VMware ESXi Installation and Setup

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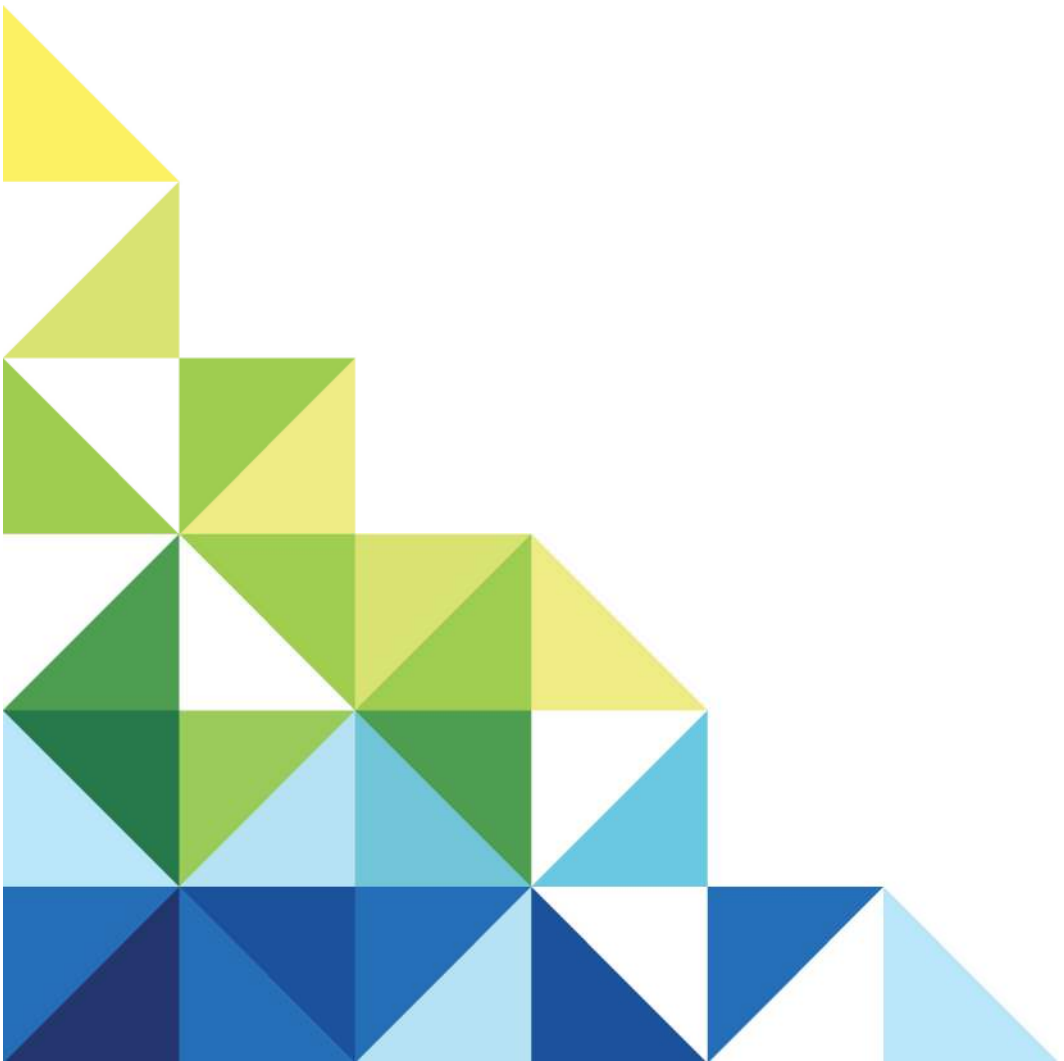
VMware vSphere 6.7
VMware ESXi 6.7



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Contents

About VMware ESXi Installation and Setup

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VMware ESXi Installation and Setup describes how to install and configure VMware ESXi™.

Intended Audience

VMware ESXi Installation and Setup is intended for experienced administrators who want to install and configure ESXi.

This information is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and data center operations. The information about using the Image Builder and VMware vSphere® Auto Deploy™ is written for administrators who have experience with Microsoft PowerShell and VMware vSphere® PowerCLI™.

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 Installation and Setup

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vSphere 6.7 provides various options for installation and setup. To ensure a successful vSphere deployment, understand the installation and setup options, and the sequence of tasks.

The two core components of vSphere are ESXi and 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. vCenter Server lets you pool and manage the resources of multiple hosts.

You can install vCenter Server on a Windows virtual machine or physical server, or deploy the vCenter Server Appliance. The vCenter Server Appliance is a preconfigured Linux-based virtual machine optimized for running vCenter Server and the vCenter Server components. You can deploy the vCenter Server Appliance on ESXi hosts 6.0 or later, or on vCenter Server instances 6.0 or later.

Starting with vSphere 6.0, all prerequisite services for running vCenter Server and the vCenter Server components are bundled in the VMware Platform Services Controller™. You can deploy vCenter Server with an embedded or external Platform Services Controller, but you must always install or deploy the Platform Services Controller before installing or deploying vCenter Server.

For detailed information about the vCenter Server installation process, see *vCenter Server Installation and Setup*.

Overview of the vSphere Installation and Setup Process

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vSphere is a sophisticated product with multiple components to install and set up. To ensure a successful vSphere deployment, understand the sequence of tasks required.

Installing vSphere includes the following tasks:

Figure 3-1. vSphere Installation and Setup Workflow

1 Read the vSphere release notes.

2 Install ESXi.

   a Verify that your system meets the minimum hardware requirements. See ESXi Requirements.

   b Determine the ESXi installation option to use. See Options for Installing ESXi.

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

d Create a worksheet with the information you will need when you install ESXi. See Required Information for ESXi Installation.

e Install ESXi.

- Installing ESXi Interactively
- Installing or Upgrading Hosts by Using a Script

Note You can also provision ESXi hosts by using vSphere Auto Deploy, but vSphere Auto Deploy is installed together with vCenter Server. To provision ESXi hosts by using Auto Deploy, you must deploy the vCenter Server Appliance or install vCenter Server.

3 Configure the ESXi boot and network settings, the direct console, and other settings. See Setting Up ESXi and After You Install and Set Up ESXi.

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

5 Determine the vCenter Server and Platform Services Controller deployment model that is suitable for your environment.

6 Deploy or install vCenter Server and Platform Services Controller.

For detailed information, see the *vCenter Server Installation and Setup* guide.

About ESXi Evaluation and Licensed Modes

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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.

Installing and Setting Up ESXi

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You can install and set up ESXi on your physical hardware so that it acts as a platform for virtual machines.

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 Set the Scratch Partition from the vSphere Web Client.

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 5-1. 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 5-2. 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.

Table 5-2. Recommendations for Enhanced Performance (Continued)

System Element	Recommendation
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 5-3. 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.

Table 5-3. Incoming Firewall Connections (Continued)

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

Table 5-4. 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.

Table 5-4. Outgoing Firewall Connections (Continued)

Port	Protocol	Service	Description
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.
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 5-5. 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 5-6. 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 a remote log server, see Configure Syslog on ESXi Hosts.

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.

Preparing for Installing ESXi

Before you install ESXi, determine the installation option that is suitable for your environment and prepare for the installation process.

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.

Options for Installing ESXi

ESXi can be installed in several ways. To ensure the best vSphere deployment, understand the options thoroughly before beginning the installation.

ESXi installations are designed to accommodate a range of deployment sizes.

Depending on the installation method you choose, different options are available for accessing the installation media and booting the installer.

Interactive ESXi Installation

Interactive installations are recommended for small deployments of fewer than five hosts.

You boot the installer from a CD or DVD, from a bootable USB device, or by PXE booting the installer from a location on the network. You follow the prompts in the installation wizard to install ESXi to disk. See Installing ESXi Interactively.

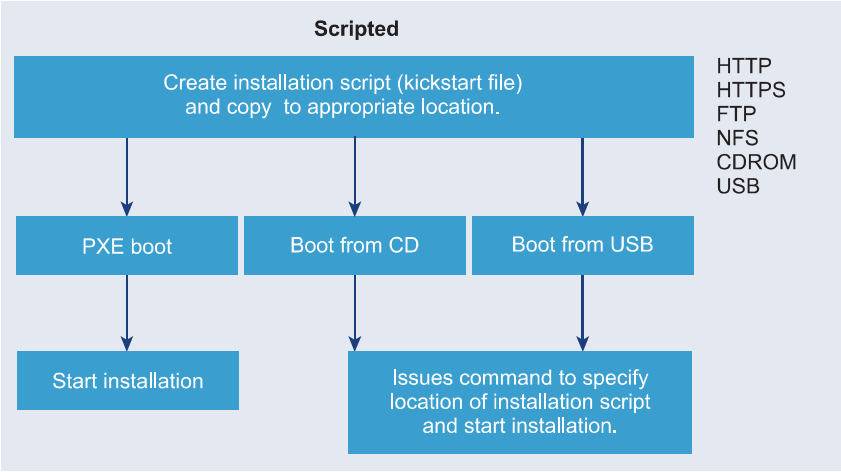
Scripted ESXi Installation

Running a script is an efficient way to deploy multiple ESXi hosts with an unattended installation.

The installation script contains the host configuration settings. You can use the script to configure multiple hosts with the same settings. See Installing or Upgrading Hosts by Using a Script.

The installation script must be stored in a location that the host can access by HTTP, HTTPS, FTP, NFS, CDROM, or USB. You can PXE boot the ESXi installer or boot it from a CD/DVD or USB drive.

Figure 5-1. Scripted Installation



vSphere Auto Deploy ESXi Installation

vSphere 5.x and later provide several ways to install ESXi with vSphere Auto Deploy.

vSphere Auto Deploy can provision hundreds of physical hosts with ESXi software. You can specify the image to deploy and the hosts to provision with the image. Optionally, you can specify host profiles to apply to the hosts, a vCenter Server location (datacenter, folder, or cluster), and script bundle for each host.

vCenter Server makes ESXi updates and patches available for download in the form of an image profile. The host configuration is provided in the form of a host profile. You can create host profiles by using the vSphere Web Client. You can create custom image profiles by using vSphere ESXi Image Builder. See Customizing Installations with vSphere ESXi Image Builder and *vSphere Host Profiles*.

When you provision hosts by using vSphere Auto Deploy, vCenter Server loads the ESXi image directly into the host memory. vSphere Auto Deploy does not store the ESXi state on the host disk. The vSphere Auto Deploy server continues to provision this host every time the host boots.

You can also use vSphere Auto Deploy to install an ESXi host, and set up a host profile that causes the host to store the ESXi image and configuration on the local disk, a remote disk, or a USB drive. Subsequently, the ESXi host boots from this local image and vSphere Auto Deploy no longer provisions the host. This process is similar to performing a scripted installation. With a scripted installation, the script provisions a host and the host then boots from disk. For this case, vSphere Auto Deploy provisions a host and the host then boots from disk. For more information, see Using vSphere Auto Deploy for Stateless Caching and Stateful Installs.

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.

Customizing Installations with vSphere ESXi Image Builder

You can use VMware vSphere® ESXi™ Image Builder CLI to create ESXi installation images with a customized set of updates, patches, and drivers.

You can use vSphere ESXi Image Builder with the vSphere Web Client or with PowerCLI to create an ESXi installation image with a customized set of ESXi updates and patches. You can also include third-party network or storage drivers that are released between vSphere releases.

You can deploy an ESXi image created with vSphere ESXi Image Builder in either of the following ways:

- By burning it to an installation DVD.
- Through vCenter Server, using the Auto Deploy feature.

Understanding vSphere ESXi Image Builder

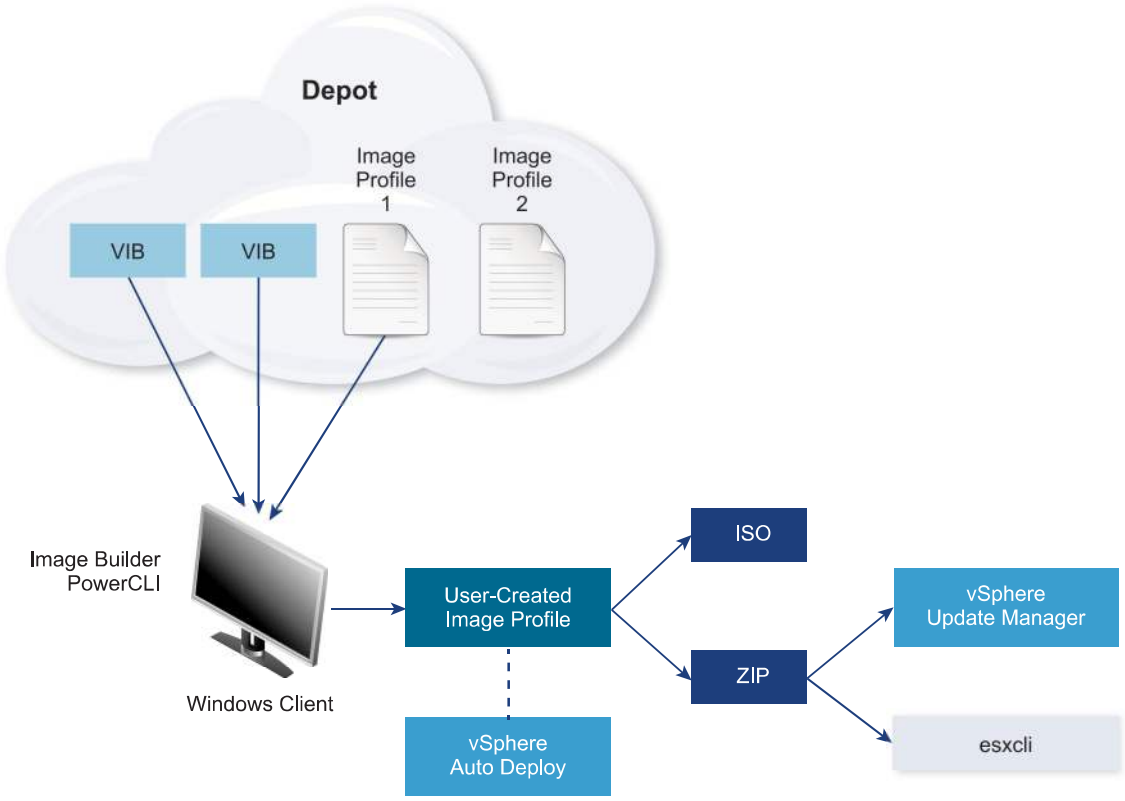
You can use the VMware vSphere® ESXi™ Image Builder CLI to manage software depots, image profiles, and software packages (VIBs). Image profiles and VIBs specify the software you want to use during installation or upgrade of an ESXi host.

vSphere ESXi Image Builder Overview

vSphere ESXi Image Builder lets you manage vSphere image profiles and VIBs.

VIBs are software packages, and image profiles contain a set of software packages. See Software Depots and Their Components.

Figure 5-2. Image Builder Architecture



You use vSphere ESXi Image Builder cmdlets for managing the software to deploy to your ESXi hosts in several different situations.

Table 5-7. Cases Where You Can Use vSphere ESXi Image Builder

Use Case for vSphere ESXi Image Builder	Description
Create image profiles for use by vSphere Auto Deploy	Use vSphere ESXi Image Builder to create an image profile that defines the VIBs that vSphere Auto Deploy uses to provision hosts.
Add custom third-party drivers to existing image profile and export to ISO or bundle	When you add third-party driver or extension custom VIBs to your ESXi hosts, use vSphere ESXi Image Builder to clone the base image provided by VMware, add the custom VIBs, and export to ISO or to offline bundle ZIP file.
Perform upgrades	If you upgrade from a 4.0 or 4.1 system that includes custom extensions or drivers, you can use vSphere ESXi Image Builder to create an image profile that includes the vSphere 5 base VIB. You can create vSphere 5 VIBs for the custom extensions and add those VIBs to the base VIB. Export the custom image profile to an ISO you can install or to a ZIP that you can use with vSphere Update Manager.
Create custom images with reduced footprint	If you require a minimal footprint image, you can clone the ESXi base image profile and remove VIBs using vSphere ESXi Image Builder.

The vSphere ESXi Image Builder cmdlets take image profiles and VIBs as input and produce various outputs.

Table 5-8. Input and Output to the vSphere ESXi Image Builder Cmdlets

Parameter	Description
Input	Image profiles and VIBs that are located in a software depot are used as input to PowerCLI cmdlets running on a Windows client.
Output	PowerCLI cmdlets create custom image profiles that can be exported to an ISO image or an offline depot ZIP file. ISO images are used for installation. The ZIP depot can be used by Update Manager or by `esxcli software` commands to update or install images. Image profiles are also used in vSphere Auto Deploy rules to customize the software to provision ESXi hosts with.

Watch the video "Using Image Builder CLI" for information about vSphere ESXi Image Builder:

Using Image Builder CLI (http://link.brightcove.com/services/player/bcpid2296383276001?bctid=ref:video_using_image_builder_cli)

Software Depots and Their Components

Understanding how depots, profiles, and VIBs are structured and where you can use them is a prerequisite for in-memory installation of a custom ESXi ISO, for provisioning ESXi hosts using vSphere Auto Deploy, and for certain custom upgrade operations.

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.

See SoftwarePackage Object Properties.

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.

See ImageProfile Object Properties.

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.

vSphere ESXi Image Builder Cmdlets Overview

vSphere ESXi Image Builder cmdlets allow you to manage image profiles and VIBs.

vSphere ESXi Image Builder includes the following cmdlets.

Note When you run vSphere ESXi Image Builder cmdlets, provide all parameters on the command line when you invoke the cmdlet. Supplying parameters in interactive mode is not recommended.

Run `Get-Help` *cmdlet_name* at the PowerCLI prompt for detailed reference information.

Table 5-9. vSphere ESXi Image Builder Cmdlets

Cmdlet	Description
`Add-EsxSoftwareDepot`	Adds the software depot or ZIP file at the specified location to your current environment. Downloads metadata from the depot and analyzes VIBs for dependencies.
`Remove-EsxSoftwareDepot`	Disconnects from the specified software depot.
`Get-EsxSoftwareDepot`	Returns a list of software depots that are in the current environment. If you want to examine and manage image profiles and VIBs, you must first add the corresponding software depot to your environment.
`Get-EsxSoftwarePackage`	Returns a list of software package objects (VIBs). Use this cmdlet's options to filter the results.
`Get-EsxImageProfile`	Returns an array of `ImageProfile` objects from all currently added depots.
`New-EsxImageProfile`	Creates a new image profile. In most cases, creating a new profile by cloning an existing profile is recommended. See Clone an Image Profile.

Table 5-9. vSphere ESXi Image Builder Cmdlets (Continued)

Cmdlet	Description
`Set-EsxImageProfile`	Modifies a local `ImageProfile` object and performs validation tests on the modified profile. The cmdlet returns the modified object but does not persist it.
`Export-EsxImageProfile`	Exports an image profile as either an ESXi ISO image for ESXi installation, or as a ZIP file.
`Compare-EsxImageProfile`	Returns an `ImageProfileDiff` structure that shows whether the two profiles have the same VIB list and acceptance level. See Acceptance Levels.
`Remove-EsxImageProfile`	Removes the image profile from the software depot.
`Add-EsxSoftwarePackage`	Adds one or more new packages (VIBs) to an existing image profile.
`Remove-EsxSoftwarePackage`	Removes one or more packages (VIBs) from an image profile.

Image Profiles

Image profiles define the set of VIBs that an ESXi installation or update process uses. Image profiles apply to hosts provisioned with vSphere Auto Deploy and to other ESXi 5.x hosts. You define and manipulate image profiles with vSphere ESXi Image Builder.

Image Profile Requirements

You can create a custom image profile from scratch or clone an existing profile and add or remove VIBs. A profile must meet the following requirements to be valid.

- Each image profile must have a unique name and vendor combination.
- Each image profile has an acceptance level. When you add a VIB to an image profile with an vSphere ESXi Image Builder cmdlet, Image Builder checks that the VIB matches the acceptance level defined for the profile.
- You cannot remove VIBs that are required by other VIBs.
- You cannot include two versions of the same VIB in an image profile. When you add a new version of a VIB, the new version replaces the existing version of the VIB.

Image Profile Validation

An image profile and its VIBs must meet several criteria to be valid.

- Image profiles must contain at least one base VIB and one bootable kernel module.
- If any VIB in the image profile depends on another VIB, that other VIB must also be included in the image profile. VIB creators store that information in the SoftwarePackage object's Depends property.
- VIBs must not conflict with each other. VIB creators store conflict information in the SoftwarePackage object's Conflicts property.
- Two VIBs with the same name, but two different versions, cannot coexist. When you add a new version of a VIB, the new version replaces the existing version of the VIB.
- No acceptance level validation issues exist.

When you make a change to an image profile, vSphere ESXi Image Builder checks that the change does not invalidate the profile.

Dependency Validation When you add or remove a VIB, vSphere ESXi Image Builder checks that package dependencies are met. Each SoftwarePackage object includes a Depends property that specifies a list of other VIBs that VIB depends on. See Structure of ImageProfile, SoftwarePackage, and ImageProfileDiff Objects

Acceptance Level Validation vSphere ESXi Image Builder performs acceptance level validation each time an image profile is created or changed. vSphere ESXi Image Builder checks the acceptance level of VIBs in the image profile against the minimum allowed acceptance level of the profile. The acceptance level of the VIB is also validated each time the signature of a VIB is validated.

VIB Validation During Export

When you export an image profile to an ISO, vSphere ESXi Image Builder validates each VIB by performing the following actions.

- Checks that no conflicts exist by checking the Conflicts property of each SoftwarePackage object.
- Performs VIB signature validation. Signature validation prevents unauthorized modification of VIB packages. The signature is a cryptographic checksum that guarantees that a VIB was produced by its author. Signature validation also happens during installation of VIBs on an ESXi host and when the vSphere Auto Deploy server uses VIBs.
- Checks that VIBs follow file path usage rules. VMware tests VMwareCertified and VMwareAccepted VIBs to guarantee those VIBs always follow file path usage rules.

Acceptance Levels

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. You can change the host acceptance levels with `esxcli` commands.

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.

Structure of ImageProfile, SoftwarePackage, and ImageProfileDiff Objects

Knowing the structure of `ImageProfile`, `SoftwarePackage`, and `ImageProfileDiff` objects helps you manage deployment and upgrade processes.

ImageProfile Object Properties

The `ImageProfile` object, which is accessible with the `Get-EsxImageProfile` PowerCLI cmdlet, has the following properties.

Name	Type	Description
`AcceptanceLevel`	`AcceptanceLevel`	Determines which VIBs you can add to the profile. Levels are VMwareCertified, VMwareAccepted, PartnerSupported, and CommunitySupported. See Acceptance Levels.
`Author`	`System.String`	The person who created the profile. 60 characters or fewer.
`CreationTime`	`System.DateTime`	The timestamp of creation time.
`Description`	`System.String`	The full text description of profile. No length limit.
`GUID`	`System.String`	Globally unique ID of the image profile.
`ModifiedTime`	`System.DateTime`	The timestamp of last modification time.
`Name`	`System.String`	The name of the image profile. 80 characters or fewer.
`ReadOnly`	`System.Boolean`	When set to `true`, the profile cannot be edited. Use `Set-EsxImageProfile -Readonly` to make your custom image profiles read-only.

Name	Type	Description
Rules	ImageProfileRule[]	Any OEM hardware requirements and restrictions that the image profile might have. vSphere Auto Deploy verifies the value of this property when deploying an image profile and deploys the profile if matching hardware is available.
Vendor	System.String	The organization that publishes the profile. 40 characters or fewer.
VibList	SoftwarePackage[]	The list of VIB IDs the image contains.

SoftwarePackage Object Properties

When preparing an image profile, you can examine software packages to decide which packages are suitable for inclusion. The SoftwarePackage object has the following properties.

Name	Type	Description
AcceptanceLevel	AcceptanceLevel	The acceptance level of this VIB.
Conflicts	SoftwareConstraint[]	A list of VIBs that cannot be installed at the same time as this VIB. Each constraint uses the following format: package–name[<<|<=|=|>=|<< version]
Depends	SoftwareConstraint[]	A list of VIBs that must be installed at the same time as this VIB. Same constraint format as Conflicts property.
Description	System.String	The long description of the VIB.
Guid	System.String	The unique ID for the VIB.
LiveInstallOk	System.Boolean	True if live installs of this VIB are supported.
LiveRemoveOk	System.Boolean	True if live removals of this VIB are supported.
MaintenanceMode	System.Boolean	True if hosts must be in maintenance mode for installation of this VIB.
Name	System.String	The name of the VIB. Usually uniquely describes the package on a running ESXi system.
Provides	SoftwareProvides	The list of virtual packages or interfaces this VIB provides. See SoftwareProvide Object Properties.
ReferenceURLs	SupportReference[]	The list of SupportReference objects with in-depth support information. The SupportReference object has two properties, Title and URL, both of type System.String.

Name	Type	Description
Replaces	SoftwareConstraint[]	The list of SoftwareConstraint objects that identify VIBs that replace this VIB or make it obsolete. VIBs automatically replace VIBs with the same name but lower versions.
ReleaseDate	System.DateTime	Date and time of VIB publication or release.
SourceUrls	System.String[]	The list of source URLs from which this VIB can be downloaded.
StatelessReady	System.Boolean	True if the package supports host profiles or other technologies that make it suitable for use in conjunction with vSphere Auto Deploy.
Summary	System.String	A one-line summary of the VIB.
Tags	System.String[]	An array of string tags for this package defined by the vendor or publisher. Tags can be used to identify characteristics of a package.
Vendor	System.String	The VIB vendor or publisher.
Version	System.String	The VIB version.
VersionObject	Software.Version	The VersionObject property is of type SoftwareVersion. The SoftwareVersion class implements a static Compare method to compare two versions of strings. See SoftwareVersion Object Properties

ImageProfileDiff Object Properties

When you run the Compare-EsxImageProfile cmdlet, you pass in two parameters, first the reference profile, and then the comparison profile. The cmdlet returns an ImageProfileDiff object, which has the following properties.

Name	Type	Description
CompAcceptanceLevel	System.String	The acceptance level for the second profile that you passed to Compare-EsxImageProfile.
DowngradeFromRef	System.String[]	The list of VIBs in the second profile that are downgrades from VIBs in the first profile.
Equal	System.Boolean	True if the two image profiles have identical packages and acceptance levels.
OnlyInComp	System.String	The list of VIBs found only in the second profile that you passed to Compare-EsxImageProfile.

Name	Type	Description
OnlyInRef	System.String[]	The list of VIBs found only in the first profile that you passed to Compare-EsxImageProfile.
PackagesEqual	System.Boolean	True if the image profiles have identical sets of VIB packages.
RefAcceptanceLevel	System.String	The acceptance level for the first profile that you passed to Compare-EsxImageProfile.
UpgradeFromRef	System.String[]	The list of VIBs in the second profile that are upgrades from VIBs in the first profile.

SoftwareVersion Object Properties

The SoftwareVersion object lets you compare two version strings. The object includes a Comparestatic method that accepts two strings as input and returns 1 if the first version string is a higher number than the second version string. Compare returns 0 if two versions strings are equal. Compare returns –1 if the second version string is a higher number than the first string. The object has the following properties.

Name	Type	Description
Version	System.String	The part of the version before the hyphen. This part indicates the primary version.
Release	System.String	The part of the version after the hyphen. This part indicates the release version.

SoftwareConstraint Object Properties

The SoftwareConstraint object implements a MatchesProvide method. The method accepts a SoftwareProvides or SoftwarePackage object as input and returns True if the constraint matches the SoftwareProvide or the SoftwarePackage, or returns False otherwise.

The SoftwareConstraint object includes the following properties.

Name	Type	Description
Name	System.String	The name of the constraint. This name should match a corresponding SoftwareProvide Name property.
Relation	System.String	An enum, or one of the following comparison indicators: <<, <=, = >=, >>. This property can be $null if the constraint does not have a Relation and Version property.

Name	Type	Description
Version	System.String	The version to match the constraint against. This property can be $null if the constraint does not have a Relation and Version property.
VersionObject	SoftwareVersion	The version represented by a SoftwareVersion object.

SoftwareProvide Object Properties

The SoftwareProvide object includes the following properties.

Name	Type	Description
Name	System.String	The name of the provide.
Version	System.String	The version of the provide. Can be $null if the provide does not specify a version.
Release	System.String	The version of the provide as represented by a SoftwareVersion object. See SoftwareVersion Object Properties.

vSphere ESXi Image Builder Installation and Usage

vSphere ESXi Image Builder consists of the vSphere ESXi Image Builder server and the vSphere ESXi Image Builder PowerShell cmdlets. The vSphere ESXi Image Builder server starts when your run the first vSphere ESXi Image Builder cmdlet.

Install vSphere ESXi Image Builder and Prerequisite Software

Before you can run vSphere ESXi Image Builder cmdlets, you must install PowerCLI and all prerequisite software. The vSphere ESXi Image Builder snap-in is included with the PowerCLI installation.

Prerequisites

If you want to manage vSphere ESXi Image Builder 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 Microsoft Windows system. 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*.

Procedure

1. Download the latest version of PowerCLI from the VMware Web site.
2. 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
3. Follow the prompts in the wizard to complete the installation.

What to do next

Review Using vSphere ESXi Image Builder Cmdlets.If you are new to PowerCLI, read the PowerCLI documentation.

Use vSphere ESXi Image Builder cmdlets and other PowerCLI cmdlets and PowerShell cmdlets to manage image profiles and VIBs. Use `Get-Help` *cmdlet_name* at any time for command-line help.

Configure the vSphere ESXi Image Builder Service Startup Type

Before you can use vSphere ESXi Image Builder with the vSphere Web Client, you must verify that the service is enabled and running.

Procedure

1. Log in to your vCenter Server system by using the vSphere Web Client.
2. On the vSphere Web Client Home page, click **Administration**.
3. Under **System Configuration** click **Services**.
4. 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 Auto Deploy.
   - On the vCenter Server Appliance, the vSphere ESXi Image Builder service by default is set to **Manual**. If you want the service to start automatically upon OS startup, select **Automatic**.

   If you select the manual startup type, you must start the service manually upon OS startup every time you want to use the service.
5. (Optional) Click the **Start the service** icon.
6. (Optional) If you want to use vSphere ESXi Image Builder with thevSphere Web Client, 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.

What to do next

- Add a Software Depot.
- Import a Software Depot.
- Clone an Image Profile.
- Create an Image Profile.

Using vSphere ESXi Image Builder Cmdlets

vSphere ESXi Image Builder cmdlets are implemented as Microsoft PowerShell cmdlets and included in PowerCLI. Users of vSphere ESXi Image Builder cmdlets can take advantage of all PowerCLI features.

Experienced PowerShell users can use vSphere ESXi Image Builder cmdlets just like other PowerShell cmdlets. If you are new to PowerShell and PowerCLI, follow these tips.

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`. See `Get-Help Format-List`.
- Use wildcards for searching and filtering VIBs and image profiles. All wildcard expressions are supported.

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.

```
Add-EsxSoftwarePackage -ImageProfile profile42 -SoftwarePackage "partner package 35"
```

Passing Parameters as Objects

You can pass parameters as objects if you want to do scripting and automation. You can use the technique with cmdlets that return multiple objects or with cmdlets that return a single object.

1 Bind the output of a cmdlet that returns multiple objects to a variable.

```
$profs = Get-EsxImageProfile
```

2 When you run the cmdlet that needs the object as input, access the object by position, with the list starting with 0.

```
Add-EsxSoftwarePackage -ImageProfile $profs[4] -SoftwarePackage partner-pkg
```

The example adds the specified software package to the fifth image profile in the list returned by `Get-EsxImageProfile`.

Most of the examples in the *vCenter Server Installation and Setup* documentation pass in parameters by name. vSphere ESXi Image Builder Workflows includes examples that pass parameters as objects.

Using vSphere ESXi Image Builder with the vSphere Web Client

You can manage software packages (VIBs), image profiles, and software depots by using the vSphere ESXi Image Builder service in the vSphere Web Client.

- Add a Software Depot

  Before you can work with software depots and customize image profiles, you must add one or more software depots to the vSphere ESXi Image Builder inventory. You can add a software depot by using the vSphere Web Client.

- Import a Software Depot

  If an offline depot is located on your local file system, you can import the ZIP file to the vSphere ESXi Image Builder inventory by using the vSphere Web Client.

- Clone an Image Profile

  You can use the vSphere Web Client to clone image profiles. You can clone an image profile when you want to make small changes to the VIB list in a profile, or if you want to use hosts from different vendors and want to use the same basic profile, but want to add vendor-specific VIBs.

- Create an Image Profile

  You can create a new image profile by using the vSphere Web Client instead of cloning an existing one. You might consider creating a new image profile if it differs significantly from the image profiles in your inventory.

- Edit an Image Profile

  You can edit image profiles by using the vSphere Web Client. You can change the name, details and VIB list of an image profile.

- Compare Image Profiles

  You can compare two image profiles by using the vSphere Web Client, for example, to see if they have the same VIB list, version, or acceptance level.

- Move an Image Profile to a Different Software Depot

  You can move image profiles between custom depots by using the vSphere Web Client. You can move an image profile to a custom depot to edit the image profile.

- Export an Image Profile to ISO or Offline Bundle ZIP

  You can export an image profile to an ISO image or a ZIP file by using the vSphere Web Client. You can use the ISO image as an ESXi installer or to upgrade hosts with vSphere Upgrade Manager. The ZIP file contains metadata and the VIBs of the image profile. You can use it for ESXi upgrades or as an offline depot.

Add a Software Depot

Before you can work with software depots and customize image profiles, you must add one or more software depots to the vSphere ESXi Image Builder inventory. You can add a software depot by using the vSphere Web Client.

Prerequisites

Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.

Procedure

1. On the vSphere Web Client Home page, click **Auto Deploy**.

   By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.

2. On the **Software Depots** tab, click the **Add Software Depot** icon.

3 Select the type of depot that you want to create.

Option	Action
Online Depot	a Enter the name of the depot in the inventory. b Enter the URL of the online depot.
Custom Depot	Enter the name of the depot in the inventory.

4 Click **OK**.

What to do next

- You can associate an image profile with a new vSphere Auto Deploy rule to provision ESXi hosts. See Create a Deploy Rule or Clone a Deploy Rule.
- You can associate an image profile with an ESXi host. See Add a Host to the vSphere Auto Deploy Inventory.
- Edit the Image Profile Association of a Host.

Import a Software Depot

If an offline depot is located on your local file system, you can import the ZIP file to the vSphere ESXi Image Builder inventory by using the vSphere Web Client.

Prerequisites

Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.

Procedure

1 On the vSphere Web Client Home page, click **Auto Deploy**.

By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.

2 On the **Software Depots** tab, click the **Import Software Depot** icon.

3 Enter the name of the software depot in the inventory.

4 Click **Browse** and select a ZIP file from the local system, that contains the software depot you want to import.

5 Click **Upload**.

What to do next

- You can associate an image profile with a new vSphere Auto Deploy rule to provision ESXi hosts. See Create a Deploy Rule or Clone a Deploy Rule.
- You can associate an image profile with an ESXi host. See Add a Host to the vSphere Auto Deploy Inventory.
- Edit the Image Profile Association of a Host.

Clone an Image Profile

You can use the vSphere Web Client to clone image profiles. You can clone an image profile when you want to make small changes to the VIB list in a profile, or if you want to use hosts from different vendors and want to use the same basic profile, but want to add vendor-specific VIBs.

The acceptance level of the VIBs you add to the base image must be at least as high as the level of the base image. If you add a VIB with a lower acceptance level to the image profile, you must lower the image profile acceptance level. For more information, see Working with Acceptance Levels.

Prerequisites

- Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.
- Add or import a software depot to the vSphere ESXi Image Builder inventory. See Add a Software Depot and Import a Software Depot.

Procedure

1. On the vSphere Web Client Home page, click **Auto Deploy**.

   By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.
2. On the **Software Depots** tab, select the software depot that contains the image profile that you want to work with.
3. From the list of image profiles in the depot, select the image profile that you want to clone and click **Clone**.
4. Enter an image profile name, vendor, and description.

   You must enter a unique image profile name.
5. From the **Software depot** drop-down list, select in which custom depot to add the new image profile and click **Next**.
6. (Optional) From the drop-down list, select an acceptance level for the image profile.
7. From the **Available** tab, select the VIBs that you want to add to the image profile and deselect the ones that you want to remove.

   You can view the VIBs that will be added to the image profile from the **Selected** tab. You can filter the VIBs by software depot from the **Software depot** drop-down list on the **Available** tab.

   Note The image profile must contain a bootable ESXi image to be valid.
8. Click **Next**.

   vSphere ESXi Image Builder verifies that the change does not invalidate the profile. Some VIBs depend on other VIBs and become invalid if you include them in an image profile separately. When you add or remove a VIB, vSphere ESXi Image Builder checks whether the package dependencies are met.

9 On the Ready to complete page, review the summary information for the new image profile and click **Finish**.

What to do next

- You can associate an image profile with a new vSphere Auto Deploy rule to provision ESXi hosts. See Create a Deploy Rule or Clone a Deploy Rule.
- You can associate an image profile with an ESXi host. See Add a Host to the vSphere Auto Deploy Inventory.
- Edit the Image Profile Association of a Host.

Create an Image Profile

You can create a new image profile by using the vSphere Web Client instead of cloning an existing one. You might consider creating a new image profile if it differs significantly from the image profiles in your inventory.

The acceptance level of the VIBs you add to the base image must be at least as high as the level of the base image. If you add a VIB with a lower acceptance level to the image profile, you must lower the image profile acceptance level. For more information, see Working with Acceptance Levels.

Prerequisites

- Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.
- Add or import a software depot to the vSphere ESXi Image Builder inventory. See Add a Software Depot and Import a Software Depot.

Procedure

1 On the vSphere Web Client Home page, click **Auto Deploy**.

By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.

2 On the **Software Depots** tab, select the custom depot in which you want to create a new image profile.

3 On the Image Profiles tab, click **New Image Profile**.

4 Enter an image profile name, vendor, and description.

You must enter a unique image profile name.

5 From the **Software depot** drop-down list, select in which custom depot to add the new image profile and click **Next**.

6 (Optional) From the drop-down list, select an acceptance level for the image profile.

7 From the **Available** tab, select the VIBs that you want to add to the image profile and deselect the ones that you want to remove.

You can view the VIBs that will be added to the image profile from the **Selected** tab. You can filter the VIBs by software depot from the **Software depot** drop-down list on the **Available** tab.

Note The image profile must contain a bootable ESXi image to be valid.

8 Click **Next**.

vSphere ESXi Image Builder verifies that the change does not invalidate the profile. Some VIBs are dependent on others and will not be valid if you include them in an image profile separately. When you add or remove a VIB, vSphere ESXi Image Builder checks that package dependencies are met.

9 On the Ready to complete page, review the summary information for the new image profile and click **Finish**.

What to do next

- You can associate an image profile with a new vSphere Auto Deploy rule to provision ESXi hosts. See Create a Deploy Rule or Clone a Deploy Rule.
- You can associate an image profile with an ESXi host. See Add a Host to the vSphere Auto Deploy Inventory.
- Edit the Image Profile Association of a Host.

Edit an Image Profile

You can edit image profiles by using the vSphere Web Client. You can change the name, details and VIB list of an image profile.

The acceptance level of the VIBs you add to the base image must be at least as high as the level of the base image. If you add a VIB with a lower acceptance level to the image profile, you must lower the image profile acceptance level. For more information, see Working with Acceptance Levels.

Prerequisites

- Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.
- Add or import a software depot to the vSphere ESXi Image Builder inventory. See Add a Software Depot and Import a Software Depot.
- Verify that there is at least one custom depot in the vSphere ESXi Image Builder inventory.

Procedure

1 On the vSphere Web Client Home page, click **Auto Deploy**.

By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.

2 On the **Software Depots** tab, select the software depot that contains the image profile that you want to work with.

3 On the **Image Profiles** tab, select the image profile that you want to edit and click **Edit**.

4 (Optional) Change the name, vendor and description information of the image profile.

5 Click **Next**.

6 From the **Available** tab, select the VIBs that you want to add to the image profile and deselect the ones that you want to remove.

You can view the VIBs that will be added to the image profile from the **Selected** tab. You can filter the VIBs by software depot from the **Software depot** drop-down list on the **Available** tab.

Note The image profile must contain a bootable ESXi image to be valid.

7 Click **Next**.

vSphere ESXi Image Builder verifies that the change does not invalidate the profile. Some VIBs depend on other VIBs and become invalid if you include them in an image profile separately. When you add or remove a VIB, vSphere ESXi Image Builder checks whether the package dependencies are met.

8 On the Ready to complete page, review the summary information for the edited image profile and click **Finish**.

What to do next

- You can associate an image profile with a new vSphere Auto Deploy rule to provision ESXi hosts. See Create a Deploy Rule or Clone a Deploy Rule.
- You can associate an image profile with an ESXi host. See Add a Host to the vSphere Auto Deploy Inventory.
- Edit the Image Profile Association of a Host.

Compare Image Profiles

You can compare two image profiles by using the vSphere Web Client, for example, to see if they have the same VIB list, version, or acceptance level.

Prerequisites

- Verify that the vSphere ESXi Image Builder service is enabled and running. See Configure the vSphere ESXi Image Builder Service Startup Type.
- Add or import a software depot to the vSphere ESXi Image Builder inventory. See Add a Software Depot and Import a Software Depot.

Procedure

1 On the vSphere Web Client Home page, click **Auto Deploy**.

By default, only the Administrator role has privileges to use the vSphere ESXi Image Builder service.

2 On the **Software Depots** tab, select the software depot that contains the image profile that you want to work with.