



vSphere – Upgrade and Best Practices

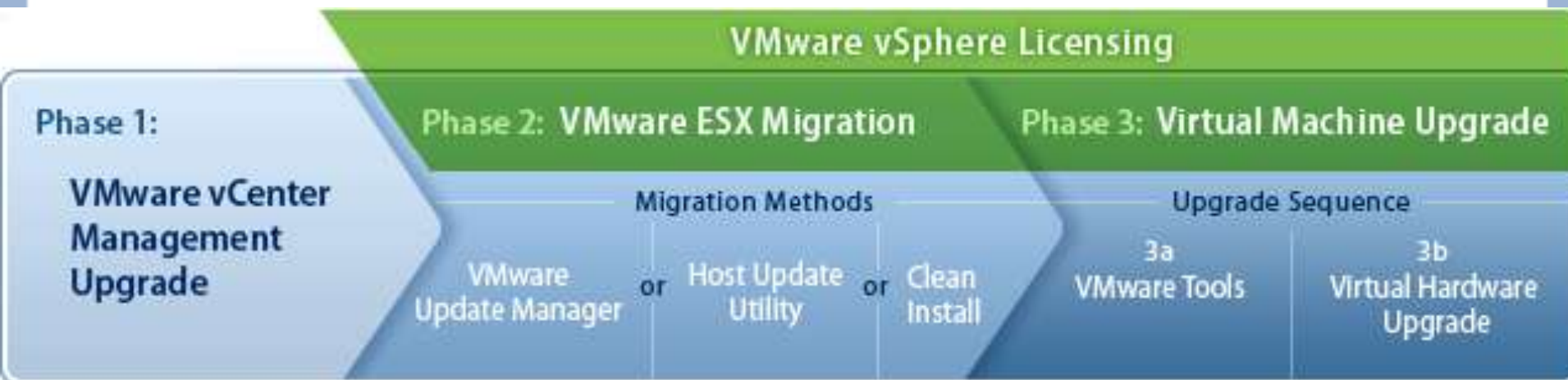
יניב וינברג - חטיבת שירותים VMware

בן חגי – מנהל קבוצת המשתמשים בישראל

Agenda

- > Virtual Infrastructure Upgrade Process
- > vCenter Server Upgrade
 - In-Place
 - Migration
- > ESX upgrade
 - VMware Infrastructure Upgrade
 - vCenter Update Manager
- > Upgrading Virtual Machines
- > Licensing Upgrade
- > Additional Resources

VMware Infrastructure Upgrade Overview



In-place Vs. Migration

> In-Place Upgrade:

- Requires downtime of the VMs
- No direct migration path from 2.x
- There is no in-place upgrade path between the different flavors of ESX, ESXi Installable or ESXi Embedded platforms.

> Migration Upgrade

- More Managed transition
- Reduces downtime dramatically
- Requires extra server/storage capacity

Upgrading vCenter

Backup vCenter Server

- > To back up vCenter Server:
 - Make a full backup of the vCenter Server database.
 - Back up any virtual machine templates that reside on the vCenter Server repository.
- > This procedure is crucial to ensure that you can restore your previous configuration of vCenter Server if the vCenter upgrade does not complete successfully.

Restore vCenter Server

- > You can restore the previous vCenter Server configuration if you have a full backup of your vCenter Server database.

To restore the previous configuration of vCenter Server

- > Completely uninstall vCenter Server 4.0.
- > Restore the previous version of vCenter Server database from the backup.
- > Reinstall your original version of vCenter Server, selecting the restored database during the installation process.
- > Reinstall a license server if one was in use in the original installation. A license server is required if vCenter Server manages ESX 3.x/ESXi 3.5 hosts.

About Upgrading vCenter Server

- > supported from vCenter Server 2.x ONLY, not from 1.x and not from vCenter 4 Beta
- > vCenter Server Upgrade – Expect downtime for the following elements:
 - In-place upgrade –requires vCenter Server downtime of about 20 minutes from vCenter 2.5
 - Migration upgrade – You can avoid downtime if you have an extra supported machine. Install vCenter Server 4.0 on the extra machine before you take the earlier version of vCenter Server out of service.
- > ESX hosts – No downtime is required.
- > Virtual machines – No downtime is required

Prerequisites for vCenter Server Upgrade

- > VirtualCenter Server 2.x installed on a machine that supports vCenter Server 4.0.
- > VMware vCenter Server 4.0 installation media.
- > License keys for all purchased functionality.
- > Ensure that existing VMware products are compatible with vCenter. Refer to the Software Compatibility Matrix guide in the vSphere Upgrade Center . certain products and versions that may not be compatible include:
 - VMware View / VDM, VMware Lab Manager, VMware Stage Manager, VMware Lifecycle Manager, VMware Site Recovery Manager
- > The ADAM service now installed with vCenter has various requirements such as a simple vCenter installation path, NTFS permissions, computer name length etc.

Consult upgrade guide document for specific requirements

Database Prerequisites

- > Before you upgrade to vCenter Server, consider the following points:
 - The VirtualCenter Server 2.x database schema is not compatible with vCenter Server 4.0.
 - You must have a backed up database that is supported by vCenter Server 4.0. If your database is not supported by vCenter Server, perform a database upgrade to a supported version or import your database into a supported version.

Database Prerequisites

- > 64-bit Oracle database with vCenter Server
 - install the 64-bit Oracle database driver
 - do not use the default installation path: C:\Program Files (x86). The installation path contains parentheses (), and the vCenter Server installer reports the path as invalid. This is a known Oracle issue.
- > IBM DB2 database, requires a clean installation of vCenter Server 4.0.
- > Oracle 11g is a suitable upgrade path for vCenter Server
 - first upgrade your existing Oracle database to Oracle 11g then upgrade VirtualCenter Server 2.x to vCenter Server 4.0.
- > Microsoft SQL 2008 is a suitable upgrade path for vCenter Server
 - First upgrade Microsoft SQL Server to Microsoft SQL Server 2008 and then upgrade VirtualCenter 2.x to vCenter Server 4.0.

Database Prerequisites

- > VirtualCenter 2.0.x with the demonstration MSDE database has no supported upgrade path to vCenter Server 4.0.
- > SQL 2000 and Oracle 9i are not supported for vCenter 4, you will need to perform database upgrade first.
- > If you have a Microsoft SQL database, make sure that bulk logging is enabled and that your system DSN is using the SQL Native Client driver.

Upgrade to vCenter Server

1. Stop the VirtualCenter service.
2. As Administrator on the Windows system run autorun.exe.
3. When the vCenter Server Installer screen appears, click **vCenter Server**.
4. The Welcome screen informs you that an earlier version of VirtualCenter is on the computer and will be upgraded vCenter Server 4.0. When the Welcome screen appears, click **Next**.
5. Type your vCenter Server license key and click **Next**.
If you omit the license key, vCenter Server will be in evaluation mode.
6. Enter the database password that corresponds to the username and DSN that the installer displays and click **Next**.
You can omit the database username and password if the DSN is using Windows NT authentication.

Upgrade to vCenter Server

7. Do one of the following:
Select **Yes, I want to upgrade my vCenter Server database.**
Or
Select **No, I do not want to upgrade my vCenter Server database.**
8. Click **I have taken a backup of the existing vCenter Server database** and click **Next**.
9. Specify the account for the vCenter Service to run in.
 - Click **Next** to use the **SYSTEM** account. Do not use the **SYSTEM** account if you plan to use Windows authentication for SQL Server.
10. Enter the port numbers that you want to use or accept the default port numbers shown on the screen and click **Next**.
11. Click **Install**.

If you are upgrading from VirtualCenter Server 2.0.x, the Database Upgrade Wizard appears.

Upgrade the vCenter Server Database Schema

1. In the Database Upgrade wizard Welcome screen, click Next.
2. On the Upgrade Information screen, select one of the following options:
 - Keep all performance
 - Discard all performance data
 - Keep performance data recorded during past 12 months.
3. Your database is now compatible with vCenter Server 4.0. It is no longer compatible with VirtualCenter 2.x. The vCenter Server installer begins installing vCenter Server 4.0.
4. Click Finish to complete the upgrade to vCenter Server.

To view the upgrade log, open %TEMP%\VCDatabaseUpgrade.log.

Upgrade the vSphere Client

- > Virtual machine users and vCenter Server administrators must use the vSphere Client 4.0 to connect to vCenter Server 4.0 or to connect directly to ESX 4.0 hosts.
- > The VI Client 2.5 and the vSphere Client 4.0 can be installed on the same machine.

VMware Infrastructure Upgrade Summary Reference

Product	Component	Description
vCenter Server	VI Client 1.x	Not supported
	VirtualCenter Server 1.x	Not supported
	vSphere Client 4.0	Install
	VirtualCenter Server 2.0	Upgrade
	VirtualCenter Server 2.5	Upgrade
	vCenter Server 4.0	Install
	WebCenter	Task: Install Issues: Runs virtual machines with limited functionality.
	Oracle database	Task: Verify that your database is supported. Upgrade if necessary. Issues: Oracle 9i is no longer supported.
	SQL database	Task: Verify that your database is supported. Upgrade if necessary. Issues: Microsoft SQL Server 2000 is no longer supported.
License server	License server	Task: If you plan to manage ESX 3.0.x/ESXi 3.5 hosts, verify that a license server is installed on the vCenter Server system. Install a license server if necessary.

Upgrading ESX

Back Up the ESX Host Configuration

> Back up the service console and the local VMFS file system.

To back up the ESX host configuration:

- Back up the files in /etc/passwd, /etc/groups (/etc/shadow, /etc/gshadow if applicable)
- Back up any custom scripts.
- Back up your .vmx files
- Back up your .vmdk files
- Back up local images, such as templates, exported virtual machines, and .iso files

Restore the ESX Host Configuration

- > If you backed up your ESX service console and VMFS files, you can restore your original ESX host configuration.

To restore your original ESX host configuration

- > Reinstall the original version of ESX on the host.
- > Restore the backed-up service console and local VMFS files.

For specific instructions, see the VMware white paper on ESX backup and restoration:

http://www.vmware.com/pdf/esx_backup_wp.pdf

Back Up the ESXi Host Configuration

- > Back up the host configuration before you begin a host upgrade.
To back up the ESXi configuration
- > Install the vSphere CLI if it is not already installed.
- > In the VI CLI, run the `vicfg-cfgbackup` command with the `-s` flag to save the host configuration to a specified backup filename.

```
vicfg-cfgbackup --server <ESXi-host-ip> --portnumber  
<port_number> --protocol <protocol_type> --username  
username --password <password> -s <backup-filename>
```

Restore the ESXi Host Configuration

- > If you have created a backup of the ESXi host configuration, you can restore the configuration.

To restore the ESXi host configuration

- > Restore the ESXi software by completing one of the following tasks:
 - Reinstall the ESXi Installable software by using the Installation CD.
 - Recover the ESXi Embedded software by using the Recovery CD.
- > Install the vSphere CLI if it is not already installed.
- > In the vSphere CLI, run the `vicfg-cfgbackup` command with the `-l` flag to load the host configuration from a specified backup file.

For instructions on using the `vicfg-cfgbackup` command, see the *ESX Setup Guide*.

Upgrading to ESX 4.0

- > Upgrade Support for ESX/ESXi
 - No Upgrade Support pre ESX 2.5.4
 - Limited support for ESX 2.5.5
 - ESX 3.0 needs to be upgraded to ESX 3.0.1 or Higher before upgrading to ESX 4.0
 - Full Upgrade Support Post ESX 3.0.1

Upgrade Tools for ESX and ESXi

- > VMware vSphere offers two GUI-based applications that you can use to upgrade ESX 3.x.x hosts to ESX 4.0 and ESXi 3.5 hosts to ESXi 4.0

- vSphere Host Update Utility

- For standalone hosts. A standalone host is an ESX/ESXi host that is not managed by vCenter Server.

- vCenter Update Manager

- For ESX/ESXi hosts that are managed by vCenter Server.

vSphere Host Update Utility 4.0

When you install the vSphere Client, you get the option to install vSphere Host Update Utility 4.0

- > vSphere Host Update Utility 4.0 is a standalone Windows Application that can be installed with vSphere client installation
 - Recommended for smaller deployments with fewer than 10 standalone ESX/ESXi hosts
 - Without vCenter Server or vCenter Update Manager
- > vSphere Host Update Utility 4.0 provides an easy way to
 - upgrade ESX 3.x and above to ESX 4.0 and ESXi 3.5 hosts to ESXi 4.0
 - upgrade from a remote location without a CD
 - with minimum down time
- > The application upgrades the virtual machine kernel (VMKernel) and the ESX service console.
- > vSphere Host Update Utility 4.0 does not upgrade VMFS datastores or virtual machine guest operating systems.
- > Log files are located on **/var/log/vmware/vua.log**

vSphere Host Update Utility 4.0

When you select hosts to be upgraded, the tool performs an automated host compatibility check as a pre-upgrade step

> The check verifies that each host is

- compatible with ESX 4.0/ESXi 4.0
- including required CPU
- ISO reachability
- adequate boot and root space.

> vSphere Host Update Utility 4.0 initiates the upgrade

- by rebooting the host
- switching the host to maintenance mode
- running the upgrade script.

While an upgrade is in progress, vSphere Host Update Utility 4.0 provides visual status so that you can monitor the status of the upgrade.

If an error happens during this process, the software rolls back the host software to the previous ESX version.

VMware vCenter Update Manager

vCenter Update Manager is for environments with vCenter.

- > vCenter Update Manager allows you to
 - Orchestrate steps of the upgrade process sequentially.
 - Attach baselines to hosts, virtual machines, and datastores
 - If the Host is not compliant, you can remediate the issue.
- > vCenter Update Manager supports mass remediation.

For detailed information about using vCenter Update Manager, see the *VMware vCenter Update Manager Administration Guide*.

Upgrading an ESX 3.x Host to ESX 4.0

1. Select **Start > Programs > VMware > vSphere Host Update Utility 4.0**.
2. Select a host from the list and click **Upgrade**.
3. Type the location of the ESX 4.0 installation file. For ESX 4.0, the installation file is an ISO.
5. Type the administrative account information for the selected host and click **Next**.
The software performs a host compatibility check.

Upgrading an ESX 3.x Host to ESX 4.0

6. For ESX, select the datastore and size of the service console virtual disk (VMDK).
VMware recommends that you select a datastore that is local to the ESX host. The service console VMDK requires at least 6GB of available space.
NFS and software iSCSI datastores are not supported as the destination for the ESX 4.0 service console VMDK.
7. (Optional) To disable automatic rollback, deselect the **Attempt to reboot host and roll back upgrade in case of failure** check box.
By default, if upgrade errors occur, the host reboots and rolls back the upgrade. If you disable this behavior, you can troubleshoot the errors manually.

Upgrading an ESX 3.x Host to ESX 4.0

8. (Optional) To automate post-upgrade configuration, select **Run a post-upgrade script** by specifying the custom post-upgrade script, or click Browse to select the location from a file browser.
 - supports the Bash (.sh) and Python (.py) interpreters.
9. (Optional) To enable automatic rollback if the post-upgrade script fails, select **Roll back the upgrade if the post-upgrade script fails** and select the number of minutes or hours for the installer to wait before it rolls back the upgrade if the post-upgrade script hangs or is delayed in execution.
10. If vCenter manages the host – you will need to reconnect it
11. Configure licensing, or use evaluation for 60 days

Upgrading an ESXi 3.5 Host to ESXi 4.0

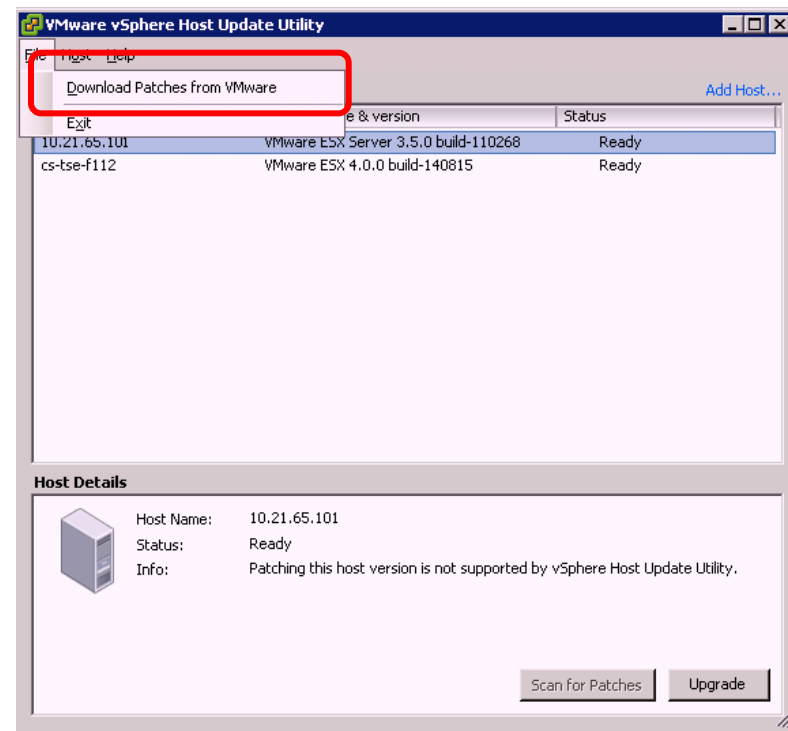
- > You can use vSphere Host Update Utility to upgrade ESXi 3.5 hosts to ESXi 4.x.
- > ESXi 3.5 Hosts are upgraded in the same way as the previous procedure (ESX 3.x to ESX 4.0), except
 - Download an **ESXi 4.0 upgrade** file and save it on the same Windows computer on which vSphere Host Update Utility is installed.

Manually Check for Available Updates

You can manually check whether updates are available for the reachable hosts in your datacenter.

To manually check for updates

- > Select Start > Programs > VMware > VMware vSphere Host Update Utility 4.0
- > On the File Menu, select **Download Patches from VMware**



Check the following location for the downloaded patches

C:\Program Files\VMware\Infrastructure\VIUpdate 4.0\vua

Roll Back an ESX Upgrade

- > Use this procedure if the upgrade to ESX 4.0 is unstable, and you determine that you need to roll back to ESX 3.x.
- > Consider the following points:
 - Any changes made to the ESX 4.0 service console will be lost after the rollback.
 - Any changes made to virtual machines will persist after the rollback.
 - If you upgraded the virtual machine hardware, the virtual machines will not work after you perform the ESX rollback. The workaround is to take snapshot of the virtual machine before you upgrade the virtual machine hardware. After you execute the ESX rollback script, boot into ESX 3.x.x and revert to the snapshot.

Roll Back an ESX Upgrade

1. Run the `rollback-to-esx3` command in the ESX 4.0 service console.

The `/usr/sbin/rollback-to-esx3` command reconfigures the bootloader to boot into ESX 3.x.x and removes the ability to boot into ESX 4.0.

You can include the optional `-f` (force) flag. If you omit the `-f` flag, the software prompts you to confirm that you want to roll back to ESX 3.x.x.

2. Reboot the server.

While the host is powering on, observe that the boot menu has changed to ESX 3.x.

3. After the host boots into ESX 3.x.x, delete the ESX 4.0 service console VMDK folder from the VMFS datastore.

The service console vmdk folder name has this format: `esxconsole-<UUID>`.

Roll Back an ESXi Update, Patch, or Upgrade

- > Each time you update an ESXi host, the software automatically saves a copy of the ESXi build on your host. If an ESXi patch is making your host unstable, you can roll back the update.
- > ESXi permits only one level of rollback.
 - Only one previous build can be saved at a time.
 - Each ESXi 4.0 host stores up to two builds, one boot build and one standby build.
- > Note on Standby Build: boot into the standby build instead of the current boot build. This causes an irreversible rollback.
 - When you manually select the standby build, the standby build becomes the new boot build and remains the boot build until you perform another update or manually select the standby build.

Roll Back an ESXi Update, Patch, or Upgrade

1. Reboot the ESXi 4.0 host.
2. When you see the page that displays the current boot build, press **Shift+r** to select the standby build.
3. Press **Shift+y** to confirm the selection and press Enter.

The previous update rolls back. The standby build becomes the boot build.

Clean Up the ESX Bootloader Menu After Upgrade

After you upgrade a host from ESX 3.x to ESX 4.0, the ESX bootloader boots into ESX 4.0 by default, but retains the option to boot into ESX 3.x.

To clean up the ESX bootloader:

1. In the ESX 4.0 service console, run the `/usr/sbin/cleanup-esx3` command with the optional `-f` (force) flag.
If you omit the `-f` flag, the software prompts you to confirm that you want to disable the ability to roll back to the ESX 3.x.x.
2. (Optional) Reboot the host.
While the server is powering on, observe that the bootloader menu does not include an option for ESX 3.x.x.

Upgrading VMs

Planning Downtime for Virtual Machines

- > Plan downtime for each virtual machine during the upgrade process.
- > Downtime is required for
 - Virtual Machine Upgrade
 - VMware Tools Upgrade
- > If an ESX/ESXi host is not managed by vCenter Server, you cannot use VMotion to move virtual machines meaning that some VM's will require downtime

Virtual Machine Backup Methods

- > Back up virtual machines by using one of the following methods:
 - Back up virtual machine files – Back up your virtual machine files, including the .vmdk or .dsk and .vmx files.
 - Backup agent – Using a backup agent, back up each virtual machine at the operating system level. This method requires you to recreate the .vmx and .vmdk files for the virtual machine before you restore from the backup.
 - Cloning – Clone the virtual machine to another datastore. This changes the UUID and so does not produce a virtual machine that is identical to the original in every respect.

Installing and Upgrading VMware Tools

Expected Downtime During VMware Tools Upgrade

- Virtual machines – Must be rebooted once as part of the VMware Tools upgrade.

Prerequisites for VMware Tools Upgrade

- > A supported guest operating system must be installed on the virtual machine.
 - Windows
 - Linux
 - Solaris
 - Netware
 - FreeBSD
- > You must have an ESX or evaluation license to power on virtual machines.

Upgrade Multiple Virtual Machines

You can upgrade multiple virtual machines by using the Virtual Machines tab.

To upgrade multiple virtual machines:

- > Select the **Inventory > Hosts and Clusters** view.
- > Select the **host** or **cluster** that contains the virtual machines you want to upgrade.
- > Select the **Virtual Machines** tab.
- > Select the **Virtual Machine(s)** you want to upgrade the VMwaretools.
(Use CTRL key and mouse click to select multiple VM's)
- > Right click your selections and select **Guest -> Install/Upgrade VMware Tools** and Click **OK**.

Configure Virtual Machines to Upgrade VMware Tools

To configure virtual machines to automatically upgrade VMware Tools

- 1 Power off the virtual machine.
- 2 Right click the virtual machine and select **Edit Settings**.
- 3 On the **Options** tab, select **VMware Tools**.
- 4 In the **Advanced** pane, select **Check and upgrade Tools before each power-on** and click **OK**.

The next time the virtual machine is powered on, it checks the ESX/ESXi host for a newer version of VMware Tools. If one is available, it is installed and the guest operating system is restarted (if required).

Virtual Machine Hardware Versions

- > All virtual machines have a hardware version.
- > The hardware version of a virtual machine indicates the lower-level virtual hardware features supported by the virtual machine, such as :
 - BIOS, number of virtual slots, maximum number of CPUs, maximum memory configuration, and supported guest operating systems.
- > Features that require a Virtual Hardware upgrade
 - VMware FT, VMware Directpath, vmxnet3, hot plug nics, memory and cpu, 10 nics a VM, Para-virtualization, SAS controller for windows 2008, VMCI, IPv6
- > To determine the virtual hardware version for a virtual machine
 - Select the virtual machine in the inventory.
 - Click Edit Settings.

Upgrade Virtual Hardware Prerequisites

- > Virtual machines with earlier hardware versions can be upgraded to take full advantage of the capabilities offered by the latest version of ESX/ESXi.
- > You cannot revert from an upgraded format to the previous format.
- > Before you upgrade virtual hardware:
 - Create a backup of the virtual machine.
 - Make sure that all .vmdk files are available to the ESX/ESXi host on a VMFS3 datastore.
 - Make sure that the virtual machine is stored on VMFS3 or NFS datastores.
 - Make sure that no suspend files exist.
 - Make sure that at least one virtual disk exists.

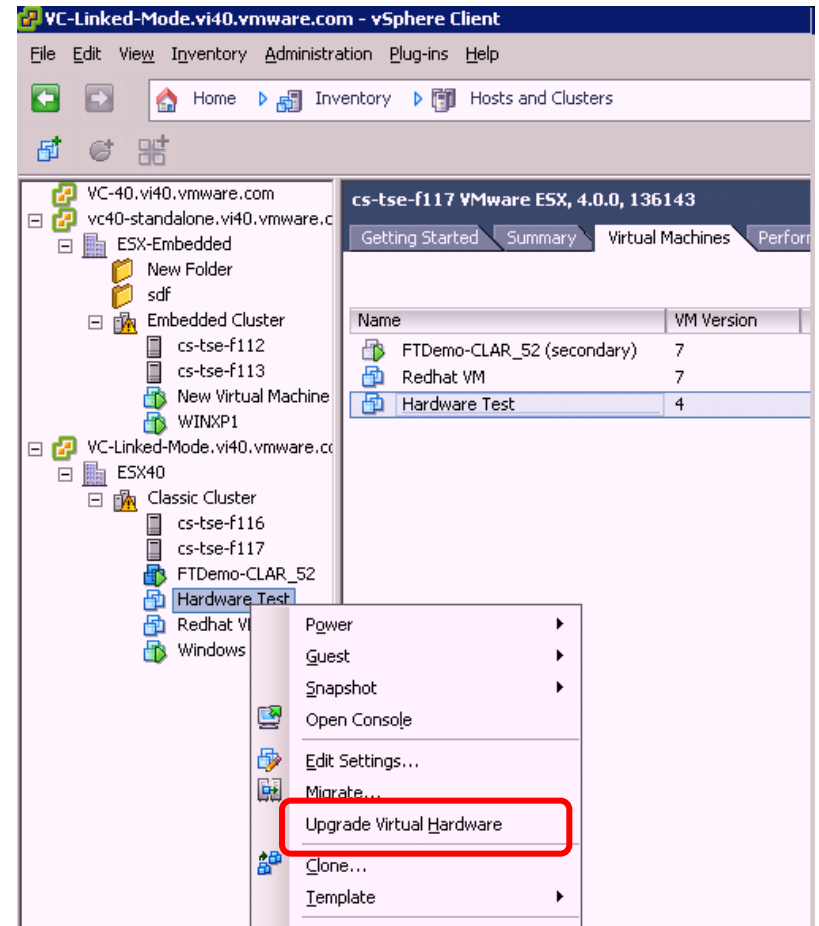
Upgrade Virtual Hardware

To upgrade virtual hardware

- > Power off the virtual machine.
- > From the VI Client, right click a virtual machine in the inventory, and select Upgrade Virtual Hardware.

The Upgrade Virtual Hardware option appears if the virtual machine does not have the highest hardware version possible on the host.

- > Click Yes to continue with the virtual hardware upgrade.
A progress bar appears in the Recent Tasks pane at the bottom of the client window.



Licensing Upgrade

License Server

- > License server is no longer necessary (required only if you are still using VI 3.x components in your environment)
 - Clean install requires license server if manage VI 3.0
- > VMware simplified Licensing and now is working with simple serial numbers.
- > Licensing is managed directly inside vCenter.

License Server

SILK-VCLIC-REG - vSphere Client

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SILK-VCLIC-REG - vSphere Client

File Edit View Inventory Administration Plug-ins Help

Home Administration Licensing Search Inventory

Licensing [Manage vSphere Licenses](#)

Report View by: ☒ Product ☐ License key ☐ Asset [Refresh](#) [Export](#)

Product	Assigned	Capacity	Label	Expires
[-] vCenter Server 4 Standard	1 instances	1 instances		
[-] XXXXX-XXXXX-XXXXX-XXXXX-XXXXX	1 instances	1 instances	Order# 20288260	Never
[-] SILK-VCLIC-REG	1 instances			
[-] vSphere 4 Enterprise (1-6 cores per CPU)	6 CPUs	8 CPUs		
[-] XXXXX-XXXXX-XXXXX-XXXXX-XXXXX	6 CPUs	8 CPUs	For ERP-2 cluster in Portland	Never
[-] 10.6.102.166	2 CPUs			
[-] osdc-pdpvc036.eng.vmware.com	2 CPUs			
[-] osdc-pdpvc077.eng.vmware.com	2 CPUs			

Capacity: 8 CPUs
Available: 4 CPUs
Expires: Never
Label: For ERP-2 cluster in Portland

VMware DRS
Storage VMotion

Help OK Cancel

Additional Resources

- > Additional Documentation Available :
 - vSphere Upgrade Guide
 - Upgrade Prerequisites Checklist
 - vSphere Migration Video series
- > KB Articles (<http://kb.vmware.com>) :
 - 1009039 - Upgrading to ESX 4.0 and vCenter 4.0 best practices
 - 1010675 - Upgrading an ESX 3.x virtual machine to ESX 4.0
 - 1009080 - Installing ESX 4.0 and vCenter 4.0 best practices

<http://www.vmware.com/products/vsphere/upgrade-center/>

Summary

- > Upgrade vCenter 2.5 to vCenter 4.0
- > Upgrade ESX to 4.0 using the VMware vSphere Host Update Utility and Learn how to rollback from Upgrades
- > Upgrade VMware Tools and hardware version
- > Licensing Updates

<http://www.vmware.com/products/vsphere/upgrade-center/>



Thank You