

# VMware Auto Deploy Administrator's Guide

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# About This Book

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The *VMware Auto Deploy Administrator's Guide* explains how to prepare your environment for VMware® Auto Deploy, and how to use VMware Auto Deploy for ESXi deployment. The *VMware Auto Deploy Administrator's Guide* also includes a reference to `deploy-cmd` management commands and troubleshooting information.

## Intended Audience

This book is for experienced system administrators who are familiar with vSphere administration tasks and datacenter operations and know how to use commands in scripts. A solid understanding of DHCP is essential.

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## Related Documentation

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

Auto Deploy is built on top of the vSphere Management Assistant (vMA). See the *vSphere Management Assistant Guide* for additional information about vMA management. To access the guide, go to <http://www.vmware.com>, click Communities, and click Developer on the right. Then choose vSphere Management Assistant under Automation Tools.

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# Introduction to VMware Auto Deploy

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VMware Auto Deploy supports automatic PXE boot (network boot using PXE) and customization of large numbers of ESXi systems. This chapter introduces Auto Deploy, discusses benefits and limitations, and gives an overview of the Auto Deploy architecture and the deployment process.

The chapter includes these topics:

- [“Auto Deploy Components”](#) on page 7
- [“Auto Deploy Architecture”](#) on page 8
- [“Process Overview”](#) on page 8
- [“Auto Deploy Prerequisites Checklist”](#) on page 10
- [“Diagnostic Partitions for ESXi Hosts”](#) on page 11

## Auto Deploy Components

Auto Deploy allows rapid deployment and configuration of a large number of ESXi hosts. After a DHCP server has been set up, Auto Deploy PXE boots machines that are turned on with an ESXi image. Auto Deploy then customizes the ESXi systems using host profiles and other information stored on the managing vCenter Server system. You can set up the environment to use different images and different host profiles for different hosts.

ESXi systems booted through Auto Deploy have the same capabilities as other ESXi systems. However, because these systems depend on the Auto Deploy appliance and the vCenter Server system, some vSphere features might work differently than they work with stateful ESXi systems. See the *VMware Auto Deploy Release Notes*.

The Auto Deploy virtual appliance is based on the vSphere Management Assistant (vMA). vMA includes prepackaged software such as a Linux distribution, the vSphere command-line interface (vCLI), and the vSphere SDK for Perl. Administrators can use the software to run scripts and agents to manage ESX/ESXi and vCenter Server systems. See the *vSphere Management Assistant Guide*.

In addition, Auto Deploy includes these components:

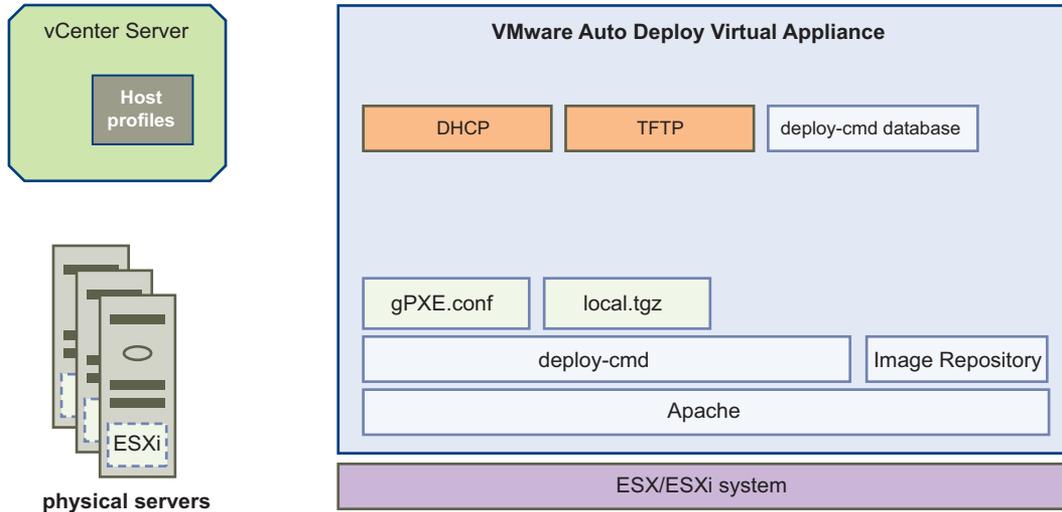
- The services required for performing the PXE boot and the auto-configuration of the ESXi systems (DHCP, TFTP, NFS, HTTP, and so on).
- The `deploy-cmd` command-line interface for configuration and control (see [“VMware Auto Deploy Interfaces”](#) on page 23).
- The `deploy-cmd` database.
- The image repository.

After an ESXi system has booted, the system contacts Auto Deploy. Auto Deploy manages configuration of the system by adding it to the vCenter Server specified in the boot profile and applying the specified host profile.

## Auto Deploy Architecture

Figure 1-1 is a static illustration of the components of the Auto Deploy virtual appliance and the vSphere components Auto Deploy interacts with.

**Figure 1-1.** Auto Deploy Architecture



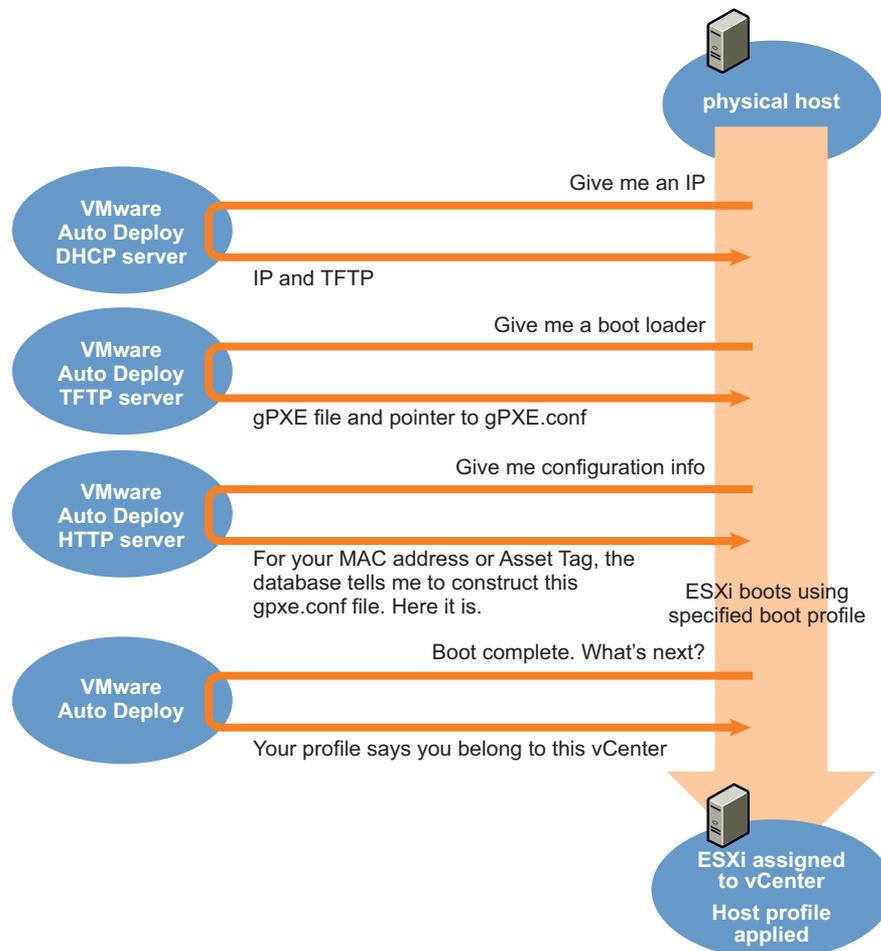
The Auto Deploy virtual appliance runs on a physical server (ESX/ESXi system) and includes components that support Auto Deploy. The physical servers are booted over the network. Auto Deploy first applies configuration stored on Auto Deploy through a boot profile and then applies configuration stored on the vCenter Server system.

- The Auto Deploy virtual appliance is a vSphere Management Assistant (vMA) virtual machine with the preinstalled components listed here. vMA itself comes prepackaged with the `vi fp` CLI for setting up target servers, the vSphere Command-Line Interface (vSphere CLI) and other interfaces and library. See the *vSphere Management Assistant Guide*.
- Auto Deploy includes the following servers for communication during the PXE boot process.
  - DHCP Server – Assigns IP addresses to the ESXi hosts the PXE boot process creates. Also assigns a TFTP Server to a booting host.
  - TFTP Server – First level boot image that is downloaded from the TFTP Server.
  - HTTP Server – Standard Web Server, used to download the files that make up ESXi (b.z, k.z, and so on).
- As part of the boot process, Auto Deploy downloads the files that make up ESXi (b.z, k.z, and so on). The default boot profile included in Auto Deploy lists those files.
- The Auto Deploy image repository comes prepackaged with an ESXi image. You can add other images to the repository using the `deploy-cmd` CLI. See [“Adding a New Image to the Auto Deploy Image Repository”](#) on page 20.
- The `deploy-cmd` database stores the information about the hosts to PXE boot and about available boot profiles. Use the `deploy-cmd` CLI to view or manipulate database content.
- `deploy-cmd` scripts are CGI and CLI scripts available on Auto Deploy. Administrators use the scripts to specify the ESXi boot and configuration process. `deploy-cmd` scripts connect to both the vCenter Server system (host profiles) and the `deploy-cmd` database.

## Process Overview

Figure 1-2 illustrates the interaction between Auto Deploy and the physical host on which you PXE boot ESXi systems.

Figure 1-2. Overview of PXE Boot Process



Auto Deploy supports automatic PXE boot and customization of large numbers of ESXi systems on the physical hosts you designate. Before you can use Auto Deploy, you must perform some setup, discussed in [“Using VMware Auto Deploy for ESXi Deployment”](#) on page 13.

When you are ready to PXE boot the physical servers, Auto Deploy interacts with the servers as follows:

- 1 The administrator turns on the physical server.
- 2 What happens next depends on whether you are using the Auto Deploy DHCP server or your own DHCP server.
  - If you are using the Auto Deploy DHCP server, Auto Deploy directs the physical server to the location from which to download the gPXE file and the gPXE . conf script.
  - If you are using a different DHCP server, you must set it up so physical servers you want to boot using Auto Deploy contact the virtual appliance’s TFTP server. Auto Deploy supplies the download locations for the gPXE file and the gPXE . conf script.

See [“Setting Up the DHCP Server”](#) on page 15.

- 3 The gPXE . conf script looks up the MAC address or asset tag for each host in the deploy-cmd database. The database has information about the boot profile for each host. You can add the information to the database by using the `deploy-cmd` CLI.
- 4 gPXE uses the information in the database to download the files listed from the image repository.
- 5 The last item in the gPXE . conf file is a URL that points to the `local . tgz` script located on Auto Deploy. The `local . tgz` script generates a `local . tgz` file based on the host profile and the boot profile.

- 6 The ESXi host now boots normally using the files downloaded from the image repository and the `local.tgz` file.
- 7 When the host has finished booting, it contacts Auto Deploy. Auto Deploy performs the following actions to complete configuration:
  - a Adds the host to the vCenter Server system specified in the boot profile.
  - b Instructs the host to enter maintenance mode.
  - c Applies the host profile specified in the boot profile.
  - d Performs any additional configuration based on information in the database and on the vCenter Server system. As part of the configuration, Auto Deploy registers virtual machines that were on the host. You can perform additional configuration using a plugin. If you create a plugin, make sure the name starts with an underbar (`_`) character.
  - e Instructs the host to exit maintenance mode.
- 8 At the end of the process, lockdown mode, TSM, and `ssh` are disabled on the freshly configured ESXi host.

After installation is complete, VMware Tools is automatically available for images that are on the Auto Deploy appliance and referenced by a relative path.

If you create a boot profile that uses a URL to point to the repository, you cannot access VMware Tools directly. For example, if the boot profile was created by running `deploy-cmd createprofile -n test -r http://localhost/vmw/vSphere/test`, you cannot access VMware Tools directly, but must install them explicitly from `vmware.com`.

## Auto Deploy Prerequisites Checklist

Before you start performing the PXE boot process on your system, make sure your system meets the following requirements.

- ESX/ESXi version 4.1 system to install Auto Deploy on. The system must be able to connect to the vCenter Server system on which you want to create and store the host profiles.  
10 GB free space and 512 MB of memory are required for the appliance.  
Because the appliance runs a 64-bit operating system, the ESX/ESXi host on which it runs must support 64-bit virtual machines. The host must have one of the following CPUs:
  - For AMD Opteron CPUs, the processor must be Rev E or later. AMD-V hardware virtualization is not required.
  - Intel processors with EM64T support with VT enabled.
 Opteron 64-bit processors earlier than rev E and Intel processors that have EM64T support but not VT support enabled, do not support a 64-bit guest operating system.
- vCenter Server system version 4.1.
  - You can use a standalone system or a system managed by a vCenterServer system.
  - You need a vCenter Server system to store host profiles, add ESXi systems, and apply the host profiles to those ESXi systems. This can be a different vCenter Server system than the one that manages the ESX/ESXi host on which Auto Deploy runs.
- DHCP server setup. If no DHCP server is running in your environment, use the built-in DHCP server. See [“Auto Deploy DHCP Server”](#) on page 15. If a DHCP server is running in your environment, see [“Third-Party DHCP Server”](#) on page 16.
- Physical machines for PXE booting.
  - You must make sure that machines meet the ESXi hardware requirements, specified in *Getting Started with ESXi*, available on [www.vmware.com](http://www.vmware.com) in Support & Downloads > Resources > Documentation.
  - You need a MAC address or asset tag of each machine.

- VMware recommends that you format a VMFS partition on a local disk for storing logs and scratch space for each machine.

You also need the following information to be able to respond to prompts during Auto Deploy appliance setup

- Host name for Auto Deploy.
- Network configuration information: Static IP address, subnet mask, DNS Server, and gateway.

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**IMPORTANT** VMware recommends setting up Auto Deploy with a static IP address.

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- Password for the vi-admin user. No root user is defined on Auto Deploy. The vi-admin user has root user privileges.

## Diagnostic Partitions for ESXi Hosts

By default, ESXi systems booted by Auto Deploy do not include a diagnostic partition (VMKcore partition) for storing diagnostic information such as core dumps. If you need access to the core dump files on the ESXi host, create a diagnostic partition on each host.

You can create a diagnostic partition by removing the `no-auto-partition` line from the boot profile that host uses. Each ESXi host created with that boot profile has a diagnostic partition and a VMFS partition.

You can also create a diagnostic partition using the vSphere Client.

### To create a diagnostic partition on your host

- 1 Log in to the vSphere Client and select the host from the Inventory panel.
- 2 Click the **Configuration** tab and click **Storage** in the Hardware panel.
- 3 Click **Datastores** and click **Add Storage**.
- 4 Select **Diagnostic** and click **Next**.

If you do not see **Diagnostic** as an option, the host already has a diagnostic partition.

You can query and scan the host's diagnostic partition by running the `vicfg-dumppart -l` vCLI command.

- 5 Specify the type of diagnostic partition.

Option	Description
Private Local	Creates a diagnostic partition on a local disk. The partition stores fault information only for your host.
Private SAN Storage	Creates the diagnostic partition on a non-shared SAN LUN. This partition stores fault information only for your host.
Shared SAN Storage	Creates the diagnostic partition on a shared SAN LUN. This partition is accessed by multiple hosts and can store fault information for more than one host.

- 6 Click **Next**.
- 7 Select the device to use for the diagnostic partition and click **Next**.
- 8 Review the partition configuration information and click **Finish**.

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# Using VMware Auto Deploy for ESXi Deployment

# 2

Several tasks are required for deploying and customizing ESXi systems. In most cases, you should perform the tasks in the order they are presented.

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**IMPORTANT** Use the [“Auto Deploy Prerequisites Checklist”](#) on page 10 to determine whether your system setup supports Auto Deploy.

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The chapter includes the following topics:

- [“Setting Up the vCenter Server System”](#) on page 13
- [“Deploying and Configuring the Appliance”](#) on page 13
- [“Setting Up the DHCP Server”](#) on page 15
- [“Making the vCenter Server System a Target Server”](#) on page 16
- [“Deploying the First Host with the Default Boot Profile”](#) on page 17
- [“Customizing the First Host and Creating a Host Profile”](#) on page 17
- [“Customizing Hosts Using Plugins and Boot Options”](#) on page 17
- [“Deploying Additional Hosts”](#) on page 19

## Setting Up the vCenter Server System

Host profiles for customizing the freshly booted ESXi systems are stored on the vCenter Server system. You must therefore set up a vCenter Server to collaborate with Auto Deploy.

You must set up the vCenter Server system to have at least one datacenter. If you do not create a datacenter, Auto Deploy creates one and names it `Untitled`.

## Deploying and Configuring the Appliance

You can deploy the Auto Deploy appliance on an ESX/ESXi system of your choice. The system can be managed by a different vCenter Server system than the one you want to add hosts to. The system must be able to connect to vCenter Server system you want to add hosts to.

### To deploy Auto Deploy

- 1 Log in to a vSphere Client connected to vCenter Server 4.1 system.
- 2 In the inventory pane, select the ESX/ESXi host to which you want to deploy Auto Deploy.
- 3 Select **File > Deploy OVF Template**.  
The Deploy OVF Template wizard appears.
- 4 Click **Browse** and select the location of the OVA file.

- 5 Click **Next** when the download details are displayed, and accept the license agreement.
- 6 When prompted, specify a name and select a location and a folder (optional) for the virtual appliance.
- 7 Select the resource pool for the virtual appliance.  
You can leave the default, which is the top-level root resource pool.
- 8 If prompted, select the datastore to store the virtual appliance on and click **Next**.
- 9 Select the network mapping and click **Next**.

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**IMPORTANT** Make sure Auto Deploy is connected to the management network on which the vCenter Server and ESXi systems that Auto Deploy will interact with are located.

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- 10 Review the information and click **Finish**.

The wizard deploys the Auto Deploy appliance to the host that you selected. The deploy process can take several minutes.

Next you configure your Auto Deploy appliance. When you start Auto Deploy the first time, it prompts you for the following configuration information:

- Host name for the appliance.
- Network configuration for the virtual appliance: IP address, subnet mask, DNS Server, and gateway.

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**IMPORTANT** VMware recommends setting up Auto Deploy with a static IP address.

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- Password for the vi-admin user. No root user exists on Auto Deploy, but the vi-admin user has root user privileges.

### To configure Auto Deploy

- 1 In the vSphere Client, right-click the virtual appliance, and click **Power On**.
- 2 Select the **Console** tab.
- 3 Answer the network configuration prompts.

If multiple network adapters are on the host, you can later use the vSphere Client to add a second network adapter to Auto Deploy.

- 4 When prompted, specify a host name for Auto Deploy.

The name can include alphanumeric characters and cannot be longer than 80 characters.

You can later change the Auto Deploy host name by modifying the `/etc/sysconfig/network` file, as you would for any Linux system.

- 5 When prompted, specify a password for the vi-admin user on this system. This user has root privileges; no root user is defined.

The prompt uses the Linux `passwd` utility.

- If you specify a password considered insecure, for example, a dictionary word or a word with less than six characters, a `Bad Password` message is displayed. Choose a different password. For information about requirements for secure passwords, search the Internet for "Linux secure password."
- You can use special characters directly at the prompt. You do not need to precede special characters with escape characters or surround words that contain special characters in quotes.

You can later change the password for the vi-admin user using the Linux `passwd` command.

Auto Deploy is now configured and prompts you to log in as vi-admin. As vi-admin, you can add servers to Auto Deploy and run commands from the Auto Deploy console.

VMware Tools is automatically available for images that are on the Auto Deploy appliance and referenced by a relative path.

If you create a boot profile that uses a URL to point to the repository, you cannot access VMware Tools directly. For example, if the boot profile was created by running `deploy-cmd createprofile -n test -r http://localhost/vmw/vSphere/test`, you cannot access VMware Tools directly, but must install them explicitly from vmware.com.

## Setting Up the DHCP Server

You must customize the DHCP server configuration so hosts you want to PXE boot are directed to Auto Deploy.

- **Auto Deploy DHCP Server** – If you do not have a DHCP server in your environment, hosts contact the Auto Deploy DHCP server and are automatically added to the `deploy-cmd` database. See [“Auto Deploy DHCP Server”](#) on page 15.
- **Third-party DHCP Server** – If a DHCP server is already running in your environment, you must configure that server so it points to Auto Deploy for all physical hosts you want to PXE boot. What precisely you do depends on the DHCP server you are using.

### Auto Deploy DHCP Server

If you intend to use the DHCP server inside Auto Deploy, you must prepare the DHCP server and might have to resolve IP address issues.

#### Preparing the DHCP Server

You must turn on the built-in DHCP server and can list existing hosts and profiles before you start turning on the hosts.

#### To turn on DHCP and check Auto Deploy setup

- 1 Run `deploy-cmd dhcpconfig` to turn on the Auto Deploy built-in DHCP server.

```
sudo deploy-cmd dhcpconfig
```

The DHCP configuration is derived from the appliance’s static IP address. See [“Resolving IP Address Issues”](#) on page 15.

- 2 Specify the vi-admin user password when prompted. No root user exists on Auto Deploy.
- 3 Get a list of hosts currently managed by Auto Deploy and in the `deploy-cmd` database.

```
deploy-cmd listhosts
```

The list is initially empty. You can explicitly add new hosts with the `deploy-cmd addhost` command if you know the boot NIC MAC address. Otherwise, hosts are added automatically when they contact the DHCP server.

- 4 Get a list of boot profiles managed by Auto Deploy.

```
deploy-cmd listprofiles
```

A default profile, which boots the version of ESXi in the appliance, is included. Newly discovered hosts that were not previously added using `deploy-cmd addhosts` are automatically assigned to the default profile.

#### Resolving IP Address Issues

If you already know the IP addresses you want to use for your hosts, you might have to preconfigure them to avoid using addresses chosen by the DHCP server.

The `dhcpd` configuration of the hosts is based on the appliance's static IP address. The built-in DHCP server hands out addresses that are on the same network segment as the appliance. The server divides the network segment into fifths and uses the third and fourth subsegments for dynamic addresses. For example, if the appliance's IP address is 192.168.2.2 and its netmask is 255.255.255.0, the DHCP range is 192.168.2.100-192.168.2.200. The bottom and top parts of the range are available for your use.

If this configuration causes problems, for example, because you know the IP addresses you want to assign to the PXE booted hosts, open the `dhcpd.conf.template` file and change it.

For example, to bind a host's Ethernet MAC address to an IP address, follow these steps:

- 1 Modify the file `/etc/dhcpd.conf.template` and add the binding, as in the following example:

```
host esx1 {
    hardware ethernet 00:e0:63:81:f7:d3;
    fixed-address 192.168.46.66;
}
```

- 2 Run the following command to regenerate the `etc/dhcpd.conf` file.

```
sudo deploy-cmd dhcpconfig
```

- 3 Restart the server.

## Third-Party DHCP Server

If you have a DHCP server in your environment, you must configure that server so hosts you want to PXE boot interact with Auto Deploy.

### To configure DHCP servers to PXE boot through Auto Deploy

- 1 Specify the Auto Deploy appliance IP as the `next-server` or `Boot Server Host Name` in the DHCP server's PXE configuration.
- 2 Specify `undionly.kpxe.vmw-hardwired` as the `Boot filename` in the DHCP server's PXE configuration.

How you make those changes depends on the DHCP server that you are using. For example, if you are using an ISC DHCP server, you change the `/etc/dhcpd.conf` file. If you are using a Microsoft DHCP server, you make the changes using the GUI.

## Making the vCenter Server System a Target Server

You use a vCenter Server system to configure the ESXi systems that are booted by Auto Deploy. To allow the Auto Deploy appliance to log in to the vCenter Server without authentication, make the vCenter Server system a target server.

- 1 In the Auto Deploy console, type:

```
sudo vifp addserver <vc_name_or_IP>
```

<vc\_name\_or\_IP> is the vCenter Server name or IP address.

- 2 Specify the name and password of a user with administrator privileges on the vCenter Server system when prompted.
- 3 (Optional) To support execution of vSphere CLI commands, initialize the target server.

```
vifptarget
```

After the vCenter Server is a target server, any commands you run against that server from Auto Deploy no longer require authentication.

You can add more than one target server to Auto Deploy using `vifp addserver`. To add ESXi hosts that are managed by different vCenter Server systems, add all vCenterServer systems as target servers. See the *vSphere Management Assistant Guide*.

## Deploying the First Host with the Default Boot Profile

After you have deployed the Auto Deploy virtual appliance, you can PXE boot the first ESXi system.

The first PXE boot uses the default profile and requires only that you turn on the physical machine you want to PXE boot.

The process is automatic and includes these steps:

- 1 The administrator turns on the system.
- 2 When the system looks for an IP address, it finds or is directed to the DHCP server that is set up to handle deployment. The DHCP server performs these tasks:
  - a Assigns an IP address to the system.
  - b Points the machine to the TFTP server to download gPXE. The version of gPXE stored on Auto Deploy is customized to work in the Auto Deploy environment.
  - c Points the machine to the HTTP Server to download the `gpxe.conf` file. For the first machine, the DHCP server points to a `gpxe.conf` file that uses the default boot profile.
- 3 The default `gpxe.conf` file instructs the host to download ESXi software, which is stored in the image repository on the appliance.
- 4 The ESXi system boots normally and contacts Auto Deploy.
- 5 Auto Deploy performs the following actions to complete configuration:
  - a Adds the host to the vCenter Server system specified in the boot profile.
  - b Instructs the host to enter maintenance mode.
  - c Applies the host profile specified in the boot profile.
  - d Instructs the host to exit maintenance mode.

## Customizing the First Host and Creating a Host Profile

The first host you deploy is your reference host. You can customize this host and create a host profile for it. If you update the default boot profile to use the host profile of the reference host, Auto Deploy applies the host profile to the PXE boot hosts.

### To generate the host profile

- 1 Open a vSphere Client and connect to the vCenter Server you want to use as the profile host.
- 2 Select Host Profiles.
- 3 Click **Create Profile** and follow the wizard steps (wizard help is available).
- 4 Set up a root password for the ESXi systems:
  - a Select the host profile and choose **Edit Profile**.
  - b In the Security configuration section, choose Administrator password.
  - c Choose **Configure a fixed administrator password** from the pull-down menu and specify the root password for the ESXi systems to be created by Auto Deploy.

---

**IMPORTANT** Host profiles must be fully specified; they cannot include settings that prompt the user for information.

---

## Customizing Hosts Using Plugins and Boot Options

You can customize some aspects of a host's behavior using plugins and boot options.

## Using Plugins

A plugin is a Python module placed in the following directory:

```
/var/lib/spindoctor/.plugins/deployplugins
```

The plugin module must contain the plugin version variable, `PLUGIN_VERSION`, set to the minimum plugin interface the plugin requires. The current version is `(1, 0)`, resulting in the following Python code:

```
PLUGIN_VERSION = (1, 0)
```

Each plugin defines a `vmwHostUp` function that Auto Deploy calls right after the host has completed booting, but before the host is added to the vCenter Server system. Any functions you define inside that function are called as well. The functions must start with an underbar (`_`) character.

```
vmwHostUp(pm, si, hostDesc, bootProfile)
```

Option	Description
<code>pm</code>	Internal use only.
<code>si</code>	Host <code>ServiceInstance</code> object.
<code>hostDesc</code>	Host description as returned by the database. It can be treated as a dictionary with items relevant to the host. The contents of the database matches the options you call <code>addhost</code> and <code>updatehost</code> with. The following host description elements might be useful. <ul style="list-style-type: none"> <li>■ <code>host ID</code> – The number that <code>deploy-cmd</code> uses to uniquely identify a host in its database. You can use that number with other host-related <code>deploy-cmd</code> commands.</li> <li>■ <code>boot mac</code> – Boot MAC address set for this host.</li> <li>■ <code>asset tag</code> – Asset tag set for this host.</li> <li>■ <code>profile name</code> – Boot profile the host is using as specified in a call to <code>deploy-cmd addhost</code> and <code>deploy-cmd updatehost</code>.</li> </ul>
<code>bootProfile</code>	Boot profile as returned by the database. Contains the information you used when creating the boot profile, for example: <ul style="list-style-type: none"> <li>■ <code>name</code> – Name of the profile.</li> <li>■ <code>vcenter</code> – vCenter Server address.</li> <li>■ <code>repo</code> – Repository address.</li> <li>■ <code>boot images</code> – List of boot images.</li> <li>■ <code>hostprofile</code> – Name of the host profile.</li> <li>■ <code>hostfolder</code> – Name of the folder or cluster to be the host's location.</li> <li>■ <code>plugins</code> – List of plugins.</li> </ul>

[Example 2-1](#) is a Python code fragment that illustrates a simple plugin.

### Example 2-1. Sample Plugin Code Fragment

```
import syslog

from pyVim import host

PLUGIN_VERSION = (1, 0)

def vmwHostUp(_pm, si, hostDesc, bootProfile):
    syslog.syslog('Hello host #%%s running profile %%s' %
                 (hostDesc['id'], bootProfile['name']))

    hostSystem = host.GetHostSystem(si)
    aboutInfo = hostSystem.config.product
    syslog.syslog(' %%s %%s %%s' % (
        aboutInfo.vendor,
        aboutInfo.name,
        aboutInfo.version))
```

You can add plugins to boot profiles using the `--plugin` option to `deploy-cmd createprofile` and `deploy-cmd updateprofile`. When Auto Deploy processes hosts that use that boot profile, it calls the plugin.

## Using Boot Options

The `--bootoptions` option to `deploy-cmd createprofile` and `deploy-cmd updateprofile` allows you to specify boot options for the hosts that Auto Deploy processes. This option allows you to specify commands you would otherwise enter at the boot loader prompt after using Shift-o.

Auto Deploy also supports the `no-auto-partition` option. By default the option is on. You can turn the option off by setting the option to the empty string, as follows:

```
deploy-cmd --bootoptions=""
```

When `no-auto-partition` is set to off, the boot process automatically formats any locally attached and blank disks. If no diagnostic partition exists on the host, the boot process formats one and formats the remaining part of the disk as a VMFS partition.

---

**IMPORTANT** SAS disks are always considered remote, so the boot process does not perform auto partitioning on a SAS disk.

---

## Deploying Additional Hosts

In most cases, you use Auto Deploy as follows:

- 1 Boot the first host, make changes, and create a host profile that uses the first host as the reference host.
- 2 Update the default boot profile using `deploy-cmd updateprofile`.

When Auto Deploy boots other hosts, they use the updated profile, and the reference host's host profile is applied to them.

For this case, you need only to turn on the systems you want to boot and they are configured automatically. See [“Updating the Default Boot Profile”](#) on page 19.

You can further customize the PXE boot hosts to use different images, be assigned to different vCenter Server systems, or include other custom information by creating additional boot profiles. For this case, you proceed as follows:

- 1 Add each system to the `deploy-cmd` database by running `deploy-cmd addhost`.
- 2 Specify the boot profile to use by using the `--profile` option to `deploy-cmd addhost`.

When you turn on a system, it contacts Auto Deploy and is booted with the boot profile that matches its MAC address or asset tag.

You can customize the hosts as follows:

- Add a nondefault image to the image repository. See [“Adding a New Image to the Auto Deploy Image Repository”](#) on page 20.
- Make sure the host profile you want to apply is available on the vCenter Server system you want to deploy to.
- Create a custom boot profile. See [“Creating a Custom Boot Profile”](#) on page 20.
- Add a host to the `deploy-cmd` database. When you add the host, you can specify a custom profile. When the host later boots, Auto Deploy checks the `deploy-cmd` database and configures the host based on the custom profile.

## Updating the Default Boot Profile

If you expect to use only one boot profile in your environment, updating the default profile is the best solution. After you have updated the default profile, any hosts you turn on boots using the updated profile.

To specify the vCenter Server system to add hosts to, run this command:

```
deploy-cmd updateprofile --name=default --vcenter=<vcenter_name>
```

To specify the host profile the default boot profile should apply to each host, run this command:

```
deploy-cmd updateprofile --name=default --hostprofile=<profile_name>
```

## Adding a New Image to the Auto Deploy Image Repository

By default, the Auto Deploy image repository includes an ESXi 4.1 image. To use other versions of ESXi, you can add a new image to Auto Deploy.

To add a new image, you start with the ESXi installer ISO file. The ISO contains the DD image that is normally written to disk by default. You instead use `vibddi` to extract the necessary files from the image and place them in the `/var/lib/deploy/images` directory.

You can use the `vibddi` CLI to manage a vSphere Installation Bundle (VIB). Most `vibddi` commands are for internal use only. Users of Auto Deploy can use `vibddi` to query what is installed and to add a new image to Auto Deploy.

### To check which VIBs are currently installed

Run `vibddi` with the `-q` option.

```
sudo vibddi -i <VMware-VMvisor-dd> -q
```

For example:

```
# sudo vibddi -i VMware-VMvisor-big-26drivers-4.X.X-14XX15.x86_64.dd -q
< vmware-esx-tools-light (4.X.X-0.3.14XX15) >
< ESXi Firmware (4.X.X-14XX15) >
```

### To add a new image to Auto Deploy

- 1 Mount the ISO file from which you want to extract the DD image.

```
sudo mount -o loop /opt/vmware/share/iso/VMware-VMvisor-Installer*.iso /mnt/iso
```

- 2 Create a directory to store the DD image in.

```
$ mkdir /var/lib/deploy/images/my-image
$ cd /var/lib/deploy/images/my-image
```

- 3 Unzip the image and write it to the new directory.

```
bunzip2 -c /mnt/iso/imagedd.bz2 > imagedd
```

- 4 Extract the ESXi system files and locker file.

```
sudo vibddi -i imagedd -e .
sudo vibddi -i imagedd -e . -a /opt/vmware/vibddi/conf/locker_export.cfg
```

- 5 Update the profile to point to the new image.

```
deploy-cmd updateprofile --name=default --repo=my-image
```

## Creating a Custom Boot Profile

Auto Deploy allows you to boot hosts with the default profile or to create profiles and add them to the Auto Deploy database.

Multiple named boot profiles allow you to specify different configuration options for different systems that you boot. You can specify the ESXi image to use, the vCenter Server system to assign the host to, and the host profile to apply.

### To create a boot profile

- 1 Make sure the ESXi image you need is in the image repository, and the host profile you need is available on the vCenter Server system.
- 2 Run the `deploy-cmd createprofile` command, which has the following options:

- `name` – Name of the profile.
- `vcenter` – Name or IP address of a vCenter Server system to add the host to.

- `repo` – Image repository. Defaults to the repository on the Auto Deploy appliance.
- `bootimages` – Boot image to use.
- `bootoptions` – Kernel command-line options.
- `hostprofile` – Name of a host profile to use. The host profile must be available on the specified vCenter Server.
- `plugins` – plugin module names.
- `hostfolder` – vCenter Server folder to add this machine to.

See “[deploy-cmd createprofile](#)” on page 24.

## Adding a Host to the Database

When you add an ESXi host to the `deploy-cmd` database, you specify which boot profile it uses. The boot profile determines the image, vCenter Server, host profile, and other characteristics for the host.

### To add a host to the database

Run `deploy-cmd addhost <host>`

The command allows you to specify a boot profile and either the MAC address or the asset tag for the host.

When you later turn on the host, Auto Deploy checks the database and finds that the host is assigned to a boot profile. The host is booted and uses the assigned options.

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## VMware Auto Deploy Interfaces

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This chapter is a reference to the commands that are supported by Auto Deploy. The chapter presents commands in alphabetical order.

- “[deploy-cmd addhost](#)” on page 23
- “[deploy-cmd createprofile](#)” on page 24
- “[deploy-cmd deletehost](#)” on page 26
- “[deploy-cmd deleteprofile](#)” on page 26
- “[deploy-cmd dhcpconfig](#)” on page 26
- “[deploy-cmd listhosts](#)” on page 27
- “[deploy-cmd listprofiles](#)” on page 27
- “[deploy-cmd updatehost](#)” on page 28
- “[deploy-cmd updateprofile](#)” on page 28

---

**IMPORTANT** You need root user privileges to run `deploy-cmd dhcpconfig`. You can log in as `vi-admin` to run any of the other commands.

---

### deploy-cmd Command Return Values

Commands might return errors, but do not generate any console output on success. Commands do return UNIX exit codes to indicate success or error.

### deploy-cmd addhost

Adds a host to the `deploy-cmd` database and allows you to specify a custom boot profile.

When you turn on a system that is set up to contact Auto Deploy, Auto Deploy boots the system with the default profile by default. You specify a custom boot profile and other custom information in the `deploy-cmd addhost` call. The information is stored in the database.

The boot profile information in the database is used during the boot process. The boot profile can specify, for example, the image should run on the host, the host profile to apply, and the folder or cluster on the vCenter Server system to add the host to.

## Options

Option	Description
<code>--profile &lt;profile_name&gt;</code>	Sets the boot profile to bind the host to. Specify an existing boot profile name. If you do not specify a profile, the command applies to the default profile. See “ <a href="#">deploy-cmd listprofiles</a> ” on page 27, “ <a href="#">deploy-cmd updatehost</a> ” on page 28 and “ <a href="#">deploy-cmd updateprofile</a> ” on page 28.
<code>--bootmac &lt;mac&gt;</code>	MAC address in hexadecimal form, for example: 00:50:56:c0:00:01 Machines are identified by their ethernet NIC MAC addresses or by the asset tag set in the machine's BIOS. You must specify either <code>bootmac</code> or <code>assettag</code> and can specify both.
<code>--assettag &lt;asset_tag&gt;</code>	String representing the asset tag. Many machines let users set the asset tag in the BIOS for inventory tracking. Auto Deploy can use the asset tag for identification. You must specify either <code>bootmac</code> or <code>assettag</code> and can specify both.

## Output

If the command is successful, it prints the following values.

- `host ID` – The number that `deploy-cmd` uses to uniquely identify a host in its database. You can use that number with other host-related `deploy-cmd` commands.
- `boot mac` – Boot MAC address set for this host.
- `asset tag` – Asset tag set for this host.
- `profile name` – Boot profile the host is using.

## Error Conditions

`boot mac` or `asset tag` already present – If the MAC address or asset tag is already present in the `deploy-cmd` database, you can either use the `deploy-cmd deletehost` command to remove the host from the database, or the `deploy-cmd updatehost` command to change settings.

`profile not found` – If you get this message, the system was unable to find the boot profile you specified. Run `deploy-cmd listprofiles` to verify the spelling, or run `deploy-cmd createprofile` to create a profile.

## Example

```
$ deploy-cmd addhost --bootmac=00:50:56:c0:00:08 --profile=profile42
```

Adds a host with the MAC address `00:50:56:c0:00:08` and binds it to the `profile42`.

## deploy-cmd createprofile

Creates a new boot profile.

This command verifies that credentials for the specified vCenter Server system are available, and that the specified host profile exists on the vCenter Server system.

## Options

The `--name` option is required. All other options are optional. If an option value is the empty string, the command pulls default values for an option from a boot profile named `default`. The exception is the `plugins` option, which is always set to the empty string if no value is set.

Option	Description
<code>--name &lt;profile name&gt;</code>	Name of the boot profile to create. <code>deploy-cmd</code> uses the name to identify the profile when you call other commands, for example, <code>deploy-cmd updatehost</code> .
<code>--vcenter</code> <code>&lt;vcenter_server_name&gt;</code>	Name or IP address of a vCenter Server to add the host to. If this option is an empty string, the command uses a default value from the boot profile named <code>default</code> . If <code>default</code> does not point to a vCenter Server, the host is not added to a vCenter Server system and no host profile is applied.
<code>--repo &lt;repo_url&gt;</code>	The location of the ESXi software that the hosts bound to this protocol should boot. You can specify a file path relative to <code>/var/lib/deploym/images</code> on the appliance, or a URL. For example, a value of <code>4.1.0-123456</code> indicates that the files are in <code>/var/lib/deploym/images/4.1.0-123456</code> . If you create a boot profile that uses a URL to point to the repository, you cannot access VMware Tools directly. Download VMware Tools from <a href="http://vmware.com">vmware.com</a> explicitly.
<code>--bootimages</code> <code>&lt;image_list&gt;</code>	A comma-separated and ordered list of files that the machines should boot. The default is <code>b.z,k.z,s.z,c.z,oem.tgz,m.z</code> . The PXE boot loader downloads those files separately from the image repository on the host. If not specified, defaults to the list of ESXi version 4.1 image files <code>b.z,k.z</code> and so on.
<code>--bootoptions</code> <code>&lt;options&gt;</code>	Kernel command-line options. Auto Deploy supports the <code>no-auto-partition</code> option, which is turned on by default. See “Using Boot Options” on page 19. To set multiple boot options, separate them by spaces.
<code>--hostprofile</code> <code>&lt;profile_name&gt;</code>	Name of a host profile in the specified vCenter Server system. Auto Deploy applies that host profile to the host that uses this boot profile. Default is no host profile. If you add a host to a cluster, Auto Deploy ignores this option and applies the cluster’s host profile. Host profiles must be fully specified, they cannot include settings that prompt the user for information.
<code>--plugins &lt;names&gt;</code>	Plugin module names. Names of the python modules stored in <code>/var/lib/deploym/.plugins/deploymplugins/...</code> You can add modules to the directory and specify them as option to <code>--plugins</code> . For example, if a Python module is named <code>my_module.py</code> , use <code>--plugins my_module</code> . Any functions inside the modules you add must start with an underbar ( <code>_</code> ) character. If you specify more than one module, they are executed in the order they are specified. See “Using Plugins” on page 18
<code>--hostfolder &lt;folder&gt;</code>	Path to the folder or cluster in the vCenter Server system to add the host to, for example <code>/MyDataCenter/MyFolder</code> . If you do not specify this option, and if the host is added to a vCenter Server system, the host is added to the first datacenter on that vCenter Server. You can later move the host to a different datacenter. If you specify a path, the host is added to the specified folder or cluster. If the host was added to the vCenter Server system during a different boot process, the host is moved to the specified folder. If the folder or cluster does not exist, a message is logged in <code>/var/log/deploym</code> .

## Warnings

This command prints a warning if no host profile or no vCenter Server system is specified.

- If no vCenter Server system is specified, the ESXi system is not added to a vCenter Server system and no host profile can be applied.
- If no host profile is specified, and if the host is attached to a cluster with a host profile, the cluster host profile is applied.

## Examples

```
deploy-cmd createprofile --name=Test1
```

Creates a profile named `Test1`. You can customize the profile with `deploy-cmd updateprofile`.

## deploy-cmd deletehost

Removes the host from the deploy-cmd database.

If the DHCP server is set up so the host boots using Auto Deploy, the host is automatically added to the database when it boots.

### Options

Option	Description
<code>--hostid &lt;host_id&gt;</code>	Host ID assigned to the host by Auto Deploy. Use the <code>deploy-cmd listhosts</code> command to list all hosts and their <code>deploy-cmd</code> ID numbers. When Auto Deploy adds a host to the database, it assigns an ID to the host.

### Error Conditions

`host id not found` – If the host ID is not found, check the spelling. Use the `deploy-cmd listhosts` command to list all hosts and their `deploy-cmd` ID numbers.

## deploy-cmd deleteprofile

Removes a boot profile from the deploy-cmd database. All hosts must be dissociated from the profile before you can delete it.

### Options

Option	Description
<code>--name &lt;profile_name&gt;</code>	Name of the boot profile to delete

### Error Conditions

`Profile doesn't exist` – If the profile does not exist, check the spelling.

`Profile is in use by hosts (that is, in the hostid to boot profile table)` – Dissociate hosts that are using the profile using `deploy-cmd updatehost`.

`Cannot delete the default profile` – If you try to delete the default profile, this message displays. You cannot delete the default profile.

### Examples

```
deploy-cmd deleteprofile --name Test1
```

## deploy-cmd dhcpconfig

Configures DHCP on the Auto Deploy virtual appliance. The DHCP configuration is based on the appliance's static IP address. Any addresses the DHCP server on the appliance assigns to hosts are on the same network segment as the appliance itself.

The network segment is divided into five subsegments, and the third and fourth subsegment are used for dynamic addresses. If the appliance's IP is 192.168.2.2 and netmask is 255.255.255.0, the DHCP range is 192.168.2.100-192.168.2.200.

On the appliance, the `dhcpd.conf` file is generated from a template file, `/etc/dhcpd.conf.template`. To update DHCP settings, update the template file and regenerate the configuration file, as follows:

- 1 Change the template `/etc/dhcpd.conf.template` file (not the configuration file).
- 2 Run `deploy-cmd dhcpconfig` again to regenerate the `/etc/dhcpd.conf` file.

### Options

This command supports no options.

## Error Conditions

An error results if a non-root user attempts to run the command.

To prevent you from accidentally starting two DHCP servers on the same network, this command fails if the appliance is configured to get its network configuration from DHCP. Use a static IP address to avoid this problem.

## Example

```
sudo deploy-cmd dhcpconfig
```

Creates the `/etc/dhcpd.conf` configuration file, sets up the system to start the DHCP server each time Auto Deploy starts, and starts the DHCP server.

## deploy-cmd listhosts

Displays the following information about each host at the command prompt:

- Host ID
- Boot MAC address
- Asset tag
- Boot profile
- Last boot date
- Last boot status

## Options

This command supports no options.

## Example

```
deploy-cmd listhosts
```

```
Host ID: 1
  Boot MAC   : (none)
  IP Address : (none)
  Asset Tag  : VERIDIAN01
  Boot Profile: default
  Status    : NEW
```

## deploy-cmd listprofiles

Displays the following information for each boot profile or for a specified boot profile at the command prompt.

- Boot profile name
- vCenter Server system
- Boot repository
- Boot images
- Host profile
- vCenter Server folder or datacenter
- Plugins

See [“deploy-cmd updatehost”](#) on page 28 for a discussion of the items in the profile.

## Example

```
deploy-cmd listprofiles
```

```
Name: default
  Repository : (default)
  vCenter    : (none)
  Boot Images : b.z,k.z,s.z,c.z,oem.tgz,m.z
  Boot Options: no-auto-partition
  Plugins     : (none)
```

```
deploy-cmd listprofiles profile1 profile2
```

Lists profile information for the two specified profiles.

## deploy-cmd updatehost

Assigns a new boot profile to a host. A new boot profile is often not needed. Instead, you update the default profile and the hosts use the updated profile. However, if your environment uses multiple profiles, you can use this command to assign a non-default profile to a host.

This command does not affect a currently running host. To apply the changes, reboot the host.

### Options

Option	Description
<code>--hostid &lt;host_id&gt;</code>	Host ID assigned to the host by Auto Deploy. Use the <code>deploy-cmd listhosts</code> command to list all hosts and their <code>deploy-cmd</code> ID numbers. When Auto Deploy adds a host to the database, it assigns an ID to the host. Use the host ID <code>default</code> to configure the profile that unknown hosts are booted with.
<code>--profile &lt;profile_name&gt;</code>	Name of a profile created with <code>deploy-cmd createprofile</code> .

### Error Conditions

`host id not found` – If the `hostid` is not found, you might have misspelled the ID. Run `deploy-cmd listhosts` to list all hosts and their `deploy-cmd` ID numbers.

`profile not found` – If the profile is not found, you might have misspelled the profile. Run `deploy-cmd listprofiles` to list all profiles.

## deploy-cmd updateprofile

Updates an existing boot profile. You must specify a name for the profile you want to update. You can specify all options that `deploy-cmd createprofile` supports.

### Options

The command only changes options you provide.

Option	Description
<code>--name &lt;profile name&gt;</code>	Name of the boot profile to update. <code>deploy-cmd</code> uses the name to identify the profile when you call other commands, for example, <code>deploy-cmd updatehost</code> .
<code>--vcenter &lt;vcenter_server_name&gt;</code>	Name or IP address of a vCenter Server to add the host to. If this option is an empty string, the command uses a default value from the boot profile named <code>default</code> . If <code>default</code> does not point to a vCenter Server, the host is not added to a vCenter Server system and no host profile is applied.
<code>--repo &lt;repo_url&gt;</code>	The location of the ESXi software that the hosts bound to this protocol should boot. You can specify a file path relative to <code>/var/lib/deploy/images</code> on the appliance, or a URL. For example, a value of <code>4.1.0-123456</code> indicates that the files are in <code>/var/lib/deploy/images/4.1.0-123456</code> . If you update a boot profile to use a URL to point to the repository, you cannot access VMware Tools directly. Download VMware Tools from <a href="http://vmware.com">vmware.com</a> explicitly.
<code>--bootimages &lt;image_list&gt;</code>	A comma-separated and ordered list of files that the machines should boot. The default is <code>b.z,k.z,s.z,c.z,oem.tgz,m.z</code> . The PXE boot loader downloads those files separately from the image repository on the host.

Option	Description
<code>--bootoptions</code> <code>&lt;options&gt;</code>	Kernel command-line options. Auto Deploy supports the <code>no-auto-partition</code> option, which is turned on by default. See <a href="#">“Using Boot Options”</a> on page 19. To set multiple boot options, separate them by spaces.
<code>--hostprofile</code> <code>&lt;profile_name&gt;</code>	Name of a host profile in the specified vCenter Server system. Auto Deploy applies that host profile to the host that uses this boot profile. Default is no host profile. If you add a host to a cluster, Auto Deploy ignores this option and applies the cluster’s host profile. Host profiles must be fully specified, they cannot include settings that prompt the user for information.
<code>--plugins</code> <code>&lt;names&gt;</code>	Plugin module names. Names of the python modules stored in <code>/var/lib/deploy/.plugins/deploypugins/...</code> You can add modules to the directory and specify them as option to <code>--plugins</code> . For example, if a Python module is named <code>my_module.py</code> , use <code>--plugins my_module</code> . Any functions inside the modules you add must start with an underbar ( <code>_</code> ) character. If you specify more than one module, modules are executed in the order they are specified. See <a href="#">“Using Plugins”</a> on page 18
<code>--hostfolder</code> <code>&lt;folder&gt;</code>	Path to the folder or cluster in the vCenter Server system to add the host to, for example <code>/MyDataCenter/MyFolder</code> . If you do not specify this option, and if the host is added to a vCenter Server system, the host is added to the first datacenter on that vCenter Server. You can later move the host to a different datacenter. If you specify a path, the host is added to the specified folder or cluster. If the host was added to the vCenter Server system during a different boot process, the host is moved to the specified folder. If the folder or cluster does not exist, a message is logged in <code>/var/log/deployp</code> .

### Warnings

This command prints a warning if no host profile or no vCenter Server system is specified.

### Examples

```
deployp-cmd updateprofile --name=default --bootimages=b.z,k.z,s.z,c.z,oem.tgz,m.z
--vcenter=192.NNN.N.N
```

Updates the default profile to use the specified boot images and vCenter Server system.

```
deployp-cmd updateprofile --name=Test1 --hostprofile=demoprofile
--hostfolder="/Techpubs/host/Test1"
```

Updates the Test1 profile to use the demoprofile host profile and to place the ESXi host that is created using Test1 in the Techpubs/host/Test1 folder.

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# Frequently Asked Questions and Troubleshooting

# 4

This chapter helps you find logs on VMware Auto Deploy, lists some FAQs (frequently asked questions), and discusses best practices. The chapter includes these topics:

- [“Using Logs to Resolve Problems”](#) on page 31
- [“Frequently Asked Questions”](#) on page 31

## Using Logs to Resolve Problems

If you have problems with the deployment of the customized ESXi system, consider looking at the following logs:

- `/var/log/messages` – DHCP messages, general system information
- `/var/log/deploy` – Logging from the `deploy-cmd` commands and CGI scripts
- `/var/log/httpd` (Apache) – Web server logs
- vCenter Server logs – You can download vCenter Server logs and logs for the hosts managed by vCenter Server by using **Administration > Export System Logs** in the vSphere Client.
- `/var/core` – ESXi core dumps. In most cases, core dump information is of interest mainly to VMware Technical Support.

## Frequently Asked Questions

- **Hosts with root password.** I want to create a profile with a preset root password for each host. Right now, the root password is the empty string.

In the vSphere Client, edit the host profile. Set the Administrator password, which is in the Security Configuration section.

VMware recommends that you create a host profile in which a root user account is defined and has a password. See [“To generate the host profile”](#) on page 17. You can then update the boot profile to use that host profile.

- **Virtual machines are not reregistered.** When you use Auto Deploy to update an ESX/ESXi host, for example, to use a new version of ESXi, the virtual machines that were registered with the host are unregistered.

The vCenter Server keeps track of virtual machines and registers them during host boot if the boot profile was created with the `--vcenter` option. If the vCenter Server is down, or if you did not specify the vCenter Server in the boot profile but add the host to the vCenter Server system explicitly, the virtual machines are not reregistered.

- **Hosts boot when vCenter Server is not available.** What happens when ESXi hosts boot and the vCenter Server system specified in the boot profile is not available?

Hosts cannot complete the boot process when the vCenter Server system is not available. The host reboots periodically until the vCenter Server system becomes available.

- **Problems reconnecting to vCenter Server.** I reboot a PXE booted ESXi host, but the host does not reconnect to the vCenter Server system.

In the vSphere Client, choose Administration > vCenter Server Settings and uncheck the vCenter requires verified host SSL certificates check box. The host can reconnect after reboot.

- **Differences between ESXi hosts.** How can I distinguish between a host booted and configured by Auto Deploy and other ESXi hosts?

Some functionality is not available on a PXE boot host. PXE boot hosts do not support:

- Resource pools
- Virtual machine registration after reboot
- **Host profiles are not applied.** Host profiles are available on the vCenter Server system but are not applied. What's the problem?

Make sure the host profile is fully specified and does not require input from the user. Check for the following log message in `/var/log/deploy`:

```
"error: host profile '<name>' requires user input; profiles must be fully specified"
```