

INTEGRATING DELL EQUALLOGIC™ SANS WITH CITRIX XENSERVER

REALIZING VIRTUALIZATION'S FULL POTENTIAL

Hypervisor-based virtualization offers enterprises opportunities for cost savings, increased security and greater operational flexibility, availability and efficiency. By creating an abstraction layer between operating systems and physical hardware, IT administrators can consolidate server capacity, parcel out computing resources as needed, and streamline system provisioning and deployment, all while improving service levels and network security. Virtualization also facilitates support for multiple operating systems, broadened choices among vendors and solutions, and employee empowerment across organizations, regardless of location.

But virtualization creates new challenges too. Consolidation of operations and assets multiplies the impact of data loss and system outage, and increases IT administrator workloads. To succeed, virtualization requires unprecedented levels of protection, automation and integration, all of which lie at the heart of the Dell EqualLogic SAN design philosophy.



EQUALLOGIC

WHY VIRTUALIZE STORAGE?

Until recently, virtualization platforms were engineered simply to consume raw disk space from the storage tier. To this end, virtualization software incorporated a rudimentary level of storage management functionality. As an unfortunate consequence of these earlier approaches, silos began to proliferate on the storage side of the network, even as virtualized servers, desktops and OS platforms helped overcome stovepipes in these domains. Because of their propensity for increasing administrative overhead, these storage silos prevent enterprises from realizing the full value of these virtualization technologies.

Moreover, for all their promise, virtualization technologies paradoxically create new challenges. The consolidation of operations and assets onto smaller numbers of servers multiplies the impact of data loss and system outage, especially when those servers are run at higher utilization rates. In addition, as the number of VMs multiplies, administrators (by now typically smaller in number, after server and site consolidation) must cope with many more IT assets than before. Consolidation through virtualization brings new complexity to the enterprise.

Thus, because of their bias toward consolidation and centralization, virtualized environments put a premium on the protection of network assets, including both physical and virtual resources. Network consolidation sites, where fewer machines run more numerous applications and store larger quantities of data, are the future epicenters of network disasters. As with classic networks, fire, malicious acts, human errors and other catastrophic agents can trigger such disasters. However, the risk of human error can be particularly acute in virtualized environments where fewer managers assume responsibility for maintaining and managing larger and more numerous assets.

DELL EQUALLOGIC: UNIQUELY SUITED TO VIRTUALIZED ENVIRONMENTS

In this context, three strategies are critical for maintaining virtualized environments: *protection*, *automation* and *integration*. Fortunately, EqualLogic SANs were engineered to help enterprises realize the full potential of their virtualization vision by playing an integral role in these strategic cornerstones.

Protection

Because consolidation and centralized management — two primary advantages of virtualization — increase the vulnerability of such assets as servers and storage media, protection strategies are vital to realizing a virtualization vision. EqualLogic SANs help protect network assets (and the data resources they contain) through numerous features and capabilities.

- Snapshots — point-in-time captures of metadata — protect data by providing space-efficient images of storage volumes associated with applications, VMs and shared repositories.
- Clones — complete copies of data volumes — can be used for replicating volumes for backup and testing purposes. The replication function creates space-efficient replicas on a designated target server (e.g., located at a DR site) which mirrors the production volume in the event that a backup-and-restore operation becomes necessary.
- Multipath IO (MPIO) on the PS Series provides network path redundancy, enabling both high availability and increased bandwidth. Finally, the EqualLogic graphical user interface (GUI) incorporates a number of management security features, including multi-array management groups, multiple pools within groups, configurable administrator access rights and robust system notification capabilities via the GUI and email.

All of these features and capabilities help ensure high levels of protection over mission-critical virtualized network assets and resources.

Automation

When virtualized environments require smaller teams of managers to manage more numerous and heterogeneous network resources, the risk of human error markedly increases. In these situations, neither technology-specific nor domain-specific expertise contributes more to effective management than does a holistic understanding of basic business processes. Automation in this context should not be viewed as a way to “dumb down” data center requirements, but instead as a strategy for increasing IT managers’ productivity. By abstracting layers of detail in parallel with the abstractions offered through server virtualization itself, these managers can spend more time on planning and other strategic work, and less time on arcane tasks and troubleshooting.

EqualLogic SANs can play a vital role in the execution of an automation strategy through the intuitive and informative EqualLogic management interface. This interface simplifies frequently-used tasks and operations, and incorporates scheduling functions for automating snapshot creation and replication at regular intervals. The browser-based EqualLogic management interface also includes Wizards, to streamline such operations as remote array setup and task scheduling.

Finally, load balancing on the EqualLogic SAN is fully automated, even across storage architectures tiered for optimal handling of different data types. EqualLogic load balancing ensures optimal usage of disk resources and requires no manual tuning or intervention of any kind. When an array must be taken out of service for any reason, an administrator needs only to select the array through the management interface and take it

offline, triggering a smooth migration of data to other available arrays and a visual indication that the unit is ready for removal.

These automated features lie at the heart of the design philosophy of the EqualLogic SAN, and support virtualization by keeping administrators focused on high-level business processes, while masking underlying technologies and processes.

EqualLogic SANs can play a vital role in automating virtualized networks through the intuitive and informative EqualLogic management interface.

Integration

While the tight integration inherent in the design of the EqualLogic SANs contributes directly to the systems’ high levels of automation, integration itself should be a strategic component of any virtualization vision. Effective integration advances the full realization of the virtualization vision by simplifying underlying architectures, more effectively abstracting automated processes into logical business operations, and reducing risks associated with technology or platform conflicts. With this design tenet as a base, the EqualLogic SANs integrate an extraordinary amount of intelligence into their arrays, thereby maximizing functionality, ease-of-use, availability and performance. To fully leverage capabilities developed by Microsoft, for example, Dell provides a comprehensive toolkit for Windows environments with its EqualLogic SANs. This suite of utilities couples SAN installation and operation more completely with existing Windows components, such as Volume Shadow Copy Service (VSS), Microsoft iSCSI Initiator, and Windows, SQL and Exchange Servers.

DELL-CITRIX INTEGRATION EXTENDS XENSERVER VIRTUALIZATION'S VALUE

The Citrix XenServer™ Adapter for Dell EqualLogic, a core component of Citrix XenServer 5.0 Dell Edition, embodies this integration strategy, providing access to EqualLogic provisioning, snapshot creation and fast cloning functionality through Citrix's XenCenter Management Client. The adapter further enhances usability, reduces training requirements and minimizes the risk of administrator error.

With the Citrix XenServer™ Adapter for Dell EqualLogic, administrators can provision VMs and associated virtual storage in a single operation using the XenCenter Management Client. This enhancement triggers XenServer to request the intelligent allocation of storage from the PS Series arrays. XenCenter also lets administrators monitor visually how the storage is being used and how much capacity remains on the SAN.

This integration shifts the execution of storage virtualization operations from the XenServer generic operations to the EqualLogic SAN, where they belong. This shift allows for much higher performance and savings in disk consumption. The Citrix XenServer™ Adapter for Dell EqualLogic thus ensures a more complete realization of both

server virtualization and storage consolidation, with the added protection, automation and integration the new architecture demands.

VIRTUALIZING WITH CITRIX XENSERVER 5.0 DELL EDITION

Building an enterprise environment using Citrix XenServer 5.0 Dell Edition offers all of the advantages of virtualization, as well as certain benefits available solely from Citrix.

Infrastructure consolidation

XenServer enables consolidation of server and other infrastructure resources. By combining servers and storage into resource pools that can be apportioned to the applications with the highest business need, IT operations can be aligned to changing demand patterns and business priorities. With XenMotion, virtual machines can be live-migrated to new servers with no service interruption, apportioning resources as necessary to support critical workloads. This enables zero-downtime maintenance and better application virtualization.

Reduced cost of physical infrastructure

With Citrix XenServer virtualization software, businesses can increase server and storage utilization, while reducing equipment, power, cooling, and real estate costs. Virtualization-powered consolidation enables businesses to decommission older systems that have grown expensive to support and failure-prone, replacing several of them with a single newer, more supportable, less power-hungry system.

Greater operational flexibility and efficiency

Using Citrix XenServer, virtual server software companies can deploy high-performance virtual machines rapidly and easily, and manage them — along with Dell EqualLogic SAN storage and networking resources — from XenCenter, a single, easy-to-use management console.

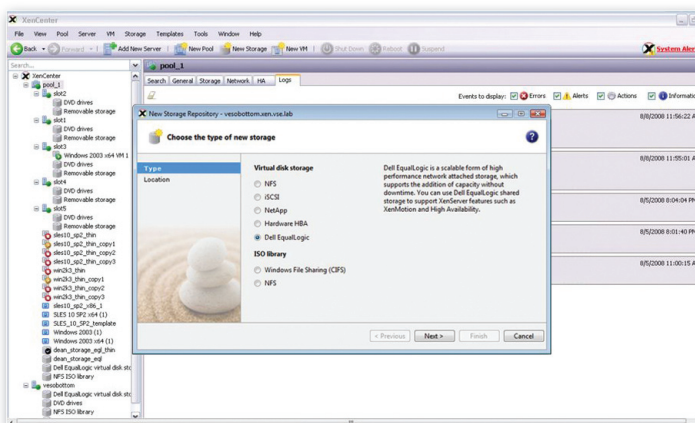


Figure 1: XenCenter-based Provisioning of Dell EqualLogic PS Series SANs

High availability

XenServer High Availability (HA) helps support continuous operations. XenServer HA works in conjunction with the EqualLogic SAN to automate the process of restarting failed VM guests. A standard feature of XenServer, HA is configured through the simple selection of a radio button on the HA tab within the XenCenter Management Client.

IT administrators can also use XenCenter to designate a target on the storage repositories for the XenServer’s heartbeat statefile, a health monitoring function built into each VM. XenCenter allows administrators to assign different HA tolerance and protection levels on individual VMs. XenCenter provides visual confirmation of both successful HA configuration and the current health state of XenServer Resource Pools.

Disaster recovery

When integrated in a XenServer environment, the Dell EqualLogic PS Series SAN plays an integral role in Citrix XenServer’s Disaster Recovery feature, providing a virtualized Storage Repository onto which XenServer can automatically back up VM metadata for use in the event of a need for restoration. Using built-in replication technology in PS Series arrays, VMs and metadata disks (referred to as “Virtual Disks”) can be replicated at a designated DR site.

When required, recovery can be performed by attaching the replicated storage to the DR Resource Pool and automatically recreating the original pool configuration and VMs from the replicated volumes. A *dry run* feature allows administrators to preview the VMs to be imported prior to actually performing the operation. Once the restore operation has completed, IT managers simply need to start the VM within the Recovery Environment.

	DELL ENTERPRISE High-end features without the high cost	DELL EXPRESS Simplified Single Server Virtualization
Concurrent VMS	No License Limit	4
Physical RAM	No License Limit	No License Limit
Admin Model	Multi-Server via XenCenter	Single Server via XenCenter
Physical CPUs	Up to 4	Up to 4
Resource Controls	Fine Grained	Automatic Fair Share
XenMotion		
Resource Pools		
Hot Add Resources		
Shared Storage		
VLAN		

Figure 2: Features Supported by Citrix XenServer 5.0 Dell Enterprise and Dell Express Editions

Increased security

The centralization provided by Citrix XenServer leaves valuable data in the well-protected data center, rather than on the road or on open networks where it is more vulnerable to loss. Internal networks and virtual firewalls can be used to restrict visibility of secure processes or back-end application tiers.

Integrated systems management

Citrix XenServer Dell Edition comes pre-installed with Dell OpenManage™ Server Administrator. This enables systems management right out of the box without any additional need to install an agent on the host.

Open source hypervisor

With the Xen™ hypervisor at its core, Citrix's XenServer offers additional benefits associated with open source software, including favorable security, vendor independence, implementation flexibility and Total Cost of Ownership (TCO) characteristics. The open source Xen hypervisor is a proven and fully supported engine for server virtualization.

SUMMARY

Through the opportunities it offers for consolidation, better management of resources and streamlined provisioning and deployment, server virtualization can result in cost savings, increased security and more efficient operations. Without a corresponding virtualized storage solution, however, IT administrators risk squandering these opportunities, as assets become more vulnerable to failure, overburdened IT managers grow more error-prone, and the vision of virtualization never fully materializes.

EqualLogic SANs offer design attributes uniquely suited for virtualized IT environments, with their multiple protection features, advanced automation and highly integrated components, while Citrix XenServer combines the feature-richness and robustness of enterprise-class virtualization with the open source benefits of the underlying Xen hypervisor. The partnership arrangement and product integration forged between Dell and Citrix helps enterprises realize the full potential of their virtualization visions.

SIMPLIFY YOUR STORAGE AT WWW.DELL.COM/PSSeries



EQUALLOGIC

Dell Inc.
300 Innovative Way
Nashua, NH 03062 USA
Telephone: 603-579-9762
Facsimile: 603-579-6910
Toll Free USA and Canada: 888-579-9762

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