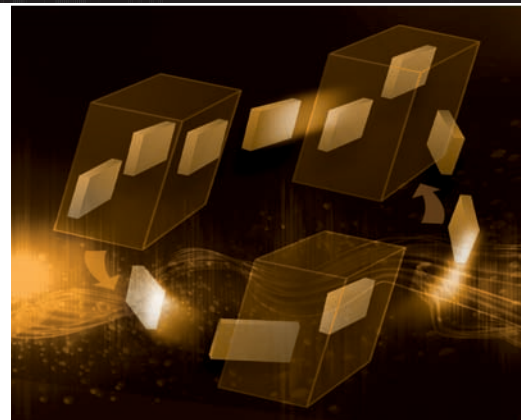


ADVANCING INTEGRATION OF MICROSOFT HYPER-V AND DELL EQUALLOGIC VIRTUALIZED SANs



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An enterprise-class storage infrastructure is essential for organizations transitioning to a virtualized data center. Dell™ EqualLogic™ PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays enable advanced integration with the robust server virtualization offered by the Microsoft® Windows Server® 2008 Hyper-V™ virtualization platform—offering the storage foundation for a comprehensive virtualization solution.

Virtualization has become an essential data center technology, allowing IT administrators to consolidate server infrastructure and reduce costs while enhancing service levels. Today, many organizations are advancing toward the next step, which is to couple storage consolidation with server virtualization in a highly available, scalable, and manageable environment. Building the foundation for these next-generation data center infrastructures requires well-integrated server and storage virtualization platforms.

With Microsoft Windows Server 2008 Hyper-V, server virtualization has the potential to become increasingly widespread, reaching a wide range of organizations. Hyper-V is a simplified virtualization platform integrated directly into Dell-supported Microsoft Windows Server 2008 x64 Edition operating systems. Dell supports Hyper-V on systems designed to support virtualization workloads, including Dell PowerEdge™ server models M600, M605, M805, M905, R805, R900, and R905, as well as a broad range of previous-generation servers.

The widespread use of the Microsoft Windows® OS allows many organizations to consider implementing a next-generation virtualized data center, heightening the need for a cost-effective platform to simplify storage area network (SAN) virtualization. Dell EqualLogic PS Series Internet SCSI (iSCSI) SAN

arrays can provide that platform, and integration enables EqualLogic arrays to work together with Hyper-V to best advantage.

CREATING A VIRTUALIZED SERVER AND STORAGE INFRASTRUCTURE

Bringing server virtualization and virtualized storage infrastructures together can be beneficial in many ways. It can help reduce costs and increase flexibility. IT organizations can consolidate resources onto a reduced number of physical systems, increase hardware utilization, dynamically allocate resources, and quickly deploy additional capacity.

To help ensure success in the next-generation data center, however, both the server virtualization hypervisor and the storage platform must support mission-critical, enterprise-class capabilities. Important business assets residing on virtual machines (VMs) must be protected against hardware failures and natural disasters. High availability is required on both the server and storage sides of the infrastructure to help avoid application failures and diminished productivity. Reliability is essential to help keep total cost of ownership low.

Other enterprise-class requirements include scalability and performance to help ensure that storage can continue to meet demand as the server infrastructure grows. Organizations need automated management

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and reporting capabilities to help reduce the burden on IT staff. And finally, a next-generation server and storage virtualization solution for Microsoft Windows Server environments must work together with key enterprise applications such as Microsoft Exchange and the Microsoft SQL Server® database platform.

INTEGRATING DELL EQUALLOGIC SANs WITH MICROSOFT HYPER-V

Dell EqualLogic PS Series iSCSI SAN arrays provide the elements required for an enterprise-class virtualized server and storage environment based on Microsoft Windows Server 2008 Hyper-V (see Figure 1). EqualLogic PS Series SANs are designed for high availability. The arrays function as peers, working together to share resources, evenly distribute workloads, and enable comprehensive data protection for the VMs in a Hyper-V environment. Power supplies, controllers, enclosures, and disk drives are fully redundant and hot swappable. If a failure does occur, disk failover helps keep operations up and running.

EqualLogic PS Series arrays are designed to deliver enterprise-class reliability in Windows Server 2008 environments. For example, the EqualLogic PS Series

product family has been certified for Windows Server 2008 x64 Editions by Microsoft, indicating that it meets Microsoft standards for compatibility and best practices. In addition, the EqualLogic PS Series has received the Microsoft Simple SAN designation, indicating that it has met specific ease-of-use, ease-of-installation, and ease-of-management criteria.

Windows Server 2008 Hyper-V enables organizations to dynamically scale VMs on physical servers, and EqualLogic PS Series arrays help extend that same dynamic scalability to storage. Administrators can expand SAN resources online and even move running workloads, all without disrupting services. Newly added arrays adopt the configuration from currently deployed arrays, and the new arrays are included automatically in the available storage pool.

Enterprise-level management capabilities are provided in the EqualLogic PS Series arrays with no added licensing fees, including role-based management, historical performance trending, and reporting. Storage pooling and tiering are automated, helping save administrative time and costs. Cloning and replication capabilities are also included in the firmware of EqualLogic PS

Series arrays, offering advanced data protection for Hyper-V environments.

Hyper-V integrates with familiar, Windows-based server management tools. For organizations that require a comprehensive server management solution, the Microsoft System Center family includes advanced VM management and monitoring. Using Microsoft System Center Virtual Machine Manager with other Microsoft System Center applications and the Dell OpenManage™ suite, administrators can manage the overall environment—virtual and physical—using the same tool.

In addition, Dell and Microsoft have worked together on advanced integration features. One feature is an innovative multipath I/O device-specific module with connection awareness to EqualLogic PS Series SAN volumes, which is designed to automatically optimize server-to-storage connections. Another feature is the Dell EqualLogic Auto-Snapshot Manager/ Microsoft Edition tool, which helps provide data protection and rapid recovery for Microsoft Exchange and SQL Server environments. This advanced integration helps organizations increase efficiency and maximize resources (see the “Top 4 reasons to integrate server and storage virtualization platforms” sidebar in this article).

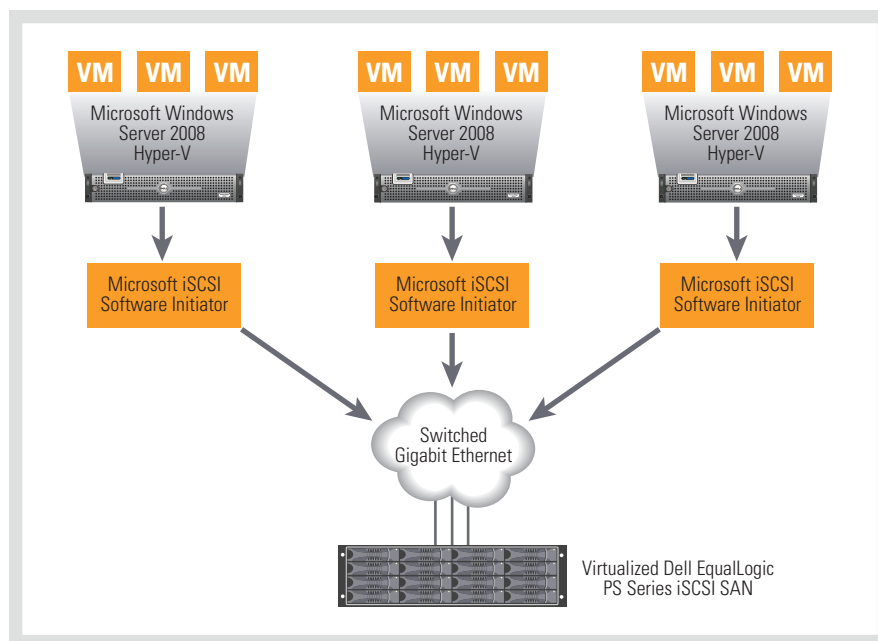


Figure 1. Virtualized Dell EqualLogic PS Series iSCSI SAN in a Microsoft Hyper-V environment

EXPLORING MULTIPATH I/O AND AUTO-SNAPSHOT MANAGER

The Dell EqualLogic Multipath I/O device-specific module is designed to improve path performance, failover, and network load-balancing capabilities of multipath I/O in Microsoft Windows Server environments. EqualLogic PS Series iSCSI SAN arrays are designed to apply storage resources where and when they are needed, automatically load balancing to help optimize performance.

In Microsoft Hyper-V environments, performance can be further optimized by advanced I/O multipathing integrated into standard Microsoft iSCSI drivers developed by Dell engineers to optimally configure the EqualLogic PS Series SAN architecture for peer storage. The module enables path

TOP 4 REASONS TO INTEGRATE SERVER AND STORAGE VIRTUALIZATION PLATFORMS

When migrating to a virtualized data center, an enterprise-class IT infrastructure is essential. By leveraging the advanced integration features of Dell EqualLogic PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays with Microsoft Windows Server 2008 Hyper-V, enterprises can achieve the following benefits:

1. **Cost savings through consolidation:** Consolidating storage capacity, increasing hardware utilization, and optimizing the server and storage infrastructure help reduce IT costs.
2. **Ease of deployment and management:** EqualLogic PS Series arrays are designed to be operational in a matter of minutes, providing storage for VMs managed by Windows Server 2008 Hyper-V.
3. **High-availability infrastructure:** EqualLogic PS Series arrays deliver fully redundant and hot-swappable components, including dual controllers, fan trays, and power supplies and disk drives with hot-spare capability.
4. **Reliability and resiliency:** EqualLogic PS Series arrays include a comprehensive set of enterprise software features at no additional cost that provides network load balancing and path failover.

activity levels to be monitored and I/O loads shifted automatically from heavily trafficked to less congested paths for high performance in Hyper-V environments.

The integrated EqualLogic and Hyper-V solution also helps deliver robust data protection capabilities. Many organizations are looking to deploy mission-critical transactional database applications such as Microsoft Exchange and SQL Server in VMs. EqualLogic PS Series arrays enable excellent performance with these applications, including fast SAN storage solutions for Exchange environments¹ and tested performance for intense SQL Server workloads.²

However, protecting transactional database applications in a virtualized environment can present challenges. Because these applications are characterized by high I/O and constantly changing information, making consistent volume copies for backup and disaster recovery purposes can be difficult. EqualLogic PS Series arrays automate these activities using


Auto-Snapshot Manager/Microsoft Edition, which is included as part of the EqualLogic PS Series Host Integration Tools.

Administrators can use direct connect pass-through volumes in the VMs to help create consistent hardware-based snapshots of application data and quickly recover to prior points in time. Auto-Snapshot Manager/Microsoft Edition also integrates with standard backup software using the Microsoft Volume Shadow Copy Service (VSS) framework, enabling integration into standard backup processes. Currently, Auto-Snapshot Manager/Microsoft Edition can be loaded into a Hyper-V guest OS. Additional integration is planned to help improve the seamlessness of the process.

LAYING THE FOUNDATION FOR NEXT-GENERATION VIRTUALIZED DATA CENTERS

Microsoft Windows Server 2008 Hyper-V is designed to provide simplified, cost-effective server virtualization that can be

easily plugged into an existing infrastructure. Dell EqualLogic PS Series iSCSI SAN arrays complement Hyper-V, helping provide the storage capabilities needed to complete the next-generation virtualized data center.

EqualLogic PS Series arrays are designed to support key features and capabilities required for both server and storage components of the next-generation data center—including high availability, enterprise-caliber reliability and management, ease of deployment, and advanced integration with Hyper-V. This approach helps simplify IT by providing a virtualization strategy geared to mobilize and manage the resources of the entire infrastructure, both virtual and physical, to help meet fast-moving enterprise demands. 

Stanley L. Stevens is a virtualization solutions marketing manager at Dell and a 16-year veteran of the IT industry. He has previously worked with global companies including Cabletron Systems, Marconi Communications, and 3Com, and has a broad technical background in networking infrastructure.

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¹Based on most I/Os per second (IOPS) per disk for a transaction workload and higher absolute performance scaling than non-mainframe systems from tests introduced in the Microsoft Exchange Solution Reviewed Program (ESRP) – Storage Program v2.0 test framework. For detailed results, see “EqualLogic PS Series 60,000-User Storage Solution for Microsoft Exchange Server 2007,” by EqualLogic, September 2007, www.equallogic.com/uploadedfiles/resources/product_documentation/ps3900xv-60000-users.pdf; and “Microsoft Exchange Solution Reviewed Program (ESRP) – Storage v2.1,” by Microsoft Corporation, technet.microsoft.com/en-us/exchange/bb412164.aspx.

²“Deployments and Tests in an iSCSI SAN,” by Microsoft Corporation, June 2007, technet.microsoft.com/en-us/library/bb649502.aspx.