Simplified monitoring of Dell EqualLogic storage with Microsoft System Center

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The Dell OpenManage™ Integration Suite for Microsoft® System Center offers a simplified way to incorporate Dell™ hardware into the System Center management framework. As part of this software portfolio, the Dell EqualLogic™ Storage Management Pack Suite extends this functionality to help administrators efficiently monitor EqualLogic storage.

As enterprise data centers migrate toward increasingly consolidated infrastructures based on virtualization and cloud networks, monitoring and managing all data center components—including servers, storage, and switches—can become increasingly complex, time-consuming, and costly. When these considerations are placed alongside the goals of maximizing productivity, providing flexible access to IT resources, and maintaining 24/7 operations, the need for a comprehensive, integrated approach to systems management becomes clear.

The Microsoft System Center suite includes a range of management tools that enable IT professionals to plan, deploy, manage, and optimize physical and virtualized environments across data centers, desktops, and other devices. In environments using this systems management suite, administrators can take advantage of the Dell OpenManage Integration Suite for Microsoft System Center to incorporate Dell hardware monitoring and management functionality into System Center.

The Dell OpenManage Integration Suite encompasses a comprehensive set of Dell Management Packs (MPs) and other tools designed to simplify and automate essential IT tasks, including the Dell Server MP Suite for Dell PowerEdge™ and PowerVault™ servers, Dell Remote Access Controllers (DRACs) and Integrated DRACs (iDRACs), and Dell Chassis Management Controllers (CMCs); the Dell Client MP for Dell business client systems; the Dell Printer MP for Dell printers; the Dell PowerVault MD Storage Arrays MP Suite for Dell PowerVault MD Series storage arrays; and the Dell EqualLogic Storage MP Suite for Dell EqualLogic PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays. Available as software downloads at no additional cost, these tools integrate directly with System Center applications to deliver end-to-end management and monitoring functionality for supported Dell hardware. Through the Dell OpenManage

For more information, see “Unified Monitoring and Proactive Management of Dell Hardware with Microsoft System Center” by Viswanathan Balakrishnan, Saravan Kumar, Mahendran P., and Vignesh Pandian, in Dell Power Solutions, 2010 Issue 1, dell.com/downloads/global/power/ps1q10-20100177-balakrishnan.pdf.
Integration Suite, administrators can select and download individual tools as needed, without having to purchase a prescribed package of tools that may not be necessary in their specific environment.

As part of the Dell OpenManage Integration Suite for Microsoft System Center, the Dell EqualLogic Storage MP Suite enables IT administrators to discover, classify, inventory, and monitor Dell EqualLogic PS Series arrays—including the latest 10 Gigabit Ethernet EqualLogic PS6010 and EqualLogic PS6510 arrays—using System Center Operations Manager (SCOM) or System Center Essentials (SCE). SCOM is typically suitable for use in large, enterprise-class environments, while SCE 2010 is designed for midsize organizations with up to 50 servers and 500 client systems and provides a unified console for managing physical and virtual servers, clients, network devices, software, and IT services; in this article, Operations Manager is used to refer generically to both SCOM and SCE. In conjunction with System Center and the other tools in the Dell OpenManage Integration Suite, the EqualLogic Storage MP Suite offers a way for administrators to incorporate their EqualLogic arrays into a comprehensive framework for efficient IT management.2

**Dell EqualLogic Storage MP Suite installation and architecture**

The Dell EqualLogic MP installer is designed to perform all necessary installation tasks other than importing the MP into the Operations Manager management server, helping simplify initial deployment for IT administrators. This process includes installing the internal Dell EqualLogic Helper utility, which the MP uses to discover and monitor EqualLogic PS Series arrays. The EqualLogic Helper files are not installed on Microsoft Windows® client operating systems. After the installation is complete, administrators can customize the MP using overrides available for various unit monitors for EqualLogic group discovery and component-level monitoring to help meet their specific needs and data center policies.

Figure 1 shows an example EqualLogic Storage MP Suite architecture in a large-scale data center. This infrastructure would comprise a SCOM root management server (RMS); device-specific SCOM management servers that monitor various Dell devices, including a dedicated, device-specific management server for monitoring the EqualLogic arrays; a SCOM database server; and a SCOM data warehouse server. After the EqualLogic MP has been imported into Operations Manager, administrators can discover the EqualLogic arrays by performing an out-of-band Simple Network Management Protocol (SNMP) v2c-based discovery using the EqualLogic management port IP address (which may be either the group IP address or the dedicated management port IP address). Operations Manager can then monitor the SNMP-based hardware traps of the discovered EqualLogic group and classify the arrays in the Operations Manager alert view, enabling administrators to proactively view and manage the resulting hardware alerts. The MP provides a separate view in the Operations Manager console showing alerts related to possible impending failures, including cause and resolution information to help administrators troubleshoot the arrays by launching the EqualLogic console and/or physically accessing the array. The MP also verifies that discovered arrays have firmware versions of 4.x.x or higher, and generates alerts listing the IP addresses of groups with members that do not meet this requirement.

As part of the MP monitoring functionality, monitored arrays are represented with various

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2 The Dell EqualLogic Storage MP Suite is available for download at support.us.dell.com/support/downloads/format.aspx?releaseid=R266477. For a list of supported EqualLogic arrays and detailed functionality provided by the EqualLogic MP, see the documentation available at support.dell.com/support/edocs/software/smconnect/msscom/40eqlmp.
Simplifying storage monitoring and management

Dell EqualLogic PS Series arrays provide the advantages of consolidated networked storage in a self-managing Internet Small Computer System Interface (iSCSI) storage area network (SAN) designed for simplicity and cost-effectiveness even in large-scale deployments. By helping to eliminate complex tasks and enabling fast, flexible storage provisioning, these arrays can help dramatically reduce the costs of storage acquisition and ongoing operations. These fault-tolerant, fully redundant arrays include software features enabling administrators to virtualize, optimize, and protect their data, while avoiding the management hassles that can come with multiple software licenses or support contracts. Organizations can also add a yearly support contract that enables them to implement new software features and enhancements as they become available, extending the value of their hardware investment.

In environments that include EqualLogic arrays, administrators can take advantage of a comprehensive suite of software options to help simplify storage management, enable advanced functions, and support virtualized storage and best-practice data protection, including the following tools:

- **EqualLogic PS Group Manager**: This simple, intuitive, unified storage management and provisioning tool allows administrators to remotely manage virtually any aspect of their EqualLogic SANs using a Web browser-based interface, helping eliminate the need for a dedicated management workstation or server. In addition to using this graphical interface, administrators can manage arrays using a scriptable command-line interface over Secure Shell (SSH) and Telnet. Standard features include built-in monitoring and notifications through e-mail, syslog support, and comprehensive Simple Network Management Protocol (SNMP) monitoring and traps.

- **Enclosure Monitoring System (EMS)**: EMS provides the real-time status of EqualLogic array components such as power supplies, controllers, fan trays, disk drives, and network interface ports. It allows administrators to quickly recognize, report, and address component faults and failures without downtime, helping maintain system availability.

- **SAN HeadQuarters (SAN HQ)**: Administrators can use SAN HQ to monitor EqualLogic arrays, pools, and groups from a single location. This centralized tool supports performance, alarm, and health monitoring as well as historical reporting to assist with operational planning, trend analysis, and troubleshooting. Flexible viewing options range from high-level group summaries to sophisticated analyses, including detailed statistics on performance, latency, capacity, volumes, and network activity. Predefined and customized views enable administrators to select their preferred method of accessing information.

Flexible views for storage monitoring

Different Dell MPs categorize Dell hardware into Dell-specific groups, which could include Dell EqualLogic PS Series storage arrays, Dell PowerVault MD Series storage arrays, Microsoft Windows–based Dell servers and clients, DRACs, CMCs, and Dell printers. Status monitoring for components, including a Controllers group for controllers, a Physical Disks group for hard disks, a Network Interfaces group for Ethernet interfaces, a Power Supply group for power supplies, and a Sensors group for temperatures and fans. This feature enables administrators to monitor an assortment of EqualLogic array components as individual field replaceable units (FRUs). In addition, the diagram view shows a Volumes group that includes the volume information associated with the arrays, enabling administrators to narrow down specific impending hardware failures and take appropriate action. Components in the diagram view are represented hierarchically for specific EqualLogic groups under the common Dell Hardware group, which includes the global health status of all Dell hardware presented by the base Dell MP. By default, the MP’s component-level discovery cycle is set to one day and the health monitoring cycle is set to approximately one hour; administrators can customize these periods using configuration overrides.

The EqualLogic PS Group Manager tool is a natural extension of the EqualLogic MP, in that it enables storage administrators to easily provision storage, schedule replication, and carry out comprehensive array management, including critical hardware components of the EqualLogic arrays. A key feature within Group Manager is the Enclosure Monitoring System (EMS), which tracks the health of redundant components such as power supplies, controllers, fan trays, disk drives, and network interface ports. Leveraging SNMP-based hardware alerts, EMS through Group Manager can notify administrators that a component has reached a “warning” or “critical” level, thus enabling a proactive approach to managing component failures. (For more information on EMS and other EqualLogic management tools, see the “Simplifying storage monitoring and management” sidebar in this article.)
Dell systems includes Dell-specific alerts and pre-failure alerts. Administrators can also launch specific Dell instrumentation consoles from the Operations Manager console to perform granular problem-solving analysis and enable effective systems management.

The Dell EqualLogic MP presents the following views in Operations Manager:

- **Alert views**: Alert views present specific alerts generated by Dell hardware. In the case of the EqualLogic MP, alerts are displayed for SNMP hardware events received from the monitored arrays, along with cause and resolution information to assist with troubleshooting (see Figures 2 and 3). Administrators can also add custom fields for group- and member-related information to help them track down alerts that have come from a specific array.

- **Diagram views**: Diagram views provide a holistic, graphical representation of hardware devices and logical device groups (see Figure 4). Administrators can further drill down the hierarchy to monitor arrays and other hardware at a granular level. This view includes realistic, component-specific icons for various FRU components in the EqualLogic arrays. In a data center environment where administrators are using both the EqualLogic MP and the MD Series Storage Array MP, this view can also visually classify EqualLogic and PowerVault MD Series storage arrays using distinctive icons to help administrators easily identify these arrays.

- **State views**: State views display health status based on the event and status poll information reported by the hardware (see Figure 5). The EqualLogic MP provides a list of severity-level indicators along with detailed inventory information to help administrators monitor and manage their arrays. By default, the Operations Manager alert mapping is “OK,” “warning,” and “critical”; the various states of the hardware alerts from the EqualLogic array, like “unknown” and “warning,” are modeled as “warning” because of the Operations Manager state representation.

- **Detail views**: Within the alert, diagram, and state views, administrators can select an individual EqualLogic group to view specific information

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**Figure 2.** Alert view for Dell EqualLogic arrays in Microsoft System Center Operations Manager 2007 R2

**Figure 3.** SNMP-based Dell EqualLogic hardware alerts and severity definitions
on that group and its members. The component attributes in these detail views have been selected to provide information that would be useful to administrators from a hardware management perspective.

To provide comprehensive details on monitored arrays and enable administrators to troubleshoot their arrays, the EqualLogic MP also includes a Launch EqualLogic Console task within Operations Manager that administrators can use to launch the Web browser–based EqualLogic PS Group Manager console.

**Unified monitoring and management infrastructure**

Microsoft System Center is designed to support a comprehensive hardware monitoring and management infrastructure. As part of the Dell OpenManage Integration Suite for Microsoft System Center, the Dell EqualLogic Storage MP Suite enables administrators to incorporate their EqualLogic PS Series iSCSI SAN arrays into a SCOM or SCE management server console alongside other Dell hardware. Taking advantage of this unified approach can help IT departments respond quickly to hardware alerts while simplifying management of the environment as a whole.

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Learn more

- **Dell and Microsoft System Center**: dell.com/systemcenter
- **Dell OpenManage**: dell.com/openmanage
- **Dell EqualLogic PS Series**: dell.com/pseries
dell.com/equallogic
- **Microsoft System Center**: microsoft.com/systemcenter

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Figure 4. Diagram view of Dell EqualLogic arrays and other hardware in Microsoft System Center Operations Manager 2007 R2

Figure 5. State view of Dell EqualLogic arrays in Microsoft System Center Operations Manager 2007 R2