Reference Architecture

EMC® INFRASTRUCTURE FOR VMWARE® VIEW™ 5.0

EMC VNX™ Series (NFS), VMware vSphere™ 5.0, VMware View 5.0, and VMware View Composer 2.7

- Simplify management and decrease TCO
- Guarantee a quality desktop experience
- Minimize the risk of virtual desktop deployment

EMC Solutions Group

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Reference architecture overview

Document purpose

EMC's commitment to consistently maintain and improve quality is led by the Total Customer Experience (TCE) program, which is driven by Six Sigma methodologies. As a result, EMC has built Customer Integration Labs in its Global Solutions Centers to reflect realworld deployments in which TCE use cases are developed and executed. These use cases provide EMC with an insight into the challenges currently facing its customers.

This document describes the reference architecture of the EMC infrastructure for VMware View 5.0, EMC VNX Series (NFS), VMware vSphere 5.0, VMware View 5.0, and VMware View Composer 2.7 solution, which was tested and validated by the EMC Solutions group.

Introduction to the EMC VNX series

The VNX series delivers uncompromising scalability and flexibility for the midtier while providing market-leading simplicity and efficiency to minimize total cost of ownership. Customers can benefit from the new VNX features such as:

- Next-generation unified storage, optimized for virtualized applications.
- Extended cache by using Flash drives with Fully Automated Storage Tiering for Virtual Pools (FAST VP) and FAST Cache that can be optimized for the highest system performance and lowest storage cost simultaneously on both block and file.
- Multiprotocol support for file, block, and object with object access through EMC Atmos™ Virtual Edition (Atmos VE).
- Simplified management with EMC Unisphere™ for a single management framework for all NAS, SAN, and replication needs.
- Up to three times improvement in performance with the latest Intel Xeon multicore processor technology, optimized for Flash.
- 6 Gb/s SAS back end with the latest drive technologies supported:
  - 3.5” 100 GB and 200 GB Flash, 3.5” 300 GB, and 600 GB 15k or 10k rpm SAS, and 3.5” 1 TB, 2 TB and 3 TB 7.2k rpm NL-SAS
  - 2.5” 100 GB and 200 GB Flash, 300 GB, 600 GB and 900 GB 10k rpm SAS
- Expanded EMC UltraFlex™ I/O connectivity—Fibre Channel (FC), Internet Small Computer System Interface (iSCSI), Common Internet File System (CIFS), network file system (NFS) including parallel NFS (pNFS), Multi-Path File System (MPFS), and Fibre Channel over Ethernet (FCoE) connectivity for converged networking over Ethernet.

The VNX series includes five new software suites and three new software packs that make it easier and simpler to attain the maximum overall benefits.

Software suites available

- VNX FAST Suite—Automatically optimizes for the highest system performance and the lowest storage cost simultaneously (FAST VP is not part of the FAST Suite for VNX5100™).

- VNX Local Protection Suite—Practices safe data protection and repurposing.
- VNX Remote Protection Suite—Protects data against localized failures, outages, and disasters.
- VNX Application Protection Suite—Automates application copies and proves compliance.
- VNX Security and Compliance Suite—Keeps data safe from changes, deletions, and malicious activity.

Software packs available

- VNX Total Efficiency Pack—Includes all five software suites (not available for VNX5100).
- VNX Total Protection Pack—Includes local, remote, and application protection suites.
- VNX Total Value Pack—Includes all three protection software suites and the Security and Compliance Suite (VNX5100 exclusively supports this package).

Solution purpose

The purpose of this reference architecture is to build and demonstrate the functionality, performance, and scalability of virtual desktops enabled by EMC VNX series, VMware vSphere 5.0, VMware View 5.0, and VMware View Composer 2.7.This solution is built on an EMC VNX5300™ platform with multiprotocol support, which provides NFS storage for the VMware datastore and CIFS-based storage for the user data.

This reference architecture validates the performance of the solution and provides guidelines to build similar solutions.

This document is not intended to be a comprehensive guide to every aspect of this solution.

The business challenge

Customers require a scalable, tiered, and highly available infrastructure to deploy their virtual desktop environment. Several new technologies are available to assist them in architecting a virtual desktop solution, but the customers need to know how best to use these technologies to maximize their investment, support service-level agreements, and reduce their desktop total cost of ownership.

The purpose of this solution is to build a replica of a common customer virtual desktop infrastructure (VDI) environment and validate the environment for performance, scalability, and functionality. Customers will achieve:

- Increased control and security of their global, mobile desktop environment, typically their most at-risk environment.
- Better end-user productivity with a more consistent environment.
- Simplified management with the environment contained in the data center.
- Better support of service-level agreements and compliance initiatives.
- Lower operational and maintenance costs.

The technology solution

This solution demonstrates how to use an EMC VNX platform to provide storage resources for a robust VMware View 5.0 environment by using Windows 7 virtual desktops.

Planning and designing the storage infrastructure for VMware View is a critical step as the shared storage must be able to absorb large bursts of input/output (I/O) that occur throughout the course of a day. These large I/O bursts can lead to periods of erratic and unpredictable virtual desktop performance. Users can often adapt to slow performance, but unpredictable performance will quickly frustrate them.

To provide predictable performance for a VDI environment, the storage must be able to handle peak I/O load from clients without resulting in high response times. Designing for this workload involves deploying several disks to handle brief periods of extreme I/O pressure. Such a deployment is expensive to implement. This solution uses EMC VNX FAST Cache to reduce the number of disks required.

Traditional host-based antivirus solutions can have a significant impact on all facets of the virtual desktops environment including storage, networking, and CPU utilization. To ensure predictable virtual desktop performance and maximize the number of virtual desktops an enrvironment can run, alternative antivirus solutions are recommended. This solution uses the McAfee Management for Optimized Virtual Environments (MOVE) antivirus platform to offload virus scanning tasks to dedicated hosts and reduce the resources required per desktop.

The solution benefits

This solution aids in the design and implementation stages for the successful deployment of virtual desktops on VMware View 5.0. This solution balances the performance requirements and cost by using the new features in the VNX Operating Environment (OE) such as EMC VNX FAST Cache. VNX support for NFS also enables the use of VMware NFS datastores for cost-effective and easily deployable storage for the desktop virtualization platform.

Using desktop virtualization provides organizations with additional benefits such as:

- Increased security by centralizing business-critical information
- Increased compliance as information is moved from endpoints into the data center
- Simplified and centralized management of desktops

Solution architecture

Architecture diagram

This solution provides a summary and characterization of the tests performed to validate the EMC infrastructure for VMware View 5.0, EMC VNX Series (NFS), VMware vSphere 5.0, VMware View 5.0, and VMware View Composer 2 solution. It involves building a 1,000-seat VMware View 5.0 environment on VNX and integrating the new VNX features to provide a compelling and cost-effective VDI platform.

Figure 1 depicts the overall physical architecture of the solution.

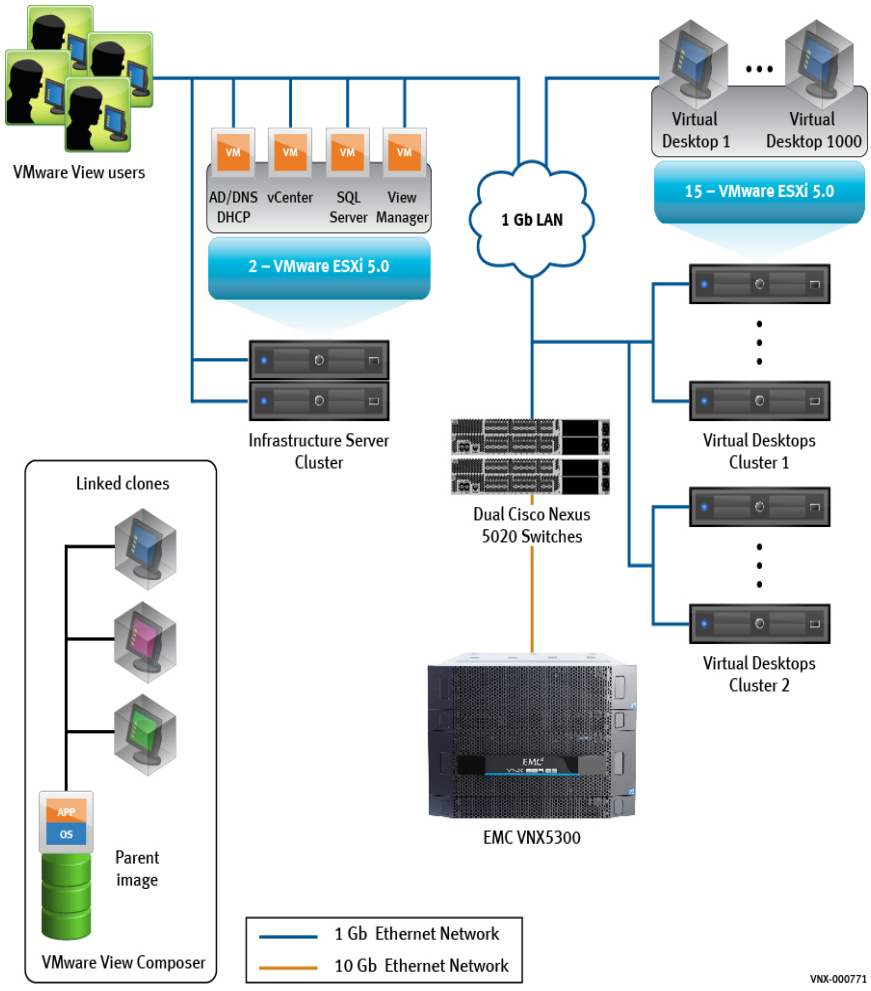

Figure 1. Physical architecture

Reference architecture overview

The reference architecture consists of the following components.

- **EMC VNX5300 platform**—Provides storage by using IP (NAS) connections for virtual desktops and infrastructure virtual machines such as VMware View Manager, VMware vCenter™ Servers, Microsoft SQL Server databases, and other supporting services. User profiles and home directories are redirected to CIFS network shares on EMC VNX5300.

- **VMware ESXi® 5.0 server**—A two-node VMware ESXi 5.0 cluster that hosts infrastructure virtual machines. Two additional VMware ESXi 5.0 clusters are used to host 1,000 virtual desktops.
- **VMware vCenter Server 5.0**—Provides a scalable and extensible platform that forms the foundation for virtualization management for the VMware ESXi5.0 clusters.
- **VMware View Manager 5.0**—Provides virtual desktop delivery, authenticates users, manages the assembly of users' virtual desktop environments, and brokers connections between users and their virtual desktops. In this reference architecture, VMware View Manager5.0 is installed on Windows Server 2008 R2 and hosted as a virtual machine on a VMware vSphere ESXi 5.0 server.
- **Virtual desktops**—One thousand virtual desktops running Windows 7 that are created by using VMware View Composer 2.7 and are deployed as linked clones.
- **McAfee Management for Optimized Virtual Environments (MOVE) 2.0.0**—The McAfee MOVE antivirus platform that replaces traditional host-based antivirus solutions by offloading virtual desktop virus scanning tasks to dedicated servers running the McAfee MOVE Antivirus Offload Server software.
- **Cisco Nexus 5020 switches**— Two Cisco Nexus 5020 switches that provide high port density, wire-speed performance, and extremely low latency to meet the growing demand for a 10-gigabit Ethernet network.
- **Microsoft Windows 2008 R2 domain controller and DNS server**— The Windows 2008 R2 domain controller that provides Active Directory services to manage the identities and relationships that constitute the Windows environment for the virtual desktops. The Domain Name System (DNS) component of the Windows network infrastructure is also installed on this server. This server is hosted as a virtual machine on a VMware ESXi 5.0 server.
- **Microsoft Windows 2008 R2 dynamic host configuration protocol (DHCP) server**—Centrally manages the IP address scheme for virtual desktops. This service is hosted on the same virtual machine as the domain controller and DNS server.
- **Microsoft SQL Server 2008**—The database service required by VMware View Manager and VMware vCenter Server to store configuration details. This SQL Server is hosted as a virtual machine on a VMware ESXi5.0 server.
- **Mixed 10-gigabit and 1-gigabit IP network**—The Ethernet network infrastructure that provides 10-gigabit connectivity to the VNX storage. The 10-gigabit infrastructure allows ESXi servers to access NFS datastores on VNX5300 with high bandwidth and low latency. The desktop clients, View components, and Windows Server infrastructure reside on the 1-gigabit network.

Storage layout

Figure 2 shows the storage layout of the disks in the reference architecture.

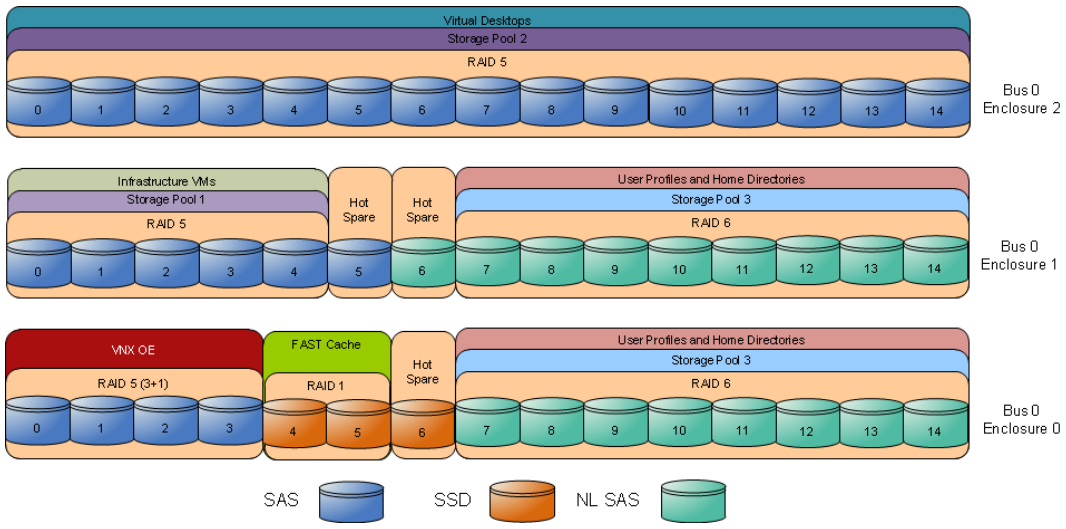

Figure 2. Storage layout

Storage layout overview

The following configurations are used in this reference architecture:

- Four SAS disks (0_0 to 0_3) are used for the VNX OE.
- Disks 0_6, 1_5, and 1_6 are hot spares. These disks are denoted as Hot Spare in the storage layout diagram.
- Two Flash drives (0_4 and 0_5) are used for EMC VNX FAST Cache. There are no user-configurable LUNs on these drives.
- Fifteen SAS disks (2_0 to 2_14) in a RAID 5 storage pool (**Storage Pool 2**) are used to store linked clones and replicas. FAST Cache is enabled for the entire pool. Six NFS file systems are created and presented to the ESXi servers as datastores.
- Sixteen NL-SAS disks (0_7 to 0_14 and 1_7 to 1_14) are configured in a RAID 6 (6+2) storage pool (**Storage Pool 3**) and used to store user data and roaming profiles. FAST Cache is enabled for the entire pool. Two VNX file systems are created and presented as Windows file shares.
- Five SAS disks (1_0 to 1_4) in a RAID 5 storage pool (Storage Pool 1) are used to store infrastructure virtual machines. A 1-TB LUN is carved out of the pool to form an NFS file system. The file system is presented to the ESXi servers as a datastore.

File system layout overview

Figure 3 shows the layout of the file system.

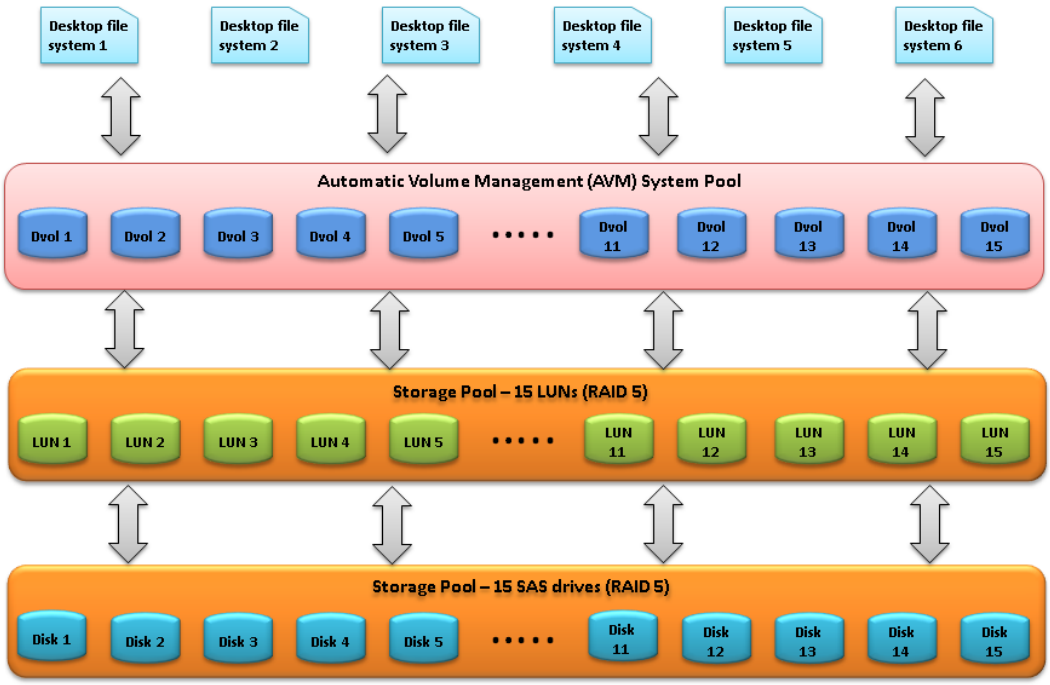

Figure 3. File system layout

Fifteen LUNs of 200 GB each are carved out of a storage pool configured with 15 SAS drives. The LUNs are presented to VNX File as dvols that belong to a system-defined pool. Six file systems are then carved out of an Automatic Volume Management (AVM) system pool and are presented to the ESXi servers as datastores. File systems 1 and 2 are used to store replicas. File systems 3 to 6 are used to store the linked clones. A total of 1,000 desktops are created and each replica is responsible for 500 linked clones.

Starting from VNX for File version 7.0.35.3, AVM is enhanced to intelligently stripe across dvols that belong to the same block-based storage pool. It is not required to manually create striped volumes and add them to the user-defined file-based pools.

Like the NFS file systems, the CIFS file systems are provisioned from an AVM system pool to store user home directories and user roaming profiles. The two file systems are grouped in the same storage pool because their I/O profiles are sequential.

Figure 4 shows the layout of the CIFS file systems.

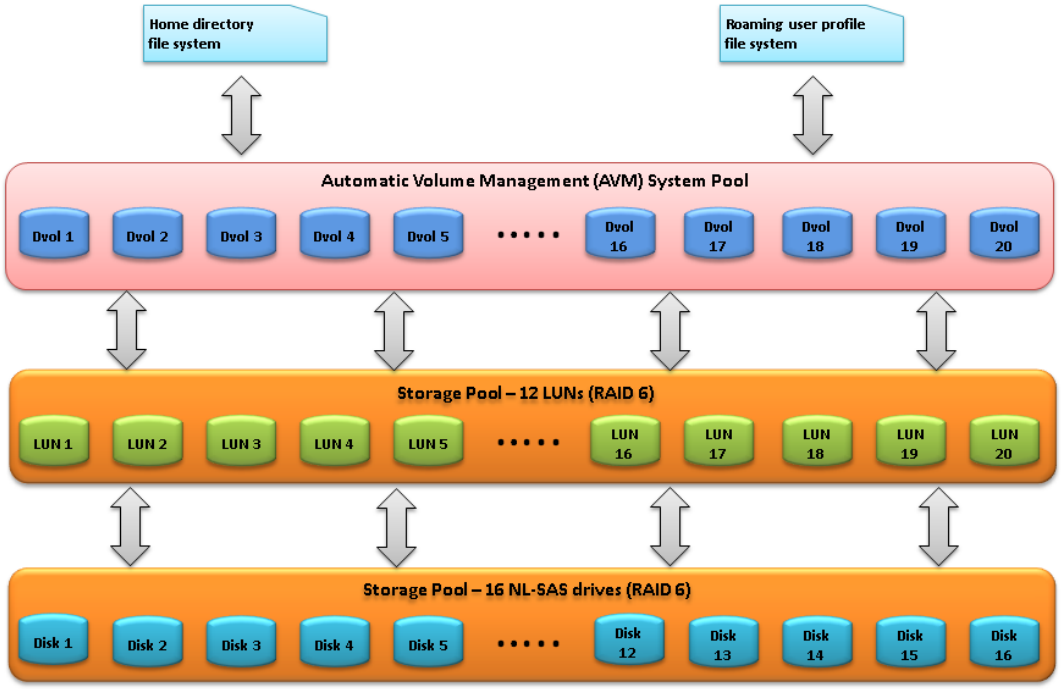

Figure 4. VNX5300 – CIFS file system layout

Twenty LUNs of 360 GB each are carved out of the RAID 6 storage pool configured with 16 NL-SAS-drives. Sixteen drives are used because the block-based storage pool internally creates 6+2 RAID 6 groups. Therefore, the number of NL-SAS drives used is a multiple of eight. Likewise, twenty LUNs are used because AVM stripes across five dvols, so the number of dvols is a multiple of five.

FAST Cache is enabled on both storage pools that are used to store the NFS and CIFS file systems.

VNX shared file systems

Two shared file systems are used by the virtual desktops—one for user profiles and the other to redirect user storage that resides in home directories. In general, redirecting users' data out of the base image to VNX for File enables centralized administration, backup and recovery, and makes the desktops more stateless. Each file system is exported to the environment through a CIFS share.

Network layout overview

Figure 5 shows the 10-gigabit Ethernet connectivity between the Cisco Nexus 5020 switches and the EMC VNX storage. Uplink Ethernet ports coming off the Nexus switches can be used to connect to a 10-gigabit or a 1-gigabit external LAN. In this solution, the 1-gigabit LAN through Cisco Catalyst 6509 switches is used to extend Ethernet connectivity to the desktop clients, VMware View components, and Windows Server infrastructure.

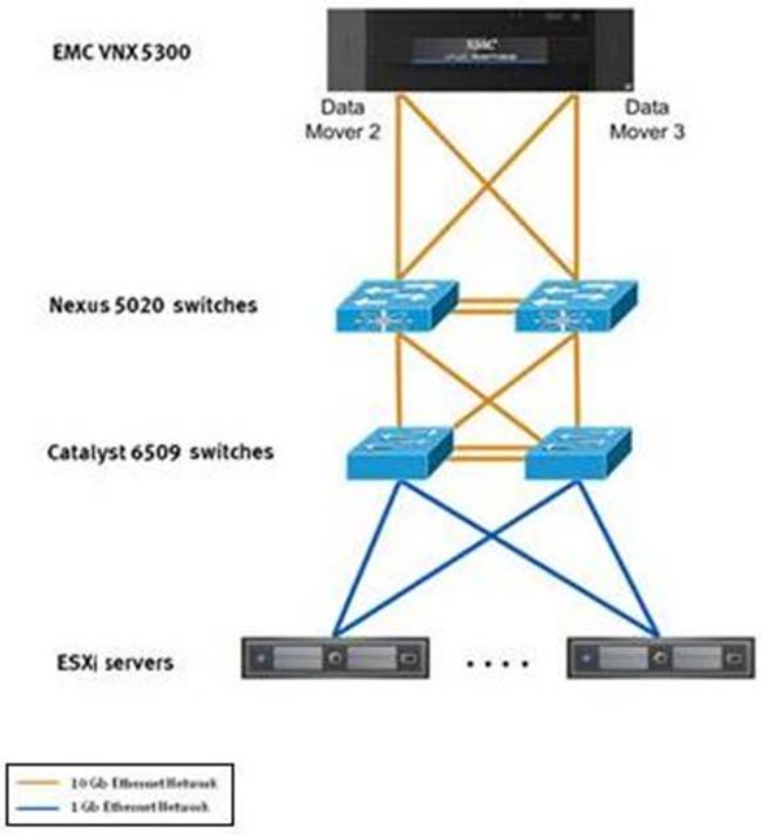

Figure 5. Network layout diagram

Host network configuration

All network interfaces on the ESXi servers in this solution use 1-gigabit Ethernet connections. All virtual desktops are assigned IP addresses by using a DHCP server. The Intel-based servers use four onboard Broadcom gigabit Ethernet controllers for all the network connections.

Figure 6 shows the vSwitch configuration in the vCenter Server.

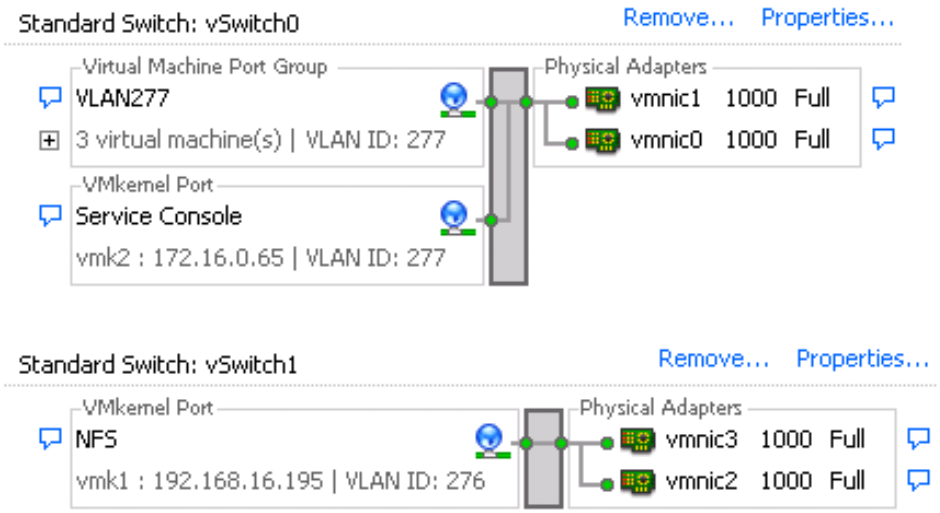

Figure 6. vSwitch configuration in vCenter Server

Virtual switches use vSwitch0 and vSwitch1 use two physical network interface cards (NICs) each.

Table 1 lists the port groups configured onvSwitch0 and vSwitch1.

Table 1. Port groups configured on vSwitch0 and vSwitch1

Virtual switch	Configured port groups	Used for
vSwitch0	Service console	VMkernel port for ESXi host management
vSwitch0	VLAN277	Network connection for virtual desktops and LAN traffic
vSwitch1	NFS	NFS datastore traffic

VNX5300 network configuration

EMC VNX5300 consists of two Data Movers. The Data Movers can be configured in an active/active or an active/passive configuration. In the active/passive configuration, the passive Data Mover serves as a failover device for the active Data Mover. In this solution, the Data Movers operate in the active/passive mode.

The VNX5300 Data Movers are configured for two 10-gigabit interfaces on a single I/O module. Link Aggregation Control Protocol (LACP) is used to configure ports fxg-1-0 and fxg-1-1 to support virtual machine traffic, home folder access, and external access for roaming profiles.

Figure 7 shows the back of two VNX5300 Data Movers that include two 10-gigabit fiber Ethernet (fxg) ports each in I/O expansion slot 1.

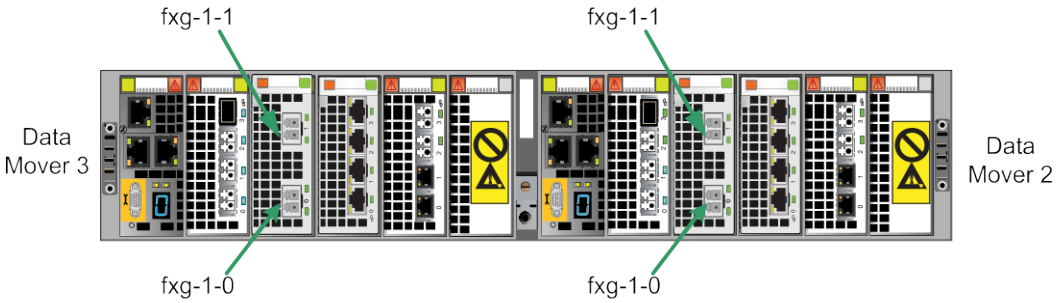

Figure 7. VNX5300 Data Movers

Key components

Introduction

This section briefly describes the key components of this solution:

- EMC VNX series
- EMC VNX FAST Cache
- VSI for VMware vSphere
- VMware View 5.0
- VMware vSphere 5.0

The Hardware and software resources section provides more information on the components that make up the solution.

EMC VNX series

The EMC VNX series is a dedicated network server optimized for file and block storage access that delivers high-end features in a scalable, easy-to-use package.

The VNX series delivers a single-box block and file solution, which offers a centralized point of management for distributed environments. This makes it possible to dynamically grow, share, and cost-effectively manage multiprotocol file systems and provide multiprotocol block access. Administrators can take advantage of the simultaneous support for NFS and CIFS protocols by enabling Windows and Linux/UNIX clients to share files by using the sophisticated file-locking mechanism of VNX for File and VNX for Block for high-bandwidth or for latency-sensitive applications.

EMC VNX FAST Cache

VNX FAST Cache, a part of the VNX FAST Suite, uses Flash drives as an expanded cache layer for the array. The VNX5300 is configured with two 100 GB Flash drives in a RAID 1 configuration for a 93 GB read/write-capable cache. This is the minimum amount of FAST Cache. Larger configurations are supported for scaling beyond 1,000 desktops.

FAST Cache is an array-wide feature available for both file and block storage. FAST Cache works by examining 64-KB chunks of data in FAST Cache-enabled objects on the array. Frequently accessed data is copied to the FAST Cache and subsequent accesses to the data chunk are serviced by FAST Cache. This enables immediate promotion of very active data to the Flash drives. The use of Flash drives dramatically improves the response times for very active data and reduces data hot spots that can occur within the LUN.

FAST Cache is an extended read/write cache that enables VMware View to deliver consistent performance at Flash-drive speeds by absorbing read-heavy activities, such as boot storms and antivirus scans, and write-heavy workloads such as operating system patches and application updates. This extended read/write cache is an ideal caching mechanism for View Composer because the base replica desktop image and other active user data that are frequently accessed are serviced directly from the Flash drives without having to access the slower drives at the lower storage tier.

VSI for VMware vSphere

EMC Virtual Storage Integrator (VSI) for VMware vSphere is a plug-in to the vSphere Client that provides a single management interface for managing EMC storage within the vSphere environment. Features can be added and removed from VSI independently, which provides flexibility to customize VSI user environments. The features are managed by using the VSI Feature Manager. VSI provides a unified user experience that allows new features to be introduced rapidly in response to changing customer requirements.

The following VSI features were used during the validation testing:

- Storage Viewer (SV)—Extends the vSphere client to facilitate the discovery and identification of EMC VNX storage devices that are allocated to VMware ESXi hosts and virtual machines. SV presents the underlying storage details to the virtual datacenter administrator, merging the data of several different storage mapping tools into a few seamless vSphere client views.
- Unified Storage Management—Simplifies storage administration of the EMC VNX platforms. It enables VMware administrators to provision new NFS and VMFS datastores and RDM volumes seamlessly within the vSphere client.

The EMC VSI for VMware vSphere product guides available on the EMC Online Support website, provide more information.

VMware View 5.0

VMware View 5.0 is the leading desktop virtualization solution that enables desktops to deliver cloud computing services to users. VMware View 5.0 integrates effectively with vSphere 5.0 to provide:

- View Composer 2.7 performance optimization—Optimizes storage utilization and performance by reducing the footprint of virtual desktops and by using tiered storage.
- Tiered storage support—View Composer 2.7 supports the use of different tiers of storage to maximize performance and reduce cost.
- Thin provisioning support—Enables efficient allocation of storage resources when virtual desktops are provisioned. This results in better utilization of storage infrastructure and reduced capital expenditure (CAPEX)/operating expenditure (OPEX).

VMware vSphere 5.0

VMware vSphere 5.0 is the market-leading virtualization platform that is used across thousands of IT environments around the world. VMware vSphere 5.0 can transform or virtualize computer hardware resources including CPU, RAM, hard disks, and network controllers to create a fully functional virtual machine, each of which runs its own operating system and applications just like a physical computer.

The high-availability features of VMware vSphere 5.0along with Distributed Resource Scheduler (DRS) and Storage vMotion® enable seamless migration of virtual desktops from one ESXiserver to another with minimal or no disruption to the customer.

VMware View architecture

Linked clone overview

VMware View 5.0 with View Composer 2.7 uses the concept of linked clones to quickly provision virtual desktops. This reference architecture uses the tiered storage feature of View Composer 2.7 to build linked clones and their replica images on separate datastores, as shown in Figure 8.

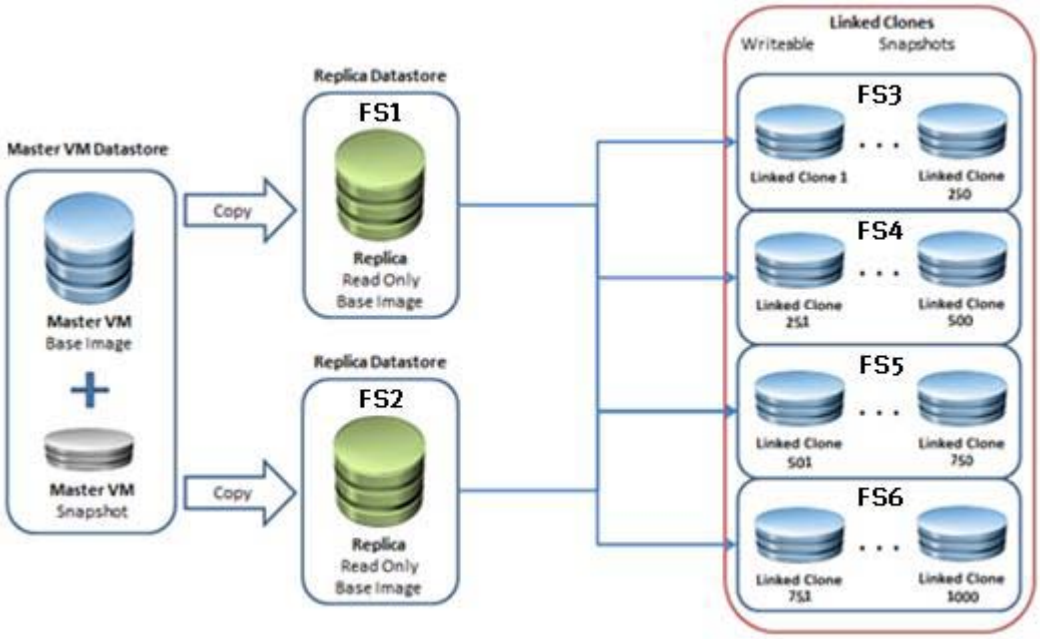

Figure 8. Linked clones and replica images

The operating system reads all the common data from the read-only replica and the unique data that is created by the operating system or useris stored on the linked clone. Figure 9 shows a logical representation of this relationship.

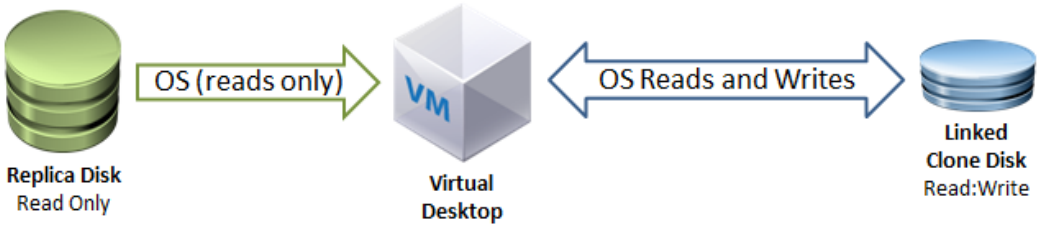

Figure 9. Logical representation of replica disk and linked clone

Automated pool configuration

All 1,000 desktops are deployed in two automated desktop pools by using a common Windows 7 master image. Two dedicated datastores are used for the replica images, and the linked clones are spread across four datastores.

High availability and failover

Introduction

This solution provides a highly available virtual desktop infrastructure. Each component is configured to provide a robust and scalable solution for the host layer, connectivity layer, and storage layer.

Storage layer

The VNX series is designed for five 9s availability by using redundant components in the array. All Data Movers, storage processors, and array components are capable of continued operation in case of a hardware failure. The RAID disk configuration on the VNX back end provides protection against data lossdue to hard disk failures. The available hot spare drives can be dynamically allocated to replace a failing disk.

Connectivity layer

The advanced networking features of VNX series, such as Fail-Safe Network (FSN) and link aggregation, provide protection against network connection failures at the array. Each ESXi host has multiple connections to both the Ethernet networks to protect against link failures. These connections are spread across multiple blades in an Ethernet switch to protect against component failure in the switch.

Host layer

The application hosts have redundant power supplies and network connections to reduce the impact of component failures in the ESXiservers. VMwarehigh availability (HA) is configured on the cluster to help recover virtual desktops quickly in case of a complete host failure.

Validated environment profile

Profile characteristics

Table 2 provides the environment profile that was used to validate the solution.

Table 2. Profile characteristics

Profile characteristic	Value
Number of virtual desktops	1,000
Virtual desktop OS	Windows 7 Enterprise SP1 (32-bit)
CPU per virtual desktop	1 vCPU
Number of virtual desktops per CPU core	• Cluster A—7.81 • Cluster B—5.95
RAM per virtual desktop	1 GB
Average storage available for each virtual desktop	2 GB (vmdk and vswap)
Average IOPS per virtual desktop at steady state	9.8
Average peak IOPS per virtual desktop during boot storm	40
Number of datastores used to store linked clones	4
Number of datastores used to store replicas	2
Number of virtual desktops per datastore	250
Disk and RAID type for datastores	RAID 5, 300 GB, 15k rpm, 3.5 in. SAS disks
Disk and RAID type for CIFS shares to host roaming user profiles and home directories	RAID 6, 2 TB, 7,200 rpm, 3.5 in. NL-SAS disks
Number of VMware clusters	2
Number of ESXi servers in each cluster	• Cluster A—8 • Cluster B—7
Number of virtual desktops in each cluster	500

Hardware and software resources

Hardware resources

Table 3 lists the hardware used to validate the solution.

Table 3. Hardware details

Hardware	Quantity	Configuration	Notes
EMC VNX5300	1	Two Data Movers (active/passive) Three disk-array enclosures (DAEs) configured with: • Twenty five 300 GB, 15k-rpm 3.5-in SAS disks • Seventeen 2 TB, 7,200 rpm 3.5 in. NL-SAS disks • Three 100 GB, 3.5 inch Flash drives	VNX shared storage
Intel-based servers	10	• Memory: 72 GB of RAM • CPU: Two Intel Xeon X5550 with 2.77-GHz quad core processors • Internal storage: One 73 GB internal SAS disk • External storage: VNX5300 (NFS) • NIC: Quad-port Broadcom BCM5709 1000Base-T adapters	8 servers—Virtual desktops ESXi cluster 1 2 servers—ESXi cluster to host infrastructure virtual machines
Intel-based servers	7	• Memory: 72 GB of RAM • CPU: Two Intel Xeon X5650 with 2.77 GHz hex core processors • Internal storage: One 73 GB internal SAS disk • External storage: VNX5300 (NFS) • NIC: Quad-port Broadcom BCM5709 1000Base-T adapters	Virtual desktops ESXi cluster 2

Hardware	Quantity	Configuration	Notes
Cisco Catalyst 6509	2	• WS-6509-E switch • WS-x6748 1-gigabit line cards • WS-SUP720-3B supervisor	1-gigabit host connections distributed over two line cards
Cisco Nexus 5020	2	Forty 100-gigabit ports	Redundant LAN A/B configuration

Software resources

Table 4 lists the software used to validate the solution.

Table 4. Solution software

Software	Configuration
VNX5300 (shared storage, file systems)	
VNX OE for File	Release 7.0.40.0
VNX OE for Block	Release 31 (05.31.000.5.502)
VSI for VMware vSphere: Unified Storage Management	Version 5.0.0.61
VSI for VMware vSphere: Storage Viewer	Version 5.0
Cisco Nexus	
Cisco Nexus 5020	Version 4.2(1)N1(1)
ESXi servers	
ESXi	ESXi 5.0.0 (474610)
EMC vSphere Storage APIs for Array Integration (VAAI) Plug-in	Version 1.0-10
vCenter Server	
OS	Windows 2008 R2 SP1
VMware vCenter Server	5.0
VMware View Manager	5.0
VMware View Composer	2.7
Virtual desktops Note: This software is used to generate the test load.	
OS	MS Windows 7 Enterprise SP1 (32-bit)
VMware tools	8.6.0 build-425873
Microsoft Office	Office Enterprise 2007 (Version 12.0.6562.5003)

Software	Configuration
Internet Explorer	8.0.7601.17514
Adobe Reader	9.1.0
McAfee Virus Scan	8.7 Enterprise
McAfee MOVE Antivirus	2.0.0
Adobe Flash Player	11
Bullzip PDF Printer	6.0.0.865
Login VSI (VDI workload generator)	3.0 Professional Edition

Conclusion

Summary

The features of the VNX operating environment enable EMC VNX series arrays to drive higher storage consolidation ratios at a lower cost than was previously possible. This reduces the capital expenditure on equipment and lowers the operational costs required to support the placement, power, and cooling of the storage arrays.

The McAfee MOVE antivirus platform reduces the overall server and storage resources required per virtual desktop by offloading CPU, RAM, and storage-intensive virus scanning tasks to dedicated servers running the MOVE Antivirus Offload Server software. In addition, the McAfee MOVE Offload Server only scans files that it has not previously scanned, regardless of the virtual desktop that makes the request. This greatly reduces the overall number of virus scans and resources required per virtual desktop when compared with traditional host-based antivirus solutions.

This reference architecture provides a blueprint for a validated VMware View 5.0 virtualization solution enabled by EMC VNX storage and the VMware vSphere 5.0 virtualization platform. The solution is able to support and scale to thousands of virtual desktops.

Next steps

EMC can help accelerate assessment, design, implementation, and management while lowering the implementation risks for an EMC infrastructure for virtual desktops enabled by EMC VNX Series (NFS), VMware vSphere 5.0, VMware View 5.0, and VMware View Composer 2.7.

To learn more about this and other solutions, contact an EMC representative.

References

EMC documentation

The following documents, located on the EMC Online Support website, provide additional and relevant information. Access to these documents depends on your login credentials. If you do not have access to a document, contact your EMC representative:

- *EMC Infrastructure for Virtual Desktops Enabled by EMC VNX Series (NFS),VMware vSphere 4.1, VMware View 4.6, and VMware View Composer* 2.6—Reference Architecture
- *EMC Performance Optimization for Microsoft Windows XP for the Virtual Desktop Infrastructure*—Applied Best Practices
- *Deploying Microsoft Windows 7 Virtual Desktops with VMware View*—Applied Best Practices Guide
- *EMC Infrastructure For Virtual Desktops Enabled by EMC VNX Series (NFS),VMware vSphere 4.1, VMware View 4.6, and VMware View Composer 2.6*—Proven Solution Guide
- *EMC Infrastructure for VMware View 5.0, EMC VNX Series (NFS), VMware vSphere 5.0, VMware View 5.0, and VMware View Composer 2.7*—Proven Solutions Guide

VMware documentation

The following VMware documents, located on the VMware website, also provide useful information:

- *VMware View Architecture Planning*
- *VMware View Installation*
- *VMware View Administration*
- *VMware View Security*
- *VMware View Upgrades*
- *VMware View Integration*
- *VMware View Windows XP Deployment Guide*
- *VMware View Optimization Guide for Windows 7*

McAfee documentation

The following documents, located on the McAfee website, also provide useful information:

- *McAfee MOVE Antivirus 2.0.0 Product Guide*
- *McAfee MOVE Antivirus 2.0.0 Software Release Notes*
- *McAfee MOVE Antivirus 2.0.0 Deployment Guide*