ESX and vCenter Server Installation Guide

ESX 4.0

vCenter Server 4.0

vmware®

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About This Book

The *Installation Guide* describes how to install new configurations of VMware® vCenter Server and ESX. This installation information covers ESX and vCenter Server only. It does not include setup or installation information for ESXi.

Intended Audience

This book is intended for anyone who needs to install vCenter Server and install ESX 4.0.

The information in this book is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

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VMware vSphere Documentation

The vSphere documentation consists of the combined VMware vCenter Server and ESX/ESXi documentation set.

Technical Support and Education Resources

The following technical support resources are available to you. To access the current version of this book and other books, go to http://www.vmware.com/support/pubs.

Online and Telephone Support	To 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.
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Introduction to VMware vSphere

These topics describe VMware vSphere.

The following figure illustrates the basic components of VMware vSphere.

Figure 1-1. VMware vSphere Components
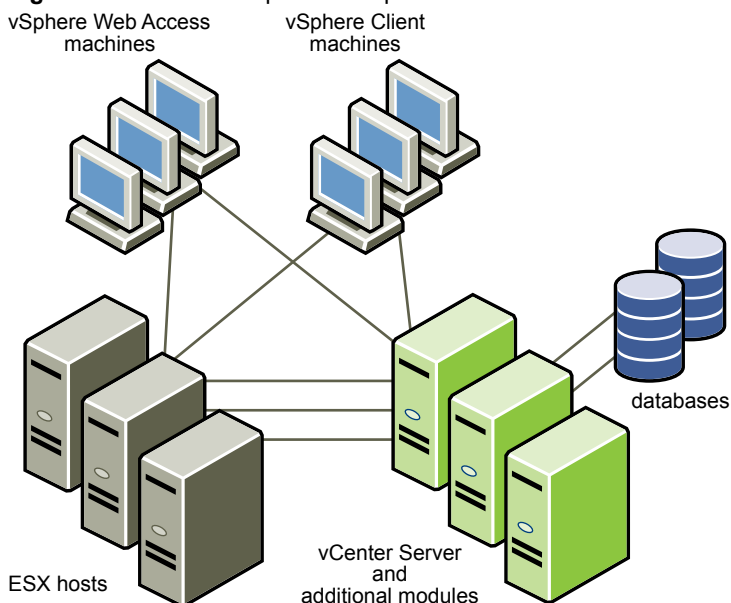
Each vCenter Server system manages multiple ESX hosts. You can run the vSphere Client and vSphere Web Access on multiple workstations.

The major VMware vSphere components are:

VMware ESX	Provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines.
VMware ESXi Embedded	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 ESXi Embedded because it is embedded as firmware on hardware that you purchase from a vendor.
VMware ESXi Installable	Provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines. You can install ESXi Installable on any hard drive on your server.

vCenter Server	A service that acts as a central administrator for ESX/ESXi hosts connected on a network. This service directs actions on the virtual machines and the hosts. The vCenter Server is the working core of vCenter. You can have multiple vCenter Server systems joined to a Linked Mode group. This allows you to log in to any single instance of vCenter Server and view and manage the inventories of all the vCenter Server systems in the group.
vCenter Server additional modules	Provide additional capabilities and features to vCenter Server. Generally, additional modules (sometimes called plug-ins) are released separately, install on top of vCenter Server, and can be upgraded independently. You can install additional modules on the same computer as the vCenter Server system or on a separate one. After the additional module is installed, you can activate the module's client component, which enhances the vSphere Client with user interface (UI) options. Additional modules include vCenter Update Manager, vCenter Converter, and vCenter Guided Consolidation Service.
vSphere Client	Installs on a Windows machine and is the primary method of interaction with VMware vSphere. The vSphere Client acts as a console to operate virtual machines and as an administration interface into the vCenter Server systems and ESX hosts.
	The vSphere Client is downloadable from the vCenter Server system and ESX hosts. The vSphere Client includes documentation for administrators and console users.
VMware vSphere Web Access	A browser-based interface for system administrators who need to access virtual machines remotely or without a vSphere Client. vSphere Web Access is also for people who use virtual machines as remote desktops.
Databases	Organize all the configuration data for the VMware vSphere environment. For small deployments, the bundled Microsoft SQL Server 2005 Express database lets you set up to 5 hosts and 50 virtual machines. vCenter Server supports other database products for larger deployments. vCenter Update Manager also requires a database. VMware recommends that you use separate databases for vCenter Server and vCenter Update Manager.

System Requirements 2

Hosts running vCenter Server and ESX must meet specific hardware and operating system requirements.

This chapter includes the following topics:

ESX Hardware Requirements

Using ESX requires specific hardware and system resources.

64-Bit Processor

- VMware ESX 4.0 will only install and run on servers with 64-bit x86 CPUs.
- Known 64-bit processors:
  - All AMD Opterons support 64 bit.
  - All Intel Xeon 3000/3200, 3100/3300, 5100/5300, 5200/5400, 7100/7300, and 7200/7400 support 64 bit.
  - All Intel Nehalem (no Xeon brand number assigned yet) support 64 bit.

RAM

2GB RAM minimum

Network Adapters

One or more network adapters. Supported network adapters include:

- Broadcom NetXtreme 570x gigabit controllers
- Intel PRO 1000 adapters

SCSI Adapter, Fibre Channel Adapter, or Internal RAID Controller

One or more of the following controllers (any combination can be used):

- Basic SCSI controllers are Adaptec Ultra-160 and Ultra-320, LSI Logic Fusion-MPT, and most NCR/Symbios SCSI controllers.

- Fibre Channel, see the *Hardware Compatibility Guide* at http://www.vmware.com/resources/compatibility.

- RAID adapters supported are HP Smart Array, Dell Perc (Adaptec RAID and LSI MegaRAID), and IBM (Adaptec) ServeRAID controllers.

Installation and Storage

- SCSI disk, Fibre Channel LUN, or RAID LUN with unpartitioned space. In a minimum configuration, this disk or RAID is shared between the service console and the virtual machines.

- For hardware iSCSI, a disk attached to an iSCSI controller, such as the QLogic qla405x. Software iSCSI is not supported for booting or installing ESX.

- Serial attached SCSI (SAS).

- For Serial ATA (SATA), a disk connected through supported SAS controllers or supported on-board SATA controllers. SATA disk drives connected behind supported SAS controllers or supported on-board SATA controllers.

- Supported SAS controllers include:

  - LSI1068E (LSISAS3442E)

  - LSI1068 (SAS 5)

  - IBM ServeRAID 8K SAS controller

  - Smart Array P400/256 controller

  - Dell PERC 5.0.1 controller

- Supported on-board SATA controllers include:

  - Intel ICH9

  - Nvidia MCP55

  - ServerWorks HT1000

When installing ESX on SATA drives, consider the following:

- Ensure that your SATA drives are connected through supported SAS controllers or supported onboard SATA controllers.

- Do not use SATA disks to create VMFS datastores shared across multiple ESX hosts.

ATA and IDE disk drives – ESX supports installing and booting on either an ATA drive or ATA RAID is supported, but ensure that your specific drive controller is included in the supported hardware. IDE drives are supported for ESX installation and VMFS creation.

Recommendations for Enhanced ESX Performance

There are several things you can do to enhance ESX performance, including using multiple physical disks, such as SCSI disks, Fibre Channel LUNs, and RAID LUNs.

Following are some recommendations for enhanced performance:

■ RAM – The ESX host might require more RAM for the service console if you are running third-party management applications or backup agents.

■ Network 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, store all data used by your virtual machines on physical disks allocated to virtual machines. These physical disks should be large enough to hold disk images used by all the virtual machines.

■ Processors – Faster processors improve ESX performance. For certain workloads, larger caches improve ESX performance.

■ Hardware compatibility – Use devices in your server that are supported by ESX 4.0 drivers. See the *Hardware Compatibility Guide* at http://www.vmware.com/resources/compatibility.

Tested Software and Firmware for Creating ESX Installation Media

Before you install ESX, you might need to burn the ESX installation ISO image onto DVD or USB media. Review the firmware and software that VMware has tested and has confirmed works.

VMware has tested these combinations, however, other combinations might work as well.

Table 2-1 lists the tested combinations for burning the ESX installation ISO image onto DVD media.

Table 2-1. Tested Combinations for DVD

DVD Drive (Make, Model, and BIOS)	Software to Burn DVD	DVD Media
Phillips + RW DVD8801	Roxio Creator Classic version: 6.1.1.48	SONY DVD +RW 120min / 4.7 GB
Philips PLDS DVD + RW DH-16A6S	Roxio Creator version: 3.3.0	SONY DVD+RW
Philips PLDS DVD + RW DH-16W1S	Roxio Creator version: 3.3.0	SONY DVD+RW
Philips BenQ PBDS + RW DH-16W1S	Roxio Creator version: 3.3.0	SONY DVD+RW
HL-DT-ST DVD+-RW GSA-H53N	Burn4Free V.4.6.0.0	SONY DVD+RW
Dell/_NEC DVD +-RW ND-3530A	Roxio Creator Classic version: 6.1.1.48	Memorex DVD-R
Dell/_NEC DVD +-RW ND-3530A	Roxio Creator Classic version: 6.1.1.48	Office Depot DVD+RW
Dell/_NEC DVD +-RW ND-3530A	Roxio Creator Classic version: 6.1.1.48	Ativa DVD-RW
Dell/_NEC DVD +-RW ND-3530A	Roxio Creator Classic version: 6.1.1.48	TDK DVD+R Verbatim DVD+R SONY DVD-R Maxell DVD+R

Table 2-2 lists the tested combinations for burning the ESX installation ISO image onto USB media.

Table 2-2. Tested Combinations for USB

External USB DVD Drive	Firmware Version
Iomega	Rev: XY13
LaCie	Rev: LA00

Table 2-2. Tested Combinations for USB (Continued)

External USB DVD Drive	Firmware Version
LG 8x portable DVD Rewriter	Rev: KE01
SONY DVD+- R 20X	Rev: SS01

vCenter Server and the vSphere Client Hardware Requirements

The vCenter Server system is a physical machine or virtual machine with access to a supported database. The vCenter Server system must meet specific requirements. Also make sure that the vSphere Client machines meet the hardware requirements.

Minimum Requirements for vCenter Server

- CPU – 2 CPUs

- Processor – 2.0GHz or faster Intel or AMD processor. Processor requirements might be higher if the database runs on the same machine.

- Memory – 3GB RAM. Memory requirements might be higher if the database runs on the same machine.

  vCenter Server includes a service called VMware VirtualCenter Management Webservices. This service requires 128MB to 1.5GB of additional memory. The VirtualCenter Management Webservices process allocates the required memory at startup.

- Disk storage – 2GB. Disk requirements might be higher if the database runs on the same machine.

- Microsoft SQL Server 2005 Express disk requirements – Up to 2GB free disk space to decompress the installation archive. Approximately 1.5GB of these files are deleted after the installation is complete.

- Networking – Gigabit connection recommended.

See your database documentation for the hardware requirements of your database. The database requirements are in addition to the vCenter Server requirements if the database and vCenter Server run on the same machine.

Minimum Requirements for the vSphere Client

- CPU – 1 CPU

- Processor – 266MHz or faster Intel or AMD processor (500MHz recommended).

- Memory – 200MB RAM

- Disk Storage – 1GB free disk space for a complete installation, which includes the following components:

  - Microsoft .NET 2.0

  - Microsoft .NET 3.0 SP1

  - Microsoft Visual J#

  - vSphere Client 4.0

  - vSphere Host Update Utility 4.0

  You must also have 400MB free on the drive that has your `%temp%` directory.

  If all of the prerequisites are already installed, 300MB of free space is required on the drive that has your `%temp%` directory, and 450MB is required for the vSphere Client 4.0.

- Networking – Gigabit connection recommended.

32-Bit or 64-Bit Operating System for vCenter Server

When you have up to 200 hosts, you can use a 32-bit Windows operating system, but a 64-bit Windows operating system is preferred. When you have 200-300 hosts, a 64-bit Windows operating system is required.

Recommendations for Optimal Performance

Depending on the number of ESX hosts and virtual machines in your environment, the following system requirements should be used as guidelines for optimal performance.

IMPORTANT   The recommended disk sizes assume default log levels. If you configure more granular log levels, more disk space is required.

Table 2-3 summarizes the requirements for a medium deployment.

Table 2-3. Up to 50 Hosts and 250 Powered-On Virtual Machines

Product	CPU	Memory	Disk
vCenter Server	2	4GB	3GB
vSphere Client	1	200MB	1GB

Table 2-4 summarizes the requirements for a large deployment.

Table 2-4. Up to 200 Hosts and 2000 Powered-On Virtual Machines

Product	CPU	Memory	Disk
vCenter Server	4	4GB	3GB
vSphere Client	1	500MB	1GB

Table 2-5 summarizes the requirements for an extra-large deployment.

vCenter Server must be hosted on a 64-bit Windows operating system for this configuration.

Table 2-5. Up to 300 Hosts and 3000 Powered-On Virtual Machines

Product	CPU	Memory	Disk
vCenter Server	4	8GB	3GB
vSphere Client	1	500MB	1GB

Requirements for Installing vCenter Server on a Custom Drive

If you install vCenter Server on the E:\ drive or on any custom drive, note the following space requirements:

- 601MB on the custom drive for vCenter Server
- 1.13GB on the C:\ drive for Microsoft .NET 3.0 SP1, Microsoft ADAM, Microsoft SQL Server 2005 Express (optional), and Microsoft Visual C++ 2005 Redistributable
- 375MB for the custom drive %temp% directory

vCenter Server Software Requirements

Make sure that your operating system supports vCenter Server.

See the *Compatibility Matrixes* on the VMware vSphere documentation Web site.

vSphere Client Software Requirements

Make sure that your operating system supports the vSphere Client.

The vSphere Client requires the Microsoft .NET 3.0 SP1 Framework. If your system does not have it installed, the vSphere Client installer installs it.

For a list of supported operating systems, see the *Compatibility Matrixes* on the VMware vSphere documentation Web site.

Support for 64-Bit Guest Operating Systems

ESX offers support for several 64-bit guest operating systems.

See the *Guest Operating System Installation Guide* for a complete list.

64-bit guest operating systems have specific hardware requirements:

- 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 Virtualization Technology (VT). Many servers that include CPUs with VT support might ship with VT disabled by default, so you must enable VT 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 64-bit VMware support, you can download the CPU Identification Utility at the VMware downloads page: http://www.vmware.com/download/shared_utilities.html.

Requirements for Creating Virtual Machines

To create a virtual machine, the ESX/ESXi host must be able to support a virtual process, a virtual chip set, and a virtual BIOS.

Each ESX/ESXi machine has the requirements shown in Table 2-6.

Table 2-6. Requirements for Creating Virtual Machines

Component	Requirements
Virtual processor	One, two, or four processors per virtual machine
	NOTE If you create a two-processor virtual machine, your ESXi machine must have at least two physical processors. For a four-processor virtual machine, your ESXi 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

Required Ports

vCenter Server requires certain ports to send and receive data.

The vCenter Server system must be able to send data to every managed host and receive data from every vSphere Client. To enable migration and provisioning activities between managed hosts, the source and destination hosts must be able to receive data from each other.

VMware uses designated ports for communication. Additionally, the managed hosts are listening for data from the vCenter Server system on designated ports. If a firewall exists between any of these elements and Windows firewall service is in use, the installer opens the ports during the installation. For custom firewalls, you must manually open the required ports. If you have a firewall between two managed hosts and you want to perform source or target activities, such as migration or cloning, you must configure a means for the managed hosts to receive data.

NOTE   In Microsoft Windows 2008, a firewall is enabled by default.

Table 2-7 lists the default ports that are required for communication between components.

Table 2-7. Required Ports

Port	Description
80	vCenter Server requires port 80 for direct HTTP connections. Port 80 redirects requests to HTTPS port 443. This is useful if you accidentally use http://server instead of https://server.
389	This port must be open on the local and all remote instances of vCenter Server. This is the LDAP port number for the Directory Services for the vCenter Server group. The vCenter Server system needs to bind to port 389, even if you are not joining this vCenter Server instance to a Linked Mode group. If another service is running on this port, it might be preferable to remove it or change its port to different port. If needed, you can run the LDAP service on any port from 1025 through 65535. If this instance is serving as the Microsoft Windows Active Directory, change the port number from 389 to an available port from 1025 through 65535.
443	The default port that the vCenter Server system uses to listen for connections from the vSphere Client. To enable the vCenter Server system to receive data from the vSphere Client, open port 443 in the firewall. The vCenter Server system also uses port 443 to listen for data transfer from the vSphere Web Access Client and other SDK clients. If you use another port number for HTTPS, you must use <ip-address>:<port> when you log in to the vCenter Server system.
636	For vCenter Linked Mode, this is the SSL port of the local instance. If another service is running on this port, it might be preferable to remove it or change its port to different port. If needed, you can run the SSL service on any port from 1025 through 65535.
902	The default port that the vCenter Server system uses to send data to managed hosts. Managed hosts also send a regular heartbeat over UDP port 902 to the vCenter Server system. This port must not be blocked by firewalls between the server and the hosts, or between hosts.
902/903	Ports 902 and 903 must not be blocked between the vSphere Client and the hosts. These ports are used by the vSphere Client to display virtual machine consoles.
8080	Web Services HTTP. Used for the VMware VirtualCenter Management Webservices.
8443	Web Services HTTPS. Used for the VMware VirtualCenter Management Webservices.

If you want the vCenter Server system to use a different port to receive vSphere Client data, see *Basic System Administration*.

To tunnel the vSphere Client data through the firewall to the receiving port on the vCenter Server system, see *Basic System Administration*. VMware does not recommended this method because it disables the vCenter Server console function.

For a discussion of firewall configuration, see the *Server Configuration Guide*.

Supported Remote Management Firmware Versions

You can use remote management applications for installing ESX or for remote management of ESX/ESXi.

Table 2-8 lists the remote management firmware versions that are supported for installing ESX 4.0 remotely.

Table 2-8. Supported Remote Management Server Models and Firmware Versions

Remote Controller Make and Model	DRAC Firmware	Java	ActiveX
DRAC 5	1.4	Not applicable	1.4.2_19
	1.45 (08.10.06)	2.1,0,14	1.6.0.50
	1.40 (08.08.22)	2,1,0,14	1.6.0_11
	1.20 (07.03.02)	1.4.2_06	2,1,0,13
	1.33	1.6.0_07	2,1,0,14
	1.32 (07.12.22)	1.4.2_13	2,1,0,13
	1.0 (06.05.12)	1.4.2_13	2,1,0,13
	1.32	1.6.0_11	2,1,0,14
	1.2	1.6.0_11	2,1,0,14
	1.45 (09.01.16)	1.6.0_11	2,1,0,14
	1.3	1.6.0_11	2,1,0,14
	1.33	1.6.0_11	2,1,0,13
DRAC 4	1.7	1.4.2_06	2,1,0,14
ILO	.26	1.6.0_11	2,1,0,14
	1.7	1.4.2_19	Not applicable
ILO2	1.91 (07/26/2009)	1.6.0_07	2,1,0,14
	1.29 (2/28/2007)	1.4.2_13	Not applicable
RSA	1.09	1.6.0_11	2,1,0,14
	1.06	1.6.0_11	2,1,0,14

Introduction to Installing ESX

<div style="text-align: right; font-size: 2em;">3</div>

These topics discuss the prerequisites and options for installing ESX.

The ESX installation includes the following components:

- ESX
- vSphere Web Access

This chapter includes the following topics:

-
-
-
-
-

Prerequisites for Installing ESX

Before you begin the installation procedure, ensure that the host meets the prerequisites.

The prerequisites are as follows:

- If ESX will not use an NTP server, make sure that the server hardware clock is set to UTC. This setting is in the system BIOS.
- Make sure the host has a supported network adapter.
- If your installation will require a network connection or if you want to test out the network settings, verify that the network cable is plugged into the Ethernet adapter that you are using for the service console. The ESX installer needs a live network connection to properly detect certain network settings, such as the host name under DHCP. IPv6 is not supported for ESX installation. Installation options that require a network connection include PXE booting the installer, accessing a remote ESX installation script, and accessing remote installation media.

About the esxconsole.vmdk

A virtual machine disk file (`.vmdk` file) stores the contents of a virtual machine's hard disk drive. A `.vmdk` file can be accessed in the same way as a physical hard disk.

In ESX 4.0, the service console's partitions are stored in a `.vmdk` file. These partitions include `/`, `swap`, `/var/log`, and all the optional partitions. The name of this file is `esxconsole–<system–uuid>/esxconsole.vmdk`. All `.vmdk` files, including the `esxconsole.vmdk`, are stored in VMFS volumes.

IMPORTANT   The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.

Options for Accessing the Installation Media, Booting the Installer, and Running the Installer

When you install ESX, you have several options that allow you to customize the process to meet the needs of your environment.

These options include how to store and access the installation media, how to boot the installer, and which mode to use when you run the installer.

By default, when you boot the ESX installer from a DVD, the DVD uses the interactive graphical mode and uses itself as the source of the installation media. You can modify the default installation process in the following ways:

- Storing and accessing the ESX installation media:
  - DVD (default)
  - FTP
  - HTTP/HTTPS (HTTPS with a proxy server is not supported.)
  - NFS
  - USB flash drive
- Booting the installer:
  - DVD (default)
  - PXE
- Running the installer:
  - Interactive graphical (default)
  - Interactive text
  - Scripted
- For scripted installation, storing and accessing the installation script:
  - Default installation script
  - FTP
  - HTTP/HTTPS
  - NFS
  - USB flash drive
  - Local disk

About ESX Evaluation Mode

Evaluation mode gives you access to all features of ESX.

The evaluation period is 60 days and begins as soon as you power on the ESX machine, even if you start in license mode initially. To make full use of the evaluation period, make an early decision on whether to use evaluation mode.

If you do not enter a vSphere license key during installation, ESX is installed in evaluation mode.

ESX Installation Options

This topic describes the methods for installing ESX and the information required for installation.

The following methods are available for installing VMware ESX software:

- Graphical mode – This is the recommended method for interactive installations.

- Text mode – Use this method if your video controller does not function properly using graphical mode.

- Scripted – An efficient way to deploy multiple hosts. See "Installing ESX Using Scripted Mode," on page 43.

NOTE   The installer for ESX 4.0 is quite different from the installer for ESX 3.x, particularly in the text and scripted installations.

Table 3-1 lists the information that you are prompted for during the installation. For future use, note the values entered. Notes are useful if you ever need to reinstall ESX and reenter the values that you originally chose.

Table 3-1. Data for ESX Installation

Data	Required or Optional	Default	Comments
Keyboard layout	Required	U.S. English	
Custom drivers	Optional	No	If you have network or storage devices that integrate with ESX software and you need to install custom drivers, you can do so during the ESX installation. Post-install, you can use vCenter Update Manager or the vSphere CLI to install custom drivers. If you PXE boot the installer, you cannot install custom drivers during the installation.
vSphere license key	Optional	None	If you do not enter a vSphere license key, ESX is installed in evaluation mode.
Network adapter for the service console	Required	A network adapter that is available and connected	Virtual machine network traffic shares this network adapter until you configure a virtual switch for another network adapter.
VLAN ID	Optional	None	Range: 0 through 4095
IP address	Optional	DHCP	You can allow DHCP to configure the network during installation. After installation, you can change the network settings.
Subnet mask	Optional	Calculated based on the IP address	
Gateway	Optional	Based on the configured IP address and subnet mask	
Primary DNS	Optional	Based on the configured IP address and subnet mask	
Secondary DNS	Optional	None	

Table 3-1. Data for ESX Installation (Continued)

Data	Required or Optional	Default	Comments
Host name	Required for static IP settings	None	vSphere Clients can use either the host name or the IP address to access the ESX host.
Install location	Required	None	Must be at least 10GB if you install the components on a single disk.
Datastore	Required in advanced setup	In the basic setup, the installer creates the /vmfs partition for the datastore.	A datastore is a partition that ESX uses to store virtual machines. This datastore is used for the service console (esxconsole.vmdk). The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.
Time zone	Required	Pacific time	
Root password	Required	None	The root password must be between 6 and 64 characters.
Additional user accounts	Optional	None	
Virtual disk partitions	Required in advanced setup	The installer creates three basic partitions: /boot, vmkcore, and VMFS. The service console VMDK file resides on the VMFS partition. The service console VMDK file contains /swap, and /var/log, by default, and any other partitions that you specify.	In the advanced setup, you can edit the location of the boot loader, edit the / (root), swap, and /var/log default partition sizes, and create additional partitions. The disk that you install the /boot partition onto must be the disk that the BIOS chooses to boot from.
Bootloader kernel options	Optional	None	In the advanced setup, you can specify kernel arguments to be written to the grub.conf file and passed to the kernel every time ESX boots.
Bootloader password	Optional	None	In the advanced setup, you can specify a bootloader password up to 30 characters.
NTP server	Optional	None. By default, if you do not enter an NTP server name or IP address, the installer uses the system date and time, which you can modify.	For text-mode and graphical-mode installations, you can enter an NTP server name at installation time. This feature is not available in scripted installation (unless you script it in a %post section). After installation, you can use the vSphere Client to configure the host to use an NTP server.

Location of the ESX Installation Media 4

Before you install ESX, you must select a location for the installation media.

The following locations are supported:

- Local DVD
- Local USB
- USB DVD drive. This is useful if you cannot burn a DVD image or the host does not have a DVD drive.
- Remote media (See "Using Remote Management Applications," on page 35).
- Remote location (media depot), accessible via HTTP/HTTPS, FTP, or NFS

This chapter includes the following topics:

- "Download the ESX ISO Image and Burn the Installation DVD," on page 23
- "Creating a Media Depot," on page 23

Download the ESX ISO Image and Burn the Installation DVD

If you do not have an ESX installation DVD, you can create one.

Procedure

1 If you are not already logged into VMware Communities, log on using your VMware store account.

2 Download the ISO image for ESX from the VMware download page at
   http://www.vmware.com/download/.

3 Burn the ISO image onto DVD media.

Creating a Media Depot

The media depot is a network-accessible location that contains the ESX installation media. You can use HTTP/HTTPS, FTP, or NFS to access the depot. The depot must be populated with the entire contents of the ESX installation DVD, preserving directory structure.

If you are performing a scripted installation, you must point to the media depot in the script by including the `install` command with the `nfs` or `url` option.

The following code snippet from an ESX installation script demonstrates how to format the pointer to the media depot if you are using NFS:

```
install nfs ––server=example.com ––dir=/nfs3/VMware/ESX/40
```

If you are performing an interactive installation instead of a scripted installation, include the askmedia boot option, which causes the installer to prompt you for the location of the media.

You can type the askmedia option at the end of the boot options list. For example:

```
Boot Options initrd=initrd.img vmkopts=debugLogToSerial:1 mem=512M askmedia
```

The boot options list appears when you boot the installer and press F2.

Booting the ESX Installer 5

You can boot the installer from the DVD using the local DVD-ROM drive, or you can PXE boot the installer.

This chapter includes the following topics:

- "Bootstrap Commands," on page 25
- "Boot the ESX Installer from the Installation DVD," on page 26
- "PXE Booting the ESX Installer," on page 27

Bootstrap Commands

Before the ESX installer Welcome screen appears, the installer displays a boot prompt where you can enter bootstrap commands to pass arguments to the installer.

When the mode selection screen appears, quickly type F2 to stop the timeout counter. If the mode selection screen times out, the default graphical mode is launched.

The supported bootstrap commands and subcommands are listed in Table 5-1.

Table 5-1. Bootstrap Commands for ESX Installation

Command	Description
askmedia	Allows you to interactively select the location of the ESX installation media. This option is required if the image is hosted at an HTTP, FTP, or NFS location.
BOOTIF	Accepts the format for the boot network adapter as supplied by PXELINUX.
gateway=<ip address>	Sets this network gateway as the default gateway during the install.
ip=<ip address>	Specifies a static IP address to be used for downloading the script and the installation media. The IPAPPEND option is also supported if you PXE boot the installer.
ks=cdrom:/<path>	Performs a scripted installation with the script at <path>, which resides on the DVD in the DVD-ROM drive.
ks=file://<path>	Performs a scripted installation with the script at <path>, which resides inside the initial ramdisk image.
ks=ftp://<server>/<path>/	Performs a scripted installation with a script located at the given URL.
ks=http://<server>/<path>	Performs a scripted installation with a script located at the given URL.

Table 5-1. Bootstrap Commands for ESX Installation (Continued)

Command	Description
ks=https://<server>/<path>	Performs a scripted installation with a script located at the given URL.
ks=nfs://<server>/<path>	Performs a scripted installation with the script located at <path> on a given NFS server.
ks=usb	Performs a scripted installation with the ks.cfg script in the root directory of the USB flash drive attached to the host. If multiple flash drives are attached, the installer cycles through each one, mounting and unmounting them until the file named ks.cfg is found.
ks=UUID:<partition–UUID>:/<path>	Performs a scripted installation with a script located on the ext partition with the given UUID.
ksdevice=<device>	Same as netdevice
nameserver=<ip address>	Specifies a domain name server as the nameserver during the install.
netdevice=<device>	Tries to use a network adapter <device> when looking for an installation script and installation media. Specify as a MAC address (for example, 00:50:56:C0:00:01). If not specified and files need to be retrieved over the network, the installer defaults to the first discovered network adapter. The IPAPPEND option is also supported if you PXE boot the installer.
netmask=<subnet mask>	Specifies subnet mask for the network interface that downloads the installation media.
noapic	Flags the kernel to use the XTPIC instead of the APIC.
text	Starts the ESX installer in text mode.
url=<url>	Looks for the installation media at the specified URL. When you are PXE booting the installer, the url= command only works with earlier versions of SYSLINUX. The command does not work with SYSLINUX/PXELINUX version 3.70 and higher.
vlanid=<vlanid>	Configures the VLAN for the network card.

Boot the ESX Installer from the Installation DVD

When you boot the installer from a DVD, you use the local DVD-ROM drive or remote media, such as iLO or DRAC.

Prerequisites

You must have an ESX installation DVD. See “Download the ESX ISO Image and Burn the Installation DVD,” on page 23.

Procedure

1   Insert the DVD in the DVD-ROM drive.

2   Use the BIOS to set the host to boot from the CD-ROM drive:

   a   Reboot the machine.

   b   Press a function key or Delete to enter the BIOS setup or boot menu for your machine.

   c   Set the CD-ROM drive as the first boot device.

3   (Optional) When the mode selection page appears, press F2 to enter boot options.

What to do next

Continue with the installation. If you are performing a scripted installation, allow the script to run.

PXE Booting the ESX Installer

The preboot execution environment (PXE) is an environment to boot computers using a network interface independently of available data storage devices or installed operating systems. These topics discuss the PXELINUX and gPXE methods of PXE booting the ESX installer.

PXE uses DHCP and Trivial File Transfer Protocol (TFTP) to bootstrap an operating system (OS) over a network.

Network booting with PXE is quite similar to booting with a DVD, but requires some network infrastructure and a machine with a PXE-capable network adapter. Most machines that are capable of running ESX have network adapters that are able to PXE boot. Once the ESX installer is booted, it works like a DVD-based installation, except that the location of the ESX installation media (the contents of the ESX DVD) must be specified.

A host first makes a DHCP request to configure its network adapter and then downloads and executes a kernel and support files. PXE booting the installer provides only the first step to installing ESX. To complete the installation, you must provide the contents of the ESX DVD either locally or on a networked server through HTTP/HTTPS, FTP, or NFS. (See Chapter 4, "Location of the ESX Installation Media," on page 23.)

About the TFTP Server, PXELINUX, and gPXE

TFTP is a light-weight version of the FTP service, and is typically used only for network booting systems or loading firmware on network devices such as routers.

Most Linux distributions come with a copy of the tftp-hpa server. You can alternatively obtain one at http://www.kernel.org/pub/software/network/tftp/.

If your TFTP server is going to run on a Microsoft Windows host, you can use tftpd32 version 2.11 or later. See http://tftpd32.jounin.net/. Previous versions of tftpd32 were incompatible with PXELINUX and gPXE.

The PXELINUX and gPXE environments allow your target machine to boot the ESX Installer. PXELINUX is part of the SYSLINUX package which can be found at http://www.kernel.org/pub/linux/utils/boot/syslinux/, although many Linux distributions include it. Many versions of PXELINUX also include gPXE. Some distributions, such as Red Hat Enterprise Linux version 5.3, include older versions of PXELINUX that do not include gPXE.

If you do not use gPXE, you might experience issues while booting the ESX installer on a heavily loaded network. This is because TFTP is not a robust protocol and is sometimes unreliable for transferring large amounts of data. If you use gPXE, only the `gpxelinux.0` binary and configuration file are transferred via TFTP. gPXE enables you to use a Web server for transferring the kernel and ramdisk required to boot the ESX installer. If you use PXELINUX without gPXE, the `pxelinux.0` binary, the configuration file, and the kernel and ramdisk are transferred via TFTP.

NOTE VMware tests PXE booting with PXELINUX version 3.63. This is not a statement of limited support.

Conceptual Overview for PXE Booting the ESX Installer

This topic provides an overview of how all the pieces fit together when you PXE boot the ESX installer.

The network infrastructure for PXE booting the installer includes the following services.

- DHCP server
- TFTP server
- PXELINUX/gPXE (SYSLINUX)
- Network Server (NFS, HTTP or FTP)

Figure 5-1 shows the flow of the interaction between the components if you are using PXELINUX with gPXE. The scripts depot and the media depot are optional. You do not need them if you are performing an interactive installation with installation media that is stored locally on a DVD or USB.

Figure 5-1. Overview for PXE Booting the ESX Installer Using PXELINUX with gPXE
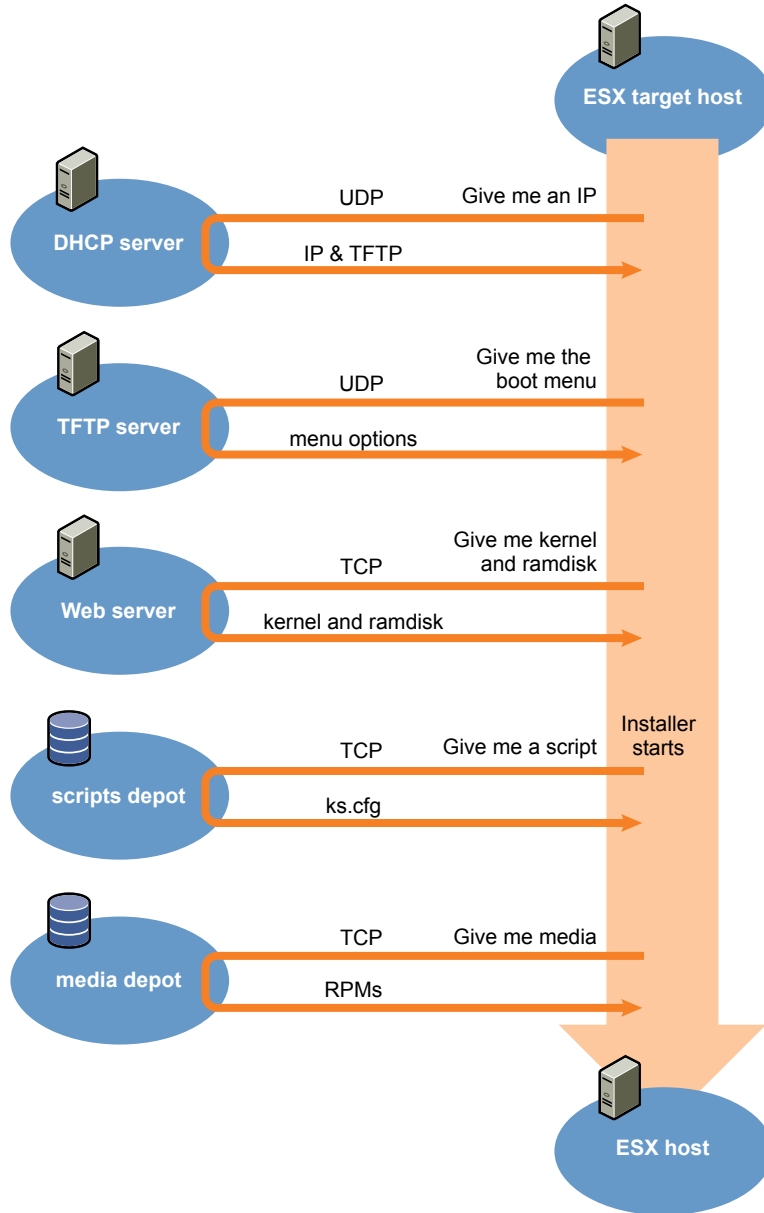
Figure 5-2 shows the flow of the interaction between the components if you are using PXELINUX without gPXE. The scripts depot and the media depot are optional. You do not need them if you are performing an interactive installation with installation media that is stored locally on a DVD or USB.

Figure 5-2. Overview for PXE Booting the ESX Installer Using PXELINUX without gPXE
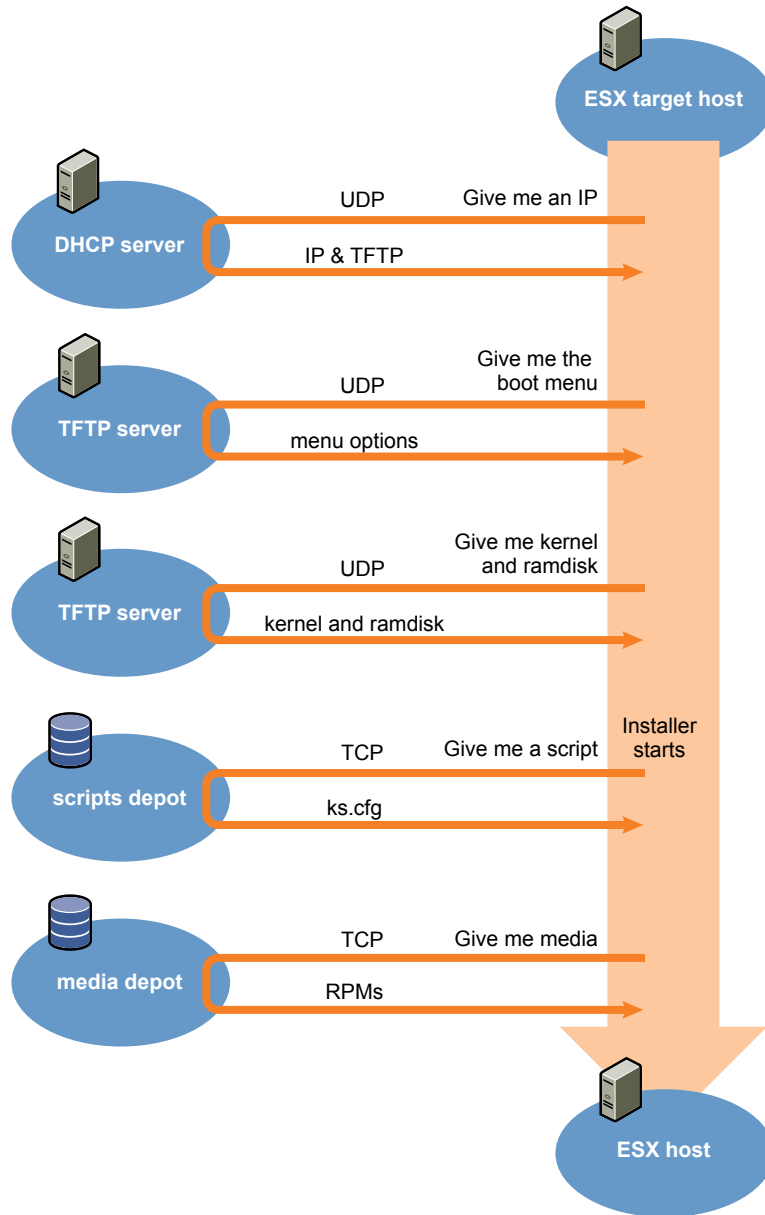
In the case presented in this document, PXE works as follows:

1   The target ESX host (the PXE client) is booted.

2   The target ESX host makes a DHCP request.

3   The DHCP server responds with the IP information and provides information about the location of a TFTP server.

4   When the client receives the information, it contacts the TFTP server asking for the file the DHCP server told it to ask for (in this case, the boot menu).

5   The TFTP server sends the boot menu, and the client executes it.

6   PXELINUX or gPXE searches for a configuration file on the TFTP server, and boots a kernel according to that configuration file. In our case, the configuration file instructs PXE to load the kernel (`vmlinuz`) and a ramdisk (`initrd.img`).

7   The client downloads the files it needs and then loads them.

8   The system boots the ESX installer.

9   The installer runs interactively or scripted, as directed by the PXE configuration file.

10   The installer uses the installation media, either from a media depot stored on the network, or locally via DVD or USB.

11   ESX is installed.

PXE Boot the ESX Installer

This procedure describes how to use a TFTP server to PXE boot the ESX installer.

Prerequisites

Your environment must have the following components:

- TFTP server that supports PXE boot

- PXELINUX

- (Optional) gPXE, which is part of the SYSLINUX package. If you have a newer version of SYSLINUX, gPXE is already built. If you are building gPXE from source, you can unpack it on most Linux machines and run the `make` command.

- For gPXE, a Web server that is accessible by your target ESX hosts

- DHCP server configured for PXE booting

- (Optional) ESX installation script

- Network adapter with PXE support on the target ESX host

- IPv4 networking (IPv6 is not supported for PXE booting.)

Procedure

1   On a Linux machine, install TFTP server software that supports PXE booting.

   If your environment does not have a TFTP server, you can use one of the packaged appliances on the VMware Marketplace. If you do this, note that certain functions, such as correct operation of the text menu system, are operating system dependent.

2   Put the `menu.c32` file in an accessible place in a supported location.

   - For gPXE, put the `menu.c32` file on a Web server. For example, you can use the httpd package in RHEL5, which contains Apache. The HTML documents are placed in `/var/www/html`, which is where you can copy `menu.c32`.

   - For PXELINUX without gPXE, put the `menu.c32` file on a TFTP server.

3   On the Linux machine, install PXELINUX.

   PXELINUX is included in the SYSLINUX package. Extract the files, locate the file `pxelinux.0` or `gpxelinux.0`, and copy it to the `/tftpboot` directory on your TFTP server.

4   Configure the DHCP server.

   The DHCP server must send the following information to your client hosts:

   - The name or IP address of your TFTP server.

   - The name of your initial boot file. This is `pxelinux.0 gpxelinux.0`.

   For more information and an example, see "Sample DHCP Configuration," on page 31.

5   Create the kernel image and ramdisk directory by copying the `vmlinuz` and `initrd.img` files from the `/isolinux` directory on the ESX installation DVD to a supported location.

- Web server, if you are using gPXE.

- `/tftpboot` directory on the TFTP server, if you are using PXELINUX without gPXE.

For more information and an example, see "Kernel Image and Ramdisk Directory," on page 35.

6   Create the `/tftpboot/pxelinux.cfg` directory on your TFTP server.

7   Create a PXE configuration file.

This file defines how the host boots when no operating system is present.

The PXE configuration file references the location of the `vmlinuz` and `initrd.img` files in the kernel image and ramdisk directory.

For more information and an example, see "Creating a PXE Configuration File," on page 32.

8   Save the PXE configuration file in `/tftpboot/pxelinux.cfg` on the TFTP server.

You now have an environment that you can using for PXE booting the ESX installer.

Sample DHCP Configuration

To PXE boot the ESX installer, the DHCP server must send the address of the TFTP server and a pointer to the `pxelinux.0` or `gpxelinux.0` directory.

The DHCP server is used by the target machine to obtain an IP address. The DHCP server needs to know if the target machine is allowed to boot and the location is of PXELINUX binary (which usually resides on a TFTP server). When the target machine first boots, it broadcasts a packet across the network requesting this information to boot itself, and the DHCP server responds.

> **CAUTION**   Setting up a new DHCP server is not recommended if your network already has one. If multiple DHCP servers respond to DHCP requests, machines can obtain incorrect or conflicting IP addresses, or can fail to receive the proper boot information. Seek the guidance of a network administrator in your organization before setting up a DHCP server.

Many DHCP servers are capable of PXE booting hosts. The following samples are for ISC DHCP version 3.0, which is included with many Linux distributions. If you are using a version of DHCP for Microsoft Windows, refer to the DHCP server documentation to determine how to pass the next-server and filename arguments to the target machine.

gPXE Example

This sample shows how to configure the ISC DHCP server to enable gPXE.

```
allow booting;
allow bootp;
# gPXE options
option space gpxe;
option gpxe-encap-opts code 175 = encapsulate gpxe;
option gpxe.bus-id code 177 = string
class "pxeclients" {
   match if substring(option vendor-class-identifier, 0, 9) = "PXEClient";
   next-server <TFTP server address>;
   if not exists gpxe.bus-id {
      filename "/gpxelinux.0";
   }
}
```

```
subnet <Network address> netmask <Subnet Mask> {
   range <Starting IP Address> <Ending IP Address>;
}
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the gpxelinux.0 binary on the TFTP server. The IP address assigned will be in the range defined in the subnet section of the configuration file.

PXELINUX (without gPXE) Example

This sample shows how to configure the ISC DHCP server to enable PXELINUX.

```
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.sample
#
ddns-update-style ad-hoc;
allow booting;
allow bootp;
class "pxeclients" {
   match if substring(option vendor-class-identifier, 0, 9) = "PXEClient";
   next-server 192.168.48.10;
   filename = "pxelinux.0";
}
subnet 192.168.48.0 netmask 255.255.255.0 {
   range 192.168.48.100 192.168.48.250;
}
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the pxelinux.0 binary on the TFTP server. The IP address assigned will be in the range defined in the subnet section of the configuration file.

Creating a PXE Configuration File

The PXE configuration file defines the menu displayed to the target ESX host as it boots up and contacts the TFTP server.

The TFTP server is always listening for PXE clients on the network. When it detects that a PXE client is asking for PXE services, it sends the client a network package that contains this boot menu.

Each PXE boot menu selection points to the location of the kernel and ramdisk files for ESX. You can create one PXE configuration file for each target ESX host, or create one PXE configuration file and name it default.

Following is an example of a PXE configuration file that you might use with PXELINUX without gPXE. See also the /isolinux/isolinux.cfg file on the ESX installation DVD.

```
default menu.c32
menu title ESX Boot Menu
timeout 30

##PXE boot the installer and perform an interactive installation
##with local media (RPM files)

label local
menu label Interactive Local Installation
kernel http://<server>/vmlinuz
append initrd=http://<server>/initrd.img vmkopts=debugLogToSerial:1 mem=512M quiet
```

```
##PXE boot the installer and perform a scripted installation with
##local or remote media (RPM files), as specified in the installation script

label scripted
menu label Scripted Installation
kernel http://<server>/vmlinuz
append initrd=http://<server>/initrd.img vmkopts=debugLogToSerial:1 mem=512M ks=nfs://
10.20.118.55/ks.cfg


##PXE boot the installer and perform an interactive installation
##with the media (RPM files) at a remote location

label network_rpm
menu label Interactive Installation with RPM files on the network
kernel http://<server>/vmlinuz
append initrd=http://<server>/initrd.img vmkopts=debugLogToSerial:1 mem=512M askmedia
```

Following is an example of a PXE configuration file that you might use with PXELINUX without gPXE. See also the /isolinux/isolinux.cfg file on the ESX installation DVD.

```
default menu.c32
menu title ESX Boot Menu
timeout 30

##PXE boot the installer and perform an interactive installation
##with local media (RPM files)

label local
menu label Interactive Local Installation
kernel test/vmlinuz
append initrd=test/initrd.img vmkopts=debugLogToSerial:1 mem=512M quiet

##PXE boot the installer and perform a scripted installation with
##local or remote media (RPM files), as specified in the installation script

label scripted
menu label Scripted Installation
kernel test/vmlinuz
append initrd=test/initrd.img vmkopts=debugLogToSerial:1 mem=512M ks=nfs://10.20.118.55/ks.cfg


##PXE boot the installer and perform an interactive installation
##with the media (RPM files) at a remote location

label network_rpm
menu label Interactive Installation with RPM files on the network
kernel test/vmlinuz
append initrd=test/initrd.img vmkopts=debugLogToSerial:1 mem=512M askmedia
```

Required Files

In the PXE configuration file, you must include paths to the following files:

- `vmlinuz` is the boot loader kernel code.

- `initrd.img` is the boot ramdisk.

The path `test/` used in the example is relative to `/tftpboot`. The actual path is `/tftpboot/test/` on the TFTP server.

Installation Mode

`ks=nfs://10.20.118.55/ks.cfg` is the path to the ESX installation script. In a scripted installation, your script includes all the necessary responses to fill in the blanks, including the location of the installation media.

In an interactive installation, omit the ks= option. If you are performing an interactive installation with the installation media at a remote location, include the askmedia boot option, which causes the installer to prompt you for the location of the installation media.

ESX 3.x supported a hybrid installation. In this mode, you could supply an incomplete ESX installation script, and the installer prompts you for the missing parts. ESX 4.0 does not support this. You either have all responses in your ESX installation script or you have no script.

IPAPPEND

For scripted installations, the IPAPPEND option specifies that the same network adapter the machine boots from is also used for connecting to the network. When you include the IPAPPEND option in the PXE configuration file, omit the --device option to the installation script `network` command. The IPAPPEND option has no impact on interactive installations. The following snippet shows how to include the IPAPPEND option in the PXE configuration file:

```
label Installer
menu default
kernel http://<server>/vmlinuz
append initrd=http://<server>/initrd.img mem=512M vmkopts=debugLogToSerial:1 ks=nfs://
10.20.118.55/ks.cfg
IPAPPEND 2
```

For the IPAPPEND flag_val, use IPAPPEND 2. IPAPPEND 1 is not required.

If you omit the `network` --device option from the installation script, the IPAPPEND option from the PXE configuration file, and the `netdevice` bootstrap command, the installer uses the first plugged in network adapter.

Filename for the PXE Configuration File

For the filename of the PXE configuration file, choose one of the following:

- `01-<mac_address_of_target_ESX_host>`. For example, `01-23-45-67-89-0a-bc`

- The target ESX host IP address in hexadecimal notation.

- `default`

The initial boot file, `pxelinux.0` tries to load a PXE configuration file. First it tries with the MAC address of the target ESX host, prefixed with its ARP type code (01 for Ethernet). If that fails, it tries with the hexadecimal notation of target ESX system IP address. Ultimately, it tries to load a file named `default`.

For example, you might save the file on the TFTP server at `/tftpboot/pxelinux.cfg/01-00-21-5a-ce-40-f6`. The MAC address of the network adapter on the target ESX host is 00-21-5a-ce-40-f6.

File Location for the PXE Configuration File

Save the file in `/tftpboot/pxelinux.cfg/` on the TFTP server.

Kernel Image and Ramdisk Directory

The kernel image and ramdisk directory contains files that that must be loaded across the network to enable PXE booting of the ESX installer. `vmlinuz` is a Linux kernel used for booting. The kernel is located in the `initrd.img` file.

The kernel image and ramdisk directory is located on a Web server (for gPXE) or on the TFTP server in the `/tftpboot` directory (for PXELINUX without gPXE. For example, the directory might be at `/tftpboot/esx/` and contain the following files:

```
-r--r--r-- 1 root root 1922578 Nov 12 05:51 initrd.img
-r--r--r-- 1 root root 966633 Nov 12 05:51 vmlinuz
```

These files come from the ESX installation DVD, under the `/isolinux` directory.

You reference the `vmlinuz` and `initrd.img` files from the PXE configuration file. The following code snippet shows how you reference `vmlinuz` and `initrd.img` in the PXE configuration script:

```
kernel esx/vmlinuz
append initrd=esx/initrd.img ...
...
```

Using Remote Management Applications

Remote management applications allow you to install ESX on server machines that are in remote locations.

Remote management applications supported for installation include Integrated Lights-Out (iLO), Dell Remote Access Card (DRAC), IBM management module (MM), and Remote Supervisor Adapter II (RSA II). For a list of currently supported server models and remote management firmware versions, see "Supported Remote Management Firmware Versions," on page 17.

Generally, administrators use remote management applications to perform GUI-based, remote installations of ESX. However, you can use a remote management application for scripted installations as well.

If you use remote management applications to install ESX, be careful using the virtual CD feature. The virtual CD might encounter corruption problems with systems or networks under load. If you must use this method, run the media test provided by the ESX installer. If a remote installation from an ISO image fails, complete the installation from the physical DVD media.

VMware recommends that instead of using the virtual CD media for the entire installation, you boot from the virtual CD, enter the askmedia option in the ESX installer boot screen, and then complete the installation with NFS, HTTP/HTTPS, or FTP. The ESX ISO must be mounted in a place that is accessible by one of these network installation methods. This approach is much more reliable than attempting the entire installation via virtual media.

If you PXE boot the installer, you cannot install custom drivers during the ESX installation. If you choose to boot the installer from the DVD and install custom drivers during the ESX installation, the drive that you use for the ESX DVD is the drive that you must use for the custom driver CD/DVD. If the drive is a USB drive (including an emulated USB drive), you must not detach the drive during the installation procedure. If the ESX DVD is an ISO image, the custom driver CD/DVD must be an ISO image as well.

Installing VMware ESX

<div align="right" style="font-size:3em">**6**</div>

You have multiple options for installing ESX. You can install ESX interactively or by using a script. For interactive installation, you can use graphical mode or text mode.

This chapter includes the following topics:

Install ESX Using the Graphical Mode

The graphical mode is the recommended installation method if you are installing ESX for the first time. The graphical mode runs by default if you do not select an alternate installation method.

Prerequisites

See "Prerequisites for Installing ESX," on page 19.

Procedure

1 Choose a method for booting the installer.

- Boot from the DVD using the local CD-ROM drive.

- PXE boot the installer.

2 Select **Install ESX in graphical mode**.

3 (Optional) Press F2 and type boot options for the installer.

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

4 Click **Next** to continue.

5 Select **I accept the terms of the license agreement** and click **Next**.

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

Note If the alignment of the license agreement screen is skewed to the left, you might need to auto-adjust your host monitor.

---

6 Select your keyboard type from the list and click **Next**.

7   Select whether to install custom drivers with the ESX installation.

You might need custom drivers if your system is not listed in the *Hardware Compatibility Guide* and has a network or storage device that was not originally compatible with ESX 4.0.

If you PXE booted the ESX installer, you cannot install custom drivers during the installation process. You can install them after the ESX installation is complete.

■   Select **Yes** and click **Add** to install custom drivers. The installer prompts you to insert the media containing the custom drivers. After you add the custom drivers to the list, the installer prompts you to reinsert the ESX installation DVD and continue with the installation. Click **Next** to continue.

■   Select **No** if you do not need to install custom drivers. You can install custom drivers after the ESX installation is complete, using other command-line and GUI tools available to you, such as the vSphere CLI and vCenter Update Manager. Click **Next** to continue.

8   Click **Yes** to load the required ESX drivers.

9   Configure ESX licensing.

■   Select **Enter a serial number now**, enter the vSphere license key, and click **Next**.

■   Select **Enter a license key later** and click **Next**. This choice allows you to evaluate ESX (or enter a vSphere license key later using the vSphere Client).

10   Select the network adapter for the ESX service console.

Virtual machine network traffic shares this network adapter until you configure a virtual switch for another network adapter. You can configure other network adapters at a later time from the vSphere Client.

11   If the adapter is connected to a VLAN, select **This adapter requires a VLAN ID**, enter a VLAN ID number between 0 and 4095, and click **Next**.

12   Configure the network settings.

VMware recommends that you use a static IP address to simplify client access. If you want to use static settings but you do not have the required information, you can use DHCP for the installation and configure static settings after you consult with your network administrator.

For the host name, type the complete host name including the domain. This option is available only if you use a static IP address.

13   (Optional) Click **Test these settings** to test the network interface.

14   (Optional) Select the location of the unpacked ESX installation ISO image.

These options appear if you entered the `askmedia` bootstrap command at the mode selection screen. You can specify one of the following locations:

■   DVD or USB (You can select a CD-ROM drive other than the one you might be using for booting the installer.)

■   Network file system (NFS) server and a directory path.

■   HTTP or HTTPS URL

■   FTP URL

15 Select a setup option.

Option	Description
Standard Setup	The installer configures the default partitions on a single hard drive or LUN where you install ESX. The default partitions are sized based on the capacity of the hard drive or LUN.
Advanced Setup	Allows you to specify `esxconsole.vmdk` partition settings, kernel options, and a bootloader location and password. If you leave the **Configure boot loader automatically** option selected, the installer places the boot loader in the master boot record (MBR).

16 Select a location to install ESX.

⚠ CAUTION   The installer erases all content on the selected storage device.

Installing ESX on a USB device is not supported.

Click **Next** and click **OK** to confirm your selection.

17 Configure advanced options.

a Configure a location for the VMFS datastore to store the service console.

■ **Create new datastore** – Select the same disk as ESX or select another disk. If you select another disk, the disk used for the ESX location contains only the `/boot` and `vmkcore` partitions, and the rest of the disk is unpartitioned. The second disk is formatted as a single VMFS partition that spans the entire disk.

You can create additional partitions post-install, using the vSphere Client.

■ **Use existing datastore** – Select an existing datastore available to the host.

VMFS2 volumes are not recognized by ESX 4.0.

The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.

b Create new partitions and edit or delete the default partitions.

VMware recommends that you retain the `/var/log` partition of 2000MB.

18 Configure advanced bootloader options.

The Bootloader Options page appears if you deselected the **Configure boot loader automatically** check box.

a Enter bootloader kernel arguments.

The installer writes the arguments to the `grub.conf` file and passes them to the ESX kernel every time ESX boots.

b Enter an optional bootloader password. It can be up to 30 characters.

c Select where the GRUB bootloader is installed.

By default, the GRUB bootloader is installed in the MBR. Use this option for most installations. For legacy hardware that stores BIOS information in the MBR, click **Install GRUB on the first partition of the disk, instead of the Master Boot Record**.

19 Configure the time zone.

20   Configure the date and time settings.

- Select **Automatically** and enter the IP address or host name of an NTP server.

- Select **Manually** to use the machine date and time detected by the installer or to set the date and time yourself. If you select **Manually** and you do not have a functioning mouse, you can change the calendar month and year by using Ctrl-left-arrow and Ctrl-right-arrow for the month, and Ctrl-up-arrow and Ctrl-down-arrow for the year.

21   Enter a root password.

It must contain between 6 and 64 characters.

22   (Optional) Create additional users by clicking **Add**.

23   Confirm your installation configuration and click **Next**.

If an installation error occurs at this point, the ISO image might be invalid or there might be something wrong with the DVD media. To troubleshoot, try the ISO download process again, make sure the DVD is in working order, and make sure the DVD drive and DVD media type are compatible. When you retry the installation, perform the media check operation. Alternatively, use another media access option, such as HTTP.

24   Click **Next** and then click **Finish** to exit the installer and reboot the host.

25   During reboot, press the key required to enter your machine's BIOS setup or boot menu

This key is often a function key or Delete.

26   Set the first boot device to be the drive on which you installed ESX.

After installation, a `esxconsole‑<system‑uuid>/esxconsole.vmdk` file is created in a VMFS volume. The `/`, `swap`, `/var/log`, and any of the optional partitions are stored in the `esxconsole.vmdk` file.

After you install ESX and reboot the host, you can log in to the service console to read the installation log at `/var/log/esx_install.log`.

NOTE   In previous releases of ESX, if the system did not boot up after installation, one troubleshooting approach was to mount the partitions for debugging. For ESX 4.0, mounting the partitions would not be helpful in resolving the issue. If after installation the system does not boot up, the most likely cause is that the BIOS is configured to boot from the wrong disk.

Install ESX Using the Text Mode

Use the text interface if your video controller does not function properly when you use graphical mode.

Prerequisites

See "Prerequisites for Installing ESX," on page 19.

Procedure

1   Choose a method for booting the installer.

- Boot from the DVD using the local DVD-ROM drive.

- PXE boot the installer.

2   Select **Install ESX in text mode**.

3   (Optional) Press F2 and type boot options for the installer.

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

4   Enter **1** to continue.

5   Select a keyboard model.

- To accept the default US English, enter **1**.

- To configure the keyboard, enter **2** and enter the number that corresponds to your keyboard model.

6   Enter **accept** to accept the VMware license agreement.

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

7   Select whether to install custom drivers with the ESX installation.

You might need custom drivers if your system is not listed in the *Hardware Compatibility Guide* and has a network or storage device that was not originally compatible with ESX 4.0.

If you PXE booted the ESX installer, you cannot install custom drivers during the installation process. You can install them after the ESX installation is complete.

- Enter **1** to install custom drivers with the ESX installation. If you enter **1**, the installer prompts you to insert the media containing the custom drivers. After you add the custom drivers, the installer prompts you to reinsert the ESX installation DVD and continue with the installation.

- Enter **2** if you do not need to install custom drivers.

You can install custom drivers after the ESX installation is complete, using other command-line and GUI tools available to you, such as the vSphere CLI and vCenter Update Manager.

8   Enter **1** to load the ESX drivers and continue.

9   Configure ESX licensing.

- Enter **1** to enter the vSphere license key now.

- Enter **2** to evaluate ESX and enter a vSphere license key later using the vSphere Client.

10   Select the network adapter for the ESX service console. Virtual machine network traffic shares this network adapter until you configure a virtual switch for another network adapter. You can configure network adapters later from the vSphere Client.

Accept the Default Network Adapter and Leave the VLAN ID Unassigned	Select a Network Adapter and Assign a VLAN ID	
Enter 1.	a	Enter 2.
	b	Enter a number that corresponds to a network adapter.
	c	Optionally, enter 1 to assign a VLAN ID. Otherwise, enter 2.
	d	Enter a VLAN ID number between 0 and 4095.

11   Configure the network settings. VMware recommends that you use a static IP address to simplify client access. If you want to use static settings but you do not have the required information, you can use DHCP for the installation and configure static settings after you consult with your network administrator.

- Enter **1** to keep the automatic DHCP settings.

- Enter **2** to configure the IP settings. For the host name, type the complete host name including the domain.

12   Select the location of the ESX installation ISO image.

These options appear if you entered the **askmedia** bootstrap command at the mode selection screen.

- Enter **1** to specify DVD or USB media. You can select a DVD-ROM drive other than the one you might be using to boot the installer.

- Enter **2** to specify a network file system (NFS) server and a directory path.

- Enter **3** to specify an HTTP or HTTPS URL.

- Enter **4** to specify an FTP URL.

13 Select a setup option.

- Enter **1** for a basic setup that configures the default partitions on a single hard drive or LUN. The default partitions are sized based on the capacity of the hard drive or LUN.

- Enter **2** for an advanced setup that allows you to specify `esxconsole.vmdk` partition settings, kernel options, and a bootloader location and password.

14 Select a location to install ESX.

The installer erases all content on the selected storage device. Installing ESX on a USB device is not supported.

15 (Optional) Configure a location for the VMFS datastore partition for the service console.

- Enter **1** to create a new datastore. For the datastore location, enter **1** to select the same disk as ESX, or enter **2** to select another disk.

  If you select another disk for the VMFS partition, the ESX disk will contain only the `/boot` and `vmkcore` partitions, with the remainder of the disk unpartitioned. The VMFS disk will be formatted as a single partition that spans the entire disk.

  You can create additional partitions post-install, using the vSphere Client.

- Enter **2** to select an existing datastore available to the host.

  VMFS2 volumes are not recognized by ESX 4.0.

The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.

16 (Optional) Name the VMFS datastore.

- Enter **1** to keep the default name, `Storage1`.

- Enter **2** to change the name.

17 (Optional) Change the partition layout of the service console.

- Enter **1** to keep the default partition layout. You can configure partitions later using the vSphere Client.

- Enter **2** to create, edit, and delete partitions.

18 (Optional) Enter **1** to specify kernel arguments for the GRUB bootloader. To skip this option, enter **2**. The software writes the arguments to the `grub.conf` file and passes them to the ESX kernel every time ESX boots.

19 (Optional) Enter **1** to specify a bootloader password. It can be up to 30 characters. To skip this option, enter **2**.

20 Enter **1** to keep the default timezone. Enter **2** to configure the timezone.

21 Configure the date and time settings.

- Enter **1** to specify an NTP server.

- Enter **2** to configure the date and time manually. This option allows you to use the machine date and time detected by the installer or set the date and time yourself.

22 Enter a root password. It must contain between 6 and 64 characters.

23   Enter **1** to confirm your installation configuration.

If an installation error occurs at this point, the ISO image might be invalid or there might be something wrong with the DVD media. To troubleshoot, try the ISO download process again, make sure the DVD is in working order, and make sure the DVD drive and DVD media type are compatible. When you retry the installation, perform the media check operation. Alternatively, use another media access option, such as HTTP.

24   Enter **1** to exit the installer and reboot the host.

25   During reboot, press the key required to enter your machine's BIOS setup or boot menu.

This key is often a function key or Delete.

26   Set the first boot device to be the drive on which you installed ESX.

After installation, an `esxconsole–<system–uuid>/esxconsole.vmdk` file is created in a VMFS volume. The `/`, `swap`, `/var/log`, and any of the optional partitions are stored in the `esxconsole.vmdk` file.

After you install ESX and reboot the host, you can log in to the service console to read the installation log at `/var/log/esx_install.log`.

NOTE   In previous releases of ESX, if the system did not boot up after installation, one troubleshooting approach was to mount the partitions for debugging. For ESX 4.0, mounting the partitions would not be helpful in resolving the issue. If after installation the system does not boot up, the most likely cause is that the BIOS is configured to boot from the wrong disk.

Installing ESX Using Scripted Mode

You can quickly deploy ESX hosts using scripted, unattended installations. Scripted installations provide an efficient way to deploy multiple hosts.

The installation script contains the installation settings for ESX. You can apply the script to all your hosts that will have a similar configuration.

Scripted installations include the following steps:

1   Create a script using the supported commands.

2   Edit the installation script as needed to change settings that are unique for each host.

3   Run the scripted installation.

The installation script can reside in one of the following locations:

- Default installation script
- FTP
- HTTP/HTTPS
- NFS
- USB flash drive
- Local disk

Approaches for Scripted Installation

You can install onto multiple machines using a single script for all of them or using a separate script for each machine.

One of the settings that you can configure in a script is the IP setting, which can be static IP or DHCP for the host on which you are installing ESX. Choose one of the following approaches:

■ Create multiple scripts, each containing unique network identification information. The unique network information includes the static IP address and host name of each ESX host.

■ Create one script (or use a default script) that uses DHCP to set up multiple ESX hosts. After you complete a scripted installation, you can then configure each ESX host separately to assign a unique host name and IP address. VMware recommends that you use static IP addresses.

The IPAPPEND PXE configuration option specifies that the same network adapter the machine boots from is also used for connecting to the network. See "IPAPPEND," on page 34.

About Installation Scripts

The installation script is a text file, for example `ks.cfg`, that contains supported commands.

The command section of the script contains the options specified for the ESX installation. This section is required and must appear first in the script.

About Default Installation Scripts

Default installation scripts simplify the task of using scripted mode to perform ESX installations.

Instead of writing a script, you can use the following default scripts:

■ After your first interactive installation of ESX, the installer creates a `/root/ks.cfg` script in the ESX filesystem. This script reflects the choices you made in the interactive installation. If you perform a second interactive installation on the same host with choices that differ from the first, `/root/ks.cfg` is overwritten with a new version.

■ The installation media contains the following default installation scripts:

ks-first-safe.cfg	Installs ESX on the first detected disk and preserves the VMFS datastores on the disk.
ks-first.cfg	Installs ESX on the first detected disk.

When you install ESX using `ks-first-safe.cfg` or `ks-first.cfg`, the default root password is `mypassword`.

Default ks-first.cfg Script

The ESX installer comes with a default installation script that performs a standard installation to the first hard drive. The default `ks-first.cfg` script reformats the `/dev/sda` disk and sets up default partitioning.

This default script runs if you select the **ESX Scripted Install to first disk (overwrite VMFS)** option in the boot options menu.

You cannot modify the default script on the installation media. If you run the default script, the root password is `mypassword`. After the installation, you can log in to the ESX host and modify the default settings using the vSphere Client.

The default script contains the following commands:

```
#root Password
rootpw --iscrypted $1$MpéRëÈíÌ$n9sgFQJweS1PeSBpqRRu..
# Authconfig
authconfig --enableshadow --enablemd5
# BootLoader (Use grub by default.)
bootloader --location=mbr
# Timezone
timezone America/Los_Angeles --utc
#Install
install cdrom
#Network install type
network --device=MAC_address --bootproto=dhcp
#Keyboard
keyboard us
#Reboot after install?
reboot
# Clear partitions
clearpart --firstdisk
# Partitioning
part /boot --fstype=ext3 --size= --onfirstdisk
part storage1 --fstype=vmfs3 --size=10000 --grow --onfirstdisk
part None --fstype=vmkcore --size=100 --onfirstdisk
# Create the vmdk on the cos vmfs partition.
virtualdisk cos --size=5000 --onvmfs=storage1
# Partition the virtual disk.
part / --fstype=ext3 --size=0 --grow --onvirtualdisk=cos
part swap --fstype=swap --size=256 --onvirtualdisk=cos
#VMware Specific Commands
accepteula
serialnum --esx=XXXXX-XXXXX-XXXXX-XXXXX-XXXXX
```

Perform a Scripted Installation

This procedure describes the steps for running a custom or default script.

Prerequisites

See "ESX Hardware Requirements," on page 11.

Procedure

1   Choose a method for booting the installer.

   - Boot from the DVD using the local DVD-ROM drive.

   - PXE boot the installer.

2   When the mode selection page appears, press F2.

3   From the boot options list, select a scripted install option.

Scripted Install Option	Description
ESX Scripted Install using USB ks.cfg and customize the ks= option in the boot options list.	To specify a custom script that is not located on the USB: a Select the USB option as a template. b Customize the ks= option to specify the actual name and location of the custom script. The script must be located at one of the supported locations. See Step 4.
ESX Scripted Install using USB ks.cfg	Custom installation script located on a USB device attached to the machine. For this option, the script filename must be `ks.cfg`.
ESX Scripted Install to first disk	Default installation script included with the ESX media. You cannot customize this script. The default root password is `mypassword`.
ESX Scripted Install to first disk (overwrite VMFS)	Default installation script included with the ESX media. You cannot customize this script. The default root password is `mypassword`.

4   (Optional) At the end of the boot options list, enter a `ks=` command.

ks= Option	Description
`ks=cdrom:/ks.cfg`	Installation script is located on the DVD-ROM drive attached to the machine.
`ks=file://<path>/ks.cfg`	Installation script is at <path> which resides inside the initial ramdisk image.
`ks=ftp://<server>/<path>/ks.cfg`	Installation script is located at the given URL.
`ks=http://<server>/<path>/ks.cfg`	Installation script is located at the given URL.
`ks=nfs://<server>/<path>/ks.cfg`	Installation script is located at <path> on a given NFS server.

5   Press Enter.

The ESX installation proceeds, using the options that you specified.

Installation Script Commands

Review the commands that are supported in ESX installation scripts.

accepteula or vmaccepteula (required)

Accepts the ESX license agreement.

autopart (optional)

Compared to kickstart, the behavior of the ESX 4.0 `autopart` command is significantly different. Carefully edit the `autopart` command in your existing scripts.

Creates the default partitions on the disk. Not required if you include the `part` or `partition` command.

`--disk=` or `--drive=`	Specifies the disk to partition. For the accepted disk name formats, see "Disk Device Names," on page 54.
`--firstdisk=`	(Line break is for formatting purposes.)
`<disk-type1>,` `[<disk-type2>,...]`	Partitions the first non-USB disk found. This is the same disk as found by the `clearpart --firstdisk` command.

You can add an optional string argument to the --firstdisk flag to select the disk types. The strings that you can use are as follows:

- local
- remote
- Device driver name in the vmkernel

You can combine multiple values in a comma-separated list to concatenate other matches onto the list of matches. For example, --firstdisk=local,remote selects the first detected local disk or, if none are available, the first remote disk. This is the default behavior. To prefer a disk with the device driver named mptspi over any other local disks, use --firstdisk=mptspi,local.

--onvmfs=	Partitions only the service console VMDK and not the physical disk. The argument is the VMFS volume name where the VMDK should be placed. The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.
--extraspace=	Specifies the amount of extra space to add to the / (root) partition. The size is given in megabytes (MB). Must be greater than 0.
--vmdkpath=	Species the path for the VMDK file. Takes the same value format as the `virtualdisk`--path= option.

auth or authconfig (optional)

Sets up authentication for the system. Hesiod arguments are not supported.

If you omit this command, MD5-based and shadow passwords are enabled by default.

--disablemd5	Disables MD5-based passwords.
--disableshadow	Disables shadow passwords.
--enablemd5 (default)	Enables MD5-based passwords.
--enablenis	Enables NIS support. Requires nisdomain and nisserver.
--nisdomain=<domain>	Sets the NIS domain. Requires --enablenis.
--nisserver=<server>	Sets the NIS server (broadcasts by default). Requires --enablenis.
--useshadow or --enableshadow (default)	Enables shadow password file.
--enablekrb5	Enables Kerberos 5 to authenticate users.
--krb5realm=	Specifies the Kerberos 5 realm to which your system belongs.
--krb5kdc=	Specifies the KDCs that serve requests for the realm. Separate the names of multiple KDCs with commas.
--krb5adminserver=	Specifies the KDC in your realm that is also running the KADM5 administration server.
--enableldap	Enables LDAP.
--enableldapauth	Enables LDAP as an authentication method. Requires --enableldap.
--ldapserver=	Specifies the name of the LDAP server. Requires --enableldap.

--ldapbasedn=	Specifies the distinguished name in your LDAP directory tree under which user information is stored. Requires --enableldap.
--enableldaptls	Enables transport layer security lookups. Requires --enableldap.
--enablead	Enables active directory authentication. Requires --addomain and --addc.
--addomain	Active directory domain name. Requires --enablead.
--addc	Active directory domain controller. Requires --enablead.

bootloader (optional)

Sets up the GRUB boot loader.

--append=	Specifies extra kernel parameters for when the system is booting.
--driveorder=	Specifies which drive is first in the BIOS boot order.
--location	(Line break is for formatting purposes.)
=[mbr|partition|none]	Specifies where the boot loader is installed. The values are: mbr for the master boot record, partition for the first sector of the partition with the VMnix kernel, or none to not install the boot loader. If you omit the location option, the default location is the MBR.
--md5pass=	Sets the GRUB bootloader password with the md5 encrypted password.
--password=	Sets the GRUB boot loader password.
--upgrade	Upgrades the existing boot loader configuration and preserves existing entries.

clearpart (optional)

Compared to kickstart, the behavior of the ESX 4.0 clearpart command is significantly different. Carefully edit the clearpart command in your existing scripts.

Removes partitions from the system before creating new partitions.

--all	Removes all partitions from the system.
--drives=	Specifies which drives to clear partitions from. For the accepted drives, see Table 6-1.
--alldrives	Ignores the --drives= requirement and allows clearing of partitions on every drive.
--ignoredrives=	Removes partitions on all drives except those specified. Required unless the --drives= or --alldrives flag is specified.
--overwritevmfs	Overwrites VMFS partitions on the specified drives. Required if the disk contains a VMFS partition.
--initlabel	Initializes the disk label to the default for your architecture.
--firstdisk=	(Line break is for formatting purposes.)
<disk-type1>, **[<disk-type2>,...]**	Clears partitions on the first non-USB disk found. This is the same disk as found by autopart --firstdisk command.

You can add an optional string argument to the --firstdisk flag to select the disk types. The strings that you can use are as follows:

- local

- remote

- Device driver name in the vmkernel

You can combine multiple values in a comma-separated list to concatenate other matches onto the list of matches. For example, --firstdisk=local,remote selects the first detected local disk or, if none are available, the first remote disk. This is the default behavior. To prefer a disk with the device driver named mptspi over any other local disks, use --firstdisk=mptspi,local.

dryrun (optional)

Parses and checks the installation script. Does not perform the installation.

esxlocation (optional)

Specifies an existing Linux partition to use as the /boot partition. The partition must be formatted with an ext2 or ext3 file system, be at least 1100MB, and be a primary partition.

`--disk= or --drive=`	Specifies the disk to search for an existing Linux partition that can be used as /boot. See Table 6-1 for the accepted disk name formats.
`--firstdisk=`	(Line break is for formatting purposes.)
`<disk-type1>,`	Uses the first disk that has a partition suitable to be the /boot partition. Supports
`[<disk-type2>, ...]`	the same argument format as the `autopart` command.
`--uuid=<UUID>`	Specifies a particular partition using the partition's ext2 UUID.
`--clearcontents`	Removes any files on the partition.

firewall (optional)

Compared to kickstart, the behavior of the ESX 4.0 `firewall` command is significantly different. Carefully edit the `firewall` command in your existing scripts.

Configures firewall options. All nonessential ports are blocked by default.

`--allowIncoming`	Opens all incoming ports on the system.
`--allowOutgoing`	Opens all outgoing ports on the system.

firewallport (optional)

Specifies firewall ports to allow or disallow connections.

`--open`	Allows the specified port to pass through the firewall.
`--close`	Disallows the specified port to pass through the firewall.
`--port=<port>`	Specifies ports allowed or disallowed through the firewall.
`--proto=[tcp|udp]`	Specifies transmission protocols allowed or disallowed through the firewall.
`--dir=[in|out]`	Specifies the direction of traffic to be allowed or disallowed through the firewall.

‑‑name=<name>	Assigns a descriptive name to the firewall rule. The name must be specified for inbound ports.
‑‑enableService=<service>	Allows services specified in `services.xml` to pass through the firewall.
‑‑disableService=<service>	Disables services specified in `services.xml` from passing through the firewall.

install (optional)

Specifies that this is a fresh installation. (All scripted installations are fresh installations.)

<cdrom|usb|nfs|url>	Specifies the type of installation. The values are:

- cdrom installs from the DVD-ROM drive. For example:

  `install cdrom`

- nfs.

  Installs from the specified NFS server. For example:

  `install nfs ‑‑server=example.com ‑‑dir=/nfs3/VMware/ESX/40`

- url downloads across the network. For example:

  `install url http://example.com`

- usb

  Installs from the first USB media found to contain the installation image. For example:

  `install usb`

‑‑server=	Specifies which NFS server to connect to. Use with `nfs`.
‑‑dir=	Specifies which directory on the NFS server to mount. Use with `nfs`.
<url>	Defines the location of the runtime environment. Use with `url` (`http/https/ftp/nfs`).

keyboard (optional)

Sets the keyboard type for the system.

<keyboardType>	Specifies the keyboard map for the selected keyboard type.

serialnum or vmserialnum (optional)

Configures licensing. If not included, ESX installs in evaluation mode.

‑‑esx=<license‑key>	Specifies the vSphere license key to use. The format is 5 five-character tuples (XXXXX-XXXXX-XXXXX-XXXXX-XXXXX).

network (optional)

Configures network information for the system.

−−bootproto=[dhcp|static]	Specifies network settings.
−−device=	Specifies either the MAC address of the network card or the device name, as in vmnic0. This option refers to the uplink device for the virtual switch created for the service console. If you omit this option, the installer uses the network adapter specified with the IPAPPEND PXE configuration option or the `netdevice` bootstrap command. If you omit this option, the IPAPPEND option, and the `netdevice` bootstrap command, the installer uses the first plugged in network adapter. See "IPAPPEND," on page 34 and "Bootstrap Commands," on page 25.
−−ip=	Sets an IP address for the machine to be installed. Required with the --bootproto=static option.
−−gateway=	Designates the default gateway as an IP address. Required with the --bootproto=static option.
−−nameserver=	Designates the primary name server as an IP address. Used with the --bootproto=static option. Omit this option if you do not intend to use DNS. The --nameserver option can accept two IP addresses. For example: −−`nameserver="10.126.87.104,10.126.87.120"`
−−netmask=	Specifies the subnet mask for the installed system. Used with the --bootproto=static option. If you omit this option, the default is the standard netmask for the given IP address.
−−hostname=	Specifies the host name for the installed system. Only works with --bootproto=static.
−−vlanid=<vlanid>	Specifies a VLAN to use for networking. Set to an integer between 0 and 4095.
−−addvmportgroup=(0|1)	Specifies whether to add the VM Network port group, which is used by virtual machines. The default value is 1.

paranoid

Causes any warning messages to interrupt the installation. If you omit this command, warning messages are just logged.

part or partition (optional)

Compared to kickstart, the behavior of the ESX 4.0 `part` or `partition` command is significantly different. Carefully edit the `part` or `partition` command in your existing scripts.

Create service console partitions (except /boot) on the virtual disk and not on the physical disk.

Creates a partition on the system. Not required if you include the `autopart` command.

<mntpoint>	Specifies where to mount the partition.
−−asprimary	Specifies that the partition must be created as a primary partition and not a logical partition in the extended partition table.
−−size=	Defines the minimum partition size in megabytes.
−−grow	Allows the partition to grow to fill any available space or up to the maximum size setting.

`--maxsize=`	Specifies the maximum size in megabytes for a partition to grow.
`--ondisk= or --ondrive=`	Specifies the disk on which partitions are created. For the accepted disk formats, see Table 6-1. Cannot be used with the `--onvirtualdisk` option.

`--onfirstdisk=`
`<disk-type1>,`
`[<disk-type2>,...]`
	Partitions the first non-USB disk found. This is the same disk as found by the `autopart --firstdisk` command.
	You can add an optional string argument to the --firstdisk flag to select the disk types. The strings that you can use are as follows:
	
	■ local
	
	■ remote
	
	■ Device driver name in the vmkernel
	
	You can combine multiple values in a comma-separated list to concatenate other matches onto the list of matches. For example, --firstdisk=local,remote selects the first detected local disk or, if none are available, the first remote disk. This is the default behavior. To prefer a disk with the device driver named mptspi over any other local disks, use --firstdisk=mptspi,local.

`--onvirtualdisk=`	Specifies the virtual disk on which partitions are created. Cannot be used with the `--ondisk` option.
`--fstype=`	Sets the file system type for the partition. Usually of type vmfs3, ext3, swap, or vmkcore.

reboot (optional)

Reboots the system after scripted installation is finished.

`--noeject`	Does not eject the DVD after installation.

rootpw (required)

Sets the root password for the system. Can be between 6 and 64 characters.

`--iscrypted`	Specifies that the password is encrypted.
`<password>`	Specifies the password value.

timezone (required)

Sets the time zone for the system.

`--utc (required)`	Indicates that the BIOS clock is set to UTC (Greenwich Mean) time. Do not omit this option.
`<timezone> (optional)`	Specifies the timezone value. See the Olson database for supported values.

virtualdisk (optional)

NOTE The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only. The datastore cannot be shared between hosts.

Creates a new virtual disk.

`<name>-<system-uuid>/` `default-<name>.vmdk`	(Line break is for formatting purposes.)

	Specifies the name of the virtual disk. If you omit the --path= option, the name of the VMDK is `<name>/default-<name>.vmdk`.
--size=	Specifies the size of the virtual disk in megabytes.
--path=	Specifies the location where the virtual disk is created. The path must include a directory and a filename ending in `.vmdk`. For example: `cos/default-cos.vmdk`.
--onvmfs=	Specifies the name of the VMFS volume where the VMDK file is created.
--onfirstvmfs=	(Line break is for formatting purposes.)
(<disk-type1>, **[<disk-type2>,...])**	Uses the first VMFS volume on a disk that matches the given description and has more free space than the requested size. Uses the same argument format as `autopart`.

%include or include

Specifies an additional installation script to parse. You can add several include commands to your script. When you use the `%include` command, put the <filename> argument on the same line as the command.

<filename>	For example: `%include part.cfg`

%packages

Adds or removes a package from the installation ISO image.

The `packages.xml` file governs whether a package is added or removed by default. The requirement="recommended" tag means that the package is installed by default. To override the default setting in the script, include:

```
%packages
-<package_name> # The package will not be installed.
```

The requirement="optional" tag means that the package is not installed by default. To override the default setting in the script, include:

```
%packages
<package_name> # The package will be installed.
```

--resolvedeps	Installs the listed packages and automatically resolves package dependencies.
--ignoredeps	Ignores the unresolved dependencies and installs the listed packages without the dependencies.

%pre (optional)

Specifies a script to be executed before the kickstart configuration is evaluated. For example, a `%pre` script can generate include files, as shown here:

```
# Partitioning
%include part.cfg
...
%pre
cat > /tmp/part.cfg <<EOF
```

```
part /boot ––fstype=ext3 ––size= ––onfirstdisk
part storage1 ––fstype=vmfs3 ––size=10000 ––grow ––onfirstdisk
part None ––fstype=vmkcore ––size=100 ––onfirstdisk
EOF
```

––**interpreter**	(Line break is for formatting purposes.)
=[**python|bash**]	Specifies an interpreter to use. The default is bash.

%post (optional)

Executes the specified script after package installation has been completed. If you specify multiple %post sections, they are executed in the order they appear in the installation script. For example:

```
%post
MY_MAC=`esxcfg–nics –l | tail –1 | awk '{print $7}'` CONF_URL="http://example.com/$MY_MAC"
esxcfg–firewall ––allowOutgoing
––interpreter python –c "import urllib; urllib.urlretrieve('$CONF_URL', '/tmp/myconfig.sh')"
esxcfg–firewall ––blockOutgoing
sh /tmp/myconfig.sh
```

––**interpreter**	(Line break is for formatting purposes.)
=[**perl|python|bash**]	Specifies an interpreter to use. The default is bash.
––**nochroot**	Indicates whether the script is executed after you chroot into the service console file system.
––**timeout=secs**	Specifies a timeout for executing the script. If the script has not finished when the timeout expires, the script is forcefully terminated.
––**ignorefailure**	(Line break is for formatting purposes.)
=[**true|false**]	If true, the installation is considered a success even if the %pre script terminated with an error.

Disk Device Names

Installation script commands such as `autopart` and `clearpart` require the use of disk device names.

Table 6-1 lists the supported disk device names.

Table 6-1. Disk Device Names

Format	Examples	Description
VML	mpx.vmhba0:C0:T0:L0	The vmkernel device name.
/dev/.+	/dev/sda, /dev/cciss/c0d0	Full device path in the service console.
sdX, cciss/cNdN	sda, cciss/c0d0	Shortened device path from the service console.

Differences Between Kickstart and ESX Commands

ESX scripted installation is similar to, but incompatible with Red Hat's kickstart.

In general, kickstart and ESX scripts differ as follows:

- ESX scripts use the UUID format for specifying disks.

- ESX scripts use MAC addresses to specify network adapters.

- ESX scripts generally allow file and NFS URLs.

- ESX command options and their values require an equal sign (=) instead of a space. For example:

```
--location=mbr # Correct
--location mbr # Incorrect
```

Specific command differences are noted in the following summary.

accepteula or vmaccepteula

Only in ESX.

autopart

Compared to kickstart, the behavior of the ESX 4.0 autopart command is significantly different. Carefully edit the autopart command in your existing scripts.

auth or authconfig

--enablead	Only in ESX.
--addomain	Only in ESX.
--addc	Only in ESX.
--enablehesiod	Only in kickstart.
--hesiodlhs	Only in kickstart.
--hesiodrhs	Only in kickstart.
--enablesmbauth	Only in kickstart.
--smbservers	Only in kickstart.
--smbworkgroup	Only in kickstart.
--enablecache	Only in kickstart.

bootloader

--driveorder=	Only in ESX.
--upgrade	Only in ESX.
--useLilo	Only in kickstart.
--lba32	Only in kickstart.
--linear	Only in kickstart.
--nolinear	Only in kickstart.

clearpart

Compared to kickstart, the behavior of the ESX 4.0 clearpart command is significantly different. Carefully edit the clearpart command in your existing scripts.

device

Only in kickstart.

deviceprobe

Only in kickstart.

driverdisk

Only in kickstart.

dryrun

Only in ESX.

esxlocation

Only in ESX.

firewall

Compared to kickstart, the behavior of the ESX 4.0 `firewall` command is significantly different. Carefully edit the `firewall` command in your existing scripts.

firewallport

Only in ESX.

%include or include

In ESX, the `include` command can be specified without the leading `%`.

install

`url nfs`	Only in ESX.
`usb`	Only in ESX.
`harddrive`	Only in kickstart.

interactive

Only in kickstart.

keyboard

Optional in ESX. Mandatory in kickstart.

lang

Only in kickstart.

langsupport

Only in kickstart.

lilocheck

Only in kickstart.

logvol

Only in kickstart.

mouse

Only in kickstart.

network

––bootproto=bootp	Only in kickstart.
––vlanid=<vlanid>	Only in ESX.
––addvmportgroup=(0|1)	Only in ESX.
––device=	ethX identifiers are only in kickstart.
––nodns	Only in kickstart.

paranoid

Only in ESX.

part or partition

Compared to kickstart, the behavior of the ESX 4.0 part or partition command is significantly different. Carefully edit the part or partition command in your existing scripts.

raid

Only in kickstart.

reboot

––noeject	Only in ESX.

skipx

Only in kickstart.

text

Only in kickstart.

virtualdisk

Only in ESX.

volgroup

Only in kickstart.

xconfig

Only in kickstart.

ESX Partitioning 7

ESX hosts have required and optional partitions.

`/boot` and `vmkcore` are physical partitions. `/`, `swap`, `/var/log`, and all the optional partitions are stored on a virtual disk called `esxconsole-<system-uuid>/esxconsole.vmdk`. The virtual disk is stored in a VMFS volume.

This chapter includes the following topics:

- "Required Partitions," on page 59
- "Optional Partitions," on page 60

Required Partitions

ESX requires several partitions.

If you delete a required partition, be sure to create a new one of the same type. You cannot define the sizes of the `/boot`, `vmkcore`, and `/vmfs` partitions when you use the graphical or text installation modes. You can define these partition sizes when you do a scripted installation.

Table 7-1 describes the required partitions.

Table 7-1. ESX Required Partitions

Mount Point	Type	Size	Location	Partition Description
`/boot`	ext3	The ESX boot disk requires 1.25GB of free space and includes the `/boot` and `vmkcore` partitions. The `/boot` partition alone requires 1100MB.	Physical partition The boot drive usually defaults to the specified `/boot` partition location.	Stores information required to boot the ESX host system. For example, this is where the grub boot loader resides.
Not applicable	swap	600MB recommended minimum 1600MB maximum Use the default value applied during installation.	Virtual disk in a VMFS volume	Allows ESX to use disk space when more memory is needed than the physical RAM allows. NOTE Do not confuse the ESX swap partition with virtual machine swap space. See the *Resource Management Guide*.
`/`	ext3	Calculated dynamically based on the size of the `/usr` partition. By default, the minimum size is 5GB and no `/usr` partition is defined.	Virtual disk in a VMFS volume	Contains the ESX operating system and services, accessible through the service console. Also contains third-party add-on services or applications you install.

Table 7-1. ESX Required Partitions (Continued)

Mount Point	Type	Size	Location	Partition Description
Not applicable	VMFS3	For VMFS volumes not hosting `esxconsole.vmdk`: 1200MB For VMFS volumes hosting `esxconsole.vmdk`: 1200MB and an additional 10GB for each `esxconsole.vmdk` stored on the volume. (SAN volumes might have multiple `esxconsole.vmdk` virtual disks.)	Physical partition located on one of the following: ■ Local or boot drive ■ Local SCSI volume ■ Networked SCSI volume ■ SAN The service console must be installed on a VMFS datastore that is resident on a host's local disk or on a SAN disk that is masked and zoned to that particular host only.	Used to store virtual machines. You can create any number of VMFS volumes on each LUN if the space is available. VMFS2 is supported in read-only mode to import legacy virtual machines.
Not applicable	vmkcore	The ESX boot disk requires 1.25GB of free space and includes the `/boot` and `vmkcore` partitions. The `/boot` partition alone requires 1100MB.	Physical partition located on one of the following: ■ Local SCSI volume ■ Networked SCSI volume ■ SAN Cannot be located on a software iSCSI volume.	Used to store core dumps for debugging and technical support. If multiple ESX hosts share a SAN, configure a vmkcore partition with 100MB for each host.

Optional Partitions

You can create optional partitions during or after the ESX installation procedure.

Table 7-2 describes the optional partitions.

Table 7-2. ESX Optional Partitions

Mount Point	Type	Recommended Size	Location	Partition Description
/home	ext3	512MB	Virtual disk in a VMFS volume	Used for storage by individual users.
/tmp	ext3	1024MB	Virtual disk in a VMFS volume	Used to store temporary files.
/usr	ext3		Virtual disk in a VMFS volume	Used for user programs and data.
/var/log	ext3	2000MB	Virtual disk in a VMFS volume	Used to store log files. The graphical and text installers create this 2000MB partition by default.

Post-Installation Considerations for ESX

8

After you install ESX, you must consider host management through the vSphere Client, licensing, and adding and removing custom extensions.

This chapter includes the following topics:

- "Download the vSphere Client," on page 61
- "Licensing the Host," on page 61
- "Set an ESX/ESXi Host to Evaluation Mode," on page 62

Download the vSphere Client

The vSphere Client is a Windows program that you can use to configure the host and to operate its virtual machines. You can download vSphere Client from any host.

Prerequisites

You must have the URL of the host. This is the IP address or host name.

Procedure

1   From a Windows machine, open a Web browser.

2   Enter the URL for the host.

    For example, `http://testserver.vmware.com` or `http://10.20.80.176`.

    The welcome page appears.

3   Click **Download the vSphere Client** under Getting Started.

4   Click **Yes** in the security warning dialog box that appears.

What to do next

Install the vSphere Client.

Licensing the Host

After you purchase a host license, VMware provides a vSphere license key.

See Chapter 16, "Managing ESX/ESXi and vCenter Server Licenses," on page 105.

Set an ESX/ESXi Host to Evaluation Mode

If you entered a license for ESX, you can switch to evaluation mode to explore the full functionality of ESX.

Procedure

1   From the vSphere Client, select the host in the inventory.

2   Click the **Configuration** tab.

3   Under Software, click **Licensed Features**.

4   Click **Edit** next to ESX License Type.

5   Click **Product Evaluation**.

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

Installing, Removing, and Updating Third-Party Extensions

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A third-party extension is designed to be incorporated into ESX/ESXi in order to enhance, or extend, the functions of ESX/ESXi. For example, an extension might be a VMkernel module, a driver, or a CIM provider.

VMware provides the following tools for installing, removing, and updating extensions to ESX/ESXi hosts:

vSphere Host Update Utility	Graphical utility for ESXi only. See the *Upgrade Guide*.
vCenter Update Manager	For ESX and ESXi, automates patching and updating of extensions. See the *vCenter Update Manager Administration Guide*.
vihostupdate	Command-line utility for ESX and ESXi.
esxupdate	Command-line utility for ESX only. See the *Patch Management Guide*.

This chapter includes the following topics:

- "About Patching Hosts with vSphere Host Update Utility," on page 63
- "About the vihostupdate Command-Line Utility," on page 64
- "Update an ESX/ESXi Host Using Offline Bundles with the vihostupdate Utility," on page 64
- "Update an ESX/ESXi Host Using a Depot with the vihostupdate Utility," on page 65
- "Remove Custom Packages on ESX Using the Service Console," on page 66
- "Remove Selected Custom Packages on ESX/ESXi Using the vSphere Command Line," on page 66

About Patching Hosts with vSphere Host Update Utility

With vSphere Host Update Utility, you can download and install maintenance and patch releases, which provide security, stability, and feature enhancements for ESXi hosts.

You can use vSphere Host Update Utility to check for new release updates and patches that are applicable to the ESXi hosts registered in the vSphere Host Update Utility. vSphere Host Update Utility builds the host list by tracking the hosts that you connect to directly through the vSphere Client. You can also add hosts to the list manually.

About the vihostupdate Command-Line Utility

The `vihostupdate` command applies software updates to ESX/ESXi hosts and installs and updates ESX/ESXi extensions such as VMkernel modules, drivers, and CIM providers.

IMPORTANT Run `vihostupdate` on ESX 4.0/ESXi 4.0 hosts. Run `vihostupdate35` on ESX 3.5/ESXi 3.5 hosts.

NOTE The `esxupdate` utility is supported as well. It is for ESX only. See the *Patch Management Guide*.

The `vihostupdate` command works with bulletins. Each bulletin consists of one or more vSphere bundles and addresses one or more issues.

Towards the end of a release, bulletins include a large number of other bulletins. Bulletins are available in offline bundles and in a depot with associated `metadata.zip` files.

- If you use offline bundles, all patches and corresponding metadata are available as one ZIP file.

- If you use a depot, the `metadata.zip` file points to metadata, which describes the location of the files.

The command supports querying installed software on a host, listing software in a patch, scanning for bulletins that apply to a host, and installing all or some bulletins in the patch. You can specify a patch by using a bundle ZIP file or a depot's metadata ZIP file.

`vihostupdate` supports `https://`, `http://`, and `ftp://` downloads. You can specify the protocols in the download URL for the bundle or metadata file. `vihostupdate` also supports local paths. See "Update an ESX/ESXi Host Using Offline Bundles with the vihostupdate Utility," on page 64. To search a local depot where the vSphere CLI is installed, use `/local/depot/metadata.zip` without of the `file:///` parameter.

Update an ESX/ESXi Host Using Offline Bundles with the vihostupdate Utility

You can use the vihostupdate utility in conjunction with offline bundles or with a depot. This topic describes the procedure using offline bundles.

Prerequisites

Before you can update or patch an ESX/ESXi host from the command line, you must have access to a machine on which you can run the VMware vSphere Command-Line Interface (vSphere CLI). You can install the vSphere CLI on your Microsoft Windows or Linux system or import the VMware vSphere Management Assistant (vMA) virtual appliance onto your ESX/ESXi host. For information about importing or installing the vSphere CLI, see the *VMware vSphere Command-Line Interface Installation and Reference Guide*.

Procedure

1 Power off any virtual machines that are running on the host and place the host into maintenance mode.

2 Find out which bulletins are applicable to the ESX/ESXi host.

- Search an offline HTTP server:

  ```
  vihostupdate.pl --server <server> --scan --bundle http://<webserver>/rollup.zip
  ```

- Search the local machine:

  ```
  vihostupdate.pl --server <server> --scan --bundle <local_path>/rollup.zip
  ```

The `--server` argument is the ESX/ESXi host name or IP address.

Do not specify more than one bundle ZIP file at the command line each time you run the command. If you specify `--bundle` more than once, the command processes only the last file that was specified.

3 (Optional) List all the bulletins that are available in the bundle.

■ Search an offline HTTP server:

```
vihostupdate.pl --server <server> --list --bundle http://<webserver>/rollup.zip
```

■ Search the local machine:

```
vihostupdate.pl --server <server> --list --bundle <local_path>/rollup.zip
```

This command lists all the bulletins contained in the bundle, even those that do not apply to the host.

4 Install bulletins from the bundle on the ESX/ESXi host.

■ Install from an offline HTTP server:

```
vihostupdate.pl --server <server> --install --bundle http://<webserver>/rollup.zip --
bulletin bulletin1,bulletin2
```

■ Install from the local machine:

```
vihostupdate.pl --server <server> --install --bundle <local_path>/rollup.zip --bulletin
bulletin1,bulletin2
```

If you omit the --bulletin argument, this command installs all the bulletins in the bundle.

5 Verify that the bulletins are installed on your ESX/ESXi host.

```
vihostupdate.pl --server <server> --query
```

6 (Optional) Remove individual bulletins.

```
vihostupdate.pl --server <server> --remove --bulletin bulletin1
```

Use this option only for removing bulletins that are third-party or VMware extensions. Do not remove bulletins that are VMware patches or updates. vihostupdate can remove only one bulletin at a time.

Update an ESX/ESXi Host Using a Depot with the vihostupdate Utility

You can use the vihostupdate utility in conjunction with bundles or with a depot. This topic describe the procedure using depots.

Prerequisites

Before you can update or patch an ESX/ESXi host from the command line, you must have access to a machine on which you can run the VMware vSphere Command-Line Interface (vSphere CLI). You can install the vSphere CLI on your Microsoft Windows or Linux system or import the VMware vSphere Management Assistant (vMA) virtual appliance onto your ESX/ESXi host. For information about importing or installing the vSphere CLI, see the *VMware vSphere Command-Line Interface Installation and Reference Guide*.

Procedure

1 Power off any virtual machines that are running on the host and place the host into maintenance mode.

2 Scan the depot for bulletins that are applicable to the host:

```
vihostupdate.pl --server <server> --scan --metadata http://<webserver>/depot/metadata.zip
```

The --server argument is the ESX/ESXi host name or IP address.

Do not specify more than one ZIP file at the command line each time you run the command. If you specify --metadata more than once, the command processes only the last file that was specified.

3 (Optional) List all bulletins in the depot at the metadata.zip file location:

```
vihostupdate.pl --list --metadata http://<webserver>/depot/metadata.zip
```

This command lists all the bulletins in the depot, even those that do not apply to the host.

4   Install bulletins in the depot on the host:

```
vihostupdate.pl ––install ––metadata http://<webserver>/depot/metadata.zip ––bulletin
bulletin1,bulletin2
```

If you omit the ––bulletin argument, this command installs all the bulletins in the bundle.

5   Verify that the bulletins are installed on your ESX/ESXi host.

```
vihostupdate.pl ––server <server> ––query
```

6   (Optional) Remove individual bulletins.

```
vihostupdate.pl ––server <server> ––remove ––bulletin bulletin1
```

Use this option only for removing bulletins that are third-party or VMware extensions. Do not remove bulletins that are VMware patches or updates. vihostupdate can remove only one bulletin at a time.

Remove Custom Packages on ESX Using the Service Console

After adding custom packages, you might decide to remove them. One way to remove custom packages is to use the service console and the esxupdate command.

Do not remove bulletins that are VMware patches or updates.

For detailed information about the esxupdate command, see the *Patch Management Guide*.

Prerequisites

Before you remove a custom package, shut down or migrate running virtual machines off of the ESX host.

Procedure

1   Open the ESX service console.

2   Run the esxupdate query command to display a list of the installed bulletins.

3   Run esxupdate –b <bulletinID> remove command, where <bulletinID> is the bulletin for the extension to remove.

The specified custom package is removed.

Remove Selected Custom Packages on ESX/ESXi Using the vSphere Command Line

After adding custom packages, you might decide to remove them. One way to remove custom packages is to use the vSphere CLI and the vihostupdate command.

Do not remove bulletins that are VMware patches or updates.

For detailed information about the vihostupdate command, see the *VMware vSphere Command-Line Interface Installation and Reference Guide*.

Prerequisites

Before you remove a custom package, shut down or migrate running virtual machines off of the ESX/ESXi host.

Procedure

1   Determine which bulletins are installed on your ESX/ESXi host.

```
vihostupdate.pl ––server <server> ––query
```

Note the bundle ID for the bundle to uninstall.

2   Run the `vihostupdate` command.

`vihostupdate --server <server> --remove --bulletin <bulletin ID>`

`vihostupdate` can remove only one bulletin at a time.

The specified custom package is removed.

Preparing the vCenter Server Databases

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</div>

vCenter Server and vCenter Update Manager require databases to store and organize server data.

You do not need to install a new database for the vCenter Server installation to work. During installation, you can point the vCenter Server system to any existing supported database. vCenter Server supports Oracle and Microsoft SQL Server databases. vCenter Update Manager also supports Oracle and Microsoft SQL Server databases. For detailed information about supported database versions, see the *Compatibility Matrixes* on the VMware vSphere documentation Web site.

> ⚠ **CAUTION** If you have a VirtualCenter database that you want to preserve, do not perform a fresh installation of vCenter Server. See the *Upgrade Guide*.

VMware recommends using separate databases for vCenter Server and vCenter Update Manager. However, for a small deployments, a separate database for vCenter Update Manager might not be necessary.

Each vCenter Server instance must have its own database. vCenter Server instances cannot share the same database schema. Multiple vCenter Server databases can reside on the same database server, or they can be separated across multiple database servers. For Oracle, which has the concept of schema objects, you can run multiple vCenter Server instances in a single database server if you have a different schema owner for each vCenter Server instance, or use a dedicated Oracle database server for each vCenter Server instance.

This chapter includes the following topics:

- "vCenter Server Database Patch and Configuration Requirements," on page 69
- "Create a 32-Bit DSN on a 64-Bit Operating System," on page 70
- "Configure vCenter Server to Communicate with the Local Database After Shortening the Computer Name to 15 Characters or Fewer," on page 71
- "About the Bundled Microsoft SQL Server 2005 Express Database Package," on page 72
- "Maintaining a vCenter Server Database," on page 72
- "Configure Microsoft SQL Server Databases," on page 72
- "Configure Oracle Databases," on page 76

vCenter Server Database Patch and Configuration Requirements

After you choose a database type, make sure you understand the configuration and patch requirements for the database.

Table 10-1 lists the configuration and patch requirements for the databases that are supported with vCenter Server.

Contact your DBA for the appropriate database credentials, or install the bundled Microsoft SQL Server 2005 Express database.

Table 10-1. Configuration and Patch Requirements

Database Type	Patch and Configuration Requirements
Microsoft SQL Server 2005 Express	Bundled database that you can use for small deployments of up to 5 hosts and 50 virtual machines. If the machine has Microsoft SQL Native Client installed, remove it before installing vCenter Server with the bundled database. If the machine has MSXML Core Services 6.0 installed, remove it before installing vCenter Server with the bundled database. If you cannot remove it using the Add or Remove Programs utility, use the Windows Installer CleanUp utility. See http://support.microsoft.com/kb/968749.
Microsoft SQL Server 2005	For Microsoft Windows XP, apply MDAC 2.8 SP1 to the client. Use the SQL Native Client driver (version 9.x) for the client. Ensure that the machine has a valid ODBC DSN entry. If Microsoft SQL Server 2005 is not already installed and the machine has MSXML Core Services 6.0 installed, remove MSXML Core Services 6.0 before installing Microsoft SQL Server 2005. If you cannot remove it using the Add or Remove Programs utility, use the Windows Installer CleanUp utility. See http://support.microsoft.com/kb/968749.
Microsoft SQL Server 2008	For Microsoft Windows XP, apply MDAC 2.8 SP1 to the client. Use the SQL Native Client driver (version 10.x) for the client. Ensure that the machine has a valid ODBC DSN entry.
Oracle 10g	If necessary, first apply patch 10.2.0.3 (or later) to the client and server. Then apply patch 5699495 to the client. Ensure that the machine has a valid ODBC DSN entry. For the Oracle Instant client, copy ojdbc14.jar to the vCenter Server tomcat directory (`<vCenter install location>\Infrastructure\tomcat\lib`) The Oracle 10g client comes with ojdbc14.jar (`<Oracle client install location>\oracle\product\10.2.0\<instance_name>\jdbc\lib`). The vCenter Server installer copies the file from the Oracle client install location to the vCenter Server tomcat directory (`<vCenter install location>\Infrastructure\tomcat\lib`) If the ojdbc14.jar file is not found in the Oracle 10g client location, the vCenter Server installer prompts you to copy the file manually. You can download the file from http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/htdocs/jdbc101040.html.
Oracle 11g	Ensure that the machine has a valid ODBC DSN entry. For the Oracle Instant client, copy ojdbc14.jar to the vCenter Server tomcat directory (`<vCenter install location>\Infrastructure\tomcat\lib`) The Oracle 11g client comes with ojdbc14.jar (`<Oracle client install location>\app\Administrator\product\11.1.0\<instancename>\sqldeveloper\jdbc\lib`). The vCenter Server installer copies the file from the Oracle client install location to the vCenter Server tomcat directory (`<vCenter install location>\Infrastructure\tomcat\lib`) If the ojdbc14.jar file is not found in the Oracle 11g client location, the vCenter Server installer prompts you to copy the file manually. You can download the file from http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/htdocs/jdbc101040.html.

Create a 32-Bit DSN on a 64-Bit Operating System

You can install or upgrade to vCenter Server on both 32-bit and 64-bit operating systems.

Even though vCenter Server is supported on 64-bit operating systems, the vCenter Server system must have a 32-bit DSN. This requirement applies to all supported databases. By default, any DSN created on a 64-bit system is 64 bit.

Procedure

1   Install the ODBC drivers.

    ■   For Microsoft SQL Server database servers, install the 64-bit database ODBC drivers on your Microsoft Windows system. When you install the 64-bit drivers, the 32-bit drivers are installed automatically.

    ■   For Oracle database servers, install the 32-bit database ODBC drivers on your Microsoft Windows system.

        NOTE   The default install location on 64-bit operating systems is `C:\VMware`.

2   Run the 32-bit ODBC Administrator application, located at `[WindowsDir]\SysWOW64\odbcad32.exe`.

3   Use the application to create your DSN.

You now have a DSN that is compatible with vCenter Server. When the vCenter Server installer prompts you for a DSN, select the 32-bit DSN.

Configure vCenter Server to Communicate with the Local Database After Shortening the Computer Name to 15 Characters or Fewer

The machine on which you install or upgrade to vCenter Server must have a computer name that is 15 characters or fewer. If your database is located on the same machine that vCenter Server will be installed on and you have recently changed the name of this machine to comply with the name-length requirement, make sure the vCenter Server DSN is configured to communicate with the new name of the machine.

Changing the vCenter Server computer name impacts database communication if the database server is on the same computer with vCenter Server. If you have changed the machine name, verify that communication remains intact by completing the following procedure.

The name change has no impact on communication with remote databases. You can skip this procedure if your database is remote.

NOTE   The name-length limitation applies to the vCenter Server system. The data source name (DSN) and remote database systems can have names with more than 15 characters.

Check with your database administrator or the database vendor to make sure all components of the database are working after you rename the server.

Procedure

1   Make sure the database server is running.

2   Make sure that the vCenter Server computer name is updated in the domain name service (DNS).

    One way to test this is by pinging the computer name. For example, if the computer name is `host-1.company.com`, run the following command in the Windows command prompt:

    `ping host-1.company.com`

    If you can ping the computer name, the name is updated in DNS.

3   Update the data source information, as needed.

4   Verify the data source connectivity.

About the Bundled Microsoft SQL Server 2005 Express Database Package

The bundled Microsoft SQL Server 2005 Express database package is installed and configured when you select Microsoft SQL Server 2005 Express as your database during vCenter Server installation or upgrade.

If the machine has Microsoft SQL Native Client installed, remove it before installing vCenter Server with the bundled database.

Maintaining a vCenter Server Database

After your vCenter Server database instance and vCenter Server 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 vCenter Server upgrade. See your database documentation for information on backing up your database.

Configure Microsoft SQL Server Databases

If you use a Microsoft SQL database for your vCenter Server repository, you need to configure your database to work with vCenter Server.

Use a Script to Create a Local or Remote Microsoft SQL Server Database

To simplify the process of creating the SQL Server database, users, and privileges, you can run a script. If you do not use this script, you can create the database manually.

In the script, you can customize the location of the data and log files.

The user created by this script does not follow any security policy. The passwords are provided only for convenience. Change the passwords as appropriate.

To prepare a SQL Server database to work with vCenter Server, you generally need to create a SQL Server database user with database operator (DBO) rights. When you do this, make sure that the database user login has the **db_owner** fixed database role on the vCenter Server database and on the MSDB database. The **db_owner** role on the MSDB database is required for installation and upgrade only, and you can revoke it after installation.

If you run this script as well as the script to create the database schema, you do not have to grant DBO permissions on the vCenter Server database. For environments in which the vCenter Server database user cannot have DBO permissions, these scripts are especially useful. The user created by this script has DBO privileges on both VCDB and MSDB databases. To change this, remove the two occurrences of this line:

```
sp_addrolemember @rolename = 'db_owner', @membername = 'vpxuser'
```

IMPORTANT   If you remove these lines, you must also run the script that creates the vCenter Server database schema, instead of allowing the vCenter Server installer to create the schema.

Procedure

1   Log in to a Query Analyzer session as the sysadmin (SA) or a user account with **sysadmin** privileges.

2   Run the following script.

The script is located in the vCenter Server installation package /<installation directory>/vpx/dbschema/
DB_and_schema_creation_scripts_MSSQL.txt file.

```
use [master]
go
CREATE DATABASE [VCDB] ON PRIMARY
(NAME = N'vcdb', FILENAME = N'C:\VCDB.mdf', SIZE = 2000KB, FILEGROWTH = 10% )
LOG ON
(NAME = N'vcdb_log', FILENAME = N'C:\VCDB.ldf', SIZE = 1000KB, FILEGROWTH = 10%)
COLLATE SQL_Latin1_General_CP1_CI_AS
go
use VCDB
go
sp_addlogin @loginame=[vpxuser], @passwd=N'vpxuser!0', @defdb='VCDB',
@deflanguage='us_english'
go
ALTER LOGIN [vpxuser] WITH CHECK_POLICY = OFF
go
CREATE USER [vpxuser] for LOGIN [vpxuser]
go
sp_addrolemember @rolename = 'db_owner', @membername = 'vpxuser'
go
use MSDB
go
CREATE USER [vpxuser] for LOGIN [vpxuser]
go
sp_addrolemember @rolename = 'db_owner', @membername = 'vpxuser'
go
```

You now have a Microsoft SQL Server database that you can use with vCenter Server.

What to do next

You can run the script to create the database schema.

Use a Script to Create the Microsoft SQL Server Database Schema (Optional)

The vCenter Server installer creates the schema automatically during installation. For experienced database administrators who need more control over schema creation due to environmental constraints, you can optionally use a script to create your database schema.

To have the vCenter Server installer create your schema for you, see "Configure a SQL Server ODBC Connection," on page 74.

Prerequisites

Before you use this script, create the SQL Server database. You can create the SQL Server database manually or by using a script.

Procedure

1   Create a vCenter Server database user with the **db_datawriter** and **db_datareader** permissions.

2   Open a query analyzer window with a user having DBO rights on the vCenter Server and MSDB databases.

3   Locate the dbschema scripts in the vCenter Server installation package /`<installation directory>`/vpx/
    `dbschema` directory.

4   Run the scripts in sequence on the database.

    The DBO user must own the objects created by these scripts. Open the scripts one at a time in the Query
    Analyzer window and press F5 to execute each script in the order shown here.

    ```
    VCDB_mssql.SQL
    purge_stat1_proc_mssql.sql
    purge_stat2_proc_mssql.sql
    purge_stat3_proc_mssql.sql
    purge_usage_stats_proc_mssql.sql
    stats_rollup1_proc_mssql.sql
    stats_rollup2_proc_mssql.sql
    stats_rollup3_proc_mssql.sql
    cleanup_events_mssql.sql
    delete_stats_proc_mssql.sql
    upsert_last_event_proc_mssql.sql
    ```

5   For all supported editions of Microsoft SQL Server (except Microsoft SQL Server 2005 Express), ensure
    that the SQL Server Agent service is running by using these additional scripts to set up scheduled jobs on
    the database.

    ```
    job_schedule1_mssql.sql
    job_schedule2_mssql.sql
    job_schedule3_mssql.sql
    job_cleanup_events_mssql.sql
    ```

What to do next

1   On the machine on which you intend to install vCenter Server, create a DSN that points to the database
    server with the schema.

2   Run the vCenter Server installer.

    a   If a database reinitialization warning message appears in the vCenter Server installer, select **Do not
        overwrite, leave my existing database in place** and continue the installation.

        This message appears if you are using a database that has vCenter Server tables created by a previous
        installation. The message does not appear if the database is clean.

        If you leave your existing database in place, you cannot join a Linked Mode group during the
        installation. You can join after the installation is complete. (See "Join a Linked Mode Group After
        Installation," on page 97.)

    b   When prompted, provide the database user login.

Configure a SQL Server ODBC Connection

When you install the vCenter Server system, you can establish a connection with a SQL Server database.

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

See your Microsoft SQL ODBC documentation for specific instructions regarding configuring the SQL Server
ODBC connection.

Prerequisites

■ Review the required database patches specified in "vCenter Server Database Patch and Configuration Requirements," on page 69. If you do not prepare your database correctly, the vCenter Server installer displays error and warning messages.

■ Create a database using SQL Server Management Studio on the SQL Server.

■ Create a database user with database operator (DBO) rights.

The default database for the DBO user is the one that you created using SQL Server Management Studio.

Make sure that the database login has the **db_owner** fixed database role on the vCenter Server 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 installation.

■ If you are using a named instance of Microsoft SQL Server 2008 Standard Edition with vCenter Server, do not name the instance MSSQLSERVER. If you do, the JDBC connection does not work, and certain features, such as Performance Charts, are not available.

Procedure

1   On your vCenter Server system, open the Microsoft Windows ODBC Data Source Administrator.

■ On a 32-bit system, select **Settings > Control Panel > Administrative Tools > Data Sources (ODBC)**.

■ On a 64-bit system, open `C:\WINDOWS\SYSWOW64\odbc32.exe`.

2   Select the **System DSN** tab and do one of the following.

■ To modify an existing SQL Server ODBC connection, select the connection from the System Data Source list and click **Configure**.

■ To create a new SQL Server ODBC connection, click **Add**, select **SQL Native Client**, and click **Finish**.

3   Type an ODBC datastore name (DSN) in the **Name** text box.

For example, VMware vCenter Server.

4   (Optional) Type an ODBC DSN description in the **Description** text box.

5   Select the server name from the **Server** drop-down menu and click **Next**.

Type the SQL Server host name in the text box if it is not in the drop-down menu.

6   Select one of the authentication methods.

7   If you selected SQL authentication, type your SQL Server login name and password and click **Next**.

8   Select the database created for the vCenter Server system from the **Change the default database to** menu and click **Next**.

9   Click **Finish**.

What to do next

To test the data source, from the **ODBC Microsoft SQL Server Setup** menu, select **Test Data Source** and click **OK**. Ensure that the SQL Agent is running on your database server.

This applies to SQL Server 2005 and SQL Server 2008 editions.

Configure Microsoft SQL Server TCP/IP for JDBC

If the Microsoft SQL Server database has TCP/IP disabled and the dynamic ports are not set, the JDBC connection remains closed. This causes the vCenter Server statistics to malfunction. You can configure the server TCP/IP for JDBC.

This procedure applies to remote Microsoft SQL Server database servers. You can skip this procedure if your database is local.

Procedure

1   Start the SQL Server Configuration Manager by selecting **Start > All Programs > Microsoft SQL Server > Configuration Tools > SQL Server Configuration Manager**.

2   Select **SQL Server Network Configuration > Protocols for <Instance name>**.

3   Enable TCP/IP.

4   Open TCP/IP Properties.

5   On the **Protocol** tab, make the following selections.

   ■   Enabled: **Yes**

   ■   Listen All: **Yes**

   ■   Keep Alive: **30000**

6   On the **IP Addresses** tab, make the following selections.

   ■   Active: **Yes**

   ■   TCP Dynamic Ports: **0**

7   Restart the SQL Server service from **SQL Server Configuration Manager > SQL Server Services**.

8   Start the SQL Server Browser service from **SQL Server Configuration Manager > SQL Server Services**.

Configure Oracle Databases

If you use an Oracle database for your vCenter Server repository, you need to configure your database to work with vCenter Server.

Use a Script to Create a Local or Remote Oracle Database

When you use an Oracle database with vCenter Server, the database must have certain table spaces and privileges. To simplify the process of creating the database, you can run a script. If you do not use this script, you can create the database manually.

When using the script, you can customize the location of the data and log files.

NOTE   The user created by this script does not follow any security policy. The passwords are provided only for convenience. Change the passwords as appropriate.

Procedure

1   Log in to a SQL*Plus session with the system account.

2   Run the following script.

The script is located in the vCenter Server installation package /<installation directory>/vpx/dbschema/
DB_and_schema_creation_scripts_oracle.txt file.

```
CREATE SMALLFILE TABLESPACE "VPX" DATAFILE '/u01/app/oracle/oradata/vcdb/vpx01.dbf'
SIZE 1G AUTOEXTEND ON NEXT 10M MAXSIZE UNLIMITED LOGGING EXTENT MANAGEMENT LOCAL SEGMENT
SPACE MANAGEMENT AUTO;
```

For a Windows installation, change the directory path to the vpx01.dbf file.

You now have an Oracle database that you can use with vCenter Server.

What to do next

You can also run a script to create the database schema.

Configure an Oracle Database User

If you plan to use an Oracle database when you install vCenter Server, you must configure the database user.

You can configure an Oracle database for vCenter Server either locally on the same Microsoft Windows machine as vCenter Server or remotely on a network-connected Linux, UNIX or Microsoft Windows host.

Prerequisites

Review the software requirements for vCenter Server with Oracle.

Procedure

1   Log in to a SQL*Plus session with the system account.

2   Run the following SQL command to create a vCenter Server database user with the correct permissions.

The script is located in the vCenter Server installation package /<installation directory>/vpx/dbschema/
DB_and_schema_creation_scripts_oracle.txt file.

In this example, the user name is VPXADMIN.

```
CREATE USER "VPXADMIN" PROFILE "DEFAULT" IDENTIFIED BY "oracle" DEFAULT TABLESPACE
"VPX" ACCOUNT UNLOCK;
grant connect to VPXADMIN;
grant resource to VPXADMIN;
grant create view to VPXADMIN;
grant create sequence to VPXADMIN;
grant create table to VPXADMIN;
grant execute on dbms_lock to VPXADMIN;
grant unlimited tablespace to VPXADMIN;
```

By default, the **RESOURCE** role has the **CREATE PROCEDURE**, **CREATE TABLE**, and **CREATE SEQUENCE** privileges assigned. If the RESOURCE role does not have these privileges, explicitly grant them to the vCenter Server database user.

You now have an Oracle database user that you can reference in the vCenter Server installer.

What to do next

Create the Oracle database, including all necessary table spaces and privileges.

Use a Script to Create the Oracle Database Schema (Optional)

The vCenter Server installer creates the schema automatically during installation. For experienced database administrators who need more control over schema creation due to environmental constraints, you can optionally use a script to create your database schema.

To have the vCenter Server installer create your schema for you, see "Configure an Oracle Connection for Local Access," on page 79 or "Configure an Oracle Connection for Remote Access," on page 79, depending on your environment.

Prerequisites

Before you use this script, create the Oracle database and user. You can create the Oracle database and user manually or by using scripts.

Procedure

1 Open a SQL*Plus window with a user that has schema owner rights on the vCenter Server database.

2 Locate the dbschema scripts in the vCenter Server installation package /<installation directory>/vpx/ dbschema directory.

3 In SQL*Plus, run the scripts in sequence on the database.

   <path> is the directory path to the /<installation directory>/vpx/dbschema folder.

   ```
   @<path>/VCDB_oracle.SQL
   @<path>/purge_stat1_proc_oracle.sql
   @<path>/purge_stat2_proc_oracle.sql
   @<path>/purge_stat3_proc_oracle.sql
   @<path>/purge_usage_stats_proc_oracle.sql
   @<path>/stats_rollup1_proc_oracle.sql
   @<path>/stats_rollup2_proc_oracle.sql
   @<path>/stats_rollup3_proc_oracle.sql
   @<path>/cleanup_events_oracle.sql
   @<path>/delete_stats_proc_oracle.sql
   ```

4 For all supported editions of Oracle Server, run these additional scripts to set up scheduled jobs on the database.

   ```
   @<path>/job_schedule1_oracle.sql
   @<path>/job_schedule2_oracle.sql
   @<path>/job_schedule3_oracle.sql
   @<path>/job_cleanup_events_oracle.sql
   ```

You now have a database schema that is compatible with vCenter Server 4.0.

What to do next

1 On the machine where you are installing vCenter Server, create a DSN that points to the database server with the schema.

2 Run the vCenter Server installer.

   a If a database reinitialization warning message appears in the vCenter Server installer, select **Do not overwrite, leave my existing database in place** and continue the installation.

   This message appears if you are using a database that has vCenter Server tables created by a previous installation. The message does not appear if the database is clean.

If you leave your existing database in place, you cannot join a Linked Mode group during the installation. You can join after the installation is complete. (See "Join a Linked Mode Group After Installation," on page 97.)

b   When prompted, provide the database user login.

Configure an Oracle Connection for Local Access

VMware recommends that the vCenter Server database be located on the same system as vCenter Server.

Prerequisites

Before configuring an Oracle connection, review the required database patches specified in "vCenter Server Database Patch and Configuration Requirements," on page 69. If you do not prepare your database correctly, the vCenter Server installer displays error and warning messages.

Procedure

1   Download Oracle 10g or Oracle 11g from the Oracle Web site, install it, and create a database.

2   Configure the TNS Service Name option in the ODBC DSN. The TNS Service Name is the net service name for the database to which you want to connect. You can find the net service name in the `tnsnames.ora` file located in the `NETWORK\ADMIN` folder in the Oracle database installation location.

Configure an Oracle Connection for Remote Access

A vCenter Server system can access the database remotely.

Prerequisites

Before configuring an Oracle connection, review the required database patches specified in "vCenter Server Database Patch and Configuration Requirements," on page 69. If you do not prepare your database correctly, the vCenter Server installer displays error and warning messages.

Procedure

1   Install the Oracle client on the vCenter Server system machine.

2   Download and install the ODBC driver.

3   Create a new tablespace for a vCenter Server system using a SQL statement such as the following.

```
CREATE TABLESPACE "VPX" DATAFILE 'C:\Oracle\ORADATA\VPX\VPX.dat' SIZE 1000M AUTOEXTEND ON NEXT
500K;
```

4   Create a user, such as vpxAdmin, for accessing the tablespace through ODBC.

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

5   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 unlimited
tablespace to <user> # To ensure space is sufficient
```

By default, the **RESOURCE** role has the **CREATE PROCEDURE**, **CREATE TABLE**, and **CREATE SEQUENCE** privileges assigned. If the RESOURCE role does not have these privileges, explicitly grant them to the vCenter Server database user.

6   Use a text editor or the Net8 Configuration Assistant to edit the `tnsnames.ora` file located in the directory `C:\Oracle\Oraxx\NETWORK\ADMIN`, where xx is either 10g or 11g.

Add the following entry, where `HOST` is the managed host to which the client must connect.

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

7   Configure the TNS Service Name option in the ODBC DSN.

The TNS Service Name is the net service name for the database to which you want to connect, in this case, VPX. You can find the net service name in the `tnsnames.ora` file.

Connect to an Oracle Database Locally

A vCenter Server system can access the database locally.

Procedure

1   Create a new tablespace for a vCenter Server system using a SQL statement such as the following.

```
CREATE TABLESPACE "VPX" DATAFILE 'C:\Oracle\ORADATA\VPX\VPX.dat' SIZE 1000M AUTOEXTEND ON NEXT
500K;
```

2   Create a user, such as vpxAdmin, for accessing the tablespace through ODBC.

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

3   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 unlimited
tablespace to <user> # To ensure space is sufficient
```

By default, the **RESOURCE** role has the **CREATE PROCEDURE**, **CREATE TABLE**, and **CREATE SEQUENCE** privileges assigned. If the RESOURCE role does not have these privileges, explicitly grant them to the vCenter Server database user.

4   Create an ODBC connection to the database.

These are example settings.

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

You now have a database that you can connect to locally.

What to do next

Install vCenter Server.

Introduction to Installing vCenter Server

11

You can install vCenter Server on a physical system or on a virtual machine running on an ESX host.

This chapter includes the following topics:

- "vCenter Server Prerequisites," on page 81
- "Using a User Account for Running vCenter Server with SQL Server," on page 82
- "About Installing vCenter Server on IPv6 Machines," on page 83
- "Configure the URLs on a Standalone vCenter Server System," on page 83
- "Running the vCenter Server and vSphere Client Installers from a Network Drive," on page 83
- "vCenter Server Components," on page 83
- "Required Data for Installing vCenter Server," on page 84

vCenter Server Prerequisites

Before installing vCenter Server, review the prerequisites.

- You must have the installation DVD or download the installation ISO image.

- Your hardware must meet the requirements listed in "vCenter Server and the vSphere Client Hardware Requirements," on page 14 and the required ports must be open, as discussed in "Required Ports," on page 16.

- Your database must meet the database requirements. See "vCenter Server Database Patch and Configuration Requirements," on page 69 and Chapter 10, "Preparing the vCenter Server Databases," on page 69.

- If the machine on which you are installing vCenter Server has VirtualCenter installed, you might want to upgrade instead of performing a fresh installation of vCenter Server.

  IMPORTANT   If you want to keep your existing VirtualCenter configuration, see the *Upgrade Guide*.

- There must be no Network Address Translation (NAT) between the vCenter Server system and the hosts it will manage.

- Create a vCenter Server database, unless you plan to install the bundled SQL Server 2005 Express.

- The system that you use for your vCenter Server installation must belong to a domain rather than a workgroup. If assigned to a workgroup, the vCenter Server system is not able to discover all domains and systems available on the network when using such features as vCenter Guided Consolidation Service. 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.

- During the installation, the connection between the machine and the domain controller must be working.

- The computer name cannot be more than 15 characters.

- The DNS name of the machine must match the actual computer name.

- Make sure the system on which you are installing vCenter Server is not an Active Directory domain controller.

- On each system that is running vCenter Server, make sure that the domain user account has the following permissions:

  - Member of the Administrators group

  - **Act as part of the operating system**

  - **Log on as a service**

- Assign a static IP address and host name to the Windows server that will host the vCenter Server system. This IP address must have a valid (internal) domain name system (DNS) registration that resolves properly from all managed ESX hosts.

- If you install vCenter Server on Windows Server 2003 SP1, the disk for the installation directory must have the NTFS format, not the FAT32 format.

- Consider whether the vCenter Server instance will be standalone or in a Linked Mode group. See

- vCenter Server, like any other network server, should be installed on a machine with a fixed IP address and well-known DNS name, so that clients can reliably access the service. If you use DHCP instead of a static IP address for vCenter Server, make sure that the vCenter Server computer name is updated in the domain name service (DNS). One way to test this is by pinging the computer name. For example, if the computer name is `host-1.company.com`, run the following command in the Windows command prompt:

  ```
  ping host-1.company.com
  ```

  If you can ping the computer name, the name is updated in DNS.

Using a User Account for Running vCenter Server with SQL Server

You can use the Microsoft Windows built-in system account or a user account to run vCenter Server. With a user account, you can enable Windows authentication for SQL Server, and it also provides more security.

The user account must be an administrator on the local machine. In the installation wizard, you specify the account name as DomainName\Username. You must configure the SQL Server database to allow the domain account access to SQL Server.

The Microsoft Windows built-in system account has more permissions and rights on the server than the vCenter Server system needs, which can contribute to security problems. Even if you do not plan to use Microsoft Windows authentication for SQL Server or you are using an Oracle database, you might want to set up a local user account for the vCenter Server system. In this case, the only requirement is that the user account is an administrator on the local machine.

For SQL Server DSNs configured with Windows authentication, use the same user account for the VMware VirtualCenter Management Webservices service and the DSN user.

If you install an instance of vCenter Server as a local system account on a local SQL Server database with Integrated Windows NT Authentication and you add an Integrated Windows NT Authentication user to the local database server with the same default database as vCenter Server, vCenter Server might not start. To resolve this issue, remove the Integrated Windows NT Authentication user from the local SQL database server, or change the default database for the local system user account to the vCenter Server database for the SQL Server user account setup.

About Installing vCenter Server on IPv6 Machines

If the system on which you install vCenter Server is configured to use IPv6, vCenter Server uses IPv6. When you connect to that vCenter Server system or install additional modules, you must specify the server address in IPv6 format, unless you use the fully qualified domain name.

Configure the URLs on a Standalone vCenter Server System

If you are joining a standalone vCenter Server system to a Linked Mode group, the domain name of the system must match the machine name. If you change either name to make them match, you must also configure the vCenter Server URLs to make them compatible with the new domain name and machine name.

If you do not update the URLs, remote instances of vCenter Server cannot reach the vCenter Server system, because the default vCenter Server URL entries are no longer accurate. The vCenter Server installer configures default URL entries as follows:

- For the VirtualCenter.VimApiUrl key, the default value is `http(s)://<FQDN of VC machine>/sdk`.

- For the Virtualcenter.VimWebServicesUrl key, the default value is `https://<FQDN of VC machine>:<installed-webservices-port>/vws`.

Procedure

1 From the vSphere Client, connect directly to the vCenter Server instance on which you have changed the domain or host name.

2 Select **Administration > vCenter Server Settings** and click **Advanced Settings**.

3 For the Virtualcenter.VimApiUrl key, change the value to point to the location where the vSphere Client and SDK clients can access the vCenter Server system.

   For example: `http(s)://<machine-name/ip>:<vc-port>/sdk`.

4 For the Virtualcenter.VimWebServicesUrl key, change the value to point to the location where vCenter Server Webservices is installed.

   For example: `https://<machine-name/ip>:<webservices-port>/vws`.

5 For the Virtualcenter.Instancename key, change the value so that the modified name appears in the vCenter Server inventory view.

Running the vCenter Server and vSphere Client Installers from a Network Drive

You can run the installers from a network drive, but you cannot install the software on a network drive.

In Windows, you can map a network drive, run the installers from the network drive, and install the software on the local machine.

vCenter Server Components

When you install vCenter Server, some additional components are also installed. In some cases, you can control which components are installed.

The vCenter Server installer installs the following components:

VMware vCenter Server	Windows service to manage ESX hosts.
Microsoft.NET 3.0 SP1 Framework	Software used by the Database Upgrade wizard and the vSphere Client. Also used by vCenter Server if you are using the bundled database.

VMware vCenter Orchestrator	vCenter Server module that provides a comprehensive set of tools to efficiently manage your virtual IT environment. The vCenter Server performs a silent installation of vCenter Orchestrator. If you install vCenter Server on an IPv6 operating system, the vCenter Orchestrator module is not supported. If you install vCenter Server in a mixed environment (both IPv4 and IPv6 enabled), the vCenter Orchestrator module can only be configured using IPv4. See the *vCenter Orchestrator Administration Guide*.
Microsoft SQL Server 2005 Express (optional)	Free, bundled 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 the bundled database.

The vCenter Server `autorun.exe` application includes links to install the following optional components:

vSphere Client	Client application used to connect directly to an ESX host or indirectly to an ESX host through a vCenter Server.
vCenter Converter Enterprise for vCenter Server	vCenter Server module that enables you to convert your physical machines to virtual machines.
vCenter Guided Consolidation Service	vCenter Server module that discovers physical systems and analyzes them for preparation to be converted into virtual machines.
vCenter Update Manager	vCenter Server module that provides security monitoring and patching support for ESX hosts and virtual machines.

Required Data for Installing vCenter Server

Prepare for the installation by recording the values that the vCenter Server system requires.

Table 11-1 lists the information that you are prompted for during the installation. Note the values entered in case you need to reinstall vCenter Server and want to use the same values. VMware Knowledge Base article 1010023 contains a linked worksheet that complements Table 11-1.

Table 11-1. Data Required for vCenter Server Installation

Data	Default	Comments
User name and organization	Your organization's name	Follow your organization's policy.
vCenter Server license key	None	If you omit the license key, vCenter Server is installed in evaluation mode. After you install vCenter Server, you can enter the vCenter Server license in the vSphere Client.
vCenter Server install location	Depends on your operating system	
Standalone or join group	Standalone	Join a Linked Mode group to enable the vSphere Client to view, search, and manage data across multiple vCenter Server systems.
Fully qualified domain name of Directory Services for the vCenter Server group	None	Required if this instance of vCenter Server is joining a group. This is the name of a remote instance of vCenter Server. The local and remote instances will be members of a Linked Mode group.
LDAP port for the Directory Services for the remote vCenter Server instance	389	Required if this instance of vCenter Server is joining a Linked Mode group. This is the remote instance's LDAP port. See "Required Ports," on page 16.
Data source name (DSN)	None	Required to use an existing database. Not required if you are using the bundled database.
Database user name	None	

Table 11-1. Data Required for vCenter Server Installation (Continued)

Data	Default	Comments
Database password	None	
vCenter Server account information Can be the Microsoft Windows system account or a user-specified account	Microsoft Windows system account	Use a user-specified account if you plan to use Microsoft Windows authentication for SQL Server. See "Using a User Account for Running vCenter Server with SQL Server," on page 82.
HTTPS Web services	443	See "Required Ports," on page 16.
HTTP Web services	80	
Heartbeat (UDP) used for sending data to ESX/ESXi hosts	902	
LDAP port for the Directory Services for the local vCenter Server instance	389	
SSL port for the Directory Services for the local vCenter Server instance	636	
VMware VirtualCenter Management Webservices	8080	
VMware VirtualCenter Management Webservices	8443	

Installing vCenter Server 12

After you install vCenter Server and the vSphere Client, you can configure communication between them.

This chapter includes the following topics:

- "Download the vCenter Server Installer," on page 87
- "Install vCenter Server in a Virtual Machine," on page 87
- "Install vCenter Server," on page 88

Download the vCenter Server Installer

You must download the installer for vCenter Server, the vSphere Client, and the additional modules.

Procedure

1 Download the zip file for the vCenter Server from the VMware product page at
   http://www.vmware.com/products/.

   The installer filename is `VMware-VIMSetup-xx-4.0.0-yyyyyy.zip`, where xx is the two-character language code and yyyyyy is the build number.

2 Extract the files from the zip archive.

Install vCenter Server in a Virtual Machine

You can install vCenter Server in a Microsoft Windows virtual machine, which runs on an ESX host.

Deploying the vCenter Server system in the virtual machine has the following advantages:

- Rather than dedicating a separate server to the vCenter Server system, you can place it in a virtual machine running on the same ESX host where your other virtual machines run.

- You can provide high availability for the vCenter Server system by using VMware HA.

- You can migrate the virtual machine containing the vCenter Server system from one host to another, enabling maintenance and other activities.

- You can create snapshots of the vCenter Server virtual machine and use them for backups, archiving, and so on.

Prerequisites

See "vCenter Server Prerequisites," on page 81.

Procedure

1 On a standalone server, install ESX.

2 On any machine that has network access to your ESX host, install the vSphere Client.

3 Using the vSphere Client, access the ESX host directly to create the virtual machine for hosting vCenter Server.

4 In the virtual machine, install vCenter Server.

Install vCenter Server

vCenter Server allows you to centrally manage hosts from either a physical or virtual Windows machine, and enables the use of advanced features such as VMware Distributed Resource Scheduler (DRS), VMware High Availability (HA), and VMware VMotion.

Prerequisites

See "vCenter Server Prerequisites," on page 81.

Procedure

1 In the software installer directory, double-click the `autorun.exe` file at `C:\<installer location>\`.

2 Click **vCenter Server**.

3 Choose a language for the installer and click **OK**.

This selection controls the language for only the installer. When you use the vSphere Client to connect to the vCenter Server system, the vSphere Client appears in the language associated with the locale setting on your machine. You can alter this behavior with a command-line instruction or by changing the locale in the registry of the machine. See *Basic System Administration*.

4 When the Welcome screen appears, click **Next**.

5 Select **I agree to the terms in the license agreement** and click **Next**.

6 Type your user name, organization, and vCenter Server license key, and click **Next**.

If you omit the license key, vCenter Server will be in evaluation mode, which allows you to use the full feature set. After installation, you can convert vCenter Server to licensed mode by entering the license key using the vSphere Client.

7 Choose the type of database that you want to use.

■ If you want to use the bundled database, click **Install SQL Server 2005 Express instance (for small-scale deployments)**.

This database is suitable for deployments of up to 5 hosts and 50 virtual machines.

■ If you want to use an existing database, click **Use an existing supported database** and select your database from the list of available DSNs. Enter the user name and password for the DSN and click **Next**.

If your database is a local SQL Server database using Windows NT authentication, leave the user name and password fields blank.

If you specify a remote SQL Server database that uses Windows NT authentication, the database user and the logged-in user on the vCenter Server machine must be the same.

A dialog box might appear warning you that the DSN points to an older version of a repository that must be upgraded. If you click **Yes**, the installer upgrades the database schema, making the database irreversibly incompatible with previous VirtualCenter versions. See the *Upgrade Guide*.

8   Choose the account type.

If you want to use Windows authentication for SQL Server, specify an account that is an administrator on the local machine. As a best practice, type the account name as <DomainName>\<Username>. Type the account password, retype the password, and click **Next**.

9   Either accept the default destination folders or click **Change** to select another location, and click **Next**.

The installation path cannot have commas (,) or periods (.).

> **NOTE** To install the vCenter Server on a drive other than C:, verify that 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, your vCenter Server installation might fail.

10   Select **Create a standalone VMware vCenter Server instance** or **Join Group** and click **Next**.

Join a Linked Mode group to enable the vSphere Client to view, search, and manage data across multiple vCenter Server systems. See Chapter 14, "Creating vCenter Server Linked Mode Groups," on page 95.

This option does not appear if you are upgrading the VirtualCenter database schema. If it does not appear, you can join a Linked Mode group after the installation is complete.

11   If you join a group, enter the fully qualified domain name and LDAP port number of any remote vCenter Server system and click **Next**.

In some cases, you can enter the IP address instead of the fully qualified domain name. To help ensure connectivity, the best practice is to use the fully qualified domain name. For IPv6, unless both the local and the remote machine are in IPv6 mode, you must enter the fully qualified domain name of the remote machine instead of the IPv6 address. If the local machine has an IPv4 address and the remote machine has an IPv6 address, the local machine must support IPv4 and IPv6 mixed mode. The domain name server must be able to resolve both IPv4 and IPv6 addresses if your environment has both addressing types in a single Linked Mode group.

12   Enter the port numbers that you want to use or accept the default port numbers and click **Next**.

See "Required Ports," on page 16.

13   Click **Install**.

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

14   Click **Finish**.

What to do next

See Chapter 13, "Postinstallation Considerations for vCenter Server," on page 91.

Postinstallation Considerations for vCenter Server

13

After you install vCenter Server, consider the postinstallation options and requirements.

■ Install the vSphere Client and make sure that you can access the vCenter Server instance.

■ Check the license server configuration. A license server is required if this vCenter Server is managing ESX 3.x/ESXi 3.5 hosts. For information about installing the VMware License Server, see the documentation for VMware Infrastructure 3.

■ For environments that require strong security, VMware recommends that you replace the default certificates on your vCenter Server system with certificates signed by a commercial Certificate Authority (CA). See vSphere 4.0 technical note *Replacing vCenter Server Certificates* at http://www.vmware.com/resources/techresources/.

■ When vCenter Server and the database are installed on the same machine, after rebooting the machine, the VMware VirtualCenter Management Webservices service might not start. To start the service manually, select **Settings > Control Panel > Administrative Tools > Services > VMware VirtualCenter Management Webservices** and start the service. The machine might require several minutes to start the service.

■ For Oracle databases, note the following:

   ■ For the Oracle Instant client, copy ojdbc14.jar to the vCenter Server tomcat directory (`<vCenter install location>\Infrastructure\tomcat\lib`)

   ■ The Oracle 10g client and Oracle 11g client come with ojdbc14.jar (`<Install location>\oracle \product\10.2.0\<instance_name>\jdbc\lib` or `<Install location>\app\Administrator\product \11.1.0\<instance_name>\sqldeveloper\jdbc\lib`). The vCenter Server installer copies the file from the Oracle client install location to the vCenter Server tomcat directory (`<vCenter install location> \Infrastructure\tomcat\lib`)

   ■ If the ojdbc14.jar file is not found in the Oracle 10g or Oracle 11g client location, the vCenter Server installer prompts you to copy the file manually. You can download the file from http://www.oracle.com/technology/software/tech/java/sqlj_jdbc/htdocs/jdbc101040.html.

This chapter includes the following topics:

■ "Install the vSphere Client," on page 92

■ "Install the vSphere Host Update Utility," on page 93

■ "Uninstall VMware vSphere Components," on page 94

Install the vSphere Client

The vSphere Client enables you to connect to an ESX/ESXi host and to a vCenter Server system.

Prerequisites

■ You must have the vCenter Server installer or the vSphere Client installer.

■ You must be a member of the Administrators group on the machine.

Procedure

1   Run the vSphere Client installer.

   ■ In the vCenter Server installer, double-click the `autorun.exe` file at `C:\<vc-installer location>\` and click **VMware vSphere Client**.

   ■ If you downloaded the vSphere Client, double-click the `VMware-viclient.exe` file.

2   Choose a language for the installer and click **OK**.

   This selection controls the language only for the installer. When you use the vSphere Client, the vSphere Client appears in the language associated with the locale setting on the machine. You can alter this behavior with a command-line instruction or by changing the locale in the registry of the machine. See *Basic System Administration*.

3   When the Welcome screen appears, click **Next**.

4   Select **I agree to the terms in the license agreement** and click **Next**.

5   Type your user name and company name and click **Next**.

6   Select **Install VMware vSphere Host Update Utility** to manage host patches, updates, and upgrades from this machine and click **Next**.

   For large deployments and for environments with clustered hosts, VMware recommends that you use vCenter Update Manager instead of the vSphere Host Update Utility.

7   Accept the default installation location and click **Next**, or click **Change** to select a different location and click **Next**.

8   Click **Install** to begin the installation.

9   Click **Finish** to complete the installation.

You can use the vSphere Client to connect to an ESX/ESXi host or to connect to a vCenter Server system.

Start the vSphere Client

After you install the vSphere Client, you can connect to an ESX/ESXi host and to a vCenter Server system.

NOTE   Do not use the Windows built-in Guest account to start the vSphere Client. By default, the Guest Account is disabled. When you use the Guest account to log in to Windows, you cannot access the applications that are already installed on the computer.

Procedure

1 Select **Start > Programs > VMware > VMware vSphere Client**.

2 In the vSphere Client login window, log in to an ESX/ESXi host as root or as a normal user, or log in to a vCenter Server system as the administrator.

    a Enter the IP address or host name.

    b Enter your user name and password.

    When you connect to the vCenter Server, use the vCenter Server IP address with your Windows login user name and password. Use the login credentials appropriate to the Windows machine on which vCenter Server is installed. The vCenter Server user name and password might be different than the user name and password that you use for ESX/ESXi.

3 Click **Login**.

    If you cannot connect to the vCenter Server system, you might need to start the VMware VirtualCenter Management Webservices service manually. To do this, select **Settings > Control Panel > Administrative Tools > Services > VMware VirtualCenter Management Webservices** and start the service. The machine might require several minutes to start the service.

4 To ignore the security warnings that appear, click **Ignore**.

    Security warning messages appear because the vSphere Client detects certificates signed by the ESX/ESXi host or vCenter Server system (default setting). For highly secure environments, certificates generated by a trusted third-party are recommended.

Install the vSphere Host Update Utility

The vSphere Host Update Utility is for updating and patching ESXi 4.0 hosts and upgrading ESX 3.x/ESXi 3.5 hosts to ESX 4.0/ESXi 4.0.

The vSphere Host Update Utility is bundled with the vSphere Client. You can install the utility when you install the vSphere Client. If the vSphere Client is already installed and the vSphere Host Update Utility is not, use this procedure to install vSphere Host Update Utility.

Prerequisites

To use vSphere Host Update Utility, you must have the following:

■ Workstation or laptop with the vSphere Client installed.

■ Network connection between the ESX/ESXi host and the workstation or laptop.

■ Internet connectivity to download patch and update bundles or upgrade images from VMware.com if you do not have a local depot.

Procedure

1 Open a command window by selecting **Start > Run** and then entering `cmd`.

2 Navigate to the folder that contains `VMware-viclient.exe`.

    This executable is in the `\vpx` subfolder of the vCenter Server installation package.

3 Run the following command.

    `VMware-viclient.exe /S /V" /qr INSTALL_VIUPDATE=1 /L*v %temp%\vim-viu-launch.log"`

The vSphere Host Update Utility is installed.

What to do next

Scan hosts and apply available updates or upgrade a host.

Uninstall VMware vSphere Components

The VMware vSphere components are uninstalled separately, even if they are on the same machine. You must have administrator privileges to uninstall the vCenter Server component.

> **⚠ CAUTION** Uninstalling a vCenter Server system while it is running disrupts the vSphere Client connections, which can cause data loss.

Uninstalling vCenter Server or the vSphere Client does not uninstall any of the other components, such as the bundled database or Microsoft .NET Framework. Do not uninstall the other components if other applications on your system depend on them.

Procedure

1 If you are uninstalling the vCenter Server, unlicense the vCenter Server and the hosts, and remove the license keys from the license inventory.

2 If you are uninstalling the vCenter Server, remove the hosts from the Hosts and Clusters inventory.

3 As Administrator on the Microsoft Windows system, select **Start > Settings > Control Panel > Add/ Remove Programs**.

4 Select the component to remove from the list and click **Remove**.

5 Click **Yes** to confirm that you want to remove the program and click **Finish**.

Creating vCenter Server Linked Mode Groups 14

A Linked Mode group allows you to log in to any single instance of vCenter Server and view and manage the inventories of all the vCenter Server systems in the group.

You can join multiple vCenter Server systems to form a Linked Mode group. You can configure a Linked Mode group during vCenter Server installation or after vCenter Server is installed.

To join a vCenter Server group, you enter the fully qualified domain name (or IP address) of a remote machine on which vCenter Server 4.0 is running. The remote machine can be any vCenter Server 4.0 instance that is or will become a member of the Linked Mode group.

You must also provide the Lightweight Directory Access Protocol (LDAP) port number of the remote vCenter Server instance.

vCenter Server instances in a group replicate shared global data to the LDAP directory. The global data includes the following information for each vCenter Server instance:

- Connection information (IP and ports)
- Certificates
- Licensing information
- User roles

This chapter includes the following topics:

Linked Mode Prerequisites

Prepare the system for joining a Linked Mode group.

All the requirements for standalone vCenter Server systems apply to Linked Mode systems. See "vCenter Server Prerequisites," on page 81.

The following requirements apply to each vCenter Server system that is a member of a Linked Mode group:

■ DNS must be operational for Linked Mode replication to work.

■ The vCenter Server instances in a Linked Mode group can be in different domains if the domains have a two-way trust relationship. Each domain must trust the other domains on which vCenter Server instances are installed.

■ When adding a VirtualCenter instance to a Linked Mode group, the installer must be run by a domain user who is an administrator on both the machine where VirtualCenter is installed and the target machine of the Linked Mode group.

■ All vCenter Server instances must have network time synchronization. The vCenter Server installer validates that the machine clocks are not more than 5 minutes apart.

Linked Mode Considerations

There are several considerations to take into account before you configure a Linked Mode group.

■ Each vCenter Server user sees the vCenter Server instances on which they have valid permissions.

■ When first setting up your vCenter Server Linked Mode group, you must install the first vCenter Server as a standalone instance because you do not yet have a remote vCenter Server machine to join. Subsequent vCenter Server instances can join the first vCenter Server or other vCenter Server instances that have joined the Linked Mode group.

■ If you are joining a vCenter Server to a standalone instance that is not part of a domain, you must add the standalone instance to a domain and add a domain user as an administrator.

■ The vCenter Server instances in a Linked Mode group do not need to have the same domain user login. The instances can run under different domain accounts. By default, they run as the LocalSystem account of the machine on which they are running, which means they are different accounts.

■ During vCenter Server installation, if you enter an IP address for the remote instance of vCenter Server, the installer converts it into a fully qualified domain name.

■ You cannot join a Linked Mode group during the upgrade procedure when you are upgrading from VirtualCenter 2.x to vCenter Server 4.0. You can join after the upgrade to vCenter Server is complete. See the *Upgrade Guide*.

Configure the URLs on a Linked Mode vCenter Server System

If you connect a vCenter Server system to a Linked Mode group and the vCenter Server system has a machine name that does not match the domain name, several connectivity problems arise. This procedure describes how to correct this situation.

If you do not update the URLs, remote instances of vCenter Server cannot reach the vCenter Server system, because the default vCenter Server URL entries are no longer accurate. The vCenter Server installer configures default URL entries as follows:

■ For the Virtualcenter.VimApiUrl key, the default value is `http(s)://<Fully qualified domain name (FQDN) of VC machine>/sdk`.

■ For the Virtualcenter.VimWebServicesUrl key, the default value is `https://<FQDN of VC machine>:<installed-webservices-port>/vws`.

Procedure

1 Isolate the vCenter Server system from the Linked Mode group.

   See "Isolate a vCenter Server Instance from a Linked Mode Group," on page 98.

2 Change the domain name or the machine name to make them match.

3 From the vSphere Client, connect directly to the vCenter Server instance on which you have changed the domain or machine name.

4 Select **Administration > vCenter Server Settings** and click **Advanced Settings**.

5 For the Virtualcenter.VimApiUrl key, change the value to point to the location where the vSphere Client and SDK clients can access the vCenter Server system.

For example: `http(s)://<machine-name/ip>:<vc-port>/sdk`.

6 For the Virtualcenter.VimWebServicesUrl key, change the value to point to the location where vCenter Server Webservices is installed.

For example: `https://<machine-name/ip>:<webservices-port>/vws`.

7 For the Virtualcenter.Instancename key, change the value so that the modified name appears in the vCenter Server inventory view.

8 Rejoin the vCenter Server system to the Linked Mode group.

See "Join a Linked Mode Group After Installation," on page 97.

Joining to a Linked Mode Group During and After Installation

You can join a system to a Linked Mode group during or after installing vCenter Server.

For example, suppose you have three machines on which you want to install vCenter Server. You want the three instances to be members of a Linked Mode group.

1 On Machine 1, you install vCenter Server as a standalone instance because you do not yet have a remote vCenter Server machine to join.

2 On Machine 2, you install vCenter Server, choose to join a Linked Mode group, and provide the fully qualified domain name of Machine 1.

3 On Machine 3, you upgrade to vCenter Server 4.0. After the upgrade, you configure Machine 3 to join either Machine 1 or Machine 2. Machine 1, Machine 2, and Machine 3 are now members of a Linked Mode group.

Join a Linked Mode Group After Installation

If you have a system that is already running vCenter Server 4.0, you can join the machine to a Linked Mode group.

Prerequisites

See "Linked Mode Prerequisites," on page 95 and "Linked Mode Considerations," on page 96.

Procedure

1 Select **Start > All Programs > VMware > vCenter Server Linked Mode Configuration**.

2 Click **Next**.

3 Select **Modify linked mode configuration** and click **Next**.

4 Click **Join this vCenter Server instance to an existing linked mode group or another instance** and click **Next**.

5 Enter the server name and LDAP port number of a remote vCenter Server instance that is a member of the group and click **Next**.

If you enter an IP address for the remote server, the installer converts it into a fully qualified domain name.

6   If the vCenter Server installer detects a role conflict, select how to resolve the conflict.

Option	Description
Yes, let VMware vCenter Server resolve the conflicts for me	Click **Next**. The role on the joining system is renamed to <vcenter_name> <role_name>, where <vcenter_name> is the name of the vCenter Server system that is joining the Linked Mode group, and <role_name> is the name of the original role.
No, I'll resolve the conflicts myself	To resolve the conflicts manually: a Using the vSphere Client, log in to one of the vCenter Server systems using an account with **Administrator** privileges. b Rename the conflicting role. c Close the vSphere Client session and return to the vCenter Server installer. d Click **Back** and click **Next**. The installation continues without conflicts.

A conflict results if the joining system and the Linked Mode group each contain a role with the same name but with different privileges.

7   Click **Finish**.

vCenter Server restarts. Depending on the size of your inventory, the change to Linked Mode might take from a few seconds to a few minutes to complete.

The vCenter Server instance is now part of a Linked Mode group. After you form a Linked Mode group, you can log in to any single instance of vCenter Server and view and manage the inventories of all the vCenter Servers in the group. It might take several seconds for the global data (such as user roles) that are changed on one machine to be visible on the other machines. The delay is usually 15 seconds or less. It might take a few minutes for a new vCenter Server instance to be recognized and published by the existing instances, because group members do not read the global data very often.

What to do next

For information about configuring and using your Linked Mode group, see *Basic System Administration*.

Isolate a vCenter Server Instance from a Linked Mode Group

You can isolate a vCenter Server instance from a Linked Mode group.

Procedure

1   Select **Start > All Programs > VMware > vCenter Server Linked Mode Configuration**.

2   Click **Modify linked mode configuration** and click **Next**.

3   Click **Isolate this vCenter Server instance from linked mode group** and click **Next**.

4   Click **Continue** and click **Finish**.

The vCenter Server instance is no longer part of the Linked Mode group.

Linked Mode Troubleshooting

If you are having trouble with your Linked Mode group, consider the following points.

- When you have multiple vCenter Server instances, each instance must have a working relationship with the domain controller and not conflict with another machine that is in the domain. Conflicts can occur, for example, when you clone a vCenter Server instance that is running in a virtual machine and you do not use sysprep or a similar utility to ensure that the cloned vCenter Server instance has a globally unique identifier (GUID).

- The DNS name of the machine must match with the actual machine name. Symptoms of machine names not matching the DNS name are data replication issues, ticket errors when trying to search, and missing search results from remote instances.

- There is correct order of operations for joining a Linked Mode group.

    a   Verify that the vCenter Server domain name matches the machine name. If they do not match, change one or both to make them match.

    b   Update the URLs to make them compatible with the new domain name and machine name.

    c   Join the vCenter Server system to a Linked Mode group.

    If you do not update the URLs, remote instances of vCenter Server cannot reach the vCenter Server system, because the default vCenter Server URL entries are no longer accurate. See "Configure the URLs on a Linked Mode vCenter Server System," on page 96.

    If a vCenter Server instance is no longer reachable by remote instances of vCenter Server, the following symptom might occur:

    - Clients logging in to other vCenter Server systems in the group cannot view the information that belongs to the vCenter Server system on which you changed the domain name because the users cannot log in to the system.

    - Any users that are currently logged in to the vCenter Server system might be disconnected.

    - Search queries do not return results from the vCenter Server system.

    To resolve this issue, make sure that the Virtualcenter.VimApiUrl key points to the location where the vSphere Client and SDK clients can access the vCenter Server system, and the Virtualcenter.VimWebServicesUrl key points to the location where vCenter Server Webservices is installed. For the Virtualcenter.Instancename key, change the value so that the modified name appears in the vCenter Server inventory view.

- If you cannot join a vCenter Server instance, you can resolve the problem with the following actions:

    - Ensure that the machine is grouped into the correct organizational unit in the corresponding domain controller.

    - When you install vCenter Server, ensure that the logged in user account has administrator privileges on the machine.

    - To resolve trust problems between a machine and the domain controller, remove the machine from the domain and then add it to the domain again.

    - To ensure that the Windows policy cache is updated, run the `gpupdate /force` command from the Windows command line. This command performs a group policy update.

- If the local host cannot reach the remote host during a join operation, verify the following:
    - Remote vCenter Server IP address or fully qualified domain name is correct.
    - LDAP port on the remote vCenter Server is correct.
    - VMwareVCMSDS service is running.
- Make sure your Windows and network-based firewalls are configured to allow Linked Mode.

Configuring a Windows Firewall to Allow a Specified Program Access

vCenter Server 4.0 uses Microsoft ADAM/AD LDS to enable Linked Mode, which uses the Windows RPC port mapper to open RPC ports for replication. When you install vCenter Server in Linked Mode, the firewall configuration on the local machine must be modified.

Incorrect configuration of firewalls can cause licenses and roles to become inconsistent between instances.

Prerequisites

- The Windows version must be an earlier than Windows Server 2008. For Windows Server 2008, Windows automatically configures the firewall to permit access.
- There must be no network-based firewalls between vCenter Server Linked Mode instances. For environments with network-based firewalls, see "Configuring Firewall Access by Opening Selected Ports," on page 100.

Procedure

1 Select **Start > Run**.

2 Type `firewall.cpl` and click **OK**.

3 Make sure that the firewall is set to allow exceptions.

4 Click the **Exceptions** tab.

5 Click **Add Program**.

6 Add an exception for `C:\Windows\ADAM\dsamain.exe` and click **OK**.

7 Click **OK**.

Configuring Firewall Access by Opening Selected Ports

vCenter Server 4.0 uses Microsoft ADAM/AD LDS to enable Linked Mode, which uses the Windows RPC port mapper to open RPC ports for replication. When you install vCenter Server in Linked Mode, the firewall configuration on any network-based firewalls must be modified.

Incorrect configuration of firewalls can cause licenses and roles to become inconsistent between instances.

Procedure

◆ Configure Windows RPC ports to generically allow selective ports for machine-to-machine RPC communication.

Choose one of the following methods.

- Change the registry settings. See http://support.microsoft.com/kb/154596/en-us.
- Use Microsoft's `RPCCfg.exe` tool. See http://support.microsoft.com/kb/908472/en-us

Install Additional Modules

<div style="text-align: right">**15**</div>

You can install additional modules on the same machine that hosts vCenter Server or on remote machines.

This chapter includes the following topics:

Install VMware vCenter Guided Consolidation

The vCenter Guided Consolidation service is an extension to vCenter Server. vCenter Guided Consolidation enables you to migrate from physical servers to virtual infrastructure using a wizard that identifies physical servers for consolidation, converts them to virtual machines, and places them onto ESX/ESXi hosts.

This procedure describes how to install vCenter Guided Consolidation as an additional module (sometimes called a plug-in) on the same machine that hosts vCenter Server or on a remote machine.

The VMware vCenter Guided Consolidation service includes the following components:

vCenter Collector service	This service discovers computers in your network and collects performance data. To enable this service, the installer prompts you to enter a user name and password for an administrative account on the local machine. This account can be a domain user account specified as DomainName\UserName. The vCenter Collector service uses port 8181 and 8182, by default.
vCenter Web Server	Uses ports 8080 and 8443, by default.

Prerequisites

Before you install vCenter Guided Consolidation, download the software installer and install vCenter Server 4.0 on the local machine or on a machine that is reachable by the local machine.

Procedure

1   In the software installer directory, double-click the `autorun.exe` file at `C:\<vc-installer location>\`.

2   Click **vCenter Guided Consolidation Service**.

3   Choose a language for the installer and click **OK**.

4   When the Welcome screen appears, click **Next**.

5   Select **I agree to the terms in the license agreement** and click **Next**.

6   Accept the default installation location, or click **Change** to select a different location, and click **Next**.

7   Type an administrative user name and password and click **Next**.

8   Enter the port numbers that you want to use or accept the default port numbers and click **Next**.

9   Enter the location of the vCenter Server system.

- Enter an IP address or fully qualified domain name of the remote vCenter Server system to which the vCenter Guided Consolidation service will be an extension.

- Enter `localhost` if you are installing the vCenter Guided Consolidation service on the same system on which you installed vCenter Server.

10   Enter the port number that the vCenter Server system uses for secure HTTP (HTTPS) communication.

The default port is 443.

11   Enter the user name and password for the vCenter Server system and click **Next**.

The user account must have extension registration privileges on the vCenter Server system.

12   Select the server identity from the drop-down menu and click **Next**.

13   Click **Install** to begin the installation.

14   Click **Finish** to complete the installation.

The vCenter Guided Consolidation Service is installed.

Install VMware vCenter Update Manager

vCenter Update Manager is for environments with vCenter Server. Using vCenter Update Manager, you can orchestrate steps of an upgrade process sequentially, based on compliance baselines at the host, virtual machine, and datastore level.

This procedure describes how to install vCenter Update Manager as an additional module (sometimes called a plug-in) on the same machine that hosts vCenter Server or on a remote machine.

Prerequisites

Before you install vCenter Update Manager, download the software installer and install vCenter Server 4.0 on the local machine or on a machine that is reachable by the local machine.
vCenter Update Manager requires a supported database. The database requirements are the same as vCenter Server. You can use a supported database that is configured to work with vCenter Update Manager, or you can install the Microsoft SQL 2005 database that is bundled with vCenter Update Manager. vCenter Update Manager can use the same database as vCenter Server, but VMware recommends that you have separate databases for vCenter Server and vCenter Update Manager.

Procedure

1   In the software installer directory, double-click the `autorun.exe` file at `C:\<vc-installer location>\`.

2   Click **vCenter Update Manager**.

3   Choose a language for the installer and click **OK**.

4   When the Welcome screen appears, click **Next**.

5   Select **I agree to the terms in the license agreement** and click **Next**.

6   Enter the connection information for the vCenter Server system to which vCenter Update Manager will be an extension.

   a   Enter the IP address. By default, the IP address is that of the local host.

   b   Enter the port number that the vCenter Server system is configured to use for HTTP. By default, vCenter Server uses port 80.

   c   Enter the user name and password for the vCenter Server system.

7   Choose the type of database that you want to use for vCenter Update Manager.

- To use the bundled database, click **Install a Microsoft SQL Server 2005 Express instance** and click **Next**.

  This database is suitable for small deployments of up to 5 hosts and 50 virtual machines.

- To use an existing database, click **Use an existing supported database**, select your database from the list of available DSNs, and click **Next**.

8   If you chose to use an existing database, enter the user name and password for the DSN and click **Next**.

If your database is a local SQL Server database using Microsoft Windows NT authentication, leave the user name and password fields blank.

9   Select the fully qualified domain name or IP address to identify this instance of vCenter Update Manager on the network.

Make sure that the fully qualified domain name is accessible by the vCenter Server system and by all the ESX/ESXi hosts managed by the vCenter Server system.

10   Enter the port numbers that you want to use or accept the default port numbers.

11   (Optional) Select **Yes, I have an Internet connection, and I want to configure proxy settings now**.

12   Click **Next**.

13   Enter the proxy server name and port number.

If the local machine has proxy settings configured, the installer uses these settings by default.

14   (Optional) Select **Authenticate proxy using the credentials below**, and enter the user name and password to use for authentication.

15   Accept the default installation location or click **Change** to select a different location.

16   Accept the default location for patch downloads or click **Change** to select a different location, and click **Next**.

17   Click **Install** to begin the installation.

18   Click **Finish** to complete the installation.

The vCenter Update Manager is installed.

What to do next

Install the Update Manager client plug-in. See the *vCenter Update Manager Administration Guide*.

Install VMware vCenter Converter

vCenter Converter enables you to automate and simplify physical to virtual machine conversions as well as conversions between virtual machine formats.

This procedure describes how to install vCenter Converter as an additional module (sometimes called a plug-in) on the same machine that hosts vCenter Server or on a remote machine.

Prerequisites

Before you install vCenter Converter, download the software installer and install vCenter Server 4.0 on the local machine or on a machine that is reachable by the local machine.

Procedure

1   In the software installer directory, double-click the `autorun.exe` file at `C:\<vc-installer location>\`.

2   Click **vCenter Converter**.

3   Choose a language for the installer and click **OK**.

4   When the Welcome screen appears, click **Next**.

5   Select **I agree to the terms in the license agreement** and click **Next**.

6   Accept the default installation location and click **Next**, or click **Change** to select a different location and click **Next**.

7   Select the installation mode.

   ■   Select **Typical (Recommended)** to install the most common components.

   ■   Select **Custom** to choose the components to install.

8   Enter the connection information for the vCenter Server system to which vCenter Converter will be an extension.

   a   Enter the IP address. By default, the IP address is that of the local host.

   b   Enter the port number that the vCenter Server system is configured to use for secure HTTP (HTTPS). By default, vCenter Server uses port 443.

   c   Enter an administrative user name and password for the vCenter Server system.

9   Enter the port numbers that you want to use or accept the default port numbers and click **Next**.

10 Select the vCenter Server identity from the drop-down menu and click **Next**.

11 Click **Install** to begin the installation.

12 Click **Finish** to complete the installation.

vCenter Converter is installed.

What to do next

Install the Converter client plug-in. See the *vCenter Converter Administration Guide*.

Managing ESX/ESXi and vCenter Server Licenses

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License reporting and management are centralized.

If you upgrade all your hosts, you no longer need a license server or host-based license files. All product licenses are encapsulated in 25-character license keys that you can manage and monitor from vCenter Server.

Each ESX/ESXi host requires one license key. Each vCenter Server instance requires one license key. You cannot assign multiple license keys to a host or to a vCenter Server system. When you apply a minor upgrade or patch the ESX/ESXi or vCenter Server software, you do not need to replace the existing license key with a new one. If you upgrade the edition of the license (for example, from standard to enterprise), you must replace the existing license key in the inventory with a new upgraded license key.

This chapter includes the following topics:

About License Key Capacity

License keys have a certain amount of capacity. Capacity is based on the number of processors in the host or the number of instances of the software asset.

Licensing for Each Processor

For most vSphere products, when you purchase vSphere licenses, you must consider the total number of processors, not hosts, that will run the products. You can assign and reassign the processor capacity to any combination of hosts. For example, suppose you purchase a 10-processor vSphere license key. You can assign the 10-processor license key to any of the following combinations of hosts:

- Five 2-processor hosts

- Three 2-processor hosts and one 4-processor host

- Two 4-processor hosts and one 2-processor host

- One 8-processor host and one 2-processor host

Special considerations include:

- Dual-core and quad-core processors, such as Intel processors that combine two or four independent CPUs on a single chip, count as one processor.

- You cannot partially license a multiprocessor host. For example, a 4-CPU host requires 4-processors of vSphere license key capacity.

IMPORTANT   From the ESX/ESXi license perspective, a CPU is a processor with a physical processor in it. When you purchase a license, you select the edition, the number of CPUs, and the maximum number of cores per CPU. For example, if you purchase an enterprise license with 100 CPUs, you must also choose the maximum number of cores per CPU. For example, you might select a maximum of 2 cores per CPU, 6 cores per CPU, or 12 cores per CPU. The choice depends on the type of hardware on which you are installing ESX/ESXi.

Licensing for Each Asset Instance

Products for which you purchase a license for each instance require a single unit of license key capacity, regardless of the number of processors in the machine. The vCenter Server is an example of a product that requires this type of license. If you purchase a vCenter Server license key with a capacity greater than one, you assign one unit of the capacity to each instance of vCenter Server.

About vSphere and vCenter Server License Keys

The terms vSphere and vCenter Server are used for licenses.

vSphere Licenses   For ESX/ESXi.

vCenter Server Licenses   For vCenter Server (formerly, VirtualCenter).

About Using a License Server to Manage ESX 3.x/ESXi 3.5 Hosts

vCenter Server 4.0 does not require a license server to manage ESX 4.0/ESXi 4.0 hosts. vCenter Server 4.0 requires a license server to manage ESX 3.x/ESXi 3.5 hosts.

If you do not have a license server installed and you need one, download the VMware License Server from the VMware Web site.

The License Server installation requires no downtime. No virtual machines, servers, hosts, or clients need to be powered off for the installation of the license server.

Configure vCenter Server to Use a License Server

To manage ESX 3.x/ESXi 3.5 hosts, you must configure vCenter Server to use a license server.

Procedure

1   In vCenter Server, select **Administration > vCenter Server Settings**.

2   In the License Server text box, enter the port number and license server machine name, as in port@host.

    For example: 27000@license-3.companyname.com

3   If you want the hosts and vCenter Server to use the same license server, select the **Reconfigure ESX 3 hosts using license servers to use this server** check box.

4   Click **OK**.

About the License Portal

Use the license portal to get upgraded license keys, downgrade license keys, combine the capacity of multiple license keys, divide the capacity of a single license key, view the change history of your license keys, and find lost license keys.

Getting Upgraded License Keys

If you have VMware Infrastructure 3 license keys and you have been provided upgrades to vSphere 4.0, use the license portal to retrieve the new license keys and deactivate the old licenses. After you retrieve the license keys, enter them into the vCenter Server license inventory.

Downgrading License Keys

If you have vSphere 4.0 license keys but you need to license VMware Infrastructure 3 assets, use the license portal to downgrade the license keys. When you do this, your vSphere 4.0 license keys remain valid. When you are ready to upgrade your assets, you can stop using the VMware Infrastructure licenses and start using the vSphere 4.0 license keys by entering them into the vCenter Server license inventory and assigning them to your upgraded assets.

Combining the Capacity of License Keys

If your license inventory contains multiple license keys, each with a small amount of capacity, you might want to combine them into one large-capacity license key. This is useful when the total available capacity across license keys is large enough to accommodate an asset, but no single license key is large enough to accommodate the asset.

After you use the license portal to combine license keys, you must add the new license key to the vCenter Server license inventory and remove the old license keys.

Dividing the Capacity of License Keys

If you have a large-capacity license key, you might want to divide the capacity to create multiple smaller-capacity license keys. This is useful for managing license keys in different vCenter Server inventories or assigning different license keys to groups in your organization.

Viewing the Change History of License Keys

The license portal tracks the complete history of license key upgrades, downgrades, combinations, and divisions for your organization.

Finding Lost License Keys

If a license key is misplaced, you can search for it in the license portal using the following criteria:

- Date range

- License key

- Order number

- Transaction type

About License Inventories

The license inventories that are maintained by a vCenter Server system work slightly differently, depending on whether you have Linked Mode groups or standalone systems.

Example 16-1. Uninstallation Scenarios

1   You uninstall vCenter Server without first unlicensing and removing the hosts.

2   The hosts remain licensed.

3   You add the licensed hosts to another vCenter Server instance.

4   The license keys are transferred with the hosts.

Here is a slightly different scenario:

1   You uninstall vCenter Server without first unlicensing the hosts.

2   You reinstall vCenter Server and make it part of a different Linked Mode group.

3   The host license keys from the previous group are not transferred to the new group.

4   You add hosts that were licensed by the previous vCenter Server group to the new group.

5   The host license keys are transferred to the new group.

6   The host license keys now belong to two Linked Mode groups. If the total assignment of the key exceeds the key's capacity, this scenario is not supported and causes your license usage to be out of compliance.

Example 16-2. Standalone Scenario

Each vCenter Server instance maintains its own license inventory. If you add an ESX/ESXi host to vCenter Server and add the same host to another vCenter Server instance, the host license key moves from the first inventory to the second inventory.

1   You have two vCenter Server instances that are standalone.

2   You assign a license to a host in one vCenter Server instance.

3   You add the host to another vCenter Server instance and choose to retain the license when you perform the Add Host operation.

4   The host license key belongs to two separate license inventories. If the total assignment of the key exceeds the key's capacity, this scenario is not supported and causes your license usage to be out of compliance.

Example 16-3. Linked Mode Scenario

1   You have two vCenter Server instances that belong to the same Linked Mode group.

2   You assign a license to a host in one vCenter Server instance.

3   The two vCenter Server instances share a single license inventory.

4   When you add a license key, the key becomes available to all the vCenter Server systems within the same Linked Mode group. The license keys are shared, and each system in the group has the same inventory view, although this might not always seem so because of replication delays.

Controlling License Permissions

You can control which users are able to view and manage license resources.

The following permission types are supported.

Global.licenses	If you have global permission at the root folder, you can view and modify all licenses in the vCenter Server inventory. This includes other vCenter Server systems in a Linked Mode group.
Read-only	If you have read-only permission on a host, the vCenter Server displays the first and last five characters of the license key assigned to the host, the features present in the license, and the expiration date for the license.

If you have neither of these permissions but you can add a host to vCenter Server, you can add a license to the inventory and assign a license to the host when you perform the add host operation.

View License Information

You can see all the licenses assigned or available in your vSphere inventory using the licensing view.

Procedure

1   From a vSphere Client host that is connected to a vCenter Server system, click **Home > Licensing**.

2   (Optional) Click **Refresh**.

3   On the licensing page, select the view.

- To view the available licenses listed by product, select **Product**.

- To view the available licenses listed by license key, select **License key**.

- To view licenses listed by the asset (host or vCenter Server system) to which they are assigned, select **Asset**.

From these report views, you can right-click entities to add, assign, and remove license keys and copy license information to your clipboard.

Example 16-4. Use the Product View to Add and Assign a License Key

In this example, you select the **Product** view in the Licensing Report window. In the Evaluation Mode list, right-click a vCenter Server instance and select **Change license key**. You can then assign a license key that is in the license inventory or add a new license key and assign it in a single operation.
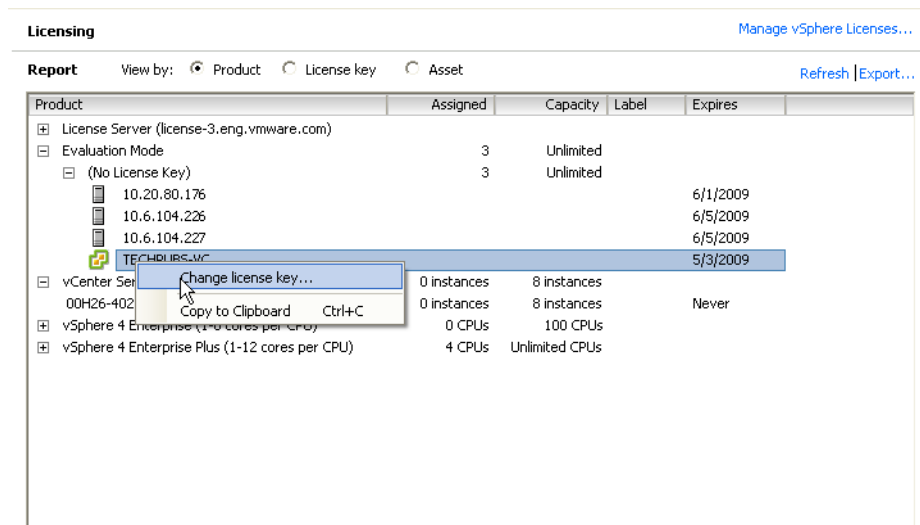
What to do next

If you have a license with zero assigned capacity, as seen in the Assigned column of the License Report, ask yourself the following questions:

- Did I forget to assign this license key to an asset?

- Did I forget to remove this license key from the inventory?

    Remove the license key in the following cases:

    - The license key has expired.

    - You use the license portal to combine the capacities of multiple small-capacity license keys to create a larger-capacity license key. Then you remove the old license keys and add the new license key to the vCenter Server inventory.

    - You have upgraded your licenses, and you must remove the legacy licenses.

Add a License Key to the License Inventory and Assign It to an Asset

After you purchase an asset, you can add the license key to the inventory and assign it to the asset. Use this procedure to add one license key and assign it to one asset.

Prerequisites

The vSphere Client must be connected to the vCenter Server system.

Procedure

1 From a vSphere Client host that is connected to a vCenter Server system, select **Home > Licensing**.

2 For the report view, select **Asset**.

3 Right-click an asset and select **Change license key**.

4 Select **Assign a new license key** and click **Enter Key**.

5   Enter the license key, enter an optional label for the key, and click **OK**.

6   Click **OK**.

Add Multiple License Keys to the License Inventory

After you purchase assets, you can add the license keys to the license inventory. You can add multiple license keys at the same time.

Prerequisites

The vSphere Client must be connected to the vCenter Server system.

Procedure

1   From a vSphere Client host that is connected to a vCenter Server system, select **Home > Licensing**.

2   Click **Manage vSphere Licenses**.

3   In the Add License Keys text area, enter license keys one per line.

     You can paste a list of keys in one operation.

4   (Optional) Type a brief description of the keys.

5   Click **Add License Keys**.

     If any of the keys are invalid, an error message lists the invalid keys. You can correct the invalid keys and try adding them again, or delete them.

6   If you are not ready to assign license keys to assets, click **Next** through the remaining wizard screens and click **Finish** to save your changes.

Assign a License Key to Multiple Assets

You can assign licenses to single or multiple assets, individually or in batches.

NOTE   After you assign a license to a host, the software might update the license report before the license assignment operation is complete. If the host becomes disconnected immediately after you assign the license, the license report might not accurately reflect the host license state. The report might show the host as licensed, even though the license assignment operation is not yet complete. When the host is reconnected to a vCenter Server system, the license assignment operation continues, and the host becomes licensed as shown in the report.

Prerequisites

To assign a license to a host, the host must be connected to a vCenter Server system.

Procedure

1   From a vSphere Client host that is connected to a vCenter Server system, select **Home > Licensing**.

2   Click **Manage vSphere Licenses**.

3   Click **Next** to go to the Assign Licenses page.

4   Click the **ESX** or **vCenter Server** tab to display the available assets.

5   Click **Show Unlicensed assets**, **Show licensed assets**, or **Show all**.

6   In the Asset window, select one or more assets to license.

     To select multiple assets, use Ctrl-click or Shift-click.

7   In the Product window, select an appropriate license key and click **Next**.

The capacity of the license key must be greater than or equal to the sum of the asset CPUs.

8   If you are not ready to remove any license keys, click **Next** to skip the Remove License Keys page and click **Finish** to save your changes.

Example 16-5. Assign a License Key to Two ESX Hosts

In this example, Shift-click to select two 2-CPU ESX hosts and then assign a vSphere Enterprise license key to the hosts. Before the assignment, the license key has an available capacity of 98 CPUs. After the assignment, the license key has an available capacity of 94 CPUs. The pop-up tool tip lists the product features included in the vSphere Enterprise license edition.
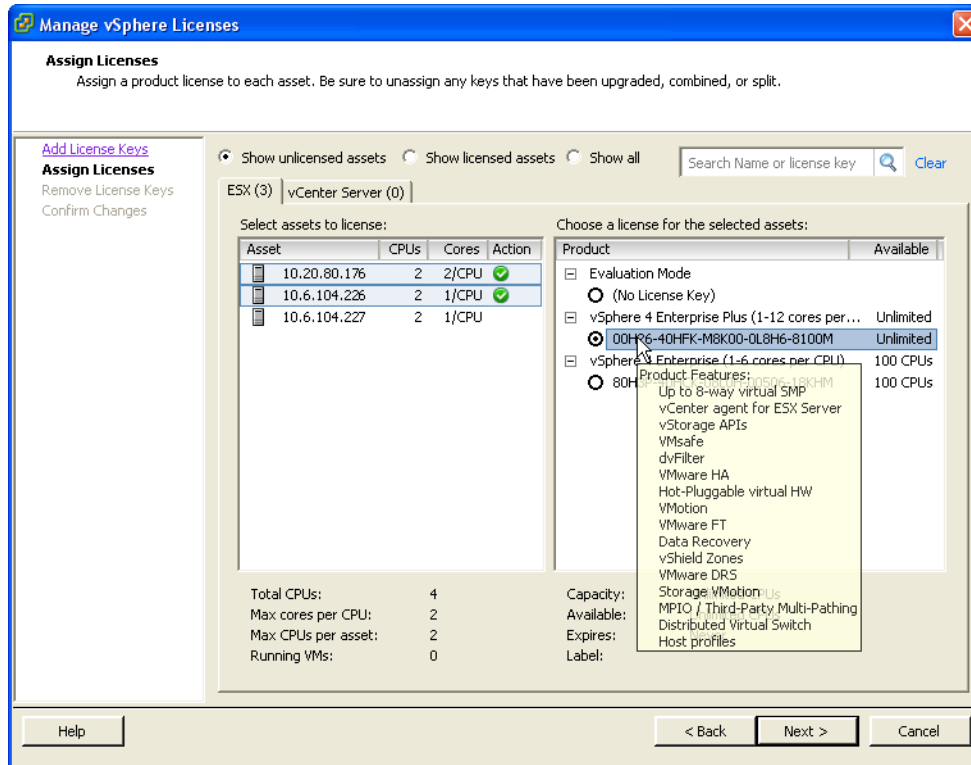
Export Report Data

You can export license data to a file that you can open in a third-party application.

Procedure

1   From a vSphere Client host that is connected to a vCenter Server system, select **Home > Licensing**.

2   Select the view that you want to export.

- **Product**

- **License key**

- **Asset**

3   From the report screen, click **Export**.

4   In the Save As dialog box, select a folder, a filename, and a format for the exported license data and click **Save**.

License a Host Without vCenter Server

If you are directly connected to the host through the vSphere Client, you can license the host.

Procedure

1 From the vSphere Client, click the **Configuration** tab.

2 Under Software, click **Licensed Features**.

3 Click **Edit**.

4 Assign a license key.

- Select **Assign an existing license key to this host** and select a license key from the Product list.

- Select **Assign a new license key to this host**, click **Enter Key**, and enter a license key and an optional label for the license key.

5 Click **OK**.

License a Host When Adding It to the vCenter Server Inventory

When you add a host to the vCenter Server inventory, you can license the host.

Prerequisites

You must have a communication channel through a firewall before adding a host.

Procedure

1 Click **Inventory** in the navigation bar.

2 Expand the inventory as needed and click the appropriate datacenter, folder, or cluster.

3 Right-click the datacenter or cluster and select **Add Host**.

4 When prompted by the Add Host wizard, assign an existing vSphere license key or add a new vSphere license key.

View Which Features Are Licensed on a Host

You can view which features a host is licensed to use.

If you try to configure features that are not included in the host license, the vSphere Client displays an error message.

Procedure

1 From the vSphere Client, select the host in the inventory.

2 Click the **Configuration** tab.

3 Under Software, click **Licensed Features**.

The Licensed Features window displays the list of features that you can configure on the host.

Set an ESX/ESXi Host to Evaluation Mode

If you entered a license for ESX, you can switch to evaluation mode to explore the full functionality of ESX.

Procedure

1   From the vSphere Client, select the host in the inventory.

2   Click the **Configuration** tab.

3   Under Software, click **Licensed Features**.

4   Click **Edit** next to ESX License Type.

5   Click **Product Evaluation**.

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

Troubleshooting Licensing

These topics provide guidelines for troubleshooting your license setup for environments with only ESX 4.0/ESXi 4.0 hosts and environments that have a mixture of ESX 4.0/ESXi 4.0 and legacy ESX 3.x/ESXi 3.5 hosts.

If you cannot resolve the problem, contact VMware for support as follows:

■   If you have difficulties in configuring licensed features, file a support request at
    http://www.vmware.com/support.

■   To license vCenter Server, you must apply a vCenter Server license key.

■   To license ESX/ESXi, you must apply a vSphere license key.

■   If you downgrade your license from evaluation mode to a license that does not support the features that you configured while using evaluation mode, the features might stop working without warning.

■   If a licensing-related error message appears when you try to configure a feature, check the licensed features on the host and on the vCenter Server system to make sure that the host or vCenter Server system is licensed to use the feature that you are trying to configure.

■   If all the hosts in a vCenter Server system inventory become disconnected, this might be because the vCenter Server license is expired or the 60-day evaluation period has expired.

■   If you cannot power on the virtual machines that reside on a host, this might be because the host license is expired or the 60-day evaluation period is expired.

■   If an ESX/ESXi host is managed by a vCenter Server system, changes made to the host license via direct connection to the host do not persist, because the changes are overwritten by the license key assigned via vCenter Server. See "About Overriding the Host License Configuration," on page 115.

■   If vCenter Server is managing ESX 3.x/ESXi 3.5 hosts, vCenter Server must check out vCenter Server Agent licenses from a license server. If vCenter Server is having trouble communicating with your license server, do the following:

    ■   Check that the license server Microsoft Windows service is running.

    ■   Check that the license server is listening.

    ■   Check the license server status.

If your license server is operating properly, you might have a problem with your license file.

If your license server is working correctly and your license file is correct, check that you correctly configured centralized or single-host licensing, as appropriate to your environment.

For detailed troubleshooting and configuration instructions, see the licensing documentation in the *Installation Guide* or the *Setup Guide* for VMware Infrastructure 3.

Applying Licenses

If you cannot apply a license to an asset, the license might not match the currently configured features and resources. When you assign a license to an asset, the license must be compatible with all the configured resources and features.

For example, suppose you add 10 ESX hosts to the vCenter Server inventory during the evaluation period. After the evaluation period expires, you try to assign a Foundation edition license to a vCenter Server system. The assignment operation fails because the Foundation edition allows a vCenter Server system to manage up to three hosts only. To correct this issue, you can upgrade the edition or you can remove seven hosts from the inventory.

As another example, suppose that you configure VMotion and DRS on a cluster of Enterprise edition hosts. Later, you try to assign Standard license keys to the hosts. This operation fails because the Standard edition does not include VMotion and DRS. You must assign Enterprise licenses to the ESX hosts or disable VMotion and DRS. For detailed information about how to disable features, see the VMware Knowledge Base.

Also, make sure you are applying the correct license key, as follows:

- To license vCenter Server assets, you must apply a vCenter Server license key.
- To license ESX/ESXi assets, you must apply a vSphere license key.

About Overriding the Host License Configuration

If the host is managed by vCenter Server, use either the **Home > Licensing** interface or the Add Host operation to configure host licensing.

If you use the **Configuration > Licensed Features > Edit** operation, the host license configuration is overridden by any license assignment operation that you perform in vCenter Server.

License Expiration

Upon license expiration, the vCenter Server software and the ESX/ESXi software continue to run, but certain operations stop working.

If a vCenter Server license expires, the managed hosts become disconnected from the vCenter Server inventory, and you cannot add hosts to the inventory. The hosts and the virtual machines on the hosts continue to run. By using the vSphere Client to connect directly to the host, you can power on or reset the virtual machines.

After you assign a valid vCenter Server license, you can reconnect all the hosts at once as follows:

1   From the vCenter Server inventory, select the datacenter.

2   Select the **Hosts** tab.

3   Shift-click or Ctrl-click to select the hosts.

4   Right-click and select **Connect**.

If an ESX/ESXi host license expires, the virtual machines that reside on the host continue to run, but you cannot power on the virtual machines or reset them.

Licensing vCenter Server and ESX/ESXi After Evaluation

After the 60-day evaluation period expires, you are no longer able to perform some operations in vCenter Server and ESX/ESXi. If you want to continue to have full use of ESX/ESXi and vCenter Server operations, you must acquire a license.

Without a license, you are able to perform some operations, but you cannot power on or reset your virtual machines. All hosts are disconnected from the vCenter Server system if the evaluation period expires before you assign a license to the vCenter Server system. Any single ESX/ESXi host is disconnected from the vCenter Server system if the ESX/ESXi evaluation period expires before you assign a license to the host.

When you switch your vCenter Server system and ESX from evaluation mode to licensed mode, consider the following:

- If a vCenter Server system is managing VMware Infrastructure 3 hosts (for example, ESX 3.x or ESXi 3.5), the vCenter Server system must have access to a license server. You can download the VMware License Server from the VMware Web site.

- To license vCenter Server, you must apply a vCenter Server license key.

- To license ESX/ESXi, you must apply a vSphere license key.

- When you assign a license to a machine on which a VMware vSphere component is installed, the license must be compatible with all resources and features that you configure during the evaluation period.

  For example, suppose you add 10 ESX hosts to the vCenter Server system inventory during the evaluation period. After the evaluation period expires, you try to assign an edition license that limits the number of hosts that can be managed by a vCenter Server system. The assignment operation fails because the edition allows a vCenter Server system to manage fewer than 10 hosts. To correct this issue, you can upgrade your license key to a higher edition or you can remove hosts from the inventory.

  As another example, if you configure a cluster of ESX hosts to use Fault Tolerance and DRS during the evaluation period, you can only assign a license that allows the use of those features. Hence, the assignment of a higher edition license succeeds. To assign a lower edition license, you must first disable Fault Tolerance and DRS.

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