

BETTER TOGETHER: OPTIMIZING VMWARE VSPHERE 6.0 DEPLOYMENTS WITH DELL EQUALLOGIC PS SERIES INTEGRATION TOOLS

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Although server virtualization provides enormous benefits for the modern data center, it can also be daunting from a storage perspective. Provisioning storage to match the exact virtual machine (VM) requirements has always been challenging, often ending in a series of compromises. Each VM will have its own unique performance and storage requirements; this can create over-provisioning and other inefficient uses of storage. A virtualization administrator has to try and match a VM's storage requirements as close as possible to storage that has been pre-provisioned. Provisioning in this way is time consuming and does not possess the VM-level granularity required to meet the specific needs of the applications running in a VM. To exacerbate the problem, often, over the lifetime of a VM, the storage requirements for a VM will change, which requires ongoing diligence and review of the storage platform and manual intervention to meet the new requirements.

VMware vSphere 6.0 introduced the biggest change to the ESXi storage stack since the company's inception with the inclusion of vSphere Virtual Volumes (VVOL). VVOL helps to solve the challenge of how to match a VM's storage requirements with external storage capabilities on a per VM basis. We found that VVOL when combined with Dell EqualLogic PS Series arrays become a powerful force in the datacenter.

In this brief, we call out some storage-related highlights of vSphere 6.0 such as Virtual Volumes, and then take a close look at how they, as well as traditional datastore stored VMs have been enhanced and packaged by Dell Storage into the EqualLogic PS Series storage solution. We will show how Dell and VMware have combined forces to deliver an enterprise-class virtual server and storage environment that is highly optimized and directly addresses the performance, availability, data protection and complexity challenges common in today's business-critical virtualized data centers.

STORAGE OPTIMIZATION & DATA PROTECTION FEATURES IN VSPHERE 6.0

To start, ask yourself a few questions about your current VM environment: Are you confident that you have placed each VM on the optimal storage resource? Is your hypervisor bogged down performing tasks that are better suited to being performed on the array? Are you maintaining too many VM and data snapshots? Do you need multiple management tools to configure storage for VMs? Are you having difficulty provisioning storage to match the virtual machine requirements? Are some aspects of virtualization cumbersome or lengthy like setting up new VMs or restoring snapshots? Is reporting inconsistent from storage administrators vs. vSphere specialists?

If you hesitated to answer with a strong “yes” or “no” to each, you can likely benefit from the storage optimization and VM-aware features found within Dell’s integration with vSphere 6.0. vSphere 6.0 not only provides vSphere Virtual Volumes (VVol) and Storage Policy Based Management (SPBM) support, but also enables end-to-end management of the array, and takes many of Dell’s existing storage features another step forward.

EQUALLOGIC TOOLS AND INTEGRATIONS: BUILT FOR VSPHERE

In order to help customers take maximum advantage of vSphere 6.0, Dell has worked closely with VMware. Dell EqualLogic PS Series has a long and successful partnership with VMware and has consistently been one of the first storage solution providers to bring new VMware integration features to market, and the latest release of tools and integrations keeps up this tradition of cooperation.

vSphere Virtual Volumes

VVol is a new storage management and integration framework designed to deliver a more efficient operational model for attached storage. It encapsulates the files that make up a VM and natively stores them as objects on an array. VVol does not require the pre-creation of LUNs and volumes with the desired capabilities for a VM’s storage. It does this with the use of SPBM where a policy for the storage of a VM is selected, and then VVol displays the storage array that can meet those requirements. Then the array implements the policy to store the VM. With VVol and SPBM, a VM’s storage, along with its desired capabilities, is provisioned when the VM is instantiated. This transforms the external storage from a LUN/Volume-centric model to a truly VM-centric storage solution, enabling data services and data placement at the virtual machine level. Hence, VVol improves the offloading of data management services to where it belongs – on the storage array.

Although VVol is a new storage construct, they have already been integrated into Dell’s PS Series arrays and their corresponding tools.* The Dell EqualLogic Group Manager (Figure 1) allows for the management and viewing of VVol-based VMs. While Dell EqualLogic SAN Headquarters (SAN HQ) is a monitoring and performance tool that allows the viewing of metrics on fine-grained per virtual disk basis. Storage administrators that are already familiar with these interfaces will find the new VVol integration a natural extension of the tool and those new to the tools will find them intuitive and easy to navigate.

Dell’s implementation of VVol simplifies the operation and the delivery of services levels as well as improves resource utilization of storage systems. The advantages include:

- VM deployments that previously took minutes, are now completed in seconds
- Array-side storage metrics can now be mapped to individual VMs and individual virtual disks, enabling both vSphere and Storage administrators to use their preferred tool for performance diagnostics
- Storage administrators gain visibility to per VM and per virtual disk storage consumption

*PS Series support for VVol and vSphere 6.0 will be available summer 2015

The screenshot displays the Dell EqualLogic Group Manager interface. The top navigation bar includes the Dell logo and the text 'EqualLogic Group Manager'. The left sidebar contains a navigation menu with options: VMware, Configuration, Storage Containers (SC01, SC02), Virtual Machines, Group, Volumes, Replication, Monitoring, VMware (selected), and NAS. The main content area is titled 'Virtual Machines' and shows a list of 8 virtual machines. Below this, it displays 'VVols for VM "Database back end" (6 total)' in a table format.

VM	Guest OS	Allocated space
Database back end	Microsoft Windows Server 2012 (64-bit)	25.39 GB
Fileshare	Microsoft Windows Server 2012 (64-bit)	12.86 GB
w2012-a	Microsoft Windows Server 2012 (64-bit)	16.99 GB
w2012-b	Microsoft Windows Server 2012 (64-bit)	12.86 GB
w2012-c	Microsoft Windows Server 2012 (64-bit)	12.86 GB
w2012-template	Microsoft Windows Server 2012 (64-bit)	8.7 GB
w2k3-template	Microsoft Windows Server 2003 (64-bit)	2.3 GB
Web front end	Microsoft Windows Server 2012 (64-bit)	12.86 GB

VVol	Type	Storage container	Reported size	Status	Last bound time	Snapshot
Database back end	Config	SC02	4 GB	bound	3/5/2015 11:2...	0
Database back end.vmdk	Data	SC02	40 GB	bound	3/5/2015 11:2...	3
Database back end-4487e3fc.vswp	Swap	SC02	4 GB	bound	3/5/2015 11:5...	0
Database back end-Snapshot3.vmem	Memory	SC02	4 GB	unbound	3/5/2015 12:2...	0
Database back end-Snapshot4.vmem	Memory	SC02	4 GB	unbound	3/5/2015 12:2...	0
Database back end-Snapshot5.vmem	Memory	SC02	4 GB	unbound	3/5/2015 12:4...	0

At the bottom of the interface, there are status indicators for 'Alarms' (0) and 'Operations' (0).

Figure 1

Dell's VVol integration (Figure 2) also adds these benefits with its granular SPBM:

- Provision and assign VMs storage based on SLAs, performance requirements and encryption needs
- Assign capabilities on a per-VM or even per-virtual disk basis
- Change capabilities for a VM as required without disrupting ongoing services

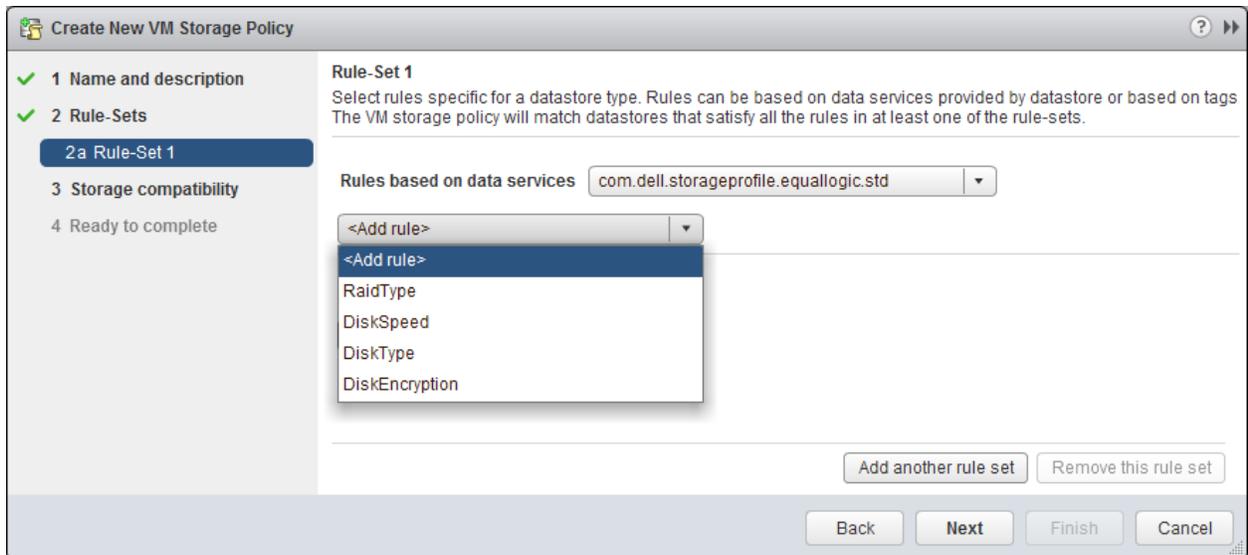


Figure 2

Snapshots in vSphere have always had limitations such as the number of snapshots that a VM can have, the length of time you should store a snapshot, the time to recover a snapshot, etc. VVol and vSphere 6.0 have enabled arrays to deal with snapshots in a more robust manner.

Dell's implementation of VVol adds these benefits to snapshot creation and management:

- Snapshots can be stored indefinitely
- Snapshots can be created and restored instantaneously
- Snapshots are stored efficiently using point-based page mapping

Point-based page mapping is not only extremely quick (almost instantaneous), but is also highly efficient. It is quick not only when it creates snapshots, but also when snapshots are deleted. Previously, using vSphere-based snapshots could take hours to delete snapshots; now array-based snapshot deletes are completed near instantly.

EQUALLOGIC HOST INTEGRATION TOOLS: PACKAGED FOR SIMPLICITY

EqualLogic Host Integration Tools for VMware (HIT/VMware) tightly integrates the EqualLogic PS Series arrays and FS Series FluidFS appliances with VMware vSphere, enabling consistent data protection, performance optimization and streamlined management and operation.

HIT/VMware consists of the following components:

- Dell Virtual Storage Manager for VMware (VSM); VSM is a vSphere plugin and allows for the management of an EqualLogic array and includes the EqualLogic vSphere API for Storage Awareness (VASA 2.0) Provider
- EqualLogic Storage Replication Adapter for VMware Site Recovery Manager (SRA SRM)
- VMware vRealize Operations (formerly vCenter Operations Manager) Adapter
- EqualLogic Multipath I/O (MPIO)

VSM 4.5 is a component of HIT/VMware and enables efficiency, performance and data protection for Dell EqualLogic PS Series storage. VSM is integrated into VMware's vSphere Web Client with convenient access to its functionality from context-sensitive menus.

OPTIMIZING YOUR VM ENVIRONMENT WITH SIMPLE MANAGEMENT AND DATA PROTECTION

VVol greatly simplifies the provisioning of storage for VMs and they are clearly the future for VM storage; yet in this first incarnation, there are some limitations, and traditional datastore based storage for VMs will be pervasive in the data center for the next few years. Fortunately, over the years, Dell has developed tools and technologies to assist in the use of traditional non-VVol based storage for VMs that are stored on their arrays.

Managing datastores has traditionally been a tedious process as IT managers have had to separately provision volumes on an array and then create and manage datastores within vSphere. VSM unifies these two steps into one UI by automating storage provisioning, thereby simplifying the datastore creation and management process. VSM allows the creation, management, and monitoring of datastores on Dell EqualLogic PS Series and FS Series arrays from within the VSM GUI which is accessed via the vCenter client.

VSM offers high-performance, space-efficient data protection for VMs and datastores within folders and clusters. It enables VM-based snapshot and restore operations in addition to traditional datastore-based snapshot, restore, failover and failback operations on Dell EqualLogic PS Series arrays. VSM enables users to configure replication from top to bottom all in a single interface. VSM offers an historical view of system and data protection scheduling with scheduling templates that may be used for both snapshot and replication operations. The resulting snapshots, replicas and clones are easily and rapidly created, managed and recovered. All of these features allow VSM to enhance the protection, storage utilization and performance of VMware-based virtual infrastructures.

INTEGRATION WITH VSPHERE

EQUALLOGIC SUPPORT FOR VAAI

The EqualLogic PS Series was one of the first storage systems to incorporate VAAI support in its firmware through the set of SCSI primitives. This integration allows the array to perform important storage tasks on behalf of vSphere and thereby improve performance and utilization for the entire infrastructure.

EQUALLOGIC VASA PROVIDER INTEGRATED WITH VMWARE

EqualLogic VASA Provider tightly integrates EqualLogic with vSphere, providing an end-to-end storage capability view of PS Series storage in the vSphere UI. vSphere 6.0 includes the second generation of VASA, 2.0, that allows the server and its attached storage to communicate using a bi-directional framework and provides storage allocation and management. Through its integration via VSM, Dell EqualLogic PS Series arrays can pass storage capabilities, alarms and events to VMware vSphere, which enables the viewing of additional details about the storage array including:

- Support for VMware Virtual Volumes
- End-to-end EqualLogic storage visibility to the VMware users
- Support for VMware Storage Policy Based Management
- PS Series storage array events and alarms for critical events related to space, capacity allocation and accessibility that are available from within vCenter UI
- Storage capability view for datastores — vSphere users can see the PS Series storage array RAID mix, snapshots, replication and the solid-state drive (SSD) mix for each datastore

EQUALLOGIC STORAGE REPLICATION ADAPTER FOR SITE RECOVERY MANAGER

EqualLogic PS Series integrates with VMware vCenter Site Recovery Manager (SRM) with a software-based Storage Replication Adapter (SRA). This uses vStorage APIs to offer centralized automated disaster recovery management, automation and testing for the entire virtualized data center. With SRA, VMware SRM utilizes the EqualLogic SAN-based replication feature, thereby making disaster recovery manageable, reliable and affordable. At this time, VVol does not support SRM, but this feature is indispensable for LUN-based VMs.

EQUALLOGIC MULTIPATHING EXTENSION MODULE FOR VMWARE

The EqualLogic Multipath I/O (MPIO) feature integrates with and utilizes the VMware vStorage APIs for Multipathing. Together, they provide multiple redundant network connections between vSphere and the underlying PS Series arrays. When all paths are operational, MPIO load balances across them for maximum performance. If a path fails, data availability is unhampered, albeit at a lower performance. When a path is restored, MPIO automatically returns to delivering load balanced performance. Under all circumstances, EqualLogic MPIO provides storage-aware, end-to-end management and visibility of data paths. This integration also helps increase storage scalability and lowers the burden on administrators by automating multipath configuration tasks.

EqualLogic Adapter for vRealize Operations Manager

The EqualLogic Adapter for vRealize Operations (formerly vCenter Operations) Manager integrates PS Series storage with the vRealize Operations Management Suite (Figure 3). This integration allows vRealize Operations to assimilate EqualLogic storage metrics in its operations management tasks.

Through this integration, VMware administrators can gain comprehensive insights on the capacity, performance and health of PS Series storage through alerts and metrics provided by the adapter. This allows administrators to incorporate PS Series storage into their overall IT operations and management practices, and helps simplify infrastructure complexity. It also enables administrators to perform long-term, data-driven capacity planning and efficient, root-cause analysis of problems on physical EqualLogic resources, all from within VMware’s virtual environment.

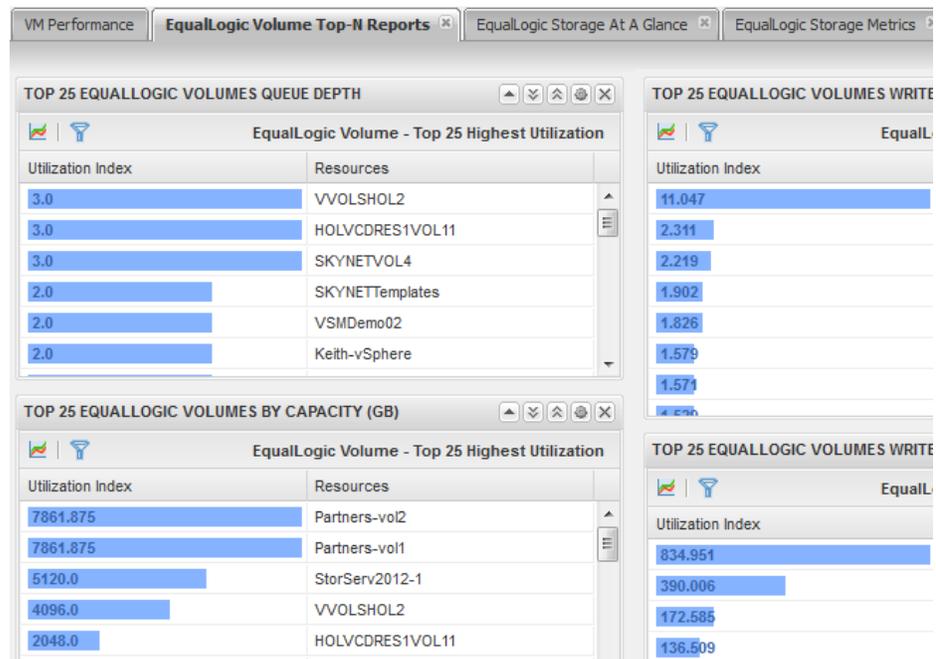


Figure 3

SAN Headquarters

EqualLogic SAN Headquarters (SAN HQ) is a full-featured monitoring and analysis tool for EqualLogic PS storage arrays. SAN HQ is included in EqualLogic’s all-inclusive licensing model and is not an expensive add-on like we have seen with some other arrays. This product helps strengthen an administrator’s ability to analyze and optimize storage performance and resource allocation and helps proactively manage and service the storage environment. From a single GUI (Figure 4) information on all of the monitored PS Series groups can be seen at a glance, including configuration and performance of pools, members, disks and volumes, Storage Containers, VVols VMs as well as alerts. If action is required, EqualLogic Group Manager can be launched directly from SAN HQ and storage systems can be adjusted to meet business needs. SAN HQ also provides proactive support capability with SupportAssist for EqualLogic, delivering a more automated support process to help improve productivity and accuracy while helping gain insight and control.

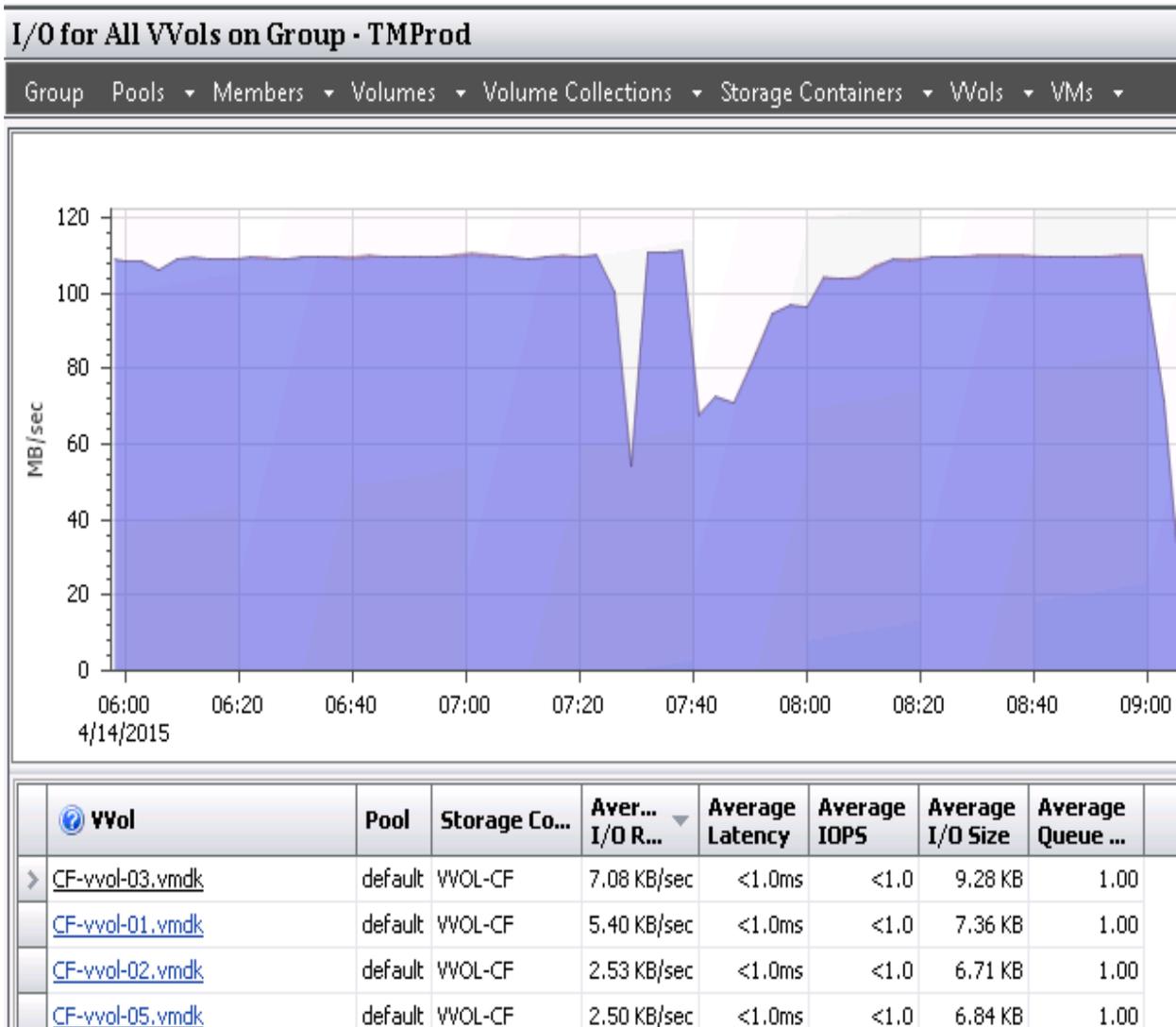


Figure 4

TANEJA GROUP OPINION

Dell EqualLogic PS Series was an early pioneer in integrating with VMware, and continues this legacy with the inclusion of the integration of vSphere 6.0 and its VM-centric storage features into its products. The comprehensive suite of tools offered by Dell EqualLogic are designed to integrate tightly with VMware vSphere and simplify storage management, streamline and optimize virtualization, improve performance by offloading functions to the storage array, when appropriate, and deliver an end-to-end data protection that is second to none in the market. These tools work with vSphere 6 to build a resilient, highly granular virtual infrastructure.

In our view, Dell EqualLogic PS Series continues to stand out as a leading choice in storage solutions for virtual environments. The EqualLogic PS Series' virtualized scale-out architecture by itself is a strong platform for a VMware virtual server infrastructure. Combined with the fact that Dell's EqualLogic PS Series customers can download all EqualLogic software and upgrades at no additional cost (with a valid support contract) and then add in Dell's comprehensive, well-integrated VMware-focused tools and integrations, the case for a PS Series platform becomes extremely strong.

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