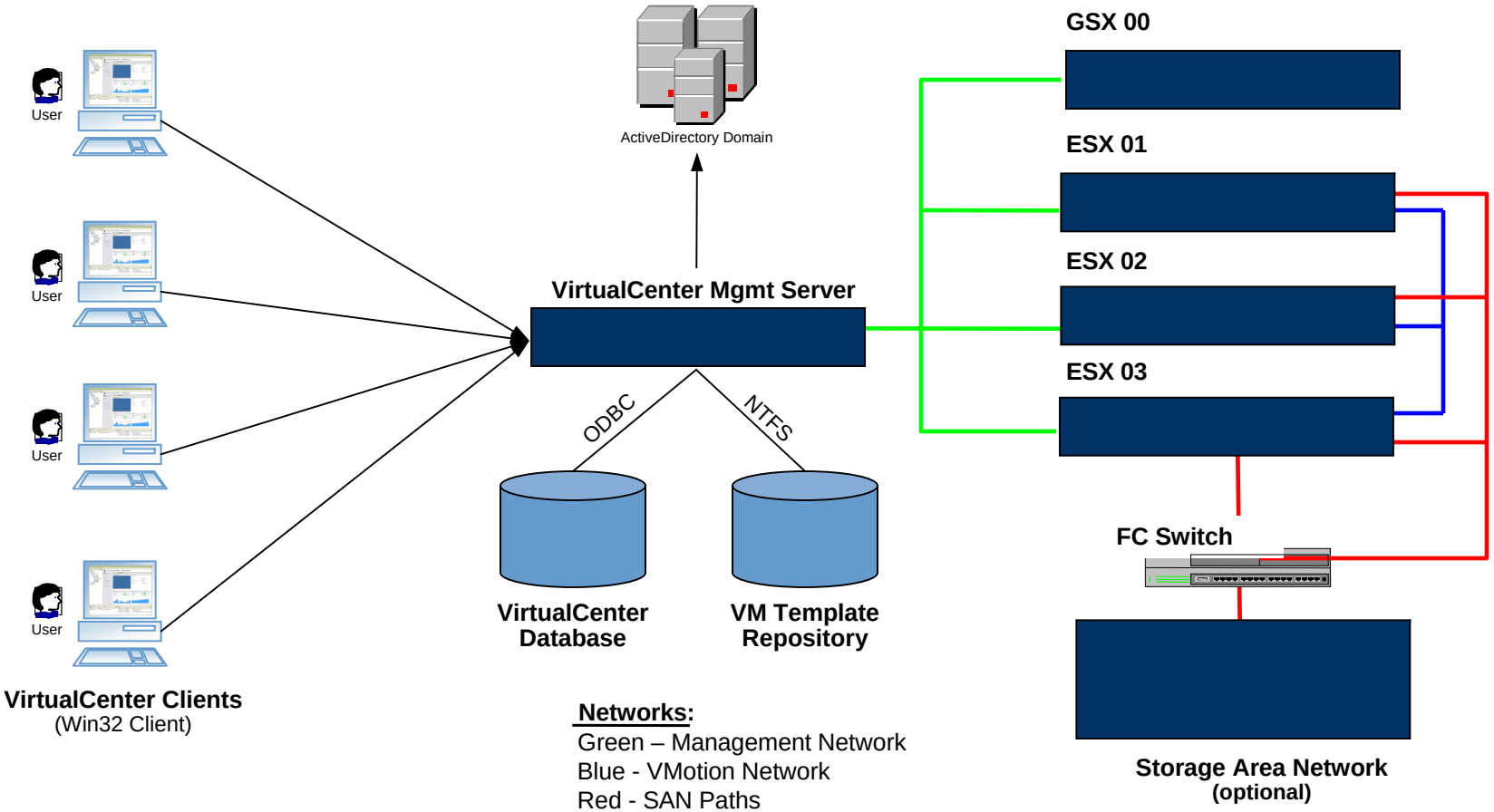
VMware VirtualCenter

Technical Best Practices

(Updated June 2005)

vmware®

VirtualCenter Product Components



Platform / Hardware Requirements

Component	VC Client	VC Management Server
	• Windows Application	• Windows Service
Supported Platforms	• Windows 2003 (all versions) • Windows 2000 (all versions) • Windows XP Pro • Windows NT 4 (SP6)	• Windows 2003 (Web, Std, Enterprise) • Windows 2000 (Server, Advanced Server) • Windows XP Pro
Hardware Requirements	• 256 MB RAM (min) • 512 MB Ram (recommended)	• Single 2.0 GHz CPU (min) • 2 Gb RAM (min) • 10/100 Mbps NIC (GigE recommended)
Other Details	• Requires .Net framework V1.1 (auto installed if needed) •Network traffic to the VC Mgmt Server encrypted via SSL • Http/Https also supported for access to the VC Mgmt Server through firewalls	• Can run in a Virtual Machine • Local storage required for VM template repository (network shares not supported)

VC Management Server - Additional Notes

- Scalability
  - A single Management Server with minimum hardware requirements is recommended for supporting up to 20 concurrent client connections, 50 ESX/GSX Servers, & 1000 VMs.
  - Increasing the hardware requirement to dual CPUs and 3 Gb RAM can scale the Management Server to support up to 50 concurrent client connections, 100 ESX/GSX Servers & 2000 VMs.
- High Availability
  - Availability of the managed ESX/GSX Servers & VMs unaffected by availability of the Management Server. Data stored in external database and VM templates should be backed up periodically
- Networking
  - The Management Server can reside on a network separated from VC Clients and/or ESX/GSX Servers, but a single port needs to be configured to permit access through firewalls (see user manual).
- Event Management
  - Management Server includes SNMP MIBs for generating alerts

VC Mgmt Server – Clustering for Availability

- VC Management Server (windows service) can be clustered using industry standard solutions, and only 1 license is required when only one instance is active at any given time
- Active / Passive clustered configurations can be installed and configured to point to the same VC database (but only one instance should be active at any given time)
- Active / Passive instances of the VC Management server will also require the following configuration settings to be equivalent:
  - Both should point to the same database (same ODBC connection setup).
  - Both should be set to the same “VC Server ID” (configured through the File->VC Settings menu).
  - Both should use the same public/private SSL keys (contained in the “C:\Documents and Settings\All Users\Application Data\VMware\VMware VirtualCenter\SSL” directory)
  - If VC WebService is enabled, both should use the same config file (located at “C:\DocumentsAndSettings\AllUsers\ApplicationData\VMware\VMwareVirtualCenter\VMA\vmaConfig.xml”.)

VirtualCenter Database Requirements

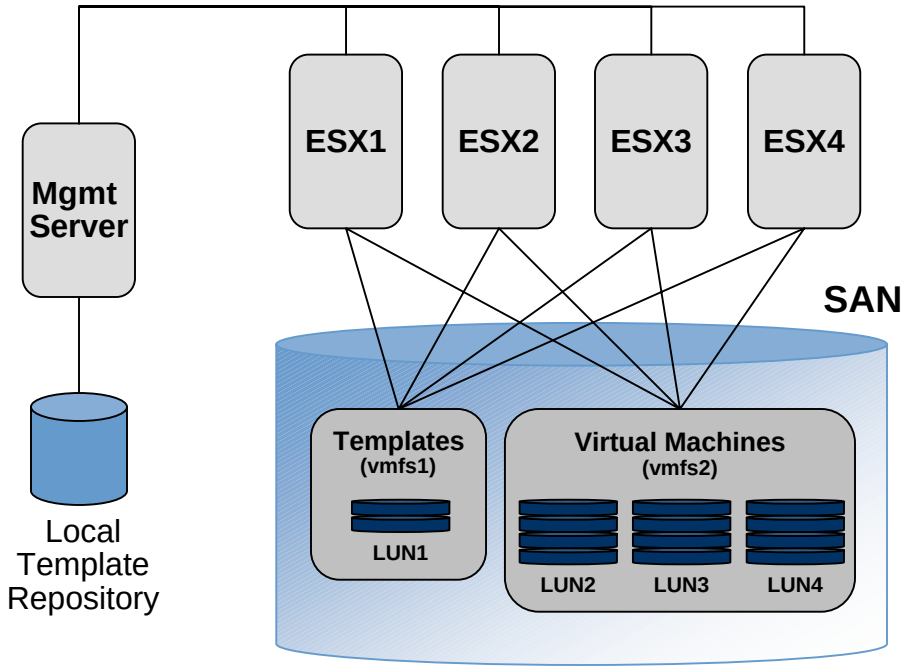
Supported Platforms	• **Oracle 8i, Oracle 9i, and Oracle 10g** • **Microsoft SQL Server (SQL Server 2000, SQL 7)** • **Microsoft Access (default for demo/eval purposes only)**
Database Sizing	**Size of the database will vary depending on the number of hosts & VMs managed, frequency of performance data collection and type of database.** •**Each stat sample collected is about 60 bytes for SQL, 100 bytes for Oracle, and each event stored is 1600 bytes for SQL, 600 bytes for Oracle.** •**Using default settings, the statistical data for 25 hosts running 8-16 VMs per host will plateau around 40-60 MB in a year (80-140 MB if set to "full"). Each month, the average number of events generated will also consume about 190 MB in SQL, and 70 MB in Oracle. Total DB size after a year is expected to be around 2.20 Gb in SQL, and 1.0 Gb in Oracle.** •**Using default settings, the statistical data for 75 hosts running 8-16 VMs per host will plateau around 90-150 MB in a year (200-330 MB if set to "full"). Each month, the average number of events generated will also consume about 190 MB in SQL, and 70 MB in Oracle. Total DB size after a year is expected to be around 2.40 Gb in SQL, and 1.2 Gb in Oracle.**
Data Extraction	• **Database views provided enable direct extraction of performance and inventory information.**
Recommendations	• **Use Oracle or SQL Server for production deployments.**

VirtualCenter Authentication & Authorization

- VirtualCenter Roles
  - VirtualCenter Administrators: super users who have all privileges on all systems
  - Virtual Machine Administrators: administrators on a subset of servers; can perform all operations on their servers, including VM provisioning, resource allocation and VMotion
  - Virtual Machine User: access to a subset of VMs; can use remote console, perform power operations, view performance graphs, but cannot create/delete VMs, set resources or move VMs.
  - Read-Only User: can only view information on a subset of VMs
- Privilege Management
  - Administrators on the Windows system running the Management Server are automatically assigned VirtualCenter Administrator privileges
  - VirtualCenter Administrators can delegate privileges to other users by accessing an existing ActiveDirectory or Domain Controller

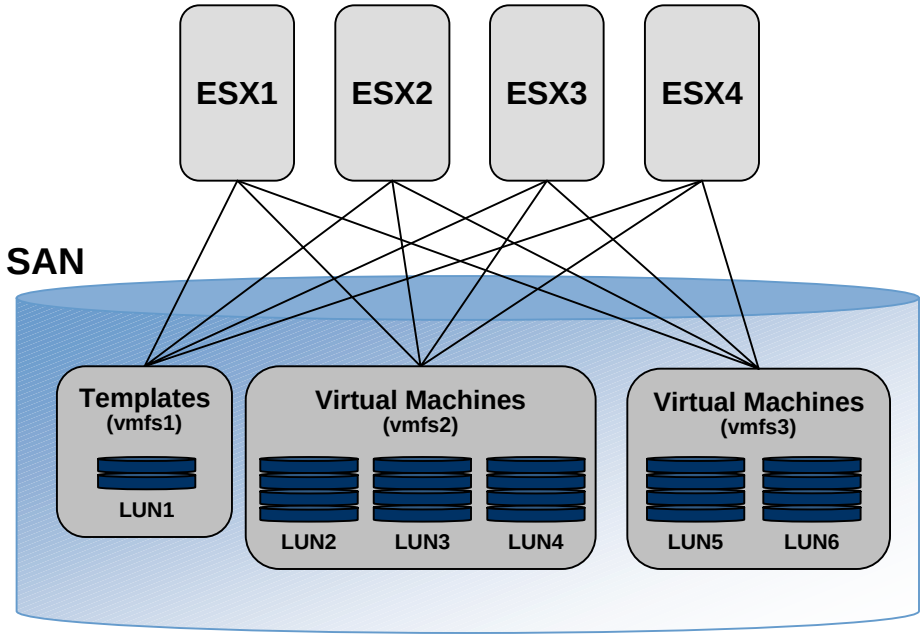
Templates: Storage & Deployment

- Store templates on a shared VMFS volume on the SAN (dedicated LUN)
- Enable access to the SAN-based template volume from all ESX servers
- SAN templates may only be provisioned to target hosts connected to SAN
- The VC Mgmt Server's local template repository can be used to provision VMs onto ESX Servers that are not connected to the SAN
- If template deployments to a LUN fail due to SCSI reservations, increase the "Scsi.ConflictRetries" parameter to a value of "10" through the Advanced Settings menu in the ESX MUI.



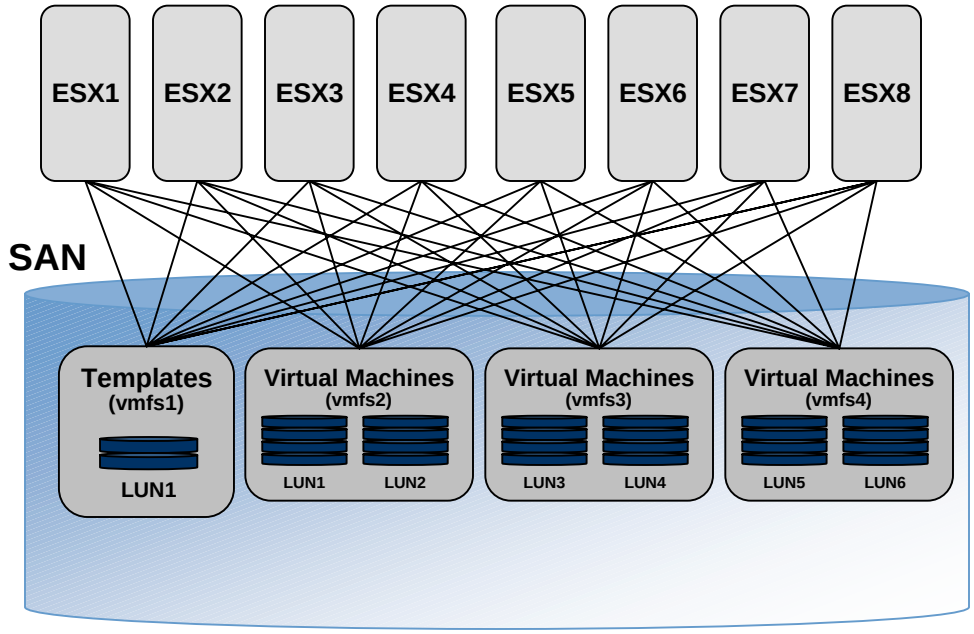
VMotion – Storage Configuration & Setup

- VM disks, including boot drive, must be stored on the SAN in a VMFS volume
- Target and source ESX Servers must have access to the VM's VMFS volume
- VMFS volumes must be in "public" mode and have volume names
- VMs must use volume names for specifying virtual disks
- Configuration files can be local to ESX Server or stored on SAN
- VMotion is not supported on clustered VMs (clustered VMs must be stored on a VMFS volume in "shared" mode)



VMotion – Best Practice for Large Environments

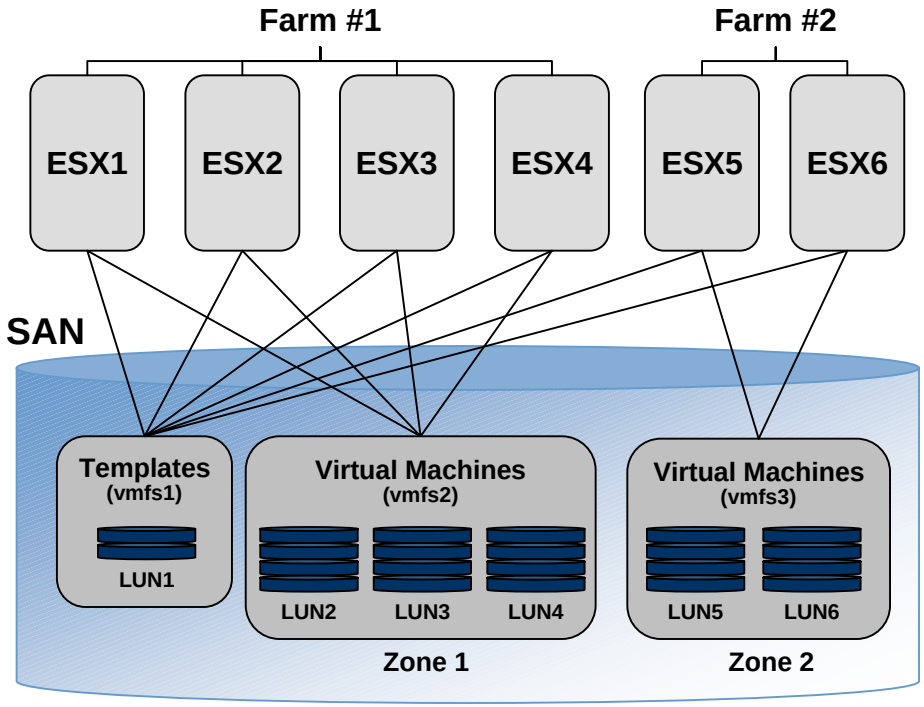
- No more than 16 ESX Servers connected to a single VMFS volume
- For added scalability, VMs should be divided into multiple VMFS volumes, each of which can still be accessible to all ESX Servers
- No more than 32 IO-intensive VMs, or 100 non-IO intensive VMs sharing a single VMFS volume*
- Also recommend increasing the maximum queue depth for the Fiber Channel adapter, and increasing the Disk.SchedNumReqOutstanding parameter (see ESX docs).



* In situations where the VMs are not IO-intensive, CPU, memory, and/or network resources constrains the number of VMs, and the threshold for acceptable performance of a single, SAN-based VMFS volume appears to be around 100 VMs.

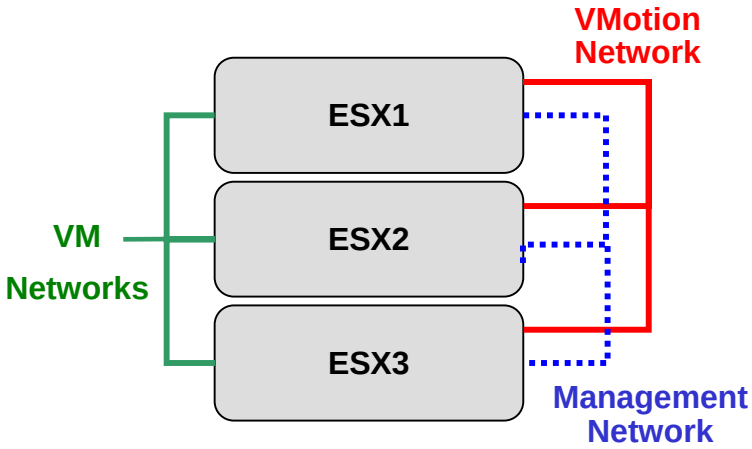
VMotion – LUN Masking and Zoning

- Cannot perform VMotion migrations between source and target ESX Servers if the LUN is masked or zoned away from the target
- Best Practice Recommendation: Apply LUN masking or zoning across separate farms



VMotion Requirements – Networking

- VMotion requires a Gigabit Ethernet network to ensure rapid migrations
  - A dedicated network is recommended to keep VM memory state secure
  - 2 hosts with cross-connected GigE cards can be used for demos
- VirtualCenter and ESX console management operations flow through the management network
  - Including VM deployment and cloning
- Network labels for each virtual NIC must be created through the ESX Server MUI:
  - Network labels are global across farms
  - VMotion automatically maps VMs to appropriate virtual NICs based on network labels
- VMs must have access to the necessary subnets on the target ESX Server



Minimum Network

- 2 NICs with at least one GigE NIC for VMotion.
- For best security, dedicate the GigE NIC to VMotion and use VLANs to divide the VM & Mgmt traffic on the other NIC
- For best availability, combine both NICs into a bond, and use VLANS to divide traffic into at least 3 networks (1 or more for VMs, 1 for COS, and 1 for VMotion)

Best Practice Network

- **1 dedicated NIC for Console OS (10/100 or GigE)**
- **1 dedicated NIC for VMotion (GigE)**
- **1 or more NICs for VMs (10/100 or GigE)**

VMotion Requirements – Server

- CPU Compatibility Requirements
  - Clock speeds and cache sizes may vary
  - Source/Destination must have same vendor class (Intel vs. AMD)
  - Source/Destination must have same CPU family (see note)
    - Note: Versions within a processor family can be distinguished by comparing CPU models, stepping levels, and extended features.

      In most cases, different versions within the same family are similar enough to maintain compatibility.

      In some cases, significant architectural changes appeared within the same CPU family (such as 64-bit extensions and SSE3). By default, VMware identifies these exceptions as incompatible with respect to guaranteeing and supporting a successful migration with VMotion.
  - VMware (in partnership with CPU and hardware vendors) is working to maintain VMotion compatibility across the widest range of processors. For current information contact your VMware representative.
- Heterogeneous support for all other underlying hardware devices (abstracted by the virtual hardware layer)