



# The cloud awaits: Storage for the growing virtualized infrastructure

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The tight integration of Dell™ EqualLogic™ PS Series iSCSI SANs and VMware® vSphere™ virtualization software helps organizations enhance IT efficiency, expand virtualization throughout the IT infrastructure, and set the stage for cloud computing.



## SNW Europe: Trends in the data center

Highlighting a keynote presentation at the SNW Europe conference, this video provides an overview of strategic storage virtualization initiatives Dell is advancing to enhance storage efficiency in data centers, including unification of storage, data deduplication, virtual storage architectures, and more.

[bit.ly/htT1M6](http://bit.ly/htT1M6)

Growth is a good situation for organizations to experience, but growth is not easy and presents challenges. Today, virtual environments in many industries are growing, and organizations are increasingly deploying VMware virtualization to help consolidate IT, improve business flexibility, increase application availability, and reduce costs. After virtualizing test and development environments, and other applications, many organizations are now eager to extend the benefits of virtualization throughout the data center, creating an end-to-end virtualized IT environment and setting the stage for cloud computing.

To succeed, organizations must adopt a storage platform that can be tightly integrated with virtualized servers. That storage platform must be designed to deliver the performance, reliability, and scalability to support the virtualization of mission-critical applications, the implementation of desktop virtualization, and the development of cloud computing environments with self-service capabilities. At the same time, that storage platform must also help control operational costs by streamlining management and avoiding unnecessary administrative tasks. Dell EqualLogic PS Series Internet SCSI (iSCSI) storage area network (SAN) arrays help meet these objectives, providing high-performance storage infrastructures that can be tightly integrated with the growing VMware virtualized server and desktop environments.

## Achieving tight integration through close collaboration

Dell EqualLogic PS Series SAN arrays and VMware vSphere virtualization software are designed to respond to similar needs in IT environments that have become large and costly to run, and complex to manage. VMware software enables organizations to create a consolidated, flexible pool of shared server resources within a physical server infrastructure. Similarly, EqualLogic PS Series storage allows organizations to pool storage resources, creating a flexible, scalable storage environment while consolidating storage hardware. By using Ethernet as the underlying networking protocol, EqualLogic PS Series arrays also enable IT groups to avoid the cost and complexity of specialized storage networks and allow them to capitalize on their existing investment in and knowledge of server networking infrastructure.

Dell and VMware are working closely to facilitate expansion of data center virtualization by solving potential obstacles. For example, Dell and VMware collaborated to produce VMware vCenter™ Site Recovery Manager (SRM) Storage Replication Adapter (SRA) for EqualLogic arrays. SRM helps simplify disaster recovery management, automation, and testing for virtualized data centers.

SRM combined with the native EqualLogic PS Series auto-replication feature (no additional

license is required) enables administrators to easily replicate data, configure virtual machine (VM) protection groups, and test recovery plans. SRM coordinates with the SAN through the SRA at the time of testing or failover. This automation and testing helps facilitate swift and efficient restoration of application services using replicated data copies, and helps organizations overcome concerns about virtualizing mission-critical applications and consolidating applications on EqualLogic PS Series storage.

Auto-Snapshot Manager/Microsoft Edition (ASM/ME) helps IT groups address the specific service-level requirements of individual applications. Organizations extending virtualization in their IT environments and consolidating applications onto fewer physical hosts need ways to maintain distinct service-level agreements (SLAs) for each application. ASM/ME provides application-aware snapshot protection for Microsoft® Exchange Server, Microsoft SQL Server®, and NT File System (NTFS) data. Integration with Microsoft Cluster Service (MSCS) and Volume Shadow Copy Service (VSS) helps produce clean, consistent snapshots that can be restored successfully.

Used in conjunction with ASM/ME to offer a scalable, multilayer approach to data protection, Auto-Snapshot Manager/VMware Edition (ASM/VE) provides data protection at the VM level. ASM/VE uses VMware vStorage application programming interfaces (APIs) to create fast, online, and hypervisor-aware snapshots, clones, and remote replicas of VMs and Virtual Machine File System (VMFS) data stores. Using a simple and intuitive interface, administrators can set automated schedules for individual VMs, groups, or even every VM in the data center, helping save significant administrative time compared with manually creating and managing VM snapshots.

ASM/VE provides more granular control over data restoration than other approaches, allowing administrators to restore a single VM rather than requiring restoration of all VMs residing in a single data store. Because ASM/VE creates space-efficient, SAN-based snapshots, IT administrators can back up large volumes of VM data frequently and still conserve capacity.

In addition, the EqualLogic Multipath Extension Module (MEM) enhances native VMware multipath I/O functionality in an EqualLogic storage environment by automating configuration and management. This ESX plug-in helps improve I/O bandwidth and latency by

enabling direct connectivity between the ESX host and each array in which data resides.

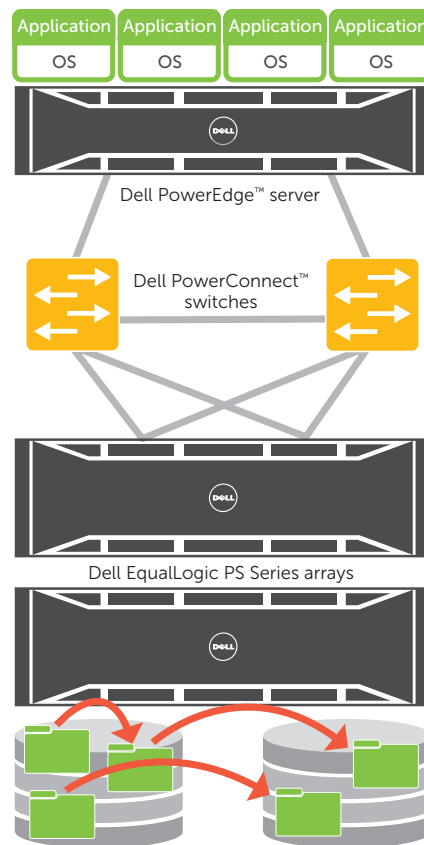
### Extending virtualization through the enterprise

Dell and VMware collaborated in the development of the VMware vStorage APIs for Array Integration (VAAI) to help improve the scalability of a virtualized environment while enhancing business agility. These APIs provide native integration between the hypervisor hosts and the storage arrays, enabling the VMware vSphere software to work directly with the Dell EqualLogic PS Series arrays.

These APIs enable administrators to offload certain storage workloads from the host servers to the SANs. These offloading operations can dramatically accelerate VM deployment tasks by avoiding the requirement to read the data all the way up the storage stack and write it back down the storage stack. Instead, this operation occurs within the storage array (see Figure 1). Administrators can deploy VMs even faster than before, enhancing the agility of IT and the business. Helping to reduce processor, memory, and network burdens also makes the environment increasingly efficient—there are additional server and network resources available for running an increased number of VMs.

These APIs also enable administrators to scale the virtual environments to higher densities than before through the use of increasingly granular protection of VMFS metadata provided by Hardware Assisted Locking. This command enables administrators to increase the number of VMs in each data store that can now utilize increased volume sizes.

The introduction of the purpose-built Dell EqualLogic PS6000XVS series arrays can facilitate the move to desktop virtualization. Combining solid-state drives (SSDs) and



**Figure 1.** Workload offloading from host servers to storage to help minimize I/O storm through servers



Serial Attached SCSI (SAS) drives in the same enclosure, EqualLogic PS6000XVS series hybrid arrays respond to workload spikes associated with desktop virtualization environments while helping control costs. Firmware in these arrays performs automated storage tiering that moves data to the optimal drive type based on access patterns. Virtual desktop images with high I/O workloads automatically migrate to low-latency, high-performance SSDs, while home directories reside on cost-effective high-capacity SAS drives to help control overall costs.

By combining the auto-tiering capability of EqualLogic PS6000XVS series arrays and the linked-clone capability of VMware View™ Composer, administrators can achieve enhanced storage efficiency without compromising on the performance demands required to scale virtual desktops. Using View Composer, administrators can create a single virtual desktop image and then provision multiple desktops using linked clones. Provisioning multiple desktops in this manner allows desktops to share a common image and helps reduce the storage footprint of the provisioned desktops. By placing the shared image on SSDs within the EqualLogic PS6000XVS series array, IT groups can avoid the performance hits of multiple concurrent users—for example, boot storms that occur when numerous end users boot systems at the same time.<sup>1</sup> In addition, SSDs allow for increased linked clones per shared desktop image, helping reduce the storage footprint and allowing enhanced cost-effective scaling of the infrastructure.

Introduction of Dell EqualLogic Host Integration Tools for VMware Edition

(HIT/VE) helps simplify deployment and management of VMFS data stores and virtual desktops in environments that use EqualLogic PS Series storage.<sup>2</sup> HIT/VE directly integrates into the VMware vCenter console, helping to automate storage provisioning, simplify data protection, and manage virtual desktop storage tasks. Along with ASM/VE, HIT/VE includes two additional tools: EqualLogic Datastore Manager and EqualLogic Virtual Desktop Deployment Tool.

EqualLogic Datastore Manager helps automate provisioning of file systems using the VMware VMFS format through an easy-to-use, wizard-based interface. The EqualLogic Virtual Desktop Deployment Tool helps accelerate virtual desktop provisioning and reduce capacity requirements using thin clone technology available with EqualLogic firmware version 5.0. Using the tool, administrators can rapidly deploy hundreds or thousands of virtual desktops, leveraging space-efficient, SAN-based thin clones of the base image and helping dramatically reduce the storage footprint of the desktop images.

### Advancing end-to-end virtualized data centers

Today, Dell and VMware are focusing collaborative efforts on advanced approaches that help organizations build end-to-end virtualized environments. These approaches provide ways to help increase IT flexibility, protect existing infrastructure investments, and offer emerging, self-service capabilities. For example, the open Dell Virtual Integrated System (VIS) architecture is designed to help reduce the cost and challenges of

deploying and operating a virtualized data center.<sup>3</sup> Tools such as Dell VIS Self-Service Creator, Dell VIS Director, and Dell Advanced Infrastructure Manager (AIM) offer automated self-service capabilities, help provide an end-to-end management hub for the entire infrastructure, and help accelerate resource provisioning.

### Building virtualized infrastructures on a robust storage foundation

Dell EqualLogic PS Series SANs offer organizations a reliable, high-performance, scalable, cost-effective, and easy-to-manage storage platform for a virtualized data center. Administrators can tap into a broad array of capabilities developed collaboratively by Dell and VMware to protect data, streamline management, and control costs. Those capabilities enable organizations to take the next steps in virtualization, expanding virtual environments to include mission-critical applications, deploying desktop virtualization infrastructures, and building next-generation cloud environments that help maximize the value of virtualization for the enterprise. **PS**



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### Learn more



**Dell storage:**  
[www.dellstorage.com](http://www.dellstorage.com)

<sup>1</sup> For more information on automated movement of workloads to meet changing storage demands, see "Optimizing the storage infrastructure for desktop virtualization," by Chhandomay Mandal, Ananda Sankaran, Chris Almond, and Vikram Belapurkar in *Dell Power Solutions*, 2011 Issue 1, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps1q11-20110247-mandal.pdf.aspx.

<sup>2</sup> For more information about the EqualLogic Host Integration Tools for VMware, see "Tightening server and storage integration in virtualized data centers," by William Urban, in *Dell Power Solutions*, 2011 Issue 1, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps1q11-20110241-eql.pdf.aspx.

<sup>3</sup> For more information on VIS, see "Transforming IT service delivery with on-demand workload provisioning," by Ganesh Padmanabhan, in *Dell Power Solutions*, 2010 Issue 4, content.dell.com/us/en/enterprise/d/business-solutions-power-en/documents-ps4q10-20110187-padmanabhan.pdf.aspx.