

# VMware Certified Professional on vSphere 4 Blueprint

## Section 1 – Plan, Install and Upgrade VMware ESX/ESXi

### Objective 1.1 -- Install VMware ESX/ESXi on local storage

#### Knowledge

- Identify minimum hardware requirements
- Download, prepare and validate installation media
- Determine appropriate ESX/ESXi configuration in a given situation
  - Obtain required information for environment
  - Verify hardware against the VMware Hardware Compatibility Guide
- Perform a custom installation
  - Customize storage layout for given situations
- Configure ESXi from the direct console
- Configure ESX/ESXi NTP
- Manage ESX/ESXi licensing
  - Compare/Contrast VMware vSphere editions
  - Manage license keys

#### Tools

- VMware Hardware Compatibility Guide
- Product documentation
- VMware Virtualization Toolkit

### Objective 1.2 – Upgrade VMware ESX/ESXi

#### Knowledge

- Plan a VMware vSphere upgrade
  - Backup/Restore ESX/ESXi host configuration
  - Understand Virtual Machine backup options
  - Determine if existing hardware meets upgrade requirements
- Understand VMware ESX/ESXi upgrade scenarios
- Perform upgrade to ESX 4.0
  - Upgrade VMware ESX/ESXi
  - Upgrade virtual machine hardware
  - Upgrade VMware Tools
- Verify success of upgrade
- Understand upgrade roll back options

## Tools

- vSphere Host Update Utility
- vCenter Update Manager
- esxupdate

## **Objective 1.3 – Secure VMware ESX/ESXi**

### Knowledge

- Identify default security principles
- Understand Service Console firewall operation
  - Service Console Security Level
  - Opening/Closing ports in the firewall using the vSphere Client
- Set up user/group accounts
- Determine applications needed for accessing the service console in a given scenario

### Tools

- vSphere Client
- Product documentation

## **Objective 1.4 – Install VMware ESX/ESXi on SAN Storage**

### Knowledge

- Configure LUN Masking
- Prepare SAN
- Configure FC or iSCSI HBA BIOS
  - Enable BIOS
  - Select Boot LUN
- Install VMware ESX/ESXi
- Determine boot LUN size in a given situation

### Tools

- FC or iSCSI HBA BIOS Tools
- FC SAN Configuration Guide
- iSCSI SAN Configuration Guide
- Product documentation

## **Objective 1.5 – Identify vSphere Architecture and Solutions**

### Knowledge

- Differentiate VMware platform products and editions
- Understand the various datacenter solutions (View, SRM, Lab Manager, etc.)
- Explain ESX/ESXi architecture
- Compare and contrast bare metal vs. hosted architecture

### Tools

- Product Documentation
- VMware vSphere Editions Comparison Chart

## **Section 2 – Configure ESX/ESXi Networking**

### **Objective 2.1 – Configure Virtual Switches**

### Knowledge

- Understand Virtual Switch and ESX/ESXi NIC and port maximums
- Determine the vSwitch NIC teaming policy in a given situation
- Determine the appropriate vSwitch security policies in a given situation
- Create/Delete Virtual Switches
- Create Ports/Port Groups
- Assign Physical Adapters
- Modify vSwitch NIC Teaming and failover policies
- Modify vSwitch security policy and VLAN settings
- Configure VMotion

### Tools

- Product documentation
- VMware vSphere Client

## **Objective 2.2 – Configure vNetwork Distributed Switches**

### Knowledge

- Understand ESX Host and port maximums for dvSwitches
- Determine the virtual port group NIC teaming and fail-over policy in a given situation
- Determine the appropriate virtual port group security policies in a given situation
- Create/Modify a vNetwork Distributed Switch
- Create/Modify Uplink Group settings
- Create/Modify dvPort Group settings
- Add an ESX/ESXi Host to a vNetwork Distributed Switch
- Add/Delete a VMkernel dvPort
- Migrate Virtual Machines to a vNetwork Distributed Switch

### Tools

- Product documentation
- VMware vSphere Client

## **Objective 2.3 – Configure VMware ESX/ESXi Management Network**

### Knowledge

- Modify Service Console IP Settings
- Configure Service Console availability
- Configure DNS and Routing settings for an ESX Host

### Tools

- Product documentation
- VMware vSphere Client

## **Section 3 – Configure ESX/ESXi Storage**

### **Objective 3.1 – Configure FC SAN Storage**

#### Knowledge

- Identify FC SAN hardware components
- Identify how ESX Server connections are made to FC SAN storage
- Describe ESX Server FC SAN storage addressing
- Describe the concepts of zoning and LUN masking
- Configure LUN masking
- Scan for new LUNs
- Determine and configure the appropriate multi-pathing policy
- Differentiate between NMP and third-party MPP

#### Tools

- Product documentation
- FC SAN Configuration Guide
- VMware vSphere Client

### **Objective 3.2 – Configure iSCSI SAN Storage**

#### Knowledge

- Identify iSCSI SAN hardware components
- Determine use cases for hardware vs. software iSCSI initiators
- Configure the iSCSI Software Initiator
- Configure Dynamic/Static Discovery
- Configure CHAP Authentication
- Configure VMkernel port binding for iSCSI Software multi-pathing
- Discover LUNs
- Identify iSCSI addressing in the context of the host

#### Tools

- Product documentation
- iSCSI SAN Configuration Guide
- VMware vSphere Client
- `esxcli`

## **Objective 3.3 – Configure NFS Datastores**

### Knowledge

- Identify the NFS hardware components
- Explain ESX exclusivity for NFS mounts
- Configure ESX/ESXi network connectivity to the NAS device
- Create an NFS Datastore

### Tools

- Product documentation
- VMware vSphere Client

## **Objective 3.4 – Configure and Manage VMFS Datastores**

### Knowledge

- Identify VMFS file system attributes
- Determine the appropriate Datastore location/configuration for given virtual machines
- Determine use cases for multiple VMFS Datastores
- Create/Configure VMFS Datastores
- Attach existing Datastore to new ESX host
- Manage VMFS Datastores
  - Group/Unmount/Delete Datastores
- Grow VMFS volumes

### Tools

- Product documentation
- VMware vSphere Client

## **Section 4 – Install and Configure vCenter Server**

### **Objective 4.1 – Install vCenter Server**

### Knowledge

- Identify hardware requirements
- Understand configuration maximums
- Determine availability requirements for a vCenter server in a given situation
- Determine appropriate vCenter Server edition
- Determine database size requirements
- Prepare/Configure vCenter Server database
- Install vCenter Server using downloaded installer

- Install additional modules
  - vCenter Guided Consolidation
  - vCenter Update Manager
  - vCenter Converter
- Determine use case for vCenter Linked Mode Groups

#### Tools

- Product documentation
- Database Sizing Tool/Calculators

### **Objective 4.2 – Manage vSphere Client plug-ins**

#### Knowledge

- Identify available plug-ins
- Determine required plug-ins for a given application
- Ensure permissions to install plug-ins
- Enable plug-ins after installation

#### Tools

- Product documentation
- vSphere Client

### **Objective 4.3 – Configure vCenter Server**

#### Knowledge

- Identify the vCenter Server managed ESX Hosts and Virtual Machine maximums
- Join ESX/ESXi Hosts to vCenter Server
- Configure Guest OS Customization
- Use datacenters and folders to organize the environment
- Configure/Use Scheduled Tasks
- Configure/Use Resource Maps
- Use Storage Reports/Storage Maps
- View/Manage Events
- Configure vCenter Server settings
- Configure vSphere Client settings

#### Tools

- Product documentation
- vSphere Client

## **Objective 4.4 – Configure Access Control**

### Knowledge

- Create/Modify user permissions in vCenter
- Create/Modify user permissions in ESX Server
- Restrict access to vCenter inventory objects
- Define vCenter predefined roles and their privileges
- Create/Clone Edit roles
- Assign roles to users and groups
- Describe how privileges propagate
- Understand permissions as applied to user and group combinations

### Tools

- Product documentation
- vSphere Client

## **Section 5 – Deploy and Manage Virtual Machines and vApps**

### **Objective 5.1 – Create and Deploy Virtual Machines**

#### Knowledge

- Understand virtual machine hardware maximums
- Create a virtual machine
  - Determine appropriate SCSI adapter
  - Determine Virtual Disk type
  - Install/Upgrade/Configure VMware Tools
- Create/Convert templates
- Customize Windows/Linux virtual machines
- Manage Customization Specifications
- Deploy a virtual machine from a template
- Deploy a virtual machine using VMware vCenter Converter Enterprise
  - Perform a Hot Clone
  - Perform a Cold Clone
  - Perform System Reconfiguration
- Deploy a virtual machine using Guided Consolidation
  - Perform Discovery
  - Analyze discovered virtual machines
  - Consolidate selected virtual machines
- Clone a virtual machine
- Import a virtual machine from a file/folder



## Tools

- Product documentation
- vSphere Client

## **Objective 5.2 – Manage Virtual Machines**

### Knowledge

- Configure/Modify virtual machines
  - Add/Hot Add virtual machine hardware
  - Grow virtual machine disks
  - Determine appropriate disk format
- Connect virtual machines to devices
- Configure virtual machine options
  - General Options
  - Advanced Options
  - Power Management Options
  - VMware Tools Options
- Configure appropriate virtual machine resource settings

## Tools

- Product documentation
- vSphere Client

## **Objective 5.3 – Deploy vApps**

### Knowledge

- Determine whether a vApp is appropriate for a given situation
- Define Open Virtual Machine Format (OVF)
- Import/Export a Virtual Appliance
- Build a vApp
- Create/Add virtual machines to a vApp
- Edit vApp Properties
- Export vApps
- Clone a vApp

## Tools

- Product documentation
- vSphere Client
- OVF Tool

## **Section 6 – Manage Compliance**

### **Objective 6.1 – Install, Configure and Manage VMware vCenter Update Manager**

#### Knowledge

- Determine installation requirements and database sizing
- Install Update Manager Server and Client components
- Configure update manager settings
- Configure patch download options
- Create baselines
- Attach baselines to vCenter inventory objects
- Scan ESX hosts and virtual machines
- Remediate ESX hosts and virtual machines
- Stage ESX/ESXi Host updates
- Analyze compliance information from a scan

#### Tools

- Product documentation
- Update Manager Database Sizing Tools

### **Objective 6.2 – Establish and Apply ESX Host Profiles**

#### Knowledge

- Create/Delete Host Profiles
- Import/Export Host Profiles
- Edit Host Profile Policies
- Associate an ESX host with a host profile
- Check for Compliance
- Apply Host Profiles
- Analyze configuration compliance information from a scan

#### Tools

- Product documentation
- vSphere Client

## **Section 7 – Establish Service Levels**

### **Objective 7.1 – Create and Configure VMware Clusters**

#### Knowledge

- Create new cluster
- Add ESX/ESXi hosts to a cluster
- Configure High Availability basic/advanced settings
- Enable/Configure VM Monitoring
- Configure Distributed Resource Scheduler basic/advanced settings
- Configure Distributed Power Management
- Configure Enhanced VMotion Compatibility
- Configure swap file location
- Analyze HA host failure capacity requirements
- Analyze HA admission control
- Determine use cases for DRS automation levels and migration thresholds
- Determine use cases for DPM policies

#### Tools

- Product documentation
- vSphere Client

### **Objective 7.2 – Enable a Fault Tolerant Virtual Machine**

#### Knowledge

- Identify FT restrictions
- Evaluate FT use cases
- Set up an FT network
- Verify requirements of operating environment
- Enable FT for a virtual machine
- Test an FT configuration
- Upgrade ESX hosts containing FT virtual machines

#### Tools

- Product documentation
- vSphere Client

## **Objective 7.3 – Create and Configure Resource Pools**

### Knowledge

- Determine Resource Pool requirements for a given situation
- Evaluate appropriate shares, reservations, and limits in a given situation
- Evaluate virtual machines for a given Resource Pool
- Create Resource Pools
- Set CPU resource shares/reservations/limits
- Set memory resource shares/reservations/limits
- Define Expandable Reservation
- Add virtual machines to pool
- Describe resource pool hierarchy

### Tools

- Product documentation
- vSphere Client

## **Objective 7.4 – Migrate Virtual Machines**

### Knowledge

- Identify compatibility requirements
- Cite the three methods of virtual machine migration
- Understand/Apply
- Determine migration use cases
- Compare and contrast migration technologies
- Migrate a virtual machine using VMotion
- Migrate a virtual machine using Storage VMotion
- Cold migrate a virtual machine

### Tools

- Product documentation
- vSphere Client

## **Objective 7.5 – Backup and Restore Virtual Machines**

### Knowledge

- Describe different back-up/restore procedures and strategies
- Create/Delete/Restore Snapshots
- Install Backup and Recovery Appliance
- Install vCenter Data Recovery plug-in
- Create a backup job with vCenter Data Recovery
- Perform full VM/file-level restore with vCenter Data Recovery

### Tools

- Product documentation
- vSphere Client
- Backup and Recovery Appliance

## **Section 8 – Perform Basic Troubleshooting and Alarm Management**

### **Objective 8.1 – Perform Basic Troubleshooting for ESX/ESXi Hosts**

#### Knowledge

- Understand general ESX Server troubleshooting guidelines
- Troubleshoot common installation issues
- Monitor ESX Server system health
- Understand how to export diagnostic data

#### Tools

- Product documentation
- vSphere Client

### **Objective 8.2 – Perform Basic Troubleshooting for VMware FT and Third-Party Clusters**

#### Knowledge

- Analyze and evaluate VM population for maintenance mode considerations
- Understand manual Third-Party failover/failback processes
- Troubleshoot Fault Tolerance partial or unexpected failovers

## Tools

- Product documentation
- vSphere Client

## **Objective 8.3 – Perform Basic Troubleshooting for Networking**

### Knowledge

- Verify VM is connected to the correct port group
- Verify port group settings are correct
- Verify that the network adaptor is connected within the VM
- Verify VM network adaptor settings
- Verify physical network adaptor settings
- Verify vSphere network management settings

## Tools

- Product documentation
- vSphere Client
- ping, vmkping, tcpdump, nslookup

## **Objective 8.4 – Perform Basic Troubleshooting for Storage**

### Knowledge

- Identify storage contention issues
- Identify storage over-commitment issues
- Identify storage connectivity issues
- Identify iSCSI software initiator configuration issues
- Interpret Storage Reports and Storage Maps

## Tools

- Product documentation
- FC SAN Configuration Guide
- iSCSI SAN Configuration Guide
- vSphere Client

## **Objective 8.5 – Perform Basic Troubleshooting for HA/DRS and VMotion**

### Knowledge

- Explain the requirements of HA/DRS and VMotion
- Verify VMotion functionality
- Verify DNS settings
- Verify the service console network functionality
- Interpret the DRS Resource Distribution Graph and Target/Current Host Load Deviation
- Troubleshoot VMotion using topology maps
- Troubleshoot HA capacity issues
- Troubleshoot HA redundancy issues

### Tools

- Product documentation
- vSphere Client
- DRS Resource Distribution Graph
- Topology Maps
- `cpuid`, `ping`, `vmkping`

## **Objective 8.6 – Create and Respond to vCenter Connectivity Alarms**

### Knowledge

- List vCenter default connectivity alarms
- List possible actions for connectivity alarms
- For a given alarm, analyze and evaluate the affected virtual infrastructure components
- Create a vCenter connectivity alarm
- Relate the alarm to the affected components

### Tools

- Product documentation
- vSphere Client

## **Objective 8.7 – Create and Respond to vCenter Utilization Alarms**

### Knowledge

- List vCenter default utilization alarms
- List possible actions for utilization alarms
- For a given alarm, analyze and evaluate the affected virtual infrastructure resource
- Create a vCenter utilization alarm
- Relate the alarm to the affected resource

### Tools

- Product documentation
- esxtop/resxtop
- Performance Charts
- vSphere Client

## **Objective 8.8 – Monitor vSphere ESX/ESXi and Virtual Machine Performance**

### Knowledge

- Identify critical performance metrics (e.g., CPU ready, queue depth, etc.)
- Explain memory metrics (ballooning, shared, etc.)
- Explain CPU metrics (ready/wait time, etc.)
- Explain network metrics (usage, packet drops, etc.)
- Explain storage metrics (latency, queuing, etc.)
- Compare and contrast Overview and Advanced Charts
- Create an Advanced Chart
- Determine host performance using guest Perfmon

### Tools

- Product documentation
- esxtop/resxtop
- Performance Charts
- vSphere Client