VMware ESXi Upgrade

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VMware vSphere 6.7
VMware ESXi 6.7

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VMware, Inc.
3401 Hillview Ave.
Palo Alto, CA 94304
www.vmware.com

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About VMware ESXi Upgrade

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VMware ESXi Upgrade describes how to upgrade VMware ESXi™ to the current version.

Intended Audience

VMware ESXi Upgrade is for anyone who needs to upgrade from earlier versions of ESXi. These topics are for experienced Microsoft Windows or Linux system administrators who are familiar with virtual machine technology and data center operations.

vSphere Web Client and vSphere Client

Task instructions in this guide are based on the vSphere Web Client. You can also perform most of the tasks in this guide by using the new vSphere Client. The new vSphere Client user interface terminology, topology, and workflow are closely aligned with the same aspects and elements of the vSphere Web Client user interface. You can apply the vSphere Web Client instructions to the new vSphere Client unless otherwise instructed.

Note In vSphere 6.7, most of the vSphere Web Client functionality is implemented in the vSphere Client. For an up-to-date list of the unsupported functionality, see Functionality Updates for the vSphere Client.

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to http://www.vmware.com/support/pubs.

Introduction to vSphere Upgrade

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vSphere 6.7 provides many options for upgrading your vSphere deployment. For a successful vSphere upgrade, you must understand the upgrade options, the configuration details that impact the upgrade process, and the sequence of tasks.

The two core components of vSphere are VMware ESXi™ and VMware vCenter Server™. ESXi is the virtualization platform on which you can create and run virtual machines and virtual appliances. vCenter Server is a service that acts as a central administrator for ESXi hosts connected in a network. You use the vCenter Server system to pool and manage the resources of multiple hosts. vCenter Server Appliance is a preconfigured Linux OS--based virtual machine optimized for running the vCenter Server system and the vCenter Server components.

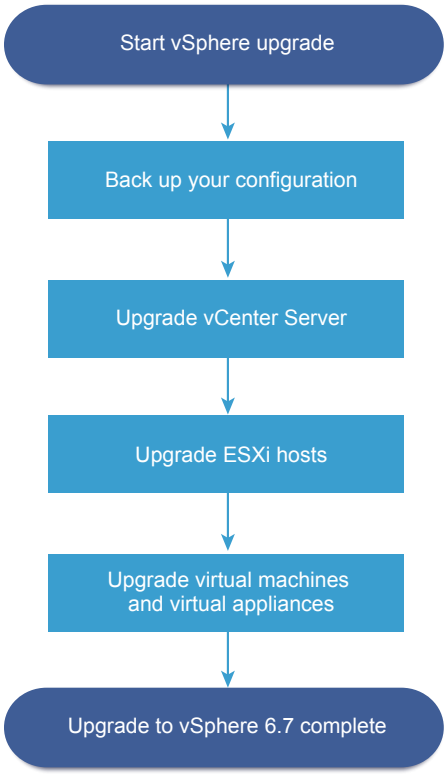
Starting with vSphere 6.0, important required services for running vCenter Server and the vCenter Server components are included in the Platform Services Controller.

Based on your existing vCenter Server configuration details, you can upgrade to one of the following deployment types:

Overview of the vSphere Upgrade Process

vSphere is a sophisticated product with multiple components to upgrade. Understanding the required sequence of tasks is vital for a successful vSphere upgrade.

Figure 2-1. Overview of High-Level vSphere Upgrade Tasks



Upgrading vSphere includes the following tasks:

1 Read the vSphere release notes.

2 Verify that you have backed up your configuration.

3 If your vSphere system includes VMware solutions or plug-ins, verify that they are compatible with the vCenter Server or vCenter Server Appliance version to which you are upgrading. See *VMware Product Interoperability Matrix* at http://www.vmware.com/resources/compatibility/sim/interop_matrix.php

4 Upgrade vCenter Server.

   For detailed instructions, see *vCenter Server Upgrade*

5 If you are using vSphere Update Manager, upgrade it. Refer to the VMware vSphere Update Manager documentation.

6 Upgrade your ESXi hosts. See Overview of the ESXi Host Upgrade Process.

7 To ensure sufficient disk storage for log files, consider setting up a syslog server for remote logging. Setting up logging on a remote host is especially important for hosts with limited local storage.

   See Required Free Space for System Logging and Configure Syslog on ESXi Hosts.

8 Upgrade your VMs and virtual appliances, manually or by using vSphere Update Manager, to perform an orchestrated upgrade.

   See Upgrading Virtual Machines and VMware Tools

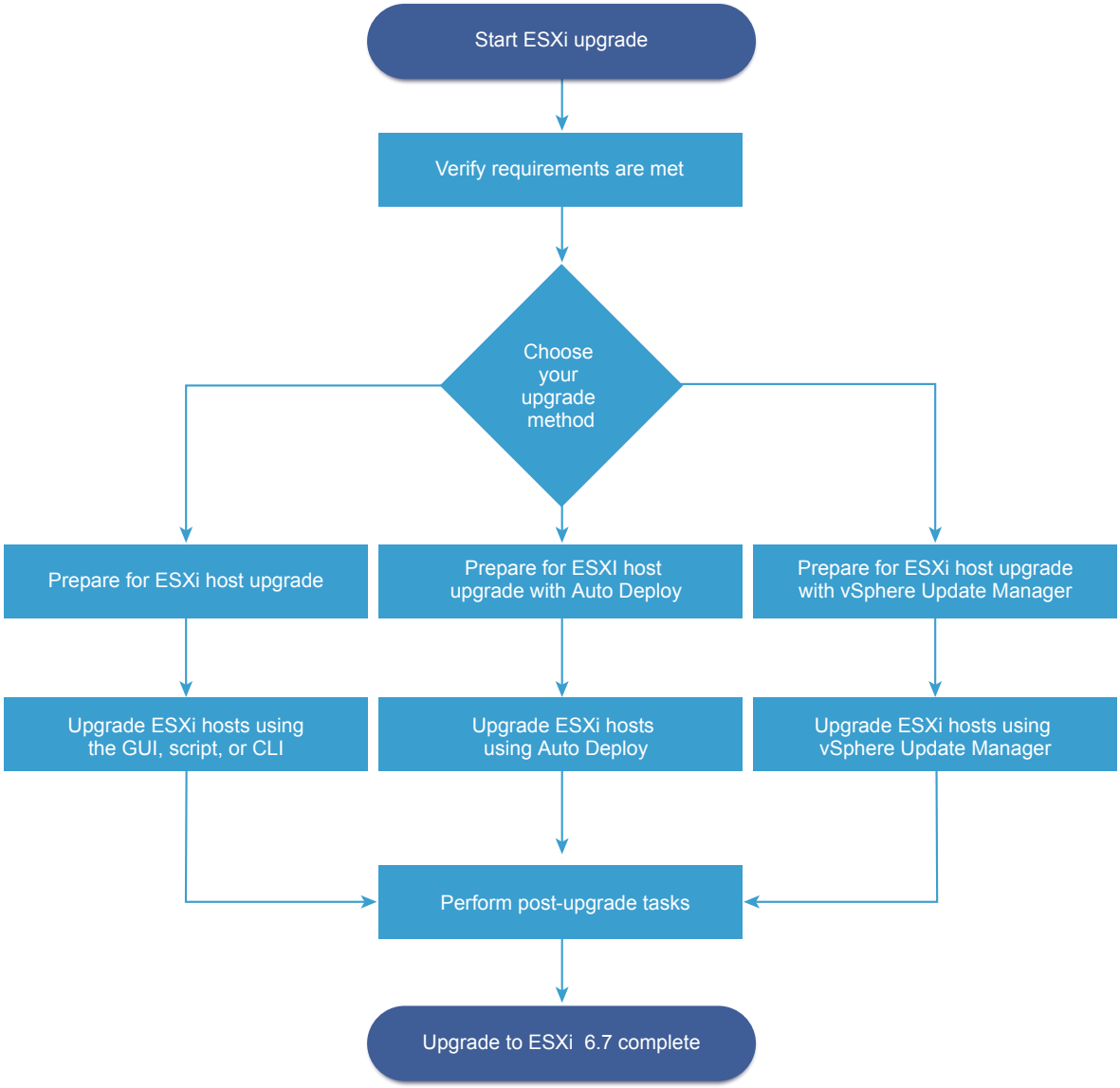
Overview of the ESXi Host Upgrade Process

VMware provides several ways to upgrade ESXi version 6.0.x and version 6.5.x hosts toESXi 6.7.

The details and level of support for an upgrade to ESXi 6.7 depend on the host to be upgraded and the upgrade method that you use. Verify support for the upgrade path from your current version of ESXi to the version to which you are upgrading. See VMware Product Interoperability Matrixes at http://www.vmware.com/resources/compatibility/sim/interop_matrix.php.

You can upgrade a ESXi 6.0.x host or 6.5.x host, asynchronously released driver or other third-party customizations, interactive upgrade from CD or DVD, scripted upgrade, or upgrade with vSphere Update Manager. When you upgrade an ESXi 6.0.x host or 6.5.x host that has custom VIBs to version 6.7, the custom VIBs are migrated. See Upgrading Hosts That Have Third-Party Custom VIBs.

Figure 2-2. Overview of the ESXi Host Upgrade Process



High level steps for upgrading ESXi:

1 Verify that your system meets the upgrade requirements. See ESXi Requirements.

2 Prepare your environment before upgrading. See Before Upgrading ESXi Hosts.

3 Determine where you want to locate and boot the ESXi installer. See Media Options for Booting the ESXi Installer. If you are PXE-booting the installer, verify that your network PXE infrastructure is properly set up. See PXE Booting the ESXi Installer.

4 Upgrade ESXi. See Chapter 3 Upgrading ESXi Hosts

5 After upgrading ESXi hosts, you must reconnect the hosts to the vCenter Server and reapply the licenses. See After You Upgrade ESXi Hosts.

Methods supported for direct upgrade to ESXi 6.7 are:

- Use the interactive graphical user interface (GUI) installer from CD, DVD, or USB drive.
- Scripted upgrade.
- Use the `esxcli` command line interface (CLI).
- vSphere Auto Deploy. If the ESXi host was deployed by using vSphere Auto Deploy, you can use vSphere Auto Deploy to reprovision the host with a 6.7 image.
- vSphere Update Manager.

Graphical User Interface (GUI) Installer	Upgrade interactively by using an ESXi installer ISO image on CD/DVD or USB flash drive. You can run the ESXi 6.7 installer from a CD/DVD or USB flash drive to do an interactive upgrade. This method is appropriate for deployments with a small number of hosts. The installer works the same as for a fresh installation, but if you select a target disk that already contains an ESXi installation, the installer upgrades the host to 6.7. The installer also gives you the option to migrate some existing host settings and configuration files and to preserve the existing VMFS datastore. See Upgrade Hosts Interactively.
Perform a Scripted Upgrade	You can upgrade hosts from ESXi 6.0.x and ESXi 6.5.x to ESXi 6.7 by running an update script for an efficient, unattended upgrade. Scripted upgrades provide an efficient way to deploy multiple hosts. You can use a script to upgrade ESXi from a CD, DVD, or USB flash drive, or by specifying a preboot execution environment (PXE) for the installer. You can also call a script from an interactive installation. See Installing or Upgrading Hosts by Using a Script.
esxcli Command Line Interface	You can use the `esxcli` command-line utility for ESXi to upgrade ESXi 6.0.x hosts or ESXi 6.5.x hosts to ESXi 6.7 hosts. See Upgrading Hosts by Using esxcli Commands.

vSphere Auto Deploy	If an ESXi host is deployed with vSphere Auto Deploy, you can use vSphere Auto Deploy to reprovision the host and reboot it with a new image profile. This profile contains an ESXi upgrade or patch, a host configuration profile, and optionally, third-party drivers or management agents that are provided by VMware partners. You can build custom images by using vSphere ESXi Image Builder CLI. See Chapter 4 Using vSphere Auto Deploy to Reprovision Hosts.
vSphere Update Manager	vSphere Update Manager is software for upgrading, migrating, updating, and patching clustered hosts, virtual machines, and guest operating systems. vSphere Update Manager orchestrates host and virtual machine upgrades. If your site uses vSphere Update Manager, VMware recommends that you use vSphere Update Manager. For instructions about performing an orchestrated virtual machine upgrade, see the*Installing and Administering VMware vSphere Update Manager* documentation.

The `esxupdate` and `vihostupdate` utilities are not supported for ESXi 6.7 upgrades.

Upgrading Virtual Machines and VMware Tools

After you upgrade ESXi hosts, you can upgrade the virtual machines on the host to take advantage of new features.

VMware offers the following tools for upgrading virtual machines:

vSphere Web Client	Requires you to perform the virtual machine upgrade one step at a time, but does not require vSphere Update Manager. See the information about upgrading virtual machines in the *vSphere Virtual Machine Administration* documentation.
vSphere Update Manager	Automates the process of upgrading and patching virtual machines, thereby ensuring that the steps occur in the correct order. You can use Update Manager to directly upgrade the virtual machine hardware version and VMware Tools. See the *Installing and Administering VMware vSphere Update Manager* documentation.

Upgrading ESXi Hosts

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After you upgrade vCenter Serverand vSphere Update Manager, upgrade ESXi hosts. You can upgrade ESXi 6.0.x and 6.5.x hosts directly to ESXi 6.7.

To upgrade hosts, you can use the tools and methods that are described in Overview of the ESXi Host Upgrade Process.

Caution If you upgrade hosts managed by vCenter Server, you must upgrade to vCenter Server before you upgrade ESXi. If you do not upgrade in the correct order, you can lose data and lose access to servers.

This chapter includes the following topics:

ESXi Requirements

To install or upgrade ESXi, your system must meet specific hardware and software requirements.

ESXi Hardware Requirements

Make sure the host meets the minimum hardware configurations supported by ESXi6.7.

Hardware and System Resources

To install or upgrade ESXi, your hardware and system resources must meet the following requirements:

- Supported server platform. For a list of supported platforms, see the *VMware Compatibility Guide* at http://www.vmware.com/resources/compatibility.

- ESXi 6.7 requires a host machine with at least two CPU cores.
- ESXi 6.7 supports 64-bit x86 processors released after September 2006. This includes a broad range of multi-core processors. For a complete list of supported processors, see the VMware compatibility guide at http://www.vmware.com/resources/compatibility.
- ESXi 6.7 requires the NX/XD bit to be enabled for the CPU in the BIOS.
- ESXi 6.7 requires a minimum of 4 GB of physical RAM. It is recommended to provide at least 8 GB of RAM to run virtual machines in typical production environments.
- To support 64-bit virtual machines, support for hardware virtualization (Intel VT-x or AMD RVI) must be enabled on x64 CPUs.
- One or more Gigabit or faster Ethernet controllers. For a list of supported network adapter models, see the *VMware Compatibility Guide* at http://www.vmware.com/resources/compatibility.
- SCSI disk or a local, non-network, RAID LUN with unpartitioned space for the virtual machines.
- For Serial ATA (SATA), a disk connected through supported SAS controllers or supported on-board SATA controllers. SATA disks are considered remote, not local. These disks are not used as a scratch partition by default because they are seen as remote.

  Note You cannot connect a SATA CD-ROM device to a virtual machine on an ESXi 6.7 host. To use the SATA CD-ROM device, you must use IDE emulation mode.

Storage Systems

For a list of supported storage systems, see the *VMware Compatibility Guide* at http://www.vmware.com/resources/compatibility. For Software Fibre Channel over Ethernet (FCoE), see Installing and Booting ESXi with Software FCoE.

ESXi Booting Requirements

vSphere 6.7 supports booting ESXi hosts from the Unified Extensible Firmware Interface (UEFI). With UEFI, you can boot systems from hard drives, CD-ROM drives, or USB media.

Starting with vSphere 6.7, VMware Auto Deploy supports network booting and provisioning of ESXi hosts with UEFI.

ESXi can boot from a disk larger than 2 TB if the system firmware and the firmware on any add-in card that you are using support it. See the vendor documentation.

Note Changing the boot type from legacy BIOS to UEFI after you install ESXi 6.7 might cause the host to fail to boot. In this case, the host displays an error message similar to `Not a VMware boot bank`. Changing the host boot type between legacy BIOS and UEFI is not supported after you install ESXi 6.7.

Storage Requirements for ESXi 6.7 Installation or Upgrade

Installing ESXi 6.7 or upgrading to ESXi 6.7 requires a boot device that is a minimum of 1 GB. When booting from a local disk, SAN or iSCSI LUN, a 5.2-GB disk is required to allow for the creation of the VMFS volume and a 4-GB scratch partition on the boot device. If a smaller disk or LUN is used, the installer attempts to allocate a scratch region on a separate local disk. If a local disk cannot be found the scratch partition, `/scratch`, is on the ESXi host ramdisk, linked to `/tmp/scratch`. You can reconfigure `/scratch` to use a separate disk or LUN. For best performance and memory optimization, do not leave `/scratch` on the ESXi host ramdisk.

To reconfigure `/scratch`, see the topic "Set the Scratch Partition from the vSphere Web Client" in the *vCenter Server Installation and Setup* documentation.

Due to the I/O sensitivity of USB and SD devices, the installer does not create a scratch partition on these devices. When installing or upgrading on USB or SD devices, the installer attempts to allocate a scratch region on an available local disk or datastore. If no local disk or datastore is found, `/scratch` is placed on the ramdisk. After the installation or upgrade, you should reconfigure `/scratch` to use a persistent datastore. Although a 1GB USB or SD device suffices for a minimal installation, you should use a 4GB or larger device. The extra space is used for an expanded coredump partition on the USB/SD device. Use a high-quality USB flash drive of 16 GB or larger so that the extra flash cells can prolong the life of the boot media, but high-quality drives of 4 GB or larger are sufficient to hold the extended coredump partition. See Knowledge Base article http://kb.vmware.com/kb/2004784.

In Auto Deploy installations, the installer attempts to allocate a scratch region on an available local disk or datastore. If no local disk or datastore is found, `/scratch` is placed on ramdisk. You should reconfigure `/scratch` to use a persistent datastore following the installation.

For environments that boot from a SAN or use Auto Deploy, you need not allocate a separate LUN for each ESXi host. You can co-locate the scratch regions for many ESXi hosts onto a single LUN. The number of hosts assigned to any single LUN should be weighed against the LUN size and the I/O behavior of the virtual machines.

ESXi 6.7 Installation on M.2 and other Non-USB Low-end Flash Media

Unlike USB flash devices, the ESXi installer creates a VMFS datastore on M.2 and other non-USB low-end flash media. If you deploy a virtual machine or migrate a virtual machine to this boot device datastore, the boot device can be worn out quickly depending on the endurance of the flash device and the characteristics of the workload. Even read-only workloads can cause problems on low-end flash devices.

Important If you install ESXi on M.2 or other non-USB low-end flash media, delete the VMFS datastore on the device immediately after installation. See *vSphere Storage* for more information on removing VMFS datastores.

Supported Remote Management Server Models and Firmware Versions

You can use remote management applications to install or upgrade ESXi, or to manage hosts remotely.

Table 3-1. Supported Remote Management Server Models and Minimum Firmware Versions

Remote Management Server Model	Firmware Version	Java
Dell DRAC 7	1.30.30 (Build 43)	1.7.0_60-b19
Dell DRAC 6	1.54 (Build 15), 1.70 (Build 21)	1.6.0_24
Dell DRAC 5	1.0, 1.45, 1.51	1.6.0_20,1.6.0_203
Dell DRAC 4	1.75	1.6.0_23
HP ILO	1.81, 1.92	1.6.0_22, 1.6.0_23
HP ILO 2	1.8, 1.81	1.6.0_20, 1.6.0_23
HP ILO 3	1.28	1.7.0_60-b19
HP ILO 4	1.13	1.7.0_60-b19
IBM RSA 2	1.03, 1.2	1.6.0_22

Recommendations for Enhanced ESXi Performance

To enhance performance, install or upgrade ESXi on a robust system with more RAM than the minimum required and with multiple physical disks.

For ESXi system requirements, see ESXi Hardware Requirements.

Table 3-2. Recommendations for Enhanced Performance

System Element	Recommendation
RAM	ESXi hosts require more RAM than typical servers. Provide at least 8GB of RAM to take full advantage of ESXi features and run virtual machines in typical production environments. An ESXi host must have sufficient RAM to run concurrent virtual machines. The following examples are provided to help you calculate the RAM required by the virtual machines running on the ESXi host. Operating four virtual machines with Red Hat Enterprise Linux or Windows XP requires at least 3GB of RAM for baseline performance. This figure includes approximately 1024MB for the virtual machines, 256MB minimum for each operating system as recommended by vendors. Running these four virtual machines with 512MB RAM requires that the ESXi host have approximately 4GB RAM, which includes 2048MB for the virtual machines. These calculations do not take into account possible memory savings from using variable overhead memory for each virtual machine. See *vSphere Resource Management*.
Dedicated Fast Ethernet adapters for virtual machines	Place the management network and virtual machine networks on different physical network cards. Dedicated Gigabit Ethernet cards for virtual machines, such as Intel PRO 1000 adapters, improve throughput to virtual machines with high network traffic.
Disk location	Place all data that your virtual machines use on physical disks allocated specifically to virtual machines. Performance is better when you do not place your virtual machines on the disk containing the ESXi boot image. Use physical disks that are large enough to hold disk images that all the virtual machines use.
VMFS5 partitioning	The ESXi installer creates the initial VMFS volumes on the first blank local disk found. To add disks or modify the original configuration, use the vSphere Web Client. This practice ensures that the starting sectors of partitions are 64K-aligned, which improves storage performance. **Note** For SAS-only environments, the installer might not format the disks. For some SAS disks, it is not possible to identify whether the disks are local or remote. After the installation, you can use the vSphere Web Client to set up VMFS.
Processors	Faster processors improve ESXi performance. For certain workloads, larger caches improve ESXi performance.
Hardware compatibility	Use devices in your server that are supported by ESXi 6.7 drivers. See the *Hardware Compatibility Guide* at http://www.vmware.com/resources/compatibility.

Incoming and Outgoing Firewall Ports for ESXi Hosts

The vSphere Web Client and the VMware Host Client allow you to open and close firewall ports for each service or to allow traffic from selected IP addresses.

The following table lists the firewalls for services that are installed by default. If you install other VIBs on your host, additional services and firewall ports might become available. The information is primarily for services that are visible in the vSphere Web Client but the table includes some other ports as well.

Table 3-3. Incoming Firewall Connections

Port	Protocol	Service	Description
5988	TCP	CIM Server	Server for CIM (Common Information Model).
5989	TCP	CIM Secure Server	Secure server for CIM.
427	TCP, UDP	CIM SLP	The CIM client uses the Service Location Protocol, version 2 (SLPv2) to find CIM servers.
546		DHCPv6	DHCP client for IPv6.
8301, 8302	UDP	DVSSync	DVSSync ports are used for synchronizing states of distributed virtual ports between hosts that have VMware FT record/replay enabled. Only hosts that run primary or backup virtual machines must have these ports open. On hosts that are not using VMware FT these ports do not have to be open.
902	TCP	NFC	Network File Copy (NFC) provides a file-type-aware FTP service for vSphere components. ESXi uses NFC for operations such as copying and moving data between datastores by default.
12345, 23451	UDP	vSANClustering Service	VMware vSAN Cluster Monitoring and Membership Directory Service. Uses UDP-based IP multicast to establish cluster members and distribute vSAN metadata to all cluster members. If disabled, vSAN does not work.
68	UDP	DHCP Client	DHCP client for IPv4.
53	UDP	DNS Client	DNS client.
8200, 8100, 8300	TCP, UDP	Fault Tolerance	Traffic between hosts for vSphere Fault Tolerance (FT).
6999	UDP	NSX Distributed Logical Router Service	NSX Virtual Distributed Router service. The firewall port associated with this service is opened when NSX VIBs are installed and the VDR module is created. If no VDR instances are associated with the host, the port does not have to be open. This service was called NSX Distributed Logical Router in earlier versions of the product.
2233	TCP	vSAN Transport	vSAN reliable datagram transport. Uses TCP and is used for vSAN storage IO. If disabled, vSAN does not work.
161	UDP	SNMP Server	Allows the host to connect to an SNMP server.
22	TCP	SSH Server	Required for SSH access.
8000	TCP	vMotion	Required for virtual machine migration with vMotion. ESXi hosts listen on port 8000 for TCP connections from remote ESXi hosts for vMotion traffic.
902, 443	TCP	vSphere Web Client	Client connections
8080	TCP	vsanvp	vSAN VASA Vendor Provider. Used by the Storage Management Service (SMS) that is part of vCenter to access information about vSAN storage profiles, capabilities, and compliance. If disabled, vSAN Storage Profile Based Management (SPBM) does not work.
80	TCP	vSphere Web Access	Welcome page, with download links for different interfaces.

Table 3-3. Incoming Firewall Connections (Continued)

Port	Protocol	Service	Description
5900 -5964	TCP	RFB protocol	
80, 9000	TCP	vSphere Update Manager	

Table 3-4. Outgoing Firewall Connections

Port	Protocol	Service	Description
427	TCP, UDP	CIM SLP	The CIM client uses the Service Location Protocol, version 2 (SLPv2) to find CIM servers.
547	TCP, UDP	DHCPv6	DHCP client for IPv6.
8301, 8302	UDP	DVSSync	DVSSync ports are used for synchronizing states of distributed virtual ports between hosts that have VMware FT record/replay enabled. Only hosts that run primary or backup virtual machines must have these ports open. On hosts that are not using VMware FT these ports do not have to be open.
44046, 31031	TCP	HBR	Used for ongoing replication traffic by vSphere Replication and VMware Site Recovery Manager.
902	TCP	NFC	Network File Copy (NFC) provides a file-type-aware FTP service for vSphere components. ESXi uses NFC for operations such as copying and moving data between datastores by default.
9	UDP	WOL	Used by Wake on LAN.
12345 23451	UDP	vSAN Clustering Service	Cluster Monitoring, Membership, and Directory Service used by vSAN.
68	UDP	DHCP Client	DHCP client.
53	TCP, UDP	DNS Client	DNS client.
80, 8200, 8100, 8300	TCP, UDP	Fault Tolerance	Supports VMware Fault Tolerance.
3260	TCP	Software iSCSI Client	Supports software iSCSI.
6999	UDP	NSX Distributed Logical Router Service	The firewall port associated with this service is opened when NSX VIBs are installed and the VDR module is created. If no VDR instances are associated with the host, the port does not have to be open.
5671	TCP	rabbitmqproxy	A proxy running on the ESXi host. This proxy allows applications that are running inside virtual machines to communicate with the AMQP brokers that are running in the vCenter network domain. The virtual machine does not have to be on the network, that is, no NIC is required. Ensure that outgoing connection IP addresses include at least the brokers in use or future. You can add brokers later to scale up.
2233	TCP	vSAN Transport	Used for RDT traffic (Unicast peer to peer communication) between vSAN nodes.
8000	TCP	vMotion	Required for virtual machine migration with vMotion.

Table 3-4. Outgoing Firewall Connections (Continued)

Port	Protocol	Service	Description
902	UDP	VMware vCenter Agent	vCenter Server agent.
8080	TCP	vsanvp	Used for vSAN Vendor Provider traffic.
9080	TCP	I/O Filter Service	Used by the I/O Filters storage feature

Table 3-5. Firewall Ports for Services That Are Not Visible in the UI by Default

Port	Protocol	Service	Comment
5900 -5964	TCP	RFB protocol	The RFB protocol is a simple protocol for remote access to graphical user interfaces.
8889	TCP	OpenWSMAN Daemon	Web Services Management (WS-Management is a DMTF open standard for the management of servers, devices, applications, and Web services.

Required Free Space for System Logging

If you used Auto Deploy to install your ESXi 6.7 host, or if you set up a log directory separate from the default location in a scratch directory on the VMFS volume, you might need to change your current log size and rotation settings to ensure that enough space is available for system logging .

All vSphere components use this infrastructure. The default values for log capacity in this infrastructure vary, depending on the amount of storage available and on how you have configured system logging. Hosts that are deployed with Auto Deploy store logs on a RAM disk, which means that the amount of space available for logs is small.

If your host is deployed with Auto Deploy, reconfigure your log storage in one of the following ways:

- Redirect logs over the network to a remote collector.
- Redirect logs to a NAS or NFS store.

If you redirect logs to non-default storage, such as a NAS or NFS store, you might also want to reconfigure log sizing and rotations for hosts that are installed to disk.

You do not need to reconfigure log storage for ESXi hosts that use the default configuration, which stores logs in a scratch directory on the VMFS volume. For these hosts, ESXi 6.7 configures logs to best suit your installation, and provides enough space to accommodate log messages.

Table 3-6. Recommended Minimum Size and Rotation Configuration for hostd, vpxa, and fdm Logs

Log	Maximum Log File Size	Number of Rotations to Preserve	Minimum Disk Space Required
Management Agent (hostd)	10 MB	10	100 MB
VirtualCenter Agent (vpxa)	5 MB	10	50 MB
vSphere HA agent (Fault Domain Manager, fdm)	5 MB	10	50 MB

For information about setting up and configuring syslog and a syslog server and installing vSphere Syslog Collector, see the *vCenter Server Installation and Setup* documentation.

VMware Host Client System Requirements

Make sure that your browser supports the VMware Host Client.

The following guest operating systems and Web browser versions are supported for the VMware Host Client.

Supported Browsers	Mac OS	Windows	Linux
Google Chrome	50+	50+	50+
Mozilla Firefox	45+	45+	45+
Microsoft Internet Explorer	N/A	11+	N/A
Microsoft Edge	N/A	38+	N/A
Safari	9.0+	N/A	N/A

ESXi Passwords and Account Lockout

For ESXi hosts, you have to use a password with predefined requirements. You can change the required length and character class requirement or allow pass phrases using the `Security.PasswordQualityControl` advanced option.

ESXi uses the Linux PAM module `pam_passwdqc` for password management and control. See the man page for `pam_passwdqc` for detailed information.

Note The default requirements for ESXi passwords can change from one release to the next. You can check and change the default password restrictions using the `Security.PasswordQualityControl` advanced option.

ESXi Passwords

ESXi enforces password requirements for access from the Direct Console User Interface, the ESXi Shell, SSH, or the VMware Host Client.

- By default, you have to include a mix of characters from four character classes: lowercase letters, uppercase letters, numbers, and special characters such as underscore or dash when you create a password.
- By default, password length is more than 7 and less than 40.
- Passwords cannot contain a dictionary word or part of a dictionary word.

Note An uppercase character that begins a password does not count toward the number of character classes used. A number that ends a password does not count toward the number of character classes used.

Example ESXi Passwords

The following password candidates illustrate potential passwords if the option is set as follows.

```
retry=3 min=disabled,disabled,disabled,7,7
```

With this setting, passwords with one or two character classes and pass phrases are not allowed, because the first three items are disabled. Passwords from three- and four-character classes require seven characters. See the `pam_passwdqc` man page for details.

With these settings, the following passwords are allowed.

- xQaTEhb!: Contains eight characters from three character classes.
- xQaT3#A: Contains seven characters from four character classes.

The following password candidates do not meet requirements.

- Xqat3hi: Begins with an uppercase character, reducing the effective number of character classes to two. The minimum number of required character classes is three.
- xQaTEh2: Ends with a number, reducing the effective number of character classes to two. The minimum number of required character classes is three.

ESXi Pass Phrase

Instead of a password, you can also use a pass phrase; however, pass phrases are disabled by default. You can change this default or other settings, by using the `Security.PasswordQualityControl` advanced option from the vSphere Web Client.

For example, you can change the option to the following.

```
retry=3 min=disabled,disabled,16,7,7
```

This example allows pass phrases of at least 16 characters and at least 3 words, separated by spaces.

For legacy hosts, changing the `/etc/pamd/passwd` file is still supported, but changing the file is deprecated for future releases. Use the `Security.PasswordQualityControl` advanced option instead.

Changing Default Password Restrictions

You can change the default restriction on passwords or pass phrases by using the `Security.PasswordQualityControl` advanced option for your ESXi host. See the *vCenter Server and Host Management* documentation for information on setting ESXi advanced options.

You can change the default, for example, to require a minimum of 15 characters and a minimum number of four words, as follows:

```
retry=3 min=disabled,disabled,15,7,7 passphrase=4
```

See the man page for `pam_passwdqc` for details.

Note Not all possible combinations of the options for `pam_passwdqc` have been tested. Perform additional testing after you change the default password settings.

ESXi Account Lockout Behavior

Starting with vSphere 6.0, account locking is supported for access through SSH and through the vSphere Web Services SDK. The Direct Console Interface (DCUI) and the ESXi Shell do not support account lockout. By default, a maximum of ten failed attempts is allowed before the account is locked. The account is unlocked after two minutes by default.

Configuring Login Behavior

You can configure the login behavior for your ESXi host with the following advanced options:

- `Security.AccountLockFailures`. Maximum number of failed login attempts before a user's account is locked. Zero disables account locking.
- `Security.AccountUnlockTime`. Number of seconds that a user is locked out.

See the *vCenter Server and Host Management* documentation for information on setting ESXi advanced options.

Before Upgrading ESXi Hosts

For a successful upgrade of your ESXi hosts, understand and prepare for the changes that are involved.

For a successful ESXi upgrade, follow these best practices:

1. Make sure that you understand the ESXi upgrade process, the effect of that process on your existing deployment, and the preparation required for the upgrade.
   - If your vSphere system includes VMware solutions or plug-ins, make sure they are compatible with the vCenter Server version that you are upgrading to. See the VMware Product Interoperability Matrix at http://www.vmware.com/resources/compatibility/sim/interop_matrix.php.

- Read Overview of the ESXi Host Upgrade Process to understand the upgrade scenarios that are supported, and the options and tools that are available to perform the upgrade.
- Read the VMware vSphere Release Notes for known installation issues.

2 Prepare the system for the upgrade.

- Make sure that the current ESXi version is supported for the upgrade. See Overview of the ESXi Host Upgrade Process.
- Make sure that the system hardware complies with ESXi requirements. See ESXi Requirements and VMware Compatibility Guide at http://www.vmware.com/resources/compatibility/search.php. Check for system compatibility, I/O compatibility with network and host bus adapter (HBA) cards, storage compatibility, and backup software compatibility.
- Make sure that sufficient disk space is available on the host for the upgrade.
- If a SAN is connected to the host, detach the Fibre Channel system before continuing with the upgrade. Do not disable HBA cards in the BIOS.

3 Back up the host before performing an upgrade. If the upgrade fails, you can restore the host.

4 If you are using Auto Deploy to provision hosts, the user who is running the process must have local administrator privileges on the ESXi host that is being provisioned. By default the installation process has these privileges and certificate provisioning happens as expected. However, if you are using another method than the installer, you must run it as a user who has the local administrator privileges.

5 Depending on the upgrade option you choose, you might need to migrate or power off all virtual machines on the host. See the instructions for your upgrade method.

- For an interactive upgrade from CD, DVD, or USB drive: see Upgrade Hosts Interactively.
- For a scripted upgrade: see Installing or Upgrading Hosts by Using a Script.
- For vSphere Auto Deploy: see Chapter 4 Using vSphere Auto Deploy to Reprovision Hosts. If the ESXi 6.0x or 6.5.x host was deployed by using vSphere Auto Deploy, you can use vSphere Auto Deploy to reprovision the host with a 6.7 image.
- For the `esxcli` command method: see Upgrading Hosts by Using esxcli Commands.

6 Plan for the tasks that must be performed after the ESXi host upgrade:

- Test the system to ensure that the upgrade completed successfully.
- Apply a host's licenses. See Applying Licenses After Upgrading to ESXi 6.7.
- Consider setting up a syslog server for remote logging, to ensure sufficient disk storage for log files. Setting up logging on a remote host is especially important for hosts with limited local storage. vSphere Syslog Collector is included as a service in vCenter Server 6.0 and can be used to collect logs from all hosts. See Required Free Space for System Logging. For information about setting up and configuring syslog and a syslog server, setting up syslog from the host profiles interface, and installing vSphere Syslog Collector, see the *vCenter Server Installation and Setup* documentation.

7 If the upgrade was unsuccessful and you backed up the host, you can restore the host.

Upgrading Hosts That Have Third-Party Custom VIBs

A host can have custom vSphere installation bundles (VIBs) installed, for example, for third-party drivers or management agents. When you upgrade an ESXi host to 6.7, all supported custom VIBs are migrated, regardless of whether the VIBs are included in the installer ISO.

If the host or the installer ISO image contains a VIB that creates a conflict and prevents the upgrade, an error message identifies the VIB that created the conflict. To upgrade the host, take one of the following actions:

- Remove the VIB that created the conflict from the host and retry the upgrade. If you are using vSphere Update Manager, select the option to remove third-party software modules during the remediation process. For more information, see the *Installing and Administering VMware vSphere Update Manager* documentation. You can also remove the VIB that created the conflict from the host by using `esxcli` commands. For more information, see Remove VIBs from a Host.
- Use the vSphere ESXi Image Builder CLI to create a custom installer ISO image that resolves the conflict. For more information about vSphere ESXi Image Builder CLI installation and usage, see the *vCenter Server Installation and Setup* documentation.

Media Options for Booting the ESXi Installer

The ESXi installer must be accessible to the system on which you are installing ESXi.

The following boot media are supported for the ESXi installer:

- Boot from a CD/DVD. See Download and Burn the ESXi Installer ISO Image to a CD or DVD.
- Boot from a USB flash drive. See Format a USB Flash Drive to Boot the ESXi Installation or Upgrade.
- PXE boot from the network. PXE Booting the ESXi Installer
- Boot from a remote location using a remote management application. See Using Remote Management Applications

Download and Burn the ESXi Installer ISO Image to a CD or DVD

If you do not have an ESXi installation CD/DVD, you can create one.

You can also create an installer ISO image that includes a custom installation script. See Create an Installer ISO Image with a Custom Installation or Upgrade Script.

Procedure

1. Download the ESXi installer from the VMware Web site at https://my.vmware.com/web/vmware/downloads.

   ESXi is listed under Datacenter & Cloud Infrastructure.

2. Confirm that the md5sum is correct.

   See the VMware Web site topic Using MD5 Checksums at http://www.vmware.com/download/md5.html.

3 Burn the ISO image to a CD or DVD.

Format a USB Flash Drive to Boot the ESXi Installation or Upgrade

You can format a USB flash drive to boot the ESXi installation or upgrade.

The instructions in this procedure assume that the USB flash drive is detected as /dev/sdb.

Note The `ks.cfg` file that contains the installation script cannot be located on the same USB flash drive that you are using to boot the installation or upgrade.

Prerequisites

- Linux machine with superuser access to it
- USB flash drive that can be detected by the Linux machine
- The ESXi ISO image, `VMware-VMvisor-Installer-`*`version_number`*`-`*`build_number`*`.x86_64.iso`, which includes the `isolinux.cfg` file
- Syslinux package

Procedure

1 If your USB flash drive is not detected as /dev/sdb, or you are not sure how your USB flash drive is detected, determine how it is detected.

   a At the command line, run the command for displaying the current log messages.

   ```
   tail -f /var/log/messages
   ```

   b Plug in your USB flash drive.

   You see several messages that identify the USB flash drive in a format similar to the following message.

   ```
   Oct 25 13:25:23 ubuntu kernel: [  712.447080] sd 3:0:0:0: [sdb] Attached SCSI removable disk
   ```

   In this example, `sdb` identifies the USB device. If your device is identified differently, use that identification, in place of *sdb*.

2 Create a partition table on the USB flash device.

   ```
   /sbin/fdisk /dev/sdb
   ```

   a Enter `d` to delete partitions until they are all deleted.

   b Enter `n` to create a primary partition 1 that extends over the entire disk.

   c Enter `t` to set the type to an appropriate setting for the FAT32 file system, such as **`c`**.

   d Enter `a` to set the active flag on partition 1.

e Enter `p` to print the partition table.

The result should be similar to the following message.

```
Disk /dev/sdb: 2004 MB, 2004877312 bytes
255 heads, 63 sectors/track, 243 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1               1         243      1951866  c   W95 FAT32 (LBA)
```

f Enter `w` to write the partition table and exit the program.

3 Format the USB flash drive with the Fat32 file system.

```
/sbin/mkfs.vfat –F 32 –n USB /dev/sdb1
```

4 Install the Syslinux bootloader on the USB flash drive.

The locations of the Syslinux executable file and the `mbr.bin` file might vary for the different Syslinux versions. For example, if you downloaded Syslinux 6.02, run the following commands.

```
/usr/bin/syslinux /dev/sdb1
cat /usr/lib/syslinux/mbr/mbr.bin > /dev/sdb
```

5 Create a destination directory and mount the USB flash drive to it.

```
mkdir /usbdisk
mount /dev/sdb1 /usbdisk
```

6 Create a destination directory and mount the ESXi installer ISO image to it.

```
mkdir /esxi_cdrom
mount –o loop VMware–VMvisor–Installer–6.x.x–XXXXXX.x86_64.iso /esxi_cdrom
```

7 Copy the contents of the ISO image to the USB flash drive.

```
cp –r /esxi_cdrom/* /usbdisk
```

8 Rename the `isolinux.cfg` file to `syslinux.cfg`.

```
mv /usbdisk/isolinux.cfg /usbdisk/syslinux.cfg
```

9 In the `/usbdisk/syslinux.cfg` file, edit the `APPEND –c boot.cfg` line to `APPEND –c boot.cfg –p 1`.

10 Unmount the USB flash drive.

```
umount /usbdisk
```

11 Unmount the installer ISO image.

```
umount /esxi_cdrom
```

The USB flash drive can boot the ESXi installer.

Create a USB Flash Drive to Store the ESXi Installation Script or Upgrade Script

You can use a USB flash drive to store the ESXi installation script or upgrade script that is used during scripted installation or upgrade of ESXi.

When multiple USB flash drives are present on the installation machine, the installation software searches for the installation or upgrade script on all attached USB flash drives.

The instructions in this procedure assume that the USB flash drive is detected as `/dev/sdb`.

Note Do not store the `ks` file containing the installation or upgrade script on the same USB flash drive that you are using to boot the installation or upgrade.

Prerequisites

- Linux machine
- ESXi installation or upgrade script, the `ks.cfg` kickstart file
- USB flash drive

Procedure

1 Attach the USB flash drive to a Linux machine that has access to the installation or upgrade script.

2 Create a partition table.

`/sbin/fdisk /dev/sdb`

a Type `d` to delete partitions until they are all deleted.

b Type `n` to create primary partition 1 that extends over the entire disk.

c Type `t` to set the type to an appropriate setting for the FAT32 file system, such as **c**.

d Type `p` to print the partition table.

The result should be similar to the following text:

```
Disk /dev/sdb: 2004 MB, 2004877312 bytes
255 heads, 63 sectors/track, 243 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1               1         243      1951866   c   W95 FAT32 (LBA)
```

e Type `w` to write the partition table and quit.

3 Format the USB flash drive with the Fat32 file system.

```
/sbin/mkfs.vfat –F 32 –n USB /dev/sdb1
```

4 Mount the USB flash drive.

```
mount /dev/sdb1 /usbdisk
```

5 Copy the ESXi installation script to the USB flash drive.

```
cp ks.cfg /usbdisk
```

6 Unmount the USB flash drive.

The USB flash drive contains the installation or upgrade script for ESXi.

What to do next

When you boot the ESXi installer, point to the location of the USB flash drive for the installation or upgrade script. See Enter Boot Options to Start an Installation or Upgrade Script and PXELINUX Configuration Files.

Create an Installer ISO Image with a Custom Installation or Upgrade Script

You can customize the standard ESXi installer ISO image with your own installation or upgrade script. This customization enables you to perform a scripted, unattended installation or upgrade when you boot the resulting installer ISO image.

See also About Installation and Upgrade Scripts and About the boot.cfg File.

Prerequisites

- Linux machine
- The ESXi ISO image `VMware-VMvisor-Installer-`*`6.x.x-XXXXXX`*`.x86_64.iso`,where *`6.x.x`* is the version of ESXi you are installing, and *XXXXXX* is the build number of the installer ISO image
- Your custom installation or upgrade script, the `ks_cust.cfg` kickstart file

Procedure

1 Download the ESXi ISO image from the VMware Web site.

2 Mount the ISO image in a folder:

```
mount –o loop VMware-VMvisor-Installer-6.x.x-XXXXXX.x86_64.iso /esxi_cdrom_mount
```

XXXXXX is the ESXi build number for the version that you are installing or upgrading to.

3 Copy the contents of `cdrom` to another folder:

```
cp –r /esxi_cdrom_mount /esxi_cdrom
```

4 Copy the kickstart file to `/esxi_cdrom`.

```
cp ks_cust.cfg /esxi_cdrom
```

5 (Optional) Modify the `boot.cfg` file to specify the location of the installation or upgrade script by using the `kernelopt` option.

You must use uppercase characters to provide the path of the script, for example,

```
kernelopt=runweasel ks=cdrom:/KS_CUST.CFG
```

The installation or upgrade becomes completely automatic, without the need to specify the kickstart file during the installation or upgrade.

6 Recreate the ISO image using the `mkisofs` or the `genisoimage` command.

Command	Syntax
`mkisofs`	`mkisofs -relaxed-filenames -J -R -o custom_esxi.iso -b isolinux.bin -c boot.cat -no-emul-boot -boot-load-size 4 -boot-info-table -eltorito-alt-boot -eltorito-platform efi -b efiboot.img -no-emul-boot /esxi_cdrom`
`genisoimage`	`genisoimage -relaxed-filenames -J -R -o custom_esxi.iso -b isolinux.bin -c boot.cat -no-emul-boot -boot-load-size 4 -boot-info-table -eltorito-alt-boot -e efiboot.img -no-emul-boot /esxi_cdrom`

You can use this ISO image for regular boot or UEFI secure boot.

The ISO image includes your custom installation or upgrade script.

What to do next

Install ESXi from the ISO image.

PXE Booting the ESXi Installer

You can use the preboot execution environment (PXE) to boot a host. Starting with vSphere 6.0, you can PXE boot the ESXi installer from a network interface on hosts with legacy BIOS or using UEFI.

ESXi is distributed in an ISO format that is designed to install to flash memory or to a local hard drive. You can extract the files and boot by using PXE.

PXE uses Dynamic Host Configuration Protocol (DHCP) and Trivial File Transfer Protocol (TFTP) to boot an operating system over a network.

PXE booting requires some network infrastructure and a machine with a PXE-capable network adapter. Most machines that can run ESXi have network adapters that can PXE boot.

Note PXE booting with legacy BIOS firmware is possible only over IPv4. PXE booting with UEFI firmware is possible with either IPv4 or IPv6.

Sample DHCP Configurations

To PXE boot the ESXi installer, the DHCP server must send the address of the TFTP server and the filename of the initial boot loader to the ESXi host.

When the target machine first boots, it broadcasts a packet across the network requesting information to boot itself. The DHCP server responds. The DHCP server must be able to determine whether the target machine is allowed to boot and the location of the initial boot loader binary, typically a file on a TFTP server.

Caution Do not set up a second DHCP server 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. Talk to a network administrator before setting up a DHCP server. For support on configuring DHCP, contact your DHCP server vendor.

Many DHCP servers can PXE boot hosts. If you are using a version of DHCP for Microsoft Windows, see the DHCP server documentation to determine how to pass the `next-server` and `filename` arguments to the target machine.

Example of Booting Using TFTP with IPv4

This example shows how to configure an ISC DHCP server to boot ESXi using a TFTP server at IPv4 address xxx.xxx.xxx.xxx.

```
#
# ISC DHCP server configuration file snippet.  This is not a complete
# configuration file; see the ISC server documentation for details on
# how to configure the DHCP server.
#
allow booting;
allow bootp;
option client-system-arch code 93 = unsigned integer 16;
class "pxeclients" {
   match if substring(option vendor-class-identifier, 0, 9) = "PXEClient";
   next-server xxx.xxx.xxx.xxx;
   if option client-system-arch = 00:07 or option client-system-arch = 00:09 {
      filename = "mboot.efi";
   } else {
      filename = "pxelinux.0";
   }
}
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the `pxelinux.0` or `mboot.efi` binary file on the TFTP server.

Example of Booting Using TFTP with IPv6

This example shows how to configure an ISC DHCPv6 server to boot ESXi using a TFTP server at IPv6 address xxxx:xxxx:xxxx:xxxx::xxxx.

```
#
# ISC DHCPv6 server configuration file snippet.  This is not a complete
# configuration file; see the ISC server documentation for details on
# how to configure the DHCP server.
#
```

```
allow booting;
allow bootp;
option dhcp6.bootfile-url code 59 = string;
option dhcp6.bootfile-url "tftp://[xxxx:xxxx:xxxx:xxxx::xxxx]/mboot.efi";
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the `mboot.efi` binary file on the TFTP server.

Example of Booting Using HTTP with IPv4

This example shows how to configure an ISC DHCP server to boot ESXi using a Web server at IPv4 address xxx.xxx.xxx.xxx. The example uses gPXELINUX for legacy BIOS hosts and iPXE for UEFI hosts.

```
#
# ISC DHCPv6 server configuration file snippet.  This is not a complete
# configuration file; see the ISC server documentation for details on
# how to configure the DHCP server.
#
allow booting;
allow bootp;
option client-system-arch code 93 = unsigned integer 16;
class "pxeclients" {
   match if substring(option vendor-class-identifier, 0, 9) = "PXEClient";
   next-server xxx.xxx.xxx.xxx;
   if option client-system-arch = 00:07 or option client-system-arch = 00:09 {
      if exists user-class and option user-class = "iPXE" {
         # Instruct iPXE to load mboot.efi as secondary bootloader
         filename = "mboot.efi";
      } else {
         # Load the snponly.efi configuration of iPXE as initial bootloader
         filename = "snponly.efi";
      }
   } else {
      filename "gpxelinux.0";
   }
}
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the `gpxelinux.0` or `snponly.efi` binary file on the TFTP server. In the UEFI case, iPXE then asks the DHCP server for the next file to load, and this time the server returns `mboot.efi` as the filename.

Example of Booting Using HTTP with IPv6

This example shows how to configure an ISC DHCPv6 server to boot ESXi using a TFTP server at IPv6 address xxxx:xxxx:xxxx:xxxx::xxxx.

```
#
# ISC DHCPv6 server configuration file snippet.  This is not a complete
# configuration file; see the ISC server documentation for details on
# how to configure the DHCP server.
#
allow booting;
allow bootp;
```

```
option dhcp6.bootfile-url code 59 = string;
if exists user-class and option user-class = "iPXE" {
   # Instruct iPXE to load mboot.efi as secondary bootloader
   option dhcp6.bootfile-url "tftp://[xxxx:xxxx:xxxx:xxxx::xxxx]/mboot.efi";
} else {
   # Load the snponly.efi configuration of iPXE as initial bootloader
   option dhcp6.bootfile-url "tftp://[xxxx:xxxx:xxxx:xxxx::xxxx]/snponly.efi";
}
```

When a machine attempts to PXE boot, the DHCP server provides an IP address and the location of the `snponly.efi` (iPXE) binary file on the TFTP server. iPXE then asks the DHCP server for the next file to load, and this time the server returns `mboot.efi` as the filename.

PXELINUX Configuration Files

You need a PXELINUX configuration file to boot the ESXi installer on a legacy BIOS system. The configuration file defines the menu displayed to the target ESXi host as it boots up and contacts the TFTP server for all SYSLINUX configurations, including PXELINUX and gPXELINUX.

This section gives general information about PXELINUX configuration files. For examples, see Sample DHCP Configurations.

For syntax details, see the SYSLINUX web site at http://www.syslinux.org/.

Required Files

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

- `mboot.c32` is the boot loader.
- `boot.cfg` is the boot loader configuration file.

See About the boot.cfg File

File Name for the PXE Configuration File

For the file name of the PXE configuration file, select one of the following options:

- `01-`*`mac_address_of_target_ESXi_host`*. For example, `01-23-45-67-89-0a-bc`
- The target ESXi host IP address in hexadecimal notation.
- `default`

The initial boot file, `pxelinux.0` or `gpxelinux.0`, tries to load a PXE configuration file in the following order:

1. It tries with the MAC address of the target ESXi host, prefixed with its ARP type code, which is 01 for Ethernet.
2. If that attempt fails, it tries with the hexadecimal notation of target ESXi system IP address.
3. Ultimately, it tries to load a file named `default`.

File Location for the PXE Configuration File

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

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 ESXi host is 00-21-5a-ce-40-f6.

PXE Boot Background Information

Understanding the PXE boot process can help you during troubleshooting.

TFTP Server

Trivial File Transfer Protocol (TFTP) is similar to the FTP service, and is typically used only for network booting systems or loading firmware on network devices such as routers. TFTP is available on Linux and Windows.

- Most Linux distributions include a copy of the tftp-hpa server. If you require a supported solution, purchase a supported TFTP server from your vendor of choice. You can also acquire a TFTP server from one of the packaged appliances on the VMware Marketplace.
- If your TFTP server will run on a Microsoft Windows host, use tftpd32 version 2.11 or later. See http://tftpd32.jounin.net/.

SYSLINUX, PXELINUX, and gPXELINUX

If you are using PXE in a legacy BIOS environment, you need to understand the different boot environments.

- SYSLINUX is an open source boot environment for machines that run legacy BIOS firmware. The ESXi boot loader for BIOS systems, `mbootc.32`, runs as a SYSLINUX plugin. You can configure SYSLINUX to boot from several types of media, including disk, ISO image, and network. You can find the SYSLINUX package at http://www.kernel.org/pub/linux/utils/boot/syslinux/.
- PXELINUX is a SYSXLINUX configuration for booting from a TFTP server according to the PXE standard. If you use PXELINUX to boot the ESXi installer, the `pxelinux.0` binary file, `mboot.c32`, the configuration file, the kernel, and other files are all transferred by TFTP.
- gPXELINUX is a hybrid configuration that includes both PXELINUX and gPXE and supports booting from a Web server. gPXELINUX is part of the SYSLINUX package. If you use gPXELINUX to boot the ESXi installer, only the `gpxelinux.0` binary file, `mboot.c32`, and the configuration file are transferred via TFTP. The remaining files are transferred via HTTP. HTTP is typically faster and more reliable than TFTP, especially for transferring large amounts of data on a heavily loaded network.

Note VMware currently builds the `mboot.c32` plugin to work with SYSLINUX version 3.86 and tests PXE booting only with that version. Other versions are likely to be incompatible. This is not a statement of limited support. For support of third-party agents that you use to set up your PXE booting infrastructure, contact the vendor.

UEFI PXE and iPXE

Most UEFI firmware natively includes PXE support that allows booting from a TFTP server. The firmware can directly load the ESXi boot loader for UEFI systems, `mboot.efi`. Additional software such as PXELINUX is not required.

iPXE can also be useful for UEFI systems that do not include PXE in firmware and for older UEFI systems with bugs in their PXE support. For such cases you can try installing iPXE on a USB flash drive and booting from there.

Note Apple Macintosh products do not include PXE boot support. They include support for network booting via an Apple-specific protocol instead.

Alternative Approaches to PXE Booting

Alternative approaches to PXE booting different software on different hosts are also possible, for example:

- Configuring the DHCP server to provide different initial boot loader filenames to different hosts depending on MAC address or other criteria. See your DCHP server's documentation.
- Approaches using iPXE as the initial bootloader with an iPXE configuration file that selects the next bootloader based on the MAC address or other criteria.

Installing and Booting ESXi with Software FCoE

You can install and boot ESXi from an FCoE LUN using VMware software FCoE adapters and network adapters with FCoE offload capabilities. Your host does not require a dedicated FCoE HBA.

See the *vSphere Storage* documentation for information about installing and booting ESXi with software FCoE.

Using Remote Management Applications

Remote management applications allow you to install ESXi on servers that are in remote locations.

Remote management applications supported for installation include HP 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 Server Models and Firmware Versions. For support on remote management applications, contact the vendor.

You can use remote management applications to do both interactive and scripted installations of ESXi remotely.

If you use remote management applications to install ESXi, the virtual CD might encounter corruption problems with systems or networks operating at peak capacity. If a remote installation from an ISO image fails, complete the installation from the physical CD media.

Download the ESXi Installer

Download the installer for ESXi.

Prerequisites

Create a My VMware account at https://my.vmware.com/web/vmware/.

Procedure

1 Download the ESXi installer from the VMware Web site at https://my.vmware.com/web/vmware/downloads.

   ESXi is listed under Datacenter & Cloud Infrastructure.

2 Confirm that the md5sum is correct.

   See the VMware Web site topic Using MD5 Checksums at http://www.vmware.com/download/md5.html.

Upgrade Hosts Interactively

To upgrade ESXi 6.0 hosts or ESXi 6.5 hosts to ESXi 6.7, you can boot the ESXi installer from a CD, DVD, or USB flash drive.

Before upgrading, consider disconnecting the network storage. This action decreases the time it takes the installer to search for available disk drives. When you disconnect network storage, any files on the disconnected disks are unavailable at installation. Do not disconnect a LUN that contains an existing ESXi installation.

Prerequisites

- Verify that the ESXi installer ISO in one of the following locations.
  - On CD or DVD. If you do not have the installation CD or DVD, you can create one. See Download and Burn the ESXi Installer ISO Image to a CD or DVD
  - On a USB flash drive. See Format a USB Flash Drive to Boot the ESXi Installation or Upgrade

  Note You can also use PXE to boot the ESXi installer to run an interactive installation or a scripted installation. See PXE Booting the ESXi Installer.

- Verify that the server hardware clock is set to UTC. This setting is in the system BIOS.
- ESXi Embedded must not be on the host. ESXi Installable and ESXi Embedded cannot exist on the same host.
- If you are upgrading an ESXi host, supported custom VIBs that are not included in the ESXi installer ISO are migrated. See Upgrading Hosts That Have Third-Party Custom VIBs
- See your hardware vendor documentation for information about changing the boot order.

Procedure

1 Insert the ESXi installer CD or DVD in the CD-ROM or DVD-ROM drive, or attach the Installer USB flash drive and restart the machine.

2 Set the BIOS to boot from the CD-ROM device or the USB flash drive.

3 In the Select a Disk panel, select the drive on which to install or upgrade ESXi and press Enter.

   Press F1 for information about the selected disk.

   Note Do not rely on the disk order in the list to select a disk. The disk order is determined by the BIOS. On systems where drives are continuously being added and removed, they might be out of order.

4 Upgrade or install ESXi if the installer finds an existing ESXi installation and VMFS datastore.

   If an existing VMFS datastore cannot be preserved, you can choose only to install ESXi and overwrite the existing VMFS datastore, or to cancel the installation. If you choose to overwrite the existing VMFS datastore, back up the datastore first.

5 Press F11 to confirm and start the upgrade.

6 Remove the installation CD or DVD or USB flash drive when the upgrade is complete.

7 Press Enter to reboot the host.

8 Set the first boot device to be the drive which you selected previously when you upgraded ESXi.

Installing or Upgrading Hosts by Using a Script

You can quickly deploy ESXi hosts by using scripted, unattended installations or upgrades. Scripted installations or upgrades provide an efficient way to deploy multiple hosts.

The installation or upgrade script contains the installation settings for ESXi. You can apply the script to all hosts that you want to have a similar configuration.

For a scripted installation or upgrade, you must use the supported commands to create a script. You can edit the script to change settings that are unique for each host.

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

- FTP server
- HTTP/HTTPS server
- NFS server
- USB flash drive
- CD-ROM drive

Enter Boot Options to Start an Installation or Upgrade Script

You can start an installation or upgrade script by typing boot options at the ESXi installer boot command line.

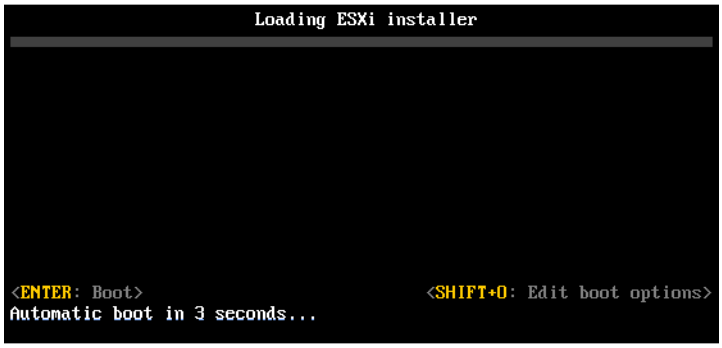
At boot time you might need to specify options to access the kickstart file. You can enter boot options by pressing Shift+O in the boot loader. For a PXE boot installation, you can pass options through the `kernelopts` line of the `boot.cfg` file. See About the boot.cfg File and PXE Booting the ESXi Installer.

To specify the location of the installation script, set the `ks=filepath` option, where *filepath* is indicates the location of your Kickstart file. Otherwise, a scripted installation or upgrade cannot start. If `ks=filepath` is omitted, the text installer is run.

Supported boot options are listed in Boot Options.

Procedure

1. Start the host.
2. When the ESXi installer window appears, press Shift+O to edit boot options.



3. At the `runweasel` command prompt, type **ks=*location of installation script plus boot command-line options***.

Example: Boot Option

You type the following boot options:

```
ks=http://00.00.00.00/kickstart/ks-osdc-pdp101.cfg nameserver=00.00.0.0 ip=00.00.00.000
netmask=255.255.255.0 gateway=00.00.00.000
```

Boot Options

When you perform a scripted installation, you might need to specify options at boot time to access the kickstart file.

Supported Boot Options

Table 3-7. Boot Options for ESXi Installation

Boot Option	Description
`BOOTIF=`*`hwtype-MAC address`*	Similar to the `netdevice` option, except in the PXELINUX format as described in the IPAPPEND option under SYSLINUX at the syslinux.zytor.com site.
`gateway=`*`ip address`*	Sets this network gateway as the default gateway to be used for downloading the installation script and installation media.

Table 3-7. Boot Options for ESXi Installation (Continued)

Boot Option	Description
`ip=`*`ip address`*	Sets up a static IP address to be used for downloading the installation script and the installation media. Note: the PXELINUX format for this option is also supported. See the IPAPPEND option under SYSLINUX at the syslinux.zytor.com site.
`ks=cdrom:/`*`path`*	Performs a scripted installation with the script at *path*, which resides on the CD in the CD-ROM drive. Each CDROM is mounted and checked until the file that matches the path is found. **Important** If you have created an installer ISO image with a custom installation or upgrade script, you must use uppercase characters to provide the path of the script, for example, `ks=cdrom:/KS_CUST.CFG`.
`ks=file://`*`path`*	Performs a scripted installation with the script at *path*.
`ks=`*`protocol`*`://`*`serverpath`*	Performs a scripted installation with a script located on the network at the given URL. *protocol* can be `http`, `https`, `ftp`, or `nfs`. An example using nfs protocol is `ks=nfs://`*`host/porturl-path`*. The format of an NFS URL is specified in RFC 2224.
`ks=usb`	Performs a scripted installation, accessing the script from an attached USB drive. Searches for a file named `ks.cfg`. The file must be located in the root directory of the drive. If multiple USB flash drives are attached, they are searched until the `ks.cfg` file is found. Only FAT16 and FAT32 file systems are supported.
`ks=usb:/`*`path`*	Performs a scripted installation with the script file at the specified path, which resides on USB.
`ksdevice=`*`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. This location can also be a vmnicNN name. If not specified and files need to be retrieved over the network, the installer defaults to the first discovered network adapter that is plugged in.
`nameserver=`*`ip address`*	Specifies a domain name server to be used for downloading the installation script and installation media.
`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. This location can also be a vmnicNN name. If not specified and files need to be retrieved over the network, the installer defaults to the first discovered network adapter that is plugged in.
`netmask=`*`subnet mask`*	Specifies subnet mask for the network interface that downloads the installation script and the installation media.
`vlanid=`*`vlanid`*	Configure the network card to be on the specified VLAN.

About Installation and Upgrade Scripts

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

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

Locations Supported for Installation or Upgrade Scripts

In scripted installations and upgrades, the ESXi installer can access the installation or upgrade script, also called the kickstart file, from several locations.

The following locations are supported for the installation or upgrade script:

- CD/DVD. See Create an Installer ISO Image with a Custom Installation or Upgrade Script.
- USB Flash drive. See Create a USB Flash Drive to Store the ESXi Installation Script or Upgrade Script.
- A network location accessible through the following protocols: NFS, HTTP, HTTPS, FTP

Path to the Installation or Upgrade Script

You can specify the path to an installation or upgrade script.

`ks=http://`*`XXX.XXX.XXX.XXX`*`/kickstart/KS.CFG` is the path to the ESXi installation script, where *`XXX.XXX.XXX.XXX`* is the IP address of the machine where the script resides. See About Installation and Upgrade Scripts.

To start an installation script from an interactive installation, you enter the `ks=` option manually. See Enter Boot Options to Start an Installation or Upgrade Script.

Installation and Upgrade Script Commands

To modify the default installation or upgrade script or to create your own script, use supported commands. Use supported commands in the installation script, which you specify with a boot command when you boot the installer.

To determine which disk to install or upgrade ESXi on, the installation script requires one of the following commands: `install`, `upgrade`, or `installorupgrade`. The `install` command creates the default partitions, including a VMFS datastore that occupies all available space after the other partitions are created.

accepteula or vmaccepteula (required)

Accepts the ESXi license agreement.

clearpart (optional)

Clears any existing partitions on the disk. Requires the `install` command to be specified. Carefully edit the `clearpart` command in your existing scripts.

`--drives=` Remove partitions on the specified drives.

`--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` Allows overwriting of VMFS partitions on the specified drives. By default, overwriting VMFS partitions is not allowed.

`--firstdisk=`

`disk-type1`

`[`*`disk-type2`*`,...]`

Partitions the first eligible disk found. By default, the eligible disks are set to the following order:

1. Locally attached storage (`local`)
2. Network storage (`remote`)
3. USB disks (`usb`)

You can change the order of the disks by using a comma-separated list appended to the argument. If you provide a filter list, the default settings are overridden. You can combine filters to specify a particular disk, including `esx` for the first disk with ESXi installed on it, model and vendor information, or the name of the VMkernel device driver. For example, to prefer a disk with the model name ST3120814A and any disk that uses the mptsas driver rather than a normal local disk, the argument is `--firstdisk=ST3120814A,mptsas,local`. You can use `localesx` for local storage that contains ESXi image or `remoteesx` for remote storage that contains ESXi image.

dryrun (optional)

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

install

Specifies that this is a fresh installation. Replaces the deprecated `autopart` command used for ESXi 4.1 scripted installations. Either the `install`, `upgrade`, or `installorupgrade` command is required to determine which disk to install or upgrade ESXi on.

`--disk= or --drive=` Specifies the disk to partition. In the command `--disk=`*`diskname`*, the *diskname* can be in any of the forms shown in the following examples:

- Path: `--disk=`*`/vmfs/devices/disks/mpx.vmhba1:C0:T0:L0`*
- MPX name: `--disk=`*`mpx.vmhba1:C0:T0:L0`*

- VML name: `--disk=vml.000000034211234`
- vmkLUN UID: `--disk=vmkLUN_UID`

For accepted disk name formats, see Disk Device Names.

`--firstdisk=`

`disk-type1,`

`[`*`disk-type2`*`,...]`

Partitions the first eligible disk found. By default, the eligible disks are set to the following order:

1. Locally attached storage (`local`)
2. Network storage (`remote`)
3. USB disks (`usb`)

You can change the order of the disks by using a comma-separated list appended to the argument. If you provide a filter list, the default settings are overridden. You can combine filters to specify a particular disk, including `esx` for the first disk with ESX installed on it, model and vendor information, or the name of the vmkernel device driver. For example, to prefer a disk with the model name ST3120814A and any disk that uses the mptsas driver rather than a normal local disk, the argument is `--firstdisk=ST3120814A,mptsas,local`. You can use `localesx` for local storage that contains ESXi image or `remoteesx` for remote storage that contains ESXi image.

`--ignoressd`

Excludes solid-state disks from eligibility for partitioning. This option can be used with the `install` command and the `--firstdisk` option. This option takes precedence over the `--firstdisk` option. This option is invalid with the `--drive` or `--disk` options and with the `upgrade` and `installorupgrade` commands. See the *vSphere Storage* documentation for more information about preventing SSD formatting during auto-partitioning.

`--overwritevsan`

You must use the `--overwritevsan` option when you install ESXi on a disk, either SSD or HDD (magnetic), that is in a vSAN disk group. If you use this option and no vSAN partition is on the selected disk, the installation will fail. When you install ESXi on a disk that is in vSAN disk group, the result depends on the disk that you select:

- If you select an SSD, the SSD and all underlying HDDs in the same disk group will be wiped.
- If you select an HDD, and the disk group size is greater than two, only the selected HDD will be wiped.

- If you select an HDD disk, and the disk group size is two or less, the SSD and the selected HDD will be wiped.

For more information about managing vSAN disk groups, see the *vSphere Storage* documentation.

--overwritevmfs Required to overwrite an existing VMFS datastore on the disk before installation.

--preservevmfs Preserves an existing VMFS datastore on the disk during installation.

--novmfsondisk Prevents a VMFS partition from being created on this disk. Must be used with `--overwritevmfs` if a VMFS partition already exists on the disk.

installorupgrade

Either the `install`, `upgrade`, or `installorupgrade` command is required to determine which disk to install or upgrade ESXi on.

--disk= or --drive= Specifies the disk to partition. In the command `--disk=`*`diskname`*, the *diskname* can be in any of the forms shown in the following examples:

- Path: `--disk=`*`/vmfs/devices/disks/mpx.vmhba1:C0:T0:L0`*
- MPX name: `--disk=`*`mpx.vmhba1:C0:T0:L0`*
- VML name: `--disk=`*`vml.000000034211234`*
- vmkLUN UID: `--disk=`*`vmkLUN_UID`*

For accepted disk name formats, see Disk Device Names.

--firstdisk= *`disk-type1`*`,` **[**`disk-type2`**,...]** Partitions the first eligible disk found. By default, the eligible disks are set to the following order:

1. Locally attached storage (`local`)
2. Network storage (`remote`)
3. USB disks (`usb`)

You can change the order of the disks by using a comma-separated list appended to the argument. If you provide a filter list, the default settings are overridden. You can combine filters to specify a particular disk, including `esx` for the first disk with ESX installed on it, model and vendor information, or the name of the vmkernel device driver. For example, to prefer a disk with the model name ST3120814A and any disk that uses the mptsas driver rather than a normal local disk, the argument is `--firstdisk=ST3120814A,mptsas,local`. You can use `localesx` for local storage that contains ESXi image or `remoteesx` for remote storage that contains ESXi image.

--overwritevsan

You must use the `--overwritevsan` option when you install ESXi on a disk, either SSD or HDD (magnetic), that is in a vSAN disk group. If you use this option and no vSAN partition is on the selected disk, the installation will fail. When you install ESXi on a disk that is in a vSAN disk group, the result depends on the disk that you select:

- If you select an SSD, the SSD and all underlying HDDs in the same disk group will be wiped.
- If you select an HDD, and the disk group size is greater than two, only the selected HDD will be wiped.
- If you select an HDD disk, and the disk group size is two or less, the SSD and the selected HDD will be wiped.

For more information about managing vSAN disk groups, see the *vSphere Storage* documentation.

--overwritevmfs

Install ESXi if a VMFS partition exists on the disk, but no ESX or ESXi installation exists. Unless this option is present, the installer will fail if a VMFS partition exists on the disk, but no ESX or ESXi installation exists.

keyboard (optional)

Sets the keyboard type for the system.

keyboardType

Specifies the keyboard map for the selected keyboard type. *keyboardType* must be one of the following types.

- Belgian
- Brazilian
- Croatian
- Czechoslovakian
- Danish
- Estonian
- Finnish
- French
- German
- Greek
- Icelandic
- Italian
- Japanese
- Latin American

- Norwegian
- Polish
- Portuguese
- Russian
- Slovenian
- Spanish
- Swedish
- Swiss French
- Swiss German
- Turkish
- Ukrainian
- United Kingdom
- US Default
- US Dvorak

serialnum or vmserialnum (optional)

Deprecated in ESXi 5.0.x. Supported in ESXi 5.1 and later. Configures licensing. If not included, ESXi installs in evaluation mode.

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

network (optional)

Specifies a network address for the system.

`--bootproto=[dhcp|static]`	Specifies whether to obtain the network settings from DHCP or set them manually.
`--device=`	Specifies either the MAC address of the network card or the device name, in the form `vmnicNN`, as in `vmnic0`. This options refers to the uplink device for the virtual switch.
`--ip=`	Sets an IP address for the machine to be installed, in the form `xxx.xxx.xxx.xxx`. Required with the `--bootproto=static` option and ignored otherwise.
`--gateway=`	Designates the default gateway as an IP address, in the form `xxx.xxx.xxx.xxx`. Used 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, in the form 255.xxx.xxx.xxx. Used with the --bootproto=static option.
--hostname=	Specifies the host name for the installed system.
--vlanid= ***vlanid***	Specifies which VLAN the system is on. Used with either the --bootproto=dhcp or --bootproto=static option. Set to an integer from 1 to 4096.
--addvmportgroup=(0|1)	Specifies whether to add the VM Network port group, which is used by virtual machines. The default value is 1.

paranoid (optional)

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

part or partition (optional)

Creates an additional VMFS datastore on the system. Only one datastore per disk can be created. Cannot be used on the same disk as the install command. Only one partition can be specified per disk and it can only be a VMFS partition.

datastore name	Specifies where the partition is to be mounted.
--ondisk= or --ondrive=	Specifies the disk or drive where the partition is created.
--firstdisk= ***disk-type1,*** **[*disk-type2*,...]**	Partitions the first eligible disk found. By default, the eligible disks are set to the following order: 1 Locally attached storage (local) 2 Network storage (remote) 3 USB disks (usb) You can change the order of the disks by using a comma-separated list appended to the argument. If you provide a filter list, the default settings are overridden. You can combine filters to specify a particular disk, including esx for the first disk with ESX installed on it, model and vendor information, or the name of the vmkernel device driver. For example, to prefer a disk with the model name ST3120814A and any disk that uses the mptsas

driver rather than a normal local disk, the argument is `--firstdisk=ST3120814A,mptsas,local`. You can use `localesx` for local storage that contains ESXi image or `remoteesx` for remote storage that contains ESXi image.

reboot (optional)

Reboots the machine after the scripted installation is complete.

<--noeject> The CD is not ejected after the installation.

rootpw (required)

Sets the root password for the system.

--iscrypted Specifies that the password is encrypted.

password Specifies the password value.

upgrade

Either the `install`, `upgrade`, or `installorupgrade` command is required to determine which disk to install or upgrade ESXi on.

--disk= or --drive= Specifies the disk to partition. In the command `--disk=`*`diskname`*, the *diskname* can be in any of the forms shown in the following examples:

- Path: `--disk=`*`/vmfs/devices/disks/mpx.vmhba1:C0:T0:L0`*
- MPX name: `--disk=`*`mpx.vmhba1:C0:T0:L0`*
- VML name: `--disk=`*`vml.000000034211234`*
- vmkLUN UID:`--disk=`*`vmkLUN_UID`*

For accepted disk name formats, see Disk Device Names.

--firstdisk=
disk-type1,
[*disk-type2*,...] Partitions the first eligible disk found. By default, the eligible disks are set to the following order:

1. Locally attached storage (`local`)
2. Network storage (`remote`)
3. USB disks (`usb`)

You can change the order of the disks by using a comma-separated list appended to the argument. If you provide a filter list, the default settings are overridden. You can combine filters to specify a particular disk, including `esx` for the first disk with ESX installed on it, model and vendor information, or the name of the vmkernel device driver. For example, to prefer a disk with the model name ST3120814A and any disk that uses the mptsas

driver rather than a normal local disk, the argument is `--firstdisk=ST3120814A,mptsas,local`. You can use `localesx` for local storage that contains ESXi image or `remoteesx` for remote storage that contains ESXi image.

%include or include (optional)

Specifies another installation script to parse. This command is treated similarly to a multiline command, but takes only one argument.

filename	For example: `%include part.cfg`

%pre (optional)

Specifies a script to run before the kickstart configuration is evaluated. For example, you can use it to generate files for the kickstart file to include.

--interpreter **=[python|busybox]**	Specifies an interpreter to use. The default is busybox.

%post (optional)

Runs the specified script after package installation is complete. If you specify multiple `%post` sections, they run in the order that they appear in the installation script.

--interpreter **=[python|busybox]**	Specifies an interpreter to use. The default is busybox.
--timeout=secs	Specifies a timeout for running the script. If the script is not finished when the timeout expires, the script is forcefully terminated.
--ignorefailure **=[true|false]**	If true, the installation is considered a success even if the `%post` script terminated with an error.

%firstboot

Creates an `init` script that runs only during the first boot. The script has no effect on subsequent boots. If multiple `%firstboot` sections are specified, they run in the order that they appear in the kickstart file.

Note You cannot check the semantics of `%firstboot` scripts until the system is booting for the first time. A `%firstboot` script might contain potentially catastrophic errors that are not exposed until after the installation is complete.

--interpreter	Specifies an interpreter to use. The default is busybox.

`=[python|busybox]`

Note You cannot check the semantics of the `%firstboot` script until the system boots for the first time. If the script contains errors, they are not exposed until after the installation is complete.

Disk Device Names

The `install`, `upgrade`, and `installorupgrade` installation script commands require the use of disk device names.

Table 3-8. Disk Device Names

Format	Example	Description
VML	vml.00025261	The device name as reported by the VMkernel
MPX	mpx.vmhba0:C0:T0:L0	The device name

About the boot.cfg File

The boot loader configuration file `boot.cfg` specifies the kernel, the kernel options, and the boot modules that the `mboot.c32` or `mboot.efi` boot loader uses in an ESXi installation.

The `boot.cfg` file is provided in the ESXi installer. You can modify the `kernelopt` line of the `boot.cfg` file to specify the location of an installation script or to pass other boot options.

The `boot.cfg` file has the following syntax:

```
# boot.cfg -- mboot configuration file
#
# Any line preceded with '#' is a comment.

title=STRING
prefix=DIRPATH
kernel=FILEPATH
kernelopt=STRING
modules=FILEPATH1 --- FILEPATH2... --- FILEPATHn

# Any other line must remain unchanged.
```

The commands in `boot.cfg` configure the boot loader.

Table 3-9. Commands in `boot.cfg` .

Command	Description
`title=`*`STRING`*	Sets the boot loader title to *`STRING`*.
`prefix=`*`STRING`*	(Optional) Adds*`DIRPATH/`* in front of every *`FILEPATH`* in the `kernel=` and `modules=` commands that do not already start with / or with `http://`.
`kernel=`*`FILEPATH`*	Sets the kernel path to *`FILEPATH`*.

Table 3-9. Commands in `boot.cfg` . (Continued)

Command	Description
`kernelopt=STRING`	Appends *STRING* to the kernel boot options.
`modules=FILEPATH1 --- FILEPATH2... --- FILEPATHn`	Lists the modules to be loaded, separated by three hyphens (---).

See Create an Installer ISO Image with a Custom Installation or Upgrade Script and PXE Booting the ESXi Installer.

Install or Upgrade ESXi from a CD or DVD by Using a Script

You can install or upgrade ESXi from a CD-ROM or DVD-ROM drive by using a script that specifies the installation or upgrade options.

You can start the installation or upgrade script by entering a boot option when you start the host. You can also create an installer ISO image that includes the installation script. With an installer ISO image, you can perform a scripted, unattended installation when you boot the resulting installer ISO image. See Create an Installer ISO Image with a Custom Installation or Upgrade Script.

Prerequisites

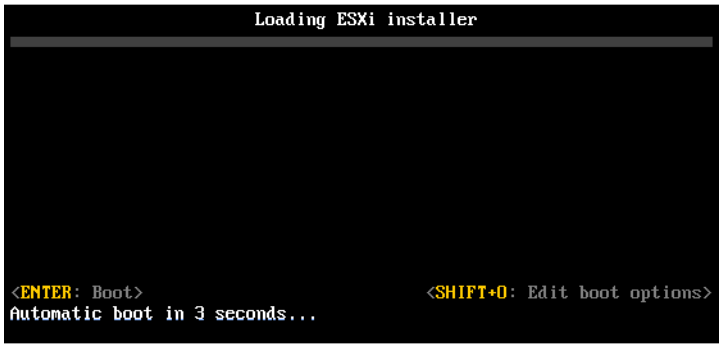
Before you run the scripted installation or upgrade, verify that the following prerequisites are met:

- The system on which you are installing or upgrading meets the hardware requirements. See ESXi Hardware Requirements.
- You have the ESXi installer ISO on an installation CD or DVD . See Download and Burn the ESXi Installer ISO Image to a CD or DVD.
- The default installation or upgrade script (`ks.cfg`) or a custom installation or upgrade script is accessible to the system. See About Installation and Upgrade Scripts.
- You have selected a boot command to run the scripted installation or upgrade. See Enter Boot Options to Start an Installation or Upgrade Script. For a complete list of boot commands, see Boot Options.

Procedure

1. Boot the ESXi installer from the local CD-ROM or DVD-ROM drive.

2 When the ESXi installer window appears, press Shift+O to edit boot options.



3 Type a boot option that calls the default installation or upgrade script or an installation or upgrade script file that you created.

   The boot option has the form `ks=`.

4 Press Enter.

The installation, upgrade, or migration runs, using the options that you specified.

Install or Upgrade ESXi from a USB Flash Drive by Using a Script

You can install or upgrade ESXi from a USB flash drive by using a script that specifies the installation or upgrade options.

Supported boot options are listed in Boot Options.

Prerequisites

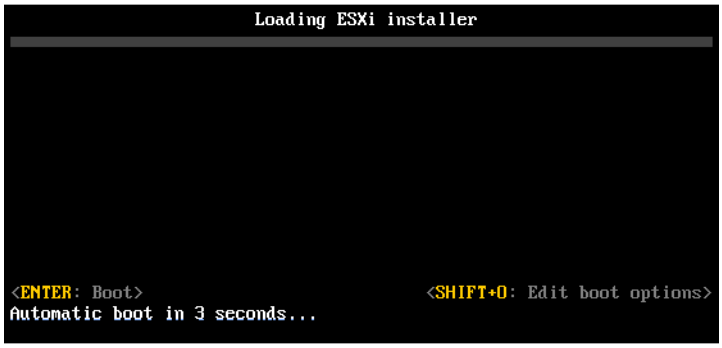
Before running the scripted installation or upgrade, verify that the following prerequisites are met:

- The system that you are installing or upgrading to ESXi meets the hardware requirements for the installation or upgrade. See ESXi Hardware Requirements.
- You have the ESXi installer ISO on a bootable USB flash drive. See Format a USB Flash Drive to Boot the ESXi Installation or Upgrade.
- The default installation or upgrade script (`ks.cfg`) or a custom installation or upgrade script is accessible to the system. See About Installation and Upgrade Scripts.
- You have selected a boot option to run the scripted installation, upgrade, or migration. See Enter Boot Options to Start an Installation or Upgrade Script.

Procedure

1 Boot the ESXi installer from the USB flash drive.

2 When the ESXi installer window appears, press Shift+O to edit boot options.



3 Type a boot option that calls the default installation or upgrade script or an installation or upgrade script file that you created.

The boot option has the form `ks=`.

4 Press Enter.

The installation, upgrade, or migration runs, using the options that you specified.

Performing a Scripted Installation or Upgrade of ESXi by Using PXE to Boot the Installer

ESXi 6.7 provides many options for using PXE to boot the installer and using an installation or upgrade script.

- For information about setting up a PXE infrastructure, see PXE Booting the ESXi Installer.
- For information about creating and locating an installation script, see About Installation and Upgrade Scripts.
- For specific procedures to use PXE to boot the ESXi installer and use an installation script, see one of the following topics:
  - PXE Boot the ESXi Installer Using a Web Server
  - PXE Boot the ESXi Installer Using TFTP
- For information about using vSphere Auto Deploy to perform a scripted upgrade by using PXE to boot, see Chapter 4 Using vSphere Auto Deploy to Reprovision Hosts.

PXE Booting the ESXi Installer

You can use the preboot execution environment (PXE) to boot a host. Starting with vSphere 6.0, you can PXE boot the ESXi installer from a network interface on hosts with legacy BIOS or using UEFI.

ESXi is distributed in an ISO format that is designed to install to flash memory or to a local hard drive. You can extract the files and boot by using PXE.

PXE uses Dynamic Host Configuration Protocol (DHCP) and Trivial File Transfer Protocol (TFTP) to boot an operating system over a network.

PXE booting requires some network infrastructure and a machine with a PXE-capable network adapter. Most machines that can run ESXi have network adapters that can PXE boot.

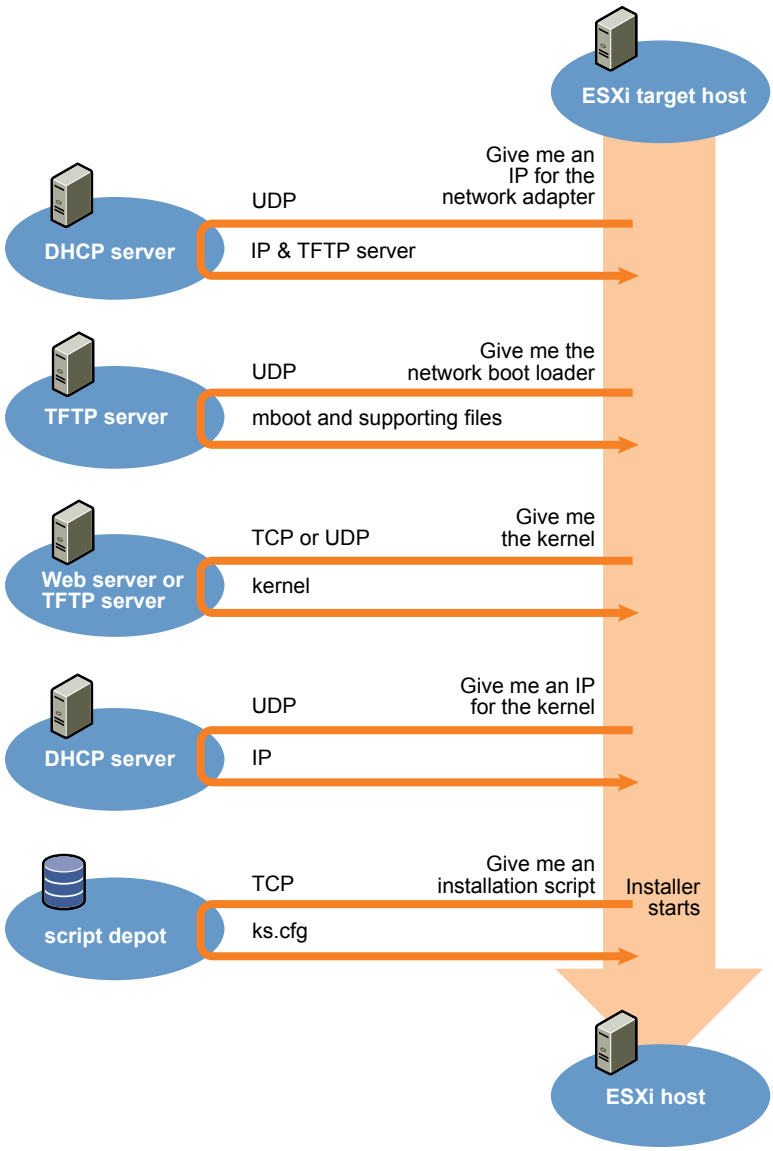
Note PXE booting with legacy BIOS firmware is possible only over IPv4. PXE booting with UEFI firmware is possible with either IPv4 or IPv6.

Overview of the PXE Boot Installation Process

Some of the details of the PXE boot process vary depending on whether the target host is using legacy BIOS or UEFI firmware, and whether the boot process uses TFTP only or TFTP plus HTTP.

When you boot the target host, it interacts with the different servers in the environment to get the network adapter, boot loader, kernel, IP address for the kernel, and finally the installation script. When all components are in place, installation starts, as shown in the following illustration.

Figure 3-1. Overview of PXE Boot Installation Process



The interaction between the ESXi host and other servers proceeds as follows:

1 The user boots the target ESXi host.

2 The target ESXi host makes a DHCP request.

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

4 The ESXi host contacts the TFTP server and requests the file that the DHCP server specified.

5 The TFTP server sends the network boot loader, and the ESXi host executes it. The initial boot loader might load additional boot loader components from the TFTP server.

6 The boot loader searches for a configuration file on the TFTP server, downloads the kernel and other ESXi components from the HTTP server or the TFTP server and boots the kernel on the ESXi host.

7 The installer runs interactively or using a kickstart script, as specified in the configuration file.

PXE Boot the ESXi Installer Using TFTP

You can use a TFTP server to PXE boot the ESXi installer. The process differs slightly depending on whether you use UEFI or boot from a legacy BIOS. Because most environments include ESXi hosts that support UEFI boot and hosts that support only legacy BIOS, this topic discusses prerequisites and steps for both types of hosts.

- For legacy BIOS machines, the procedure supports booting multiple different versions of the ESXi installer by using the same `pxelinux.0` or `gpxelinux.0` initial boot loader for all target machines, but potentially different PXELINUX configuration files depending on the target machine's MAC address.
- For UEFI machines, the procedure supports booting multiple different versions of the ESXi installer by using the same `mboot.efi` initial boot loader for all target machines, but potentially different `boot.cfg` files depending on the target machine's MAC address.

Prerequisites

Verify that your environment meets the following prerequisites.

- ESXi installer ISO image, downloaded from the VMware Web site.
- Target host with a hardware configuration that is supported for your version of ESXi. See the *VMware Compatibility Guide*.
- Network adapter with PXE support on the target ESXi host.
- DHCP server configured for PXE booting. See Sample DHCP Configurations.
- TFTP server.
- Network security policies to allow TFTP traffic (UDP port 69).
- For legacy BIOS, you can use only IPv4 networking. For UEFI PXE boot, you can use IPv4 or IPv6 networking.
- (Optional) Installation script (kickstart file).

- Use a native VLAN in most cases. If you want to specify the VLAN ID to be used with PXE booting, check that your NIC supports VLAN ID specification.

For legacy BIOS systems, version 3.86 of the SYSLINUX package, available from https://www.kernel.org/pub/linux/utils/boot/syslinux/.

Procedure

1. Configure the DHCP server for TFTP boot.
2. (Legacy BIOS only) Obtain and configure PXELINUX:
   a. Obtain SYSLINUX version 3.86, unpack it, and copy the `pxelinux.0` file to the top-level `/tftpboot` directory on your TFTP server.
   b. Create a PXELINUX configuration file using the following code model.

      `ESXi-6.x.x-XXXXXX` is the name of the TFTP subdirectory that contains the ESXi installer files.

      ```
      DEFAULT install
      NOHALT 1
      LABEL install
        KERNEL ESXi-6.x.x-XXXXXX/mboot.c32
        APPEND -c ESXi-6.x.x-XXXXXX/boot.cfg
        IPAPPEND 2
      ```

   c. Save the PXELINUX file in the `/tftpboot/pxelinux.cfg` directory on your TFTP server with a filename that will determine whether all hosts boot this installer by default:

Option	Description
Same installer	Name the file `default` if you want for all host to boot this ESXi installer by default.
Different installers	Name the file with the MAC address of the target host machine (01-*mac_address_of_target_ESXi_host*) if you want only a specific host to boot with this file, for example, `01-23-45-67-89-0a-bc`.

3. (UEFI only) Copy the file `efi/boot/bootx64.efi` from the ESXi installer ISO image to `/tftpboot/mboot.efi` on your TFTP server.

   Note Newer versions of `mboot.efi` can generally boot older versions of ESXi, but older versions of `mboot.efi` might be unable to boot newer versions of ESXi. If you plan to configure different hosts to boot different versions of the ESXi installer, use the `mboot.efi` from the newest version.

4. Create a subdirectory of your TFTP server's top-level `/tftpboot` directory and name it after the version of ESXi it will hold, for example, `/tftpboot/ESXi-6.x.x-xxxxx`.
5. Copy the contents of the ESXi installer image to the directory you just created.

6 Modify the `boot.cfg` file

   a Add the following line:

   ```
   prefix=ESXi-6.x.x-xxxxxx
   ```

   Here, `ESXi-6.x.x-xxxxxx` is the pathname of the installer files relative to the TFTP server's root directory.

   b If the filenames in the `kernel=` and `modules=` lines begin with a forward slash (/) character, delete that character.

7 (Optional) For a scripted installation, in the `boot.cfg` file, add the `kernelopt` option to the line after the kernel command, to specify the location of the installation script.

   Use the following code as a model, where `XXX.XXX.XXX.XXX` is the IP address of the server where the installation script resides, and `esxi_ksFiles` is the directory that contains the `ks.cfg` file.

   ```
   kernelopt=ks=http://XXX.XXX.XXX.XXX/esxi_ksFiles/ks.cfg
   ```

8 (UEFI only) Specify whether you want for all UEFI hosts to boot the same installer.

Option	Description
Same installer	Copy or link the `boot.cfg` file to `/tftpboot/boot.cfg`
Different installers	a Create a subdirectory of `/tftpboot` named after the MAC address of the target host machine (01-*mac_address_of_target_ESXi_host*), for example, `01-23-45-67-89-0a-bc`. b Place a copy of (or a link to) the host's `boot.cfg` file in that directory, for example, `/tftpboot/01-23-45-67-89-0a-bc/boot.cfg`.

PXE Boot the ESXi Installer Using a Web Server

You can use a Web server to PXE boot the ESXi installer. Because most environments include ESXi hosts that support UEFI boot and hosts that support only legacy BIOS, this topic discusses prerequisites and steps for both types of hosts.

- For legacy BIOS machines, the procedure supports booting multiple different versions of the ESXi installer by using the same `pxelinux.0` or `gpxelinux.0` initial boot loader for all target machines, but potentially different PXELINUX configuration files depending on the target machine's MAC address.
- For UEFI machines, the procedure supports booting multiple different versions of the ESXi installer by using the same `mboot.efi` initial boot loader for all target machines, but potentially different `boot.cfg` files depending on the target machine's MAC address.

Prerequisites

Verify that your environment has the following components:

- ESXi installer ISO image, downloaded from the VMware Web site.

- Target host with a hardware configuration that is supported for your version of ESXi. See the *VMware Compatibility Guide*.
- Network adapter with PXE support on the target ESXi host.
- DHCP server configured for PXE booting. See Sample DHCP Configurations.
- TFTP server.
- Network security policies to allow TFTP traffic (UDP port 69).
- For legacy BIOS, you can use only IPv4 networking. For UEFI PXE boot, you can use IPv4 or IPv6 networking.
- (Optional) Installation script (kickstart file).
- Use a native VLAN in most cases. If you want to specify the VLAN ID to be used with PXE booting, check that your NIC supports VLAN ID specification.

Verify that your environment also meets the following prerequisites required for PXE boot using a Web Server:

- Verify that the HTTP Web server is accessible by your target ESXi hosts.
- (UEFI) Obtain iPXE, available at http://ipxe.org.
- (Legacy BIOS) Obtain version 3.86 of the SYSLINUX package, available from https://www.kernel.org/pub/linux/utils/boot/syslinux/.

Procedure

1. Configure the DHCP server for HTTP boot.
2. (UEFI only) Obtain and configure iPXE:
   a. Obtain the iPXE source code, as described at http://ipxe.org/download.
   b. Follow the instructions on that page, but use the following make command:

      ```
      make bin-x86_64-efi/snponly.efi
      ```

   c. Copy the resulting file `snponly.efi` to `/tftpboot` directory on your TFTP server.
3. (UEFI only) Copy the file `efi/boot/bootx64.efi` from the ESXi installer ISO image to `/tftpboot/mboot.efi` on your TFTP server.

   Note Newer versions of `mboot.efi` can generally boot older versions of ESXi, but older versions of `mboot.efi` might be unable to boot newer versions of ESXi. If you plan to configure different hosts to boot different versions of the ESXi installer, use the `mboot.efi` from the newest version.

4 (Legacy BIOS only) Obtain and configure PXELINUX:

   a Obtain SYSLINUX version 3.86, unpack it, and copy the `gpxelinux.0` file to the top-level `/tftpboot` directory on your TFTP server.

   b Create a PXELINUX configuration file using the following code model.

   `ESXi-6.x.x-XXXXXX` is the name of the TFTP subdirectory that contains the ESXi installer files.

```
DEFAULT install
NOHALT 1
LABEL install
  KERNEL ESXi-6.x.x-XXXXXX/mboot.c32
  APPEND -c ESXi-6.x.x-XXXXXX/boot.cfg
  IPAPPEND 2
```

   c Save the PXELINUX file in the `/tftpboot/pxelinux.cfg` directory on your TFTP server with a filename that will determine whether all hosts boot this installer by default:

Option	Description
Same installer	Name the file `default` if you want for all host to boot this ESXi installer by default.
Different installers	Name the file with the MAC address of the target host machine (01-*mac_address_of_target_ESXi_host*) if you want only a specific host to boot with this file, for example, `01-23-45-67-89-0a-bc`.

5 Create a directory on your HTTP server named for the version of ESXi it will hold, for example, `/var/www/html/ESXi-6.x.x-XXXXXX`.

6 Copy the contents of the ESXi installer image to the directory you just created.

7 Modify the `boot.cfg` file

   a Add the following line:

```
prefix=http://XXX.XXX.XXX.XXX/ESXi-6.x.x-XXXXXX
```

   where `http://XXX.XXX.XXX.XXX/ESXi-6.x.x-XXXXXX` is the location of the installer files on the HTTP server.

   b If the filenames in the `kernel=` and `modules=` lines begin with a forward slash (/) character, delete that character.

8 (Optional) For a scripted installation, in the `boot.cfg` file, add the `kernelopt` option to the line after the kernel command, to specify the location of the installation script.

   Use the following code as a model, where `XXX.XXX.XXX.XXX` is the IP address of the server where the installation script resides, and `esxi_ksFiles` is the directory that contains the `ks.cfg` file.

```
kernelopt=ks=http://XXX.XXX.XXX.XXX/esxi_ksFiles/ks.cfg
```

9 (UEFI only) Specify whether you want for all UEFI hosts to boot the same installer.

Option	Description
Same installer	Copy or link the `boot.cfg` file to `/tftpboot/boot.cfg`
Different installers	a Create a subdirectory of `/tftpboot` named after the MAC address of the target host machine (01-*mac_address_of_target_ESXi_host*), for example, `01-23-45-67-89-0a-bc`. b Place a copy of (or a link to) the host's `boot.cfg` file in that directory, for example, `/tftpboot/01-23-45-67-89-0a-bc/boot.cfg`.

Upgrading Hosts by Using esxcli Commands

By using vSphere CLI, you can upgrade a ESXi 6.0 host or ESXi 6.5 host to version 6.7 and update or patch ESXi 6.0, ESXi 6.5, and ESXi 6.7 hosts.

To use esxcli commands for vCLI , you must install vSphere CLI (vCLI). For more information about installing and using the vCLI, see the following documents:

- *Getting Started with vSphere Command-Line Interfaces*
- *vSphere Command-Line Interface Concepts and Examples*
- *vSphere Command-Line Interface Reference* is a reference to `vicfg-` and related vCLI commands.

Note If you press Ctrl+C while an `esxcli` command is running, the command-line interface exits to a new prompt without displaying a message. However, the command continues to run to completion.

For ESXi hosts deployed with vSphere Auto Deploy, the tools VIB must be part of the base booting image used for the initial Auto Deploy installation. The tools VIB cannot be added separately later.

VIBs, Image Profiles, and Software Depots

Upgrading ESXi with esxcli commands requires an understanding of VIBs, image profiles, and software depots.

The following technical terms are used throughout the vSphere documentation set in discussions of installation and upgrade tasks.

VIB	A VIB is an ESXi software package. VMware and its partners package solutions, drivers, CIM providers, and applications that extend the ESXi platform as VIBs. VIBs are available in software depots. You can use VIBs to create and customize ISO images or to upgrade ESXi hosts by installing VIBs asynchronously onto the hosts.
Image Profile	An image profile defines an ESXi image and consists of VIBs. An image profile always includes a base VIB, and might include more VIBs. You examine and define an image profile by using vSphere ESXi Image Builder.
Software Depot	A software depot is a collection of VIBs and image profiles. The software depot is a hierarchy of files and folders and can be available through an HTTP URL (online depot) or a ZIP file (offline depot). VMware and VMware partners make depots available. Companies with large VMware installations might create internal depots to provision ESXi hosts with vSphere Auto Deploy, or to export an ISO for ESXi installation.

Understanding Acceptance Levels for VIBS and Hosts

Each VIB is released with an acceptance level that cannot be changed. The host acceptance level determines which VIBs can be installed to a host.

The acceptance level applies to individual VIBs installed by using the `esxcli software vib install` and `esxcli software vib update` commands, to VIBs installed using vSphere Update Manager, and to VIBs in image profiles.

The acceptance level of all VIBs on a host must be at least as high as the host acceptance level. For example, if the host acceptance level is VMwareAccepted, you can install VIBs with acceptance levels of VMwareCertified and VMwareAccepted, but you cannot install VIBs with acceptance levels of PartnerSupported or CommunitySupported. To install a VIB with a less restrictive acceptance level than that of the host, you can change the acceptance level of the host by using the vSphere Web Client or by running `esxcli software acceptance` commands.

Setting host acceptance levels is a best practice that allows you to specify which VIBs can be installed on a host and used with an image profile, and the level of support you can expect for a VIB. For example, you would probably set a more restrictive acceptance level for hosts in a production environment than for hosts in a testing environment.

VMware supports the following acceptance levels.

VMwareCertified The VMwareCertified acceptance level has the most stringent requirements. VIBs with this level go through thorough testing fully equivalent to VMware in-house Quality Assurance testing for the same technology. Today, only I/O Vendor Program (IOVP) program drivers are published at this level. VMware takes support calls for VIBs with this acceptance level.

VMwareAccepted VIBs with this acceptance level go through verification testing, but the tests do not fully test every function of the software. The partner runs the tests and VMware verifies the result. Today, CIM providers and PSA plug-ins are among the VIBs published at this level. VMware directs support calls for VIBs with this acceptance level to the partner's support organization.

PartnerSupported VIBs with the PartnerSupported acceptance level are published by a partner that VMware trusts. The partner performs all testing. VMware does not verify the results. This level is used for a new or nonmainstream technology that partners want to enable for VMware systems. Today, driver VIB technologies such as Infiniband, ATAoE, and SSD are at this level with nonstandard hardware drivers. VMware directs support calls for VIBs with this acceptance level to the partner's support organization.

CommunitySupported The CommunitySupported acceptance level is for VIBs created by individuals or companies outside of VMware partner programs. VIBs at this level have not gone through any VMware-approved testing program and are not supported by VMware Technical Support or by a VMware partner.

Table 3-10. VIB Acceptance Levels Required to Install on Hosts

Host Acceptance Level	VMwareCertified VIB	VMwareAccepted VIB	PartnerSupported VIB	CommunitySupported VIB
VMwareCertified	x			
VMwareAccepted	x	x		
PartnerSupported	x	x	x	
CommunitySupported	x	x	x	x

Match a Host Acceptance Level with an Update Acceptance Level

You can change the host acceptance level to match the acceptance level for a VIB or image profile that you want to install. The acceptance level of all VIBs on a host must be at least as high as the host acceptance level.

Use this procedure to determine the acceptance levels of the host and the VIB or image profile to install, and to change the acceptance level of the host, if necessary for the update.

When you specify a target server by using **--server=server_name**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Retrieve the acceptance level for the VIB or image profile.

Option	Description
List information for all VIBs	**esxcli --server=*server_name* software sources vib list --depot=*depot_URL***
List information for a specified VIB	**esxcli --server=*server_name* software sources vib list --viburl=*vib_URL***
List information for all image profiles	**esxcli --server=*server_name* software sources profile list --depot=*depot_URL***
List information for a specified image profile	**esxcli --server=*server_name* software sources profile get --depot=*depot_URL* --profile=*profile_name***

2 Retrieve the host acceptance level.

esxcli --server=*server_name* software acceptance get

3 (Optional) If the acceptance level of the VIB is more restrictive than the acceptance level of the host, change the acceptance level of the host.

esxcli --server=*server_name* software acceptance set --level=*acceptance_level*

The *acceptance_level* can be `VMwareCertified`, `VMwareAccepted`, `PartnerSupported`, or `CommunitySupported`. The values for *acceptance_level* are case-sensitive.

Note You can use the `--force` option for the `esxcli software vib` or `esxcli software profile` command to add a VIB or image profile with a lower acceptance level than the host. A warning will appear. Because your setup is no longer consistent, the warning is repeated when you install VIBs, remove VIBs, and perform certain other operations on the host.

Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted

VIBs that you can install with live install do not require the host to be rebooted, but might require the host to be placed in maintenance mode. Other VIBs and profiles might require the host to be rebooted after the installation or update.

When you specify a target server by using **--server=server_name**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Check whether the VIB or image profile that you want to install requires the host to be placed in maintenance mode or to be rebooted after the installation or update.

Run one of the following commands.

Option	Description
Check the VIB	**esxcli --server=*server_name* software sources vib get -v *absolute_path_to_vib***
Check the VIBs in a depot	**esxcli --server=*server_name* software sources vib get --depot=*depot_name***
Check the image profile in a depot	**esxcli --server=*server_name* software sources profile get --depot=*depot_name***

2 Review the return values.

The return values, which are read from the VIB metadata, indicate whether the host must be in maintenance mode before installing the VIB or image profile, and whether installing the VIB or profile requires the host to be rebooted.

Note vSphere Update Manager relies on the `esxupdate`/`esxcli` scan result to determine whether maintenance mode is required or not. When you install a VIB on a live system, if the value for `Live-Install-Allowed` is set to false, the installation result will instruct Update Manager to reboot the host. When you remove a VIB from a live system, if the value for `Live-Remove-Allowed` is set to false, the removal result will instruct Update Manager to reboot the host. In either case, during the reboot, Update Manager will automatically put the host into maintenance mode.

What to do next

If necessary, place the host in maintenance mode. See Place a Host in Maintenance Mode. If a reboot is required, and if the host belongs to a VMware HA cluster, remove the host from the cluster or disable HA on the cluster before the installation or update.

Place a Host in Maintenance Mode

Some installation and update operations that use live install require the host to be in maintenance mode.

To determine whether an upgrade operation requires the host to be in maintenance mode, see Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted

Note If the host is a member of a vSAN cluster, and any virtual machine object on the host uses the "Number of failures to tolerate=0" setting in its storage policy, the host might experience unusual delays when entering maintenance mode. The delay occurs because vSAN has to evacuate this object from the host for the maintenance operation to complete successfully.

When you specify a target server by using **`--server=server_name`**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Check whether the host is in maintenance mode.

```
vicfg-hostops --server=server_name --operation info
```

2 Power off each virtual machine running on the ESXi host.

Option	Command
To shut down the guest operating system and then power off the virtual machine	`vmware-cmd --server=server_name path_to_vm stop soft`
To force the power off operation	`vmware-cmd --server=server_name path_to_vm stop hard`

Alternatively, to avoid powering off virtual machines, you can migrate them to another host. See the topic *Migrating Virtual Machines* in the *vCenter Server and Host Management* documentation.

3 Place the host in maintenance mode.

```
vicfg-hostops --server=server_name --operation enter
```

4 Verify that the host is in maintenance mode.

```
vicfg-hostops --server=server_name --operation info
```

Update a Host with Individual VIBs

You can update a host with VIBs stored in a software depot that is accessible through a URL or in an offline ZIP depot.

Important If you are updating ESXi from a zip bundle in a VMware-supplied depot, either online from the VMware Web site or downloaded locally, VMware supports only the update method specified for VMware-supplied depots in the topic Upgrade or Update a Host with Image Profiles.

When you specify a target server by using **--server=server_name**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

- Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.
- Determine whether the update requires the host to be in maintenance mode or to be rebooted. If necessary, place the host in maintenance mode.

  See Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted. See Place a Host in Maintenance Mode.
- If the update requires a reboot, and if the host belongs to a VMware HA cluster, remove the host from the cluster or disable HA on the cluster.

Procedure

1 Determine which VIBs are installed on the host.

```
esxcli --server=server_name software vib list
```

2 Find out which VIBs are available in the depot.

Option	Description
from a depot accessible by URL	`esxcli --server=server_name software sources vib list --depot=http://web_server/depot_name`
from a local depot ZIP file	`esxcli --server=server_name software sources vib list --depot=absolute_path_to_depot_zip_file`

You can specify a proxy server by using the **--proxy** argument.

3 Update the existing VIBs to include the VIBs in the depot or install new VIBs.

Option	Description
Update VIBs from a depot accessible by URL	`esxcli --server=server_name software vib update --depot=http://web_server/depot_name`
Update VIBs from a local depot ZIP file	`esxcli --server=server_name software vib update --depot=absolute_path_to_depot_ZIP_file`
Install all VIBs from a ZIP file on a specified offline depot (includes both VMware VIBs and partner-supplied VIBs)	`esxcli --server=server_name software vib install --depot path_to_VMware_vib_ZIP_file\VMware_vib_ZIP_file --depot path_to_partner_vib_ZIP_file\partner_vib_ZIP_file`

Options for the `update` and `install` commands allow you to perform a dry run, to specify a specific VIB, to bypass acceptance level verification, and so on. Do not bypass verification on production systems. See the *esxcli Reference* at http://www.vmware.com/support/developer/vcli/.

4 Verify that the VIBs are installed on your ESXi host.

```
esxcli --server=server_name software vib list
```

Upgrade or Update a Host with Image Profiles

You can upgrade or update a host with image profiles stored in a software depot that is accessible through a URL or in an offline ZIP depot.

You can use the **`esxcli software profile update`** or **`esxcli software profile install`** command to upgrade or update an ESXi host.

When you upgrade or update a host, the **`esxcli software profile update`** or **`esxcli software profile install`** command applies a higher version (major or minor) of a full image profile onto the host. After this operation and a reboot, the host can join to a vCenter Server environment of the same higher version.

The **`esxcli software profile update`** command brings the entire contents of the ESXi host image to the same level as the corresponding upgrade method using an ISO installer. However, the ISO installer performs a pre-upgrade check for potential problems, and the **`esxcli`** upgrade method does not. The ISO installer checks the host to make sure that it has sufficient memory for the upgrade, and does not have unsupported devices connected. For more about the ISO installer and other ESXi upgrade methods, see Overview of the ESXi Host Upgrade Process.

Important If you are upgrading or updating ESXi from a zip bundle in a VMware-supplied depot, either online from the VMware Web site or downloaded locally, VMware supports only the update command `esxcli software profile update --depot=depot_location --profile=profile_name`.

When you specify a target server by using **`--server=server_name`**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Note Options to the `update` and `install` commands allow you to perform a dry run, to specify a specific VIB, to bypass acceptance level verification, and so on. Do not bypass verification on production systems. See the *vSphere Command-Line Interface Reference*.

Prerequisites

- Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.
- Determine whether the update requires the host to be in maintenance mode or to be rebooted. If necessary, place the host in maintenance mode.

  See Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted. See Place a Host in Maintenance Mode.

- If the update requires a reboot, and if the host belongs to a VMware HA cluster, remove the host from the cluster or disable HA on the cluster.

Procedure

1 Determine which VIBs are installed on the host.

```
esxcli --server=server_name software vib list
```

2 Determine which image profiles are available in the depot.

```
esxcli --server=server_name software sources profile list --
depot=http://webserver/depot_name
```

You can specify a proxy server by using the **--proxy** argument.

3 Update the existing image profile to include the VIBs or install new VIBs.

Important The `software profile update` command updates existing VIBS with the corresponding VIBs from the specified profile, but does not affect other VIBs installed on the target server. The `software profile install` command installs the VIBs present in the depot image profile, and removes any other VIBS installed on the target server.

Option	Description
Update the image profile from a VMware-supplied zip bundle, in a depot, accessible online from the VMware Web site or downloaded to a local depot.	`esxcli software profile update --depot=depot_location --profile=profile_name` **Important** This is the only update method that VMware supports for zip bundles supplied by VMware. VMware-supplied zip bundle names take the form: `VMware-ESXi-version_number-build_number-depot.zip` The profile name for VMware-supplied zip bundles takes one of the following forms. ■ `ESXi-version_number-build_number-standard` ■ `ESXi-version_number-build_number-notools` (does not include VMware Tools)
Update the image profile from a depot accessible by URL	`esxcli --server=server_name software profile update --depot=http://webserver/depot_name --profile=profile_name`
Update the image profile from ZIP file stored locally on the target server	`esxcli --server=server_name software profile update --depot=file:///<path_to_profile_ZIP_file>/<profile_ZIP_file> --profile=profile_name`
Update the image profile from a ZIP file on the target server, copied into a datastore	`esxcli --server=server_name software profile update --depot="[datastore_name]profile_ZIP_file" --profile=profile_name`
Update the image profile from a ZIP file copied locally and applied on the target server	`esxcli --server=server_name software profile update --depot=/root_dir/path_to_profile_ZIP_file/profile_ZIP_file --profile=profile_name`
Install all new VIBs in a specified profile accessible by URL	`esxcli --server=server_name software profile install --depot=http://webserver/depot_name --profile=profile_name`

Option	Description
Install all new VIBs in a specified profile from a ZIP file stored locally on the target	`esxcli --server=server_name software profile install --depot=file:///<path_to_profile_ZIP_file>/<profile_ZIP_file> --profile=profile_name`
Install all new VIBs from a ZIP file on the target server, copied into a datastore	`esxcli --server=server_name software profile install --depot="[datastore_name]profile_ZIP_file" --profile=profile_name`
Install all new VIBs from a ZIP file copied locally and applied on the target server	`esxcli --server=server_name software profile install --depot=/root_dir/path_to_profile_ZIP_file/profile_ZIP_file --profile=profile_name`

Note Options to the `update` and `install` commands allow you to perform a dry run, to specify a specific VIB, to bypass acceptance level verification, and so on. Do not bypass verification on production systems. See the *vSphere Command-Line Interface Reference*.

4 Verify that the VIBs are installed on your ESXi host.

```
esxcli --server=server_name software vib list
```

Update ESXi Hosts by Using Zip Files

You can update hosts with VIBs or image profiles by downloading a ZIP file of a depot.

VMware partners prepare third-party VIBs to provide management agents or asynchronously released drivers.

Important If you are updating ESXi from a zip bundle in a VMware-supplied depot, either online from the VMware Web site or downloaded locally, VMware supports only the update method specified for VMware-supplied depots in the topic Upgrade or Update a Host with Image Profiles.

When you specify a target server by using `--server=server_name`, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

- Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.
- Download the ZIP file of a depot bundle from a third-party VMware partner.
- Determine whether the update requires the host to be in maintenance mode or to be rebooted. If necessary, place the host in maintenance mode.

  See Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted. See Place a Host in Maintenance Mode.

- If the update requires a reboot, and if the host belongs to a VMware HA cluster, remove the host from the cluster or disable HA on the cluster.

Procedure

- Install the ZIP file.

  ```
  esxcli --server=server_name software vib update --
  depot=/path_to_vib_ZIP/ZIP_file_name.zip
  ```

Remove VIBs from a Host

You can uninstall third-party VIBs or VMware VIBs from your ESXi host.

VMware partners prepare third-party VIBs to provide management agents or asynchronously released drivers.

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Prerequisites

- If the removal requires a reboot, and if the host belongs to a VMware HA cluster, disable HA for the host.
- Determine whether the update requires the host to be in maintenance mode or to be rebooted. If necessary, place the host in maintenance mode.

  See Determine Whether an Update Requires the Host to Be in Maintenance Mode or to Be Rebooted. See Place a Host in Maintenance Mode.
- Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1. Power off each virtual machine running on the ESXi host.

Option	Command
To shut down the guest operating system and then power off the virtual machine	`vmware-cmd --server=server_name path_to_vm stop soft`
To force the power off operation	`vmware-cmd --server=server_name path_to_vm stop hard`

   Alternatively, to avoid powering off virtual machines, you can migrate them to another host. See the topic *Migrating Virtual Machines* in the *vCenter Server and Host Management* documentation.

2. Place the host in maintenance mode.

   ```
   vicfg-hostops --server=server_name --operation enter
   ```

3. If necessary, shut down or migrate virtual machines.

4 Determine which VIBs are installed on the host.

```
esxcli --server=server_name software vib list
```

5 Remove the VIB.

```
esxcli --server=server_name software vib remove --vibname=name
```

Specify one or more VIBs to remove in one of the following forms:

- *name*
- *name*:*version*
- *vendor*:*name*
- *vendor*:*name*:*version*

For example, the command to remove a VIB specified by vendor, name and version would take this form:

```
esxcli --server myEsxiHost software vib remove --vibname=PatchVendor:patch42:version3
```

Note The `remove` command supports several more options. See the *vSphere Command-Line Interface Reference*.

Adding Third-Party Extensions to Hosts with an esxcli Command

You can use the `esxcli software vib` command to add to the system a third-party extension released as a VIB package. When you use this command, the VIB system updates the firewall rule set and refreshes the host daemon after you reboot the system.

Otherwise, you can use a firewall configuration file to specify port rules for host services to enable for the extension. The *vSphere Security* documentation discusses how to add, apply, and refresh a firewall rule set and lists the `esxcli network firewall` commands.

Perform a Dry Run of an esxcli Installation or Upgrade

You can use the `--dry-run` option to preview the results of an installation or upgrade operation. A dry run of the installation or update procedure does not make any changes, but reports the VIB-level operations that will be performed if you run the command without the `--dry-run` option.

When you specify a target server by using **`--server=server_name`**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Enter the installation or upgrade command, adding the **--dry-run** option.

- **esxcli --server=*server_name* software vib install --dry-run**
- **esxcli --server=*server_name* software vib update --dry-run**
- **esxcli --server=*server_name* software profile install --dry-run**
- **esxcli --server=*server_name* software profile update --dry-run**

2 Review the output that is returned.

The output shows which VIBs will be installed or removed and whether the installation or update requires a reboot.

Display the Installed VIBs and Profiles That Will Be Active After the Next Host Reboot

You can use the `--rebooting-image` option to list the VIBs and profiles that are installed on the host and will be active after the next host reboot.

When you specify a target server by using **--server=server_name**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Enter one of the following commands.

Option	Description
For VIBs	**esxcli --server=*server_name* software vib list --rebooting-image**
For Profiles	**esxcli --server=*server_name* software profile get --rebooting-image**

2 Review the output that is returned.

The output displays information for the ESXi image that will become active after the next reboot. If the pending-reboot image has not been created, the output returns nothing.

Display the Image Profile and Acceptance Level of the Host

You can use the `software profile get` command to display the currently installed image profile and acceptance level for the specified host.

This command also shows details of the installed image profile history, including profile modifications.

When you specify a target server by using **`--server=server_name`**, the server prompts you for a user name and password. Other connection options, such as a configuration file or session file, are supported. For a list of connection options, see *Getting Started with vSphere Command-Line Interfaces*, or run `esxcli --help` at the vCLI command prompt.

Prerequisites

Install vCLI or deploy the vSphere Management Assistant (vMA) virtual machine. See *Getting Started with vSphere Command-Line Interfaces*. For troubleshooting, run `esxcli` commands in the ESXi Shell.

Procedure

1 Enter the following command.

```
esxcli --server=server_name software profile get
```

2 Review the output.

After You Upgrade ESXi Hosts

To complete a host upgrade, you ensure that the host is reconnected to its managing vCenter Server system and reconfigured if necessary. You also check that the host is licensed correctly.

After you upgrade an ESXi host, take the following actions:

- View the upgrade logs. You can use the vSphere Web Client to export the log files.
- If a vCenter Server system manages the host, you must reconnect the host to vCenter Server by right-clicking the host in the vCenter Server inventory and selecting **Connect**.
- When the upgrade is complete, the ESXi host is in evaluation mode. The evaluation period is 60 days. You must assign a vSphere 6.7 license before the evaluation period expires. You can upgrade existing licenses or acquire new ones from My VMware. Use the vSphere Web Client to configure the licensing for the hosts in your environment. See the *vCenter Server and Host Management* documentation for details about managing licenses in vSphere.
- The host sdX devices might be renumbered after the upgrade. If necessary, update any scripts that reference sdX devices.
- Upgrade virtual machines on the host. See Upgrading Virtual Machines and VMware Tools.
- Set up the vSphere Authentication Proxy service. Earlier versions of the vSphere Authentication Proxy are not compatible with vSphere 6.7. See the *vSphere Security* documentation for details about configuring the vSphere Authentication Proxy service.

About ESXi Evaluation and Licensed Modes

You can use evaluation mode to explore the entire set of features for ESXi hosts. The evaluation mode provides the set of features equal to a vSphere Enterprise Plus license. Before the evaluation mode expires, you must assign to your hosts a license that supports all the features in use.

For example, in evaluation mode, you can use vSphere vMotion technology, the vSphere HA feature, the vSphere DRS feature, and other features. If you want to continue using these features, you must assign a license that supports them.

The installable version of ESXi hosts is always installed in evaluation mode. ESXi Embedded is preinstalled on an internal storage device by your hardware vendor. It might be in evaluation mode or prelicensed.

The evaluation period is 60 days and begins when you turn on the ESXi host. At any time during the 60-day evaluation period, you can convert from licensed mode to evaluation mode. The time available in the evaluation period is decreased by the time already used.

For example, suppose that you use an ESXi host in evaluation mode for 20 days and then assign a vSphere Standard Edition license key to the host. If you set the host back in evaluation mode, you can explore the entire set of features for the host for the remaining evaluation period of 40 days.

For information about managing licensing for ESXi hosts, see the *vCenter Server and Host Management* documentation.

Applying Licenses After Upgrading to ESXi 6.7

After you upgrade to ESXi 6.7, you must apply a vSphere 6.7 license.

When you upgrade ESXi 6.0 or ESXi 6.5 hosts to ESXi 6.7 hosts, the hosts are in a 60-day evaluation mode period until you apply the correct vSphere 6.0 licenses. See About ESXi Evaluation and Licensed Modes.

You can upgrade your existing vSphere 6.0 or 6.5 licenses or acquire vSphere 6.7 licenses from My VMware. After you have vSphere 6.7 licenses, you must assign them to all upgraded ESXi 6.7 hosts by using the license management functionality in the vSphere Web Client. See the *vCenter Server and Host Management* documentation for details. If you use the scripted method to upgrade to ESXi 6.7, you can provide the license key in the kickstart (ks) file.

Run the Secure Boot Validation Script on an Upgraded ESXi Host

After you upgrade an ESXi host from an older version of ESXi that did not support UEFI secure boot, you may be able to enable secure boot. Whether you can enable secure boot depends on how you performed the upgrade and whether the upgrade replaced all of the existing VIBs or left some VIBs unchanged. You can run a validation script after you perform the upgrade to determine whether the upgraded installation supports secure boot.

For secure boot to succeed, the signature of every installed VIB must be available on the system. Older versions of ESXi do not save the signatures when installing VIBs.

UEFI secure boot requires that the original VIB signatures are persisted. Older versions of ESXi do not persist the signatures, but the upgrade process updates the VIB signatures.

- If you upgrade using ESXCLI commands, upgraded VIBs do not have persisted signatures. In that case, you cannot perform a secure boot on that system.

- If you upgrade using the ISO the upgrade process saves the signatures of all new VIBs. This also applies to upgrades of vSphere Update Manager that use the ISO.

If any old VIBs remain on the system the signatures of those VIBs still are not available and secure boot is not possible.

For example, if the system uses a 3rd-party driver, and the VMware upgrade does not include a new version of the driver VIB, then the old VIB remains on the system after the upgrade. In rare cases VMware may drop ongoing development of a specific VIB without providing a new VIB that replaces or obsoletes it, so the old VIB remains on the system after upgrade.

Note

UEFI secure boot also requires an up-to-date bootloader. This script does not check for an up-to-date bootloader.

Prerequisites

- Verify that the hardware supports UEFI secure boot.
- Verify that all VIBs are signed with an acceptance level of at least PartnerSupported. If you include VIBs at the CommunitySupported level, you cannot use secure boot.

Procedure

1. Upgrade the ESXi and run the following command.

```
/usr/lib/vmware/secureboot/bin/secureBoot.py –c
```

2. Check the output.

   The output either includes `Secure boot can be enabled` or `Secure boot CANNOT be enabled`.

Required Free Space for System Logging

If you used Auto Deploy to install your ESXi 6.7 host, or if you set up a log directory separate from the default location in a scratch directory on the VMFS volume, you might need to change your current log size and rotation settings to ensure that enough space is available for system logging .

All vSphere components use this infrastructure. The default values for log capacity in this infrastructure vary, depending on the amount of storage available and on how you have configured system logging. Hosts that are deployed with Auto Deploy store logs on a RAM disk, which means that the amount of space available for logs is small.

If your host is deployed with Auto Deploy, reconfigure your log storage in one of the following ways:

- Redirect logs over the network to a remote collector.
- Redirect logs to a NAS or NFS store.

If you redirect logs to non-default storage, such as a NAS or NFS store, you might also want to reconfigure log sizing and rotations for hosts that are installed to disk.

You do not need to reconfigure log storage for ESXi hosts that use the default configuration, which stores logs in a scratch directory on the VMFS volume. For these hosts, ESXi 6.7 configures logs to best suit your installation, and provides enough space to accommodate log messages.

Table 3-11. Recommended Minimum Size and Rotation Configuration for hostd, vpxa, and fdm Logs

Log	Maximum Log File Size	Number of Rotations to Preserve	Minimum Disk Space Required
Management Agent (hostd)	10 MB	10	100 MB
VirtualCenter Agent (vpxa)	5 MB	10	50 MB
vSphere HA agent (Fault Domain Manager, fdm)	5 MB	10	50 MB

For information about setting up and configuring syslog and a syslog server and installing vSphere Syslog Collector, see the *vCenter Server Installation and Setup* documentation.

Configure Syslog on ESXi Hosts

You can use the vSphere Web Client or the `esxcli system syslog` vCLI command to configure the syslog service.

For information about using the `esxcli system syslog` command and other vCLI commands, see *Getting Started with vSphere Command-Line Interfaces*.

Procedure

1. In the vSphere Web Client inventory, select the host.
2. Click **Configure**.
3. Under System, click **Advanced System Settings**.
4. Filter for **`syslog`**.
5. To set up logging globally, select the setting to change and click **Edit**.

Option	Description
Syslog.global.defaultRotate	Maximum number of archives to keep. You can set this number globally and for individual subloggers.
Syslog.global.defaultSize	Default size of the log, in KB, before the system rotates logs. You can set this number globally and for individual subloggers.
Syslog.global.LogDir	Directory where logs are stored. The directory can be located on mounted NFS or VMFS volumes. Only the `/scratch` directory on the local file system is persistent across reboots. Specify the directory as [*datastorename*] *path_to_file*, where the path is relative to the root of the volume backing the datastore. For example, the path `[storage1] /systemlogs` maps to the path `/vmfs/volumes/storage1/systemlogs`.

Option	Description
Syslog.global.logDirUnique	Selecting this option creates a subdirectory with the name of the ESXi host under the directory specified by **Syslog.global.LogDir**. A unique directory is useful if the same NFS directory is used by multiple ESXi hosts.
Syslog.global.LogHost	Remote host to which syslog messages are forwarded and port on which the remote host receives syslog messages. You can include the protocol and the port, for example, `ssl://hostName1:1514`. UDP (default), TCP, and SSL are supported. The remote host must have syslog installed and correctly configured to receive the forwarded syslog messages. See the documentation for the syslog service installed on the remote host for information on configuration.

6 (Optional) To overwrite the default log size and log rotation for any of the logs.

   a Click the name of the log that you want to customize.

   b Click **Edit** and enter the number of rotations and the log size you want.

7 Click **OK**.

Changes to the syslog options take effect immediately.

Using vSphere Auto Deploy to Reprovision Hosts

4

If a host was deployed using vSphere Auto Deploy, you can use vSphere Auto Deploy to reprovision the host with a new image profile that contains a different version of ESXi. You can use vSphere ESXi Image Builder to create and manage image profiles.

Note If you upgrade the host to use an ESXi 6.0 or later image, the vSphere Auto Deploy server provisions the ESXi host with certificates that are signed by VMCA. If you are currently using custom certificates, you can set up the host to use the custom certificates after the upgrade. See *vSphere Security*.

The vSphere Auto Deploy server is automatically upgraded if you upgrade the corresponding vCenter Server system. Starting with version 6.0, the vSphere Auto Deploy server is always on the same management node as the vCenter Server system.

This chapter includes the following topics:

Introduction to vSphere Auto Deploy

When you start a physical host that is set up for vSphere Auto Deploy, vSphere Auto Deploy uses PXE boot infrastructure in conjunction with vSphere host profiles to provision and customize that host. No state is stored on the host itself. Instead, the vSphere Auto Deploy server manages state information for each host.

State Information for ESXi Hosts

vSphere Auto Deploy stores the information for the ESXi hosts to be provisioned in different locations. Information about the location of image profiles and host profiles is initially specified in the rules that map machines to image profiles and host profiles.

Table 4-1. vSphere Auto Deploy Stores Information for Deployment

Information Type	Description	Source of Information
Image state	The executable software to run on an ESXi host.	Image profile, created with vSphere ESXi Image Builder.
Configuration state	The configurable settings that determine how the host is configured, for example, virtual switches and their settings, driver settings, boot parameters, and so on.	Host profile, created by using the host profile UI. Often comes from a template host.
Dynamic state	The runtime state that is generated by the running software, for example, generated private keys or runtime databases.	Host memory, lost during reboot.
Virtual machine state	The virtual machines stored on a host and virtual machine autostart information (subsequent boots only).	Virtual machine information sent by vCenter Server to vSphere Auto Deploy must be available to supply virtual machine information to vSphere Auto Deploy.
User input	State that is based on user input, for example, an IP address that the user provides when the system starts up, cannot automatically be included in the host profile.	Host customization information, stored by vCenter Server during first boot. You can create a host profile that requires user input for certain values. When vSphere Auto Deploy applies a host profile that requires user provided information, the host is placed in maintenance mode. Use the host profile UI to check the host profile compliance, and respond to the prompt to customize the host.

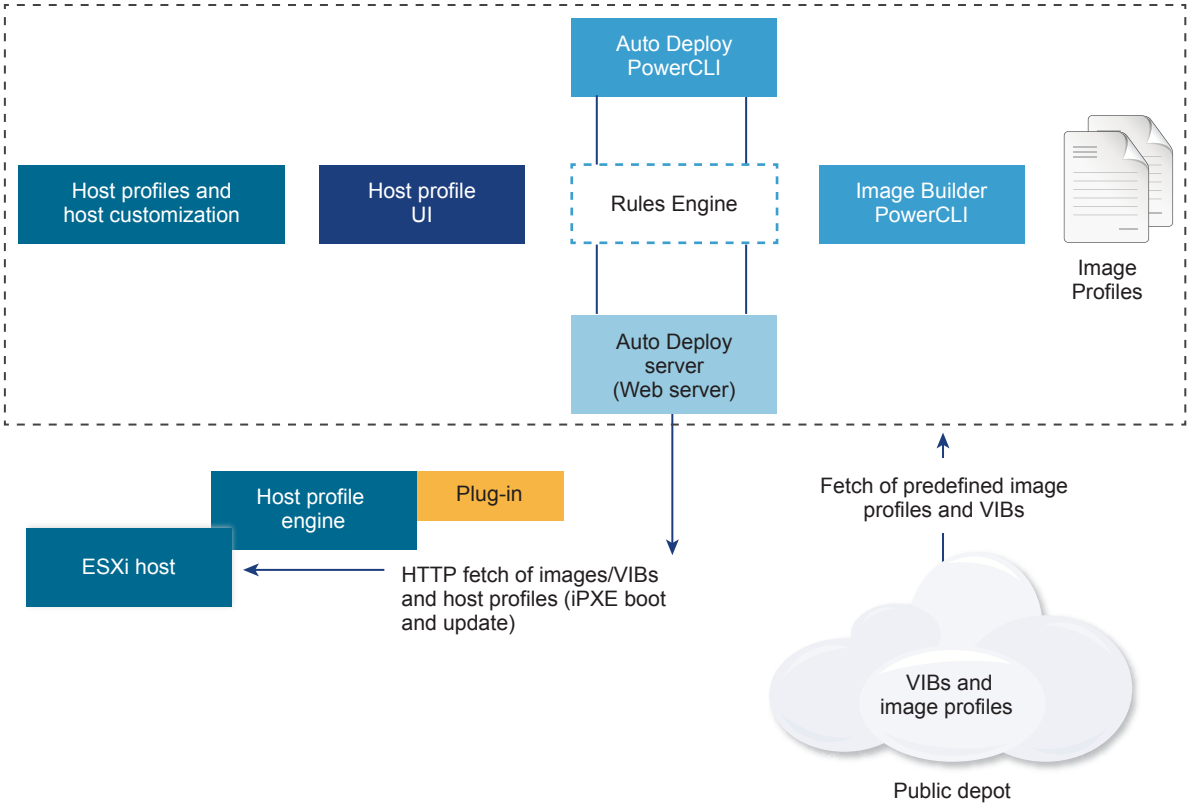
vSphere Auto Deploy Architecture

The vSphere Auto Deploy infrastructure consists of several components.

For more information, watch the video "Auto Deploy Architecture":

Auto Deploy Architecture (http://link.brightcove.com/services/player/bcpid2296383276001?bctid=ref:video_auto_deploy_architecture)

Figure 4-1. vSphere Auto Deploy Architecture



vSphere Auto Deploy server Serves images and host profiles to ESXi hosts.

vSphere Auto Deploy rules engine Sends information to the vSphere Auto Deploy server which image profile and which host profile to serve to which host. Administrators use vSphere Auto Deploy to define the rules that assign image profiles and host profiles to hosts.

Image profiles Define the set of VIBs to boot ESXi hosts with.

- VMware and VMware partners make image profiles and VIBs available in public depots. Use vSphere ESXi Image Builder to examine the depot and use the vSphere Auto Deploy rules engine to specify which image profile to assign to which host.
- VMware customers can create a custom image profile based on the public image profiles and VIBs in the depot and apply that image profile to the host.

Host profiles	Define machine-specific configuration such as networking or storage setup. Use the host profile UI to create host profiles. You can create a host profile for a reference host and apply that host profile to other hosts in your environment for a consistent configuration.
Host customization	Stores information that the user provides when host profiles are applied to the host. Host customization might contain an IP address or other information that the user supplied for that host. For more information about host customizations, see the *vSphere Host Profiles* documentation. Host customization was called answer file in earlier releases of vSphere Auto Deploy.

Preparing for vSphere Auto Deploy

Before you can start using vSphere Auto Deploy, you must prepare your environment. You start with server setup and hardware preparation. You must configure the vSphere Auto Deploy service startup type in the vCenter Server system that you plan to use for managing the hosts you provision, and install PowerCLI.

- Prepare Your System for vSphere Auto Deploy

  Before you can PXE boot an ESXi host with vSphere Auto Deploy, you must install prerequisite software and set up the DHCP and TFTP servers that vSphere Auto Deploy interacts with.

- Using vSphere Auto Deploy Cmdlets

  vSphere Auto Deploy cmdlets are implemented as Microsoft PowerShell cmdlets and included in PowerCLI. Users of vSphere Auto Deploy cmdlets can take advantage of all PowerCLI features.

- Set Up Bulk Licensing

  You can use the vSphere Web Client or ESXi Shell to specify individual license keys, or you can set up bulk licensing by using PowerCLI cmdlets. Bulk licensing works for all ESXi hosts, but is especially useful for hosts provisioned with vSphere Auto Deploy.

Prepare Your System for vSphere Auto Deploy

Before you can PXE boot an ESXi host with vSphere Auto Deploy, you must install prerequisite software and set up the DHCP and TFTP servers that vSphere Auto Deploy interacts with.

For detailed steps and information about preparing your system for vSphere Auto Deploy, see *vSphere Installation and Setup*.

Prerequisites

- Verify that the hosts that you plan to provision with vSphere Auto Deploy meet the hardware requirements for ESXi. See ESXi Hardware Requirements.
- Verify that the ESXi hosts have network connectivity to vCenter Server and that all port requirements are met. See *vCenter Server Upgrade*.

- If you want to use VLANs in your vSphere Auto Deploy environment, you must set up the end to end networking properly. When the host is PXE booting, the firmware driver must be set up to tag the frames with proper VLAN IDs. You must do this set up manually by making the correct changes in the UEFI/BIOS interface. You must also correctly configure the ESXi port groups with the correct VLAN IDs. Ask your network administrator how VLAN IDs are used in your environment.
- Verify that you have enough storage for the vSphere Auto Deploy repository. The vSphere Auto Deploy server uses the repository to store data it needs, including the rules and rule sets you create and the VIBs and image profiles that you specify in your rules.

  Best practice is to allocate 2 GB to have enough room for four image profiles and some extra space. Each image profile requires approximately 350 MB. Determine how much space to reserve for the vSphere Auto Deploy repository by considering how many image profiles you expect to use.
- Obtain administrative privileges to the DHCP server that manages the network segment you want to boot from. You can use a DHCP server already in your environment, or install a DHCP server. For your vSphere Auto Deploy setup, replace the `gpxelinux.0` file name with `snponly64.efi.vmw-hardwired` for UEFI or `undionly.kpxe.vmw-hardwired` for BIOS. For more information on DHCP configurations, see Sample DHCP Configurations.
- Secure your network as you would for any other PXE-based deployment method. vSphere Auto Deploy transfers data over SSL to prevent casual interference and snooping. However, the authenticity of the client or the vSphere Auto Deploy server is not checked during a PXE boot.
- If you want to manage vSphere Auto Deploy with PowerCLI cmdlets, verify that Microsoft .NET Framework 4.5 or 4.5.x and Windows PowerShell 3.0 or 4.0 are installed on a Windows machine. You can install PowerCLI on the Windows system on which vCenter Server is installed or on a different Windows system. See the *vSphere PowerCLI User's Guide*.
- Set up a remote Syslog server. See the *vCenter Server and Host Management* documentation for Syslog server configuration information. Configure the first host you boot to use the remote Syslog server and apply that host's host profile to all other target hosts. Optionally, install and use the vSphere Syslog Collector, a vCenter Server support tool that provides a unified architecture for system logging and enables network logging and combining of logs from multiple hosts.
- Install ESXi Dump Collector, set up your first host so that all core dumps are directed to ESXi Dump Collector, and apply the host profile from that host to all other hosts.
- If the hosts that you plan to provision with vSphere Auto Deploy are with legacy BIOS, verify that the vSphere Auto Deploy server has an IPv4 address. PXE booting with legacy BIOS firmware is possible only over IPv4. PXE booting with UEFI firmware is possible with either IPv4 or IPv6.

Procedure

1. Install vCenter Server or deploy the vCenter Server Appliance.

   The vSphere Auto Deploy server is included with the management node.

2 Configure the vSphere Auto Deploy service startup type.

   a Log in to your vCenter Server system by using the vSphere Web Client.

   b On the vSphere Web Client Home page, click **Administration**.

   c Under **System Configuration** click **Services**.

   d Select **Auto Deploy**, click the **Actions** menu, and select **Edit Startup Type**.

      - On Windows, the vSphere Auto Deploy service is disabled. In the **Edit Startup Type** window, select **Manual** or **Automatic** to enable vSphere Auto Deploy.
      - On the vCenter Server Appliance, the vSphere Auto Deploy service by default is set to **Manual**. If you want the vSphere Auto Deploy service to start automatically upon OS startup, select **Automatic**.

3 (Optional) If you want to manage vSphere Auto Deploy with the vSphere Web Client, configure the vSphere ESXi Image Builder service startup type.

   a Repeat Step 2a through Step 2c.

   b Select **ImageBuilder Service**, click the **Actions** menu, and select **Edit Startup Type**.

      - On Windows, the vSphere ESXi Image Builder service is disabled. In the **Edit Startup Type** window, select **Manual** or **Automatic** to enable the service.
      - On the vCenter Server Appliance, the vSphere Auto Deploy service by default is set to **Manual**. If you want the vSphere ESXi Image Builder service to start automatically upon OS startup, select **Automatic**.

   c Log out of the vSphere Web Client and log in again.

      The **Auto Deploy** icon is visible on the Home page of the vSphere Web Client.

4 (Optional) If you want to manage vSphere Auto Deploy with PowerCLI cmdlets, install PowerCLI.

   a Download the latest version of PowerCLI from the VMware Web site.

   b Navigate to the folder that contains the PowerCLI file you downloaded and double-click the executable file.

      If the installation wizard detects an earlier version of PowerCLI on your system, it will attempt to upgrade your existing installation

   c Follow the prompts in the wizard to complete the installation.

5 Configure the TFTP server.

   a In a vSphere Web Client connected to the vCenter Server system, go to the inventory list and select the vCenter Server system.

   b Click the **Manage** tab, select **Settings**, and click **Auto Deploy**.

   c Click **Download TFTP Boot Zip** to download the TFTP configuration file and unzip the file to the directory in which your TFTP server stores files.

6 Set up your DHCP server to point to the TFTP server on which the TFTP ZIP file is located.

   a Specify the TFTP Server's IP address in DHCP option 66, frequently called next-server.

   b Specify the boot file name, which is `snponly64.efi.vmw-hardwired` for UEFI or `undionly.kpxe.vmw-hardwired` for BIOS in the DHCP option 67, frequently called `boot-filename`.

7 Set each host you want to provision with vSphere Auto Deploy to network boot or PXE boot, following the manufacturer's instructions.

8 (Optional) If you set up your environment to use Thumbprint mode, you can use your own Certificate Authority (CA) by replacing the OpenSSL certificate `rbd-ca.crt` and the OpenSSL private key `rbd-ca.key` with your own certificate and key file.

   - On Windows, the files are in the SSL subfolder of the vSphere Auto Deploy installation directory. For example, on Windows 7 the default is `C:\ProgramData\VMware\VMware vSphere Auto Deploy\ssl`.
   - On the vCenter Server Appliance, the files are in `/etc/vmware-rbd/ssl/`.

   By default, vCenter Server 6.0 and later uses VMware Certificate Authority (VMCA).

When you start a host that is set up for vSphere Auto Deploy, the host contacts the DHCP server and is directed to the vSphere Auto Deploy server, which provisions the host with the image profile specified in the active rule set.

What to do next

- Define a rule that assigns an image profile and optional host profile, host location or script bundle to the host.
- (Optional) Configure the first host that you provision as a reference host. Use the storage, networking, and other settings you want for your target hosts to share. Create a host profile for the reference host and write a rule that assigns both the already tested image profile and the host profile to target hosts.
- (Optional) If you want to have vSphere Auto Deploy overwrite existing partitions, set up a reference host to do auto partitioning and apply the host profile of the reference host to other hosts.
- (Optional) If you have to configure host-specific information, set up the host profile of the reference host to prompt for user input. For more information about host customizations, see the *vSphere Host Profiles* documentation.

Using vSphere Auto Deploy Cmdlets

vSphere Auto Deploy cmdlets are implemented as Microsoft PowerShell cmdlets and included in PowerCLI. Users of vSphere Auto Deploy cmdlets can take advantage of all PowerCLI features.

Experienced PowerShell users can use vSphere Auto Deploy cmdlets just like other PowerShell cmdlets. If you are new to PowerShell and PowerCLI, the following tips might be helpful.

You can type cmdlets, parameters, and parameter values in the PowerCLI shell.

- Get help for any cmdlet by running `Get-Help`*`cmdlet_name`*.
- Remember that PowerShell is not case sensitive.
- Use tab completion for cmdlet names and parameter names.
- Format any variable and cmdlet output by using `Format-List` or `Format-Table`, or their short forms `fl` or `ft`. For more information, run the `Get-Help Format-List` cmdlet.

Passing Parameters by Name

You can pass in parameters by name in most cases and surround parameter values that contain spaces or special characters with double quotes.

```
Copy-DeployRule -DeployRule testrule -ReplaceItem MyNewProfile
```

Most examples in the *vCenter Server Installation and Setup* documentation pass in parameters by name.

Passing Parameters as Objects

You can pass parameters as objects if you want to perform scripting and automation. Passing in parameters as objects is useful with cmdlets that return multiple objects and with cmdlets that return a single object. Consider the following example.

1 Bind the object that encapsulates rule set compliance information for a host to a variable.

```
$tr = Test-DeployRuleSetCompliance MyEsxi42
```

2 View the `itemlist` property of the object to see the difference between what is in the rule set and what the host is currently using.

```
$tr.itemlist
```

3 Remediate the host to use the revised rule set by using the `Repair-DeployRuleSetCompliance` cmdlet with the variable.

```
Repair-DeployRuleSetCompliance $tr
```

The example remediates the host the next time you boot the host.

Set Up Bulk Licensing

You can use the vSphere Web Client or ESXi Shell to specify individual license keys, or you can set up bulk licensing by using PowerCLI cmdlets. Bulk licensing works for all ESXi hosts, but is especially useful for hosts provisioned with vSphere Auto Deploy.

Assigning license keys through the vSphere Web Client and assigning licensing by using PowerCLI cmdlets function differently.

Assign license keys with the vSphere Web Client	You can assign license keys to a host when you add the host to the vCenter Server system or when the host is managed by a vCenter Server system.
Assign license keys with LicenseDataManager PowerCLI	You can specify a set of license keys to be added to a set of hosts. The license keys are added to the vCenter Server database. Each time a host is added to the vCenter Server system or reconnects to it, the host is assigned a license key. A license key that is assigned through PowerCLI is treated as a default license key. When an unlicensed host is added or reconnected, it is assigned the default license key. If a host is already licensed, it keeps its license key.

The following example assigns licenses to all hosts in a data center. You can also associate licenses with hosts and clusters.

The following example is for advanced PowerCLI users who know how to use PowerShell variables.

Prerequisites

Prepare Your System for vSphere Auto Deploy.

Procedure

1 In a PowerCLI session, connect to the vCenter Server system you want to use and bind the associated license manager to a variable.

```
Connect-VIServer -Server 192.XXX.X.XX -User username -Password password
$licenseDataManager = Get-LicenseDataManager
```

2 Run a cmdlet that retrieves the datacenter in which the hosts for which you want to use the bulk licensing feature are located.

```
$hostContainer = Get-Datacenter -Name Datacenter-X
```

You can also run a cmdlet that retrieves a cluster to use bulk licensing for all hosts in a cluster, or retrieves a folder to use bulk licensing for all hosts in a folder.

3 Create a new `LicenseData` object and a `LicenseKeyEntry` object with associated type ID and license key.

```
$licenseData = New-Object VMware.VimAutomation.License.Types.LicenseData
$licenseKeyEntry = New-Object Vmware.VimAutomation.License.Types.LicenseKeyEntry
$licenseKeyEntry.TypeId = "vmware-vsphere"
$licenseKeyEntry.LicenseKey = "XXXXX-XXXXX-XXXXX-XXXXX-XXXXX"
```

4 Associate the `LicenseKeys` attribute of the `LicenseData` object you created in step 3 with the `LicenseKeyEntry` object.

```
$licenseData.LicenseKeys += $licenseKeyEntry
```

5 Update the license data for the data center with the `LicenseData` object and verify that the license is associated with the host container.

```
$licenseDataManager.UpdateAssociatedLicenseData($hostContainer.Uid, $licenseData)
$licenseDataManager.QueryAssociatedLicenseData($hostContainer.Uid)
```

6 Provision one or more hosts with vSphere Auto Deploy and assign them to the data center or to the cluster that you assigned the license data to.

7 You can use the vSphere Web Client to verify that the host is successfully assigned to the default license XXXXX–XXXXX–XXXXX–XXXXX–XXXXX.

All hosts that you assigned to the data center are now licensed automatically.

Reprovisioning Hosts

vSphere Auto Deploy supports multiple reprovisioning options. You can perform a simple reboot or reprovision with a different image profile or a different host profile.

A first boot using vSphere Auto Deploy requires that you set up your environment and add rules to the rule set. See the topic "Preparing for vSphere Auto Deploy" in the *vSphere installation and Setup* documentation.

The following reprovisioning operations are available.

- Simple reboot.
- Reboot of hosts for which the user answered questions during the boot operation.
- Reprovision with a different image profile.
- Reprovision with a different host profile.

Reprovision Hosts with Simple Reboot Operations

A simple reboot of a host that is provisioned with vSphere Auto Deploy requires only that all prerequisites are still met. The process uses the previously assigned image profile, host profile, custom script, and vCenter Server location.

Prerequisites

- Verify that the setup you performed during the first boot operation is in place.
- Verify that all associated items like are available. An item can be an image profile, host profile, custom script or vCenter Server inventory location.
- Verify that the host has the identifying information (asset tag, IP address) it had during previous boot operations.

Procedure

1 Place the host in maintenance mode.

Host Type	Action
Host is part of a DRS cluster	VMware DRS migrates virtual machines to appropriate hosts when you place the host in maintenance mode.
Host is not part of a DRS cluster	You must migrate all virtual machines to different hosts and place each host in maintenance mode.

2 Reboot the host.

The host shuts down. When the host reboots, it uses the image profile that the vSphere Auto Deploy server provides. The vSphere Auto Deploy server also applies the host profile stored on the vCenter Server system.

Reprovision a Host with a New Image Profile by Using PowerCLI

You can use vSphere Auto Deploy to reprovision a host with a new image profile in a PowerCLI session by changing the rule for the host and performing a test and repair compliance operation.

Several options for reprovisioning hosts exist.

- If the VIBs that you want to use support live update, you can use an `esxcli software vib` command. In that case, you must also update the rule set to use an image profile that includes the new VIBs.
- During testing, you can apply an image profile to an individual host with the `Apply-EsxImageProfile` cmdlet and reboot the host so the change takes effect. The `Apply-EsxImageProfile` cmdlet updates the association between the host and the image profile but does not install VIBs on the host.
- In all other cases, use this procedure.

Prerequisites

- Verify that the image profile you want to use to reprovision the host is available. Use vSphere ESXi Image Builder in a PowerCLI session. See "Using vSphere ESXi Image Builder CLI" in the *vSphere Installation and Setup* documentation.
- Verify that the setup you performed during the first boot operation is in place.

Procedure

1 At the PowerShell prompt, run the `Connect-VIServer` PowerCLI cmdlet to connect to the vCenter Server system that vSphere Auto Deploy is registered with.

```
Connect-VIServer ipv4_or_ipv6_address
```

The cmdlet might return a server certificate warning. In a production environment, make sure no server certificate warnings result. In a development environment, you can ignore the warning.

2 Determine the location of a public software depot that contains the image profile that you want to use, or define a custom image profile with vSphere ESXi Image Builder.

3 Run `Add-EsxSoftwareDepot` to add the software depot that contains the image profile to the PowerCLI session.

Depot Type	Cmdlet
Remote depot	Run **`Add-EsxSoftwareDepot`** ***`depot_url`***.
ZIP file	a Download the ZIP file to a local file path or create a mount point local to the PowerCLI machine. b Run **`Add-EsxSoftwareDepot C:\`*`file_path`*`\`*`my_offline_depot`*`.zip`**.

4 Run `Get-EsxImageProfile` to see a list of image profiles, and decide which profile you want to use.

5 Run `Copy-DeployRule` and specify the `ReplaceItem` parameter to change the rule that assigns an image profile to hosts.

The following cmdlet replaces the current image profile that the rule assigns to the host with the *my_new_imageprofile* profile. After the cmdlet completes, `myrule` assigns the new image profile to hosts. The old version of `myrule` is renamed and hidden.

```
Copy-DeployRule myrule -ReplaceItem my_new_imageprofile
```

6 Test the rule compliance for each host that you want to deploy the image to.

a Verify that you can access the host for which you want to test rule set compliance.

```
Get-VMHost -Name ESXi_hostname
```

b Run the cmdlet that tests rule set compliance for the host, and bind the return value to a variable for later use.

```
$tr = Test-DeployRuleSetCompliance ESXi_hostname
```

c Examine the differences between the contents of the rule set and configuration of the host.

```
$tr.itemlist
```

The system returns a table of current and expected items if the host for which you want to test the new rule set compliance is compliant with the active rule set.

```
CurrentItem                          ExpectedItem
-----------                          ------------
my_old_imageprofile                        my_new_imageprofile
```

d Remediate the host to use the revised rule set the next time you boot the host.

```
Repair-DeployRuleSetCompliance $tr
```

7 Reboot the host to provision it with the new image profile.

Write a Rule and Assign a Host Profile to Hosts

vSphere Auto Deploy can assign a host profile to one or more hosts. The host profile might include information about storage configuration, network configuration, or other characteristics of the host. If you add a host to a cluster, that cluster's host profile is used.

In many cases, you assign a host to a cluster instead of specifying a host profile explicitly. The host uses the host profile of the cluster.

Prerequisites

- Install PowerCLI and all prerequisite software. For information see *vCenter Server Installation and Setup*.
- Export the host profile that you want to use.

Procedure

1 In a PowerCLI session, run the `Connect-VIServer` cmdlet to connect to the vCenter Server system that vSphere Auto Deploy is registered with.

```
Connect-VIServer ipv4_or_ipv6_address
```

The cmdlet might return a server certificate warning. In a production environment, make sure no server certificate warnings result. In a development environment, you can ignore the warning.

2 Using the vSphere Web Client, set up a host with the settings you want to use and create a host profile from that host.

3 Find the name of the host profile by running `Get-VMhostProfile` PowerCLI cmdlet, passing in the ESXi host from which you create a host profile.

4 At the PowerCLI prompt, define a rule in which host profiles are assigned to hosts with certain attributes, for example a range of IP addresses.

```
New-DeployRule -Name "testrule2" -Item my_host_profile -Pattern "vendor=Acme,Zven", "ipv4=192.XXX.
1.10-192.XXX.1.20"
```

The specified item is assigned to all hosts with the specified attributes. This example specifies a rule named testrule2. The rule assigns the specified host profile *my_host_profile* to all hosts with an IP address inside the specified range and with a manufacturer of Acme or Zven.

5 Add the rule to the rule set.

```
Add-DeployRule testrule2
```

By default, the working rule set becomes the active rule set, and any changes to the rule set become active when you add a rule. If you use the `NoActivate` parameter, the working rule set does not become the active rule set.

What to do next

- Assign a host already provisioned with vSphere Auto Deploy to the new host profile by performing compliance test and repair operations on those hosts. For more information, see Test and Repair Rule Compliance.
- Power on unprovisioned hosts to provision them with the host profile.

Test and Repair Rule Compliance

When you add a rule to the vSphere Auto Deploy rule set or make changes to one or more rules, hosts are not updated automatically. vSphere Auto Deploy applies the new rules only when you test their rule compliance and perform remediation.

Prerequisites

- Prepare Your System for vSphere Auto Deploy
- Verify that your infrastructure includes one or more ESXi hosts provisioned with vSphere Auto Deploy, and that the host on which you installed PowerCLI can access those ESXi hosts.

Procedure

1. In a PowerCLI session, run the `Connect-VIServer` cmdlet to connect to the vCenter Server system that vSphere Auto Deploy is registered with.

   ```
   Connect-VIServer ipv4_or_ipv6_address
   ```

   The cmdlet might return a server certificate warning. In a production environment, make sure no server certificate warnings result. In a development environment, you can ignore the warning.

2. Use PowerCLI to check which vSphere Auto Deploy rules are currently available.

   ```
   Get-DeployRule
   ```

   The system returns the rules and the associated items and patterns.

3. Make a change to one of the available rules.

   For example, you can change the image profile and the name of the rule.

   ```
   Copy-DeployRule -DeployRule testrule -ReplaceItem MyNewProfile
   ```

   You cannot edit a rule already added to the active rule set. Instead, you can copy the rule and replace the item or pattern you want to change.

4. Verify that you can access the host for which you want to test rule set compliance.

   ```
   Get-VMHost -Name MyEsxi42
   ```

5 Run the cmdlet that tests rule set compliance for the host, and bind the return value to a variable for later use.

```
$tr = Test-DeployRuleSetCompliance MyEsxi42
```

6 Examine the differences between the contents of the rule set and configuration of the host.

```
$tr.itemlist
```

The system returns a table of current and expected items if the host for which you want to test the new rule set compliance is compliant with the active rule set.

```
CurrentItem                          ExpectedItem
-----------                          ------------
My Profile 25                        MyNewProfile
```

7 Remediate the host to use the revised rule set the next time you boot the host.

```
Repair-DeployRuleSetCompliance $tr
```

What to do next

If the rule you changed specified the inventory location, the change takes effect when you repair compliance. For all other changes, reboot your host to have vSphere Auto Deploy apply the new rule and to achieve compliance between the rule set and the host.

Collect Logs to Troubleshoot ESXi Hosts

5

You can collect installation or upgrade log files for ESXi. If an installation or upgrade fails, checking the log files can help you identify the source of the failure.

Solution

1. Enter the `vm-support` command in the ESXi Shell or through SSH.
2. Navigate to the `/var/tmp/` directory.
3. Retrieve the log files from the `.tgz` file.