power supply unit or it is defective.	Restrict and Migrate
2324	The AC power supply cable has been removed.	Critical	The power cable may be pulled out or removed. The power cable may also have overheated and become warped and nonfunctional.	Restrict and Migrate
2327	The NVRAM has corrupted data. The controller is reinitializing the NVRAM	Warning	The NVRAM has corrupted data. This may ocurr after a power surge, a battery failure, or for other reasons. The controller is reinitializing the NVRAM	Restrict and Migrate
2328	The NVRAM has corrupt data.	Warning	The NVRAM has corrupt data. The controller is unable to correct the situation	Restrict and Migrate

Table 3-1.   Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2329	SAS port report	Warning	The text for this alert is generated by the controller and can vary depending on the situation.	Restrict and Migrate
2337	The controller is unable to recover cached data from the battery backup unit (BBU).	Critical	The controller was unable to recover data from the cache.	Restrict
2340	The background initialization (BGI) completed with uncorrectable errors.	Critical	The background initialization task encountered errors that cannot be corrected.	Restrict and Migrate
2342	The Check Consistency found inconsistent parity data. Data redundancy may be lost.	Warning	The data on a source disk and the redundant data on a target disk is inconsistent.	Restrict and Migrate
2349	A bad disk block could not be reassigned during a write operation.	Critical	A write operation could not complete because the disk contains bad disk blocks that could not be reassigned. Data loss may have occurred.	Restrict

Table 3-1. Alert Cause and Recovery Action *(continued)*

Dell Event ID	Alert Description in SCOM/ SCE & PRO Tip in SCVMM	Severity	Alert Cause	Dell PRO Tip Recommended Remedial Action
2350	There was an unrecoverable disk media error during the rebuild or recovery operation	Critical	The rebuild or recovery operation encountered an unrecoverable disk media error.	Restrict
2356	SAS SMP communications error.	Critical	The text for this alert is generated by the firmware and can vary depending on the situation. The reference to SMP in this text refers to SAS Management Protocol.	Restrict
2357	SAS expander error	Critical	There may be a problem with the enclosure. Verify the health of the enclosure and its components.	Restrict