



By Timothy Sherbak
Cris Banson

EXTENDING BENEFITS OF VIRTUAL REMOTE DESKTOPS USING VMWARE AND DELL EQUALLOGIC SANs

Virtualization can offer increased scalability, reliability, and availability while helping simplify management and reduce operating costs. Now, Virtual Remote Desktop solutions based on VMware® Virtual Desktop Infrastructure and virtualized Dell™ EqualLogic™ Internet SCSI (iSCSI) storage area networks (SANs) can offer similar benefits for the desktop environment—helping reduce the traditional cost and complexity of managing physical laptops, desktops, and workstations.

Prompted by the success of virtualization in the data center and the growing challenges presented by enterprise desktop management, many IT organizations are preparing for the transition to desktop virtualization. Like server virtualization, desktop virtualization requires a virtual storage environment to help deliver the full range of benefits. For example, desktops can become highly available only if they are backed by highly available storage in the form of a storage area network (SAN). Determining the appropriate SAN to optimize the performance, manageability, and scalability of the storage system is particularly important when aggregating hundreds or thousands of desktops.

The combination of VMware Infrastructure 3 virtualization software and virtualized Dell EqualLogic PS Series Internet SCSI (iSCSI) SANs can provide an excellent foundation for virtualizing desktop environments. Virtualized EqualLogic PS Series SANs help extend the capabilities of VMware Infrastructure 3 and simplify virtual desktop deployments, mitigating project risk. iSCSI connectivity helps organizations reduce the cost of infrastructure and take advantage of existing networking knowledge to help lower operational costs. In addition, the PS Series virtualized

storage architecture is designed to provide simple deployment, management, and growth to help reduce ongoing costs.

VMWARE VIRTUAL DESKTOP INFRASTRUCTURE

Organizations evaluating desktop virtualization environments must address several challenges, including escalating support and maintenance costs for physical PCs, frequent security patches and software upgrades, unregulated downloads of personal software, a dramatically increased number of mobile users, and a lack of comprehensive planning for data and application backups. Administrators must support growing numbers of local and remote users while performing the many day-to-day tasks that desktop systems require, such as upgrading applications, refreshing hardware, troubleshooting user problems, and securing data.

VMware Virtual Desktop Infrastructure helps address these challenges in a way that can benefit both the organization and end users. It is designed to provide users with convenient access to virtual desktops systems that are hosted in a central data center but behave just like physical PCs. It also helps

Related Categories:

Data consolidation
and management
Dell EqualLogic storage
Flexible computing
Internet SCSI (iSCSI)
Storage
Storage area network (SAN)
Virtualization
VMware

Visit DELL.COM/PowerSolutions
for the complete category index.

provide a secure, flexible, and easy-to-manage IT infrastructure designed to be cost-effective and helps reduce the complexity of managing physical laptops, desktops, and workstations (see the “Step-by-step: Sizing the solution” sidebar in this article).

VMware Virtual Desktop Infrastructure leverages VMware Infrastructure 3 to consolidate desktop environments onto data center servers (see Figure 1). It works closely with VMware VirtualCenter to provide advanced virtual desktop management capabilities, such as automatic suspend and resume, that help reduce the memory and processing power required to host virtual desktops. By taking advantage of the capabilities of VMware Infrastructure 3, desktops can run even when server hardware fails and recover quickly from unplanned outages without duplicate hardware.

VMware Virtual Desktop Manager, a key component of Virtual Desktop Infrastructure, can securely connect authorized users to centralized virtual desktops. It is designed to work with VMware Infrastructure 3 to enhance control and manageability while offering a familiar desktop experience. Users can log in to centralized virtual desktop images from a Web browser or through the VMware Virtual Desktop Manager client.

Emerging technology advances are expected to further enhance the power of VMware Virtual Desktop Infrastructure. For example, VMware View Composer desktop image management software, based on VMware vStorage Linked Clones technology, allows administrators to significantly reduce storage requirements while helping to reduce desktop provisioning time from hours to minutes. View Composer is designed to make updating and patching seamless to desktop end users and efficient for IT administrators, while retaining individual users’ data and settings. As a result, IT staff can streamline management of thousands of desktops while helping ensure that all user systems are up-to-date.

ESSENTIAL ELEMENTS FOR VIRTUAL DESKTOP ENVIRONMENTS

The combination of VMware Virtual Desktop Infrastructure software and virtualized Dell EqualLogic PS Series iSCSI SANs can help meet evolving enterprise requirements and lay the foundation for an end-to-end virtualized IT infrastructure. By deploying EqualLogic storage arrays, IT departments can circumvent the cost and management complexity of traditional SAN infrastructures without compromising the enterprise-class storage requirements of a virtual desktop infrastructure. Designed for enterprise deployment and bundled with a comprehensive suite of enterprise software features, EqualLogic PS Series SANs offer the elements required for a successful desktop virtualization environment: scalability, high availability, data protection, simplified management, and high performance.

Scalability: Enabling performance and capacity expansion without disruption

VMware virtualization enables organizations to dynamically scale computing

resources by seamlessly adding physical servers into a VMware ESX server cluster. The VMware Distributed Resource Scheduler (DRS) feature enables existing virtual machine (VM) workloads to be automatically and nondisruptively distributed across the new physical resources. EqualLogic PS Series SANs help extend that same dynamic scalability to back-end storage, enabling organizations to easily expand both the server and storage infrastructure as the number of hosted users on the system increases.

Adding storage can be fast and simple. Administrators can expand EqualLogic PS Series SAN resources online without disrupting users (see Figure 2). EqualLogic PS Series SANs added to an EqualLogic group can “learn” the configuration from currently deployed arrays, with the recently added arrays then automatically integrated into the existing virtualized pool of storage. The SAN distributes data volumes across available storage resources, rebalancing workloads automatically to help provide high storage resource utilization and efficiency. As the

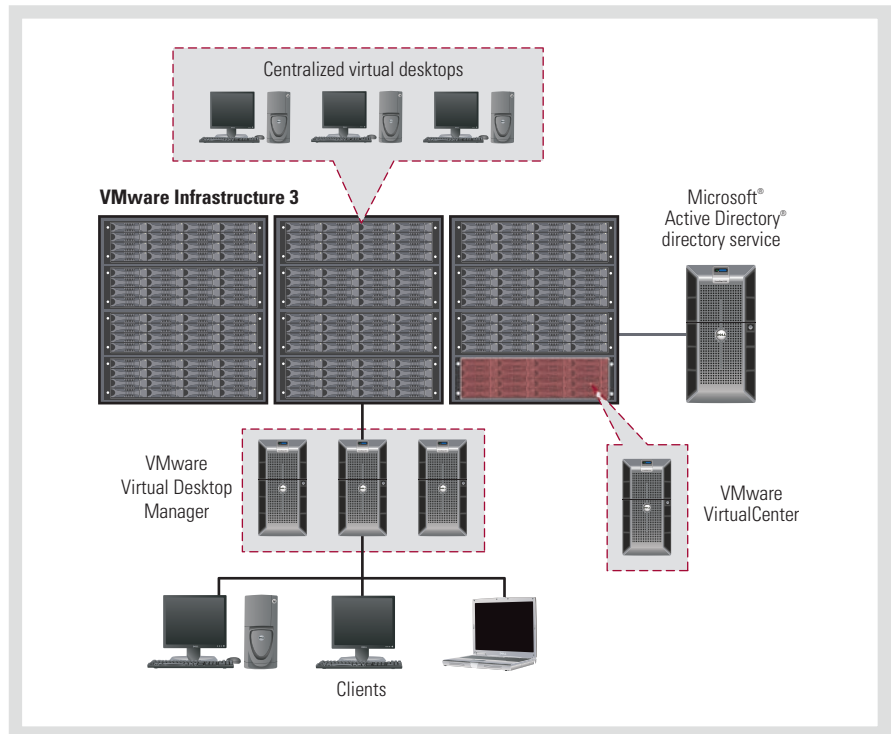


Figure 1. Example environment based on VMware Infrastructure 3 and Virtual Desktop Manager

STEP-BY-STEP: SIZING THE SOLUTION

Sizing a desktop virtualization environment with VMware software and Dell server and storage platforms depends on several key factors. On the client side, the desktop configuration and user workload profile largely determine how many desktops can be hosted on a single VMware ESX server. Administrators must appropriately size the Dell PowerEdge™ servers hosting the desktops and the Dell EqualLogic storage area network (SAN) storing the virtual disks to help ensure that an optimal number of desktops can run with adequate user response times. The following steps can help collect the necessary information:

- 1. Measure physical desktop usage.** Understanding how different applications affect physical processor, memory, network, and storage resources is key. In large desktop environments, VMware Capacity Planner can collect the physical metrics that help estimate virtual machine (VM) requirements.
- 2. Estimate processor requirements.** Administrators can use Microsoft Performance Monitor to measure average processor utilization for the physical desktops, then multiply the measurement by the targeted number of virtual desktops for each VMware ESX server to estimate their processor requirements. Other factors to consider include storage and virtualization, connection protocol, and additional capacity for usage spikes.
- 3. Estimate memory requirements.** Because memory usage can vary based on VMware ESX page sharing, calculating memory requirements requires some estimates. The high watermark can be estimated by ignoring the effect of page sharing: for example, to create 64 VMs with 512 MB of RAM each, a hypervisor without page sharing would require at least 32 GB of RAM. With page sharing on the ESX server, actual memory requirements in production would be less.
- 4. Calculate network requirements.** Dividing the estimated traffic by the speed of the network interface card (NIC) yields the number of NICs typically required. Administrators should also consider the type of NICs used, multimedia applications, shared folders, and the connection broker protocol.
- 5. Estimate storage capacity requirements.** Administrators can estimate the storage capacity requirements for VM system drives using the following formula:

$$(.vmdk \text{ file size}) + (\text{VM RAM}) + (\text{size of suspend/resume space for VM}) + (100 \text{ MB per VM for logs})$$

Beyond VM system disk requirements, administrators should also take into account the virtual disks hosting files and data for each user. For performance requirements, they should consider both the I/Os per second (IOPS) and storage throughput data gathered from the physical workload. Given the significant capacity of disk drives today and modest throughput requirements, in practice, administrators should give careful attention to creating a storage configuration with enough disk drives to meet the aggregate IOPS requirements.

Using the information acquired in these steps, IT organizations can create an optimal configuration for virtual desktop environments. As a final step, administrators should deploy the configuration in a proof-of-concept pilot test environment to monitor and validate performance.

SAN is expanded and the added resources are applied to the existing virtual desktop workloads, virtual desktop users can continue their work, operationally unaffected by the infrastructure changes.

High availability: Avoiding downtime

Large-scale enterprise deployments can yield significant cost savings but require a robust feature set and configuration. VMware Virtual Desktop Infrastructure enables organizations to increase the baseline level of availability provided for all applications and provide increased levels of availability easily and cost-effectively. EqualLogic PS Series SANs are designed with fully redundant, hot-swappable components and include a media error detection and correction feature to help preempt disk failure. If a failure occurs, controller failover, RAID protection, hot spare components, and I/O multipathing capabilities can help keep operations running.

Data protection:

Providing built-in capabilities

When desktop resources are consolidated, ensuring that they are fully protected at all times is critical. To help meet this requirement, snapshot, clone, and replication capabilities are included in the software of EqualLogic PS Series SANs to enable advanced data protection for VMware Virtual Desktop Infrastructure environments.

EqualLogic Auto-Snapshot Manager/VMware Edition helps provide space-efficient, hypervisor-aware, SAN-based snapshots and fast recovery of VMs and Virtual Machine File System (VMFS) data stores.¹ An easy-to-navigate graphical user interface displays SAN- and VMware-centric views and provides simple, centrally managed data protection for the entire virtual desktop infrastructure. Through this interface, consolidated

¹ For more information, see "How Dell EqualLogic Auto-Snapshot Manager/VMware Edition Helps Protect Virtual Environments," by Andrew Gilman and William Urban, in *Dell Power Solutions*, November 2008, DELL.COM/Downloads/Global/Power/ps4q08-20090107-Gilman.pdf.

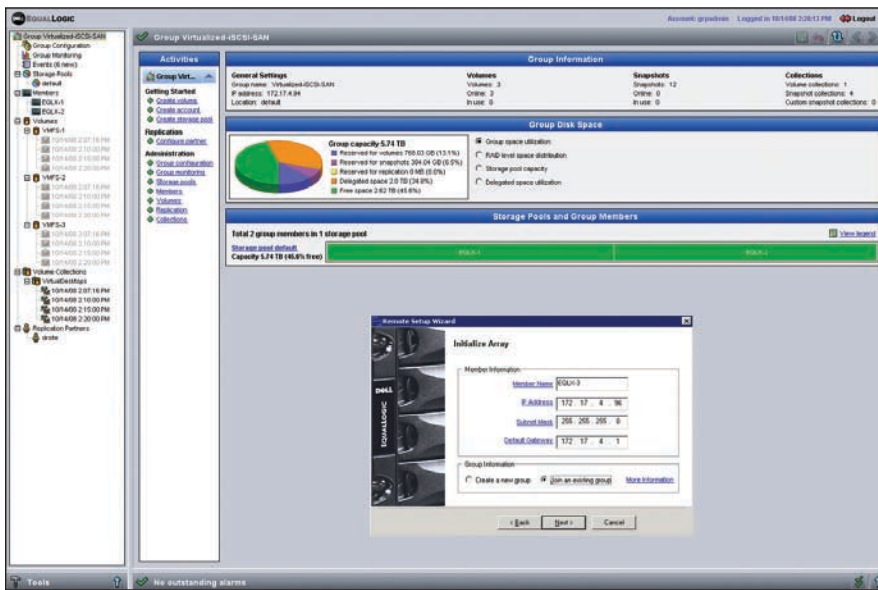


Figure 2. Dell EqualLogic Group Manager and Remote Setup Wizard for nondisruptively adding SAN resources

scheduling of periodic point-in-time copies of virtual desktops in the environment can be achieved using space-efficient SAN-based snapshots for quick online retrieval of the virtual desktop in case of data loss or corruption.

**Simplified management:
Automating IT tasks**

Virtual desktop infrastructures help streamline IT tasks including configuration, deployment, and administration, and EqualLogic PS Series SANs are designed to extend those benefits by simplifying consolidated storage. Storage configuration, management, pooling, and tiering are automated to help save administrative time and expense.

Within the SAN environment, administrators can quickly and easily provision storage with a few button clicks. The key functions needed to configure, manage, and scale storage are automated, helping reduce administration tasks for volume and capacity growth. RAID type and data layout are created automatically at the time of provisioning, then optimized as workload patterns for the recently provisioned storage evolve. By avoiding complex tasks and enabling fast and flexible storage provisioning,

EqualLogic PS Series SANs can help dramatically reduce deployment and ongoing operational costs.

A primary advantage of these features is that storage administration remains stable as the group expands. Administrators perform management tasks at the group level through the intuitive, single-pane EqualLogic Group Manager console. Storage and network I/O load balancing can occur automatically across multiple storage tiers as resources and performance metrics change. Administrators are not required to manually map application data to specific physical devices and controllers. Because the group can automatically tune itself and is managed as a single logical system, the ongoing operational costs of storage management can remain fixed even as storage grows.

High performance: Delivering efficient I/O for aggregated environments

I/O performance and scalability are especially important in virtual desktop environments because increasing numbers of desktop images are sharing storage resources. Individually, virtual desktops have relatively modest I/O requirements—but in aggregate, hundreds or thousands of concurrent desktops can require a

significant storage infrastructure to help maintain responsiveness. Administrators can stripe volumes hosting virtual desktops and their associated data sets across multiple controllers, cache memories, network connections, and disk drives to distribute workloads across available resources for optimal utilization and concurrent processing.

**FLEXIBLE, EASY-TO-MANAGE
DESKTOP ENVIRONMENT**

Moving toward an end-to-end virtualized IT infrastructure that includes servers, desktops, storage, and disaster recovery helps organizations realize the efficiencies and cost advantages of virtualization. Dell EqualLogic PS Series virtualized iSCSI SANs can help organizations take full advantage of the simplicity, security, performance, and efficiency of a VMware Virtual Desktop Infrastructure environment, while also gaining the flexibility to easily grow and change an enterprise-wide virtualized infrastructure based on evolving needs.

Timothy Sherbak is senior manager of virtualization solutions marketing for the Dell EqualLogic product family.

Cris Banson is a senior technical storage specialist at VMware.

MORE

ONLINE

DELL.COM/PowerSolutions

QUICK LINKS

Dell EqualLogic PS Series:
DELL.COM/EqualLogic
DELL.COM/PSSeries

VMware Virtual Desktop Infrastructure:
www.vmware.com/vdi