

# ESX Server 3i Embedded Setup Guide

ESX Server 3i version 3.5 Embedded and VirtualCenter 2.5



ESX Server 3i Embedded Setup Guide

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# About This Book

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This manual, the *ESX Server 3i Embedded Setup Guide*, describes how to install new configurations of VMware® VirtualCenter and ESX Server 3i.

The *ESX Server 3i Embedded Setup Guide* discusses ESX Server 3i only. To read about ESX Server 3.5, see [http://www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html).

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 set up or use ESX Server 3i. The information in this manual is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

## Document Feedback

VMware welcomes your suggestions for improving our documentation. If you have comments, send your feedback to:

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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 manual use the abbreviations listed in [Table 1](#).

**Table 1.** Abbreviations

<b>Abbreviation</b>	<b>Description</b>
database	VirtualCenter database
datastore	Storage for the managed host
dsk#	Storage disk for the managed host
host <i>n</i>	VirtualCenter managed hosts
SAN	Storage area network type datastore shared between managed hosts
tplt	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. You can access the most current versions of this manual and other books by going 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 <http://www.vmware.com/support>.

Customers with appropriate support contracts should use telephone support for the fastest response on priority 1 issues. Go to [http://www.vmware.com/support/phone\\_support.html](http://www.vmware.com/support/phone_support.html).

## Support Offerings

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## VMware Education Services

VMware courses offer extensive hands-on labs, case study examples, and course materials designed to be used as on-the-job reference tools. For more information about VMware Education Services, go to <http://mylearn1.vmware.com/mgreg/index.cfm>.



# Introduction to VMware Infrastructure

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# 1

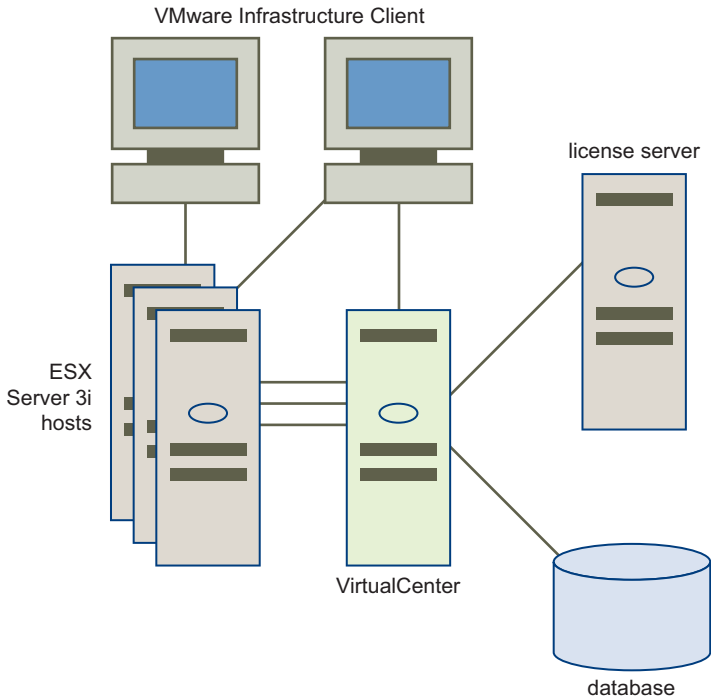
This book describes VMware ESX Server 3i and VMware VirtualCenter. This chapter describes the components individually, to help you decide which components to install. The following sections introduce VMware ESX Server 3i and VirtualCenter.

- [“VMware Infrastructure at a Glance”](#) on page 14
- [“About ESX Server 3i”](#) on page 16

## VMware Infrastructure at a Glance

**Figure 1-1** illustrates the six basic components of VMware Infrastructure. The figure shows the license server on a separate machine. You can install the license server on the same machine that hosts VirtualCenter.

**Figure 1-1.** VMware Infrastructure Components



One VirtualCenter Server manages multiple ESX Server 3i hosts.

Each shaded block represents a separate installer or procedure. The VMware Infrastructure Client (VI Client) appears twice, because you can run it on multiple workstations.

The major components of VMware Infrastructure are:

- **VMware ESX Server 3i** – Provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines. You do not need to install ESX Server 3i because it is embedded as firmware on a server platform that you purchase from a hardware vendor.
- **VMware VirtualCenter Server** (VirtualCenter) – Installs on a Windows machine, either physical or virtual, to centrally manage your VMware ESX Server 3i hosts. VirtualCenter allows the use of advanced VMware Infrastructure features such as VMware DRS, VMware HA, and VMware VMotion™.

A VMware SDK Web service is installed with VirtualCenter. See [“Configuring Communication Between VirtualCenter Components”](#) on page 103.

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

Documentation provided with each plug-in offers information about how server components of plug-ins are installed.

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

The following plug-ins are available:

- **VMware Converter** – Converts physical or virtual machines into ESX Server 3i 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 3i 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. For more information on installing the VMware Update Manager server component along with VirtualCenter, see [“Configuring Communication Between VirtualCenter Components”](#) on page 103. If upgrading, see the *Upgrade Guide*. For general information on Update Manager, see the *VMware Update Manager Administration Guide*.

- **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 the VirtualCenter Server and ESX Server 3i hosts.
- **License server** – Installs on a Windows system to authorize VirtualCenter hosts and ESX Server 3i hosts appropriately for your licensing agreement. Administrators make changes to software licenses using the VI Client. See [“Setting Up Centralized Licensing”](#) on page 75.
- **Database** – VirtualCenter 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 lets you 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. See [“Preparing the VirtualCenter Server Database”](#) on page 93.

## About ESX Server 3i

An ESX Server 3i host is a physical server that contains an ESX Server image preinstalled as firmware in the factory.

When you first boot up the ESX Server 3i host, you use the direct console user interface for initial configuration and troubleshooting of the ESX Server software. The direct console appears if you attach a monitor to the host. If you install the VMware Infrastructure Management software, you can also use the VMware Infrastructure client applications to manage the host.

When you power on the ESX Server 3i host for the first time (or when you power on the host after you reset the host to the configuration defaults), the host enters a boot up phase during which system network and storage devices are configured with defaults.

The default behavior for networking is for the Dynamic Host Configuration Protocol (DHCP) to configure IP. The default behavior for storage is for all visible blank internal disks to be formatted with the virtual machine file system (VMFS) so that virtual machines can be stored on the disks.

After the host completes the boot up phase, the direct console appears on the attached monitor. Using a keyboard and monitor attached to the host, you can examine the default network configuration applied during the boot-up phase and change any settings that are not compatible with your network environment.

Key operations available to you in the direct console include:

- Configuring ESX Server 3i host defaults
- Setting up administrative access
- Troubleshooting ESX Server 3i

For information about setting up your ESX Server 3i host and using the direct console, see [“Setting Up ESX Server 3i”](#) on page 19.



# Setting Up ESX Server 3i

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# 2

This chapter provides information about using the direct console user interface and configuring defaults for ESX Server 3i. It includes the following sections:

- [“Network Access to Your ESX Server 3i Host”](#) on page 20
- [“Setting up the Direct Console User Interface”](#) on page 21
- [“Configuring ESX Server 3i Boot Settings”](#) on page 22
- [“Configuring Network Settings”](#) on page 25
- [“Configuring Storage Behavior”](#) on page 29
- [“Configuring ESX Server 3i Security”](#) on page 31
- [“Resetting the Configuration Defaults”](#) on page 33
- [“Managing ESX Server 3i Remotely”](#) on page 34
- [“Restarting Management Agents”](#) on page 35
- [“Viewing System Logs”](#) on page 35

## Network Access to Your ESX Server 3i Host

The default behavior for networking is for DHCP to configure IP. You can accept the default behavior, prevent the default behavior from taking effect during the boot up phase, or override the default behavior after it takes effect. You can change any settings that are not compatible with your network environment. [Table 2-1](#) summarizes the scenarios and approaches for network configuration that ESX Server 3i supports.

**Table 2-1.** Network Configuration Scenarios and Approaches

Scenario	Approach
You want to accept the DHCP-configured IP settings.	Note the IP address that DHCP assigns and use the VI Client or another desktop client interface to connect to the ESX Server 3i host.
One of the following is true: <ul style="list-style-type: none"> <li>■ You do not have a DHCP server.</li> <li>■ The ESX Server 3i host is not connected to a DHCP server.</li> <li>■ Your connected DHCP server is not functioning properly.</li> </ul>	<p>During the initial boot-up phase, the software assigns a default IP address (169.254.0.1/16).</p> <p>If you are connecting to the ESX Server 3i host remotely through the VI Client or another desktop client interface, you can make the initial connection by using the default IP address. Then you can configure a static IP address.</p> <p>If you are local to the ESX Server 3i host, you can override the default IP address by configuring a static IP address using the direct console.</p>
The ESX Server 3i host is connected to a functioning DHCP server, but you do not want to use the DHCP-configured IP address.	<p>During the initial boot-up phase, the software assigns a DHCP-configured IP address.</p> <p>If you are connecting to the ESX Server 3i host remotely through the VI Client or another desktop client interface, After the initial connection is made, you can make the initial connection by using the default IP address. Then you can configure a static IP address.</p> <p>If you are local to the ESX Server 3i host, you can override the DHCP-configured IP address by configuring a static IP address using the direct console.</p>
Your security deployment policies do not permit unconfigured hosts to be powered on the network.	<p>Setup procedure:</p> <ol style="list-style-type: none"> <li>1 Make sure that no network cables are connected to the host.</li> <li>2 Power on the host.</li> <li>3 Use the direct console to configure the administrative password.</li> <li>4 Use the direct console to configure a static IP address.</li> <li>5 Connect a network cable to the host.</li> <li>6 Use the VI Client to connect to VirtualCenter.</li> <li>7 Add the host to the VirtualCenter inventory.</li> </ol>

## Setting up the Direct Console User Interface

The direct console is similar to the BIOS of a computer with a keyboard-only user interface. [Table 2-2](#) lists the keys you can use to navigate and perform actions in the direct console.

**Table 2-2.** Navigating in the direct console

Actions	Keys
View and change configuration	F2
Shut down or restart the host	F12
Move the highlight between selection fields	Arrow keys
Select a menu item	Enter
Toggle a value	Spacebar
Confirm sensitive commands, such as resetting configuration defaults	F11
Save and exit	Enter
Exit without saving	Esc
Exit system logs	q

## Configuring the Keyboard Layout

You can configure the layout for the keyboard that you use with the direct console.

### To configure the keyboard layout

- 1 From the direct console, select **Configure Keyboard** and press Enter.
- 2 Select the layout to use.
- 3 Press the spacebar to toggle selections on and off.
- 4 Press Enter.

## Configuring a Security Banner for the Direct Console

A security banner is a message that is displayed on the Welcome screen of the direct console.

### To add a security banner to the direct console

- 1 Log in to the host from the VI Client.
- 2 From the **Configuration** tab, select **Advanced Settings**.
- 3 From the Advanced Settings window, select **Annotations**.
- 4 Enter a security message.

The message is displayed on the direct console Welcome screen.

## Configuring ESX Server 3i Boot Settings

When you power on the ESX Server 3i host for the first time (or when you power on the host after you reset the host to the configuration defaults), the host enters a boot-up phase during which you can select a boot device. You can always boot into ESX Server 3i mode or into another mode. During the boot-up phase, system network and storage devices are configured with defaults.

After the host completes the boot-up phase, the direct console user interface appears on the attached monitor. Using a keyboard and monitor attached to the host, you can use the direct console to configure the ESX Server host, to examine the default network configuration applied during the boot-up phase, and to troubleshoot the ESX Server software.

## Selecting the Boot Device

The basic input/output system (BIOS) boot configuration determines in which mode your server boots. Generally, the USB flash device is listed first in the BIOS boot settings on the machine that hosts ESX Server 3i. The ability to change the boot setting is helpful if you have other supported operating systems on the host. You can change the boot setting by configuring the boot order in the BIOS during startup or by selecting a boot device from the Boot Options menu.

When you change the boot order in the BIOS, the new setting affects the current boot and all subsequent reboots. When you select a boot device from the boot option menu, the selection affects the current boot only. The Boot Options menu is useful for one-time boots when you do not want to change the default BIOS settings.

Some servers do not have a Boot Options menu, in which case you must change the boot order in the BIOS, even for one-time boots, and then change it back again during the subsequent reboot.

---

**NOTE** The Boot Options menu discussed in this section is different from the system boot options that you can configure by logging into the VI Client, selecting a host, and clicking **Configuration > Processors > Boot Options**.

This section discusses the system BIOS Boot Options menu. The boot options in the VI Client only allow you to configure the boot sequence for floppy, CD-ROM, and the hard disk (C: drive). For some servers, the system BIOS has two options. One is for the boot sequence (floppy, CD-ROM, hard disk) and another for the hard disk boot order (USB key, local hard disk). When you are using the VI Client, the boot options correspond to the BIOS boot sequence (floppy, CD-ROM, hard disk).

---

## Configuring the Boot Setting for ESX Server 3i

Some ESX Server 3i hosts might not be preconfigured in the BIOS to boot into ESX Server 3i mode.

### To configure the boot setting for ESX Server 3i mode

- 1 While the ESX Server 3i host is powering on, press the key required to enter your host's BIOS Setup page.

Depending on your server hardware, the key might be F1, F2, F10, F11, F12, or Del. The option to open the BIOS Setup page might be different for your server.

- 2 Select the USB flash device and move it to the first position in the list.

The host powers on in ESX Server 3i mode. If the host does not power on in ESX Server 3i mode, you might need to reimage the USB flash as described in [“Recovering the ESX Server 3i Embedded Software”](#) on page 41.

## Configuring the Boot Setting for Another Mode

If you use your server for multiple purposes, you can change the boot configuration as appropriate.

Follow the procedure for one-time boots if your server has a boot option menu and you do not want to change the default boot order. The following procedure is useful for booting from virtual media, for example.

If your server does not have a boot option menu or if you want to change the default boot order, follow the procedure to change the boot order.

### To select a one-time boot option

- 1 Reboot the server.
- 2 While the server is powering on, open the boot option menu.  
For example, on some servers you can select F11 to open the boot menu option.
- 3 From this boot option menu, follow the instructions to select a device from which to boot.  
The server boots in the configured mode one time and goes back to the default boot order for subsequent reboots.

### To change the boot order

- 1 Reboot the server.
- 2 While the server is powering on, press the key required to enter your host's BIOS Setup page.  
Depending on your server hardware, the key might be F1, F2, F10, F11, F12, or Del. The option to open the BIOS Setup page might be different for your server.
- 3 Change the boot order by selecting a device and moving it to the first position in the list.  
The host powers on in the configured mode for this boot and for all subsequent reboots.

## Configuring the Boot Setting for Virtual Media

Virtual media is access storage media (such as flash memory, external drive, USB, floppy, or CD-ROM) that can be made available to any machine on a network.

### To boot from virtual media

- 1 Connect media to the virtual device.  
For example, if you are using a Dell server, log in to the Dell Remote Access Controller (DRAC) (or a similar remote management interface) and select a physical floppy or CD-ROM drive, or provide a path to a floppy image or CD-ROM image. Then click **Connect** to connect the selected media to the virtual device.
- 2 Reboot the server.  
While the server is powering on, configure the boot setting to boot from the virtual media device. See [“Configuring the Boot Setting for Another Mode”](#) on page 23.

## Configuring Network Settings

You must set up your IP address before your ESX Server 3i host is operational. To configure basic network settings, use the direct console or the VI Client.

### Choosing NICs for the Management Network

Traffic between an ESX Server 3i host and any external management software moves in and out through an Ethernet network interface card (NIC) on the host. Examples of external management software include the VI Client, VirtualCenter, and SNMP client software. NICs on the host are named `vmnic<N>`, where N is the number of the NIC (for example, `vmnic0`, `vmnic1`, and so forth.)

During the boot-up phase, the ESX Server 3i host chooses `vmnic0` for management traffic. You can override the default choice by manually choosing the NIC that carries management traffic for the host. In some cases, for best availability, you might want to use a Gigabit Ethernet NIC for your management traffic. Another way to help ensure availability is to select multiple NICs for management traffic. Choosing multiple NICs enables load balancing and failover capabilities.

#### To choose NICs

- 1 From the direct console, select **Configure Management Network** and press Enter.
- 2 Select **Network Adapters** and press Enter.
- 3 Select a NIC.
- 4 Press the spacebar to toggle NIC selections on and off.
- 5 Press Enter.

After the network is functional, you can use the VI Client to connect to the ESX Server 3i host.

### Setting the VLAN ID

Optionally, you can set the virtual LAN (VLAN) ID number of the ESX Server 3i host.

#### To set the VLAN ID

- 1 From the direct console, select **Configure Management Network** and press Enter.
- 2 Select **VLAN (optional)** and press Enter.
- 3 Enter a VLAN ID number.

VLAN ID numbers range from 1 through 4094.

## Configuring IP Settings

You can choose either manual or automatic IP configuration of the ESX Server 3i host. By default, IP configuration is automatic. The automatic setting enables DHCP to set the IP address, subnet mask, and default gateway. The direct console displays the IP address that DHCP assigns to the host. For future reference, VMware recommends that you write down this IP address.

For DHCP to work, your network environment must have a DHCP server. If DHCP is not available or not desirable, the host might be assigned the built-in default IP address, which is 169.254.0.1/16. You can use this default address to connect initially and then configure a static network address. The default subnet mask is 255.255.0.0. The default gateway is blank. If two hosts power up with no DHCP service, both hosts receive the default 169.254.0.1 IP address. No outbound traffic is allowed through this IP address. This is why the default IP address is not a long-term alternative to DHCP. It provides a temporary method to connect to the host so that you can configure static IP settings.

If you are not local to the host, you can use the VI Client to configure static IP settings, if you are on the same physical subnet and you configure the VI Client IP to be on the 169.254.0.x network.

If you are local to the host, you can use the direct console to configure static IP settings, including the IP address, subnet mask, and default gateway.

### To configure static IP settings from the direct console

- 1 From the direct console, select **Configure Management Network** and press Enter.
- 2 Select **IP Configuration** and press Enter.
- 3 Navigate to **Set static IP address and network configuration**.
- 4 Press the spacebar to select the highlighted item.
- 5 Select and delete the current IP address, subnet mask, and default gateway.
- 6 Enter a static IP address, subnet mask, and default gateway.
- 7 Press Enter.

### To configure static IP settings from the VI Client

- 1 From the VI Client, select the host in the inventory.
- 2 Select the **Configuration** tab and click **Networking**.
- 3 Click **Properties** next to **Virtual Switch: vSwitch0**.
- 4 Select **Management Network** and click **Edit**.

- 5 On the **General** tab, click **Use the following IP settings**.
- 6 Enter a static IP address, subnet mask, and default gateway.
- 7 Click **OK**.

## Configuring DNS

You can choose either manual or automatic Domain Name System (DNS) configuration of the ESX Server 3i host. By default, DNS configuration is automatic. The automatic setting enables a DHCP server to acquire DNS information. For automatic DNS to work, your network environment must have a DHCP server and a DNS server.

In network environments where automatic DNS is not available or not desirable, you can configure static DNS information, including a host name, a primary name server, a secondary name server, and DNS suffixes.

If you are not local to the host, you can use the VI Client to configure DNS information.

If you are local to the host, you can use the direct console to configure DNS information.

### To configure DNS settings from the direct console

- 1 From the direct console, select **Configure Management Network** and press Enter.
- 2 Select **DNS Configuration** and press Enter.
- 3 Navigate to **Use the following DNS server addresses and hostname**.
- 4 Press the spacebar to select the highlighted item.
- 5 Select and delete the current primary server, alternate server, and host name.
- 6 Enter a static primary server, alternate server, and host name.
- 7 Press Enter.

### To configure DNS settings from the VI Client

- 1 From the VI Client, select the host in the inventory.
- 2 Select the **Configuration** tab and click **Networking**.
- 3 Click **Properties** next to **Virtual Switch: vSwitch0**.
- 4 Select **Management Network** and click **Edit**.
- 5 On the **General** tab, click **Use the following IP settings**.
- 6 Click **Edit** next to **VMkernel Default Gateway**.

- 7 On the **DNS Configuration** tab, enter a static primary server, alternate server, host name, and DNS suffixes.
- 8 Click **OK**.

## Configuring DNS Suffixes

By default, DHCP acquires the DNS suffixes.

### To configure the DNS suffixes

- 1 From the direct console, select **Configure Management Network**.
- 2 Select **Custom DNS Suffixes** and press Enter.
- 3 Press the Backspace key to delete the current DNS suffixes.
- 4 Enter new DNS suffixes.
- 5 Press Enter.

## Testing Network Connectivity

You can use the direct console to perform some simple network connectivity tests. By default, the direct console performs the following tests:

- Pings the default gateway
- Pings the primary DNS nameserver
- Pings the secondary DNS nameserver
- Resolves the DNS host name

### To test the management network

- 1 From the direct console, select **Test Management Network** and press Enter.
- 2 Press Enter to start the test.

The ESX Server 3i host tests your network configuration.

### To test connectivity to other devices or networks

- 1 From the direct console, select **Test Management Network** and press Enter.
- 2 Select and delete one or more default addresses or the default host name.
- 3 Type other addresses to ping or another DNS host name to resolve.
- 4 Press Enter to start the test.

## Configuring Storage Behavior

When you power on ESX Server 3i, the host enters an initial boot-up phase during which system storage devices are configured with defaults. The default behavior for storage is for the software to format all visible blank internal disks with VMFS, so you can store virtual machines on the disks.

On the hard drive from which the ESX Server 3i host is booting, the disk-formatting software retains existing diagnostic partitions that are created by the hardware vendor. In the remaining space, the software creates:

- One 4GB VFAT scratch partition for system swap, if this partition is not present on another disk. See [“Configuring the Scratch Partition”](#) on page 29.
- One 110MB diagnostic partition for core dumps, if this partition is not present on another disk.
- One VMFS3 partition on the remaining free space.

The VFAT scratch and diagnostic partitions are created only on the disk from which the ESX Server 3i host is booting. On other disks, the software creates one VMFS3 partition per blank disk, using the whole disk. The software formats blank disks only.

You might want to override this default behavior if, for example, your policy is to use shared storage devices instead of local storage.

To prevent automatic disk formatting from occurring, detach local storage devices from the host before you power on the host for the first time (or before you power on the host after you reset the host to the configuration defaults). The automatic disk formatting occurs the first time you power on the host and when you power on the host after you reset the host to the configuration defaults. For subsequent reboots, you do not need to detach local storage devices. If automatic disk formatting already occurred and you want to override the VMFS formatting, you can remove the datastore. See the *Server Configuration Guide*.

## Configuring the Scratch Partition

The first time you power on the ESX Server 3i host (and when you power on the host after you reset the host to the configuration defaults), the software creates and enables one 4GB VFAT scratch partition for system swap, if this partition is not present on another disk. The host uses system swap for its own operation. System swap is different from virtual machine swap.

If the host does not have a scratch partition, the host uses 512MB more memory than it would otherwise use. If you do not want the host to use this additional memory, keep the scratch partition enabled. If the scratch partition is disabled, you can enable it.

Before you can enable the scratch partition, you must have access to a machine that is running the Remote Command-Line Interface (CLI). For information about importing or installing the Remote CLI, see the “Remote Command-Line Interfaces” appendix of the *ESX Server 3i Configuration Guide*.

### To enable the scratch partition

- 1 Power on the Remote CLI and log in.

You do not need to type the password on the command line. If no password is specified, the tool prompts you for the password without echoing the output to the terminal. This means the password you type is not visible in the window as you run the command.

You can create a secure connection to the Remote CLI by using the Remote CLI IP address. If you are using the VI Client, you can right-click the Remote CLI and select **Open Console**.

If the Remote CLI is installed on your Windows or Linux system, you can use the installed application, in which case you do not need to log in.

- 2 To get the current state, run the following read-only commands:

```
vicfg-advcfg.pl --server <ip-address> --username root --password <password> -s /ScratchConfig/CurrentScratchLocation
```

```
vicfg-advcfg.pl --server <ip-address> --username root --password <password> -s /ScratchConfig/ConfiguredSwapState
```

- 3 Run the following commands to enable or disable system swap:

To enable swap:

```
vicfg-advcfg --server <ip-address> --username root --password <password> -s true ScratchConfig.ConfiguredSwapState
```

To disable swap:

```
vicfg-advcfg --server <ip-address> --username root --password <password> -s false ScratchConfig.ConfiguredSwapState
```

- 4 If you enabled system swap, run the following command to enter the location of a datastore on which to create and enable the system swap partition:

```
vicfg-advcfg --server <ip-address> --username root --password <password> -s "/vmfs/volumes/<NameOfDatastore>/<DirectorySpecificToHost>" ScratchConfig.ConfiguredScratchLocation
```

The configured directory must be unique across hosts.

To retrieve the swap state:

```
vicfg-advcfg -server <ip-address> --username root --password <password> -g
ScratchConfig.ConfiguredSwapState
```

To retrieve scratch location:

```
vicfg-advcfg --server <ip-address> --username root --password <password>
-g ScratchConfig.ConfiguredScratchLocation
```

- 5 To make the changes take effect, reboot the host.

## Configuring ESX Server 3i Security

The procedures in this section describe how to set the administrator username and password to secure your ESX Server host and to configure host *lockdown* mode, which prevents remote personnel from logging into the ESX Server 3i host by using the root login name. In addition, it describes how to determine the ESX Server 3i serial number, which is required for recovery operations, if necessary.

### Recording the ESX Server 3i Serial Number

If the ESX Server 3i host is licensed to use the Standalone edition, a serial number is assigned to the host. VMware recommends that you write down the serial number and tape it to the server, if possible, or put the serial number in a secure, easily accessible location. You can access the serial number from the direct console or the VI Client.

When you perform a configuration backup, the serial number is backed up with the configuration and is restored when you restore the configuration.

#### To access the ESX Server 3i serial number from the direct console

From the direct console, select **View Support Information**.

The license serial number appears in the form XXXX-XXXX-XXXX-XXXX.

The physical machine serial number also appears. Do not confuse the license serial number with the physical machine serial number.

#### To access the ESX Server 3i serial number from the VI Client

- 1 From the VI Client, select the host in the inventory.
- 2 Select the **Configuration** tab and click **Licensed Features**.

The serial number is listed under **License Source**. If the serial number is not listed, another host license source is configured.

## Configuring the Administrative Password

The administrative username for the ESX Server 3i host is root.

By default, the administrative password is null, meaning there is no administrative password.

### To create an administrative password

- 1 From the direct console, select **Configure Root Password**.
- 2 If prompted for an old password, press Enter.  
If you are setting the password for the first time, you are not prompted for an old password.
- 3 Enter a new password.
- 4 Retype the new password and press Enter to save the password configuration.

## Configuring Lockdown Mode

Lockdown mode prevents remote personnel from logging into the ESX Server 3i host by using the root login name. If you configure lockdown mode and you do not configure other local host user accounts, direct host access is restricted. This means standalone host access through the VI Client, access through the VI API, and the remote command-line interface (CLI) are not allowed for user root.

When lockdown mode is enabled, users can still access the host through the direct console or through an authorized centralized management application, such as VirtualCenter. By default, lockdown mode is disabled.

When lockdown mode is enabled, you can create a user (other than root) with administrator privileges to connect to a standalone host. Do not use this approach in environments with numerous hosts because maintaining separate user password databases for each host might be difficult to manage.

Enable lockdown mode only after you add the host to the VirtualCenter inventory. The operation to enable lockdown mode fails if you try it before you add the host to VirtualCenter. In VirtualCenter, you can choose to enable lockdown mode when you add the host to the VirtualCenter inventory. If you do so, you do not need to enable lockdown mode in the direct console.

**To configure lockdown mode**

- 1 Add the ESX Server 3i host to the VirtualCenter inventory.
- 2 From the direct console, select **Configure Lockdown Mode** and press Enter.
- 3 Press the spacebar to select **Enable Lockdown Mode** and press Enter.
- 4 Press Enter.

## Resetting the Configuration Defaults

When you reset the configuration defaults, the software overrides all configuration changes that you have made, deletes the administrative password, and reboots the host. Some configuration changes that your hardware vendor might have made in the factory are deleted as well when you reset the configuration defaults. These changes include IP address settings and license configuration.

Before you reset the configuration defaults, first back up the ESX Server configuration. After you reset the configuration defaults, you can use the backup file to restore your configuration.

Resetting the configuration defaults does not remove any virtual machines that are on the ESX Server 3i host. Virtual machines are stored on the datastore, not on the USB flash. After you reset the configuration defaults, the virtual machines are not visible, but you can retrieve them by reconfiguring storage (if the host doesn't recognize and configure storage during the reboot), and reregistering the virtual machines.



**CAUTION** When you reset the configuration defaults, users accessing this host through the VI Client or VirtualCenter lose connectivity.

---

**To reset configuration defaults**

- 1 (Recommended) Back up the configuration by running the Remote CLI `vicfg-cfgbackup` command.
- 2 From the direct console, select **Reset Customized Settings** and press Enter.
- 3 Press F11 to confirm.

The system processor reboots the server after all settings are reset.

- 4 (Optional) To restore overridden configuration data, use the Remote CLI to run the `vicfg-cfgbackup` command.

See [“About Backing Up and Restoring an ESX Server 3i Configuration”](#) on page 38.

## Managing ESX Server 3i Remotely

After the ESX Server 3i host is booted into the direct console, you can manage the host by using the VI Client and VirtualCenter. To do this, install both applications on a computer serving as a management station with network access to the ESX Server 3i host. You can install VirtualCenter in licensed mode or in evaluation mode.

You can download VirtualCenter from [www.vmware.com](http://www.vmware.com) or use the VMware Infrastructure Management Installer CD. You can download the VI Client directly from the ESX Server 3i host or use the VMware Infrastructure Management Installer CD.

Following are brief instructions for installing the VI Client and VirtualCenter:

- **VI Client**—Use the VI Client to connect to a single ESX Server 3i host or to VirtualCenter.

To install the VI Client, use a browser to point to the IP address of the ESX Server 3i host (<http://ESX-host-IP-address>). On the Welcome page, click **Download the VI Client**. Alternatively, you can use the VMware Infrastructure Management Installer CD, which is included with ESX Server 3i.

After you install the VI Client, you can connect to the ESX Server 3i host by using the ESX Server 3i host IP address with username root and no password. If you configure an administrative password (as described in “[Configuring the Administrative Password](#)” on page 32), use the configured password. For detailed information about installing the VI Client, see “[Installing VMware Infrastructure Management](#)” on page 93.

- **VirtualCenter**—If you have multiple ESX Server hosts, consider using VirtualCenter, which lets you manage all hosts from a single interface and use advanced features, such as VMware HA, DRS, and VMotion.

To install VirtualCenter, download the latest version from <http://www.vmware.com/download/vi/>. Alternatively, you can use the VMware Infrastructure Management Installer CD, which is included with ESX Server 3i.

After you install VirtualCenter, you can manage all of your ESX Server hosts (including ESX Server 3i) from a single interface. To access VirtualCenter, use the VI Client to connect to the VirtualCenter IP address with your Windows login username and password. Specifically, use the login credentials appropriate to the Windows machine on which VirtualCenter is installed. The VirtualCenter username and password might be different than the username and password you use for ESX Server 3i.

For detailed information about installing VirtualCenter, see “[Installing VMware Infrastructure Management](#)” on page 93.

After you install the VI Client and VirtualCenter, you can convert a physical machine into a virtual machine. Alternatively, you can download sample virtual machines at <http://www.vmware.com/appliances/>. For information about importing virtual machines, see the *Basic System Administration Guide*.

## Restarting Management Agents

A management agent is software that synchronizes VMware components and lets you access the ESX Server 3i host through the VI Client or VirtualCenter. It is installed with the VMware Infrastructure Management software. You might need to restart the management agents if remote access is interrupted.

When you restart management agents, the software restarts all management agents and services that are installed and running in `/etc/init.d` on the ESX Server host. Typically, these agents include `hostd`, `ntpd`, `sfcdb`, `slpd`, and `wsmamd`. The software also restarts the Automated Availability Manager (AAM) if it is installed.



**CAUTION** When you restart management agents, users accessing this host through the VI Client or VirtualCenter lose connectivity.

---

### To restart management agents

- 1 From the direct console, select **Restart Management Agents** and press Enter.
- 2 Press F11 to confirm the restart.

The ESX Server 3i host restarts the management agents.

## Viewing System Logs

System logs provide detailed information about system operational events.

### To view system logs

- 1 From the direct console, select **View System Logs**.
- 2 Press a corresponding number key to view a log:
  - 1—Messages
  - 2—Configuration
  - 3—Management Agent (`hostd`)
  - 4—VirtualCenter Agent (`vpva`)

VirtualCenter Agent (`vpva`) logs appear if you add the host to VirtualCenter.

- 3 Press Enter or the spacebar to scroll through the messages.
- 4 (Optional) Perform a regular expression search:
  - a Press the slash key (/).
  - b Type the text to find.
  - c Press Enter.  
The found text is highlighted on the screen.
- 5 Press q to return to the direct console.

**To redirect system log files to a remote host**

- 1 From the VI Client, select the host in the inventory.
- 2 Select the **Configuration** tab and click **Advanced Settings**.
- 3 Click **Syslog**.
- 4 For **Syslog.Remote.Hostname**, enter a host name to which syslog data can be forwarded.

# Backing Up and Restoring ESX Server 3i

---

# 3

This chapter provides information about backing up and restoring the ESX Server 3i configuration and recovering the ESX Server 3i boot image if it becomes damaged.

In addition, it describes how to remove ESX Server 3i from the host.

This chapter contains the following sections:

- [“About Backing Up and Restoring an ESX Server 3i Configuration”](#) on page 38
- [“Recovering the ESX Server 3i Embedded Software”](#) on page 41
- [“Removing ESX Server 3i from the Host”](#) on page 42

For information on installing VMware Infrastructure Management software, see [“Installing VMware Infrastructure Management”](#) on page 93. For information about using the desktop clients, see the VMware Infrastructure 3 documentation set.

## About Backing Up and Restoring an ESX Server 3i Configuration

You can back up the ESX Server 3i host configuration data after preliminary tasks are completed. VMware recommends that you back up your host configuration after you change the configuration or upgrade the ESX Server image.

When you perform a configuration backup, the serial number is backed up with the configuration and is restored when you restore the configuration. However, the serial number is not preserved when you run the recovery CD. For this reason, the recommended procedure is to first back up the configuration, run the recovery CD if needed, then restore the configuration.

You perform the backup by using the `vicfg-cfgbackup` command, which you run from the Remote Command-Line Interface (Remote CLI). The Remote CLI is available in two forms:

- As a virtual appliance that you import into ESX Server, VMware Workstation, or VMware Player.
- As a package that you install on Microsoft Windows and Linux machines.

You run the `vicfg-cfgbackup` command from the Service Console of the virtual appliance or from a command prompt on the system where you installed the Remote CLIs. You run CLI commands on an ESX Server 3i host to which you connect remotely.

For information about setting up and using the Remote CLI, see the *ESX Server 3i Configuration Guide* appendices.

### Considerations When Using the Remote CLI Virtual Appliance

When you back up the host configuration, you can run the `vicfg-cfgbackup` command from a Remote CLI virtual appliance that is running on the target host (the host you are backing up or restoring), or you can run it from a remote host. However, to restore a configuration on the target host, you must run the Remote CLI virtual appliance from a remote host.

When you restore the configuration, the target host must be in maintenance mode, which means all virtual machines (including the Remote CLI virtual appliance) must be powered off.

For example, suppose you have two ESX Server 3i hosts (host1 and host2) and you import the virtual appliance into both hosts. To back up the host1 configuration, run the `vicfg-cfgbackup` command in the Remote CLI on either host1 or host 2 and point to host1 in the `-server` command-line option.

Likewise, to back up the host2 configuration, you can run the `vicfg-cfgbackup` command in the Remote CLI on either host1 or host2 and point to host2 in the `-server` command-line option. To restore the host1 configuration, run the `vicfg-cfgbackup` command in the Remote CLI on host2 and point to host1 in the `-server` command-line option. To restore the host2 configuration, run the `vicfg-cfgbackup` command in the Remote CLI on host1 and point to host2 in the `-server` command-line option.

## Backing Up ESX Server 3i Configuration Data

### To back up host configuration data

- 1 Start the Remote CLI and log in.

You do not need to type the password on the command line. If no password is specified, the tool prompts you for the password without echoing the output to the terminal. This means the password you type is not visible in the window as you run the command.

You can create a secure connection to the Remote CLI, by using the Remote CLI IP address. If you are using the VI Client, you can right-click the Remote CLI and select **Open Console**. If the Remote CLI is installed on your Windows or Linux system, you can use the installed application, in which case you do not need to log in.

- 2 Run the `vicfg-cfgbackup` command with the `-s` flag to save the host configuration to the specified backup filename.

```
vicfg-cfgbackup --server <3i-host-ip> --portnumber <port_number>
--protocol <protocol_type> --username root --password <root_password>
-s <backup-filename>
```

The `-portnumber` and `-protocol` options are optional. If you exclude them, the defaults are port 443 and protocol HTTPS.

If your administrative password includes special characters, such as `$` or `&`, you must include a backslash escape character (`\`) before each special character.

For the backup filename, include the build number that is currently running on the host that you are backing up. If you are running the Remote CLI as a virtual appliance, the backup file is saved locally on the virtual appliance. Local storage for backup files is safe because virtual appliances are stored in the `/vmfs/volumes/<datastore>` directory, which is separate from the ESX Server 3i image and configuration files.

## Restoring ESX Server 3i Configuration Data

You can restore the ESX Server 3i host configuration data if you have created a backup.

### To restore host configuration data

- 1 Power off any virtual machines that are running on the host that you want to restore.

When you run the `vicfg-cfgbackup -l` command, the software places the host into maintenance mode. The host cannot be placed into maintenance mode unless you first power off all virtual machines that are running on the host.

- 2 (Optional) Restore the host to the ESX Server build that was running when you created the configuration back up.

When you restore configuration data, the build number currently running on the host must be the same as the build number that was running when you created the backup file. You can override this requirement by including the `-f` (force) flag with the `vicfg-cfgbackup` command.

- 3 On a host other than the host you are restoring, power on the Remote CLI and log in.

You do not need to type the password on the command line. If no password is specified, the tool prompts you for the password without echoing the output to the terminal. This means the password you type is not visible in the window as you run the command.

You can create a secure connection to the Remote CLI by using the Remote CLI IP address. If you are using the VI Client, you can right-click the Remote CLI and select **Open Console**. If the Remote CLI is installed on your Windows or Linux system, you do not need to log in.

- 4 Run the `vicfg-cfgbackup` command with the `-l` flag to load the host configuration from the specified backup file.

```
vicfg-cfgbackup --server <3i_host_IP> --portnumber <port_number>
--protocol <protocol_type> --username root --password '<root_password>'
-l <backup_filename>
```

The host you are restoring reboots and the backup configuration is restored.

The `-portnumber` and `-protocol` options are optional. If you exclude them, the defaults are port 443 and protocol HTTPS.

If your administrative password includes special characters, such as `$` or `&`, you must include a backslash escape character (`\`) before each special character.

## Recovering the ESX Server 3i Embedded Software

If the host does not boot up in ESX Server 3i mode, even though the BIOS is configured to boot from the USB flash, the file partitions on the USB flash might be corrupted. To resolve this problem, you can restore the software by running the ESX Server 3i recovery CD (if you have one). Your hardware vendor might provide instructions for recovering your ESX Server 3i, or might include a recovery CD with the server platform. If you do not have a recovery CD, contact your hardware vendor or VMware Customer Service to obtain the appropriate ISO file. After you obtain the ISO file, you can burn it onto a blank CD.

Running the recovery CD overwrites all configuration data with most of the system defaults. The serial number that your hardware vendor installed is lost when you run the recovery CD. When you perform a configuration backup, the serial number is backed up with the configuration and is restored when you restore the configuration. For this reason, the recommended procedure is to first back up the configuration, run the recovery CD if needed, then restore the configuration. You cannot back up the configuration unless the host boots into ESX Server 3i mode at least once, so it is not always possible to follow the recommended procedure. When there is no configuration backup, call your hardware vendor's technical support to retrieve the serial number.

### To restore ESX Server 3i

- 1 Insert the recovery CD into the ESX Server 3i host.
- 2 Use the system BIOS to change the boot order so that the CD-ROM drive is listed first. To modify the boot sequence:
  - a Reboot the host.
  - b While the host is powering on, press F11 or F12 to open the BIOS Setup page.
  - c Select the CD-ROM drive and move it to the first position in the list.

The option to open the BIOS Setup page might be different for your server. You might need to open the BIOS configuration screens to modify the boot setting.

As the host continues to power on, the recovery CD Welcome screen appears.

- 3 Press Enter to continue through the screens.

To cancel the recovery operation, press the Esc key. If you press the Esc key, the host reboots and the data contained on your server's embedded USB flash remains intact.

If you press Enter through all the screens and the recovery operation begins, you cannot cancel or undo the recovery.

- 4 Press Enter to reboot the host.
- 5 Remove the CD-ROM from the CD-ROM drive.
- 6 Reopen the system BIOS to change the boot order so that the USB flash is listed first.
- 7 Verify that the host boots into ESX Server 3i mode.

After the reboot, a new ESX Server software build is installed and all configuration data is lost. If you backed up the ESX Server configuration, you can restore it. When you perform a configuration backup, the serial number is backed up with the configuration and is restored when you restore the configuration. To restore configuration data, first upgrade to the ESX Server build that was running when you created the backup. Then use the Remote CLI to run the `vicfg-cfgbackup` command.

After you restore the host firmware, virtual machines on that host might not be listed in the host inventory. This does not mean that the virtual machines are lost or destroyed. Any virtual machines that you added to the host remain in the VMFS datastore unless you explicitly remove them. For information about returning a virtual machine to the VirtualCenter inventory, see the *Basic System Administration Guide*.

See also [“About Backing Up and Restoring an ESX Server 3i Configuration”](#) on page 38.

## Removing ESX Server 3i from the Host

If you do not want your server to be an ESX Server 3i host, you can deactivate the ESX Server 3i setup. To do this, you do the following:

- Remove VMFS datastores on the internal disks so that the internal disks are no longer set up to store virtual machines. See [“Configuring Storage Behavior”](#) on page 29.
- Change the boot setting in the BIOS so that the host no longer starts up in ESX Server 3i mode. See [“Configuring the Boot Setting for Another Mode”](#) on page 23.

# Adding ESX Server 3i to VMware Infrastructure

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# 4

This chapter discusses the requirements and recommendations for adding ESX Server 3i hosts to a data center that has existing VMware Infrastructure components, such as ESX Server hosts and VirtualCenter Server.

Specifically, this chapter discusses the implications for VirtualCenter, virtual machines, virtual machine tools, and ESX upgrades, when you add ESX Server 3i to your VMware Infrastructure.

Upgrading VMware Infrastructure components from earlier versions is a multi-stage process in which procedures must be performed in a particular order. The upgrade path depends on your ESX Server and datastore configurations. For detailed information about preparing for and executing VMware Infrastructure upgrades, see the *Upgrade Guide* for ESX Server 3.5 and VirtualCenter 2.5.

## VirtualCenter

- If you have an older version of VirtualCenter and you want to use VirtualCenter to manage ESX Server 3i (or ESX Server 3), you must upgrade the VirtualCenter software to version 2.5.
- ESX Server 3i version 3.5 hosts and ESX Server 3.5 hosts that are managed together in VirtualCenter can run the same virtual machines, use VMotion to migrate virtual machines between the hosts, and access the same datastores.
- You can manage ESX Server 3.0 hosts in the same cluster with ESX Server 3i and ESX Server 3.5 hosts.
- You can manage ESX Server 2.0.x as standalone hosts in VirtualCenter. ESX Server 2.0.x hosts cannot be added to clusters.

## Virtual Machines

- In general, virtual machines that you create on ESX Server 3i (or ESX Server 3) hosts are supported on ESX Server 3.0.x hosts. This capability means that you can migrate the virtual machines between the hosts and use VMotion. If you create virtual machines that use paravirtualization (VMI) or an enhanced networking device (vmxnet), VMotion is not supported. In this case, you can move the virtual machine to the ESX Server 3.0.x host if the virtual machine is powered off.
- Virtual machines that you create on ESX Server 3i (or ESX Server 3.5) hosts are not supported on ESX Server 2.x hosts.

## Virtual Machine Tools

- For ESX Server 3i version 3.5, there is a virtual hardware upgrade and a VMware Tools upgrade. The VMware Tools upgrade is not required but is available for version 2.x and version 3.x virtual machines.
- If you upgrade VMware Tools for a virtual machine to VMware Tools version 3.5, you can use the upgraded virtual machine on an ESX Server 3.0.x host. If you do migrate the virtual machine to an ESX Server 3.0.x host, VMware recommends that you uninstall the ESX Server 3.5 Tools and install ESX Server 3.0.x Tools.

## ESX Server Upgrades

- Upgrades from earlier versions of ESX Server to ESX Server 3i have no in-place upgrade, but you can migrate existing virtual machines and datastores.
- To replace ESX Server 3i version 3.5 with ESX Server 3, you can disable ESX Server 3i (as described in [“Removing ESX Server 3i from the Host”](#) on page 42) and then install ESX Server 3 in-place. Alternatively, you can migrate virtual machines from an ESX Server 3i host to an ESX Server 3 host.
- ESX Server 3i version 3.5 is the first release of ESX Server 3i. There is currently no ESX Server 3i upgrade available.

# VMware Infrastructure System Requirements

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# 5

You can manage a standalone VMware ESX Server without VirtualCenter Server. However, if you have multiple ESX Server hosts and you want to manage them centrally, consider installing the VirtualCenter Server. This server installs on a Windows machine, either physical or virtual. VirtualCenter allows the use of advanced VMware Infrastructure features such as VMware DRS, VMware HA, and VMotion.

This chapter describes the hardware and operating system requirements for hosts running VirtualCenter and other VMware Infrastructure components. Use the information in this chapter to ensure that your environment meets the requirements for installation. Topics covered here are:

- [“VirtualCenter Requirements”](#) on page 45
- [“VI Client Hardware Requirements”](#) on page 47
- [“VI Client Software Requirements”](#) on page 48
- [“License Server Requirements”](#) on page 48
- [“Supported Guest Operating Systems”](#) on page 49
- [“Virtual Machine Requirements”](#) on page 49

## VirtualCenter Requirements

VirtualCenter manages ESX Server hosts by using a server and three types of remote management clients. The VirtualCenter Server is a physical machine or virtual machine configured with access to a supported database.

## VirtualCenter Hardware Requirements

VirtualCenter hardware must meet the following requirements:

- **Processor** – 2.0GHz or later Intel or AMD x86 processor. Processor requirements can be larger if your database is run on the same hardware.
- **Memory** – 2GB RAM minimum. RAM requirements can be larger if your database is run on the same hardware.
- **Disk storage** – 560MB minimum, 2GB recommended. You must have 245MB free on the destination drive for installation of the program, and you must have 315MB free on the drive that contains your %temp% directory.

---

**NOTE** Storage requirements can be larger if your database runs on the same hardware as the VirtualCenter machine. The size of the database varies with the number of hosts and virtual machines you manage. Using default settings for a year with 25 hosts and 8 to 16 virtual machines each, the total database size can consume up to 2.2GB (SQL) or 1.0GB (Oracle).

---

**Microsoft SQL Server 2005 Express disk requirements** – The bundled database requires up to 2GB free disk space to decompress the installation archive. However, approximately 1.5GB of these files are deleted after the installation is complete.

- **Networking** – Gigabit recommended.

## VirtualCenter Software Requirements

VirtualCenter is supported on the 32-bit versions of these operating systems:

- Windows 2000 Server SP4 with Update Rollup 1 (Download Update Rollup 1 at <http://www.microsoft.com/windows2000/server/evaluation/news/bulletins/rollup.msp>)
- Windows XP Pro SP2
- Windows 2003 Server SP1
- Windows 2003 Server R2

VirtualCenter 2.x installation is not supported on 64-bit operating systems.

The VirtualCenter installer requires Internet Explorer 5.5 or later.

## VirtualCenter Database Requirements

VirtualCenter supports the database formats listed in [Table 5-1](#).

**Table 5-1.** Supported Database Formats

Database Type	Service Pack, Patch, and Driver Requirements
Microsoft SQL Server 2000 Standard	SP4
Microsoft SQL Server 2000 Enterprise	For Windows 2000 and Windows XP, apply MDAC 2.8 SP1 to the client. Use SQL Server driver for the client.
Microsoft SQL Server 2005 Enterprise	SP1 or SP2 For Windows 2000 and Windows XP, apply MDAC 2.8 SP1 to the client. Use 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 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. Then apply patch 5699495 to the client. ( <a href="#">SEE UPDATE</a> )

Each database requires some configuration adjustments in addition to the basic installation. See [“Preparing the VirtualCenter Server Database”](#) on page 93.

## End of Support Life for Microsoft Access and MSDE Databases

Support for Microsoft Access was discontinued with VMware VirtualCenter version 2.0. Support for MSDE is discontinued with VMware VirtualCenter version 2.5. VirtualCenter 2.5 includes a bundled version of Microsoft SQL Server 2005 Express, for use in small deployments of up to 5 hosts and 50 virtual machines.

## VI Client Hardware Requirements

The VI Client hardware must meet the following requirements:

- **Processor** – 266MHz or faster Intel or AMD x86 processor (500MHz recommended).
- **Memory** – 256MB RAM minimum, 512MB recommended.

- **Disk Storage** – 150MB free disk space required for basic installation. You must have 55MB free on the destination drive for installation of the program, and you must have 100MB free on the drive that contains your %temp% directory.
- **Networking** – Gigabit recommended.

## VI Client Software Requirements

The VI Client is designed for these operating systems:

- Windows 2000 Pro SP4
- Windows 2000 Server SP4 with Update Rollup 1 (Download Update Rollup 1 at <http://www.microsoft.com/windows2000/server/evaluation/news/bulletins/rollup.mspx>)
- Windows XP Pro SP2
- Windows 2003 SP1 (all releases except 64-bit)
- Windows 2003 Server R2
- Windows Vista Business (including 64-bit editions)
- Windows Vista Enterprise (including 64-bit editions)

The VI Client requires the Microsoft .NET Framework. If your system doesn't have it installed, the VI Client installer installs it.

## License Server Requirements

This section describes the license server requirements.

The license server hardware must meet the following requirements:

- **Processor** – 266MHz or faster Intel or AMD x86 processor.
- **Memory** – 256MB RAM minimum, 512MB recommended.
- **Disk Storage** – 25MB free disk space required for basic installation.
- **Networking** – Gigabit recommended.

VMware recommends that you install the license server on the same machine as your VirtualCenter Server to ensure connectivity. The VMware Infrastructure Management Installation CD installs a license server when you install VirtualCenter.

The license server software is supported on the 32-bit versions of the following operating systems:

- Windows 2000 Server SP4
- Windows XP Pro (at any SP level)
- Windows 2003 (all releases except 64-bit)

## Supported Guest Operating Systems

The VMware *Guest Operating System Installation Guide* includes information on supported guest operating systems. This document is available for download at:

[http://www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html)

ESX Server version 3.5 offers support for a number of 64-bit guest operating systems. For a complete list, see the *Guest Operating System Installation Guide*.

A 64-bit guest operating system requires specific hardware. For AMD Opteron-based systems, the processors must be Opteron Rev E and later. For Intel Xeon-based systems, the processors must include support for Intel's Virtualization Technology (VT). Many servers that include CPUs with VT support might have VT disabled by default, and VT must be enabled manually. If your CPUs support VT, but you do not see this option in the BIOS, contact your vendor to request a BIOS version that lets you enable VT support.

To determine whether your server has the necessary support, you can use a CPU Compatibility Tool at [http://www.vmware.com/download/vi/drivers\\_tools.html](http://www.vmware.com/download/vi/drivers_tools.html).

## Virtual Machine Requirements

Each ESX Server virtual machine has the requirements specified in this section.

### Virtual Processor

- Intel Pentium II or later (dependent on system processor)
- One, two, or four processors for each virtual machine

If you plan to create a two-processor virtual machine, your ESX Server machine must have at least two physical processors. For a four-processor virtual machine, your ESX Server machine must have at least four physical processors.

### Virtual Chip Set

Intel 440BX-based motherboard with NS338 SIO chip

# Virtual BIOS

PhoenixBIOS 4.0 Release 6

# VirtualCenter and ESX Server 3i Licensing Overview

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# 6

This chapter describes the licensing models available with ESX Server 3i and VirtualCenter.

This chapter contains the following sections:

- [“Licensing Terminology”](#) on page 52
- [“ESX Server 3i Editions”](#) on page 52
- [“VirtualCenter Server Editions”](#) on page 54
- [“VirtualCenter and ESX Server 3i Licensing Model”](#) on page 54
- [“License Key Functionality”](#) on page 57
- [“License Expiration Considerations”](#) on page 60
- [“License Server Availability”](#) on page 60
- [“Using an Existing FLEXnet License Server”](#) on page 64
- [“Contacting Support”](#) on page 65

## Licensing Terminology

You might encounter the following terms during the license redemption and configuration process:

- **License activation code** – A license activation code (LAC) is a unique code that is associated with one or more VMware products purchased. You receive this code after your order is processed, unless you purchased your products from an authorized VMware reseller, in which case you receive a partner activation code.
- **Partner activation code** – A partner activation code is a unique code identifying orders placed through VMware partners. If you purchased VMware Infrastructure 3 from an authorized VMware reseller, you use this code to register your purchase to your VMware store account.
- **License activation portal** – The license activation portal is a self-service Web portal that you can use to redeem your license activation codes and download license files for VMware Infrastructure 3.
- **Partner activation portal** – A partner activation portal is a self-service Web portal used to register a purchase made from an authorized VMware reseller to your VMware store account. You enter your partner activation code into the portal and download your license files from the license activation portal.

## ESX Server 3i Editions

Depending on the edition of VMware Infrastructure software you purchased, you might be entitled to different ESX Server 3i licence types.

Some editions include limited access to the feature set of ESX Server 3i. Certain standard functionality is available only with an optional add-on license, at additional cost. Other editions include full access to the full feature set of ESX Server 3i.

Licenses from previous releases of ESX Server work with ESX Server 3i version 3.5. However, licensing capabilities added to ESX Server 3i version 3.5 editions (for example, VMware Consolidated Backup) are not supported with previous editions of ESX Server.

Table 6-1 displays ESX Server 3i features arranged by edition.

**Table 6-1.** Edition Features for ESX Server 3i Machines

<b>Feature</b>	<b>ESX Server 3i Standalone</b>	<b>VI Foundation</b>	<b>VI Standard</b>	<b>VI Enterprise</b>
License type	Serial number	Flex license files (centralized or single host)	Flex license files (centralized or single host)	Flex license files (centralized or single host)
VMFS	Yes	Yes	Yes	Yes
Virtual SMP support	Yes	Yes	Yes	Yes
VMware Consolidated Backup (VCB)	No	Yes	Yes	Yes
VMware Update Manager	No	Yes	Yes	Yes
VMware HA	No	Add-on	Yes	Yes
Server VMotion and Storage VMotion	No	Add-on	Add-on	Yes
VMware DRS and DPM (Distributed Resource Management and Distributed Power Management)	No	Add-on	Add-on	Yes
Guided server consolidation, with purchase of VirtualCenter Server	No	Yes	Yes	Yes
Manageable by the VI Client	One instance of the VI Client can manage a host at any given time.	Unrestricted	Unrestricted	Unrestricted
Remote CLI access	Restricted	Yes	Yes	Yes
Manageable by VirtualCenter in production mode	Add-on	Yes	Yes	Yes
Manageable by VirtualCenter in evaluation mode	Yes	Yes	Yes	Yes
VirtualCenter Management Agent	Add-on	Yes	Yes	Yes

## VirtualCenter Server Editions

At least one instance of a VirtualCenter license is required for VI Foundation, VI Standard, and VI Enterprise editions. The following VirtualCenter editions are available:

- **VirtualCenter Foundation** – Lets you manage up to three ESX Server hosts. If you need to manage more than three hosts, upgrade to VirtualCenter edition.
- **VirtualCenter** – An enterprise-level edition that lets you manage up to the system maximum number of hosts. For information about system maximums, see *Configuration Maximums for VMware Infrastructure 3*.

VirtualCenter editions require flex, centralized license files. You can convert VirtualCenter Foundation edition to VirtualCenter edition by adding an appropriate license file and switching the editions. The software doesn't need to be reinstalled. For information about switching between the editions, see ["To configure centralized licensing for VirtualCenter"](#) on page 76.

You can convert VirtualCenter Foundation edition to VirtualCenter Full edition by simply adding an appropriate license file and switching the editions. The software doesn't need to be re-installed. For information on switching between the editions, see ["To configure centralized licensing for VirtualCenter"](#) on page 76.

## VirtualCenter and ESX Server 3i Licensing Model

For ESX Server 3i, the Standalone edition lets you perform most operations. To use some advanced operations, you can use evaluation mode or you can purchase an upgraded license.

For VirtualCenter, unless you are using evaluation mode, a software license is required for most operations, such as adding hosts to your VirtualCenter inventory. However, you can install, launch, and configure VirtualCenter version 2.5 without a software license.

Two modes of licensing are available: single-host and centralized. Both single-host and centralized licenses are based on FLEXnet mechanisms. A flex license is either served (centralized) or unserved (single host).

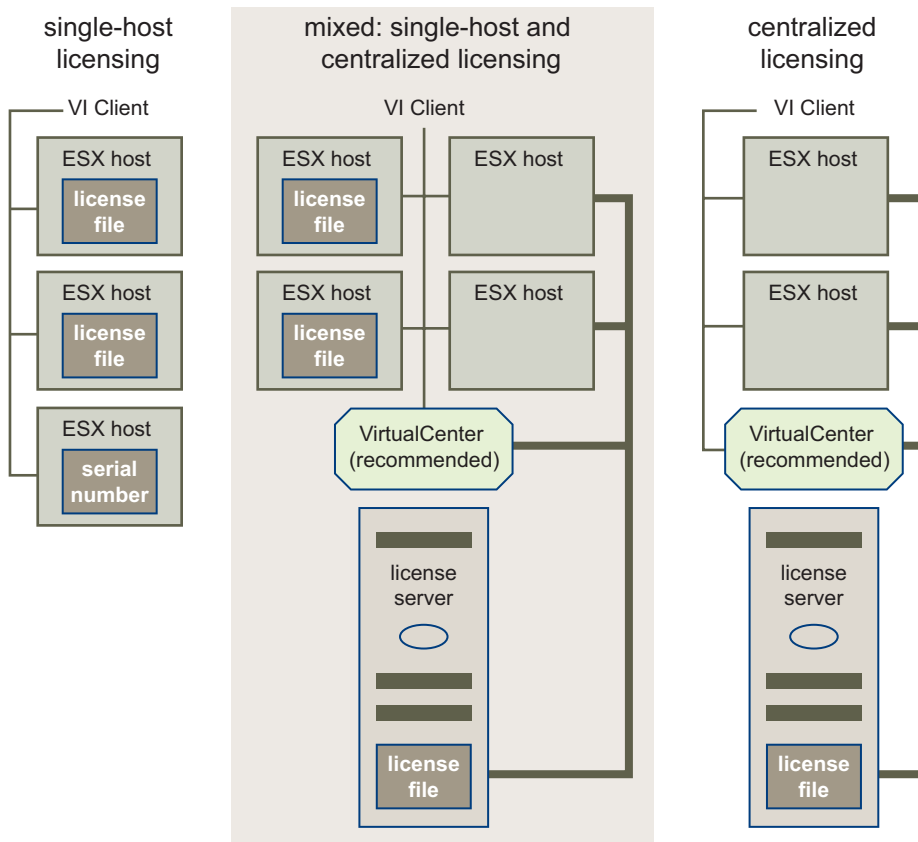
### Single-Host and Centralized License Types

For single-host licenses, the serial number or license files are stored on individual ESX Server hosts. Centralized licenses are stored on a license server, which makes these licenses available to one or more hosts. You can run a mixed environment employing both single-host and centralized licensing.

VirtualCenter and features that require VirtualCenter, such as VMotion™, must have centralized licensing. ESX Server specific features can be licensed for either centralized or single-host licensing.

Figure 6-1 illustrates the three types of license environments.

**Figure 6-1.** License File Locations in Single-Host, Mixed, and Centralized Licensing Environments



## Centralized Licensing

Centralized licensing simplifies license management in large, dynamic environments by allowing a VMware license server to administer licenses. With centralized licensing, you maintain all of your VirtualCenter Server and ESX Server licenses from one console.

With centralized licensing, a license server manages a license pool, which is a central repository holding your entire licensed entitlement. When a host requires a particular licensed functionality, the license for that entitlement is checked out from the license pool. License keys are released back to the pool when they are no longer being used and are available again to any host.

The advantages of centralized licensing include:

- You administer all licensing from a single location.
- New licenses are allocated and reallocated by using any combination of ESX Server form factors. For example, you can use the same 32-processor license for sixteen 2-processor hosts, eight 4-processor hosts, four 8-processor hosts, two 16-processor hosts, or any combination totaling 32 processors.
- Ongoing license management is simplified by allowing licenses to be assigned and reassigned as needed. Assignment changes as the needs of an environment change, such as when hosts are added or removed, or premium features like VMotion, DRS, or HA are transferred among hosts.
- During periods of license server unavailability, although new licenses cannot be issued, existing VirtualCenter Server licensed functionality continues to operate indefinitely and existing ESX Server licensed functionality continues to operate within a 14-day grace period. See [“License Server Availability”](#) on page 60.

VMware recommends that you use centralized licensing for large, changing environments.

## Single-Host Licensing

There are two scenarios for single-host licensing:

- **Host-based serial number** — For the ESX Server 3i Standalone edition, each host has a serial number that is supplied by the hardware vendor and is typically preinstalled. If the serial number is not preinstalled, it might be enclosed on a sticker or a card.
- **Host-based license file** — For all other ESX Server 3i editions—including VI3 Foundation, VI3 Standard, and VI3 Enterprise—each host has a license file.

For host-based license files, the following rules apply:

- Your total entitlement for purchased features is divided among separate license files residing on ESX Server hosts and the VirtualCenter Server.
- When someone activates a licensed feature, the feature for that entitlement must reside in the license file on that host.
- You maintain separate license files on each ESX Server host. Distribution of unused licenses is not automatic, and you do not depend on an external connection for licensing.

The advantages of host-based license files include:

- Single-host files require no license server to be installed for ESX Server host-only environments.
- In a VirtualCenter and license server environment, host-based license files allows ESX Server host licenses to be modified during periods of license server unavailability.

## License Key Functionality

License keys determine specific entitlement to run VMware software. Depending on the ESX Server and VirtualCenter features you want to use, you purchase such keys based on one of the following criteria:

- Per-processor basis – To activate a feature, a host requires a feature license for each of its processors.
- Per-instance basis – To activate a single instance of a certain feature, a single license is required regardless of how many processors are used.

Licensed features also differ in their operation based on whether they are considered to be ESX Server or VirtualCenter features. You can license ESX Server features by using either single-host or centralized licensing. They do not require VirtualCenter or a license server. VirtualCenter features require centralized licensing. ESX Server features and VirtualCenter features also differ in their behavior when the license server is not available. See [“License Server Availability”](#) on page 60.

[Table 6-2](#) summarizes the license feature types for VMware Infrastructure 3.

**Table 6-2.** Summary of License Feature Types

Feature	ESX Server or VirtualCenter	Per-Processor or Per-Instance
ESX Server	ESX Server	Per-Processor
VirtualCenter Server	VirtualCenter	Per-Instance
VirtualCenter Agent for ESX Server	VirtualCenter	Per-Processor
VMware Consolidated Backup (VCB)	ESX Server	Per-Processor
Server VMotion and Storage VMotion	VirtualCenter	Per-Processor
VMware HA	VirtualCenter	Per-Processor
VMware DRS and DPM	VirtualCenter	Per-Processor

## Per-Processor Licensing

For most VMware Infrastructure products, you purchase licenses on a per-processor basis, which means that you need to indicate the total number of processors, not hosts, that will run the products. You can then deploy and redeploy the purchased processor capacity, sold in increments of two processors, on any combination of hosts.

For example, you purchase ESX Server licenses for ten processors and VMotion licenses for six processors. You can then deploy those licenses on any of the following combinations of servers:

- ESX Server on five 2-processor hosts. Enable VMotion on three hosts.
- ESX Server on three 2-processor hosts and a 4-processor host. Enable VMotion on three 2-processor hosts, or on one 2-processor host and a 4-processor host.
- ESX Server on two 4-processor hosts and one 2-processor host. Enable VMotion on one 4-processor host and one 2-processor host.
- ESX Server on one 8-processor host and one 2-processor host. VMotion between these two hosts cannot be enabled unless you purchase an additional 4-processor VMotion license.

Special considerations include:

- Dual-core and quad-core processors, such as Intel x86 processors that combine two or four independent central processing units on a single chip, count as one processor.
- You cannot partially license a multiprocessor host. For example, a 4-CPU host requires a license with the capacity for four processors.
- Single-processor licensing is supported for server-based licenses. In general, for server-based licensing, checkout of licenses in odd quantities is supported. However, host-based files cannot be generated with odd quantities. They must be generated in multiples of two.

The following features are licensed on a per-processor basis:

- **ESX Server** – To power on a virtual machine, a host must have licensing on a per-processor basis. This means a dual-processor host requires two matching ESX Server licenses. A four-processor machine requires four matching ESX Server licenses. See “*ESX Server 3i Editions*” on page 52.
- **VMware Consolidated Backup (VCB)** – To use the Consolidated Backup capabilities—and backup of all virtual machines running on an ESX Server host—a VCB license key must be available for each processor within that host. For a description of this feature, see the *Virtual Machine Backup Guide*.
- **VirtualCenter Agent for ESX Server** – This agent is installed on an ESX Server host when it is added to the VirtualCenter Server. You must have one agent license key for each ESX Server processor to be added to VirtualCenter.
- **Server VMotion and Storage VMotion**– To migrate a powered-on virtual machine between hosts, each ESX Server processor involved must have a VMotion license key. For example, if you use VMotion from a dual-processor ESX Server host to another dual-processor host, you must have four VMotion licenses. See *Basic System Administration*.
- **VMware HA** – To restart virtual machines whose ESX Server host has failed, the VirtualCenter Server must have an HA license key for each ESX Server processor in the HA cluster. For a description of this feature, see the *Resource Management Guide*.
- **VMware DRS and DPM**– To provide automatic load balancing of virtual machines among hosts and distributed power management, the VirtualCenter Server must have a DRS and DPM license key for each ESX Server processor in the DRS cluster. As a prerequisite, DRS requires appropriate VMotion license keys for all hosts in the DRS cluster. For a description of this feature, see the *Resource Management Guide*.

## Per-Instance Licensing

Features that are licensed on a per-instance basis require only one license key for each feature instance, regardless of the number of processors used. The VirtualCenter Server is currently the only feature licensed on a per-instance basis. For information about different editions of VirtualCenter, see [“VirtualCenter Server Editions”](#) on page 54.

## License Expiration Considerations

When the FLEXnet license server expires a license, the VI Client does not display a message that the license is expiring unless you use the VI Client to manage your virtual machines, for example to power them on or reset them.

The message appears every time you use the VI Client to perform an operation on a virtual machine.

## License Server Availability

VMware provides the following mechanisms that help prevent the license server from being a single point of failure. The license server acts primarily as a license distribution mechanism. If your license server becomes unavailable, you cannot issue any new licenses to enable new hosts or new features. However, all licensed functionality currently operating at the time the license server becomes unavailable continues to operate as follows:

- All VirtualCenter licensed features continue to operate indefinitely, relying on a cached version of the license state. This includes not only basic VirtualCenter Server operation, but licenses for VirtualCenter add-ons, such as VMotion and DRS.
- ESX Server licensed features have a 14-day grace period during which hosts continue operation, relying on a cached version of the license state, even across reboots. After the grace period expires, certain ESX Server operations, such as powering on virtual machines, become unavailable.

During the ESX Server grace period, when the license server is unavailable, the following operations are unaffected:

- **Virtual machines** continue to run. You can use the VI Client to configure and operate virtual machines.
- **ESX Server hosts** continue to run. You can connect to any ESX Server host in the VirtualCenter inventory for operation and maintenance. Connections to VirtualCenter remain. You can use the VI Client to operate and maintain virtual machines from the host even if the VirtualCenter Server connection is also lost.

During the grace period, restricted operations include:

- Adding ESX Server hosts to the VirtualCenter inventory. You cannot change VirtualCenter agent licenses for hosts.
- Adding or removing hosts from a cluster. You cannot change host membership for the current VMotion, HA, or DRS configuration.
- Adding or removing license keys.

When the grace period expires, cached license information is no longer stored. As a result, virtual machines can no longer be powered on. Running virtual machines continue to run but cannot be rebooted.

When the license server becomes available again, hosts reconnect to the license server. No rebooting or manual action is required to restore license availability. The grace period timer is reset whenever the license server becomes available again.

[Table 6-3](#) displays ESX Server licensed operations permitted while the license server is unavailable. Operations that are not permitted are operations that require the acquisition of new licenses from the license server.

**Table 6-3.** Permitted ESX Server Operations When the License Server Is Unavailable

<b>Component</b>	<b>Attempted Action</b>	<b>During Grace Period</b>	<b>After Grace Period Expires</b>
Virtual machine	Power on	Permitted	Not Permitted
	Create and delete	Permitted	Permitted
	Suspend and resume	Permitted	Permitted
	Configure virtual machine with VI Client	Permitted	Permitted
ESX Server host	Continue operations	Permitted	Permitted
	Power on and power off	Permitted	Permitted
	Configure ESX Server host with VI Client	Permitted	Permitted
	Modify license file for single-host licensing	Permitted	Permitted
	Restart virtual machines within the failed host's HA cluster	Permitted	Not Permitted
	Add or remove license keys	Not Permitted	Not Permitted

Table 6-4 lists VirtualCenter licensed operations that are permitted when the license server is unavailable. Operations that are not permitted are operations that require the acquisition of new licenses from the license server.

**Table 6-4.** Permitted VirtualCenter Operations When the License Server Is Unavailable

Component	Attempted Action	When License Server Is Unavailable
VirtualCenter Server	Remove an ESX Server host from inventory (see next entry)	Permitted
	Add an ESX Server host to inventory	Not Permitted
	Connect and reconnect to an ESX Server host in inventory	Permitted
	Move a powered-off virtual machine between hosts in inventory (cold migration)	Permitted
	Move an ESX Server host among folders in inventory	Permitted
	Move an ESX Server host out of a VMotion-DRS-HA cluster (see next entry)	Permitted
	Move an ESX Server host into a VMotion-DRS-HA cluster	Not Permitted
	Configure the VirtualCenter Server with VI Client	Permitted
	Start VMotion between hosts in inventory	Permitted
	Continue load balancing within a DRS cluster	Permitted
Add or remove license keys	Not Permitted	



**CAUTION** If you release licenses for licensed features while the license server is unavailable, the released licenses cannot be redistributed until the license server becomes available again. For example, if you remove the network adapter associated with VMotion while the license server is unavailable, that VMotion license is released and is unavailable until the license server is available again. Removing a host from the VirtualCenter inventory or removing a host from a cluster has a similar effect.

VirtualCenter uses a heartbeat mechanism to check whether the license server is reachable and to see if there are any changes in the license file. The heartbeat interval is five minutes. Therefore, it might take VirtualCenter as long as five minutes to detect license changes or if the license server has become unavailable.

When the license server becomes unavailable, or if a change in the license file causes a checked-out license to be removed, VirtualCenter marks the affected licenses as “Unlicensed Use,” and the licensed features continue to operate as previously described. When the license server becomes available again, or when licenses are added to the license file again, VirtualCenter checks out the licenses again and reverts them to the Licensed state. If a license cannot be checked out, the license remains in the Unlicensed Use state.

If license server availability is a particular concern in your environment, consider one of the following strategies:

- Install the license server on the same machine as the VirtualCenter Server. This is the default option that the VirtualCenter installer provides.
- Install the license server on a virtual machine, and place that virtual machine in an HA cluster. VMware HA restarts the license server machine on another ESX Server host in case of failure.
- Use single-host license files on ESX Server hosts.

## Using an Existing FLEXnet License Server

In most cases, VMware recommends installing the license server on the same machine as the VirtualCenter Server. However, if you already have a FLEXnet license server in your environment providing licenses for other products, you might want to install the VMware license server on that system.

The VMware license server is supported only on Windows operating systems. You cannot install the VMware license server on a Linux-based FLEXnet server. See [“License Server Requirements”](#) on page 48.

To install the VMware license server on your existing FLEXnet server, use the standalone license server installer as described in [“Installing a License Server”](#) on page 87. This installs the VMware license server vendor daemon, which can coexist with other vendor daemons already installed on the server.

## Contacting Support

If you require assistance with licensing, contact VMware for support as follows:

- If you did not receive license activation codes for your VI3 purchase or have difficulties in using your license activation codes to obtain license files, email [vi-hotline@vmware.com](mailto:vi-hotline@vmware.com).
- If you have license files and have difficulty configuring or troubleshooting licensed features, file a support request at <http://www.vmware.com/support>.



# Running VMware VirtualCenter and VMware ESX Server in Evaluation Mode

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# 7

This chapter provides information about how to evaluate an upgraded license of VirtualCenter 2.5 and ESX Server version 3.5 and how to obtain licenses when the evaluation mode expires. This chapter contains the following topics:

- [“Using Evaluation Mode for ESX Server”](#) on page 67
- [“Using Evaluation Mode for VirtualCenter”](#) on page 68
- [“Licensing VirtualCenter and ESX Server After the Evaluation Period Expires”](#) on page 68

## Using Evaluation Mode for ESX Server

ESX Server 3i generally includes a standalone edition serial number. You can run ESX Server 3i with the preinstalled serial number, purchase and activate an upgraded license, or evaluate an upgraded license. When you run ESX Server 3i in evaluation mode, intended for demonstration and evaluation purposes, your software is completely operational, does not require any licensing configuration, and provides full functionality of ESX Server for 60 days from the time you first activate the software. During the 60-day evaluation, the software notifies you of the time remaining until the evaluation mode expires. The evaluation period cannot be paused and it cannot be restarted.

If the ESX Server 3i host does not have a serial number preinstalled at boot time, the host boots up in evaluation mode.

## Using Evaluation Mode for VirtualCenter

You can use ESX Server without VirtualCenter. However, if you have multiple ESX Server hosts and you want to manage them collectively, VMware recommends that you use VirtualCenter. Before purchasing and activating licenses for VirtualCenter 2.5, you can install and run VirtualCenter in evaluation mode. When run in evaluation mode, intended for demonstration and evaluation purposes, your software is completely operational immediately after installation, does not require any licensing configuration, and provides full functionality of VirtualCenter for 60 days from the time you first install VirtualCenter. During the 60-day evaluation, the software notifies you of the time remaining until the evaluation mode expires. The evaluation period cannot be paused and it cannot be restarted.

## Licensing VirtualCenter and ESX Server After the Evaluation Period Expires

After the 60-day evaluation period expires, unless you obtain licenses for your software, you cannot perform most operations in VirtualCenter and ESX Server. For example, you cannot power on virtual machines, add new hosts, or use advanced ESX Server and VirtualCenter features.

If you do not license VirtualCenter before the evaluation period expires, all of the hosts in the VirtualCenter inventory are disconnected.

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**NOTE** Reinstalling the VirtualCenter Server after the 60-day evaluation expires doesn't restart evaluation mode.

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[Table 7-1](#) details the ESX Server behavior after evaluation mode expires. The operations that are not permitted require the acquisition of new licenses.

**Table 7-1.** ESX Server Operations After the 60-Day Evaluation Period

Component	Attempted Action	After 60 Days
Virtual machine	Power on	Not Permitted
	Create and delete	Permitted
	Suspend and resume	Permitted
	Configure virtual machine with the VI Client	Permitted

**Table 7-1.** ESX Server Operations After the 60-Day Evaluation Period (Continued)

<b>Component</b>	<b>Attempted Action</b>	<b>After 60 Days</b>
ESX Server host	Continue operations on existing hosts	Permitted
	Power on and power off	Permitted
	Configure ESX Server host with the VI Client	Permitted
	Restart virtual machines within the failed host's HA cluster	Not Permitted
	Add or remove license keys	Permitted

## Considerations when Switching ESX Server and VirtualCenter to Licensed Modes

When you switch VirtualCenter and ESX Server from evaluation mode to the licensed mode, keep in mind the following items:

- If the number of ESX Server hosts you add to your inventory exceeds the number that your current licensing type allows, you cannot manage the excess hosts. You can delete them from the VirtualCenter inventory or use the VI Client to directly access the hosts and configure their licensing.
- Make sure all required licenses are on your license server.



# Licensing VirtualCenter and ESX Server 3i

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# 8

This chapter provides procedures for redeeming license files and configuring license options.

This chapter contains the following sections:

- [“Licensing Process”](#) on page 72
- [“Obtaining License Files”](#) on page 75
- [“Setting Up Centralized Licensing”](#) on page 75
- [“Setting Up Single-Host Licensing”](#) on page 80
- [“License File Contents”](#) on page 83
- [“License File Locations”](#) on page 85
- [“Adding New License Files to License Servers”](#) on page 85
- [“Adding New License Files to Single-Hosts”](#) on page 86
- [“Installing a License Server”](#) on page 87
- [“Troubleshooting Licensing”](#) on page 88

## Licensing Process

Figure 8-1 summarizes the license configuration processes for ESX Server 3i.

Figure 8-1. License Configuration Process for ESX Server 3i

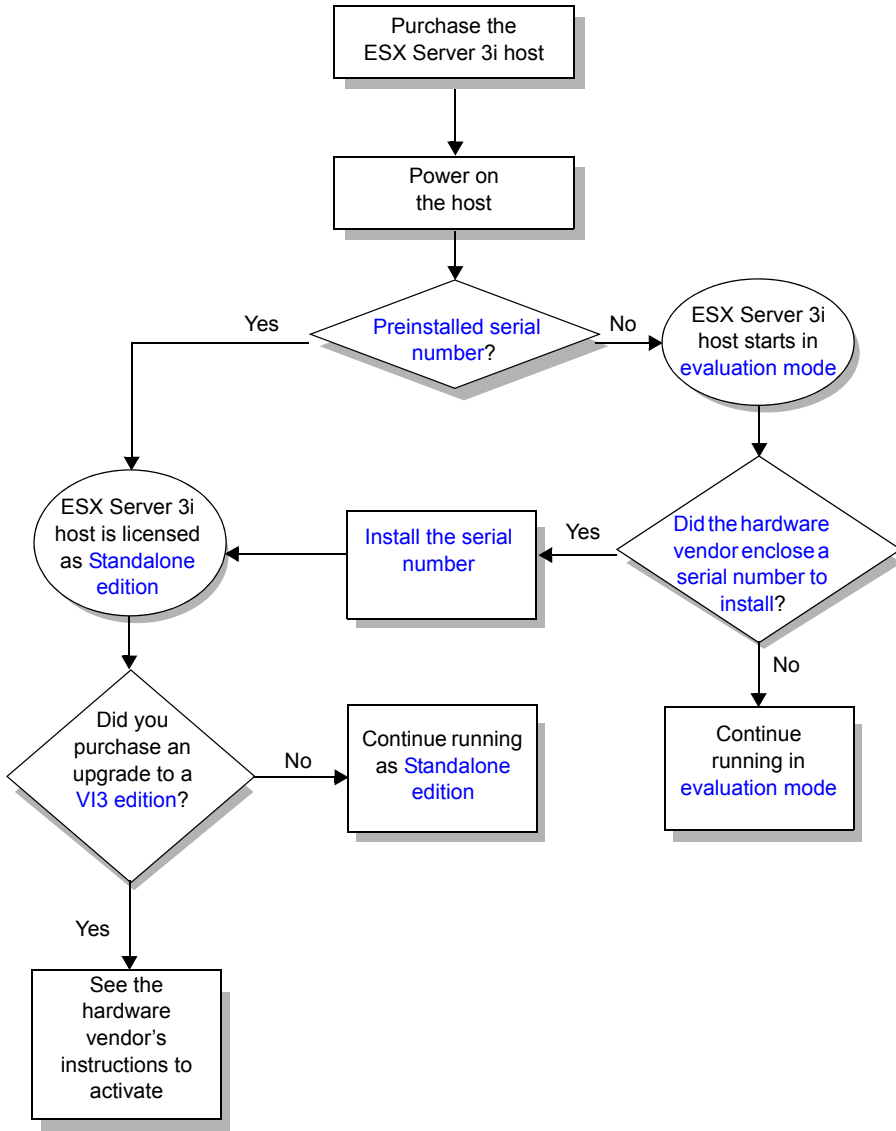
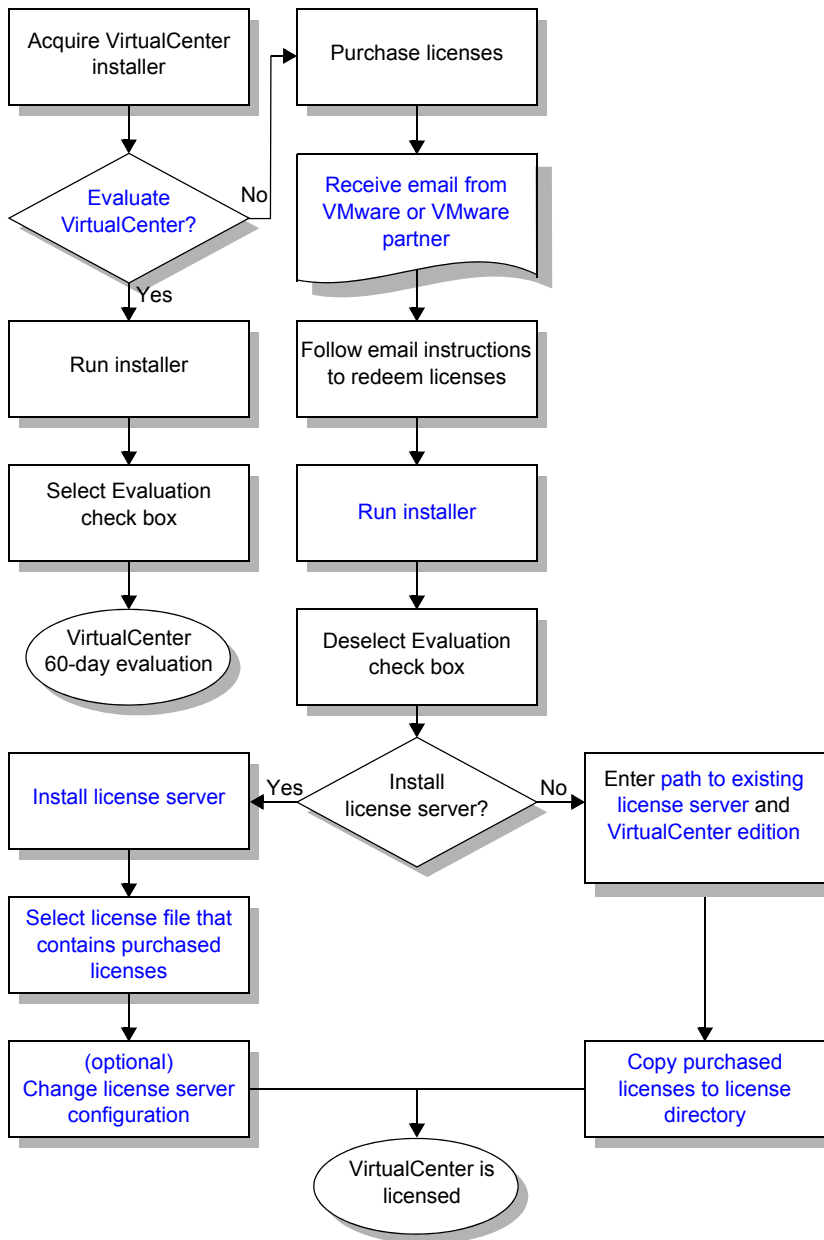


Figure 8-2 summarizes the license configuration processes for the VirtualCenter Server.

**Figure 8-2.** License Configuration Process for VirtualCenter



After you purchase VMware Infrastructure software, do the following to obtain and use your licenses:

- 1 Decide which license type to use.

For ESX Server 3i Standalone addition, you can use a host-based serial number. VI3 editions of ESX Server and VirtualCenter use FLEXnet licensing, which offers a choice of license types: centralized, single-host, or mixed. See [“VirtualCenter and ESX Server 3i Licensing Model”](#) on page 54.

- 2 Register your purchase.

Whether you purchased VMware Infrastructure 3 from an authorized VMware reseller or directly from VMware, you must register your purchase to your VMware store account. See [“Obtaining License Files”](#) on page 75.

- 3 Obtain license files.

After your purchase is registered, use the Web-based license activation portal to generate and download license files appropriate to the license type you chose in [Step 1](#). See [“Obtaining License Files”](#) on page 75.

- 4 Install VirtualCenter.

- 5 Configure your licensing according to the license type you chose in [Step 1](#):

- To configure centralized licensing, see [“Setting Up Centralized Licensing”](#) on page 75.
- To configure licensing for a single host, see [“Setting Up Single-Host Licensing”](#) on page 80.
- To configure a mixed license environment, see [“Single-Host and Centralized Licensing in the Same Environment”](#) on page 81.

## Obtaining License Files

The process of obtaining license files varies slightly depending on how you purchased VMware Infrastructure 3. The first step in obtaining license files is to obtain one or more license activation codes, which you receive in one of the following ways:

- If you purchased VMware Infrastructure 3 with your ESX Server 3i enabled machine from an authorized VMware reseller, such as Dell, Hewlett-Packard, or IBM, you receive an email message containing instructions on how to redeem and activate your licenses. Enter either the serial number or a partner activation code into the partner activation portal to register your purchase.
- For other new purchases of VMware Infrastructure 3, you receive an email that contains a license activation code.

When you receive the email that contains your activation codes, follow the instructions in the email to register license activation codes and generate license files through the Web-based license activation portal.

See the license activation portal online Help.

## Setting Up Centralized Licensing

You can configure centralized licensing at installation time. After installation, you can make changes to licensing through the VI Client.

### Installing License Files

After you obtain your license files, save them as ASCII text files in a directory you can access from your license server machine. Use the .lic extension when saving your license files. The file extension .lic is required.

When you install the VMware license server, you can then import the license files into your license server. Centralized license files are placed at the following default location on the machine running the license server:

```
C:\Program Files\VMware\VMware License Server\Licenses
```

For instructions regarding the recommended license server installation, see [“Configuring Communication Between VirtualCenter Components”](#) on page 103.

For instructions on installing a standalone license server, see [“Installing a License Server”](#) on page 87.

## Location of the License Server

VMware recommends that you follow the default installation and place your license server on the same machine as your VirtualCenter Server. This location has the advantage of simplicity of setup, as well as guaranteeing VirtualCenter-to-license server communications. Change this only if you have a good reason, such as an existing FLEXnet license server.

To access the license server documentation, choose **Start > Programs > VMware > VMware License Server** and select the *VMware License Server User Guide*.

## Configuring Centralized Licensing

The first procedure in this section describes the configuration for centralized licensing. If your environment uses the default VirtualCenter installation, or if you have no VirtualCenter Server, go directly to [“To configure centralized licensing for an ESX Server host”](#) on page 77.

### To configure centralized licensing for VirtualCenter

- 1 From the VI Client, choose **Administration > VirtualCenter Management Server Configuration**.
- 2 Click **License Server** in the list on the left.
- 3 Click **Use the Following License Server**.
- 4 Enter the machine name and, optionally, a port.

If you do not specify a port, the default port, 27000, is used.

For example, with the default license server port 27000 on a license server called license, your entry might look like this:

```
license.vmware.com:27000
```

- 5 If you want to change the VirtualCenter Server edition, select one of the following:
  - VC Foundation Edition
  - VC Full Edition

For more information on the VirtualCenter editions, see [“VirtualCenter Server Editions”](#) on page 54.

- 6 (Optional) If you do not want VirtualCenter to override the host's current license setting, deselect **Change host license server settings to match VirtualCenter's setting when they are added to inventory**.

Selecting this check box causes VirtualCenter to override the host's current license setting and instead use the license server that VirtualCenter uses.

- 7 Click **OK** to save your changes.

You do not need to change any other settings to enable centralized licensing.

The total number of licenses consumed and available on the license server are summarized on the **Licenses** tab in the Admin view of the VI Client connected to VirtualCenter. This tab was labeled "License Viewer" in earlier versions of VirtualCenter.

---

**NOTE** If you did not select the check box for the optional setting, see ["To configure centralized licensing for an ESX Server host"](#) on page 77 to manually configure ESX Server hosts to use centralized licensing.

---

### To configure centralized licensing for an ESX Server host

- 1 From the VI Client, select the host in the inventory.
- 2 Click the **Configuration** tab.
- 3 Under **Software**, click **Licensed Features**.
- 4 To set the license server:
  - a Click **Edit** to the right of **License Sources**.
  - b Click **Use License Server**.  
This is the default configuration.
  - c Enter the port number and license server machine name in the **Address** field, as in port@host.  
  
For example, with the default license server port 27000 on a license server called license-1, your entry might look like this:  
`27000@license-1.vmware.com`
  - d Click **OK** to close the dialog box and save your changes.

- 5 Set the ESX Server edition:
  - a Click **Edit** to the right of **ESX Server License Type**.
  - b Specify the edition for the host, or select **Unlicensed** to release this host's licenses back to the license server. The **ESX Server License Type** dialog box displays only those editions that are available to your ESX Server host.
  - c Click **OK** to close the dialog box and save your changes.
- 6 To configure add-on licenses:
  - a Click **Edit** to the right of **Add-Ons**.
  - b Select the add-on products to use and click **OK**.

The total number of licenses consumed and available on the license server are summarized on the **Licenses** tab in the Admin view of the VI Client connected to VirtualCenter. This tab was labeled "License Viewer" in earlier versions of VirtualCenter.

#### To configure local license server licensing for VirtualCenter

- 1 From the VI Client, choose **Administration > VirtualCenter Management Server Configuration**.
- 2 Click **License Server** in the list on the left.
- 3 Click **Use license services on this VirtualCenter Server**.
- 4 If you want to change the VirtualCenter Server edition, select one of the following:
  - VC Foundation Edition
  - VC Full Edition

For more information on the VirtualCenter editions, see "[VirtualCenter Server Editions](#)" on page 54.

- 5 (Optional) If you do not want VirtualCenter to override the host's current license setting, deselect **Change host license server settings to match VirtualCenter's setting when they are added to inventory**.

Selecting this check box causes VirtualCenter to override the host's current license setting and instead use the license server that VirtualCenter uses.

Make sure that you use an IP address that is accessible from the ESX Server host. If you configure VirtualCenter to use a local license server and the host name of the local license server (the VirtualCenter host) is not resolvable from the ESX Server host, then the ESX Server host cannot acquire licenses from the local license server.

- 6 Click **OK** to save your changes.

You do not need to change any other settings to enable local license server licensing.

The total number of licenses consumed and available on the license server are summarized on the **Licenses** tab in the Admin view of the VI Client connected to VirtualCenter. This tab was labeled “License Viewer” in earlier versions of VirtualCenter.

---

**NOTE** If you did not select the check box for the optional setting, see [“To configure centralized licensing for an ESX Server host”](#) on page 77 to manually configure ESX Server hosts to use centralized licensing.

---

## Default License Server Ports

By default, VirtualCenter and ESX Server software is configured to use the 27000 and 27010 TCP/IP ports to communicate with the license server. For ESX Server 3i, you need to use the default port numbers for the license server.

## Changing from Single-Host to Centralized Licensing

You can change your ESX Server hosts from single-host licensing to centralized licensing. To do this, you must generate a new license file, install a license server (if you do not have one installed), and configure your hosts to use the new license type.

### To change ESX Server hosts from single-host licensing to centralized licensing

- 1 Use the VMware license activation portal to generate and download a centralized license file that contains the licenses for your ESX Server hosts and any associated VirtualCenter Server features. The license activation portal lets you generate single-host and centralized license files from the same license activation code.
- 2 If you did not already install a license server, do so as follows:
  - To install a license server as part of a VirtualCenter installation, see [Chapter 9, “Installing VMware Infrastructure Management,”](#) on page 93.
  - To install a standalone license server, see [“Installing a License Server”](#) on page 87.
  - To use an existing FLEXnet license server already installed in your environment, see [“Using an Existing FLEXnet License Server”](#) on page 64.
- 3 Configure your VirtualCenter Server and ESX Server hosts as described in [“Configuring Centralized Licensing”](#) on page 76.

## Setting Up Single-Host Licensing

There are two scenarios for single-host licensing:

- **Host-based serial number** — For the ESX Server 3i Standalone edition, each host has a serial number that is supplied by the hardware vendor and is typically preinstalled. If the serial number is not preinstalled, it might be enclosed on a sticker or a card.
- **Host-based license file** — For all other ESX Server 3i editions—including VI3 Foundation, VI3 Standard, and VI3 Enterprise—each host has a license file.

### Configuring an ESX Server 3i Machine to Use a Host-Based Serial Number

If you receive an ESX Server 3i serial number from your hardware vendor, you can use the VI Client to install the serial number.

#### To use the VI Client to install a host-based serial number

- 1 From the VI Client, select the host in the inventory.
- 2 Click the **Configuration** tab.
- 3 Under **Software**, click **Licensed Features**.
- 4 Click **Edit** to the right of **License Sources**.
- 5 Click **Use Serial Number**.
- 6 Enter the serial number.
- 7 Click **OK** to save your changes.

### Configuring an ESX Server Machine for Host-Based Licensing

Host-based licensing requires a valid license file on each ESX Server host.

When you receive your license file, rename it to `vmware.lic` and place it on a file system you can access from your VI Client. The file extension `.lic` is required.

#### To use the VI Client to configure host-based licensing

- 1 From the VI Client, select the host in the inventory.
- 2 Click the **Configuration** tab.
- 3 Under **Software**, click **Licensed Features**.
- 4 Click **Edit** to the right of **License Sources**.

- 5 Click **Use Host License File**.
- 6 Click **Browse** and locate the license file.

This file must be located on the client machine, not on the ESX Server host. Files must have a .lic extension to appear in the file browser.

- 7 Click **OK** to save your changes.

## Single-Host and Centralized Licensing in the Same Environment

Using single-host licenses for ESX Server features and centralized licensing for VirtualCenter features in the same environment is permitted. Doing so requires changes to the default VirtualCenter configuration settings. If you do not change the VirtualCenter settings, the settings can override single-host license files:

- When VirtualCenter restarts
- When the single-host ESX Server machines are added to inventory again

Any single-host license file on the ESX Server machine remains unchanged but ignored.



**CAUTION** If you restore an ESX Server machine to single-host licensing without changing the VirtualCenter default configuration, VirtualCenter settings might override the single-host settings on the ESX Server machine.

---

The ESX Server 3i Standalone edition is not licensed for VirtualCenter management. This means that the combination of serial-number host licensing and VirtualCenter management is not an option.

### To change VirtualCenter settings to allow single-host ESX Server licensing

- 1 From the VI Client, choose **Administration > Server Settings**.
- 2 Click **License Server** in the list on the left.
- 3 Deselect the check box for **Change host license server settings to match VirtualCenter's setting when they are added to inventory**.
- 4 Click **OK** to save your changes.
- 5 **Remove** and **Add** any affected ESX Server machine in the inventory.

Now it is safe to reconfigure single-host licensing on any changed ESX Server machines. See [“Configuring an ESX Server Machine for Host-Based Licensing”](#) on page 80.

## Configuring Licensing for a Mixed ESX Server 2.x and ESX Server 3.x Environment

You can use the VirtualCenter Server 2.x to manage a mixed environment of both ESX Server 2.x and ESX Server 3.x hosts. You receive license activation codes with purchases of VMware Infrastructure 3. You can redeem the codes for both ESX Server 2.x serial numbers and VMware Infrastructure 3 license files.

### To configure licensing for the ESX Server 2.x hosts in the mixed environment

- 1 Leave the licensing unchanged on existing ESX Server 2.x hosts that use serial numbers.
- 2 For new ESX Server 2.x installations, redeem your license activation codes on the license activation portal for ESX Server 2.x serial numbers.

Provide these serial numbers at the time of installation or configuration.

- 3 Redeem your license activation code(s) to generate a centralized license file that contains licenses for VirtualCenter Server, VirtualCenter Management Agents, VMotion, and ESX Server 3.x.

If necessary, combine multiple generated license files to produce a single file.

Your generated license file can include ESX Server version 3.x licenses for the ESX Server version 2.x hosts that you obtained ESX Server 2.x serial numbers for in Step 2. This lets you easily distribute licenses to these hosts if they are later upgraded to ESX Server 3.x.

- 4 Install and configure the VirtualCenter Server 2.x to use the license server.

For information about installing VirtualCenter, see [Chapter 9, "Installing VMware Infrastructure Management,"](#) on page 93.

## Changing from Centralized to Single-Host Licensing

You can change your ESX Server hosts from centralized licensing to single-host licensing. VirtualCenter and additional features such as VMotion, VMware DRS, and VMware HA must have centralized licensing. To change the license type for your ESX Server hosts, you must generate new license files for each host and configure the hosts to use the new license type.

## To change ESX Server hosts from centralized licensing to host-based licensing

- 1 Use the VMware license activation portal to generate and download new single-host license files for each ESX Server host.  
  
The license activation portal lets you generate both single-host and centralized license files from the same license activation code. For host-based licensing, you need one license file for each ESX Server host.
- 2 If you are using VirtualCenter, change your VirtualCenter Server settings so that VirtualCenter does not override host license settings, as described in [“Single-Host and Centralized Licensing in the Same Environment”](#) on page 81.
- 3 Configure your ESX Server host as described in [“Configuring an ESX Server Machine for Host-Based Licensing”](#) on page 80.

## License File Contents

Both centralized and single-host operation require license files. License files are ASCII text files that contain two types of information: the license type and license keys.

- **License-type section** – Specifies the TCP/IP ports that use the license server to communicate with ESX Server hosts. VMware recommends that you not modify these default ports. If you do need to change the ports, use an ASCII text editor and validate your edited license file at <http://www.vmware.com/checklicense/>.

A license-type header looks similar to the following:

```
SERVER this_host ANY 27000
VENDOR VMWARELM port=27010
USE SERVER
```

This section appears only in a license server file and indicates that license keys should be served on a license server. Single-host license files have no type section.

- **License-key section** – Contains encrypted license keys, one for each feature to which you are entitled. [Table 8-1](#) lists the available license keys.

**Table 8-1.** License Keys

Feature Name	License File Key	License Type Available
ESX Server Foundation edition	PROD_ESX_STARTER	Centralized or single-host
ESX Server Standard edition ESX Server Enterprise edition	PROD_ESX_FULL	Centralized or single-host
VMware Consolidated Backup	ESX_FULL_BACKUP	Centralized or single-host
VirtualCenter Server Foundation	PROD_VC_EXPRESS	Centralized only

**Table 8-1.** License Keys (Continued)

Feature Name	License File Key	License Type Available
VirtualCenter Server	PROD_VC	Centralized only
VirtualCenter Management Agent	VC_ESXHOST	Centralized only
VMware Server VMotion VMware Storage VMotion	VC_VMOTION	Centralized only
VMware DRS VMware DPM	VC_DRS	Centralized only
VMware HA	VC_DAS	Centralized only

Centralized files and single-host files can be differentiated by the following distinguishing features:

- Single-host license files contain no license-type section. Centralized files contain a license-type section as the file header.
- Single-host license files contain the string `licenseType=Host` as part of each license-key block in the file. Centralized license files contain the string `licenseType=Server` as part of each license-key block in the file, as shown in the following examples.

[Example 8-1](#) shows a typical single-host license key.

**Example 8-1.** Single-Host License Key

---

```
INCREMENT PROD_ESX_FULL VMWARELM 2005.05 31-dec-2008 uncounted \
  VENDOR_STRING="licenseType=Host;vmodl=esxFull;desc=ESX Server \
  Enterprise;capacityType=cpuPackage;gp=14;exclude=BACKUP;count=8" \
  HOSTID=ANY ISSUED=06-AUG-2007 \
  NOTICE="FulfillmentId=777;Name=VMware Internal" TS_OK \
  SIGN="095A 14A7 ..."
```

---

[Example 8-2](#) shows a typical centralized license key.

**Example 8-2.** Centralized License Key

---

```
INCREMENT PROD_ESX_FULL VMWARELM 2005.05 31-dec-2008 8 \
  VENDOR_STRING="licenseType=Server;vmodl=esxFull;desc=ESX Server \
  Enterprise;capacityType=cpuPackage;gp=14;exclude=BACKUP" \
  ISSUED=06-AUG-2007 NOTICE="FulfillmentId=1201;Name=VMware \
  Internal" TS_OK SIGN="1F7F 98D5 ..."
```

---

## License File Locations

A license file resides on every ESX Server machine or every license server, depending on whether you use centralized or host-based licensing:

- **Centralized license files** are placed at the following default location on the machine running the VMware license server:

```
C:\Program Files\VMware\VMware License Server\Licenses
```

---

**NOTE** In VirtualCenter 2.0, the default location of the license file was C:\Documents and Settings\All Users\Application Data\VMware\VMware License Server\vmware.lic. This location no longer exists.

---

You can add new license files to the license directory. See [“Adding New License Files to License Servers”](#) on page 85.

- **Single-host license files** are placed at the following default location on the machine running ESX Server.

```
/etc/vmware/vmware.lic
```

---

**NOTE** In centralized licensing, this file exists on the ESX Server machine, but contains no license keys.

---

You can add new licenses to the single-host by using the license activation portal. See [“Adding New License Files to Single-Hosts”](#) on page 86.

## Adding New License Files to License Servers

The license server supports a license directory for multiple license files. If you obtained multiple license files (for example, from separate orders) and you want to manage all of these licenses from the same license server, add them to the license server directory and then restart the server.

### To add new licenses to the license server directory

- 1 Add the new license file to the following default directory on the machine running the VMware license server:

```
C:\Program Files\VMware\VMware License Server\Licenses
```

- 2 Restart the VMware License Server service.

The following procedure is for Windows 2000 Professional. The menus and commands for other versions of Windows can vary.

**To restart the license server Windows Service**

- 1 Choose **Start > Settings > Control Panel**.
- 2 Double-click **Administrative Tools**.
- 3 Double-click **Services**.
- 4 Scroll down, right-click **VMware License Server**, and choose **Restart**.

You can change the default location of your centralized directory, or your license file.

**To change the default location of the license directory**

- 1 On the computer that runs the license server application, choose **Start > Programs > VMware > VMware License Server > VMware License Server Tools**.
- 2 Click the **Config Services** tab.
- 3 Click **Browse** next to the **Path to license file** field, and choose a license file from the license directory.

If you want the license server to use the entire license directory, manually remove the name of the file, leaving only the name of the directory.

- 4 Click the **Start/Stop/Reread** tab.
- 5 Click **Stop**.
- 6 Click **Start**.
- 7 Click **ReRead License File** to load the new license files.

## Adding New License Files to Single-Hosts

Host-based licensing does not support a multiple-license-file directory. If you have multiple license files, you need to combine them into a single license file by using the license activation portal. For example, you can add newly purchased licenses to an existing license file, or combine entitlements from two separate purchases into a single license file. You can combine evaluation licenses and production licenses in a single file, but products might require configuration changes when the evaluation licenses expire.

You can combine the files by using the VMware Web-based license activation portal. For example, you can combine two ESX Server license files into a single license file. See [“Obtaining License Files”](#) on page 75.

## Installing a License Server

This section describes an independent installation of the license server. You can skip this section if you are using the VMware Infrastructure Management Installer, as described in “[Installing VMware Infrastructure Management Software](#)” on page 99. The VMware Infrastructure Management Installer installs a license server.

To check whether a license server is already installed, choose **Start > Programs > VMware** and look for **VMware License Server**. If a license server is installed, VMware recommends reinstalling or upgrading the license server to the latest version.

You can use the following procedure with any installation to have a standalone license server on a machine other than your VirtualCenter Server host.

You can install the license server on the same machine where the VirtualCenter Server resides or on a separate machine. To ensure the best possible license pool availability, VMware recommends installing the license server on the same machine where the VirtualCenter Server resides.

To install the VMware license server software, you must have:

- Hardware that meets “[VMware Infrastructure System Requirements](#)” on page 45
- A static IP address or machine name that your license server can use

The following procedure assumes that you have Administrator privileges on a Windows system.

### To install a VMware license server

- 1 Insert the VMware Infrastructure Installation CD.  
If the VMware Infrastructure Management Installer appears, click cancel to exit.
- 2 Navigate to the \vpx folder on the installation CD and double-click VMware-licenseserver.exe.
- 3 Verify that you are installing the license server and click **Next**.
- 4 To accept the license agreement, select **I accept the terms in the license agreement** and click **Next**.
- 5 Select the folder in which you want to install the license server and click **Next**.
- 6 Type the full path to your license file or click **Browse** to locate this file and click **Next**.

The license file should be located in a directory you can access from your license server machine.

- 7 Click **Install** to begin the installation.
- 8 Click **Finish** to complete the license server installation.

After you install the license server, you can access detailed information about using and configuring the server by clicking **Start > Programs > VMware > VMware License Server** and selecting the *VMware License Server User Guide*.

## Troubleshooting Licensing

This section provides guidelines for troubleshooting your license setup. If you are not able to resolve your problems with licensing by using the information given in this section, contact VMware for support as follows:

- If you did not receive license activation codes for your VI3 purchase or have difficulties in using your license activation codes to obtain license files, email [vi-hotline@vmware.com](mailto:vi-hotline@vmware.com).
- If you have license files and have difficulties in configuring or troubleshooting licensed features, file a support request at <http://www.vmware.com/support>.

## Receiving License Activation Codes

VMware sends license activation codes and licensing information to the license administrator listed for a particular purchase. If you are not the license administrator, contact your organization's license administrator for your license activation codes.

If you need to change the license administrator for your order, contact [vi-hotline@vmware.com](mailto:vi-hotline@vmware.com). Include the relevant order numbers in your email.

If you purchased VMware Infrastructure 3 from an authorized VMware reseller, you must register your purchase by using the partner activation code(s) supplied by the partner to generate your license files.

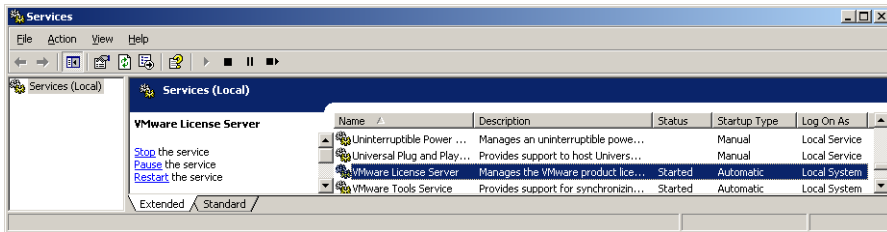
## Checking the License Server

If you are having trouble communicating with your license server, check the following:

- The license server Windows service is running.
- The license server is listening.
- The license server status.

### To check that the license server Windows service is running

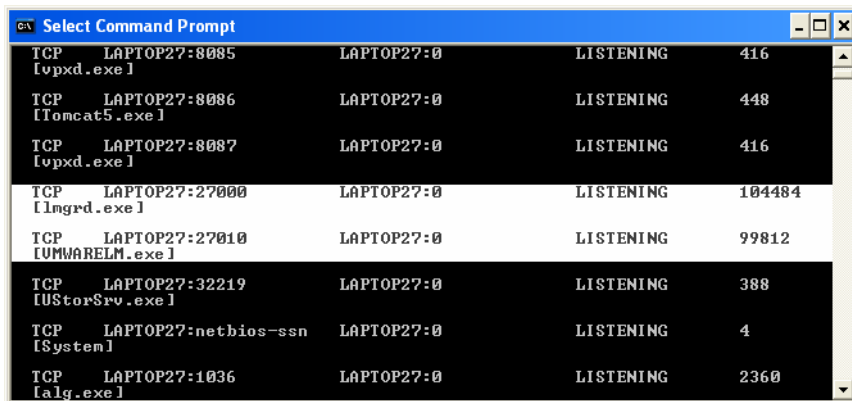
- 1 On the machine on which the license server is installed, choose **Start > Control Panel > Administrative Tools > Services** to display the Services control panel.
- 2 Verify that the Status column for the VMware License Server entry reads “Started.”
- 3 If the VMware License Server is not started, start it by right-clicking on the service and choosing **Start**.



### To check that the license server is listening

- 1 On the machine on which the license server is installed, choose **Start > Command Prompt**.
- 2 Type **netstat -ab** at the command line.
- 3 Verify that the `lmgd.exe` process is listening on port 27000 and that the `VMWARELM.exe` process is listening on port 27010.

If not, the license server might not be installed or might not be started.



### To check the license server status

- 1 On the machine on which the license server is installed, choose **Start > Programs > VMware > VMware License Server > VMware License Server Tools** to launch the LMTOOLS utility.
- 2 Click the **Server Status** tab to display the Server Status page.
- 3 Click **Perform Status Inquiry**.

License server information, including the location of the license file, appears at the bottom of the page.

## Checking the License File

If your license server is operating properly, or if you are using host-based licensing, but you still cannot use licensed features, your license file might have a problem. Check the following:

- Validate your license file at <http://www.vmware.com/checklicense/>.
- Ensure that you are using the correct type of license file. If you are using a license server, use a centralized file. If you are using host-based licensing, make sure that you are using a single-host license file on each host.

Files for centralized licensing contain a block of header text at the top, and the string `VENDOR_STRING=licenseType=Server` appears in each license key in the file. Single-host license files have no header text, and the string `VENDOR_STRING=licenseType=Host` appears in each license key in the file.

- If you are using a centralized license file, check that the license-type header information appears only once, at the top of the file.
- Check that the license file contains the correct keys for the features you want to use. For a list of keys, see [Table 8-1, "License Keys,"](#) on page 83.
- If you edited the license file, check that you did not mix centralized and single-host keys in a single file.

## Checking License Configuration

If your license server (if used) appears to be working correctly, and your license file is correct, use the VI Client to check that you correctly configured licensing for your hosts:

- If you are using centralized licensing, follow the instructions in [“Configuring Centralized Licensing”](#) on page 76.
- If you are using single-host licensing, follow the instructions [“Configuring an ESX Server Machine for Host-Based Licensing”](#) on page 80.



# Installing VMware Infrastructure Management

---

# 9

This chapter describes how to prepare your VirtualCenter database, install VMware Infrastructure Management software, and configure communication between components. You can install VMware Infrastructure Management software on a physical system or on a virtual machine running on an ESX Server host.

This chapter contains the following topics:

- [“Preparing the VirtualCenter Server Database”](#) on page 93
- [“Installing VMware Infrastructure Management Software”](#) on page 99
- [“Configuring Communication Between VirtualCenter Components”](#) on page 103
- [“Uninstalling VMware Infrastructure Components”](#) on page 105
- [“Installing VirtualCenter on a Virtual Machine”](#) on page 106

## Preparing the VirtualCenter Server Database

To install VirtualCenter, you must also install a database. VirtualCenter Server requires a database to store and organize server data. VirtualCenter version 2.5 supports Oracle, SQL Server, and Microsoft SQL Server 2005 Express.

The VirtualCenter Server requires administration credentials (ID and password) to log in to an Oracle or SQL database. Contact your DBA for these credentials, or install the bundled Microsoft SQL Server 2005 Express database for smaller deployments.

---

**NOTE** Microsoft SQL Server 2005 Express is supported only for small deployments with up to 5 hosts and 50 virtual machines.

---

## Configuring Your VirtualCenter Database

This section discusses configuration requirements for all supported databases.

### Configuring an Oracle Connection to Work Locally

To use an Oracle database as your VirtualCenter database and have VirtualCenter access the database locally, use the following procedure.

Before you begin this procedure, review the required database patches specified in [Table 5-1, “Supported Database Formats,”](#) on page 47. If you do not prepare your database correctly, the VirtualCenter installer might display error and warning messages.

#### To prepare an Oracle database to work locally with VirtualCenter

- 1 From the Oracle database machine, install and prepare Oracle:
  - a Download Oracle 9i or Oracle 10g from the Oracle Web site, install it, and create a database (VirtualCenter).
  - b Download Oracle ODBC from the Oracle Web site.
  - c Install the Oracle ODBC corresponding driver through the Oracle Universal Installer (directions are provided with the driver).
  - d Increase the number of open cursors for the database. Add the entry `open_cursors = 300` to the `C:\Oracle\ADMIN\VPX\pfile\init.ora` file.
- 2 Connect Oracle locally:
  - a Create a new tablespace specifically for VirtualCenter by using the following SQL statement:
 

```
CREATE TABLESPACE "VPX" DATAFILE 'C:\Oracle\ORADATA\VPX\VPX.dat'
      SIZE 1000M AUTOEXTEND ON NEXT 500K;
```
  - b Create a user, such as `vpxAdmin`, for accessing this tablespace through ODBC:
 

```
CREATE USER vpxAdmin IDENTIFIED BY vpxadmin DEFAULT TABLESPACE vpx;
```

- c 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
```

- d Create an ODBC connection to the database. The following are example settings:

```
Data Source Name: VMware VirtualCenter
TNS Service Name: VPX
User Id: vpxAdmin
```

### Configuring an Oracle Connection to Work Remotely

To use an Oracle database as your VirtualCenter database and have VirtualCenter access the database remotely, use the following procedure.

Before you begin this procedure, review the required database patches specified in [Table 5-1, "Supported Database Formats,"](#) on page 47. If you do not prepare your database correctly, the VirtualCenter installer might display error and warning messages.

#### To prepare an Oracle database to work remotely with VirtualCenter

- 1 Install the Oracle client on the VirtualCenter Server machine.
- 2 Connect to Oracle remotely:
  - a Download and install the ODBC driver.
  - b Edit the `tnsnames.ora` file located at Ora9I or 10g, as appropriate:

```
C:\Oracle\Ora9I\NETWORK\ADMIN
```

In this example, xx is either 9I or 10g.

- c Use the Net8 Configuration Assistant to add the following entry:

```
VPX =
(DESCRIPTION =
(AADDRESS_LIST =
(AADDRESS=(PROTOCOL=TCP) (HOST=vpxd-Oracle) (PORT=1521))
)
(CONNECT_DATA =
(SERVICE_NAME = VPX)
)
)
HOST =
```

In this example, HOST is the managed host to which the client needs to connect.

## Configuring a SQL Server ODBC Connection

When you install VirtualCenter, you can establish a connection with a SQL Server database. The following procedure describes how to configure a SQL Server ODBC connection.

For specific instructions about how to configure the SQL Server ODBC connection, see your Microsoft SQL ODBC documentation.

If you use SQL Server for VirtualCenter, do not use the master database.

---

**NOTE** Microsoft Windows NT authentication is not supported with remote SQL Server.

---

Before you begin this procedure, review the required database patches specified in [Table 5-1, “Supported Database Formats,”](#) on page 47. If you do not prepare your database correctly, the VirtualCenter installer might display error and warning messages.

### To prepare a SQL Server database to work with VirtualCenter

- 1 On your Microsoft SQL Server, perform the following tasks:
  - a Create a SQL Server database by using Enterprise Manager on the SQL Server.
  - b Create a SQL Server database user with database operator (DBO) rights.

The default database for the DBO user is what you defined in [Step a](#).

Make sure the database user has either a sysadmin server role or the db\_owner fixed database role on the VirtualCenter database and the MSDB database. (SEE UPDATE) The db\_owner role on the MSDB database is required for installation and upgrade only. This role can be revoked after the installation or upgrade process is completed.

- 2 On your VirtualCenter Server, open the Windows ODBC Data Source Administrator.
- 3 Click **Settings > Control Panel > Administrative Tools > Data Sources (ODBC)**.
- 4 Click the **System DSN** tab.
- 5 To modify an existing SQL Server ODBC connection:
  - a Select the appropriate ODBC connection from the **System Data Source** list. Click **Configure**.
  - b Proceed with [Step 7](#).
- 6 To create a SQL Server ODBC connection:
  - a Click **Add**.
  - b For SQL Server 2000, select **SQL Server** and click **Finish**.  
For SQL Server 2005, select **SQL Native Client** and click **Finish**.
- 7 Type an ODBC data store name (DSN) name in the **Name** field.  
For example, type **VMware VirtualCenter**.
- 8 (Optional) Type an ODBC DSN description in the **Description** field.
- 9 Select the server name from the **Server** drop-down menu.  
Type the SQL Server machine name in the text field if you cannot find it in the drop-down menu.
- 10 Click **Next**.
- 11 Select one of the authentication methods:
  - If you are using local SQL Server, select **Windows NT authentication**. Windows NT authentication, also known as “trusted authentication,” is supported only if the SQL Server is running on the same system as VirtualCenter.
  - If you are using remote SQL Server, select **SQL Server authentication**. Windows NT authentication is not supported on remote SQL servers.

To identify the authentication type:

- a Open SQL Server Enterprise Manager.
- b Click the **Properties** tab to view properties.
- c Check the mode.

The mode indicates either Windows NT or SQL Server authentication type.

- 12 Type your SQL Server login name and password.  
Ask your database administrator for this information.
- 13 Click **Next**.
- 14 Select the database created for VirtualCenter from the **Change the default database to** menu and click **Next**.
- 15 Click **Finish**.
- 16 From the **ODBC Microsoft SQL Server Setup** menu, choose **Test Data Source**.  
If the test data source is acceptable, click **OK**. If it is not acceptable, click **Back** and reconfigure any incorrect items.
- 17 To close the ODBC Data Source Administrator, click **Close**.
- 18 Ensure that the SQL Agent is running on your database server.  
This applies to SQL Server 2000 and SQL Server 2005 editions.

## Configuring Microsoft SQL Server 2005 Express

VirtualCenter supports both Microsoft SQL Server 2005 Express (32-bit) and Microsoft SQL Server 2005 Express (64-bit). The Microsoft SQL Server 2005 Express database package is installed and configured when you select Microsoft SQL Server 2005 Express as your database during VirtualCenter installation or upgrade. This is shown in [“Configuring Communication Between VirtualCenter Components”](#) on page 103. No additional configuration is required.

If Microsoft SQL Server 2005 Express is already installed, review the required database patches specified in [“VirtualCenter Database Requirements \(SEE UPDATE\)”](#) on page 47. If you do not prepare your database correctly, the VirtualCenter installer might display error and warning messages.

See [www.microsoft.com/sql/editions/express/default.msp](http://www.microsoft.com/sql/editions/express/default.msp).

---

**NOTE** VMware does not support Microsoft SQL Server 2005 Express for deployments with more than 5 hosts and 50 virtual machines.

---

## Maintaining Your VirtualCenter Database

After your VirtualCenter database instance and VirtualCenter are installed and operational, perform standard database maintenance processes. These include:

- Monitoring the growth of the log file and compacting the database log file, as needed. See the documentation for the database type you are using.
- Scheduling regular backups of the database.
- Backing up the database before any VirtualCenter upgrade.

For more information on backing up your database, see your database documentation.

## Installing VMware Infrastructure Management Software

This section describes how to install management software by using the VMware Infrastructure Management CD or download package. The VMware Infrastructure Management CD allows you to choose the components you want to install and installs all selected components in a single procedure.

### VirtualCenter Installation Prerequisites

If you choose to install VirtualCenter, first do the following:

- Ensure that your hardware meets [“VMware Infrastructure System Requirements”](#) on page 45.
- Make sure that the system you use for your VirtualCenter installation belongs to a domain rather than a workgroup. If assigned to a workgroup, your VirtualCenter Server cannot discover all domains and systems available on the network when using such features as VirtualCenter Consolidation. To determine whether the system belongs to a workgroup or a domain, right-click **My Computer** and click **Properties** and the **Computer Name** tab. The Computer Name tab displays either a Workgroup label or a Domain label.
- Create a VirtualCenter database, unless you want to use SQL Server 2005 Express. See [“Preparing the VirtualCenter Server Database”](#) on page 93.
- Obtain and assign a static IP address and host name to the Windows server that will host VirtualCenter and the license server. This IP address must have a valid (internal) DNS registration that resolves properly from all managed ESX Server hosts. For best results, ensure that the Windows server name is exactly the same as the DNS host name.

- You can deploy VirtualCenter behind a firewall. However, make sure there is no Network Address Translation (NAT) firewall between VirtualCenter and the hosts it will manage.
- The installer automatically installs a license server for you, unless you enter a path to an existing license server.
  - If you want to use an existing license server, obtain the host name or IP address.
  - If you are going to allow the installer to install a license server, you need a valid served license file.

Because the license server does not support license files on a network share, place your license files in a directory on a system where you are installing the license server.

## Components Installed

The VMware Infrastructure Management installer includes the following components:

- VMware VirtualCenter Server – A Windows service to manage ESX Server hosts.
- VI Client - A client application used to connect directly to an ESX Server or indirectly to an ESX Server through a VirtualCenter Server.
- Microsoft.NET Framework – Software used by the VirtualCenter Server, Database Upgrade wizard, and the VI Client.
- Microsoft SQL Server 2005 Express – A free version of the Microsoft SQL Server database for smaller-scale applications. If you enter a path to an existing database, the installer does not install Microsoft SQL Server 2005 Express.
- VMware Update Manager (optional) – A VirtualCenter plugin that provides security monitoring and patching support for ESX Server hosts and virtual machines.
- VMware Converter Enterprise for VirtualCenter Server (optional) – A VirtualCenter plugin that enables you to convert your physical machines to virtual machines.
- VMware license server – A Windows service allowing all VMware products to be licensed from a central pool and managed from one console. If you enter a path to an existing license server, the installer does not install a license server.

## Installation Procedure

The following procedure describes how to install all VMware Infrastructure management components.

### To install VMware Infrastructure Management

- 1 As Administrator on the Windows system, insert the installation 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 Read the Introduction page and click **Next**.
- 4 Select **I accept the terms in the license agreement** and click **Next**.
- 5 Type your user name and company name and click **Next**.
- 6 Select one of the installation types and click **Next**.

The choices are:

- Install the VI Client.
  - Install VirtualCenter.
  - Choose a custom installation to install multiple components.
- 7 Select the option corresponding with the database you configured.

If you have not configured a supported database, click **Install Microsoft SQL Server 2005 Express**. This database is suitable for small deployments of up to 5 hosts and 50 virtual machines.

If you have configured a supported database, click **Use an existing database** and enter your database connection information:

- a Type the data source name (DSN) associated with your database.  
This must be a system DSN.
- b If your database is a local SQL Server database using Windows NT authentication, leave the user name and password fields blank. Otherwise, type the user name and password associated with the datasource name and click **Next**.

If your connection fails, a warning appears. Click **OK** and re-enter your database connection information until you can continue.

8 Select one of the following options:

- To use VirtualCenter in evaluation mode, select **I want to evaluate VirtualCenter Server** and click **Next**.

If you choose this option, the enterprise-level edition of VirtualCenter is installed in evaluation mode. The VMware License Server is also installed so that you can switch to licensed mode during or after the evaluation period.

- To use VirtualCenter in licensed mode with an existing license server:

- i Select **Use an existing License Server**.
- ii Enter the path to your existing license server.
- iii Select the VirtualCenter edition that you purchased and click **Next**.

If you choose this option, the VMware License Server is not installed.

- To use VirtualCenter in licensed mode when you do not have an existing license server:

- i Leave both check boxes unselected.
- ii Select the VirtualCenter edition that you purchased and click **Next**.

If you choose this option, the VMware License Server is installed.

9 Enter the port and proxy information that you want to use or accept the default information shown on screen and click **Next**. This step applies only to custom installations.

The default port for HTTPS is 443. If you configure VirtualCenter to use a different port for HTTPS, you must use the configured port number when you log in to VirtualCenter in this format: <ip-address>:<port-number>

10 Enter information about the system on which you are installing VirtualCenter and click **Next**.

Enter:

- The IP address or domain name of the system on which you are installing VirtualCenter.
- The login and password that you use to login to the system on which you are installing VirtualCenter.

11 For VMware Update Manager, you can use the same database that you use for VirtualCenter, or you can use another database. See [Step 7](#).

- 12 For VMware Update Manager, enter the port and proxy information that you want to use or accept the default information shown on screen. This step applies only to custom installations.
- 13 For VMware Converter, enter the port information that you want to use or accept the default information shown on screen. This step applies only to custom installations.

Click **Next** to continue through the deployment options screens.

- 14 Accept the default destination folders and click **Next**.

If you do not want to accept the default destination folders:

- For VMware Infrastructure, click **Change** to select another location and click **Next**.
- For downloading patches, click **Change** to select another location and click **Next**.



**CAUTION** To install the VMware Infrastructure components on a drive other than the C: drive, verify there is enough space in the C:\WINDOWS\Installer folder to install the Microsoft Windows Installer .msi file. If you do not have enough space, because of a known issue with Windows Installer, your VMware Infrastructure installation might fail.

---

- 15 Click **Install**.

Installation might take several minutes. Multiple progress bars appear during installation of the selected components.

- 16 Click **Finish** to complete the VMware Infrastructure installation.

## Configuring Communication Between VirtualCenter Components

VirtualCenter must be able to send data to every VirtualCenter-managed host and receive data from each VI Client. To enable any migration or provisioning activities between VirtualCenter-managed hosts, the source and target hosts must be able to receive data from each other. ([SEE UPDATE](#))

During normal operations, VirtualCenter is listening for data from its managed hosts and clients on designated ports. Additionally, VirtualCenter assumes that its managed hosts are listening for data from VirtualCenter on designated ports. If a firewall is between any of these elements, an opening must be created to allow data transfer to these designated ports.

The following sections describe how to facilitate this communication. For information about SDK communications, see the VMware SDK documentation. For a more thorough discussion of firewall configuration, see the *Server Configuration Guide*.

## Connecting to Your VirtualCenter Server Through a Firewall

The default ports that VirtualCenter uses to listen for connections from the VI Client are ports 80, 443, and 902. VirtualCenter also uses port 443 to listen for data transfer from SDK clients.

If you have a firewall between your VirtualCenter Server and its clients, you must configure a means for VirtualCenter to receive data from them.

To enable VirtualCenter to receive data from the VI Client, open ports 80, 443, and 902 in the firewall to allow data transfer from the VI Client to VirtualCenter. To enable VirtualCenter to receive data from SDK clients, open port 443 in the firewall. For additional information on configuring ports in a firewall, see your firewall system administrator.

If you want VirtualCenter to use a different port to receive VI Client data, see *Basic System Administration*.

To tunnel the VI Client data through the firewall to the receiving port on VirtualCenter, see *Basic System Administration*. VMware recommends that you not use this method because it disables the VirtualCenter console function.

## Connecting to Your Managed Hosts Through a Firewall

The default port that VirtualCenter uses to send data to the managed hosts is port 902.

If you have a firewall between your VirtualCenter Server and VirtualCenter-managed host, you must configure a means for VirtualCenter to send data to the VirtualCenter-managed host.

If you have a firewall between two VirtualCenter-managed hosts and you want to perform any source or target activities, such as migration or cloning, you must configure a means for the managed hosts to receive data.

Managed hosts also send a regular heartbeat over UDP port 902 to VirtualCenter. Firewalls must not block this port.

**To enable a VirtualCenter-managed host to receive data on the default port**

Open port 902 in the firewall to allow data transfer to the VirtualCenter-managed host from VirtualCenter or another VirtualCenter-managed host. For additional information on configuring the ports, see your firewall system administrator.

**Connecting Hosts with the License Server Through a Firewall**

The default ports that the license server uses to communicate with ESX Server hosts are 2700 and 27010. If you are using centralized licensing with your ESX Server hosts, and have a firewall between your ESX Server hosts and your license server, open these ports.

You can change the default ports by editing the license file. When you edit the license file, use an ASCII text editor. Validate the edited license file at <http://www.vmware.com/checklicense/>. After changing the ports, open the new ports you chose in the firewall. Consult your firewall system administrator for additional information on configuring the ports. For information on configuring the ESX Server firewall, see the *Server Configuration Guide*.

**Uninstalling VMware Infrastructure Components**

The VMware Infrastructure components are uninstalled separately, even if they are on the same machine. You must have Administrator privileges to uninstall the VirtualCenter component.



**CAUTION** If you try to uninstall VirtualCenter while it is running, you must confirm that you want to take action. Uninstalling in this way causes a disruption to any VI Clients connected to the service. This can cause data loss.

---

Uninstalling the VMware Infrastructure components does not uninstall the Microsoft .NET Framework. Do not uninstall the Microsoft .NET Framework if you have other applications on your system that depend upon it.

**To uninstall a VMware Infrastructure Component using the Add/Remove Programs Tool**

- 1 As Administrator on the Windows system, choose **Start > Settings > Control Panel > Add/Remove Programs**.
- 2 To select a VMware Infrastructure component, scroll through the list of installed programs, select the component to remove, and click **Change** or **Remove**.

- 3 Click **Yes** to confirm that you want to remove the program.
- 4 Click **Finish**.

## Installing VirtualCenter on a Virtual Machine

You can install your VirtualCenter components on a Windows virtual machine, which runs on an ESX Server host. Deploying VirtualCenter on a virtual machine has the following advantages:

- Rather than dedicating a separate server to VirtualCenter, you can install it on a virtual machine running on the same ESX Server host where your other virtual machines run.
- You can provide high availability for VirtualCenter by using VMware HA.
- You can migrate the virtual machine that contains VirtualCenter from one host to another, enabling maintenance and other activities.
- You can create snapshots of the VirtualCenter virtual machine and use them for backups, archiving, and so on.

### To install VirtualCenter on a virtual machine

- 1 On any machine that has network access to your ESX Server host, install the VI Client.
- 2 Using the VI Client, access the ESX Server host directly to create the virtual machine for hosting VirtualCenter.

For information about creating virtual machines, see *Basic System Administration*.

- 3 On the virtual machine, install VirtualCenter.

See “[Installing VMware Infrastructure Management Software](#)” on page 99.

For more details on installing and running VirtualCenter on a virtual machine, see *Running VirtualCenter in a Virtual Machine* at [www.vmware.com/pdf/vi3\\_vc\\_in\\_vm.pdf](http://www.vmware.com/pdf/vi3_vc_in_vm.pdf)

# Maintaining ESX Server 3i and the VI Client

---

# 10

Software updates might be patches for addressing critical security issues or urgent bug fixes, or they might be general updates or maintenance releases. They might be located on the local file system or on an NFS, FTP, or HTTP server. Each update consists of a descriptor file and a set of packages. The descriptor controls the installation process and checks that requirements are met. For example, you might be required to power off all virtual machines running on the server you are about to update, or you might need to reboot the server after the update.

This chapter discusses two utilities you can use to apply software updates to the VI Client and ESX Server 3i software. The VMware Infrastructure Update is a graphical user interface (GUI) application. The `vihostupdate` utility is a remote command-line interface (CLI) tool. These utilities are discussed in the following sections:

- [“Performing Maintenance with Infrastructure Update”](#) on page 107
- [“Performing Maintenance With the `vihostupdate` Utility”](#) on page 111
- [“Rolling Back an Update”](#) on page 114

## Performing Maintenance with Infrastructure Update

When you install the VI Client, the software installs Infrastructure Update. Infrastructure Update lets you learn about, download, and install maintenance and patch releases, which provide security, stability, and feature enhancements for VMware Infrastructure.

The Infrastructure Update periodically checks for new updates that are applicable to ESX Server 3i hosts connected to the VI Client. If new updates are discovered, Infrastructure Update downloads the image and the companion software in the background, and caches the downloaded updates in a local repository.

---

**NOTE** Software upgrades are different from updates. Upgrades are for major releases of the type *x.0* and minor software releases of the type *x.y*. For example, ESX Server 2.0 and ESX Server 2.5.

VMware updates are for maintenance releases of the type *x.y.z* and patches. For example, ESX Server 2.5.3 and ESX Server 2.5.3 Patch 2. Updates are discussed in this chapter.

See <http://www.vmware.com/download>.

---

## System Requirements for Infrastructure Update

To use Infrastructure Update, you must have:

- A workstation or laptop with the VI Client installed.

You can install the VI Client by using the VMware Infrastructure Management CD distributed with the ESX Server 3i host. Alternatively, you can download the VI Client at <http://<ip-address of your 3i host>>.

- A network connection between the ESX Server 3i host and the computer that is running the VI Client.

## Scheduling Automatic Update Notifications

By default, automatic update notification is enabled. If you keep automatic update notifications enabled, you do not have to search for new updates or worry that something important might be missing. Infrastructure Update checks for available updates for the following software components:

- ESX Server 3i
- Remote CLI
- VI Client
- VMware Tools
- VMware Update

The default day and time for the update service to check for available updates is every Sunday at 12:00 a.m.

**To schedule a different day and time for update checks**

- 1 Choose **Start > Programs > VMware > Infrastructure Update**.
- 2 On the **Updates** tab, enter a different day and time.

**Selecting Hosts to Be Managed**

Infrastructure Update compiles a list of ESX hosts in your datacenter. This list of hosts has a subset of hosts that are currently reachable. By default, the service manages reachable hosts by periodically checking them for available updates.

**To configure the list of managed hosts**

- 1 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 2 On the **Hosts** tab, select the hosts to manage and click **Apply**.

Infrastructure Update verifies that the selected hosts are reachable.

**Installing Available Updates**

Infrastructure Update downloads available updates. The downloads are background tasks and do not disrupt normal operation. The update service does not install updates for you. Instead, the update service displays a list of available updates that you can choose to install.

When new updates are available, the system tray icon for Infrastructure Update displays a notification. The notifications appear only if you keep automatic update notifications enabled.

**To install available updates**

- 1 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 2 On the **Hosts** tab, select a host and click **Apply**.
- 3 Enter the user name and password for the selected host.

An installation wizard lets you choose the software packages to install and guides you through the installation process.

- 4 Click **Continue** to install available updates on the next host.
- 5 Repeat [Step 3](#) and [Step 4](#) until all hosts are updated.

After all updates are applied, VMware Update restarts all affected services.

## Disabling Automatic Update Notifications

When you use the VI Client to connect to a host directly, the VI Client checks for available updates and notifies you when updates are available.

### To disable automatic update notifications

- 1 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 2 On the **Updates** tab, deselect **Automatically check for recommended updates** and click **OK**.

## Manually Checking for Available Updates

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

### To manually check for updates

- 1 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 2 On the **Hosts** tab, select the hosts to check for updates.
- 3 On the **Updates** tab, click **Check Now**.

The update service replies to your query, indicating either that an update is available or that there is no update.

For information about how to install updates, see [“Installing Available Updates”](#) on page 109.

## Using Removable Media to Install Updates

Optionally, you can manually download and burn update files onto removable media, such as a CD-ROM or DVD, and then use the removable media to update a remote system. This option is useful when you update ESX Server 3i hosts that are not connected to the Internet.

### To install software that is stored on removable media

- 1 From <http://www.vmware.com/download>, download one or more package ZIP files.
- 2 Burn the files onto removable media, such as a CD-ROM or DVD.
- 3 Insert the removable media into a workstation or laptop with the VI Client installed.
- 4 Connect the VI Client to the host that needs to be updated.

- 5 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 6 On the **Updates** tab, click **Add Files**.
- 7 Navigate to the removable media and select a ZIP file.

This action adds the ZIP file to the installation cache. If applicable updates are available for hosts that the update service is managing, an install wizard guides you through the installation process. To update hosts that are not already being managed, add them to the managed hosts list.

#### **To add hosts to the managed hosts list**

- 1 Choose **Start > Programs > VMware > VMware Infrastructure Update**.
- 2 On the **Hosts** tab, select the hosts to check for updates.
- 3 On the **Updates** tab, click **Check Now**.

## **Performing Maintenance With the vihostupdate Utility**

You can use the vihostupdate Remote CLI utility for maintenance of your ESX Server 3i hosts and the VI Client. The command can install software updates, enforce software update policies, and track installed software. Only the root user can run the command.

---

**NOTE** In contrast to most other Remote CLI commands, you must run this command on the ESX Server 3i host directly, that is, the `--vihost` option is not supported.

---

The Remote CLI is available in two forms:

- As a virtual appliance that you can import into ESX Server, VMware Workstation, or VMware Player.
- As a package that you can install on Microsoft Windows and Linux machines.

For information about importing or installing the Remote CLI, see the “Remote Command-Line Interfaces” appendix of the *ESX Server 3i Configuration Guide*.

Before you can back up your host configuration data, you must have access to a machine that is running the Remote CLI. After you power on the Remote CLI, a shell prompt lets you run CLI commands on an ESX Server 3i host to which you connect remotely.

## To update a host

- 1 Power off any virtual machines that are running on the host to update.  

When you run the `vihostupdate` utility, the software places the host into maintenance mode. The host cannot be placed into maintenance mode unless you first power off all virtual machines that are running on the host.
- 2 On a host other than the host you are updating, power on the Remote CLI and log in.  

You do not need to type the password on the command line. If no password is specified, the tool prompts you for the password without echoing the output to the terminal. This means the password you type is not visible in the window as you run the command.

You can create a secure connection to the Remote CLI, by using the Remote CLI IP address. If you are using the VI Client, you can right-click the Remote CLI and select **Open Console**. If the Remote CLI is installed on your Windows or Linux system, you can use the installed application, in which case you do not need to log in.
- 3 Download the file and copy it to the Remote CLI file system.
- 4 Run the `vihostupdate` utility.
- 5 Reboot the host for the updates to take effect.

For command syntax examples, see [“Examples: the vihostupdate Utility”](#) on page 113.

## How the vihostupdate Maintenance Utility Installs Software Updates

During the installation process, the `vihostupdate` utility proceeds as follows:

- 1 Checks for prerequisites. For example, checks whether the correct version of the ESX Server host is installed or whether all virtual machines are powered off.
- 2 Updates an ESX Server 3i host with available updates. You must ensure that the update bundle is in a directory that is accessible from the `vihostupdate` tool.
- 3 Installs three separate components including the ESX Server 3i firmware, VMware Tools for virtual machines, and a VI Client installer.

## Options for the vihostupdate Utility

You can run the vihostupdate utility with the options shown in [Table 10-1](#). For information about general options available with the Remote CLI commands, see the “Remote Command-Line Interfaces” appendix of the *ESX Server 3i Configuration Guide*.

**Table 10-1.** Options for the vihostupdate utility

Option	Description
--bundle <bundle_file_name>	--b Unpack the downloaded ZIP file. If you specify this option, you cannot specify --metadata.
--install	--i Patch the host with applicable packages in the update bundle. This option takes no arguments, but you must also include either -b to specify a bundle or -m to specify a metadata file.
--metadata <metadata_xml_file>	--m Path to the metadata.xml file that contains information about the update bundle. If you specify this option, you cannot specify --bundle.
--query	--q List installed packages on the host. This option returns version information for the ESX Server host, as well as all packages installed and their version numbers.

## Examples: the vihostupdate Utility

Assume the path to a file is <mypatch>.zip. If you then go to the directory where you copied that file, you can execute the commands shown in [Table 10-2](#).

**Table 10-2.** Examples for the vihostupdate utility

Example	Description
vihostupdate --server <3i-host-ip> --username root --password <password> --i --b mypatch.zip	Unpacks the file and patches the host.
vihostupdate --server <3i-host-ip> --username root --password <password> --b mypatch.zip	Unpacks the file, but <i>does not</i> patch the host.
vihostupdate --server <3i-host-ip> --username root --password <password> --i --m mypatch/metadata.xml	Patches the host.

## Rolling Back an Update

Each ESX Server 3i host can store two builds, one boot build and one standby build. The boot build is the one from which the system is booted.

For each update, the update utility updates the standby build. After the update, you then reboot the host. On reboot, the newly updated build becomes the boot build. If the update is successful, the host continues to boot from the new boot build until the next update. Upon the next update, the update service updates the standby build, and the standby build becomes the new boot build.

For example, suppose the current boot build is 52252 and the standby build is 51605. When you update the host to build 52386, the update process replaces build 51605 with build 52386 and makes build 52252 the standby build. If the update is successful, you continue to boot from build 52386 until the next update.

If an update fails and the ESX Server 3i host cannot boot from the new build, the host reverts to booting from the original build the next time you reboot.

During the boot process, you can manually boot into the standby build. This causes an irreversible rollback. In other words, when you manually select the standby build, the standby build becomes the new boot build and remains the boot build until you perform another update or manually select the standby build.

If the update process is interrupted, the update fails. For example, suppose you performed an update and you are rebooting the ESX Server 3i host. The boot menu displays **Build-XXXXX (upgrading)**. If an interruption occurs, for example a reboot or a power failure, the update fails.

### To switch to the standby build

- 1 Reboot the ESX Server 3i host.
- 2 When you see the page that displays the current boot build, press Shift-r to select the standby build.
- 3 Press Shift-y to confirm the selection and press Enter.

# Monitoring the Condition of ESX Server 3i

---

# 11

ESX Server 3i monitoring lets you check the condition of the following host components:

- CPU processors
- Fans
- Memory
- Storage
- Temperature

## To monitor the condition of a host

- 1 Log on to the VI Client and select the server from the inventory panel.
- 2 Click the **Configuration** tab and click **Health Status**.

If a component is functioning normally, the status indicator is green. The indicator changes to yellow or red if a system component violates a performance threshold or is not functioning properly. Generally, a yellow indicator signifies degraded performance. A red indicator signifies that a component has stopped operating or has exceeded the highest threshold.

The **Reading** column displays the current values for the sensors. For instance, this column displays rotations per minute (RPM) for fans and degrees Celsius for temperature.

If you are using VMware Distributed Resource Scheduler (DRS) and VMware High Availability (HA), these services can take action when hardware events occur.



# Appendix: ESX Server 3i Hardware Considerations

---

Your ESX Server 3i host comes from the hardware vendor in a state that is ready to use. For reference, this appendix provides the system requirements.

This appendix covers the following topics:

- [“Minimum Hardware Configurations”](#) on page 117
- [“Enhanced Performance Recommendations”](#) on page 119
- [“Hardware and Software Compatibility”](#) on page 120

## Minimum Hardware Configurations

This section discusses the minimum hardware configurations supported by ESX Server 3i version 3.5.

You need the following hardware and system resources to use ESX Server.

- One or more Ethernet controllers. Supported controllers include:
  - Broadcom NetXtreme 570x Gigabit controllers
  - Intel PRO/1000 adapters

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**NOTE** The 3Com 3c990 driver does not support all revisions of the 3c990. For example, 3CR990B is incompatible.

---

- A SCSI adapter, Fibre Channel adapter, or internal RAID controller:
  - **Basic SCSI** controllers are Adaptec Ultra-160 and Ultra-320, LSI Logic Fusion-MPT, and most NCR/Symbios™ SCSI controllers.
  - **Fibre Channel.** See the *Storage / SAN Compatibility Guide*.
  - **RAID adapters** supported are HP Smart Array, Dell PercRAID (Adaptec RAID and LSI MegaRAID), and IBM (Adaptec) ServeRAID controllers.
- A SCSI disk, Fibre Channel LUN, or RAID LUN with unpartitioned space. This disk or RAID is used for the virtual machines.
- For hardware iSCSI, a disk attached to an iSCSI controller, such as the QLogic qla405x.
- For SATA, a disk connected through supported dual SAS-SATA controllers that are using SAS drivers.

ESX Server supports the following storage systems:

- **ATA disk drives** – Storage of virtual machines is currently not supported on ATA drives or RAIDs. Virtual machines must be stored on VMFS volumes configured on a SCSI or SATA drive, a SCSI RAID, or a SAN.
- **Serial ATA (SATA) disk drives** – Sharing VMFS datastores on SATA disks across multiple ESX Server hosts is not supported.
- **SCSI disk drives** – SCSI disk drives can store virtual machines on VMFS partitions.
- **Storage area networks (SANs)** – SANs, both Fibre Channel and iSCSI, are supported for storing virtual machines on VMFS datastores.

---

**NOTE** The minimum supported LUN capacity for VMFS3 is 1200MB.

---

## Enhanced Performance Recommendations

The configurations listed in the previous sections are for a basic ESX Server 3i configuration. In practice, you can use multiple physical disks, which include SCSI disks, RAID LUNs, and so on.

The following are recommendations for enhanced performance:

- **RAM** – Having sufficient RAM for all of your virtual machines is important for achieving good performance. ESX Server hosts require more RAM than typical servers. An ESX Server host must be equipped with sufficient RAM to run concurrent virtual machines.

For example, operating four virtual machines with Red Hat Enterprise Linux or Windows XP requires that your ESX Server host be equipped with over one gigabyte of RAM for *baseline* performance (1024MB for the virtual machines [256MB minimum for each operating system as recommended by vendors × 4]).

Running these example virtual machines with a more reasonable 512MB RAM requires the ESX Server host to be equipped with at least 2GB RAM (2048MB for the virtual machines [512MB × 4]).

These calculations do not take into account system use and variable overhead memory for each virtual machine. See the *Resource Management Guide*.

- **Dedicated fast Ethernet adapters for virtual machines** – Dedicated Gigabit Ethernet cards for virtual machines, such as Intel PRO/1000 adapters, improve throughput to virtual machines with high network traffic.
- **Disk location** – For best performance, all data that your virtual machines use should be on physical disks allocated to virtual machines. These physical disks should be large enough to hold disk images that all of the virtual machines can use.
- **Processors** – Faster processors improve ESX Server performance. For certain workloads, larger caches improve ESX Server performance.
- **Hardware compatibility** – To ensure the best possible I/O performance and workload management, VMware ESX Server provides its own drivers for supported devices. Be sure that the devices you plan to use in your server are supported. For additional detail on I/O device compatibility, download the *ESX Server I/O Compatibility Guide* from the VMware Web site at [www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html).

## Hardware and Software Compatibility

For specific information on supported hardware and software, download the ESX Server Compatibility Guides from the VMware Web site at [www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html).

- **Systems compatibility** – Lists the standard operating systems and server platforms against which VMware tests.
- **I/O compatibility** – Lists devices that are accessed directly through device drivers in the ESX Server host.
- **Storage compatibility** – Lists in detail the combinations of HBAs and storage devices currently tested by VMware and its storage partners.
- **Backup software compatibility** – Describes the specific backup packages tested by VMware.

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# Updates for the ESX Server 3i Embedded Setup Guide

Last Updated: June 12, 2009

This document provides updates to the ESX Server 3i version 3.5 Embedded and VirtualCenter 2.5 version of the *ESX Server 3i Embedded Setup Guide*. Updated descriptions, procedures, and graphics 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 *ESX Server 3i Embedded Setup Guide*:

- [Updates for the Table of Supported Database Formats on Page 47](#)
- [Updates for the To prepare a SQL Server database to work with VirtualCenter Procedure on Page 96](#)
- [Updates for the Configuring Communication Between VirtualCenter Components Section on Page 103](#)

## Updates for the Table of Supported Database Formats on Page 47

The following row should appear in [Table 5-1](#):

---

Microsoft SQL Server 2005 Standard	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.
------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------

---

[Table 5-1](#) 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	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.
Oracle Database 10g Release 2 (10.2.0.1.0) Enterprise Edition	<b>Note:</b> VMware supports 10.2.0.3.0 and later versions of Oracle Database 10g Release 2.

## Updates for the To prepare a SQL Server database to work with VirtualCenter Procedure on [Page 96](#)

The following text should appear in [“To prepare a SQL Server database to work with VirtualCenter”](#):

Make sure that the database user has the following permissions:

- **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 Server 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.

## Updates for the Configuring Communication Between VirtualCenter Components Section on [Page 103](#)

The following text should appear in the [“Configuring Communication Between VirtualCenter Components”](#) section:

Port 443 is required for communication from VirtualCenter to ESX Server hosts.