Upgrade Guide

Update 2 and later for
ESX Server 3.5, ESX Server 3i version 3.5, VirtualCenter 2.5

This document supports the version of each product listed and supports all subsequent versions until the document is replaced by a new edition. To check for more recent editions of this document, see http://www.vmware.com/support/pubs.

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About This Book

This manual, the *Upgrade Guide*, describes how to upgrade existing configurations of VMware® VirtualCenter and ESX Server.

The *Upgrade Guide* covers both ESX Server 3.5 and ESX Server 3i version 3.5. For ease of discussion, this book uses the following product naming conventions:

- For topics specific to ESX Server 3.5, this book uses the term "ESX Server 3."

- For topics specific to ESX Server 3i version 3.5, this book uses the term "ESX Server 3i."

- For topics common to both products, this book uses the term "ESX Server."

- When the identification of a specific release is important to a discussion, this book refers to the product by its full, versioned name.

- When a discussion applies to all versions of ESX Server for VMware Infrastructure 3, this book uses the term "ESX Server 3.x."

Intended Audience

This manual is intended for anyone who needs to upgrade from earlier versions of ESX Server 3.5, ESX Server 3i, and VirtualCenter 2.5 to Update 2 and later releases of ESX Server 3.5, ESX Server 3i, and VirtualCenter 2.5. The information in this manual is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

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VMware Infrastructure Documentation

The VMware Infrastructure documentation consists of the combined VMware VirtualCenter and ESX Server documentation set.

Abbreviations Used in Figures

The figures in this book use the abbreviations listed in Table 1.

Table 1. Abbreviations

Abbreviation	Description
database	VirtualCenter database
datastore	Storage for the managed host
dsk#	Storage disk for the managed host
host*n*	VirtualCenter managed hosts
SAN	Storage area network type datastore shared between managed hosts
tmplt	Template
user#	User with access permissions
VC	VirtualCenter
VM#	Virtual machines on a managed host

Technical Support and Education Resources

The following sections describe the technical support resources available to you. To access the current versions of this book and other books, go to:

http://www.vmware.com/support/pubs.

Online and Telephone Support

Use online support to submit technical support requests, view your product and contract information, and register your products. Go to:

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Planning a VMware Infrastructure Upgrade

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This chapter discusses planning and preparations for upgrading VMware Infrastructure from earlier version of ESX Server and VirtualCenter to an ESX Server 3.5 and VirtualCenter 2.5 environment. Upgrading is a multistage process in which procedures must be performed in a particular order. The upgrade path depends on your ESX Server host and datastore configurations. The information in this chapter can help you plan a smooth upgrade with a minimum of system downtime.

> ⚠️ **CAUTION** VMware recommends that you read this chapter before attempting to upgrade. If you do not follow appropriate safeguards, you might lose data and lose access to your servers. Without careful planning, you might incur more downtime than is necessary.

This chapter contains the following sections:

- "VMware Infrastructure at a Glance" on page 12
- "Ensuring a Safe and Smooth Upgrade" on page 15
- "Understanding Changes to VMware Architecture" on page 19
- "Strategies for In-Place or Migration Upgrades" on page 21
- "Understanding the Stages of Upgrading" on page 23
- "Upgrade Scenarios" on page 31

VMware Infrastructure at a Glance

Figure 1-1 illustrates the six basic components of VMware Infrastructure.

Figure 1-1. VMware Infrastructure Components
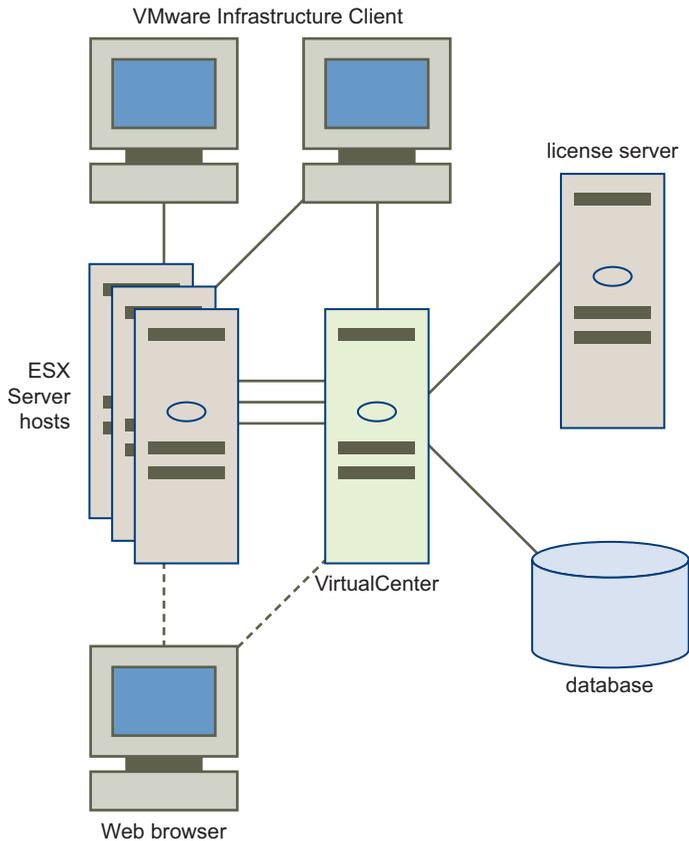
One VirtualCenter Server manages multiple ESX Server hosts.

Each shaded block represents a separate installer or procedure. The VMware Infrastructure Client (VI Client) appears twice, because you can download it from a VirtualCenter Server or ESX Server host.

The major components of VMware Infrastructure are:

■ **ESX Server –** ESX Server provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines.

ESX Server 3 includes installation documentation in the form of man pages available from the service console. See the *Installation Guide*.

ESX Server 3i Installable uses a text installer that doesn't require man pages. For installation documentation, see the *ESX Server 3i Installable Setup Guide*.

■ **VirtualCenter Server** – This server installs on a Windows machine, either physical or virtual, to centrally manage your VMware ESX Server hosts. The VirtualCenter Server allows the use of advanced VMware Infrastructure features such as VMware Distributed Resource Scheduler (DRS), VMware High Availability (HA), and VMware VMotion™.

A VMware SDK Web service is installed with the VirtualCenter Server.

■ **VirtualCenter Plugins** – Optional applications that provide additional capabilities and features to VirtualCenter. Generally, plugins are released separately, install on top of VirtualCenter, and can be upgraded independently. You can install server components of plugins on the same computer where the VirtualCenter Server resides, or on a separate one. After the server component of a plugin is installed, you can activate the plugin's client component, which enhances the VI Client with appropriate UI options.

Documentation provided with each plugin offers information on how server components of plugins are installed.

For information on how to install the client component, verify which plugins are already installed, and how to disable or uninstall plugins that you are not using, see *Basic System Administration*.

The following plugins are available:

■ VMware Converter – Enables you to convert physical or virtual machines into ESX Server virtual machines. After converting the virtual machines, you can add them to your VirtualCenter inventory.

■ VMware Update Manager – Provides security monitoring and patching support for ESX Server hosts and virtual machines. In addition to an independent server component installation, this release supports the combined installation for the VirtualCenter Server and Update Manager. See "Upgrading VirtualCenter" on page 53. For general information, see the *VMware Update Manager Administration Guide*.

- **VI Client** – The VI Client installs on a Windows machine and is the primary method of interaction with VMware Infrastructure. The VI Client acts as:

  - A **console** to operate virtual machines.

  - An **administration interface** into VirtualCenter hosts and ESX Server hosts.

  You can download the VI Client from the VirtualCenter Server and ESX Server hosts. The VI Client installation includes documentation for administrators and for console users.

- **Web browser –** A browser allows you to download the VI Client from the VirtualCenter Server or ESX Server hosts. When you have appropriate login credentials, a browser also lets you perform limited management of your VirtualCenter Server and ESX Server hosts.

- **License server** – This server installs on a Windows system to authorize the VirtualCenter Server machines and ESX Server hosts appropriately for your licensing agreement. There is no direct interaction with the license server. Administrators make changes to software licenses using the VI Client.

- **Database** – The VirtualCenter Server uses a database to organize all the configuration data for the VMware Infrastructure environment. For small deployments, the bundled Microsoft SQL Server 2005 Express database allows you to set up a limited numbers of hosts and virtual machines (5 hosts and 50 virtual machines). VirtualCenter supports several other database products for larger deployments.

The following manuals provide information about installing VMware Infrastructure, configuring licensing, and configuring your VirtualCenter database:

- For ESX Server 3, see the *Installation Guide.*

- For ESX Server 3i, see the *Setup Guide*.

These guides provide information about the following functionality that effects upgrades:

- Installation wizard for installing VirtualCenter, VI Client, and plug-in components

- A feature that detects plugins installed on a VirtualCenter Server during a VI Client installation

- Licensing changes, including centralized licensing and a new unlicensed evaluation mode

- VMFS3 changes

- VMware Tools updates and upgrades

Other new features do not impact any upgrade processes.

Ensuring a Safe and Smooth Upgrade

Even if you want to start upgrading immediately, read these topics to help prevent data loss or surprises.

You must upgrade the VirtualCenter Server, ESX Server hosts, and datastores in a specific order, as described in "Understanding the Stages of Upgrading" on page 23. If you do not complete each upgrade stage before moving on, you can lose data and server access.

Order is also important within each upgrade stage. Even when an exact sequence is optional, VMware makes recommendations. For example, to minimize downtime, follow VMware recommendations for completing and repeating certain steps in a stage.

Generally, the upgrade process has only one direction. After you upgrade part of your VMware Infrastructure, that upgraded part cannot be reverted for use with older VMware software.

With appropriate backups and planning, you can restore your original versions of ESX Server and VirtualCenter.

Supported Upgrades in This Release

The following upgrades are supported in for ESX Server 3.5 and VirtualCenter 2.5:

- **VirtualCenter upgrades** are supported from most released versions of VirtualCenter to VirtualCenter 2.5. For a compatibility list, see "Before You Upgrade VirtualCenter" on page 51.

- **ESX Server upgrades** are supported from most ESX Server 2.x and ESX Server 3.x versions to this ESX Server 3.5 release. For a compatibility list, see "Before You Upgrade ESX Server" on page 62.

  A subset of ESX Server 2.x versions support the migration upgrade using the new feature in ESX Server 3.x and ESX Server 3i and higher that enables upgrade VMotion with simultaneous relocation to a new datastore. See "Migration Upgrade" on page 21.

- **Unsupported upgrades** can fail with lost data, lost network connections, and unusable configurations. Do not upgrade an unsupported configuration that contains important data or is a production machine.

Backup and Restore Strategies

VMware recommends that you back up your VMware infrastructure components before upgrading. This section describes backup and restore strategies for each component.

VirtualCenter Backup

Before upgrading, make a full backup of the VirtualCenter database. See your database documentation.

Back up any virtual machine templates that reside on the VirtualCenter Server repository.

To restore the previous configuration of VirtualCenter

1   Completely uninstall VirtualCenter 2.5.

2   Restore the previous version of VirtualCenter database from the backup.

3   Reinstall your original version of VirtualCenter, selecting the restored database during the installation process.

The following manuals provide information about installing and uninstalling VirtualCenter:

- For ESX Server 3, see the *Installation Guide.*

- For ESX Server 3i, see the *Setup Guide*.

ESX Server Backup

Before upgrading an ESX Server host, back up the service console and the local VMFS2 file system, including the following:

- The `/etc/passwd` and `/etc/groups` files

- Custom scripts

- `.vmx` files

- Local images: templates, exported virtual machines, and `.iso` files

To restore your original ESX Server host configuration

1   Reinstall the original version of ESX Server on the host.

2   Restore the backed-up service console and local VMFS files.

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

Virtual Machine Backup

Before beginning an upgrade, 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. If the ESX Server you are upgrading uses the VMFS2 file system, the `.vmdk` or `.dsk` files are located on your VMFS2 partitions while the `.vmx` files are stored with the service console.

- **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. (Note that this changes the UUID and so does not produce a virtual machine that is identical to the original in every respect.)

Preupgrade Script

ESX Server 3.5 includes a preupgrade script, which verifies that your system can be upgraded and alerts you to problems that you need to address before upgrading.

The preupgrade script is valid for major upgrades, not minor upgrades. Specifically, use the preupgrade script before you upgrade from ESX Server 2.x to ESX Server 3.x. Do not use the preupgrade script on ESX Server 3.0.x hosts.

Before performing a major upgrade on an ESX Server host, run the preupgrade script as described in "Running the Preupgrade Script" on page 70 and address problems flagged by the script.

Downtime for Virtual Machines

Plan downtime for each virtual machine during the upgrade process. Typically, this downtime occurs during Stage 3 (virtual machine upgrade) and Stage 4 (VMware Tools upgrade). Depending on your upgrade strategy, some virtual machine downtime may be required during Stage 2 (ESX Server and VMFS upgrade). For more information on downtime requirements for each stage, see "Understanding the Stages of Upgrading" on page 23.

Depending on your upgrade strategy, you might not have to shut down more than a single virtual machine at any given time. You can stagger or offset individual virtual machine downtimes to accommodate a schedule convenient to you and your customers.

For example:

■ If your virtual machine users are located in diverse time zones, you can prepare by migrating virtual machines to specific hosts to serve a given time zone. This way you can arrange host upgrades so virtual machine downtime occurs transparently outside business hours for that time zone.

■ If your virtual machine users operate around the clock, you can delay downtime for their virtual machines to normally scheduled maintenance periods. There is no requirement that any upgrade stage be completed within a certain time period. You can take as long as needed at any given stage.

Two strategies for upgrade are discussed in "Strategies for In-Place or Migration Upgrades" on page 21.

Understanding Changes to VMware Architecture

This section describes VMware architecture changes as they relate to the process of upgrading from ESX Server 2.x and VirtualCenter 1.x. If you do not want to read about architectural details, proceed to "Understanding the Stages of Upgrading" on page 23.

To help you understand why upgrade order is important, the next sections describe differences in architecture from previous versions.

Virtual Machine File System Format: VMFS2 to VMFS3

You might be aware of file system formats such as FAT, NTFS, HPFS, UFS, and EXT3. VMware created a file system optimized for virtual machines called *VMFS*.

Two types of VMFS file systems are:

- **VMFS2** – Created with ESX Server 2.x.

- **VMFS3** – Created with ESX Server 3.x. VMFS3 enhancements include multidirectory support and support for storing all components of a virtual machine (both `.vmx` and `.vmdk` files) on the VMFS3 datastore. A virtual machine must reside on a VMFS3 file system before an ESX Server 3.x host can power it on.

Table 1-1. Host Access to VMFS File Systems

Server Type	VMFS2 Datastore	VMFS3 Datastore
ESX Server 2 host	Read/write (runs VMs)	No access
ESX Server 3 host	Read only (copies VMs)	Read/write (runs VMs)

Converting a file system to VMFS3 takes approximately 15 minutes and requires downtime for all virtual machines remaining on the volume.

By moving all virtual machine files, including `.vmx` configuration files, to central, shared storage such as NAS or VMFS3 on Fibre Channel SAN and iSCSI SAN, an ESX Server host receives benefits for larger storage environments enabled by SAN, NAS, and iSCSI. Now all information about a virtual machine is centrally stored, and it is easier to manage, backup, restore, migrate, and copy virtual machines than it was in ESX Server 2.x. Having all virtual machine data stored centrally on the VMFS3 datastore is also essential to newer VMware Infrastructure functionality, such as VMware HA.

NOTE VMFS3 file systems are restricted to a block size of no greater than 8MB. You cannot directly upgrade a VMFS2 file system with a block size of greater than 8MB to VMFS3. To upgrade a VMFS2 file system with a block size greater than 8MB, use a migration upgrade strategy as described in "Migration Upgrade" on page 21.

Converting the file system on a volume is Procedure 2B from "Understanding the Stages of Upgrading" on page 23.

CAUTION   You cannot revert from VMFS3 to VMFS2. After it is upgraded, the VMFS3 volume is usable only with ESX Server 3.x hosts.

Upgrading VM2 Virtual Machine Format to VM3

VMware software stores virtual machines in multiple files. These files encompass virtual disk files, virtual hardware information presented to the guest operating system, and virtual machine configuration attributes.

The two types of virtual machine formats are:

- **VM2 Virtual Machine** – The VM2 format is used by virtual machines created with ESX Server 2.

- **VM3 Virtual Machine** – The VM3 format is used by virtual machines created with ESX Server 3.x. VM3 enhancements include improved snapshot support and support for new hardware.

ESX Server 3.x can power on VM2-format virtual machines in "Legacy Mode" if they are located on VMFS3 datastores. However, performance and features are limited without an upgrade to VM3.

Part of the VM2 to VM3 process moves the virtual machine `.vmx` configuration file from an ESX Server host file system to a directory on the VMFS3 datastore, placing all files for that virtual machine in one directory.

Upgrading the virtual machine format is Stage 3, from "Understanding the Stages of Upgrading" on page 23.

CAUTION   You cannot revert from VM3 to VM2. After it is upgraded, a VM3-format virtual machine is usable only with ESX Server 3.x.

Strategies for In-Place or Migration Upgrades

This section focuses on the upgrade process for VMFS volumes and virtual machines. The available upgrade strategies are in-place and migration.

In-Place Upgrade

The in-place upgrade is a software upgrade.

With an in-place upgrade strategy, you upgrade the VirtualCenter Server, ESX Server, the VMFS file system, and the virtual machines on the hosts and datastores on which they currently reside.

For ESX Server hosts using only local disks, an in-place upgrade means replacing the existing ESX Server 2.x with ESX Server 3.5, the existing VMFS2 with VMFS3, and upgrading the VM2-format virtual machines to VM3.

For multiple ESX Server hosts sharing SAN LUNs, an in-place upgrade is more complex. You upgrade one or more of your ESX Server 2.x hosts to ESX Server 3.x. Then, at an appropriate time, you upgrade one SAN LUN from VMFS2 to VMFS3. Downtime for all virtual machines on that LUN begins at that time.

For upgrades from earlier versions of ESX Server to ESX Server 3i, no in-place upgrade is available. Instead, you can migrate existing virtual machines and datastores to ESX Server 3i hosts.

Advantage of an In-Place Upgrade

You can upgrade properly prepared datastores and virtual machines with one click. This strategy also requires fewer additional resources than a migration upgrade.

Disadvantage of an In-Place Upgrade

The disadvantage of an in-place upgrade is that all virtual machines on a particular datastore must be powered off simultaneously for the VMFS2 to VMFS3 file system upgrade.

Migration Upgrade

The migration upgrade is more of a managed transition than a strict upgrade. The migration upgrade reduces virtual machine downtime to the bare minimum by moving virtual machines directly from a production host running ESX Server 2 to a production host running ESX Server 3 or ESX Server 3i.

If you are upgrading from a supported ESX Server 2.x version to ESX Server 3.x or higher, you can use upgrade VMotion, which allows you to migrate powered-on virtual machines from an ESX Server 2.x host to an ESX Server 3.x host while simultaneously relocating the virtual machine files from a VMFS2 to a VMFS3 datastore. This allows you to completely avoid virtual machine downtime associated with the host and datastore upgrade.

A migration upgrade requires that you have extra machines and storage capacity that are not yet part of your production environment:

- One or more machines meeting ESX Server 3.x requirements. The following manuals provide information about minimum hardware requirements:

    - For ESX Server 3, see the *Installation Guide.*

    - For ESX Server 3i, see the *Setup Guide*.

- Empty host storage sufficient to hold a portion of your production virtual machines. This storage capacity should be as large as possible. A larger capacity for virtual machines on this extra storage means fewer operations are required before all your virtual machines are migrated.

To use upgrade VMotion to migrate powered-on virtual machines while simultaneously relocating them from a VMFS2 to a VMFS3 datastore, you must meet the following requirements:

- Migrate virtual machines only from the following supported ESX Server versions:

    - ESX Server 2.5.3

    - ESX Server 2.5.4

    - ESX Server 2.5.5

- Make sure that the virtual machines to be migrated have persistent-mode disks.

Advantage of a Migration Upgrade

The advantage of a migration upgrade is that you can minimize downtime for mission-critical virtual machines by keeping them operational until you have upgraded ESX Server hosts ready to receive them. With the migration upgrade, it is not necessary to have all virtual machines on a particular datastore powered off simultaneously. Instead, virtual machines can be migrated to the new environment while powered on.

Disadvantage of a Migration Upgrade

The disadvantage of this upgrade strategy is that it needs additional resources. A migration upgrade calls for sufficient resources to run the production environment partly on ESX Server 2 hosts and partly on ESX Server 3 hosts. Any required redundancies and safeguards must be available on both upgraded and non-upgraded infrastructure during the transition.

Understanding the Stages of Upgrading

There are four sequential stages to upgrade to VMware Infrastructure to VMware VirtualCenter 2.5 and ESX Server 3.5:

- "Stage 1–Upgrading VMware VirtualCenter" on page 24
- "Stage 2–Upgrading Your ESX Server Hosts and Datastores" on page 25
    - "Stage 2A–Upgrading a VMware ESX Server Host" on page 27
    - "Stage 2B–Upgrading a Datastore from VMFS2 to VMFS3" on page 27
- "Stage 3–Upgrading Your Virtual Machines" on page 28
- "Stage 4–Upgrading VMware Tools Within the Guest Operating System" on page 30

Requirements for Staging

You can take any amount of time to complete each of the upgrade stages. However:

- You must complete one stage before you move to the next stage.
- After you start an upgrade stage, you cannot revert to the previous stage. Each of these stages is an irreversible process.
- Some major stages have minor steps within them. Follow the directions within each stage regarding the required sequence of minor steps.

> **CAUTION** Because certain commands can simultaneously upgrade more than one stage, VMware recommends that you thoroughly understand the irreversible changes at each stage before you upgrade your production environments.

Stage 1–Upgrading VMware VirtualCenter

This stage upgrades the VirtualCenter Server and its database.

Expected Downtime in Stage 1

- **VirtualCenter Server** – Expect downtime for the following elements:

  - In-place upgrade – VMware estimates that the upgrade requires the VirtualCenter Server to be out of production for ten minutes. No reboot is required. The downtime can be scheduled at your convenience.

  - Migration upgrade – You can avoid Stage 1 downtime if you have an extra supported machine. Install VirtualCenter 2.5 on the extra machine before you take the earlier version of VirtualCenter out of service.

> **CAUTION** VMware does not support management of one ESX Server host by multiple VirtualCenter Server machines. While there are safeguards, you might inadvertently find a host to be managed by VirtualCenter 1.x and VirtualCenter 2.x at the same time. If so, shut down VirtualCenter 1.x immediately or remove the host from the VirtualCenter 1.x to prevent corruption of virtual machines or the VirtualCenter database.

- **VMware license server** – No downtime is required.
- **ESX Server hosts** – No downtime is required.
- **Virtual machines** – No downtime is required.

Prerequisites for Stage 1

The following items are prerequisites for completing stage 1 of installation:

- VirtualCenter 1.x or VirtualCenter 2.x.
- VMware VirtualCenter 2.5 installation media.
- License keys for all purchased functionality.

  These keys can include VirtualCenter, ESX Server, Virtual SMP, VMotion, DRS, and HA.

- Login credentials, the database name, and the database server name used by the VirtualCenter database. The database server name is typically the ODBC System data store name (DSN) connection name for the VirtualCenter database.

Upgrade Tasks for Stage 1

1   Upgrade VirtualCenter to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Install the VI Client for users of the VirtualCenter client.

Considerations for Stage 1

■   **Access database** – Access is no longer supported. Microsoft SQL Server 2005 Express is the supported bundled database for small deployments (up to 5 hosts and 50 virtual machines).

■   **Legacy clients** – VMware Management Interface users and remote console clients cannot connect to VirtualCenter 2.5. However, any browser can connect to the VirtualCenter 2.5 URL and download a Windows VI Client. The Management Interface and remote console clients can still connect directly to ESX Server 2.x hosts, even if those hosts are now managed by VirtualCenter 2.5.

Stage 2–Upgrading Your ESX Server Hosts and Datastores

To ensure that you have enough free space for the upgrade and to check for other potential upgrade problems, run the preupgrade script. See "Running the Preupgrade Script" on page 70.

Upgrade Strategy for ESX Server Host with Local Disks

If you are upgrading ESX Server hosts with only local disks and no shared SAN, your upgrade procedures are straightforward. Insert the product CD into the CD-ROM drive of your ESX Server host, and upgrade the ESX Server host as described in "Performing the ESX Server Host Upgrade" on page 69. This will upgrade the following components:

■   ESX Server (in-place)

■   VMFS (in-place)

The following components are not upgraded:

■   Your virtual machines

■   VMware Tools inside each machine

Upgrade Strategy for ESX Server Host with SAN

The rest of this section describes upgrading hosts with SAN-based shared VMFS datastores. The challenge here is in upgrading the shared VMFS disk. If multiple servers depend on, for example, a single VMFS disk, how do you accomplish the upgrade of that disk?

One approach is to upgrade all the servers first, and then upgrade the disk. Although this approach is possible, it incurs a large amount of downtime. All virtual machines in your environment must be brought down for the duration of the process, due to a key limitation that ESX Server 3.x hosts cannot run virtual machines residing on legacy VMFS2 storage.

There are other strategies that can minimize and mitigate the downtime for your virtual machines. These approaches require additional thought and planning.

A migration upgrade to a separate VMFS3 datastore involves migrating virtual machines from your legacy environment to your new environment.

- **Advantage** – Avoids downtime for virtual machines at this step.

- **Disadvantage** – Migrating each virtual machine is time-consuming. Additional disk resources are needed. Each virtual machine's virtual disk is copied from a VMFS2 volume to a VMFS3 volume.

NOTE   The migration scenarios described in this chapter make use of a new feature in ESX Server 3.x. This feature is supported only for upgrades from specific ESX Server 2.x versions.

An in-place upgrade essentially involves upgrading a subset of your ESX Server hosts and then upgrading their associated VMFS2 volumes in-place. This process can be repeated multiple times over subsets of ESX Server hosts and disks.

- **Advantage** – An in-place upgrade is faster than a migration upgrade. No additional disk or server resources are needed.

- **Disadvantage** – A group of virtual machines must experience downtime simultaneously while the VMFS2 volume on which they reside is upgraded.

Whatever strategy you take, you need to use two basic procedures. The remainder of this section discusses upgrading a VMware ESX Server host and upgrading a datastore from VMFS2 to VMFS3.

Expected Downtime in Stage 2

- **ESX Server Hosts –** Expect downtime from the following elements:

  - **Procedure 2A** – Whether you choose a migration or an in-place upgrade, each host must be rebooted for the upgrade, and then rebooted after the upgrade is installed. VMware estimates the upgrade requires each host to be out of production for approximately 40 minutes. Virtual machines can be migrated with VMotion to prevent downtime.

  - **Procedure 2B** – For an in-place upgrade, each datastore file system partition must be unavailable to all ESX Server hosts except the one performing the upgrade for the duration of the upgrade. For a migration upgrade, the VMFS2 datastore is emptied of virtual machines before it is upgraded, so the upgrade does not affect any ESX Server hosts.

- **Virtual Machine** – For an in-place upgrade, downtime occurs when you upgrade the host and continues until you have upgraded the VMFS2 datastore to VMFS3. For a migration upgrade, virtual machine downtime need not occur during the host or datastore upgrade.

Stage 2A–Upgrading a VMware ESX Server Host

Before you begin procedure 2A, consider the following:

- **VM2 virtual machines** – VM2-format virtual machines remain on VMFS2 datastores. An ESX Server 3.x host cannot power on a VM2-format virtual machines on a VMFS2 datastore. If you attempt to power on a VM2-format virtual machine before moving it to a VMFS3 datastore, you receive an error.

- **VMFS2 datastores** – VMFS2 datastore must be upgraded or they are read-only on ESX Server 3.x hosts at the end of stage 2. The required VMFS2 to VMFS3 upgrade is accomplished in the next stage.

- **Legacy clients** – VMware Management Interface users and remote console clients cannot connect to an ESX Server 3.x host. However, any browser can connect to the ESX Server 3.x host URL and download a Windows VI Client.

Stage 2B–Upgrading a Datastore from VMFS2 to VMFS3

The upgrade from VMFS2 to VMFS3 is a nondestructive upgrade to the file system. Virtual machines stored on VMFS2 volumes are not erased. All virtual machines with disks on the VMFS2 volume must be powered off.

Before you begin procedure 2B, consider the following:

- **ESX Server 2 host** – Is no longer supported at the end of procedure 2B. An ESX Server 2 host cannot access VMFS3 datastores.

- **ESX Server 3 host** – Reads VMFS2 datastores for upgrade only. An ESX Server 3.x host cannot power on a virtual machine from VMFS2 datastores.

- **VM2-Format virtual machines** – Can be powered on in legacy mode if they are relocated to VMFS3 datastores.

    Non-upgraded (VM2 format) virtual machines remain in the appropriate ESX Server inventory. Manual VM3 upgrades occur in stage 4.

- **VMFS2 datastores** – Are no longer supported for running virtual machines. VMFS2 datastores are upgraded or removed from service. All virtual machines on VMFS2 partitions remain registered with the appropriate ESX Server 3.x host. However, any attempt to power on a VM2-format virtual machine fails with an error message `IncompatibleVersion.`

- **VMFS3 datastores** – Contain all usable virtual machines at the end of procedure 2B. All virtual machines are on VMFS3 partitions registered with the appropriate ESX Server 3.x host.

Stage 3–Upgrading Your Virtual Machines

Stage 3 is a manual upgrade for remaining VM2-format virtual machines. The VM3-format upgrade offers improved snapshots and other enhanced functionality.

CAUTION Do not move to stage 3 until all virtual machines are relocated onto VMFS3 datastores. The stage 3 upgrade is irreversible. Upgraded virtual machines can never be powered on by an ESX Server 2 host, even if relocated to a VMFS2 datastore. Make sure to back up any virtual machine you need to use again on an ESX Server 2 host.

Expected Downtime in Stage 3

- **VirtualCenter Server** – No downtime is required.

- **ESX Server hosts** – No downtime is required.

- **VMware license server** – No downtime is required.

- **Virtual machines** – VMware estimates the upgrade requires each virtual machine to be out of production for 30 minutes. The downtime can be concurrent for multiple virtual machines.

Prerequisites for Stage 3

The following items are prerequisites for completing stage 3 of installation:

- All `.vmdk` files must be available to the ESX Server host on a VMFS3 datastore.

- A virtual machine can be upgraded if:

  - It is stored on VMFS3 or NFS datastores.

  - No suspend files exist.

  - At least one virtual disk exists.

Results of Stage 3

- **VM2-format virtual machines** – Have been upgraded at the end of this stage.

- **VM3-format virtual machines** – This is the format of all virtual machines.

Upgrade Tasks in Stage 3

1   Select a virtual machine in the Inventory.

2   Choose **Inventory** > **Virtual Machine** > **Upgrade Virtual Hardware**.

See "Upgrading Datastores" on page 78.

Alternatively, you can upgrade multiple virtual machines from VM2 to VM3 and upgrade their VMware Tools versions. See "Upgrading Hardware and VMware Tools in Multiple Virtual Machines" on page 82.

Upgrading to VM3 virtual hardware format results in these actions:

- The `.vmx` configuration file is updated to VM3 format.

- The `.vmdk` virtual disk file is updated to VMDK3 format. This allows operation of features such as multiple snapshots.

- The `.vmx` and `.vmdk` files are located in one directory on the VMFS3 volume. This allows a virtual machine to be used by any ESX Server host sharing the datastore. (If the virtual machine was relocated to this VMFS3 datastore during a migration upgrade, these files will already be located on the VMFS3 volume prior to the virtual hardware upgrade.)

CAUTION   Do not move to stage 4 until all virtual machines are upgraded to VM3 format.

Stage 4–Upgrading VMware Tools Within the Guest Operating System

VMware Tools includes drivers that are optimized for the emulated and virtualized hardware in a VMware virtual machine. Updating VMware Tools provides the best performance and stability available for a guest operating system.

Expected Downtime in Stage 4

- **VirtualCenter Server** – No downtime is required.

- **ESX Server hosts** – No downtime is required.

- **VMware license server** – No downtime is required.

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

Prerequisites for Stage 4

The following items are prerequisites for completing stage 4 of installation:

- A supported guest operating system must be installed on the virtual machine.

- You must have a license installed that allows you to power on virtual machines.

Upgrade Procedure for Stage 4

1   Launch the virtual machine.

2   Install or upgrade VMware Tools.

Alternatively, you can run a script to upgrade multiple virtual machines from VM2 to VM3 and upgrade their VMware Tools versions.

See "Upgrading VMware Tools" on page 82 and "Upgrading Hardware and VMware Tools in Multiple Virtual Machines" on page 82.

Considerations for Stage 4

- **VMware Tools 2** – All virtual machines have been upgraded from VMware Tools 2 to VMware Tools 3 at the end of this stage.

- **VMware Tools 3** – Is used by all virtual machines.

Upgrade Scenarios

The upgrade scenarios listed in Table 1-2 provide detailed guidance on how to upgrade your VMware Infrastructure components in various environments.

Table 1-2. Upgrade Scenarios

Server Type	Upgrade Type	In-Place or Migration	Storage	Example
ESX Server 3	Major ESX Server 2.x to ESX Server 3.5	In-place	Local or SAN	"Scenario 1: Upgrading In-Place" on page 33
ESX Server 3	Major ESX Server 2.x to ESX Server 3.5 With VMotion	Migration	SAN	"Scenario 2: Upgrading Hosts on a SAN Using Upgrade VMotion" on page 37
ESX Server 3	Major ESX Server 2.x to ESX Server 3.5	In-Place	SAN	"Scenario 3: Upgrading Hosts on a SAN and Upgrading a VMFS Volume In-Place" on page 38
ESX Server 3	Minor ESX Server 3.0.x to ESX Server 3.5	In-Place	Local	"Scenario 4: Upgrading a Local Disk In-Place" on page 40
ESX Server 3	Minor ESX Server 3.0.x to ESX Server 3.5 With VMotion	Migration	SAN	"Scenario 5: Upgrading Hosts on a SAN Using VMotion without DRS and HA" on page 40
ESX Server 3	Minor ESX Server 3.0.x to ESX Server 3.5 With VMotion, DRS, and HA	Migration	SAN	"Scenario 6: Upgrading Hosts on a SAN Using VMotion with DRS and HA" on page 41
ESX Server 3i	Major ESX Server 2.x to ESX Server 3i version 3.5 With VMotion	Migration	Local or SAN	"Scenario 1: Upgrading Using Upgrade VMotion" on page 44
ESX Server 3i	Major ESX Server 2.x to ESX Server 3i version 3.5	Migration	Local or SAN	"Scenario 2: Upgrading Using Cold Migration" on page 44

Table 1-2. Upgrade Scenarios (Continued)

Server Type	Upgrade Type	In-Place or Migration	Storage	Example
ESX Server 3i	Minor ESX Server 3.0.x to ESX Server 3i version 3.5 With VMotion	Migration	Local or SAN	"Scenario 3: Performing a Minor Upgrade Using VMotion" on page 45
ESX Server 3i	Minor ESX Server 3.0.x to ESX Server 3i version 3.5	Migration	Local or SAN	"Scenario 4: Assigning a LUN to an ESX Server 3i Host" on page 46
ESX Server 3i	Minor ESX Server 3.0.x to ESX Server 3i version 3.5 With VMotion, DRS, and HA	Migration	SAN	"Scenario 5: Upgrading Hosts on a SAN with DRS and HA" on page 46

ESX Server 3 and VirtualCenter Upgrade Scenarios

2

This chapter discusses several scenarios for upgrading to ESX Server 3 and VirtualCenter 2.5, including both major and minor upgrades:

- "Major Upgrades" on page 33
- "Minor Upgrades" on page 40

For information on upgrading to ESX Server 3i, see "ESX Server 3i and VirtualCenter Upgrade Scenarios" on page 43.

Major Upgrades

Major upgrades involve upgrading from VMware Infrastructure 2 to VMware Infrastructure 3.

Scenario 1: Upgrading In-Place

In this case, you upgrade the ESX Server software in-place. Then you upgrade the VMFS datastore in-place. Finally, you upgrade all the virtual machines in-place. During the upgrade procedure, the ESX Server host is not operational.

A typical environment for this upgrade is illustrated in Figure 2-1.

Figure 2-1. Typical Environment for In-Place Upgrade
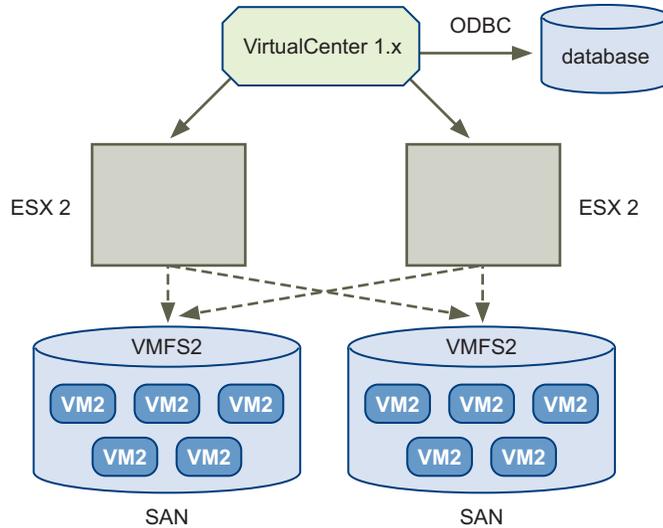
HVL Alignment

Before performing this type of upgrade, it might be useful to perform a host-virtual machine-LUN (HVL) alignment, that is, to migrate virtual machines so that all virtual machines on a given LUN are associated with only one ESX Server host. When hosts, virtual machines, and LUNs are aligned in this way, you can upgrade hosts and VMFS2 datastores in pairs without having to consider effects on other hosts and datastores.

Often, an HVL alignment can be achieved using VMotion to realign the virtual machines with hosts. If this is not possible, then cold migration is necessary. The extra virtual machine downtime incurred by cold migration might outweigh the benefits of performing the HVL alignment.

Figure 2-2 shows the typical environment before an HVL alignment.

Figure 2-2. Typical Environment Before HVL Alignment
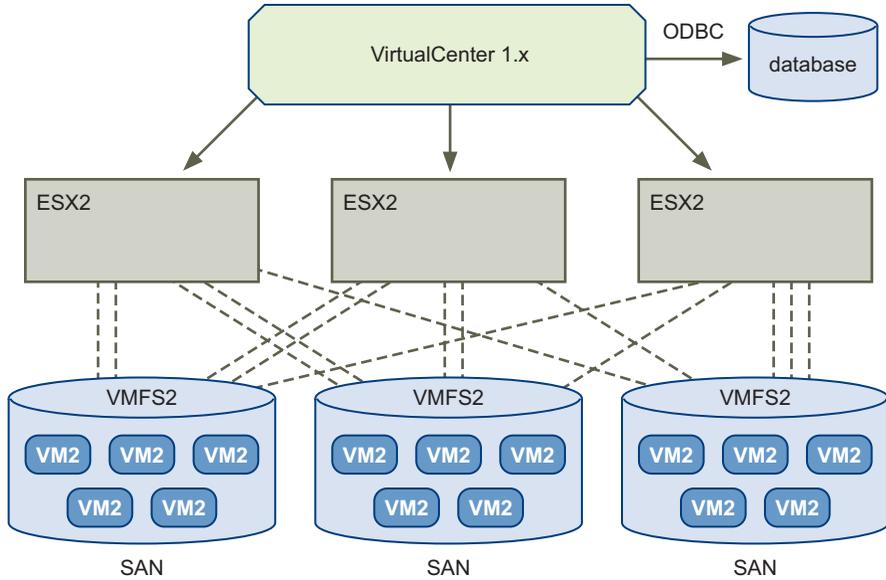
Figure 2-3 shows the typical environments after an HVL alignment.

Figure 2-3. Typical Environment After HVL Alignment
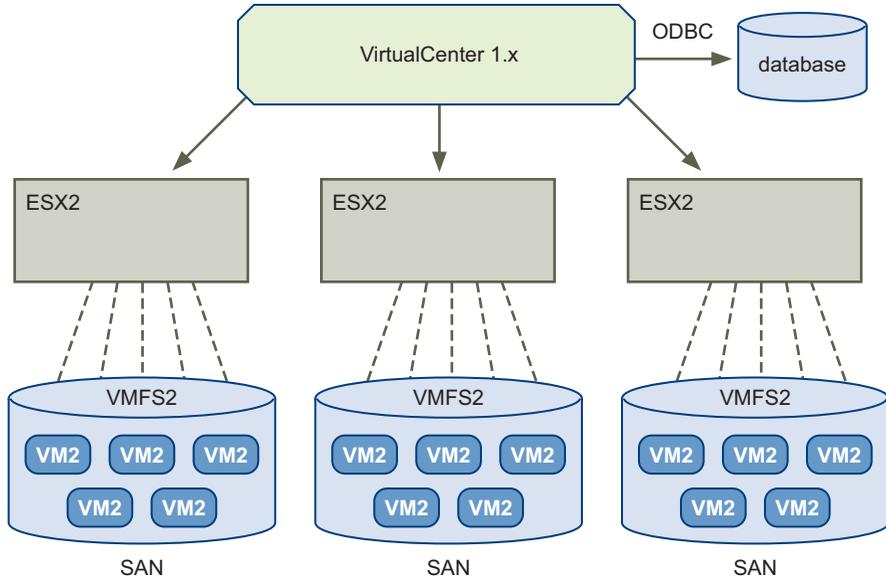
To perform the upgrade

1   Upgrade VirtualCenter 1.x to VirtualCenter 2.5.

    For VirtualCenter 1.2, upgrade to VirtualCenter 1.4.1 before upgrading to VirtualCenter 2.5.

    For VirtualCenter 1.3 and higher, upgrade directly to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Choose a host and datastore pair to upgrade.

4   Power off all virtual machines on the host.

5   Upgrade the host from ESX Server 2.x to ESX Server 3.x.

6   Perform an in-place file system upgrade from VMFS2 to VMFS3.

7   Upgrade the virtual hardware from VM2 format to VM3 format.

    This step also relocates all virtual machine files to the VMFS3 datastore.

8   Upgrade VMware Tools 2 to VMware Tools 3.

Scenario 2: Upgrading Hosts on a SAN Using Upgrade VMotion

Consider this scenario when you have multiple ESX Server 2.x hosts with shared VMFS2 volumes on a SAN datastore. This scenario is typically used when the number of VMFS volumes is less than the number of ESX Servers.

In this scenario, you use upgrade VMotion (also known as VMotion with datastore relocation) to copy the virtual machines over the network. A typical environment for this upgrade is illustrated in Figure 2-4.

NOTE You cannot use this type of migration upgrade for virtual machines residing on a shared mode VMFS2 datastore. For more information on upgrading with shared VMFS2 volumes, see *Setup for Microsoft Cluster Service*.

Figure 2-4. Typical Environment for Upgrading Hosts on a SAN Using Upgrade VMotion
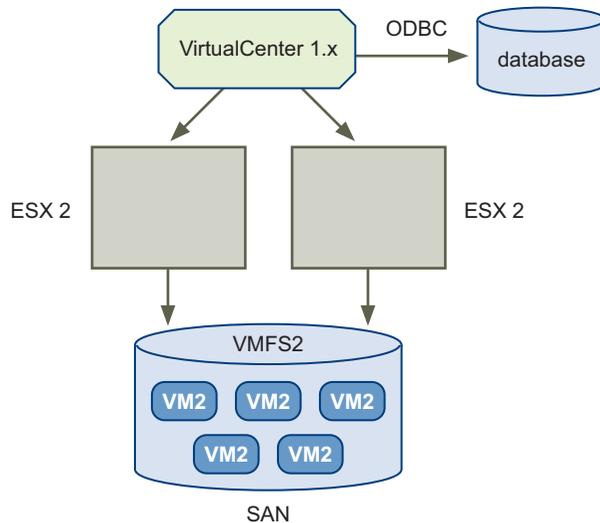
To perform the upgrade

1   Upgrade VirtualCenter 1.x to 2.5.

    For VirtualCenter 1.2, upgrade to VirtualCenter 1.4.1 before upgrading to VirtualCenter 2.5.

    For VirtualCenter 1.3 and higher, upgrade directly to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Evacuate the first ESX Server 2.x host using VMotion.

4   Upgrade the first ESX Server 2.x host to ESX Server 3.x.

5   Use the first host to create a new VMFS3 volume on the SAN.

        This volume must be equal or greater in storage capacity to the VMFS2 volume to be upgraded.

6   Use upgrade VMotion to move the virtual machines from the VMFS2 datastore to the host with the new VMFS3 datastore.

7   Power off the virtual machines and upgrade the virtual hardware from VM2 format to VM3 format.

8   From within the guest operating systems, upgrade VMware Tools 2 to VMware Tools 3.

9   Repeat Step 6 through Step 8 to migrate all virtual machines.

10   After all the remaining virtual machines are evacuated, upgrade the ESX Server to ESX Server 3.x.

Scenario 3: Upgrading Hosts on a SAN and Upgrading a VMFS Volume In-Place

In this scenario, you power off only the virtual machines on the VMFS volume that you are upgrading in-place. This approach is recommended for environments with multiple ESX Servers and shared SAN storage, where the number of VMFS datastores is equal to or greater than the number of ESX Servers.

To perform the upgrade

1   Use VMotion to evacuate all virtual machines from one host to other hosts.

2   Upgrade or install ESX Server 3.x on this empty server.

3   Reattach the VMFS2 LUN with virtual machines to the ESX Server 3.x host.

        The VMFS2 LUN is now shared between the ESX Server 3.x host and the other ESX Server 2 hosts that are running the virtual machines.

4   For the virtual machines whose `.vmdk` files are located on this VMFS 2 LUN, power them off (on the other ESX Server 2 hosts).

5   Use VirtualCenter to relocate these virtual machines to the new ESX Server 3.x host.

6   When prompted, select **Keep virtual machine configuration files and virtual
disks in their current locations**.

The relocate operation copies only the configuration (`.vmx`) files, because both the
ESX Server 3.x host and the ESX Server 2.x host see the common VMFS2
volume/LUN. The virtual machines are now in the following state: The `.vmx` files
are in the EXT3 partition of the ESX Server 3.x service console, and `.vmdk` files are
on VMFS2. They cannot be powered on at this point.

7   Perform an in-place upgrade of the VMFS2 to VMFS3 on the ESX Server 3.x host.

The virtual machines can now be powered on in the legacy virtual hardware VM2
format.

VMware supports only limited operations on the virtual machine at this level:
Power-ons, connect/disconnect removable devices and point them at file images
and relocate.

8   Upgrade the virtual hardware from VM2 format to VM3 format and upgrade
VMware Tools 2 to VMware Tools 3.

Considerations for Scenario 3

■   This approach requires spare CPU capacity and VMotion capability.

■   Performing an in-place upgrade allows you to save the time otherwise required for
copying disks over the network.

■   The required downtime occurs from Step 4 through Step 8, when you relocate the
configuration files and perform the VMFS2 to VMFS3 in-place upgrade.

■   Suppose you have eight servers and eight LUNs. You can iterate through this
process for server 1 and LUN 1, server 2 and LUN 2, server 3 and LUN 3, and so
on. When you have two or three servers remaining, it might not be possible to
perform Step 1 (evacuate the servers using VMotion). You can use upgrade
VMotion for the final few servers. See "Scenario 2: Upgrading Hosts on a SAN
Using Upgrade VMotion" on page 37.

Minor Upgrades

(SEE UPDATE) Minor upgrades involve upgrading from VirtualCenter 2.5/ESX Server 3.x to VirtualCenter 2.5 and ESX Server 3.5.

Scenario 4: Upgrading a Local Disk In-Place

In this scenario, you upgrade the ESX Server software in-place. You do not need to upgrade the VMFS volumes or virtual machines. You must upgrade only the VMware Tools. During this upgrade procedure, the ESX Server host is not operational.

To perform the upgrade

1   Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Power off all virtual machines on the ESX Server host.

4   Upgrade ESX Server 3.0.x to ESX Server 3.5.

5   Upgrade VMware Tools version 2 to VMware Tools version 3.

6   Repeat Step 3 through Step 5 for each ESX Server host.

Scenario 5: Upgrading Hosts on a SAN Using VMotion without DRS and HA

In this case, you upgrade an ESX Server 3.0.x host with a shared VMFS. This scenario is appropriate when the hosts are on a SAN and when DRS and HA are not configured.

To perform the upgrade

1   Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Use VMotion to evacuate virtual machines from the ESX Server 3.0.x host.

4   Upgrade the ESX Server 3.0.x to ESX Server 3.5.

5   Use VMotion to move the virtual machines back to the ESX Server host.

6   Upgrade VMware Tools 2 to VMware Tools 3.

7   Repeat Step 3 through Step 6 for each ESX Server host.

Scenario 6: Upgrading Hosts on a SAN Using VMotion with DRS and HA

(SEE UPDATE) In this scenario, DRS and HA are configured and the virtual machine migration occurs automatically. You do not need to decide how to perform the migration or plan resource provisioning. You place the ESX Server host into maintenance mode, and after the software migrates the virtual machines to other hosts, you perform the ESX Server upgrade.

To perform the upgrade

1 Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2 Upgrade the VirtualCenter database.

3 Place the ESX Server host into maintenance mode.

4 Wait until the software evacuates all the virtual machines from the ESX Server host.

5 Upgrade the ESX Server 3.0.x host to ESX Server 3.5.

6 Add the upgraded ESX Server to the DRS cluster.

7 Repeat Step 3 through Step 6 for each ESX Server host.

ESX Server 3i and VirtualCenter Upgrade Scenarios

3

This chapter discusses several scenarios for upgrading to ESX Server 3i version 3.5 and VirtualCenter 2.5, including both major and minor upgrades:

- "Major Upgrades" on page 43

- "Minor Upgrades" on page 45

- "Changing the ESX Server Version" on page 47

For information on upgrading to ESX Server 3, see "ESX Server 3 and VirtualCenter Upgrade Scenarios" on page 33.

Major Upgrades

Major upgrades involve upgrading from VMware Infrastructure 2 to VMware Infrastructure 3. Specifically, these scenarios discuss upgrades from ESX Server 2.5.x and VirtualCenter 1.x to ESX Server 3i version 3.5 and VirtualCenter 2.5.

Scenario 1: Upgrading Using Upgrade VMotion

In this scenario, VirtualCenter 1.4 is managing ESX Server 2.5.x hosts.

To perform the upgrade

1   Upgrade VirtualCenter 1.x to VirtualCenter 2.5.

    For VirtualCenter 1.2, upgrade to VirtualCenter 1.4.1 before upgrading to VirtualCenter 2.5.

    For VirtualCenter 1.3 and higher, upgrade directly to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Add an ESX Server 3i host to the VirtualCenter 2.5 inventory.

4   Create a VMFS3 datastore on the ESX Server 3i host.

5   Use upgrade VMotion to migrate a virtual machine from the ESX Server 2.5.x host to the ESX Server 3i host.

6   Power off the virtual machine.

7   Upgrade the virtual hardware from VM2 format to VM3 format.

8   Power on the virtual machine.

9   Upgrade from VMware Tools 2 to VMware Tools 3.

10 Repeat Step 5 through Step 9 to migrate additional virtual machines.

Scenario 2: Upgrading Using Cold Migration

In this scenario, VirtualCenter 1.4 is managing ESX Server 2.5.x hosts. During the upgrade process, you keep `.vmdk` files at the same VMFS volume and assign the ESX Server 2.5.x VMFS2 LUN to the ESX Server 3i host.

To perform the upgrade

1   Upgrade VirtualCenter 1.x to VirtualCenter 2.5.

    For VirtualCenter 1.2, upgrade to VirtualCenter 1.4.1 before upgrading to VirtualCenter 2.5.

    For VirtualCenter 1.3 and higher, upgrade directly to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Add an ESX Server 3i host to the VirtualCenter 2.5 inventory.

4   Make the ESX Server 2.5.x VMFS2 LUN available to the ESX Server 3i host.

5   Power off the virtual machines on the ESX Server 2.5.x host.

6   Use VirtualCenter to relocate these virtual machines to the new ESX Server 3i host.

7   When prompted, select **Keep virtual machine configuration files and virtual disks in their current locations**.

The relocate operation copies only the configuration (`.vmx`) files, because both the ESX Server 3i host and the ESX Server 2.5.x host see the common VMFS2 volume/LUN. The virtual machines are now in the following state: The `.vmx` files are in the VMFS3 partition of the ESX Server 3i host, and `.vmdk` files are on VMFS2. They cannot be powered on at this point.

8   Put the ESX Server 3i host into maintenance mode.

9   Upgrade the VMFS2 datastore to VMFS3 on the ESX Server 3i host.

10   Take the ESX Server 3i host out of maintenance mode.

11   Upgrade the virtual hardware from VM2 format to VM3 format.

12   Power on the virtual machines on the ESX Server 3i host.

13   Upgrade VMware Tools 2 to VMware Tools 3.

Minor Upgrades

Minor upgrades involve upgrading from VirtualCenter 2.0.x and ESX Server 3.0.x to VirtualCenter 2.5 and ESX Server 3.5 and adding ESX Server 3i version 3.5.

Scenario 3: Performing a Minor Upgrade Using VMotion

In this scenario, VirtualCenter 2.0.x is managing ESX Server 3.0.x hosts with licenses to use VMotion. The ESX Server 3i host has access to the ESX Server 3.0.x LUNs.

To perform the upgrade

1   Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Add an ESX Server 3i host to the VirtualCenter 2.5 inventory.

4   Use VMotion to migrate virtual machines from an ESX Server 3.0.x host to the ESX Server 3.i host.

5   Upgrade VMware Tools version 2 to VMware Tools version 3.

Scenario 4: Assigning a LUN to an ESX Server 3i Host

In this case, VirtualCenter 2.0.x is managing ESX Server 3.0.x hosts. All the virtual machines on the ESX Server 3.0.x host are on a LUN.

To perform the upgrade

1   Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Add an ESX Server 3i host to the VirtualCenter 2.5 inventory.

4   Power off the virtual machines on the LUN.

5   Assign the LUN to the ESX Server 3i host.

6   Register the virtual machines on the ESX Server 3i host.

7   Power on the virtual machines on the LUN.

8   Upgrade VMware Tools 2 to VMware Tools 3.

Scenario 5: Upgrading Hosts on a SAN with DRS and HA

(SEE UPDATE) In this case, VirtualCenter 2.0.x is managing ESX Server 3.0.x hosts in a cluster with DRS and HA enabled. To add an ESX Server 3i host to the cluster, you must upgrade to VirtualCenter 2.5 and upgrade the ESX Server 3.0.x hosts to ESX Server 3.5.

To perform the upgrade

1   Upgrade VirtualCenter 2.0.x to VirtualCenter 2.5.

2   Upgrade the VirtualCenter database.

3   Add an ESX Server 3i host to the VirtualCenter 2.5 inventory, making it part of the DRS cluster.

4   Put the ESX Server 3.0.x host into maintenance mode.

5   Wait until the software evacuates all the virtual machines from the ESX Server 3.0.x host.

6   Upgrade the ESX Server 3.0.x host to ESX Server 3.5.

The upgraded ESX Server is part of the DRS cluster.

7   Repeat steps from Step 3 through Step 6 for each of the ESX Server 3.0.x hosts.

Changing the ESX Server Version

You can change from ESX Server 3 to ESX Server 3i Installable and from ESX Server 3i to ESX Server 3.

To change from ESX Server 3 to ESX Server 3i Installable

1   Do one of the following:

- Uninstall ESX Server 3 and install ESX Server 3i in place.

  For information about uninstalling ESX Server 3, see the *Installation Guide*. For information about installing ESX Server 3i Installable, see the *Setup Guide*.

- Migrate virtual machines from an ESX Server 3i host to an ESX Server 3 host.

  See the *Basic System Administration Guide*.

2   Reregister the virtual machines with the ESX Server 3i host by using VI Client.

See the VI Client Help.

To change from ESX Server 3i to ESX Server 3

1   Do one of the following:

- Disable ESX Server 3i and install ESX Server 3 in place.

  For information about disabling ESX Server 3i, see the *Setup Guide*. For information about installing ESX Server 3, see the *Installation Guide*.

- Migrate virtual machines from an ESX Server 3i host to an ESX Server 3 host.

  See the *Basic System Administration Guide*.

2   Reregister the virtual machines with the ESX Server 3 host by using VI Client.

See the VI Client Help.

Upgrading VirtualCenter

4

This chapter describes important considerations to be aware of and preparations to make before you begin a VirtualCenter upgrade. This chapter includes procedures for upgrading VMware VirtualCenter:

- "Release Upgrade Support" on page 49

- "Before You Upgrade VirtualCenter" on page 51

- "Performing the VirtualCenter Upgrade" on page 53

> **CAUTION**   You must upgrade VMware VirtualCenter before you upgrade VMware ESX Server. However, some upgrade procedures in this chapter must occur *after* you install VMware ESX Server. If you do not upgrade in the stages described in this manual, you can lose data and lose access to your servers. See "Understanding the Stages of Upgrading" on page 23.

Release Upgrade Support

Upgrades from previous VirtualCenter releases are supported as follows:

- VirtualCenter upgrades are supported from VirtualCenter 1.x to the latest VirtualCenter release.

- Unsupported upgrades include all VirtualCenter beta releases. Upgrading from these releases can fail with lost data and unusable configurations.

Table 4-1 lists versions of VirtualCenter that are supported for upgrade.

Table 4-1. (SEE UPDATE) VirtualCenter Upgrade Support

VMware VirtualCenter Version	Upgrade Support to VirtualCenter 2.5 Update 2
VirtualCenter beta release (any)	No upgrade support
VirtualCenter 1.0	No upgrade support
VirtualCenter 1.1	No upgrade support
VirtualCenter 1.2	Upgrade to VirtualCenter 1.4.1 before upgrading to VirtualCenter 2.5.
VirtualCenter 1.3	Yes
VirtualCenter 1.3.x	Yes
VirtualCenter 1.4	Yes
VirtualCenter 1.4.x	Yes
VirtualCenter 2.0	Yes
VirtualCenter 2.0.1	Yes
VirtualCenter 2.0.2	Yes
VirtualCenter 2.5	Yes
VirtualCenter 2.5 Update 1	Yes

Before You Upgrade VirtualCenter

Before you upgrade your VirtualCenter Server, consider the following points:

- VirtualCenter 2.5 Uses TCP/IP Ports 80 and 443

    Previous releases allow you to run the VirtualCenter Server on the same machine as a Web server using TCP/IP port 80 (http) or port 443. This configuration is no longer allowed because it causes a port conflict. The VirtualCenter Server uses TCP/IP ports 80 and 443 for the VMware Infrastructure Web client.

- VirtualCenter 2.x Cannot Run on a GSX Server Host

    VirtualCenter 2.x server cannot exist on a GSX Server host. These VMware applications use the same TCP/IP ports (notably 80 and 902). You can remove GSX Server software after you perform the VirtualCenter Server upgrade. However, with both products operating on the same machine, errors can include the following:

    - No Web access to VirtualCenter 2.x.

    - Connections using VI Client produce the message
      `530 Please Login with USER and PASS.`

    - Dropped or unsuccessful connections occur when using the GSX Server client.

- VirtualCenter Database Must Be Upgraded

    As part of upgrading your VirtualCenter Server, you must upgrade the VirtualCenter database. You cannot use the same database for VirtualCenter 1.x and 2.x.

> **CAUTION** When the VirtualCenter Database Upgrade wizard runs, it updates the database with extra fields, making the database unusable by VirtualCenter 1.x.

■   Make sure that your database meets the requirements shown in Table 4-2.

Table 4-2. Supported Database Formats

Database Type	Service Pack, Patch, and Driver Requirements
Microsoft SQL Server 2000 Standard Microsoft SQL Server 2000 Enterprise	Install SP4 for Microsoft SQL Server 2000. For Windows 2000 and Windows XP, apply MDAC 2.8 SP1 to the client. Use the SQL Server driver for the client.
Microsoft SQL Server 2005 Standard Microsoft SQL Server 2005 Enterprise	Install SP1 or SP2 for Microsoft SQL Server 2005. For Windows 2000 and Windows XP, apply MDAC 2.8 SP1 to the client. Use the SQL Native Client driver for the client.
Microsoft SQL Server 2005 Express SP2	For Windows 2000 and Windows XP, apply MDAC 2.8 SP1 to the client. Use the SQL Native Client driver for the client.
Oracle 9i release 2 Standard Oracle 9i release 2 Enterprise	Apply patch 9.2.0.8.0 to the server and client.
Oracle 10g Standard Release 1 (10.1.0.3.0) Oracle 10g Enterprise Release 1 (10.1.0.3.0)	None
Oracle 10g Standard Release 2 (10.2.0.1.0) Oracle 10g Enterprise Release 2 (10.2.0.1.0)	First apply patch 10.2.0.3.0 to the client and server. Next apply patch 5699495 to the client. (SEE UPDATE)

■   Make sure that the database user has the following permissions:

   ■   **Oracle** – Either grant dba permission to the user, or grant the following permissions to the user:

```
grant connect to <user>
grant resource to <user>
grant create view to <user>
grant create any sequence to <user> # For VirtualCenter upgrade only
grant create any table to <user> # For VirtualCenter upgrade only
grant execute on dbms_job to <user>
grant execute on dbms_lock to <user>
grant unlimited tablespace to <user> # To ensure space limitation is
                not an issue
```

- **Microsoft SQL Server 2000** – Make sure that the database user has the db_owner fixed database role on the VirtualCenter database and the MSDB database. The db_owner role on the MSDB database is required for installation and upgrade only. You can revoke this role after the installation or upgrade process is completed. Do not grant the System Administrators server role to the database user. However, if the System Administrators role was previously granted while the database was used with VirtualCenter 2.0.x, do not revoke the System Administrators role. Leave it as is.

- **Microsoft SQL Server 2005** – Make sure that the database login has either the sysadmin server role or the db_owner fixed database role on the VirtualCenter database and on the MSDB database. The db_owner role on the MSDB database is required for installation and upgrade only. You can revoke this role after the installation or upgrade process is complete.

If you are installing a new database, read the detailed instructions for preparing your database. These instructions are included in the *Setup Guide* for ESX Server 3i and the *Installation Guide* for ESX Server 3.

Performing the VirtualCenter Upgrade

This section describes stage 1 (out of four stages) in upgrading your the VirtualCenter Server and ESX Server infrastructure. For a list of all stages, see "Understanding the Stages of Upgrading" on page 23.

The VirtualCenter upgrade includes upgrading VirtualCenter, the VirtualCenter database, the VI Client, and the license server.

Upgrading VirtualCenter

The VMware Infrastructure Management installer detects any previous VirtualCenter release and uninstalls it. After the uninstall, the actual installation of VirtualCenter begins.

This operation requires downtime for the VirtualCenter Server that you are upgrading. No virtual machines need to be powered off.

If a previous VirtualCenter release was installed, the VirtualCenter installation wizard presents you with several screens that are specific to the upgrade procedure:

1   As Administrator on the Windows system, insert the VMware Infrastructure Management Installer CD.

2   When the VMware Infrastructure Management Installer screen appears, click **Next**.

If the VMware Infrastructure Management Installer screen does not appear, double-click the autorun.exe icon.

3   A dialog box appears with the message, "Would you like to remove the VMware VirtualCenter database settings from this machine? Select 'NO' if you would like to preserve these settings for future install."

■   Click **No** to preserve the VirtualCenter database for upgrading by the Database Upgrade wizard.

■   Click **Yes** if you had a Microsoft Access database and no longer need it.

> **CAUTION**   If you click **Yes**, the data store name (DSN) is deleted, and the Database Upgrade wizard cannot upgrade the VirtualCenter database. To recover the DSN, follow the instructions in "Repairing the Database DSN" on page 58.

4   Select **Launch the VMware VirtualCenter Server 2.5 database upgrade wizard** to upgrade your database after the installation is finished. Click **Finish** to complete the installation of the VirtualCenter Server.

The Database Upgrade wizard launches.

5   Continue with "Using the Database Upgrade Wizard" on page 57.

The following manuals provide information about installing VMware Infrastructure:

■   For ESX Server 3, see the *Installation Guide.*

■   For ESX Server 3i, see the *Setup Guide*.

Upgrading the VirtualCenter Database

This section describes how to upgrade your VirtualCenter database.

■   To upgrade your database, follow the steps in "Using the Database Upgrade Wizard" on page 57.

■   To restore a database DSN that you have deleted, follow the steps in "Repairing the Database DSN" on page 58.

> **NOTE**   You must first upgrade a VirtualCenter Server version 1.2 to version 1.4.1. If you are upgrading from VirtualCenter 1.1 or lower, first upgrade to version 1.2, then to version 1.4.1.

When migrating an existing VirtualCenter database to one of the database formats supported by VirtualCenter 2.5, keep in mind the following:

■ If you select the **database upgrade** option, the appropriate scripts for a database upgrade are launched, and progress, status, and any error messages encountered appear in the VirtualCenter installer.

■ If you are upgrading a SQL database, you must first enable bulk logging in the database.

    a   Open SQL Server Enterprise Manager.

    b   Right-click the database and click **Properties > Options > Recovery Mode**.

    c   Select **Bulk-logged**.

■ If a database chosen for upgrade appears to be corrupted or somehow incompatible with the database upgrade process, a warning appears in the VirtualCenter Server installer. You are given the option to cancel the database upgrade process.

■ **If you upgrade on a Windows 2000 Server SP4 machine**, Windows 2000 Server SP4 requires installation of Microsoft Data Access Components (MDAC) 2.8 or higher. Before you upgrade VirtualCenter on Windows 2000, you should upgrade to the latest version of MDAC. This issue does not appear to affect other Windows versions, only Windows 2000.

Upgrading Oracle and SQL Databases

During the upgrade of the VirtualCenter Server, a dialog box asks if you want to keep your database settings. The ability to keep your database depends on the VirtualCenter release from which you are upgrading:

■ **VirtualCenter release 1.0 or 1.1** – VirtualCenter 2.5 cannot upgrade your database. Click **No**. The installer creates an empty database, using your existing database configuration and login credentials.

■ **VirtualCenter release 1.2 and 1.3** – VirtualCenter 2.5 can upgrade your database, or you can create an empty database:

    ■ Click **OK** to upgrade the existing database for VirtualCenter 2.5.

    ■ Click **No** to have the installer create an empty database, using your existing database configuration and login credentials.

End of Life for Access Database

VMware VirtualCenter 2.5 does not support Microsoft Access databases. For small deployments of up to 5 hosts and 50 virtual machines, VirtualCenter 2.5 supports Microsoft SQL Server 2005 Express.

If you have data in an Access database that you want to use with your upgraded VirtualCenter 2.5 installation, you can migrate to an Microsoft SQL Server 2005 Express or SQL Server database.

To migrate an Access database to Microsoft SQL Server 2005 Express or SQL Server

1   Install Microsoft SQL Server 2005 Express or SQL Server.

2   Create and configure a new database to store the VirtualCenter repository.

3   Shut down the VirtualCenter Server.

4   Reinstall VirtualCenter 1.2 or 1.3, selecting the database you created in Step 2 as your database.

    Do not start the VirtualCenter service after reinstallation.

5   Use the Microsoft Access Upsizing wizard to migrate your old database to the new database:

    a   Open the database that you want to migrate in Microsoft Access.

    b   Choose **Tools** > **Database Utilities** > **Upsizing Wizard**.

    c   Select **Use existing database** and click **Next**.

    d   In the Select Data Source dialog box, click the **Machine Data Source** tab, select the DSN you created as part of Step 2, and click **OK**.

    e   Click **>>** to move all available tables to the Export to SQL Server column and click **Next**.

    f   Do not select any table attributes to data options to include and click **Next**.

    g   Select **No application changes** and click **Next**.

    h   Click **Finish**.

6   Review the report. If no errors are reported, migration is complete.

After your Microsoft Access database has been migrated to an Microsoft SQL Server 2005 Express or SQL Server database, it can be upgraded as part of the upgrade to VirtualCenter 2.5.

NOTE The Microsoft Access Upsizing wizard is available in Microsoft Access 2000 and higher versions. For information on using the Upsizing wizard on earlier versions of Access and for other known issues, refer to the following Microsoft knowledge base articles: http://support.microsoft.com/default.aspx?kbid=241743 and http://support.microsoft.com/?kbid=237980.

The following manuals provide information about configuring Microsoft SQL Server 2005 Express:

■   For ESX Server 3, see the *Installation Guide.*

■   For ESX Server 3i, see the *Setup Guide*.

Using the Database Upgrade Wizard

If you selected the check box for **Launch the VMware VirtualCenter Server 2.5 database upgrade wizard** on the Finish page of the VirtualCenter installation, the Database Upgrade wizard starts automatically. If you did not select the check box, you can use the wizard by starting it manually.

To manually start the Database Upgrade wizard

1   Open the command prompt.

2   Change the working directory to the VirtualCenter installation directory.

3   Run the VCDatabaseUpgrade.exe command with the following parameters:

```
> VCDatabaseUpgrade.exe DSN=<dsn-name> UID=<DB-Username>
                 PWD=<DB-user-password>
```

To upgrade the VirtualCenter database

1   On the first page of the wizard, review the supported database types.

    If your database is not one of these supported types, click **Cancel**, convert the database to one of those types, and restart the wizard.

    On the first three wizard pages, you can click **Cancel** at any time to cancel the upgrade process and close the wizard. If you do not upgrade your VirtualCenter 1.x database, you cannot use the VirtualCenter 2.5 with that database.

2   After you determine that your database is one of the supported database types, click **Next**.

3   On the Upgrade Information page of the wizard, select one or both of the following options if you want to include either of these types of data in your upgraded database:

   ■   **Preserve events and tasks** – Ensures that all events and tasks associated with the ESX Server hosts, virtual machines, and VirtualCenter 1.x are preserved after the upgrade.

   ■   **Preserve performance data** – Ensures that all performance data for the ESX Server hosts and virtual machines is preserved after the upgrade.

       The tables for events/tasks and performance data can be large. For that reason, you might decide not to save them. If you do not preserve the tables, you cannot view historical performance statistics and events/tasks for the time when the database was maintained in VirtualCenter 1.x.

4   Click **Next** after you have selected the options you want to use.

5   On the Ready to Complete page of the wizard, review the summary information. To change any information, click **Back** or click the **Upgrade Information** link to return to the Upgrade Information panel.

6   When the summary information is correct, click **Start** to begin the upgrade process.

   The Upgrade Status page appears and shows you the progress of the upgrade as it occurs. When the upgrade has completed, a message about the success or failure of the upgrade process appears.

   After a successful database upgrade, the system tries to start the vpxd service. If the service times out because the database is large, you see an error message noting that the upgrade has failed. The upgrade has not failed, however. The installer timed out waiting for the service to start.

7   Click **Finish** to close the Database Upgrade wizard.

Repairing the Database DSN

Follow this procedure to restore your database DSN and upgrade your database if you removed the VMware VirtualCenter database settings when you upgraded VirtualCenter.

To restore the database DSN

1   Create a DSN and configure it with the same options used for your original VirtualCenter 1.x DSN.

2   Start the VirtualCenter Server installer again.

3   Select the **Repair/Modify** option and provide database details in the Database Information page.

4   Complete the remaining steps of the VirtualCenter upgrade, and launch the Database Upgrade wizard.

Follow the steps described in "Using the Database Upgrade Wizard" on page 57.

Upgrading VirtualCenter Clients to VI Clients

Virtual machine users and VirtualCenter administrators must use the VI Client to connect. Older clients do not work for VirtualCenter 2.5 servers or ESX Server 3.5 hosts.

The VI Client is available for download from all VirtualCenter 2.5 hosts or ESX Server 3.5 hosts. Connect to the URL of the appropriate machine with a Web browser.

Downtime for a VI Client Upgrade

This operation requires no downtime. No virtual machines or clients need to be powered off for this process.

To upgrade the VI Client

1   (Optional) Use **Add/Remove Programs** from the control panel to remove any previous VMware client.

Older VMware clients do not need to be removed. The VI Client can coexist with the VirtualCenter Client version 1.x, 2.0.x, the GSX Server Client version 3.x, and the VMware remote console.

2   Install the VI Client.

Troubleshooting the VI Client

The "One or more of the types in the assembly unable to load" message indicates that the client installation has failed. You must uninstall the VI Client using **Add/Remove Programs** from the Windows Control Panel, and reinstall it.

Upgrading VMware Infrastructure to Use the License Server

VirtualCenter 2.5 requires a license server. If you did not allow the VirtualCenter installer to install one, see the appropriate guide for information about installing a license server:

■ For ESX Server 3, see the *Installation Guide*.

■ For ESX Server 3i, see the *Setup Guide*.

Downtime for a License Server Installation

This stage requires no downtime. No virtual machines, servers, hosts, or clients need to be powered off for this process.

Upgrading ESX Server

5

This chapter discusses the upgrade issues and describes procedure for upgrading ESX Server hosts.

This chapter includes the following sections:

> **CAUTION** If you have an enterprise using VMware VirtualCenter, you must upgrade the VirtualCenter Server before you upgrade any ESX Server hosts. Otherwise, you might lose data and host access.

Release Upgrade Support

You can upgrade most customer releases of VMware ESX Server to the ESX Server 3 version 3.5 (or to the ESX Server 3 version 3.5 Update releases).

There is no in-place upgrade from ESX Server to ESX Server 3i. To upgrade virtual machines from ESX Server to ESX Server 3i, you must perform a migration upgrade. For ESX Server 3i upgrade scenarios, see "ESX Server 3i and VirtualCenter Upgrade Scenarios" on page 43.

Table 5-1 gives details of upgrade support for ESX Server versions.

Table 5-1. Upgrade Support for ESX Server

ESX Server Version	Support
ESX Server beta release (any)	No upgrade support
ESX Server 1.x	No upgrade support
ESX Server 2	No upgrade support
ESX Server 2.1	No upgrade support
ESX Server 2.1.1	No upgrade support
ESX Server 2.1.2	No upgrade support
ESX Server 2.1.3	No upgrade support
ESX Server 2.5	No upgrade support
ESX Server 2.5.1	No upgrade support
ESX Server 2.5.2	No upgrade support
ESX Server 2.5.3	Yes
ESX Server 2.5.4	Yes
ESX Server 2.5.5	Yes
ESX Server 3.0	Yes
ESX Server 3.0.1	Yes
ESX Server 3.0.2	Yes
ESX Server 3.5	Yes
ESX Server 3.5 Update 1	Yes

Before You Upgrade ESX Server

Read "Planning a VMware Infrastructure Upgrade" on page 11 before you begin an upgrade. If you do not follow the order given in this manual, you might lose data and lose access to your servers.

This section discusses important issues to consider before you upgrade an ESX Server host.

Follow Upgrade Steps in the Order Given

It is critical that you upgrade components in a specific order. The complete upgrade process includes upgrades to the file system, virtual machine file structures, and VMware Tools. Performing any step out of order can result in lost data and server access.

This manual assumes you have a multiple-server production environment to upgrade your VMware ESX Server, one host at a time. However, even if you have only one ESX Server host, your upgrade steps should follow the same order.

Host Configuration Requires a VI Client

ESX Server 3.x host configuration requires VI Client. This is a change from previous versions which included a browser-based management interface, and advocated the use of the service console. The browser-based management interface, Web Access, allows you to manage virtual machines, but cannot perform host configuration tasks. (Web Access is not supported on ESX Server 3i.) Using the service console is not recommended.

Support for Scripted Installations

For information on remote and scripted installations, see the *Installation Guide*.

Support for Legacy Hardware

To determine if you have hardware that is not supported for ESX Server software, see the following guides:

■ For ESX Server 3, see the *Installation Guide.*

■ For ESX Server 3i, see the *Setup Guide*.

Components Installed by the Upgrade

Upgrading VMware ESX Server installs the following components:

■ **The service console (ESX Server)** – Installs, configures, and administers third-party add-ons for ESX Server. This is a modified version of Red Hat Enterprise Linux 3.0 with a single purpose: configuring the ESX Server host.

■ **VMkernel** – Manages system hardware and the virtual machines running on the server. Users communicate with the VMkernel through the service console.

■ **VMkernel modules** – Support high-performance device I/O and allow you to add functionality at runtime to the VMkernel (for example, network traffic filters).

Upgrade Requirements

To upgrade VMware ESX Server, you need:

■   Installation media or installation archive containing VMware ESX Server 3.5.

■   A computer running ESX Server 2.x or later that meets the system hardware requirements for ESX Server 3.5. For information about hardware requirements, see the following guides:

  ■   For ESX Server 3, see the *Installation Guide.*

  ■   For ESX Server 3i, see the *Setup Guide*.

To upgrade your VMFS2 volumes to VMFS3 as described in "Upgrading Datastores" on page 78, you must have at least 1200MB of free space on the VMFS2 volumes. Run the preupgrade script as described in "Running the Preupgrade Script" on page 70. The script checks that your VMFS2 volumes meet the minimum space requirements.

If the VMFS2 volume does not have sufficient free space, the upgrade to VMFS3 fails. An error message is displayed. To proceed, free up space on the VMFS2 volume.

To create free space on a VMFS2 volume

1   Log in to the service console through SSH or a local console.

2   Unload the vmfs2 and vmfs3 modules by typing `vmkload_mod –u vmfs2` and `vmkload_mod –u vmfs3` at the command line.

3   Load the fsaux module in VMFS-2 unlink mode by typing `vmkload_mod fsaux fsauxFunction=fs2unlink`.

4   Move or remove files on the volume to make at least 1200MB available on it.

    Use the `rm` and `mv` commands.

5   Unload the fsaux module by typing `vmkload_mod –u fsaux`.

6   Reload the vmfs2 and vmfs3 modules by typing `vmkload_mod vmfs2` and `vmkload_mod vmfs3`.

7   Try the upgrade again.

Using Remote Management Applications

If you use remote management applications—such as Integrated Lights-Out (iLO), Dell Remote Access Card (DRAC), IBM management module (MM), or Remote Supervisor Adapter II (RSA II)—to install ESX Server, be careful using the virtual CD feature. You might encounter corruption problems if you use this installation method with systems under load. If you must use this method, run the media test provided by the ESX Server Installer. If a remote installation from an ISO image fails, carry out the remote installation from the physical CD-ROM media.

Adjusting ESX Server 2.x Host Security Property to Allow RPM Transaction

When you upgrade from ESX Server 2.x to ESX Server 3.x, if the Security property on your ESX Server 2.x host is set to Low, a problem in Red Hat common code (rpmlib) can occur causing the installer to crash during an RPM transaction. To avoid this problem, before upgrading, use the VMware Management Interface to set Security to High.

Selecting the Boot Drive

Boot drive requirements are dependent on the ESX Server 3.5 version.

The ESX Server 3 service console operating system supports booting from the following storage systems:

- **SCSI disk drive or RAID** – Supported for installing ESX Server and for storing virtual machines.

- **SANs** – Supported for installing ESX Server and for storing virtual machines. For important considerations about LUN requirements, see the following guides the *Installation Guide.*

- **iSCSI disk drive** – Supported for installing ESX Server and for storing virtual machines.

- **SATA** – If connected through specified SAS controllers, are supported for installing ESX Server and for storing virtual machines.

NOTE If you are upgrading an ESX Server system with an IDE drive that has the master boot record (MBR) on it, and a SCSI drive that has the ESX Server service console installed on it, you might experience boot problems after upgrading, such as booting into a grub boot loader menu. The ESX Server 3 upgrade installer selects the disk containing the service console as the default boot device. To avoid problems, either select the IDE drive as the boot device during the upgrade or change the settings in the system BIOS after the upgrade to set the SCSI drive as the boot device.

The ESX Server 3i Installable image supports booting from the following storage systems:

■ **SCSI disk drives** – Supported for installing ESX Server 3i and for storing virtual machines.

■ **Serial ATA (SATA) disk drives** – When plugged into dual SATA/SAS controllers, supported for installing ESX Server 3i and for storing virtual machines on VMFS partitions. Ensure that your SATA drives are connected through supported controllers.

NOTE   Sharing VMFS datastores on SATA disks across multiple ESX Server 3i hosts is not supported.

■ **Serial Attached SCSI (SAS) disk drives** – Supported for installing ESX Server 3i and for storing virtual machines.

The ESX Server 3i Embedded image supports booting only from the USB drive.

Host Drive and LUN Requirements

You must have a SCSI drive, SCSI RAID, iSCSI or SATA drive, NFS, or SAN to store virtual machines if you install ESX Server 3 on an IDE, or ATA drive.

IDE and ATA drives are not supported for VMFS3 partitions. SATA drives do not support VMFS volumes shared across multiple ESX Server hosts.

Although ESX Server supports up to 256 LUNs for operation, the installer supports a maximum of 128 SCSI, Fibre Channel SAN, and gatekeeper LUNs. If you have more than 128 LUNs, connect them after the installation is complete.

NOTE   You cannot install ESX Server 3i on a LUN, but you can create your virtual machines on one.

Verifying Hardware Support

Before deploying ESX Server on a particular drive and disk controller, check the latest version of the *ESX Server Storage Compatibility Guide* to ensure your specific controller is supported.

Before deploying ESX Server on a SAN, check the latest versions of the *ESX Server Storage Compatibility Guide* and the *SAN Configuration Guide* from the VMware Web site at www.vmware.com/support/pubs/vi_pubs.html.

Allocating PCI Devices

ESX Server 2.x had a PCI device allocation system whereby all SCSI storage devices controlled by the same driver must be allocated in one of the following ways:

■ Allocated to the VMkernel for use by virtual machines

■ Allocated to the service console

■ Allocated to the VMkernel but shared with the service console

When you upgrade from ESX Server 2.x, all PCI devices are allocated to the VMkernel and shared with the service console as necessary.

Debug Mode Is Not Installed with an Upgrade from ESX Server 2.x

The default boot partition from ESX Server 2.x is not large enough for a version 3 upgrade to include a debug kernel. An upgraded ESX Server host boot menu includes two options:

■ VMware ESX Server

■ Service Console only (troubleshooting mode)

Commit or Discard Changes to Virtual Disks in Undoable Mode

If upgrading from ESX Server 2.x, commit virtual machine redo logs and change virtual disks to persistent mode before upgrading to ESX Server 3.x.

Restoring NFS Mounts After Upgrade

During the upgrade from ESX Server 2.x to ESX Server 3.x, the `/etc/fstab` file is replaced, causing NFS mounts to be lost. The old `/etc/fstab` file is copied to `/etc/fstab.save`. To restore NFS mounts, copy any missing entries from `/etc/fstab.save` to `/etc/fstab`.

Reloading USB Controllers After Upgrade

After you upgrade your ESX Server 2.5 system, you might not be able to use your USB keyboard or remote interfaces, such as RSA II, DRAC, or iLO, if you previously installed ESX Server with your system's USB controller turned off, or if the controller was not detected properly. To make your system aware of the USB controller, you need to reload it.

To reload USB Controllers

1   Using a PS/2 keyboard or logging in to your system remotely, open the
    `/etc/modules.conf` file in a text editor.

2   Add the following line to the `/etc/modules.conf` file:

    `alias usb-controller usb-uhci`

    If you have a Compaq machine, which uses the Open Host Controller Interface,
    add the following line:

    `alias usb-controller usb-ohci`

3   Run the following command:

    `modprobe usb-[o|u]hci`

Reconfiguring Virtual Machines with SCSI Passthroughs After Upgrade

When you upgrade an ESX Server 2.5 system, SCSI devices that were previously
attached in passthrough mode to virtual machines are renumbered. This renumbering
results in virtual machines previously attached to them pointing at invalid devices.
After you upgrade your system, edit the virtual machine settings, remove all such
devices, and readd them. For more information on configuring hardware devices, see
Basic System Administration.

Upgrading Virtual Machines with RAW Disks

Virtual machines with RAW disks do not work after upgrading to ESX Server 3.x. To
upgrade a virtual machine with a RAW disk, do one of the following:

■   If upgrading from ESX Server 2.5, convert the RAW disk to a raw device mapping
    before upgrading. See the *ESX Server 2.5 Administration Guide*.

■   If upgrading from ESX Server 2.1, remove the RAW disk from the virtual machine
    before upgrading. When you have finished upgrading, add the RAW disk back as
    a raw device mapping.

Performing the ESX Server Host Upgrade

This section describes the procedures for upgrading an ESX Server host to version 3. This is Procedure 2A, as described in "Understanding the Stages of Upgrading" on page 23.

NOTE   VMware recommends that for each ESX Server 2 host, you perform Procedure 2A and Procedure 2B together. Upgrade one host and its datastores, then another host and its datastores, and so on. This technique prevents a situation in which you have a long time with no access to any virtual machine.

Machine Downtime for a Host Upgrade

Procedure 2A requires downtime for the single ESX Server host that you are upgrading.

Virtual Machine Downtime for a Host Upgrade

Virtual machines do not require down time for Procedure 2A if you can migrate them to another ESX Server host using VMotion.

■   **If you have a VMotion license**, use it to migrate all virtual machines to a different ESX Server host before you upgrade this ESX Server binary. Migrating prevents virtual machine downtime during Procedure 2A.

■   **If you do not have VMotion**, all virtual machines have unavoidable downtime at this step. You can minimize the downtime for a production virtual machine by preparing an ESX Server host with a VMFS3 partition before you begin upgrading the production ESX Server hosts.

For procedures to minimize downtime, see "Understanding the Stages of Upgrading" on page 23.

Host Upgrade Methods

Multiple methods are available for upgrading the VMware ESX Server host:

■   **Graphical installer from CD** – Use a graphical, mouse-based installation program to upgrade ESX Server. This is the recommended installation method. See "Upgrading Using the Graphical Installer" on page 71.

■   **Text-mode installer from CD** – Use a text-based interface to upgrade ESX Server. Choose this upgrade method if your video controller, keyboard, or mouse does not function properly using the graphical installer. See "Upgrading Using the Text-Based Installer" on page 73.

■ **Tarball installer from download** – Use the service console to upgrade ESX Server. See "Upgrading from ESX Server 2.x Using a Tarball" on page 76.

■ **Scripted upgrade from CD or PXE server** – Use a scripted installation method to upgrade ESX Server. For information about scripted installations and upgrades, see the *Installation Guide*.

Running the Preupgrade Script

ESX Server 3.5 includes a preupgrade script, which verifies that your system can be upgraded, and alerts you to problems that you need to address before upgrading. If you have multiple network interfaces exposed to the service console, this script also gathers additional information needed for the upgrade. VMware requires that you run this script before upgrading ESX Server.

NOTE Do not use the preupgrade script when upgrading from ESX Server 3.x. You can use the script only on ESX Server 2.x systems.

To run the preupgrade script

1   Insert the ESX Server 3 installation CD into the CD drive.

2   Mount the CD:

    mount /mnt/cdrom

3   Run the upgrade script:

    perl /mnt/cdrom/scripts/preupgrade.pl

After you run the script, review any warnings or error messages, and take appropriate action. If there are no problems with the system, the script informs you that it is safe to upgrade.

Upgrading Using the Graphical Installer

This section describes how to upgrade ESX Server using the graphical installer. You can execute all actions in the ESX Server graphical installer by pressing the Tab key, spacebar, arrow keys, or Enter key.

To upgrade the server with the graphical installer

1   Run the preupgrade script, and address any problems flagged.

2   Verify that the network cable is plugged into the Ethernet adapter that you are using for the service console.

   The ESX Server installer needs a live network connection to properly detect certain network settings, such as the machine name under DHCP.

3   Power on the machine with the VMware ESX Server CD in the CD drive.

   ESX Server begins its boot process until the mode selection page appears.

   If this page does not appear:

   a   Reboot the machine.

   b   Press the key required to enter your machine's BIOS Setup page.

      This key is often F1, F2, or F10.

   c   Set the CD as the first boot device.

   d   Reboot the machine.

4   Press **Enter**.

   A series of installation messages scroll past until the Test Media page appears.

5   Select **Test** to have the installer inspect the installation CD media for errors.

   ■   If you select **Skip**, continue with Step 6.

   ■   If you select **OK**, a progress bar appears. The CD media is being tested for errors. When testing is complete, a Media Check Result dialog box appears and click **OK**.

      Anaconda system installer messages appear.

6   Click **Next** at the Welcome page.

   The Select Keyboard page appears.

7   Choose the language for your keyboard from the list and click **Next**.

   The Mouse Configuration page appears.

8   Select your mouse.

Mouse configuration is not a critical setting. After ESX Server is installed, the setting is ignored. The X Window System is not supported from the service console.

9   Select **Upgrade** and click **Next**.

10 Read through the end user license agreement, select the **I accept the terms of the license agreement check box and click Next**.

You cannot install this product unless you accept the license agreement.

If the installer does not detect that your drive has been partitioned, you see the following dialog box.
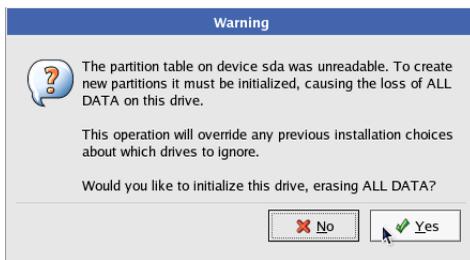
11 If you are upgrading, do not click **Yes**. If you expected to upgrade a previous ESX Server installation and you see this dialog box, click **No** and exit from the installation.

The installer does not recognize your existing ESX Server installation, and the disk partitioning or file system needs repair before any upgrade can occur.

12 Select how the ESX Server will boot:

■   **From a drive (install on the MBR of the drive)** – Use this option for most installations.

This drive must match the first boot device set in the host BIOS. If these settings do not match, the host cannot boot into ESX Server. If these settings are not properly configured, the host boots into a grub boot loader menu instead of ESX Server.

■   **From a partition** – Use this option for legacy hardware that stores BIOS information in the MBR.

Do not select an optical drive as the location for the boot loader.

13   Select the boot options.

To add default options to the `boot` command, enter them into the **General kernel parameters** field. These options are passed to the ESX Server kernel every time it boots.

14   Review and confirm your entries and click **Next**.

With an upgrade, you do not have to configure disk partitions, network, time zone, or root password. All these settings are preserved from your previous installation.

⚠ **CAUTION**   This is the last opportunity to cancel the upgrade and return to your previous configuration. When you click **Next**, the installer begins upgrading your existing installation.

A progress bar appears with a percentage indicator to show the status of the upgrade. A dialog box informs you when the installation completes.

15   Click **Finish** to exit and reboot.

NOTE   If the system reboots and displays a boot loader prompt, such as `LILO` or `LI`, the BIOS boot setting is set to a different disk than the one you specified during Step 12 of the upgrade. Change the BIOS settings so that the correct disk is selected for booting.

Upgrading Using the Text-Based Installer

This section describes how to upgrade the ESX Server using the text-based installer.

To navigate and perform actions in the ESX Server text installer, press the Tab key, spacebar, arrow keys, or Enter key:

■   Move the highlight between selection fields using the Tab key.

■   Make a selection within a field using the arrow keys or by typing a value.

■   Press Tab until the highlight is in the **OK** box, and then press the spacebar or Enter.

To upgrade the server with the text-based installer

1   Download the ESX Server installer CD image and burn a CD for it.

2   Verify that the network cable is plugged into the Ethernet adapter that you are using for the service console.

The ESX Server installer needs a live network connection to properly detect certain network settings, such as the machine name under DHCP.

3   Power on the machine with the VMware ESX Server CD in the CD drive.

The ESX Server begins its boot process until the mode selection page appears.

If this page does not appear:

a   Reboot the machine.

b   Press the key required to enter your machine's BIOS Setup page.

This key is often F1, F2, or F10.

c   Set the CD as the first boot device.

d   Reboot the machine.

4   Type **esx text**, and press **Enter**.

A series of installation messages scroll past until the Test Media page appears.

5   Click **Test** to have the installer inspect the installation CD media for errors.

- If you click **Skip**, continue with Step 6.

- If you click **Test**, a progress bar appears. The CD media is being tested for errors. When testing is complete, a Media Check Result dialog box appears and click **OK**.

6   Click **OK** at the Welcome page.

7   Select your keyboard language and click **OK**.

8   Select your mouse and click **OK**.

If the installer detects a previous installation of ESX Server, a dialog box appears allowing you to select **Install** or **Upgrade**.

9   Select **Upgrade** and click **OK**.

The license agreement appears.

10   Read through the end user license agreement, select the **I accept the terms of the license agreement** check box **and click Next**.

You cannot upgrade this product unless you accept the license agreement.

11   Select the location for the boot loader record.

- **From a drive (install on the MBR of the drive)** – Use this option for most installations.

  This drive must match the first boot device set in the host BIOS. If these settings do not match, the host cannot boot into ESX Server. If these settings are not properly configured, the host boots into a boot loader menu instead of ESX Server.

- **From a partition** – Use this option for legacy hardware that stores BIOS information in the MBR.

  Do not select an optical drive as the location for the boot loader.

12   Click **OK**.

13   Configure the boot loader options and click **OK**.

14   Confirm your entries and click **OK**.

CAUTION   This is the last opportunity to cancel the upgrade and return to your previous configuration. When you click **Next**, the installer begins upgrading your previous installation.

A progress bar appears with a percentage indicator to show the status of the installation. A dialog box appears when the installation completes.

15   Click **Finish** to exit and reboot.

NOTE   If the system reboots and displays a boot loader prompt (such as LILO or LI), the BIOS boot setting is set to a different disk than the one you specified during Step 11 of the upgrade. Change the BIOS settings so that the correct disk is selected for booting.

Upgrading from ESX Server 2.x Using a Tarball

You can upgrade from ESX Server 2.x to ESX Server 3.5 using an upgrade tarball packaged with an upgrade script.

Previous releases allowed you to upgrade using a tarball with one script and two reboots. Due to the added complexity of upgrading from ESX Server 2.x to ESX Server 3.5, upgrading now requires two scripts and three reboots.

NOTE When upgrading using an upgrade tarball, do not interrupt the upgrade process. If the upgrade script is interrupted in the middle of an upgrade, you might not be able to restart it due to a lack of free disk space.

In this case, either attempt to free up disk space and try again, or force the upgrade by passing the ‑‑force option to upgrade.pl.

To upgrade the ESX Server host using a tarball

1   Reboot the ESX Server host into Linux mode.

2   Run the script upgrade.pl.

3   Reboot the ESX Server host into Service Console only mode.

4   Run the script upgrade2.pl.

5   Reboot the ESX Server host to VMware ESX Server mode.

Both scripts have the same syntax, and accept the same arguments.

The form of these commands is:

```
./upgrade.pl
```

Available options include:

- ‑h, ‑‑help: Display a help message.

- ‑‑accept‑eula: Accept the end user licensing agreement.

- ‑‑reboot=[yes|no]: Do not prompt for reboot. If yes, reboot. If no, do not reboot. Defaults to yes if neither is specified.

Upgrading from ESX Server 3.x Using esxupdate

You can upgrade from ESX Server 3.x to ESX Server 3.5 using the esxupdate utility provided with ESX Server 3.x. The esxupdate utility is for ESX Server 3.
For ESX Server 3i, use the vihostupdate utility instead.

Useful esxupdate options

If you need to upgrade multiple ESX Server 3.x hosts in-place, you can extract the zip archive onto an NFS share or an HTTP server. Then point the `esxupdate` command to the shared location. This saves you from having to download and extract the archive onto each ESX Server host. For example:

```
esxupdate –r http://bitserver.mycompany.com/pub/ESX3.5/upgrade update
```

Other useful options:

■   `–n/––noreboot`
Disable the automatic reboot after update. If you include this option, you must reboot the host manually for the changes to take effect.

■   `–x <pkgname>`
Exclude a package.

To upgrade using esxupdate

1   Download the esxupdate zip file.

    This zip file is not the same as the tarball used to upgrade from ESX Server 2.x to ESX Server 3.5. Ensure that you have downloaded the correct file before proceeding.

2   Extract the compressed zip file and change to the newly created directory.

    The easiest way to do this is to run the `unzip` command:

    ```
    unzip VMware–esx–upgrade–from–esx3–<build>.zip
    ```

3   Type **esxupdate update**.

    When the update command completes, the software reboots the ESX Server host.

For detailed information on the esxupdate utility, see the *ESX Server 3 Patch Management Guide*. For information on the vihostupdate utility for ESX Server 3i, see the *Setup Guide*.

Upgrading Datastores

This section describes the procedures for upgrading an ESX Server datastore from VMFS2 to VMFS3.

This Procedure 2B requires downtime for all virtual machines on the datastore being upgraded. However, an ESX Server 3 host with multiple datastores can operate virtual machines already stored on VMFS3 datastores while upgrading a VMFS2 datastore to VMFS3.

You can minimize downtime for virtual machines by migrating them to another datastore while this one is upgraded. See "Migration Upgrade" on page 21.

When upgrading an ESX datastore from VMFS2 to VMFS3, keep in mind the following:

If you have a virtual machine with disks on multiple VMFS2 volumes, the first virtual disk and the .vmx file are relocated to a subdirectory when the VMFS2 volume on which they reside is upgraded to VMFS3. Other virtual disks located on other VMFS2 volumes are not relocated, even when those disks are upgraded to VMFS3.

You must upgrade all of the VMFS2 datastores on which a virtual machine's disks reside before you power on that virtual machine.

VMFS3 file systems are restricted to a block size of no greater than 8MB. You cannot directly upgrade a VMFS2 file system with a block size of greater than 8MB to VMFS3 using the procedure described below. To upgrade from a VMFS2 file system with a block size greater than 8MB, use a migration upgrade strategy.

On ESX Server 3i hosts, if you configure system swap on the VMFS3 volume, an upgrade from VMFS2 to VMFS3 fails. To fix this problem, disable the system swap before you upgrade your VMFS2 volume. To do this, reboot the ESX Server 3i host. While the host is powering on, press the **o** key. Pressing the **o** key allows you to perform an advanced system reboot by specifying options for the reboot. Run the `nouwswap` command. After the host is powered on, retry the datastore upgrade.

An inconsistency exists between the maximum file sizes allowed in VMFS2 and VMFS3. For example, on a 1 MB block size VMFS2 volume, you can store a file with the size up to 456GB, while the maximum file size on a 1 MB block size VMFS3 volume should not exceed 256GB. If your VMFS2 file system stores `.vmdk` files with a size greater than the VMFS3 file system with the corresponding block size allows, use the migration upgrade strategy to upgrade from VMFS2. Otherwise, your upgrade can fail.

Table 5-2 lists the maximum allowed file sizes.

Table 5-2. Maximum Allowed File Sizes for VMFS2 and VMFS3

	Maximum .vmdk **File Size**	
Block Size	**VMFS2**	**VMFS3**
1	456GB	256GB
2	912GB	512GB
4	1.78TB	1TB
8	3.56TB	2TB

To upgrade a datastore

1 Connect to the ESX Server host using the datastore you want to migrate to VMFS3.

2 If shared, the datastores must be disconnected from other hosts before you attempt the VMFS upgrade.

3 Put the ESX Server host into maintenance mode:

a Right-click the appropriate host in the inventory, and choose **Enter Maintenance Mode** from the drop-down menu.

b Click **Yes** to confirm the dialog box that appears.

4 Select the volume you want to upgrade:

a Select the **Configuration** tab.

b Select **Storage** from the **Hardware** list.

c Click the appropriate item in the Storage pane.

d Click **Upgrade to VMFS3**.

When the file system is converted, the file system is VMFS3.

If any file on the VMFS2 file system is locked, the upgrade fails with an error message identifying which ESX Server host is using the locked files.

5 Repeat this process until you have only VMFS3 datastores on this ESX Server host.

6 Exit maintenance mode:

a Select the **Summary** tab.

b Click **Exit Maintenance Mode** in the **Commands** area.

Relocating Virtual Machines

This operation moves the `.vmx` configuration file from the ESX Server host to the VMFS3 datastore. At the end of this operation, all virtual machine data and configuration files reside in one folder on the datastore.

To relocate virtual machines

1 Right-click the ESX Server host in the VI Client inventory, and choose **Relocate VM files** from the drop-down menu.

    When the relocation is complete, a dialog box appears with the following message: "The virtual machine files for host <hostname> have been relocated successfully."

2 Click **OK** to dismiss the dialog box.

Upgrading Virtual Machines

6

This chapter lists upgrade issues and the procedure for upgrading virtual machines, and contains the following sections:

> ⚠️ **CAUTION**   You must upgrade the ESX Server host and datastore on which a virtual machine resides before you upgrade a virtual machine.

Upgrading Virtual Hardware to VM3 Format

This section describes the procedures for upgrading a virtual machine. This is stage 3, described in "Understanding the Stages of Upgrading" on page 23.

To upgrade the virtual hardware and VMware Tools for multiple virtual machines at one time, see "Upgrading Hardware and VMware Tools in Multiple Virtual Machines" on page 82.

NOTE   Performing a virtual hardware upgrade on nonpersistent, append, and undoable mode virtual machines converts the redo logs of the virtual machines to snapshots. You can find the corresponding snapshots under the snapshot manager after the upgrade. However, VMware recommends committing the redo logs before performing the virtual hardware upgrade.

To upgrade virtual hardware

1   From the VI Client, right-click a virtual machine in the inventory, and choose **Upgrade Virtual Hardware** from the drop-down menu.

    A confirmation dialog box appears with the warning message.

2   Click **Yes**.

    A progress bar appears in the Recent Tasks pane at the bottom of the client window.

Repeat this procedure for all virtual machines on this host.

Upgrading VMware Tools

This section describes the procedures for upgrading virtual machine guest operating system drivers.

VMware recommends that you upgrade all virtual machines with the latest version of VMware Tools. A virtual machine with an older version of VMware Tools, when powered on an ESX Server 3 host or higher, might not have full network connectivity and might display incorrect connectivity information.

For a description of the installation or upgrade of VMware Tools in each individual virtual machine, see *Basic System Administration*.

Upgrading Hardware and VMware Tools in Multiple Virtual Machines

You can install or upgrade VMware Tools in a number of virtual machines.

To install or upgrade VMware Tools in multiple virtual machines

1   Launch the VI Client and log in to the VirtualCenter Server.

2   Click **Inventory** in the navigation bar and expand the inventory.

3   In the inventory list, select the host on which virtual machines you want to upgrade reside.

4   Click the **Virtual Machines** tab.

5   Select the virtual machines you want to upgrade with the new version of VMware Tools.

    If you are installing VMware Tools in the virtual machines, make sure that the virtual machines are powered on.

6   Right-click the virtual machines and choose **Install/Upgrade Tools**.

(SEE UPDATE) VirtualCenter provides two options to upgrade VMware tools:

■   **Interactive tools upgrade** – Requires some user interaction and requires you
to reboot the guest operating system manually.

■   **Auto tools upgrade** – Upgrades tools without user interaction and reboots the
guest operating system, if required. Auto tools upgrade is supported for tools
version ESX 3.0.0 and above on Windows and Linux guest operating systems.

7   (SEE UPDATE) (Optional) Enter command-line options in the **Advanced** field (see
Table 6-1).

Table 6-1. Command-Line Options

Option	Description
–u user	Specifies a user with sufficient privileges on the target virtual machine, including VirtualMachine.Config.*, VirtualMachine.Interact.*, and VirtualMachine.Provisioning.*
–p password	Specifies a password on the command line. If this is omitted, the tool immediately prompts for a password.
–n vmname	Specified the name of the virtual machine to upgrade. This name corresponds to the display name of a virtual machine. Specify multiple virtual machines using multiple –n parameters. The –n option is ignored if –h is specified.
–h host	Attempts to upgrade all the virtual machines on a particular host. Fails if the specified host is not ESX Server 3.0 or greater.
–m maxpowerons	On a particular host, powers on only this number of virtual machines at a time.
–o port	Specifies the VirtualCenter Server port, if a port other than the default port 902 has been configured.
–t maxpowerontime	Allows a user to set the maximum amount of time for a virtual machine to be powered on in case the guest is unable to power off the machine itself. After the tools upgrade is scheduled on a virtual machine, the virtual machine is powered on and allowed to run through the tools installation process. In most cases, the guest powers down the machine when the process completes.
–s	Skips the tools and does only the virtual hardware upgrade.
–q	Works quietly. Doesn't produce status or completion messages on shutdown.

After you install or upgrade VMware Tools in virtual machines, you need to reboot guest operating systems to be able to use the new drivers.

For more information about installing and upgrading VMware Tools, see *Basic System Administration*.

Specifying Host or Virtual Machine Names

To specify a host or a virtual machine name in the **Advanced** field when upgrading VMware Tools, you must specify a path to the host or virtual machine. The path corresponds to the location of the host or virtual machine displayed in the VI Client inventory. To determine host paths, display the Hosts and Clusters view in the inventory panel. To determine virtual machine paths, display the Virtual Machines and Templates view in the inventory panel.

For the case illustrated in Figure 6-1, the path for the host testserver3.eng.vmware.com is /Datacenter1/Folder1/testserver3.eng.vmware.com.

Figure 6-1. Example Hosts and Clusters Inventory View, Showing the Path for a Host

For the case illustrated in Figure 6-2, the path for the virtual machine vm1 is /Datacenter1/MyVMs/vm1.

Figure 6-2. Example Virtual Machines and Templates Inventory View, Showing the Path for a Virtual Machine
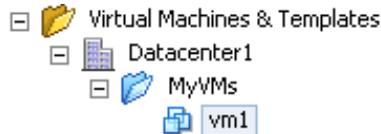
Usage Examples

The following are some usage examples for the `vmware-vmupgrade` command:

■ To upgrade a single virtual machine named myvm, in datacenter DC, in the root virtual machine folder:

```
vmware-vmupgrade -u user -n /DC/myvm
```

■ To upgrade a single virtual machine named vm1 in the folder My VMs, in datacenter DC, in the folder `dcFolder`:

```
vmware-vmupgrade -u user -n /dcFolder/DC/MyVMs/vm1
```

■ To upgrade two virtual machines, vm1 and vm2, both in datacenter DC, and to force all virtual machines to power off after 5 five minutes. One virtual machine is a Linux virtual machine that does not have Advanced Power Management configured, so that when the guest is shutdown, the virtual machine doesn't power off.

```
vmware-vmupgrade -u user -n /DC/vm1 -n /DC/vm2 -t 5
```

■ To upgrade all (powered-off) virtual machines on host myhost.vmware.com in the root host folder of datacenter DC, while powering-on at most two virtual machines at a time on the host:

```
vmware-vmupgrade -u user -h /DC/myhost.vmware.com -m 2
```

■ To upgrade powered-off virtual machines on host host1.vmware.com in cluster myCluster in the datacenter folder `/DC/folder1`:

```
vmware-vmupgrade -u user -h /DC/folder1/myCluster/host1.vmware.com
```

Unexpected Hardware Changes When Upgrading Virtual Adapter

Upgrading virtual hardware and installing VMware Tools 3 includes enhancements to the virtual network adapter. A Windows guest operating system might interpret these changes as indicating a different network adapter in the virtual machine and launch the New Hardware wizard accordingly.

While this behavior occurs mostly on Windows guest operating systems, it can occur on older releases of Linux guest operating systems.

Upgrading Virtual Machine Templates

Virtual machine templates created with earlier versions of VirtualCenter and ESX Server must also be upgraded for use with VirtualCenter 2.5 and ESX Server 3.x.

GSX templates are not supported on ESX Server 3.x. To upgrade GSX templates, first upgrade them to ESX Server 2.x and then upgrade them to ESX Server 3.x.

With VirtualCenter 1.x and ESX Server 2.x, virtual machine templates could be stored locally on the VirtualCenter Server disk or on an ESX Server datastore. With VirtualCenter 2.5 and ESX Server 3.x, templates must be located on an ESX Server datastore. The Legacy Templates Upgrade wizard included in the VI Client can relocate your templates during the upgrade process.

To upgrade a virtual machine template

1   From the VI Client, log in to your VirtualCenter Server.

2   Choose **Administration > Upgrade Legacy Templates**.

    The Legacy Template Upgrade wizard starts.

3   Select the template to upgrade and click **Next**.

4   If the template currently resides on the VirtualCenter Server disk, select an ESX Server host to relocate to and click **Next**.

    The Select Datastore page appears.

5   Select a disk on which to place the upgraded template and click **Next**.

6   Select the destination folder on the host and click **Next**.

7   Review your choices and click **Finish**.

The template is upgraded and relocated to the location you have chosen.

When you upgrade templates residing on the VirtualCenter Server disk, the upgraded template is relocated to the disk you have chosen, but the original template remains on the VirtualCenter Server disk. VMware recommends deleting this original after you have verified that your template upgrade was successful.

Using Workstation or GSX Server Virtual Disks with ESX Server 3.x

Virtual machines created in VMware Workstation or VMware GSX Server are not supported in ESX Server 3.x. To use these virtual machines in ESX Server 3.x, use the `vmkfstools -i` command to import their virtual disks into your ESX Server system. Then, create a new virtual machine on your ESX Server host using the imported virtual disks. For more information about vmkstools, see the *Server Configuration Guide*.

Appendix: Upgrade Preparation Checklists

This appendix contains tables detailing components that change in each of the four upgrade stages. The tables describe the tasks to be completed at each stage and list the VMware Infrastructure components that are supported at each stage of the tapered. This appendix contains the following tables:

- "Upgrading VirtualCenter Components" on page 90

- "Upgrading ESX Server Host" on page 91

- "Upgrading File Systems on a Datastore" on page 92

- "Upgrading Virtual Machines to VM3 Format" on page 93

- "Upgrading Guest Operating Systems with VMWare Tools 3" on page 94

Table A-1 summarizes stage 1 of the upgrade process. See "Stage 1–Upgrading VMware VirtualCenter" on page 24.

Table A-1. Upgrading VirtualCenter Components

Product	Component	Stage 1 Description
VirtualCenter	Client 1.x	**Task**: Remove from service.
	Server 1.x	**Task**: Remove from service.
	Client 2.5	**Task**: Install in Stage 1.
	Server 2.5	**Task**: Install in Stage 1. **Issues**: Access database is not supported.
	WebCenter	**Task**: Install in Stage 1. **Issues**: Runs virtual machines with limited functionality.
	Oracle database	No change.
	SQL database	No change.
	Access database	**Task**: Remove from service.
	Microsoft SQL Server 2005 Express database	**Task**: Install in Stage 1 (optional).
License server	License server	**Task**: Install in Stage 1 (optional).
ESX Server	ESX Server 2.x host	No change.
	VMFS2 volumes	No change.
	VM2 virtual machines	No change.
	VMDK2 virtual disk	No change.
	ESX Server MUI	No change.
	ESX Server host client	No change.
	VMware Tools 2.5	No change.
	ESX Server 3.x host	Not supported in this environment.
	VMFS3 volumes	Not supported in this environment.
	VM3 virtual machines	Not supported in this environment.
	VMDK3 virtual disk	Not supported in this environment.
	VMware Tools 3.x	Not supported in this environment.

Table A-2 summarizes procedure 2A of the upgrade process. See "Stage 2A–Upgrading a VMware ESX Server Host" on page 27.

Table A-2. Upgrading ESX Server Host

Product	Component	Procedure 2A Description
VirtualCenter	Client 1.x	Not supported in this environment.
	Server 1.x	Not supported in this environment.
	Client 2.5	No change.
	Server 2.5	No change.
	WebCenter	No change.
	Oracle database	No change.
	SQL database	No change.
	Access database	Not supported in this environment.
	MSDE database	No change.
License server	License Server	No change.
ESX Server	ESX Server 2.x host	**Task**: Remove from service.
	VMFS2 volumes	**Issues**: Read only from ESX Server 3.x hosts.
	VM2 virtual machines	**Issues**: Unavailable if stored on VMFS2. Supported on VMFS3 with limited operations, such as power-on, power-off, suspend, resume and relocate (migrate).
	VMDK2 virtual disk	
	ESX Server MUI	**Task**: Remove from service.
	ESX Server host client	**Task**: Remove from service.
	VMware Tools 2.5	No change.
	ESX Server 3.5	**Task**: Install in this stage.
	VMFS3 volumes	Supported by ESX Server 3.x hosts.
	VM3 virtual machines	Supported by ESX Server 3.x hosts.
	VMDK3 virtual disk	Supported by ESX Server 3.xhosts.
	VMware Tools 3.x	Supported by ESX Server 3.x hosts.

Table A-3 summarizes procedure 2B of the upgrade process. See "Stage 2B–Upgrading a Datastore from VMFS2 to VMFS3" on page 27.

Table A-3. Upgrading File Systems on a Datastore

Product	Component	Procedure 2B Description
VirtualCenter	Client 1.x	Not supported in this environment.
	Server 1.x	Not supported in this environment.
	Client 2.5	No change.
	Server 2.5	No change.
	WebCenter	No change.
	Oracle database	No change.
	SQL database	No change.
	Access database	Not supported in this environment.
	MSDE database	No change.
License server	License server	No change.
ESX Server	ESX Server 2.x host	Not supported in this environment.
	VMFS2 volumes	**Task**: Upgrade all datastores to VMFS3 in this stage. **Issues**: Read-only allowed from ESX Server 3.x hosts.
	VM2 virtual machines	**Issues**: Supported with limited operations, such as power-on, power-off, suspend, resume and relocate (migrate).
	VMDK2 virtual disk	**Issues**: Virtual disk files on VMFS2 remain in the VMDK2 format
	ESX Server MUI	Not supported in this environment.
	ESX Server host client	Not supported in this environment.
	VMware Tools 2.5	No change.
	ESX Server host 3.x	No change.
	VMFS3 volumes	No change.
	VM3 virtual machines	No change.
	VMDK3 virtual disk	No change.
	VMware Tools 3.x	No change.

Table A-4 summarizes stage 3 of the upgrade process. See "Stage 3–Upgrading Your Virtual Machines" on page 28.

Table A-4. Upgrading Virtual Machines to VM3 Format

Product	Component	Stage 3 Description
VirtualCenter	Client 1.x	Not supported in this environment.
	Server 1.x	Not supported in this environment.
	Client 2.5	No change.
	Server 2.5	No change.
	WebCenter	No change.
	Oracle database	No change.
	SQL database	No change.
	Access database	Not supported in this environment.
	MSDE database	No change.
License server	License server	No change.
ESX Server	ESX Server 2.x host	Not supported in this environment.
	VMFS2 volumes	Not supported in this environment.
	VM2 virtual machines	**Task**: Upgrade to VM3 format in this stage.
	VMDK2 virtual disk	Not supported in this environment.
	ESX Server MUI	Not supported in this environment.
	ESX Server host client	Not supported in this environment.
	VMware Tools 2.5	No change.
	ESX Server host 3.x	No change.
	VMFS3 volumes	No change.
	VM3 virtual machines	No change.
	VMDK3 virtual disk	No change.
	VMware Tools 3.x	No change.

Table A-5 summarizes stage 4 of the upgrade process. See "Stage 4–Upgrading VMware Tools Within the Guest Operating System" on page 30.

Table A-5. Upgrading Guest Operating Systems with VMWare Tools 3

Product	Component	Stage 4 Description
VirtualCenter	Client 1.x	Not supported in this environment.
	Server 1.x	Not supported in this environment.
	Client 2.5	No change.
	Server 2.5	No change.
	WebCenter	No change.
	Oracle database	No change.
	SQL database	No change.
	Access database	Not supported in this environment.
	MSDE database	No change.
License server	License server	No change.
ESX Server	ESX Server 2.x host	Not supported in this environment.
	VMFS2 volumes	Not supported in this environment.
	VM2 virtual machines	Not supported in this environment.
	VMDK2 virtual disk	Not supported in this environment.
	ESX Server MUI	Not supported in this environment.
	ESX Server host client	Not supported in this environment.
	VMware Tools 2.5	**Task**: Upgrade to VMware Tools 3.x in this stage.
	ESX Server host 3.x	No change.
	VMFS3 volumes	No change.
	VM3 virtual machines	No change.
	VMDK3 virtual disk	No change.
	VMware Tools 3.x	No change.

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Updates for the Upgrade Guide

Last Updated: May 14, 2010

This document provides an update to the Update 2 release for ESX Server 3.5, ESX Server 3i version 3.5, and VirtualCenter 2.5 version of the *Upgrade Guide*. Updated descriptions and procedures are organized by page number so that you can easily locate the areas of the guide that have changes. If the change spans multiple sequential pages, this document provides the starting page number only.

The following is a list of updates to the *Upgrade Guide*:

- Update for the Minor Upgrades Section on Page 40

- Update for the Scenario 6: Upgrading Hosts on a SAN Using VMotion with DRS and HA Section on Page 41

- Update for the Scenario 5: Upgrading Hosts on a SAN with DRS and HA Section on Page 46

- Update for the Table of VirtualCenter Upgrade Support on Page 50

- Update for the Table of Supported Database Formats on Page 52

- Update for the Procedure To Install or Upgrade VMware Tools in Multiple Virtual Machines on Page 83

Update for the Minor Upgrades Section on Page 40

In the "Minor Upgrades" section, the text indicates that minor upgrades involve upgrading from VirtualCenter 2.5/ESX Server 3.x to VirtualCenter 2.5 and ESX Server 3.5. This is incorrect. The text should state that minor upgrades involve upgrading from VirtualCenter 2x/ESX Server 3.x to VirtualCenter 2.5 and ESX Server 3.5.

Update for the Scenario 6: Upgrading Hosts on a SAN Using VMotion with DRS and HA Section on Page 41

The section "Scenario 6: Upgrading Hosts on a SAN Using VMotion with DRS and HA" assumes that you have VMware HA and VMware DRS enabled. If your cluster configuration has strict admission control, migrations of virtual machines during the ESX Server upgrade might not work. To resolve this problem, use one of the following approaches:

- If you can accept some degradation of virtual machine availability, disable strict admission control, perform ESX Server upgrades, then re-enable strict admission control.

- If you must ensure that all virtual machines remain available during the ESX Server upgrade, add another host to the cluster, thereby adding more capacity. This allows the software to perform migrations of virtual machines without violating strict admission control.

HA strict admission control is enabled by default. You can disable it in the VI Client by opening the HA section of the cluster's Settings dialog box and selecting **Allow VMs to be powered on even if they violate availability constraints**.

Update for the Scenario 5: Upgrading Hosts on a SAN with DRS and HA Section on Page 46

The section "Scenario 5: Upgrading Hosts on a SAN with DRS and HA" assumes that you have VMware HA and VMware DRS enabled. If your cluster configuration has strict admission control, migrations of virtual machines during the ESX Server 3i host upgrade might not work. To resolve this problem, use one of the following approaches:

- If you can accept some degradation of virtual machine availability, disable strict admission control, perform ESX Server 3i host upgrades, then re-enable strict admission control.

- If you must ensure that all virtual machines remain available during the ESX Server 3i upgrade, add another host to the cluster, thereby adding more capacity. This allows the software to perform migrations of virtual machines without violating strict admission control.

HA strict admission control is enabled by default. You can disable it in the VI Client by opening the HA section of the cluster's Settings dialog box and selecting **Allow VMs to be powered on even if they violate availability constraints**.

Update for the Table of VirtualCenter Upgrade Support on Page 50

Table 4-1 mentions incorrectly that you can upgrade from VirtualCenter 1.3 or VirtualCenter 1.3.x to VirtualCenter 2.5 Update 2. The rows should appear as follows:

VirtualCenter 1.3	No
VirtualCenter 1.3.x	No

Update for the Table of Supported Database Formats on Page 52

Table 4-2 does not mention support for versions later than 10.2.0.3.0 of Oracle 10g Enterprise Release 2, and the support for two new Oracle patches. The row should appear as follows:

Oracle Database 10g Release 2 (10.2.0.1.0) Standard Edition Oracle Database 10g Release 2 (10.2.0.1.0) Enterprise Edition	After applying patch 10.2.0.3.0 to the client and server, apply patch 5699495 to the client. Also apply patches 6085625 and 6452485 to the server. **Note:** VMware supports 10.2.0.3.0 and later versions of Oracle Database 10g Release 2.

Update for the Procedure To Install or Upgrade VMware Tools in Multiple Virtual Machines on Page 83

In Step 6 of the procedure, "To install or upgrade VMware Tools in multiple virtual machines," the information on VMware Tools upgrade is updated as follows:

If you want to upgrade VMware Tools and select **Install/Upgrade Tools**, upgrades start automatically for Linux guest operating systems even if there is a same or a new version of VMware Tools in the guest operating systems.

In Step 7 of the procedure, "To install or upgrade VMware Tools in multiple virtual machines," the text erroneously refers to command-line options for the `vmware–vmupgrade.exe` script. The `vmware–vmupgrade.exe` script is deprecated. The command-line options shown in Table 6-1 should not appear in this guide.