VCP5 Blueprint with study notes

http://vinfrastructure.it/en/certifications-on-virtualization/vcp/vcp5/

The actual version of the blueprint is 1.3 (the version 1.4 was the last for the beta exam).
Similar works, for VCP5 study notes:

- http://virtuallanger.com/vcp5/
- http://www.valcolabs.com/
- http://vcp5.wordpress.com/
- http://blog.mwpreston.net/vcp-5/
- http://thesaffageek.co.uk/vcp5/
- http://www.vmtheory.com/index.php?title=VCP5_Blueprint
- http://vmwaretraining.blogspot.com/2011/10/studying-for-vcp5-exam.html
- VCP510 (VCP on vSphere 5) Exam Cram Notes Part 1, Part 2 and Part 3
- Damian Karlson's VMware VCP 5 Resources
- VCP5 shared notes
- vSphere 5 vReference card: Networking, Resouce, HA, VM, vCenter

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Section 1 - Plan, Install, Configure and Upgrade vCenter Server and VMware ESXi

Objective 1.1 – Install and Configure vCenter Server

- See also this similar post: *Objective 1.1 – Install and Configure vCenter Server* and *Objective 1.1 — Install and Configure vCenter Server*.
- VMware vSphere Basics guide[1]
- vSphere Installation and Setup guide[2]
- vCenter Server and Host Management guide[3]

Identify available vCenter Server editions (new in vSphere 5)

As in vSphere 4.x, the vCenter Server 5 editions are:

- vCenter Server Foundation: same limits of 4.x (max 3 hosts, no Orchestrator, no Linked mode, no support for some products like SRM)
- vCenter Server Essential: basically a Foundation edition to be used in the Essential and Essential+ bundles
- vCenter Server Standard: the full edition (with some limits only in the appliance version)

For the vCenter Server installation and deployment there are now two different options (in vSphere 4.x there was only the first one):

- install the vCenter Server on a Windows Server machine (physical or VM), see minimum requirements (and note that now Windows XP is no more supported)
- deploy of a virtual appliance (VA) based on SuSE Enterprise (no Windows license is required, but there are some limitations)

Deploy the vCenter Appliance (new in vSphere 5)

The deploy phase is similar to a usual virtual appliance (VA): http://vmwire.com/2011/07/15/vsphere-vcenter-server-linux-virtual-appliance-quick-start-guide/

The blueprint does not specify also the configuration, but I suppose that could be required. See the vSphere Installation and Setup Guide (page 201) and vCenter Server and Host Management Guide (page 41).

For more info and a list of the vCSA limits see also: vCenter Server Virtual Appliance (vCSA)

Install vCenter Server into a virtual machine (same as vSphere 4.x)

See: http://virtual-infrastructure.it/vdesign/vmware-vcenter-server-physical-or-virtual/.

Size the vCenter Server database (similar as vSphere 4.x)

You can use the estimator included in vCenter Server (or download the excel from VMware site). I recommend checking how grow with the number of hosts, VMs and the statistical level:

- http://vmetc.com/2008/12/11/estimate-virtualcenter-database-size-from-the-vi-client/

Install additional vCenter Server components (new in vSphere 5)

In the vCenter DVD there are the following packages:

- vCenter Server for Windows (that include also the Orchestrator)
- vSphere Client
- vSphere Web Client (server part for Windows)
- vSphere Update Manager
- ESXi Dump Collector
- Syslog Server
- Auto Deploy
- vSphere Authentication Proxy

Install/Remove vSphere Client plug-ins (same as vSphere 4.x)

Installation usually is done from the plug-in manager (but not always) or from an installation program or MSI (for example for the VDR's plug-in. The removal is the same of a usual Windows programs, from the control panel / Uninstall.

Different is how the plug-in are registered and de-registered from the vCenter Server side… in this case there are specific procedures(for removal see KB 1025360 – Removing unwanted plug-ins from vCenter Server).

Enable/Disable vSphere Client plug-ins (same as vSphere 4.x)

Still done from the plug-in manager (see official documents). In case of issues during the enable, check if there aren't old version of the plug-in or see KB 2001202 – Cannot enable vSphere Client plugins after they are installed.

License vCenter Server (similar as vSphere 4.x)

The license management is the same of vSphere 4.x and also the type of vCenter Server license is the same (for instance).

New in vCenter Server 5.0 is the Reporting tool to see licenses usage (that this tool require the vSphere Web Client?). Each 30 minutes snapshots of licenses usage have been saved in the vCenter DB.

Determine availability requirements for a vCenter Server in a given vSphere implementation (similar as vSphere 4.x)

See also: http://vinfrastructure.it/en/vdesign/vcenter-server-solutions-to-increase-the-availability/.

The vCenter Server availability could be necessary in most cases and critical for large environment (or where a lot of services depends on it). In small environment, usually, this not so critical, because most of the VMware functions still work also without vCenter Server (for more info see vCenter Server Design: Physical vs Virtual).

There are at least four solutions to increase the availability for vCenter Server:

- use a VM for vCenter Server and use VMware HA
- use vCenter Server Heartbeat product
- use a MSCS solution for vCenter (unsupported from vSphere version)
- use VMware FT (can work, but it's unsupported)

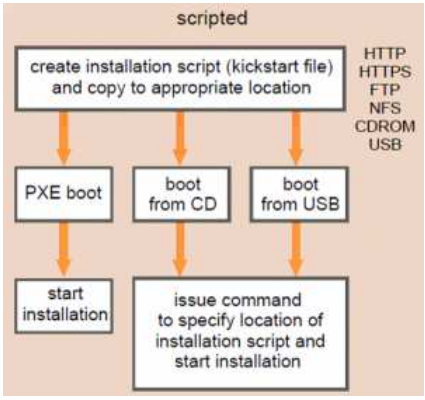
See also: http://kb.vmware.com/kb/1024051 – Supported vCenter Server high availability options.

Determine use case for vSphere Client and Web Client (new in vSphere 5.x)

See the VMware vSphere Basics guide and the document vSphere Web Client.

Objective 1.2 – Install and Configure VMware ESXi

- See also this similar post: *Objective 1.2 – Install and Configure VMware ESXi* and *Objective 1.2 – Install and Configure VMware ESXi*.
- VMware vSphere Basics guide[1]
- vSphere Installation and Setup guide[2]
- vCenter Server and Host Management guide[3]



Perform an interactive installation of ESXi (similar as vSphere 4.x)

Interactive installation is quite simple and similar to a generic ESXi 4.x.

Seems strange but there is no mention on scripted installation (introduced first time, for ESXi, in version 4.1) in the blueprint, but IMHO you must know them, at least how you can boot from (you can PXE boot the ESXi installer or boot it from a CD/DVD or USB drive) and where you can put the kickstart file (the installation script can be stored in a location that the host can access by HTTP, HTTPS, FTP, NFS, CDROM, or USB). Also check the format of the kickstart file to know required and optional fields.

Of course the questions are not too deep on this aspects (there will be also a VCAP5-DCA exam…)

Deploy an ESXi host using Auto Deploy (new in vSphere 5.x)

See also: vSphere Installation and Setup Guide (page 57).

Auto Deploy is a new method for provisioning ESXi hosts in vSphere 5.0. At a high level the ESXi host boots over the network (using PXE/gPXE), contacts the Auto Deploy Server which loads the ESXi image into the hosts memory (the host become stateless). After loading the ESXi image the Auto Deploy Server coordinates with vCenter Server to configure the host, using Host Profiles (same as in vSphere 4.x) and Answer Files (answer files are new in 5.0). You can create image profiles with ESXi Image Builder CLI, and host profiles using the vSphere Client.

- vSphere 5 What's New – Image Builder and Auto Deploy
- vSphere Auto Deploy Demo
- Configuring VMware vSphere Auto Deploy
- vSphere 5 – How to run ESXi stateless with vSphere Auto Deploy

Configure NTP on an ESXi Host (same as vSphere 4.x)

Is the same for ESX/ESXi from version 3.5 and can be configured from the vSphere Client. See also: How to configure NTP on VMware ESX.

Configure DNS and Routing on an ESXi Host (same as vSphere 4.x)

Is the same for ESX/ESXi from version 3.x and can be configured from the vSphere Client. See also: Use the VI Client to change DNS, gateway, and hostname.

Note that, compared to the old ESX host, in the ESXi there is only a single gateway (not one for Service Console and one, optional, for vmkernel interfaces).

Enable/Configure/Disable hyperthreading (same as vSphere 4.x)

See: vSphere Resource Management Guide (page 19).

To enable hyperthreading, you must first enable it in your system's BIOS settings and then turn it on in the vSphere Client (in host Configuration tab / Processors / Properties). Hyperthreading is enabled by default.
Some Intel processors, for example Xeon 5500 processors or those based on the P4 microarchitecture, support hyperthreading. Consult your system documentation to determine whether your CPU supports hyperthreading.

Enable/Size/Disable memory compression cache (same as vSphere 4.1)

This new feature introduced in vSphere 4.1 is another memory management solution (faster that the last change: the VM swap). See official documentation for more info.

- To enable or disable this feature (enabled by default): change host Advanced Settings (**Mem.MemZipEnable**, 1 to enable or 0 to disable the memory compression cache).
- To change the size: still in host Advanced Settings (**Mem.MemZipMaxPct**, the value is a percentage of the size of the virtual machine and must be between 5 and 100 percent).

License an ESXi host (new in vSphere 5.x)

Host licensing in quite new in vSphere 5… But do not expect too much questions about it (is not a VSP5 exam).

The vCenter Server is still licensed on instance, but now each host is licensed not only per socket (one socket is a physical CPU package) but also per **vRAM Entitlement** and this value depends on the ESXi edition (note that the edition are the same as vSphere 4.x exept the Advanced that has been suppressed). For more info see: the vSphere 5 licensing model.

Objective 1.3 – Plan and Perform Upgrades of vCenter Server and VMware ESXi

- See also this similar post: *Objective 1.3 - Plan and Perform Upgrades of vCenter Server and VMware ESXi* and *Objective 1.3 – Plan and Perform Upgrades of vCenter Server and VMware ESXi*.
- VMware vSphere Basics guide[1]
- vSphere Installation and Setup guide[2]
- vSphere Upgrade guide[4]
- VMware vSphere Examples and Scenarios guide[5]
- Installing and Administering VMware vSphere Update Manager[6]

Identify upgrade requirements for ESXi hosts (similar as vSphere 4.x)

See: vSphere Upgrade Guide (page 11) and vSphere Upgrade Guide (page 69).

ESXi 5 system requirements are the same for a clean installation: 64 bit CPU, one or more supported NIC, 2098 MB RAM (note that are more than 2 GB), supported storage, … There are other requirements based on the type of source.

Note that there upgrade and migration are used in the guide in the same way, but a ESXi 4.x to ESXi 5 is an upgrade and ESX 4.x to ESXi 5 is a migration. Upgrade/migration can be perform in an automated mode (with VUM or by scripting) or in a interactive mode (you can boot the ESXi installer from a CD, DVD, or USB flash drive to upgrade ESX/ESXi 4.x hosts to ESXi 5.0).

Upgrade Method	Upgrade from ESX or ESXi 4.x to ESXi 5.0	Upgrade or Patch from ESXi 5.0 to ESXi 5.n
vSphere Update Manager	yes	yes
Interactive upgrade from CD, DVD, or USB drive	yes	yes
Scripted upgrade	yes	yes
vSphere Auto Deploy	no	yes
esxcli	no	yes

Study also the files that are migrated from a ESX 4.x to a ESXi 5. Some are converted, other make not sense on a ESXi.

Identify steps required to upgrade a vSphere implementation (similar as vSphere 4.1)

See the entire vSphere Upgrade Guide. Basically the steps are (after the requirements check):

- Upgrade of vCenter Server (upgrade from vCenter Server 4.1 is possible, exept if it installed on a 64 bit Windows XP) or deploy on a new vCenter Server 5. There is a downtime but it related only to vCenter Server.
- Optional, upgrade or install of VMware Update Manager to handle the hosts upgrade/migration.
- Upgrade or migration or reinstallation of hosts (vMotion across old and new host will work)… with vMotion an more hosts (and enough resources) this step can be done without downtime.
- Upgrade of VMware Tools in all VMs (new Tools can works also on vSphere 4.x)… task not stricly required but recomended. There is a downtime in each Windows VMs (due to reboot needed after VMware Tools upgrade).
- Upgrade of VMFS (could be done with running VMs on it and without downtime)… task not stricly required but recommended… note that old hosts cannot read VMFS5 and new hosts can work fine on VMFS3.
- Upgrade of virtual hardware to v8 (but ESXi 5 can also run VMs in v7 and v4 format)… task suggested. There is a downtime in each VM (VM must be powered off to perform the upgrade of virtual hardware).

Note that VUM can orchestrate hosts, VMware Tools and virtual hardware upgrade.

Upgrade a vNetwork Distributed Switch (similar as vSphere 4.1)

A vSphere distributed switch version 4.0 or 4.1 can be upgraded to a later version (5.0), enabling the distributed switch to take advantage of features that are only available in the later version.

For the DVS upgrade see the vSphere Networking Guide (page 24). Log in to the vSphere Client and select the Networking inventory view. Select the vSphere distributed switch in the inventory pane. On the Summary tab, next to Version, select Upgrade.

Upgrade from VMFS3 to VMFS5 (new in vSphere 5.x)

vSphere 5 offers a pain free upgrade path from VMFS-3 to VMFS-5. The upgrade is an online and non-disruptive operation which allows the resident virtual machines to continue to run on the datastore. But upgraded VMFS datastores may have impact on SDRS operations, specifically virtual machine migrations.

When upgrading a VMFS datastore from VMFS-3 to VMFS-5, the current VMFS-3 block size will be maintained and this block size may be larger than the VMFS-5 block size as VMFS-5 uses unified 1MB block size.

In upgraded hosts, the VMFS partition is not upgraded from VMFS3 to VMFS5. ESXi 5.0 is compatible with VMFS3 partitions. You can upgrade the partition to VMFS5 after the host is upgraded to ESXi 5.0. See the information on upgrading datastores from command line to VMFS5 in the vSphere Storage Guide (page 206).

Also note that new ESXi use a different partition schema (GPT instead of MBR) to handle disks and LUNs larger than 2 TB. For new installation the GPT partition table is used.

For more info about VMFS see also: http://www.boche.net/blog/index.php/2011/07/21/vmfs-5-vmfs-3-whats-the-deal/

Upgrade VMware Tools (same as vSphere 4.x)

See the vSphere Upgrade Guide (page 138). This task can be done manually (from vSphere Client) or with VUM. Note that:

- The version of VMware Tools included in vSphere 5.0 is supported on vSphere 4.x and 5.0 virtual machines. That is, you can also use this new version of VMware Tools in virtual machines on ESX/ESXi 4.x hosts.
- Virtual machines in a vSphere 5.0 environment support the versions of VMware Tools included in vSphere 4.0-5.0. That is, you are not strictly required to upgrade VMware Tools if VMware Tools was installed from an ESX/ESXi 4.x host.

Upgrade Virtual Machine hardware (same as vSphere 4.x)

See the vSphere Upgrade Guide (page 154). Can be done only with the VM powered off. Some new features (like more than 8 vCPU, for example) require the new virtual hardware (v8). ESXi 5 can create, edit and run v8 and v7 VMs, and can edit and run v4 VMs.

Paravirtualization (VMI) is not supported on ESXi 5.0. Hence, you cannot move VMI-enabled virtual machines from an ESX 3.x or ESX 4.x/ESXi 4.x host to an ESXi 5.0 host when the virtual machines are powered on.

Upgrade an ESXi Host using vCenter Update Manager (similar as vSphere 4.x)

See the vSphere Upgrade Guide (page 92). You can use Update Manager to perform orchestrated upgrades of the ESX/ESXi hosts in your vSphere inventory by using a single upgrade baseline. You can create upgrade baselines for ESX/ESXi hosts with ESXi 5.x images that you import to the Update Manager repository. You can use ESXi .iso images to upgrade ESXi 4.x hosts to ESXi 5.x or migrate ESX 4.x hosts to ESXi 5.x.

Determine whether an in-place upgrade is appropriate in a given upgrade scenario (similar as vSphere 4.x)

Some upgrade/migration paths are not supported, like:

- ESX/ESXi 3.x hosts: You must upgrade them to ESX (see next point) or ESXi version 4.x.
- ESX 4.x host that was upgraded from ESX 3.x with a partition layout incompatible with ESXi 5.0.
- You cannot use Auto Deploy to upgrade or migrate version 4.x ESX and ESXi hosts to ESXi 5.0, because version 4.x ESX and ESXi hosts are deployed by the traditional method of installing the software on the host hard disk.
- You cannot change the installation location of the hypervisor (for example to move from local disk to a flash card.

Objective 1.4 –Secure vCenter Server and ESXi

- See also: *Objective 1.4 – Secure vCenter Server and ESXi* e *Objective 1.4 –Secure vCenter Server and ESXi*.
- vSphere Installation and Setup guide[2]
- vCenter Server and Host Management guide[3]
- VMware vSphere Examples and Scenarios guide[5]
- vSphere Security guide[7]
- Most of the references are from the vSphere Security Guide, but also the old (from VI 3.x) Managing VMware VirtualCenter Roles and Permissions is still a good reference.

Identify common vCenter Server privileges and roles (similar as vSphere 4.x)

See: vSphere Security Guide (page 59). Some are available both in ESXi and vCenter Server:

- No Access: Cannot view or change the assigned object. vSphere Client tabs associated with an object appear without content. Can be used to revoke permissions that would otherwise be propagated to an object from a parent object.
- Read Only: View the state and details about the object. View all the tab panels in the vSphere Client except the Console tab. Cannot perform any actions through the menus and toolbars.
- Administrator: All privileges for all objects. Add, remove, and set access rights and privileges for all the vCenter Server users and all the virtual objects in the vSphere environment. NOTE Users who are in the Active Directory group ESX Admins are automatically assigned the Administrator role.

Describe how permissions are applied and inherited in vCenter Server (same as vSphere 4.x)

See: vSphere Security Guide (page 48 and also page 51 for some examples).

When you assign a permission to an object, you can choose whether the permission propagates down the object hierarchy. You set propagation for each permission. Propagation is not universally applied. Permissions defined for a child object always override the permissions that are propagated from parent objects.

Note that in previous releases of vCenter Server, datastores and networks inherited access permissions from the datacenter. In vCenter Server 5.0, they have their own set of privileges that control access to them. This might require you to manually assign privileges, depending on the access level you require. For more info see the vSphere Upgrade Guide (page 61).

Configure and administer the ESXi firewall (new in vSphere 5.x)

See: What's new in vSphere 5: ESXi firewall.

Enable/Configure/Disable services in the ESXi firewall (new in vSphere 5.x)

See: What's new in vSphere 5: ESXi firewall.

Enable Lockdown Mode (same as vSphere 4.1)

See: The New Lockdown Mode in ESXi 4.1 and the vSphere Security Guide (page 81).

Note that lockdown mode does not apply to root users who log in using authorized keys. When you use an authorized key file for root user authentication, root users are not prevented from accessing a host with SSH when the host is in lockdown mode. Also the root user is still authorized to log in to the direct console user interface when lockdown mode is enabled.

Configure network security policies (same as vSphere 4.x)

See: VMware Virtual Networking Concepts and the vSphere Security Guide (page 25).

The virtual switch (but also a port group) has the ability to enforce L2 security policies to prevent virtual machines from impersonating other nodes on the network. There are three components to this feature:

- **Promiscuous mode** is disabled by default for all virtual machines. This prevents them from seeing unicast traffic to other nodes on the network.
- **MAC address change** lockdown prevents virtual machines from changing their own unicast addresses. This also prevents them from seeing unicast traffic to other nodes on the network, blocking a potential security vulnerability that is similar to but narrower than promiscuous mode.
- **Forged transmit blocking**, when you enable it, prevents virtual machines from sending traffic that appears to come from nodes on the network other than themselves

For VLAN security see vSphere Security Guide (page 20).

View/Sort/Export user and group lists (same as vSphere 4.x)

See: vSphere Security Guide (page 45). Note that there are local users/groups (both ESXi and vCenter Server local users) and centralized users/groups (from a directory service).

Add/Modify/Remove permissions for users and groups on vCenter Server inventory objects (same as vSphere 4.x)

See: vSphere Security Guide (page 53) and http://www.vmwarehub.com/Permissions.html.

Create/Clone/Edit vCenter Server Roles (same as vSphere 4.x)

See: vSphere Security Guide (page 61). When you remove a role that is assigned to a user or group, you can remove assignments or replace them with an assignment to another role.

Add an ESXi Host to a directory service (similar as vSphere 4.1)

There are two different way to use an Active Directory solution in ESXi 5:

- Add a Host to a Directory Service Domain (same as ESXi 4.1): see vSphere Security Guide (page 63).
- Use the new vSphere Authentication Proxy service (CAM service): see vSphere Security Guide (page 65).

Apply permissions to ESXi Hosts using Host Profiles (same as vSphere 4.x)

See Use Host Profiles to Apply Permissions to Hosts (for host added in the AD) and the vSphere Security Guide (at page 67 to use with the vSphere Authentication Proxy).

Determine the appropriate set of privileges for common tasks in vCenter Server (similar as vSphere 4.x)

See the vSphere Security Guide and also, for other guide, the privileges requirements are always specificated.

Objective 1.5 – Identify vSphere Architecture and Solutions Knowledge

- See also those similar posts: *Objective 1.5 – Identify vSphere Architecture and Solutions* and *Objective 1.5 – Identify vSphere Architecture and Solutions*.
- VMware vSphere Basics guide[1]

Identify available vSphere editions and features (some changes from vSphere 4.x)

See the Compare vSphere 5.0 Kits and Compare vSphere 5.0 Editions.

Explain ESXi and vCenter Server architectures (similar as vSphere 4.x)

See the VMware Sphere Basic guide, the Objective 0.1 – VMware Products and also VMware Web Site.

Explain Private/Public/Hybrid cloud concepts

This part it's not obvious… Apart the definition and difference between private, hybrid and public cloud it's also needed a knowledge of the type of services.

- http://en.wikipedia.org/wiki/Cloud_computing
- http://www.vmware.com/solutions/cloud-computing/public-cloud/faqs.html
- VMware vCloud: Requirements for a Cloud - http://www.vmware.com/files/pdf/cloud/VMware-vCloud-Requirement-11Q1-White-Paper.pdf
- VMware vCloud: Service Definition for a Public Cloud - http://www.vmware.com/files/pdf/cloud/VMware-ServiceDef-Public-Cloud-11Q1-White-Paper.pdf
- VMware vCloud: Service Definition for a Private Cloud - http://www.vmware.com/files/pdf/cloud/VMware-ServiceDef-Private-Cloud-11Q1-White-Paper.pdf

Determine appropriate vSphere edition based on customer requirements (some changes from vSphere 4.x)

Of course this depends by several factors, not only the requirements but also the constraints and assumptions. Price and vRAM entitlement could be a factor, for this see vSphere 5.0 Licensing, Pricing and Packaging Whitepaper.

Usually Essential bundles could be fine for SMB, the Standard could be a way to upgrade and scale an Essential+ bundle, the Enterprise could be fine for most cases (note that the Advanced is no more available) and Enterprise+ is for who need specific features (like DVS, Auto Deploy, SDRS, SIOC, NIOC, …).

Section 2 – Plan and Configure vSphere Networking

- VMware Virtual Networking Concepts
- VMware Virtual Networking

Objective 2.1 – Configure vNetwork Standard Switches

- See also those posts: *Objective 2.1 – Configure vNetwork Standard Switches* and *Objective 2.1 – Configure vNetwork Standard Switches* and *Objective 2.1 – Configure vNetwork Standard Switches*.
- vSphere Installation and Setup guide[2]
- vSphere Networking guide[8]

Identify vNetwork Standard Switch capabilities (same as vSphere 4.x)

See: VMware Virtual Networking Concepts and VMware Virtual Networking.

Create/Delete a vNetwork Standard Switch (similar as vSphere 4.x)

See the vSphere Networking Guide. No need to know the CLI…

Note that now also from the GUI the vSwitch MTU can be changed.

Add/Configure/Remove vmnics on a vNetwork Standard Switch (same as vSphere 4.x)

See the vSphere Networking Guide (page 16 and 17). Each physical NIC act as a vSwitch uplink.

Configure vmkernel ports for network services (similar as vSphere 4.x)

See the vSphere Networking Guide (page 14). The VMkernel port groups can be used for:

- Management (the portgroup must be flag with “Management” option).
- vMotion (the portgroup must be flag with “vMotion” option).
- Management (the portgroup must be flag with “fault tolerance logging” option).
- IP storage, like iSCSI (with software initiator) or NFS.

Note that now also from the GUI the MTU can be changed.

Add/Edit/Remove port groups on a vNetwork Standard Switch (same as vSphere 4.x)

See the vSphere Networking Guide (page 12).

A VLAN ID, which restricts port group traffic to a logical Ethernet segment within the physical network, is optional. For a port group to reach port groups located on other VLANs, the VLAN ID must be set to **4095**. If you use VLAN IDs, you must change the port group labels and VLAN IDs together so that the labels properly represent connectivity.

Determine use case for a vNetwork Standard Switch (same as vSphere 4.x)

Both standard (vSS) and distributed (vDS) switches can exist at the same time. Note that vDS can give more functions that vSS. But vDS license require the Enterprise+ edition, so for all other editions the only way is use vSS.

For very small environment vSS could be most simple: everything should be controlled on local host. Basically, you go to Local Host->Configuration->Networking. Then, you start everything from there.

Objective 2.2 – Configure vNetwork Distributed Switches

- See also those posts: *Objective 2.2 – Configure vNetwork Distributed Switches* and *Objective 2.2 – Configure vNetwork Distributed Switches*
- vSphere Installation and Setup guide[2]
- vSphere Networking guide[8]

Identify vNetwork Distributed Switch capabilities (similar as vSphere 4.1)

Official page with features of vDS:

- Improves visibility into virtual machine traffic through Netflow **(New in vDS 5)**
- Enhances monitoring and troubleshooting using SPAN and LLDP **(New in vDS 5)**
- Enables the new Network I/O Control (NIOC) feature (now utilizing per VM controls) **(New in vDS 5)**
- Simplified provisioning and administration of virtual networking across many hosts and clusters through a centralized interface.
- Simplified end-to-end physical and virtual network management through third-party virtual switch extensions for the Cisco Nexus 1000V virtual switch.
- Enhanced provisioning and traffic management capabilities through private VLAN support and bi-directional virtual machine rate-limiting.
- Enhanced security and monitoring for virtual machines migrated via VMware vMotion through maintenance and migration of port runtime state.
- Prioritized controls between different traffic types, including virtual machine, vMotion, FT, and IP storage traffic.
- Load-based teaming for dynamic adjustment of the teaming algorithm so that the load is always balanced across a team of physical adapters on the distributed switch (New in vDS 4.1).

See also: vSphere 5 new Networking features.

Create/Delete a vNetwork Distributed Switch (same as vSphere 4.x)

For this and next points see the vSphere Networking Guide and http://thevirtualheadline.com/2011/07/11/vsphere-vnetwork-distributed-switches/.

Add/Remove ESXi hosts from a vNetwork Distributed Switch (same as vSphere 4.x)

See the vSphere Networking Guide (page 21).

Add/Configure/Remove dvPort groups (same as vSphere 4.x)

See the vSphere Networking Guide (page 25).

Add/Remove uplink adapters to dvUplink groups (same as vSphere 4.x)

See the vSphere Networking Guide (page 29).

Create/Configure/Remove virtual adapters (same as vSphere 4.x)

See the vSphere Networking Guide (page 30).

Migrate virtual adapters to/from a vNetwork Standard Switch (same as vSphere 4.x)

See the vSphere Networking Guide (page 31) and VMware vNetwork Distributed Switch: Migration and Configuration

Migrate virtual machines to/from a vNetwork Distributed Switch (same as vSphere 4.x)

See the vSphere Networking Guide (page 33) and VMware vNetwork Distributed Switch: Migration and Configuration

Determine use case for a vNetwork Distributed Switch (similar as vSphere 4.1)

- VMware vSphere™ 4: Deployment Methods for the VMware® vNetwork Distributed Switch
- http://blog.mrpol.nl/2011/07/06/vcap-dca-objective-2-4-administer-vnetwork-distributed-switch-settings/
- http://geeksilver.wordpress.com/2010/05/21/vds-vnetwork-distributed-switch-my-understanding-part-2/

Objective 2.3 – Configure vSS and vDS Policies

- See also those posts: *Objective 2.3 – Configure vSS and VDS Policies* and *Objective 2.3 – Configure vSS and vDS Policies*
- vSphere Installation and Setup guide[2]
- vSphere Networking guide[8]

Identify common vSS and vDS policies (similar as vSphere 4.x)

See the vSphere Networking Guide (page 43). Policies set at the standard switch or distributed port group level apply to all of the port groups on the standard switch or to ports in the distributed port group. The exceptions are the configuration options that are overridden at the standard port group or distributed port level.

The blueprint does not cover the NIOC and Monitor policies, but I suggest to study them as well.

Configure dvPort group blocking policies (similar as vSphere 4.x)

For network security policy see: http://vinfrastructure.it/2011/08/vcp5-exam-prep-part-1-4/.

For port blocking policies see the vSphere Networking Guide (page 59).

Configure load balancing and failover policies (similar as vSphere 4.1)

See the vSphere Networking Guide (page 43). Load balancing and failover policies allow you to determine how network traffic is distributed between adapters and how to re-route traffic in the event of adapter failure. The Failover and Load Balancing policies include the following parameters:

- **Load Balancing policy**: Route based on the originating port or Route based on IP hash (require etherchannel at switch level)or Route based on source MAC hash or Use explicit failover order or Route based on physical NIC load (only for vDS) .
- **Failover Detection**: Link Status or Beacon Probing (this make sense with at least 3 NICs).
- **Failback**: Yes or No.
- **Network Adapter Order**: Active or Standby or Unused.

Configure VLAN settings (same as vSphere 4.x)

See the vSphere Networking Guide (page 50). In the VLAN ID field of a port group (or distribuited port group) set a value between 1 and 4094 (0 disable the VLAN and 4095 is the same as trunk all the VLANs).

For vDS other two options are available: VLAN Trunking (to specify a range) and Private VLAN (for more info see http://kb.vmware.com/kb/1010691)

Configure traffic shaping policies (same as vSphere 4.x)

See the vSphere Networking Guide (page 54). A traffic shaping policy is defined by average bandwidth, peak bandwidth, and burst size. You can establish a traffic shaping policy for each port group and each distributed port or distributed port group.

ESXi shapes outbound network traffic on standard switches and inbound and outbound traffic on distributed switches. Traffic shaping restricts the network bandwidth available on a port, but can also be configured to allow bursts of traffic to flow through at higher speeds.

Enable TCP Segmentation Offload support for a virtual machine (same as vSphere 4.x)

See the vSphere Networking Guide (page 38). TCP Segmentation Offload (TSO) is enabled on the VMkernel interface by default, but must be enabled at the virtual machine level.

Enable Jumbo Frames support on appropriate components (new in vSphere 5)

See the vSphere Networking Guide (page 39). Now it's possible configure the MTU from GUI also in standard vSwitch and on vmkernel interfaces.

Determine appropriate VLAN configuration for a vSphere implementation (similar as vSphere 4.x)

See the vSphere Networking Guide (page 66). VLAN tagging is possible at diffent level: External Switch Tagging (EST), Virtual Switch Tagging (VST), and Virtual Guest Tagging (VGT).

Missing advanced features

The blueprint does not cover port Mirroring and NetFlow (new from vSphere 5)… but I suggest to study them as well. Note that also a new (and standard) discover protocol (LLDP) has been added (but only to vDS).

Section 3 – Plan and Configure vSphere Storage

- See also those posts: *Objective 3.1 – Configure Shared Storage for vSphere* and *Objective 3.1 – Configure Shared Storage for vSphere*
- vSphere Installation and Setup guide[2]
- vSphere Storage guide[9]
- VMware vSphere Examples and Scenarios guide[5]

Objective 3.1 – Configure Shared Storage for vSphere

Identify storage adapters and devices (similar as vSphere 4.x)

See the vSphere Storage Guide (page 10). Storage adapters provide connectivity for your ESXi host to a specific storage unit (block oriented) or network.
ESXi supports different classes of adapters, including SCSI, SATA, SAS, iSCSI, Fibre Channel, Fibre Channel over Ethernet (FCoE). ESXi accesses the adapters directly through device drivers in the VMkernel.

Notice that (block oriented) storage can be local (SCSI, SAS o SATA) or SAN oriented (iSCSI, FC, FCoE). Local storage can also be shared with special type of enclouse (like those LSI based), intead the SAN oriented storages is (usually) shared. In order to use serveral vSphere features (like vMotion, HA, DRS, DPM, …) a shared storage is needed.

Note also that RAID functions must be implemented in hardware (VMware does not support at all neither software RAID and "fake" RAID): or in the host storage controller/adapter (for local and not shared storage) or in the storage.

Identify storage naming conventions (similar as vSphere 4.x)

See the vSphere Storage Guide (page 17). Each storage device, or LUN, is identified by several names:

- Device Identifiers: SCSI INQUIRY identifier (naa.number, t10.number, eui.number) or Path-based identifier (mpx.path)
- Legacy identifier (vml.number)
- Runtime Name

Identify hardware/dependent hardware/software iSCSI initiator requirements (similar as vSphere 4.1)

See the vSphere Storage Guide (page 63) and also http://vinfrastructure.it/en/vdesign/vstorage-software-vs-hardware-iscsi/

Compare and contrast array thin provisioning and virtual disk thin provisioning (similar as vSphere 4.x)

See the vSphere Storage Guide (page 183). With ESXi, you can use two models of thin provisioning, array-level (depends on storage functions) and virtual disk-level (using the thin format).

One issue with array level approach, is that vSphere was previsously not notified of storage type of LUN and storage was not able to track the real usage (and reclaim the free space). With the new **VAAI** primitives for Thin Provisioning and also with new VASA APIs this problem is solved.

Describe zoning and LUN masking practices (same as vSphere 4.x)

See the vSphere Storage Guide (page 32). Zoning provides access control in the SAN topology. Zoning defines which HBAs can connect to which storage interfaces.
When you configure a SAN (usually FC) by using zoning, the devices outside a zone are not visible to the devices inside the zone. Zoning has the following effects:

- Controls and isolates paths in a fabric.
- Can prevent non-ESXi systems from accessing a particular storage system, and from possibly destroying VMFS data.
- Can be used to separate different environments, for example, a test from a production environment.

LUN masking is instead a way to hide some LUN to a host and can be applied both on storage side (usually the preferred solution) or on host side. The effect is that it can reduces the number of targets and LUNs presented to a host and, for example, make a rescan faster.

Scan/Rescan storage (same as vSphere 4.x)

See the vSphere Storage Guide (page 124). Can be done for each host, but if you want to rescan storage available to all hosts managed by your vCenter Server system, you can do so by right-clicking a datacenter, cluster, or folder that contains the hosts and selecting Rescan for Datastores.

Note that, by default, the VMkernel scans for LUN 0 to LUN 255 for every target (a total of 256 LUNs). You can modify the Disk.MaxLUN parameter to improve LUN discovery speed.

Identify use cases for FCoE (new in vSphere 5)

See the vSphere Storage Guide (page 21 and 37). The **Fibre Channel over Ethernet** (FCoE) procotocol encapsulates Fibre Channel frames into Ethernet frames. As a result, your host does not need special Fibre Channel links to connect to Fibre Channel storage, but can use 10Gbit lossless Ethernet to deliver Fibre Channel traffic.

In vSphere 5 two type of adapters can be used: Converged Network Adapter (**hardware FCoE**, as the hardware independent iSCSI adapter) or NIC with FCoE support (**software FCoE**, similar as the hardware dependent iSCSI adapter).

Create an NFS share for use with vSphere (same as vSphere 4.x)

See the vSphere Storage Guide (page 128).

Connect to a NAS device (same as vSphere 4.x)

See the vSphere Storage Guide (page 128).

Note: in vSphere 5 there is the Hardware Acceleration on NAS Devices (but must be provided from the storage vendor). NFS datastores with Hardware Acceleration and VMFS datastores support the following disk provisioning policies: **Flat** disk (old zeroedthick format), **Thick** Provision (the old eagerzeroedthick) and **Thin** Provisioning. On NFS datastores that do not support Hardware Acceleration, only thin format is available.

Enable/Configure/Disable vCenter Server storage filters (same as vSphere 4.x)

Vedere the vSphere Storage Guide (pag. 126). Use advanced settings of vCenter Server: config.vpxd.filter.vmfsFilter, config.vpxd.filter.rd, …

Configure/Edit hardware/dependent hardware initiators (similar as vSphere 4.1)

See the vSphere Storage Guide (page 70).

Enable/Disable software iSCSI initiator (same as vSphere 4.x)

See the vSphere Storage Guide (page 72).

Configure/Edit software iSCSI initiator settings (same as vSphere 4.x)

See the vSphere Storage Guide (page 72).

Configure iSCSI port binding (new in vSphere 5)

See the vSphere Storage Guide (page 78). This is required for some type of storage and previosly was only possible from the CLI. Now it can simple be set from the vSphere Client.

Enable/Configure/Disable iSCSI CHAP (same as vSphere 4.x)

See the vSphere Storage Guide (page 83).

Determine use case for hardware/dependent hardware/software iSCSI initiator (similar as vSphere 4.1)

See the vSphere Storage Guide (page 63) and also http://vinfrastructure.it/vdesign/vstorage-software-vs-hardware-iscsi/

Determine use case for and configure array thin provisioning (similar as vSphere 4.x)

See previous point about thin provisiong.

Objective 3.2 – Configure the Storage Virtual Appliance for vSphere

- See also this post: *Objective 3.2 – Configure the Storage Virtual Appliance for vSphere*.
- VMware vSphere Storage Appliance Installation and Configuration guide[10]
- VMware vSphere Storage Appliance Administration guide[11]

This objective is related to a new product: the VMware Storage Virtual Appliance 1.0 (SVA or usually called also VSA) for vSphere 5. Note that this product is not included in vSphere editions, but is a separate product with his specific license (see the VMware site for more details).

Note: to make a virtual environment to test VSA see the blog Getting the VMware VSA running in a nested ESXi environment.

Define SVA architecture

See the vSphere Storage Appliance 1.0 Installation and Configuration Guide (page 9) and the VMware vSphere Storage Appliance Technical Whitepaper (page 3) and vSphere Storage Appliance (VSA) – Introduction.

VSA can be deployed in a two-node or three-node configuration. Collectively, the two or three nodes in the VSA implementation are known as a VSA storage cluster. Each VMware ESXi server has a VSA instance deployed to it as a virtual machine. The VSA instance will then use the available space on the local disk(s) of the VMware ESXi servers to present one mirrored NFS volume per VMware ESXi. The NFS volume is presented to all VMware ESXi servers in the datacenter.

Configure ESXi hosts as SVA hosts

The VSA can be deployed in two configurations:

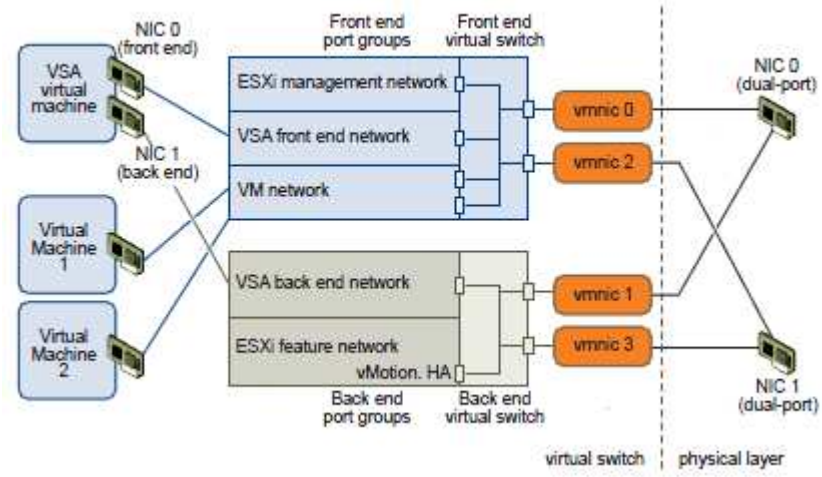
- 3 x VMware ESXi 5.0 server configuration
- 2 x VMware ESXi 5.0 server configuration

The two different configurations are identical in the way in which they present storage. The only difference is in the way that they handle VSA storage cluster membership. The two-node VSA configuration uses a special VSA cluster service, which runs on the VMware vCenter Server. This behaves as a cluster member and is used to make sure that there is still a majority of members in the cluster, should one VMware ESXi server VSA member fail. There is no storage associated with the VSA cluster service.

Configure the storage network for the SVA

See the vSphere Storage Appliance 1.0 Installation and Configuration Guide (page 21). It require 2 different networks (front-end and back-end network).

Figure 1-5. Logical Network Architecture of a VSA Cluster Member



Deploy/Configure the SVA Manager

A VSA installation is started by installing the VSA manager software on an existing VMware vCenter Server. Once completed, a vSphere client is opened and pointed to the VMware vCenter Server, and the VSA manager plug-in is enabled. This creates a VSA manager tab in the vSphere client.

NOTE: In this release of VSA, an instance of VMware vCenter Server 5.0 can only manage a single VSA storage cluster.

Administer SVA storage resources

See the vSphere Storage Appliance 1.0 Administration.

Determine use case for deploying the SVA

VSA enables users to get the full range of vSphere features, including vSphere HA, vMotion, and vSphere DRS, without having to purchase a physical storage array to provide shared storage, making VSA a very cost-effective solution (IMHO price is not so cost effective, also in the bundle with Essential+).

VSA is very easy to deploy. Many of the configuration tasks, such as network setup and vSphere HA deployment, are done by the installer. The benefit here is that this product can be deployed by customers who might not be well versed in vSphere. It gives them a good first-time user experience.

VSA is very resilient. If a VMware ESXi server that is hosting one of the VSAs goes down, or one VSA member suffers an outage, with the redundancy built into the VSA, the NFS share presented from that VSA will be automatically and seamlessly failed over to another VSA in the cluster.

Determine appropriate ESXi host resources for the SVA

About calculating the VSA Cluster Capacity, see the vSphere Storage Appliance 1.0 Installation and Configuration Guide (page 15).

About the requirements for the hosts see the vSphere Storage Appliance 1.0 Installation and Configuration Guide (page 17). Note that the actual HCL is very small and that RAID10 is the only supported RAID configuration for the VSA cluster.

Objective 3.3 – Create and Configure VMFS and NFS Datastores

- See also those posts: *Objective 3.3 – Create and Configure VMFS and NFS Datastores* and *Objective 3.3 – Create and Configure VMFS and NFS Datastores*.
- vSphere Installation and Setup guide[2]
- vSphere Storage guide[9]

Identify VMFS and NFS Datastore properties (similar as vSphere 4.x)

See the vSphere Storage Guide (page 21). NFS as quite the same functions (also hardware acceleration introducted in vSphere 5), but still cannot implement a RDM disk, and for this reason cannot implement a guest cluster solution (like Microsoft MSCS).

Identify VMFS5 capabilities (new in vSphere 5)

See the vSphere Storage Guide (page 114) and vSphere 5.0 Storage Features Part 1 – VMFS-5.

VMFS5 provides many improvements in scalability and performance over the previous version. The following improvements can be found in VMFS5:

- GTP partition table (see also vSphere 5.0 Storage Features Part 7 – VMFS-5 & GPT) is used (for newly formatted VMFS5 datastores)
- Unified the block size (to 1MB for newly formatted VMFS5 datastores), previous versions of VMFS used 1,2,4 or 8MB file blocks.
- Larger single Extent Volumes: in previous versions of VMFS, the largest single extent was 2TB. With VMFS-5, this limit has been increased to ~ 60TB.
- Smoother upgrade path with on-line in-place upgrade.

- Scalability improvements using VAAI and ATS Enhancement.
- Increased resource limits such as filedescriptors, Smaller Sub-Block, Small File Support, Increased File Count
- Mount and Unmount workflow in the vSphere Client.

Differences between newly created and upgraded VMFS-5 datastores:

- VMFS-5 upgraded from VMFS-3 continues to use the previous file block size which may be larger than the unified 1MB file block size.
- VMFS-5 upgraded from VMFS-3 continues to use 64KB sub-blocks and not new 8K sub-blocks.
- VMFS-5 upgraded from VMFS-3 continues to have a file limit of 30720 rather than new file limit of > 100000 for newly created VMFS-5.
- VMFS-5 upgraded from VMFS-3 continues to use MBR (Master Boot Record) partition type; when the VMFS-5 volume is grown above 2TB, it automatically & seamlessly switches from MBR to GPT (GUID Partition Table) with no impact to the running VMs.
- VMFS-5 upgraded from VMFS-3 continue to have its partition starting on sector 128; newly created VMFS5 partitions will have their partition starting at sector 2048.

For RDM – Raw Device Mappings:

- There is now support for passthru RDMs to be ~ 60TB in size.
- Both upgraded VMFS-5 & newly created VMFS-5 support the larger passthru RDM.

Note that:

- The maximum size of a **VMDK** on VMFS-5 is still **2TB -512 bytes**.
- The maximum size of a **non-passthru (virtual) RDM** on VMFS-5 is still **2TB -512 bytes**.
- The maximum number of **LUNs** that are supported on an ESXi 5.0 host is still **256**.

Create/Rename/Delete/Unmount a VMFS Datastore (same as vSphere 4.x)

See the vSphere Storage Guide (page 115, 129, 123 and 131).

Mount/Unmount an NFS Datastore (same as vSphere 4.x)

See the vSphere Storage Guide (page 128).

Extend/Expand VMFS Datastores (same as vSphere 4.x)

See the vSphere Storage Guide (page 119). Note that two methods are availabe (as also in vSphere 4.x):

- Add a new extent (same as VI 3.x): an extent is a partition on a storage device, or LUN. You can add up to 32 new extents of the same storage type to an existing VMFS datastore. The spanned VMFS datastore can use any of allits extents at any time. It does not need to fill up a particular extent before using the next one.
- Grow an extent in an existing VMFS datastore (better and clean solution), so that it fills the available adjacent capacity. Only extents with free space immediately after them are expandable.

Upgrade a VMFS3 Datastore to VMFS5 (new in vSphere 5)

See the vSphere Storage Guide (page 121). For VMFS3 the upgrade can be done with VM running on it (different from VMFS2 to VMFS3 upgrade). Of course all hosts accessing the datastore must support VMFS5.

Place a VMFS Datastore in Maintenance Mode (new in vSphere 5)

See the vSphere Resource Management Guide (page 83). Maintenance mode is available to datastores within a Storage DRS-enabled datastore cluster. Standalone datastores cannot be placed in maintenance mode.

Select the Preferred Path for a VMFS Datastore (similar as vSphere 4.x)

See the vSphere Storage Guide (page 158).

Disable a path to a VMFS Datastore (similar as vSphere 4.x)

See the vSphere Storage Guide (page 163).

Determine use case for multiple VMFS/NFS Datastores (similar as vSphere 4.x)

Understand the limits (quite few now) of NFS, but also the benefits. See also: http://technodrone.blogspot.com/2010/01/vmfs-or-nfs.html.

Determine appropriate Path Selection Policy for a given VMFS Datastore (similar as vSphere 4.x)

See the vSphere Storage Guide (page 159).

Section 4 – Deploy and Administer Virtual Machines and vApps

Objective 4.1 – Create and Deploy Virtual Machines

- See also this post: *Objective 4.1 – Create and Deploy Virtual Machines*.
- vSphere Virtual Machine Administration guide[12]
- Installing and Configuring VMware Tools Guide
  - http://www.vmware.com/pdf/GuestOS_guide.pdf
  - http://www.vmware.com/pdf/osp_install_guide.pdf

Identify capabilities of virtual machine hardware versions (new in vSphere 5)

See the vSphere Virtual Machine Administration Guide (page 81) and Virtual Machine Hardware Version 8

Identify VMware Tools device drivers (similar as vSphere 4.x)

See VMware KB: Overview of *VMware Tools*

Identify methods to access and use a virtual machine console (same as vSphere 4.x)

As usual there is the console in the vSphere Client, and also in vSphere Web Client. But after the guest OS is installed is better choose a network protocol to remote manage the OS (like SSH for Linux or RDP for Windows)

Identify virtual machine storage resources (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 9).

Place virtual machines in selected ESXi hosts/Clusters/Resource Pools (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 29).

Configure and deploy a Guest OS into a new virtual machine (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 33 and 40).

Configure/Modify disk controller for virtual disks (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 36) and Virtual SCSI Adapter type.

Configure appropriate virtual disk type for a virtual machine (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 36 and 121) and VMDK virtual disk type.

Create/Convert thin/thick provisioned virtual disks (same vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 129).

Configure disk shares (similar as vSphere 4.1)

See the vSphere Virtual Machine Administration Guide (page 128). Can also be done from the vSphere Web Client.

Install/Upgrade/Update VMware Tools (same as vSphere 4.x)

See the Guest Operating System Installation *Guide*.

Configure virtual machine time synchronization (same as vSphere 4.x)

See *Timekeeping* best practices for *Linux* guests and *Timekeeping* in *VMware* Virtual Machines.

Convert a physical machine using VMware Converter (similar as vSphere 4.x)

The vCenter Server installation does not include any Converter, so you must use the Standalone Converter edition. See also the VMware vCenter Converter Standalone Documentation page. Note that the version 5 is actually in beta phase.

Import a supported virtual machine source using VMware Converter (similar as vSphere 4.x)

See also the VMware vCenter Converter Standalone Documentation page.

Modify virtual hardware settings using VMware Converter (similar as vSphere 4.x)

See also the VMware vCenter Converter Standalone Documentation page.

Configure/Modify virtual CPU and Memory resources according to OS and application requirements (similar as vSphere 4.x)

See What's New in *Performance* in *VMware vSphere*™ 5.0 and *Performance Best Practices for VMware vSphere* 4.1.

Configure/Modify virtual NIC adapter and connect virtual machines to appropriate network resources (same as vSphere 4.1)

See the vSphere Virtual Machine Administration Guide (page 107) and Virtual NIC type.

Determine appropriate datastore locations for virtual machines based on application workloads (similar as vSphere 4.x)

There are three options:

- Store all virtual machine files in the same location on a datastore.
- Store all virtual machine files in the same datastore cluster (SDRS is needed).
- Store virtual machine configuration files and disks in separate locations.

About the different choices, they depends of course by the datastore types (which RAID level, number and kind of disks, …), by the workload requirements, the usage of SIOC (if datastore is shared with other VMs, …). But for the VCP5 exam do not expect too much… there are the VCAP exams for more detail about those choices.

Objective 4.2 – Create and Deploy vApps

- See also this similar post: *Objective 4.2 – Create and Deploy vApps*.
- vSphere Virtual Machine Administration guide[12]

Identify vApp settings (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 179 and 183). Common settings are:

- vApp Resources for CPU and memory capacity (Share, Reservation, Reservation type, Limit).
- vApp Startup and Shutdown Options for the order of the VMs inside the vApp.
- vApp Properties (in the Advanced Property Configuration)
- IP Allocation Policy (see later)

Create/Clone/Export a vApp (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 178 and 193) and Build & Manage a vApp. Can also be done from the vSphere Web Client.

Note that the distribution format for vApp is OVF, and the vApp metadata resides in the vCenter Server's database, so a vApp can be distributed across multiple ESXi hosts. This information can be lost if the vCenter Server database is cleared or if a standalone ESXi host that contains a vApp is removed from vCenter Server. You should back up vApps to an OVF package to avoid losing any metadata.

Add objects to an existing vApp (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 181). Can also be done from the vSphere Web Client.

Note that a vApp can include: VMs, Resource Pools and other vApps.

Edit vApp settings (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 183) and Edit vApp settings. Can also be done from the vSphere Web Client.

Configure IP pools (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 191). Note that the IP allocation options are:

- Fixed IP: addresses are manually configured. No automatic allocation is performed. No IP pool is needed.
- Transient IP: addresses are automatically allocated using IP pools from a specified range when the vApp is powered on. The IP addresses are released when the appliance is powered off.
- DHCP: a DHCP server is used to allocate the IP addresses. The addresses assigned by the DHCP server are visible in the OVF environments of virtual machines started in the vApp.

Suspend/Resume a vApp (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 194 and 195). Can also be done from the vSphere Web Client.

Determine when a tiered application should be deployed as a vApp (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 177) and vApps in vSphere 4, and why they're very, very useful. Note that vApps requires both a vCenter Server and a DRS license.

Objective 4.3 – Manage Virtual Machine Clones and Templates

- See also this similar post: *Objective 4.3 – Manage Virtual Machine Clones and Templates*.
- vSphere Virtual Machine Administration guide[12]
- VMware vSphere Examples and Scenarios guide[5]
- OVF Tool User Guide - https://www.vmware.com/support/developer/ovf/ovf20/ovftool_201_userguide.pdf

Identify the vCenter Server managed ESXi hosts and Virtual Machine maximums (new in vSphere 5)

See also: Configuration Maximums for VMware vSphere 5.0. Main differences from vSphere 4.1:

- Virtual Machine Maximums: 32 vCPU (instead of 8 vCPU and 1 TB vRAM (instead of 255 GB)

- ESXi Host Maximums: 512 VM per host (instead of 320), 2048 vCPU per host (instead of 512), 2 TB RAM (instead of 1 TB), 256 NFS mounts per host (instead of 64)
- vCenter Server Maximums: quite the same of v 4.1
- VUM Maximums: more concurrent operations

Identify Cloning and Template options (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 43).

Different choices for the destination: which cluster or host, which datastore, which VMDK type, perform a customization (guest OS reconfiguration), power on and/or edit the VM Properties.

Clone an existing virtual machine (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 44). Can also be done from the vSphere Web Client.

Create a template from an existing virtual machine (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 47).

Deploy a virtual machine from a template (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 50). Can also be done from the vSphere Web Client.

Update existing virtual machine templates (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 53 and 55).

Deploy virtual appliances and/or vApps from an OVF template (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 68).

Import and/or Export an OVF template (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 68 and 70).

Determine the appropriate deployment methodology for a given virtual machine application (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 15).

Objective 4.4 – Administer Virtual Machines and vApps

- See also this similar post: *Objective 4.4 – Administer Virtual Machines and vApps*.
- vSphere Virtual Machine Administration guide[12]

Identify files used by virtual machines (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 9).

Identify locations for virtual machine configuration files and virtual disks (same as vSphere 4.x)

By default all related VM's files are in a folder (and the name of this folder is usually the initial VM name). But vmdk can simple created or relocated (with a Storage Migration) on other datastores. About the swap and snapshot files see:

- VMware *KB*: Storing a *virtual machine* swap *file* in a *location* other than the default
- Creating *snapshots* in a different *location* than default *virtual machine*

Identify common practices for securing virtual machines (same as vSphere 4.1)

See the final release of the vSphere 4.1 Security Hardening Guide.

Hot Extend a virtual disk (same as vSphere 4.x)

Introduced in ESX 3.5 Update 2, with this feature you can increase the size of a vmdk of a running VM (does not require any specific license and work also on the free hypervisor). But then you have to extend the guest filesystem in the VM.

For Windows see: How to expand a VMDK and extend a partition in for VMware ESX. Note that diskpart does not work on system disk on Windows 2000/2003 or XP (use Dell Extpart instead) and that starting from Vista it possible handle the extend also from the GUI (using the Disk Management snap-in).

Configure virtual machine options (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 11 and 80).

Configure virtual machine power settings (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 171).

Configure virtual machine boot options (same as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 173). Can also be done from the vSphere Web Client.

Configure virtual machine troubleshooting options (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 176). Can also be done from the vSphere Web Client.

Assign a Storage Policy to a virtual machine (new in vSphere 5)

See the vSphere Virtual Machine Administration Guide (page 131).

Verify Storage Policy compliance for virtual machines (new in vSphere 5)

See the vSphere Virtual Machine Administration Guide (page 131).

Determine when an advanced virtual machine parameter is required (similar as vSphere 4.x)

There are advances parameters that can be edited inside the vmx file, or simple the advanced virtual machine options (like Mem/CPU hotplug, Boot Options, Fibre Channel NPIV, …).

In both cases those parameters must be used only when really needed.

Adjust virtual machine resources (shares, limits and reservations) based on virtual machine workloads (similar as vSphere 4.1)

See the vSphere Resource Management Guide.

Section 5 – Establish and Maintain Service Levels

Objective 5.1 – Create and Configure VMware Clusters

- See also those similar posts: *Objective 5.1 – Create and Configure VMware Clusters* and *Objective 5.1 – Create and Configure VMware Clusters*.
- vCenter Server and Host Management guide[3]
- vSphere Availability guide[13]
- vSphere Resource Management guide[14]

Describe DRS virtual machine entitlement (similar as vSphere 4.x)

The word entitlement is now usually referred to the vRAM entitlement, but in this context seems to be related on how work the DRS, for more info see the vSphere Resource Management Guide.

Create/Delete a DRS/HA Cluster (similar as vSphere 4.x)

See the vCenter Server and Host Management Guide (page 57), vSphere Resource Management Guide (page 51), vSphere Availability Guide (page 11).

Add/Remove ESXi Hosts from a DRS/HA Cluster (same as vSphere 4.x)

See the vCenter Server and Host Management Guide (page 56 and 113). Note that in order to add a host to an EVC cluster, you must put it in maintenance mode.

Add/Remove virtual machines from a DRS/HA Cluster (similar as vSphere 4.x)

Same of usual VM management. Just be sure that VMs are compliant with cluster requirements, like (for example) be on shared storage.

Configure Storage DRS (new in vSphere 5)

See the vSphere Resource Management Guide (page 77) and the *VMware Storage DRS* official page.

Configure Enhanced vMotion Compatibility (similar as vSphere 4.x)

See the vCenter Server and Host Management Guide (page 123) and *VMware KB 1003212*: Enhanced VMotion Compatibility *(EVC)* and *VMware KB 1005764*: *EVC* and CPU Compatibility FAQ.

Monitor a DRS/HA Cluster (similar as vSphere 4.x)

Understant the vSphere Client (and also the vSphere Web Client) interface.

Configure migration thresholds for DRS and virtual machines (similar as vSphere 4.x)

See the vSphere Resource Management Guide (page 54).

Configure automation levels for DRS and virtual machines (same as vSphere 4.x)

See the vSphere Resource Management Guide (page 57):

- Manual -> Initial placement: Recommended host(s) is displayed, Migration: Recommendation is displayed.
- Partially Automated n Initial placement: Automatic, Migration: Recommendation is displayed.
- Fully Automated n Initial placement: Automatic, Migration: Recommendation is executed automatically.

Create VM-Host and VM-VM affinity rules (similar as vSphere 4.1)

See the vSphere Resource Management Guide (page 71).

Enable/Disable Host Monitoring (similar as vSphere 4.x)

See the vSphere Availability Guide (page 24).

Enable/Configure/Disable virtual machine and application monitoring (similar as vSphere 4.1)

See the vSphere Availability Guide (page 26). Note that application monitoring need specific API used in the applications.

Configure admission control for HA and virtual machines (similar as vSphere 4.x)

See the vSphere Availability Guide (page 16) and vSphere 5.0 HA: Changes in *admission control*.

Determine appropriate failover methodology and required resources for an HA implementation (similar as vSphere 4.x)

See the vSphere Availability Guide (page 30).

Objective 5.2 – Plan and Implement VMware Fault Tolerance

- vSphere Availability guide[13]

Note that VMware FT is quite still the 1.0 version with the same constraints of a vSphere 4.1 version.

Identify VMware Fault Tolerance requirements (same as vSphere 4.x)

See the vSphere Availability guide (page 38) and *VMware KB*: Processors and guest operating systems that support VMware FT. To check the requirements, there is also a specific tool: VMware SiteSurvey utility.

Configure VMware Fault Tolerance networking (same as vSphere 4.x)

See the vSphere Availability guide (page 41). A good practice is use a dedicated vmkernel interface enable to FT logging on a dedicated pNIC. Network bandwidth is important to define how much VMs can be protected.

Enable/Disable VMware Fault Tolerance on a virtual machine (same as vSphere 4.x)

See the vSphere Availability guide (page 45). Study also the different reason on why a VM is in a non protected status (page 46).

Test an FT configuration (same as vSphere 4.x)

See *VMware* KB: *Testing* a *VMware Fault Tolerance* Configuration.

Determine use case for enabling VMware Fault Tolerance on a virtual machine (same as vSphere 4.x)

See the vSphere Availability guide (page 37). Remember the limit of one vCPU.

Objective 5.3 – Create and Administer Resource Pools

- See also those similar posts: *Objective 5.3 – Create and Administer Resource Pools* and *Objective 5.3 – Create and Administer Resource Pools*.
- vSphere Resource Management guide[14]
- vSphere Virtual Machine Administration guide[12]

Describe the Resource Pool hierarchy (same as vSphere 4.x)

See the vSphere Resource Management Guide (page 43). Note that a DRS license is required, in order to use resource pools in a VMware cluster.

Define the Expandable Reservation parameter (same as vSphere 4.x)

With this option, if you power on a virtual machine in this resource pool, and the combined reservations of the virtual machines are larger than the reservation of the resource pool, the resource pool can use resources from its parent or ancestors.

Create/Remove a Resource Pool (same as vSphere 4.x)

See the vSphere Resource Management Guide (page 45).

Configure Resource Pool attributes (same as vSphere 4.x)

See the vSphere Resource Management Guide (page 45). Note that shares, reservations and limits concepts are the same both in resource pools and VM properties.

Add/Remove virtual machines from a Resource Pool (same as vSphere 4.x)

See the vSphere Resource Management Guide (page 46).

Determine Resource Pool requirements for a given vSphere implementation (same as vSphere 4.x)

For a VMware Cluster, the requirements are the same for DRS (and of course for vMotion). Note that DRS can works fine combined with VMware HA and also FT.

Evaluate appropriate shares, reservations and limits for a Resource Pool based on virtual machine workloads (similar as vSphere 4.x)

See the DRS Performance and Best Practices document.

Clone a vApp (same as vSphere 4.x)

See the vSphere Virtual Machine Administration guide (page 195). For other vApp related questions see: VCP5 Exam Prep – Part 4.4

Objective 5.4 – Migrate Virtual Machines

- See also those similar posts: *Objective 5.4 – Migrate Virtual Machines* and *Objective 5.4 – Migrate Virtual Machines*.
- vSphere Resource Management guide[14]
- vSphere Virtual Machine Administration guide[12]
- VMware vSphere Examples and Scenarios guide[5]

Identify ESXi host and virtual machine requirements for vMotion and Storage vMotion (same as vSphere 4.x)

See the vSphere Virtual Machine Administration guide (page 219) and vCenter Server and Host Management guide (page 119 and 122).

Some basic requiments: for vMotion a specific vmkernel interface (enabled for vMotion) is required, as the CPU compatibility (or EVC). For Storage vMotion the host must see both source and destination datastore.

Identify Enhanced vMotion Compatibility CPU requirements (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 123) and *VMware KB*: Enhanced *VMotion* Compatibility (EVC) processor support. More baselines are available.

Identify snapshot requirements for vMotion/Storage vMotion migration (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 121). Some restrictions apply when migrating virtual machines with snapshots:

- Migrating a virtual machine with snapshots is now permitted, regardless of the virtual machine power state, as long as the virtual machine is being migrated toa new host without moving its configuration file or disks. (The virtual machine must reside on shared storageaccessible to both hosts.)
- Reverting to a snapshot after migration with vMotion might cause the virtual machine to fail, because themigration wizard cannot verify the compatibility of the virtual machine state in the snapshot with the destination host. Failure occurs only if the configuration in the snapshot uses devices or virtual disks that are not accessible on the current host, or if the snapshot contains an active virtual machine state that was running on hardware that is incompatible with the current host CPU.
- If the migration involves moving the configuration file or virtual disks, the following additional restrictions apply:
- The starting and destination hosts must be running ESX 3.5 or ESXi 3.5 or later.
- All of the virtual machine files and disks must reside in a single directory, and the migrate operation must move all the virtual machine files and disks to a single destination directory.

Migrate virtual machines using vMotion/Storage vMotion (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration guide (page 223) and vCenter Server and Host Management guide (page 132). Can also be done from the vSphere Web Client.

About vMotion with high priority: On hosts running ESX/ESXi version 4.1 or later, vCenter Server attempts to reserve resources on both the source and destination hosts to be shared
among all concurrent migrations with vMotion. vCenter Server grants a larger share of host CPU resources to high priority migrations than to standard priority migrations. Migrations always proceed regardless of the resources that have been reserved. On hosts running ESX/ESXi version 4.0 or earlier, vCenter Server attempts to reserve a fixed amount of resources on both the source and destination hosts for each individual migration. High priority migrations do not proceed if resources are unavailable.

Remember that the Storage vMotion of virtual machines during VMware Tools installation is not supported.

Configure virtual machine swap file location (same as vSphere 4.x)

See the vCenter Server and Host Management guide (page 121).

You can configure ESX 3.5 or ESXi 3.5 or later hosts to store virtual machine swapfiles in one of two locations: with the virtual machine configuration file, or on a local swapfile datastore specified for that host. You can also set individual virtual machines to have a different swapfile location from the default set for their current host. If hosts are all 3.5 or later, during a migration with vMotion, if the swapfile location specified on the destination host differs from the swapfile location specified on the source host, the swapfile is copied to the new location. This can result in slower migrations with vMotion. If the destination host cannot access the specified swapfile location, it stores the swapfile with the virtual machine configuration file-

Migrate a powered-off or suspended virtual machine (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration guide (page 220). Can also be done from the vSphere Web Client.

When you migrate a suspended virtual machine, the new host for the virtual machine must meet CPU compatibility requirements, because the virtual machine must be able to resume executing instructions on the new host.

Utilize Storage vMotion techniques (changing virtual disk type, renaming virtual machines, etc.) (same as vSphere 4.x)

See the vSphere Virtual Machine Administration guide (page 226).

During a Storage vMotion or also a cold storage migration all files are renamed with the current VM name. The vmdk can be change from thin to flat or viceversa.

For virtual compatibility mode RDMs, you can migrate the mapping file or convert to thick-provisioned or thinprovisioned disks during migration as long as the destination is not an NFS datastore. If you convert the mapping file, a new virtual disk is created and the contents of the mapped LUN are copied to this disk. For physical compatibility mode RDMs, you can migrate the mapping file only.

Objective 5.5 – Backup and Restore Virtual Machines

- See also those similar posts: *Objective 5.5 – Backup and Restore Virtual Machines* and *Objective 5.5 – Backup and Restore Virtual Machines*.
- vSphere Virtual Machine Administration guide[12]
- VMware Data Recovery Administration guide[15]

Identify snapshot requirements (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 208) and *VMware* KB: Understanding virtual machine *snapshots* in *VMware*.

Note that snapshots provide a point-in-time image of the disk that backup solutions can use, but Snapshots are not meant to be a robust method of backup and recovery. If the files containing a virtual machine are lost, its snapshot files are also lost. Also, large numbers of snapshots are difficult to manage, consume large amounts of disk space, and are not protected in the case of hardware failure.

Create/Delete/Consolidate virtual machine snapshots (similar as vSphere 4.x)

See the vSphere Virtual Machine Administration Guide (page 209 and 216). Can also be done from the vSphere Web Client.

The consolidate operarion, instead, is a new feature of vSphere 5. Snapshot consolidation is useful when snapshot disks fail to compact after a Delete or Delete all operation or if the disk did not consolidate. This might happen, for example, if you delete a snapshot but its associated disk does not commit back to the base disk. For more info see the vSphere Virtual Machine Administration Guide (page 218).

Install and Configure VMware Data Recovery (similar as VDR 1.x)

See the VMware Data Recovery Administration Guide (page 13). For more info about VDR see also: VMware Data Recovery (VDR) as a backup solution.

Create a backup job with VMware Date Recovery (similar as VDR 1.x)

See the VMware Data Recovery Administration Guide (page 26). Note that now is possible use email notification and have a different time window for "maintenance" activities (like integrity check).

Perform a test and live full/file-level restore with VMware Data Recovery (similar as VDR 1.x)

See the VMware Data Recovery Administration Guide (page 31 and 33).

Determine appropriate backup solution for a given vSphere implementation (similar as vSphere 4.x)

VMware provide only VDR (in all edition exept the Essential bundle), ad a backup product, and a set of vStorage API (the VADP subset) to integrate 3rd part backup programs. Note that in vSphere 5 VCB is no more available.

The commercial backup products can give more feature than VDR, like: more option for scheduling, more type of destination, application recovery, data replication, ...

About the criteria of choosing a backup solution, the features list is just one, but there is also the price (that depends the type of licensing), if you need also backup of physical environment (in this case "traditional" backup solutions may be better), if you have already a skill on one solution, the performance and scalability, ...

Objective 5.6 – Patch and Update ESXi and Virtual Machines

- See also this similar post: *Objective 5.6 – Patch and Update ESXi and Virtual Machines*.
- vSphere Host Profiles guide[16]
- Installing and Administering VMware vSphere Update Manager guide[17]
- Reconfiguring VMware vSphere Update Manager[18]
- VMware vSphere Examples and Scenarios guide[5]

Identify patching requirements for ESXi hosts and virtual machine hardware/tools (similar as vSphere 4.x)

Each piece of software need to be patched for different reasons... but the most important are usually the security reasons.

For ESXi a patch need that the host is put in maintenance mode and require a host reboot after the patch operation. All those operations can be orchestrated by VUM.

For VMware Tools a new version is usually related to a new major release or also of some update (in most cases related to vmkernel update). On most guest OS (like Windows) a VMware Tools patch need a VM reboot. All those operations can be orchestrated by VUM.

For VM virtual hardware this upgrade is related to new major relases (for example with vSphere 5 the new virtual hardware is v8) e richiede di fatto due riavvi della VM. It require first the VMware Tools upgrade, and usually two VM downtime. All those operations can be orchestrated by VUM.

Create/Edit/Remove a Host Profile from an ESXi host (same as vSphere 4.x)

See the vSphere Host Profiles Guide (page 8). Usually you can start from a base ESXi and use it as a template.

Attach/Apply a Host Profile to an ESXi host or cluster (same as vSphere 4.x)

See the vSphere Host Profiles Guide (page 12).

Perform compliance scanning and remediation of an ESXi host using Host Profiles (same as vSphere 4.x)

See the vSphere Host Profiles Guide (page 16).

Install and Configure vCenter Update Manager (similar as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 31). Note that you can install or upgrade the Update Manager server on 64-bit operating systems. Even though Update Manager runs on 64-bit operating systems, it is a 32-bit application and requires a 32-bit ODBC DSN.

Configure patch download options (same as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 66).

Create/Edit/Delete an Update Manager baseline (same as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 81).

Attach an Update Manager baseline to an ESXi host or cluster (same as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 95).

Scan and remediate ESXi hosts and virtual machine hardware/tools using Update Manager (same as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 99 and 115). Note that Update Manager 5.0 does not support virtual machine guest patch operations.

Stage ESXi host updates (same as vSphere 4.x)

See the Installing and Administering VMware vSphere Update Manager guide (page 119).

Section 6 – Perform Basic Troubleshooting and Alarm Management

Objective 6.1 – Perform Basic Troubleshooting for ESXi Hosts

- vCenter Server and Host Management guide[3]
- vSphere Monitoring and Performance guide[19]
- vSphere Troubleshooting guide[20]

Identify general ESXi host troubleshooting guidelines (new in vSphere 5)

See the vSphere Troubleshooting guide.

Troubleshoot common installation issues (new in vSphere 5)

For Audodeply see the vSphere Troubleshooting guide (page 20). For other installation is most similar to old version and remember to check requiments and HCL.

Monitor ESXi system health (similar as vSphere 4.x)

See the vSphere Monitoring and Performance Guide (page 25).

Export diagnostic information (new in vSphere 5)

See the vCenter Server and Host Management Guide (page 95).

Objective 6.2 – Perform Basic vSphere Network Troubleshooting

- vSphere Networking guide[8]
- vSphere Troubleshooting guide[20]

Verify network configuration (same as vSphere 4.x)

See *VMware Virtual Networking Concepts* for basic concepts for standard virtual switches. See Objective 2.2 – Configure vNetwork Distributed Switches for distributed virtual switches.

Verify a given virtual machine is configured with the correct network resources (same as vSphere 4.x)

See *VMware* KB: *Troubleshooting virtual* machine *network* connection issues and http://damiankarlson.com/vcap-dca4-exam/objective-6-3-troubleshoot-network-performance-and-connectivity/

Troubleshoot virtual switch and port group configuration issues (same as vSphere 4.x)

Use previous links. For vmkernel porgroup vmkping can help in network tests (remember to use -d option to test large packets like, for example, Jumbo Frames).

Troubleshoot physical network adapter configuration issues (same as vSphere 4.x)

Remember that each pNIC act as an uplink, so the relative pSwitch port must be configured in the same of others in the same vSwitch. Mix of different NIC adapters is permitted. Mix of different speed could be possible, but can create performance issues. For IP hash team policy a specific configuration is required on the pSwitch. Beacon probing make sense only with at least 3 pNIC.

Identify the root cause of a network issue based on troubleshooting information (similar as vSphere 4.x)

A top-down or bottom-up approach though the network layer could be useful. Also a packet trace in the network could help (see Using a *Network* Packet Analyzer on a *VMware* vSphere *Virtual Network* and VMware KB: Capturing a network trace in *ESXi* using Tech Support).

Objective 6.3 – Perform Basic vSphere Storage Troubleshooting

- vSphere Storage guide[9]
- vSphere Troubleshooting guide[20]

Verify storage configuration (similar as vSphere 4.x)

See the vSphere Troubleshooting guide (page 45). A minimum of storage enterprise knowledge is also required.

Troubleshoot storage contention issues (similar as vSphere 4.x)

See the vSphere Troubleshooting guide (page 45) and vSphere Storage guide (page 24).

Troubleshoot storage over-commitment issues (similar as vSphere 4.x)

See the vSphere Storage guide (page 183) and VCP5 Exam Prep – Part 3.1 (in the thin provisioning points).

Troubleshoot iSCSI software initiator configuration issues (similar as vSphere 4.x)

See the vSphere Storage guide (page 107). Also a networking check could be useful.

Troubleshoot Storage Reports and Storage Maps (similar as vSphere 4.x)

See Using VMware *vSphere Storage* Views.

Identify the root cause of a storage issue based on troubleshooting information (similar as vSphere 4.x)

See the vSphere Troubleshooting guide (page 45).

Objective 6.4 – Perform Basic Troubleshooting for HA/DRS Clusters and vMotion/Storage vMotion

- For HA and DRS see also: HA Deepdive and DRS Deepdive
- vSphere Availability guide[13]
- vSphere Resource Management guide[14]
- vSphere Monitoring and Performance guide[19]
- vSphere Troubleshooting guide[20]

Identify HA/DRS and vMotion requirements (similar as vSphere 4.x)

See the vSphere Availability guide (page 11) and the vSphere Resource Management guide (page 51). Basically a shared storage is required, some network configurations, and (for DRS and vMotion) a CPU compatibility or the EVC function in the cluster.

Verify vMotion/Storage vMotion configuration (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 119 and 122). For the network for vMotion a vmkernel interface is required (note that now vSphere 5 can use more interfaces). For Storage vMotion the main requirement is that the host can see both storages.

Verify HA network configuration (new in vSphere 5)

See the vSphere Availability guide (page 13). Heartbeat can go through the vmkernel management interfaces (or other specific interfaces)… but now with vSphere also thought the shared storage.

Verify HA/DRS cluster configuration (similar as vSphere 4.x)

See the vSphere Availability guide (page 11) and the vSphere Resource Management guide (page 51). Some new windows are now available to check HA and DRS status.

Troubleshoot HA capacity issues (similar as vSphere 4.x)

See the vSphere Troubleshooting guide (page 31). When planning for HA you need to plan for a maximum host failure; the number of hosts that can fail before you run short on resources. When VMs can no longer start this might be due to a lack of resources (memory is quite common) with warnings like “insufficient resources to satisfy failover level”.

Troubleshoot HA redundancy issues (same as vSphere 4.x)

See the vSphere Availability guide (page 11).

Interpret the DRS Resource Distribution Graph and Target/Current Host Load Deviation (same as vSphere 4.x)

See VMware DRS Resource Distribution Chart.

Troubleshoot DRS load imbalance issues (similar as vSphere 4.x)

See the vSphere Resource Management guide (page 62).

Troubleshoot vMotion/Storage vMotion migration issues (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 119 and 122). Check also compatibility with snaphosts.

Interpret vMotion Resource Maps (similar as vSphere 4.x)

Topology maps are a easy way to show you the network and storage connection from an to hosts and/or VMs. As stated above there are some requirements to the use of vMotion live storage, networking etc. A first and easy check is to look at the topology maps and see if these requirements are met. Maps can be found when selecting a server and than selecting the tab Maps.

Identify the root cause of a DRS/HA cluster or migration issue based on troubleshooting information (similar as vSphere 4.x)

See all the previous references and also Perform Basic Troubleshooting for HA/DRS. For HA failover see also the vSphere Troubleshooting guide

Section 7 – Monitor a vSphere Implementation

Objective 7.1 – Monitor ESXi, vCenter Server and Virtual Machines

- See also this similar post: *Objective 7.1 – Monitor ESXi, vCenter Server and Virtual Machines*.
- vCenter Server and Host Management guide[3]
- vSphere Resource Management guide[14]
- vSphere Monitoring and Performance guide[19]

Describe how Tasks and Events are viewed in vCenter Server (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 101).

Identify critical performance metrics (similar as vSphere 4.x)

See also: Monitor vSphere ESX/ESXi and Virtual Machine Performance (for VCP4).

Explain common memory metrics (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 7).

Explain common CPU metrics (similar as vSphere 4.x)

See the old Basic System Administrator guide.

Explain common network metrics (similar as vSphere 4.x)

See the old Basic System Administrator guide.

Explain common storage metrics (similar as vSphere 4.x)

See the old Basic System Administrator guide.

Compare and contrast Overview and Advanced Charts (similar as vSphere 4.x)

See also: Monitor vSphere ESX/ESXi and Virtual Machine Performance (for VCP4).

Configure SNMP for vCenter Server (same as vSphere 4.x)

See the vCenter Server and Host Management guide (page 37).

Configure Active Directory and SMTP settings for vCenter Server (same as vSphere 4.x)

See the vCenter Server and Host Management guide (page 36).

Configure vCenter Server logging options (same as vSphere 4.x)

See the vCenter Server and Host Management guide (page 38).

Create a log bundle (same as vSphere 4.x)

See the vCenter Server and Host Management guide (page 98).

Create/Edit/Delete a Scheduled Task (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 101).

Configure/View/Print/Export resource maps (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 143).

Start/Stop/Verify vCenter Server service status (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 112).

Start/Stop/Verify ESXi host agent status (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 111).

Configure vCenter Server timeout settings(similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 38).

Monitor/Administer vCenter Server connections (similar as vSphere 4.x)

See the vCenter Server and Host Management guide (page 28).

Create an Advanced Chart (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 13) and Understanding and Customizing *VMware* ESX Server *Performance* **chart**.

Determine host performance using resxtop and guest Perfmon (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 43) and *ESXTOP* – Yellow Bricks and *VMware* Tools Has *Perfmon* Integration.

Given performance data, identify the affected vSphere resource (similar as vSphere 4.x)

See: *Performance* Best Practices for *VMware vSphere* 4.1.

Objective 7.2 – Create and Administer vCenter Server Alarms

- See also this similar post: *Objective 7.2 – Create and Administer vCenter Server Alarms*.
- vCenter Server and Host Management guide[3]
- vSphere Resource Management guide[14]
- vSphere Monitoring and Performance guide[19]
- VMware vSphere Examples and Scenarios guide[5]
- Sample chapter of VCP VMware Certified Professional on VSphere 4 Study Guide: Exam VCP-410 book
- *5 things you need to know about VMware vSphere Alarms*

List vCenter default utilization alarms (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and Objective 8.7 – Create and Respond to vCenter Utilization Alarms.

List vCenter default connectivity alarms (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and Objective 8.6 – Create and Respond to vCenter Connectivity Alarms.

List possible actions for utilization and connectivity alarms (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and Managing with *Alarm Actions*.

Create a vCenter utilization alarm (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and Objective 8.7 – Create and Respond to vCenter Utilization Alarms.

Create a vCenter connectivity alarm (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and Objective 8.6 – Create and Respond to vCenter Connectivity Alarms.

Configure alarm triggers (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and *5 things you need to know about VMware vSphere Alarms*.

Configure alarm actions (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33) and *5 things you need to know about VMware vSphere Alarms*.

For a given alarm, identify the affected resource in a vSphere implementation (similar as vSphere 4.x)

See the vSphere Monitoring and Performance guide (page 33).

Practice Exams

http://vinfrastructure.it/en/2011/08/vcp5-practice-exams/

This is a list of some practice tests for the VCP5 exam:

- VCP5 Official Mock Exam – This time the mock exam seems good enough (some questions are still too easy, but some are similar to the VCP5 beta exam).
- http://www.simonlong.co.uk/blog/vcp5-practice-exams/ – The exam is just in a beta phase, a little simple yet, but with some good question.
- http://www.kalenarndt.com/vcp-510-quiz/ – Actually with few questions, but just started.
- vSphere 5 Configuration Maximums Practice Tests Series – Some tests about the configuration maximums.
- http://twitter.com/#!/VCP5_QOTD - One question each day (but seems blocked on Aug, 9).

References

Official documentation

- http://www.vmware.com/support/pubs/vsphere-esxi-vcenter-server-pubs.html
- http://www.vmware.com/support/pubs/vum_pubs.html
- http://www.vmware.com/support/pubs/vsphere-storage-appliance-pubs.html
- http://www.vmware.com/support/pubs/vdr_pubs.html
- What's New in VMware vSphere 5.0
- VMware vSphere 5.0 Release Notes
- Hardware, Host, and Guest Operating System Compatibility Guides
- VMware Product Interoperability Matrix
- Configuration Maximums for VMware vSphere 5.0

Other references

- VCP5 beta exam experience
- VMware vSphere 5 links
- What's New Duncan's Collection
- What's New in VMware vSphere 5 – Technical Whitepapers

[1] http://pubs.vmware.com/vsphere-50/topic/com.vmware.ICbase/PDF/vsphere-esxi-vcenter-server-50-basics-guide.pdf
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