

Installing and Configuring VMware Tools

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vSphere

VMware Fusion

VMware Player

VMware Workstation

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About Installing and Configuring VMware Tools

Installing and Configuring VMware Tools provides information about using the various VMware® products to install, upgrade, and configure VMware Tools.

VMware Tools is a suite of utilities that you install in the operating system of a virtual machine. VMware Tools enhances the performance of a virtual machine and makes possible many of the ease-of-use features in VMware products. For example, the following features are just some of the features that are available only if VMware Tools is installed:

- Significantly faster graphics performance and Windows Aero on operating systems that support Aero
- Copying and pasting text, graphics, and files between the virtual machine and the host or client desktop
- Improved mouse performance
- Synchronization of the clock in the virtual machine with the clock on the host or client desktop
- Scripting that helps automate guest operating system operations

Not all features are supported on all guest operating systems or in all VMware products.

Intended Audience

This information is intended for anyone who wants to install, upgrade, or configure VMware Tools in a virtual machine. The information in this book is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

Components of VMware Tools

VMware Tools is a suite of utilities that enhances the performance of a virtual machine. Although a guest operating system can run without VMware Tools, many VMware features are not available until you install VMware Tools.

This chapter includes the following topics:

- [“VMware Tools Service,”](#) on page 7
- [“VMware Tools Device Drivers,”](#) on page 8
- [“VMware User Process,”](#) on page 9

VMware Tools Service

The VMware Tools service starts when the guest operating system boots. The service passes information between host and guest operating systems.

This program, which runs in the background, is called `vmtoolsd.exe` in Windows guest operating systems, `vmware-tools-daemon` in Mac OS X guest operating systems, and `vmtoolsd` in Linux, FreeBSD, and Solaris guest operating systems. The VMware Tools service performs the following tasks:

- Passes messages from the host to the guest operating system, except in Mac OS X guest operating systems.
- Runs scripts that help automate guest operating system operations. The scripts run when the power state of the virtual machine changes.
- Synchronizes the time in the guest operating system with the time on the host, except in Mac OS X guest operating systems.
- In Windows guest operating systems, allows the pointer to move freely between the guest and the vSphere client or the Workstation, Fusion, or Player host operating system.

On Linux guest operating systems that run Xorg 1.8 and later, this functionality is available as a standard feature.

- In Windows and Mac OS X guest operating systems, fits the screen display resolution of the guest to the screen resolution of the vSphere client or the Workstation, Fusion, or Player host, if running in full screen mode. If running in windowed mode, fits the screen resolution of the guest to the size of the window on the client or host. This functionality is performed by the VMware Tools service container (`vmtoolsd`).
- In Windows guest operating systems, helps create the quiesced snapshots used by certain backup applications. This feature applies to vSphere.
- In Linux, Solaris, and FreeBSD guest operating systems, executes commands in the virtual machine when you shut down or restart the guest operating system.

- Is one of the processes that sends a heartbeat to the VMware product to indicate that the guest operating system is running. When the virtual machine runs under vSphere or VMware Server, a gauge for this heartbeat appears in the management interface.
- Provides support for guest operating system-bound calls created with the VMware VIX API, except in Mac OS X guest operating systems.

VMware Tools Device Drivers

Device drivers smooth mouse operations, make VMware features such as folder sharing available, and improve sound, graphics, and networking performance. If you do a custom VMware Tools installation or reinstallation, you can choose which drivers to install.

Which drivers are installed when you install VMware Tools also depends on the guest operating system and the VMware product. The following device drivers can be included with VMware Tools:

SVGA driver

This virtual driver enables 32-bit displays, high display resolution, and significantly faster graphics performance. When you install VMware Tools, a virtual SVGA driver replaces the default VGA driver, which allows for only 640 X 480 resolution and 16-color graphics.

On Windows guest operating systems whose operating system is Windows Vista or later, the VMware SVGA 3D (Microsoft - WDDM) driver is installed. This driver provides the same base functionality as the SVGA driver, and it adds Windows Aero support.

SCSI driver

Included with VMware Tools is the VMware Paravirtual SCSI driver for use with paravirtual SCSI devices. Drivers for other storage adapters are either bundled with the operating system, or they are available from third-party vendors.

For example, Windows Server 2008 defaults to LSI Logic SAS, which provides the best performance for that operating system. In this case, the LSI Logic SAS driver provided by the operating system is used.

Paravirtual SCSI driver

This driver is for VMware Paravirtual SCSI adapters, which enhance the performance of some virtualized applications.

VMXNet NIC drivers

The vmxnet and vmxnet3 networking drivers improve network performance. Which driver is used depends on how you configure device settings for the virtual machine. Search the VMware Knowledge Base for information on which guest operating systems support these drivers.

When you install VMware Tools, a VMXNet NIC driver replaces the default vlance driver.

Mouse driver

The virtual mouse driver improves mouse performance. This driver is required if you use some third-party tools such as Microsoft Terminal Services.

Audio driver

This sound driver is required for all 64-bit Windows guest operating systems and 32-bit Windows Server 2003, Windows Server 2008, and Windows Vista guest operating systems if you use the virtual machine with VMware Server, Workstation, or Fusion.

Kernel module for sharing folders

The host-guest file system module, called hgfs.sys on Windows guest operating systems and vmhgfs on Linux and Solaris, is required to use the virtual machine with Workstation or Fusion and share folders between hosts and guests.

vmblock Module	Used in Workstation and Fusion, this module is essential for drag-and-drop copy operations between hosts and guests.
vShield Endpoint	If you use vSphere and vShield, you can now perform a custom VMware Tools installation to install the vShield Endpoint Thin Agent component. vShield Endpoint uses the hypervisor to perform antivirus scans without a bulky agent. This strategy avoids resource bottlenecks and optimizes memory use. For more information, see the <i>vShield Quick Start Guide</i> .
ThinPrint driver	This driver enables the virtual printing feature on Microsoft Windows virtual machines. With virtual printing, printers added to the operating system on the client or host appear in the list of available printers in the guest operating system. No additional printer drivers must be installed in the virtual machine.
Memory control driver	This driver is available and recommended if you use VMware vSphere. Excluding this driver hinders the memory management capabilities of the virtual machine in a vSphere deployment.
Modules and drivers that support making automatic backups of virtual machines	If the guest operating system is Windows Vista, Windows Server 2003, or other newer Windows operating systems, a Volume Shadow Copy Services (VSS) module is installed. For other, older Windows operating systems, the Filesystem Sync driver is installed. These modules allow external third-party backup software that is integrated with vSphere to create application-consistent snapshots. During the snapshotting process, certain processes are paused and virtual machine disks are quiesced.
VMCI and VMCI Sockets drivers	The Virtual Machine Communication Interface driver allows fast and efficient communication between virtual machines. Developers can write client-server applications to the VMCI Sock (vsock) interface to make use of the VMCI virtual device.

VMware User Process

With the VMware user process, you can use such features as copy and paste, drag and drop, and Unity with VMware products that support these features.

This process starts automatically when you log in to a Windows guest operating system or, on Linux, when you start a Desktop Environment session, but you can also start it manually.

The program file for this process is called `vmtoolsd.exe` on Windows guest operating systems and `vmusr` on Linux, Solaris, and FreeBSD guest operating systems. This process supports the following tasks:

- Allows you to copy and paste text between guest operating system and the vSphere client or the Workstation, Fusion, or Player host operating system. For virtual machines that are used with Workstation or Fusion, you can copy and paste files between the host operating system and Windows, Linux, Solaris, and FreeBSD guest operating systems.
- On Linux, Solaris, and FreeBSD guest operating systems, grabs and releases the pointer when the SVGA driver is not installed.
- On Linux, Solaris, and FreeBSD guest operating systems, fits the screen display resolution of the guest to the screen resolution of the vSphere client or the Workstation, Fusion, or Player host operating system, if running in full screen mode. If running in windowed mode, fits the screen resolution of the guest to the size of the window on the client or host.
- For virtual machines used with Workstation or Fusion, allows you to drag files between the host operating system and Windows, Linux, Solaris, and FreeBSD guest operating systems.

- For VMware products that support the Unity feature, allows you to open an application window in a Windows or Linux guest operating system, enter Unity mode, and have that window appear on your Workstation, Fusion, or Player host desktop like any other host application window.

Installing and Upgrading VMware Tools

2

Installing VMware Tools is part of the process of creating a new virtual machine, and upgrading VMware Tools is part of the process of keeping your virtual machine up to current standards.

Some new features in a particular release of a VMware product might depend on installing or upgrading to the new version of VMware Tools included in that release. Other compatibility options are also available.

- The version of VMware Tools included in vSphere 5.0 is supported on vSphere 4.x and 5.0 virtual machines. That is, you can also use this new version of VMware Tools in virtual machines on ESX/ESXi 4.x hosts.
- Virtual machines in a vSphere 5.0 environment support the versions of VMware Tools included in vSphere 4.0-5.0. That is, you are not strictly required to upgrade VMware Tools if VMware Tools was installed from an ESX/ESXi 4.x host.

This chapter includes the following topics:

- [“Installing VMware Tools,”](#) on page 11
- [“Upgrading VMware Tools,”](#) on page 12
- [“Manually Install or Upgrade VMware Tools in a Windows Virtual Machine,”](#) on page 13
- [“Automate the Installation of VMware Tools in a Windows Virtual Machine,”](#) on page 14
- [“Manually Install or Upgrade VMware Tools in a Linux Virtual Machine,”](#) on page 20
- [“Manually Install or Upgrade VMware Tools in a Solaris Virtual Machine,”](#) on page 22
- [“Manually Install or Upgrade VMware Tools in a FreeBSD Virtual Machine,”](#) on page 23
- [“Manually Install or Upgrade VMware Tools in a NetWare Virtual Machine,”](#) on page 25
- [“Manually Install or Upgrade VMware Tools in a Mac OS X Virtual Machine,”](#) on page 26

Installing VMware Tools

VMware Tools is a suite of utilities that enhances the performance of the virtual machine’s guest operating system and improves management of the virtual machine.

Although the guest operating system can run without VMware Tools, many VMware features are not available until you install VMware Tools. For example, if you do not have VMware Tools installed in your virtual machine, you cannot use the shutdown or restart options from the toolbar. You can use only the power options.

If you are using VMware Fusion, Player, or Workstation, you can use the Windows Easy Install or Linux Easy Install feature to install VMware Tools as soon as the operating system is finished installing.

The installers for VMware Tools are ISO image files. An ISO image file looks like a CD-ROM to your guest operating system. There is an ISO image file for each type of guest operating system, including Windows, Linux, Solaris, FreeBSD, and NetWare. When you select the command to install or upgrade VMware Tools, the virtual machine's first virtual CD-ROM disk drive temporarily connects to the VMware Tools ISO file for your guest operating system.

If you are using VMware Fusion, Player, or Workstation, the most recent versions of the ISO files are stored on a VMware Web site. When you select the command to install or upgrade VMware Tools, the VMware product determines whether it has downloaded the most recent version of the ISO file for the specific operating system. If the latest version has not been downloaded or if no VMware Tools ISO file for that operating system has ever been downloaded, you are prompted to download the file.

The installation procedure varies, depending on the operating system.

Upgrading VMware Tools

You can upgrade VMware Tools manually, or you can configure virtual machines to check for and install newer versions of VMware Tools.

The guest operating system checks the version of VMware Tools when you power on a virtual machine. The status bar of the virtual machine displays a message when a new version is available.

In Windows virtual machines, you can set VMware Tools to notify you when an upgrade is available. If this notification option is enabled, the VMware Tools icon in the Windows taskbar includes a yellow caution icon when a VMware Tools upgrade is available.

To install a VMware Tools upgrade, you can use the same procedure that you used for installing VMware Tools the first time. Upgrading VMware Tools means installing a new version.

For Windows and Linux guest operating systems, you can configure the virtual machine to automatically upgrade VMware Tools. Although the version check is performed when you power on the virtual machine, on Windows guest operating systems, the automatic upgrade occurs when you power off or restart the virtual machine. The status bar displays the message *Installing VMware Tools ...* when an upgrade is in progress.

IMPORTANT When you upgrade VMware Tools on Linux guest operating systems, new network modules are available but are not used until you either reboot the guest operating system or stop networking, unload and re-load the VMware networking kernel modules, and then restart networking. This behavior means that even if VMware Tools is set to automatically upgrade, you must reboot or re-load network modules to make new features available.

This strategy avoids network interruptions and allows you to work with VMware Tools over SSH.

For vSphere virtual machines, you have options for upgrading many virtual machines at the same time.

- Log in to vCenter Server, select a host or cluster, and use the **Virtual Machines** tab to specify the virtual machines on which to perform a VMware Tools upgrade.
- Use Update Manager to perform an orchestrated upgrade of virtual machines at the folder or datacenter level.

Some new features in a particular release of a VMware product might depend on installing or upgrading to the new version of VMware Tools included in that release. Other compatibility options are also available.

Table 2-1. Virtual Machine Compatibility Options

Compatibility	Description
ESXi 5.1 and later	This virtual machine (hardware version 9) is compatible with ESXi 5.1 and later.
ESXi 5.0 and later	This virtual machine (hardware version 8) is compatible with ESXi 5.0 and 5.1.
ESX/ESXi 4.x and later	This virtual machine (hardware version 7) is compatible with ESX/ ESXi 4.x, ESXi 5.0, and ESXi 5.1.

Table 2-1. Virtual Machine Compatibility Options (Continued)

Compatibility	Description
ESX/ESXi 3.5 and later	This virtual machine (hardware version 4) is compatible with ESX/ESX 3.5, ESX/ESX 4.x, and ESXi 5.1. It is also compatible with VMware Server 1.0 and later. You cannot create a virtual machine with ESX/ESXi 3.5 compatibility on ESXi 5.0.
ESX Server 2.x and later	This virtual machine (hardware version 3) is compatible with ESX Server 2.x, ESX/ESXi 3.5, ESX/ESXi 4.x, and ESXi 5.0. You cannot create or edit virtual machines with ESX Server 2.x compatibility. You can only start or upgrade them.

For more information, see the documentation for your specific VMware product.

Manually Install or Upgrade VMware Tools in a Windows Virtual Machine

All supported Windows guest operating systems support VMware Tools.

Install the latest version of VMware Tools to enhance the performance of the virtual machine's guest operating system and improve virtual machine management. When you power on a virtual machine, if a new version of VMware Tools is available, you see a notification in the status bar of the guest operating system.

For Windows 2000 and later, VMware Tools installs a virtual machine upgrade helper tool. This tool restores the network configuration if you upgrade from virtual hardware version 4 to version 7 or higher. In vSphere, virtual hardware version 4 corresponds to ESX/ESXi 3.5 compatibility. Virtual hardware version 7 corresponds to ESX/ESXi 4.x compatibility.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- For vSphere virtual machines, to determine whether you have the latest version of VMware Tools, in the vSphere Client inventory, select the virtual machine and click the **Summary** tab.
- For VMware Player, Fusion, and Workstation virtual machines, if you connected the virtual machine's virtual CD/DVD drive to an ISO image file when you installed the operating system, change the setting so that the virtual CD/DVD drive is configured to autodetect a physical drive.

The autodetect setting enables the virtual machine's first virtual CD/DVD drive to detect and connect to the VMware Tools ISO file for a VMware Tools installation. This ISO file looks like a physical CD to your guest operating system. Use the virtual machine settings editor to set the CD/DVD drive to autodetect a physical drive.

- Log in as an administrator unless you are using an older Windows operating system. Any user can install VMware Tools in a Windows 95, Windows 98, or Windows Me guest operating system. For operating systems newer than these, you must log in as an administrator.
- If you use vSphere and plan to install the vShield Endpoint Thin Agent driver, see the system requirements listed in the *vShield Quick Start Guide*. The vShield component is not installed by default. You must perform a custom installation and include that component.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . <ol style="list-style-type: none"> a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines.
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 If you are using vCenter Server and are performing an upgrade or reinstallation, in the Install/Upgrade VMware Tools dialog box, select **Interactive Tools Installation** or **Interactive Tools Upgrade** and click **OK**.

The process starts by mounting the VMware Tools virtual disc on the guest operating system.

- 3 If you are installing VMware Tools for the first time, click **OK** in the Install VMware Tools information screen.

If autorun is enabled for the CD-ROM drive in the guest operating system, the VMware Tools installation wizard appears.

- 4 If autorun is not enabled, to manually launch the wizard, click **Start > Run** and enter **D:\setup.exe**, where **D:** is your first virtual CD-ROM drive.
- 5 Follow the on-screen instructions.
 If you use vSphere, to install nondefault components, such as the vShield Endpoint Thin Agent driver, select the **Custom** setup.
- 6 If the New Hardware wizard appears, go through the wizard and accept the defaults.
- 7 If you are installing a beta or RC version of VMware Tools and you see a warning that a package or driver is not signed, click **Install Anyway** to complete the installation.
- 8 When prompted, reboot the virtual machine.

If you are using vCenter Server, the **VMware Tools** label on the **Summary** tab changes to **OK**.

What to do next

(Recommended) If you upgraded VMware Tools as part of a vSphere upgrade, next determine whether to upgrade the virtual machines in your environment. To review and compare the hardware available for different compatibility levels, see the *vSphere Virtual Machine Administration* documentation.

Automate the Installation of VMware Tools in a Windows Virtual Machine

If you are installing VMware Tools in a number of Windows virtual machines, you can automate its installation.

The strategy you use to automate the installation of VMware Tools depends on the VMware product you are using.

- If you are using VMware Player or Workstation, you can use the VMware Tools `setup.exe` at a command prompt in the guest operating system.

- If you are using vCenter Server, you can use the **Virtual Machines** tab for a host or cluster and select the virtual machines on which to install or upgrade VMware Tools.

Regardless of which strategy you use, you can specify options for the components you want to include or exclude.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system as an administrator.
- If you plan to use `setup.exe` at the command line to run the VMware Tools installation, edit the virtual machine settings to connect the virtual CD/DVD drive to the VMware Tools ISO image. In VMware Workstation and Player, the `windows.iso` file is on the host in the directory where you installed Workstation or Player.
- If you want to use MSI arguments to specify options regarding the silent installation, go to the Windows Installer page on the MSDN Web site to familiarize yourself with the syntax. You can use these arguments with the `setup.exe` command or place them in the vCenter Server dialog box for automatic installations and upgrades.
- If you want to prevent some VMware Tools components from being installed, familiarize yourself with the VMware Tools component names so that you can specify which components to exclude. See [“Names of VMware Tools Components Used in Silent Installations,”](#) on page 16.
- If you are installing VMware Tools from a beta or release candidate of a VMware product, suppress prompts about unsigned drivers. See [“Suppress Prompts About Unsigned Drivers on Pre-Windows Vista Operating Systems,”](#) on page 18 and [“Add VMware as a Trusted Publisher to Suppress Driver Prompts,”](#) on page 19.

Procedure

- If you use VMware Workstation or Player, use the `setup.exe` command.
 - a Open a command prompt in the guest operating system and change directories to the virtual CD/DVD drive.
 - b Enter the `setup.exe` command with any MSI arguments.

```
setup.exe /S /v "/qn msi_args"
```

To exclude some of the VMware Tools components, use the `ADDLOCAL` and `REMOVE` options.

```
setup.exe /S /v "/qn msi_args ADDLOCAL=ALL REMOVE=component"
```

For example, the following command performs a silent installation and suppresses rebooting when installation is complete. This command also installs all components except the shared folders component.

```
setup.exe /S /v "/qn REBOOT=R ADDLOCAL=ALL REMOVE=Hgfs"
```

The next example shows the same command, but with logging added.

```
setup.exe /S /v "/qn /l*v ""%TEMP%\vmmsi.log"" REBOOT=R ADDLOCAL=ALL REMOVE=Hgfs"
```

- If you use vCenter Server, use the **Virtual Machines** tab to select multiple virtual machines.
 - a In the **Inventory > Hosts and Clusters** view, select the host, cluster, or datacenter and click the **Virtual Machines** tab.
 - b Control-click or Shift-click to select the virtual machines.

- c Right-click and select **Guest > Install/Upgrade VMware Tools**.
- d Complete the dialog box.

To specify any MSI arguments or to specify which VMware Tools components to exclude, add the same arguments and options that you would for the `setup.exe` program in the **Advanced** text box.

Names of VMware Tools Components Used in Silent Installations

In Windows virtual machines, when running an automatic installation or running an installation of VMware Tools using the command line, you can specify which VMware Tools components to install.

Because VMware Tools contains so many components, if you do not want to install particular components, you specify which ones to exclude rather than which ones to include. The syntax is `ADDLOCAL=ALL REMOVE=component`. The valid values for VMware Tools components are listed in the following table.

Component names are case-sensitive. Not all components are installed on all operating systems.

Table 2-2. VMware Tools Component Values

Valid Component Values	Description	
Drivers	Audio	Audio driver for 64-bit operating systems and Windows Vista and later systems.
	BootCamp	Driver for Mac BootCamp support.
	Debug	Driver for the VMware record/replay feature.
	LSI	PCI Fusion-MPT Miniport driver for Windows XP systems.
	MemCtl	VMware memory control driver. Use this driver if you plan to use this virtual machine in a vSphere environment. Excluding this feature hinders the memory management capabilities of the virtual machine running in a vSphere environment.
	Mouse	VMware mouse driver. Excluding this feature decreases mouse performance in your virtual machine.
	PVSCSI	Driver for VMware Paravirtual SCSI adapters, which enhance the performance of some virtualized applications.
	SVGA	VMware SVGA driver. Excluding this feature limits the display capabilities of your virtual machine.
	Sync	Filesystem Sync driver, which enables backup applications to create application-consistent snapshots. This driver ensures that no I/O is written during snapshot creation. This driver is used if the guest operating system is earlier than Windows Server 2003. For newer operating systems, the VSS driver is used instead.
	ThinPrint	Driver that enables printers added to the host operating system to appear in the list of available printers in the virtual machine. This virtual printing feature does not require any additional printer drivers to be installed in the virtual machine.
	VMCI	Virtual Machine Communication Interface driver. This driver allows virtual machines to communicate with each other without using the network. Developers can write client-server applications to the VMCI Sock (vsock) interface to make use of the VMCI virtual device.
	Hgfs	VMware shared folders driver. Use this driver if you plan to use this virtual machine with VMware Workstation, Player, or Fusion. Excluding this feature prevents you from sharing a folder between your virtual machine and the host system.
	VMXNet	VMware VMXnet networking driver.
	VMXNet3	Next-generation VMware VMXnet networking driver for virtual machines that use virtual hardware version 7 and higher. For more information, see the VMware Knowledge Base article 1001805. Virtual hardware version 7 corresponds to ESX/ESXi 4.x compatibility.
	VShield	Driver for the vShield Endpoint Thin Agent component. Install this component if you use vSphere and vShield Endpoint. By default, this component is not installed.
Toolbox	VSS	Driver for creating automatic backups. This driver is used if the guest operating system is Windows Vista, Windows Server 2003, or other newer operating system. For older operating systems and in Linux operating system, the Filesystem Sync driver is used instead.
	Unity	Component to support the Unity feature, which allows you to open an application window in a virtual machine, enter Unity mode, and have that window appear on your host desktop like

Table 2-2. VMware Tools Component Values (Continued)

Valid Component Values	Description
	any other host application window.
PerfMon	Driver for WMI performance logging.

IMPORTANT One way to determine the component values to use is to run the interactive VMware Tools installer with full logging turned on, select the components that you want installed, and then search the log files for the ADDLOCAL and REMOVE properties. The log files show the names used by the program. The following command runs the interactive installer with full logging turned on:

```
Setup.exe /s /v"/qn /l*v ""%TEMP%\vmmsi.log""
```

Suppress Prompts About Unsigned Drivers on Pre-Windows Vista Operating Systems

If you are installing a beta or RC version of VMware Tools in a Windows Server 2003 or earlier guest operating system, you can use a computer properties setting to suppress prompts that interfere with automatic installation of VMware Tools.

The version of VMware Tools included in a beta or release candidate version of a VMware product usually has some drivers that are signed only by VMware. If you are installing one of these versions in many virtual machines that run Windows Server 2003 or earlier guest operating systems, or if you plan to install VMware Tools from the command line, you can suppress prompts about unsigned drivers. If you do not suppress the prompts, during a VMware Tools installation, a message box appears several times and requires you to click **Continue Anyway** to complete the installation.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system as an administrator.

Procedure

- 1 In the Windows Server 2003 or earlier guest operating system, in the **Start** menu, right-click **My Computer** and select **Properties**.
- 2 In the System Properties dialog box, click the **Hardware** tab and click **Driver Signing**.
- 3 In the Driver Signing Options dialog box, click **Ignore** and click **OK**.
- 4 Click **OK** in the System Properties dialog box.

When you run the VMware Tools installer, no prompts appear in the guest operating system.

What to do next

Install VMware Tools. See [“Automate the Installation of VMware Tools in a Windows Virtual Machine,”](#) on page 14.

Add VMware as a Trusted Publisher to Suppress Driver Prompts

If you are installing a beta or RC version of VMware Tools in a Windows Vista or later guest operating system, you can add a VMware certificate to suppress prompts that interfere with automatic installation of VMware Tools.

The version of VMware Tools included in a beta or release candidate version of a VMware product usually has some drivers that are signed only by VMware. If you are installing one of these versions in many virtual machines that run Windows Vista or later guest operating systems, or if you plan to install VMware Tools from the command line, add a VMware security certificate to the trusted publishers group. If you do not add the VMware certificate, during a VMware Tools installation, a message box appears several times and prompts you to install device software from VMware.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system as an administrator.

Procedure

- 1 Use the certificate export wizard to create a VMware certificate file.
 - a Locate a signed VMware file, such as a VMware .exe or .sys file.
 - b Right-click the file and select **Properties**.
 - c Click the **Digital Signatures** tab and select **View Certificate**.
 - d Click the **Details** tab and click **Copy to File**.
 - e Complete the instructions in the export wizard and name the exported certificate `vmware.cer`.
- 2 Copy the exported VMware certificate to the guest operating system on which you plan to install VMware Tools.
- 3 Obtain a copy of the `certmgr.exe` application and copy it to the guest operating system on which you plan to install VMware Tools.

The `certmgr.exe` application is included in the Windows SDK.

- 4 In the guest operating system, run the `certmgr.exe` command to add the VMware certificate to the trusted publishers group.

```
certmgr.exe -add vmware.cer -c -s -r localMachine TrustedPublisher
```

When you run the VMware Tools installer, no prompts appear in the guest operating system.

What to do next

Install VMware Tools. See [“Automate the Installation of VMware Tools in a Windows Virtual Machine,”](#) on page 14.

Manually Install or Upgrade VMware Tools in a Linux Virtual Machine

For Linux virtual machines, you manually install or upgrade VMware Tools by using the command line.

Install the latest version of VMware Tools to enhance the performance of the virtual machine's guest operating system and improve virtual machine management. When you power on a virtual machine, if a new version of VMware Tools is available, you see a notification in the status bar of the guest operating system.

NOTE This procedure describes how to use the VMware Tools tar installer to install or upgrade VMware Tools. For virtual machines in a vSphere environment, you can alternatively use VMware Tools operating system specific packages (OSPs) to install and upgrade VMware Tools. With OSPs you can use the native update mechanisms of your operating system to download, install, and manage VMware Tools. For more information, see [“Operating System Specific Packages for Linux Guest Operating Systems,”](#) on page 22.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.
- For vSphere virtual machines, to determine whether you have the latest version of VMware Tools, in the vSphere Client inventory, select the virtual machine and click the **Summary** tab.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines .
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 In the virtual machine, log in to the guest operating system as root and open a terminal window.
- 3 Run the mount command with no arguments to determine whether your Linux distribution automatically mounted the VMware Tools virtual CD-ROM image.

If the CD-ROM device is mounted, the CD-ROM device and its mount point are listed as something like this:

```
/dev/cdrom on /mnt/cdrom type iso9660 (ro,nosuid,nodev)
```

- 4 If the VMware Tools virtual CD-ROM image is not mounted, mount the CD-ROM drive.
 - a If a mount point directory does not already exist, create it.


```
mkdir /mnt/cdrom
```

Some Linux distributions use different mount point names. For example, on some distributions the mount point is `/media/VMware Tools` rather than `/mnt/cdrom`. Modify the command to reflect the conventions that your distribution uses.
 - b Mount the CD-ROM drive.


```
mount /dev/cdrom /mnt/cdrom
```

Some Linux distributions use different device names or organize the `/dev` directory differently. If your CD-ROM drive is not `/dev/cdrom` or if the mount point for a CD-ROM is not `/mnt/cdrom`, modify the command to reflect the conventions that your distribution uses.
- 5 Change to a working directory (for example, `/tmp`).


```
cd /tmp
```
- 6 Delete any previous `vmware-tools-distrib` directory before you install VMware Tools.

The location of this directory depends on where you placed it during the previous installation. Often this directory is placed in `/tmp/vmware-tools-distrib`.
- 7 List the contents of the mount point directory and note the filename of the VMware Tools tar installer.


```
ls mount-point
```
- 8 Uncompress the installer.


```
tar xzpf /mnt/cdrom/VMwareTools-x.x.x-yyyy.tar.gz
```

The value `x.x.x` is the product version number, and `yyyy` is the build number of the product release.

If you attempt to install a tar installation over an RPM installation, or the reverse, the installer detects the previous installation and must convert the installer database format before continuing.
- 9 If necessary, unmount the CD-ROM image.


```
umount /dev/cdrom
```

If your Linux distribution automatically mounted the CD-ROM, you do not need to unmount the image.
- 10 Run the installer and configure VMware Tools.


```
cd vmware-tools-distrib
./vmware-install.pl
```

Usually, the `vmware-config-tools.pl` configuration file runs after the installer file finishes running.
- 11 Respond to the prompts by pressing Enter to accept the default values, if appropriate for your configuration.
- 12 Follow the instructions at the end of the script.

Depending on the features you use, these instructions can include restarting the X session, restarting networking, logging in again, and starting the VMware User process. You can alternatively reboot the guest operating system to accomplish all these tasks.

If you are using vCenter Server, the **VMware Tools** label on the **Summary** tab changes to **OK**.

What to do next

(Recommended) If you upgraded VMware Tools as part of a vSphere upgrade, next determine whether to upgrade the virtual machines in your environment. To review and compare the hardware available for different compatibility levels, see the *vSphere Virtual Machine Administration* documentation.

Operating System Specific Packages for Linux Guest Operating Systems

For vSphere deployments, VMware provides operating system specific packages (OSPs) as a packaging and distribution mechanism for VMware Tools. These VMware Tools OSPs are packaged using native package formats and standards such as `rpm` and `deb`.

Using OSPs provides the following benefits:

- You can use the native update mechanisms of the guest operating system to download, install, and manage VMware Tools.
- You can upgrade to the latest version of VMware Tools without having to upgrade to the latest version of vSphere.
- Because VMware Tools OSPs follow the best practices and standards of the specific Linux operating system, OSPs use standard mechanisms for determining dependencies among packages. These mechanisms allow you to audit the packages on virtual machines with or without graphics components.
- You can use standard operating system tools to examine OSPs during VMware Tools installation. This process allows you to easily determine which components to install and to verify the validity of the packaging.

IMPORTANT Use OSPs if you want to use native update mechanisms, rather than vCenter Server, to manage updates for VMware Tools. If you use an OSP, the VMware Tools status is **unmanaged** on the virtual machine **Summary** tab. The status **unmanaged** means that you cannot use vCenter Server to manage VMware Tools and you cannot use vSphere Update Manager to upgrade VMware Tools.

For more information, go to the VMware Operating System Specific Packages Web site, at <http://www.vmware.com/download/packages.html>.

Manually Install or Upgrade VMware Tools in a Solaris Virtual Machine

For Solaris virtual machines, you manually install or upgrade VMware Tools by using the command line.

Install the latest version of VMware Tools to enhance the performance of the virtual machine's guest operating system and improve virtual machine management. When you power on a virtual machine, if a new version of VMware Tools is available, you see a notification in the status bar of the guest operating system.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.
- For vSphere virtual machines, to determine whether you have the latest version of VMware Tools, in the vSphere Client inventory, select the virtual machine and click the **Summary** tab.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . <ol style="list-style-type: none"> a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines.
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 In the virtual machine, log in to the guest operating system as root and open a terminal window.
- 3 If the Solaris volume manager does not mount the CD-ROM under `/cdrom/vmwaretools`, restart the volume manager.

```
/etc/init.d/volmgt stop
/etc/init.d/volmgt start
```

- 4 Change to a working directory (for example, `/tmp`).

```
cd /tmp
```

- 5 Extract VMware Tools.

```
gunzip -c /cdrom/vmwaretools/vmware-solaris-tools.tar.gz | tar xf -
```

- 6 Run the installer and configure VMware Tools.

```
cd vmware-tools-distrib
./vmware-install.pl
```

Usually, the `vmware-config-tools.pl` configuration file runs after the installer file finishes running.

- 7 Respond to the prompts by pressing Enter to accept the default values, if appropriate for your configuration.

- 8 Follow the instructions at the end of the script.

Depending on the features you use, these instructions can include restarting the X session, restarting networking, logging in again, and starting the VMware User process. You can alternatively reboot the guest operating system to accomplish all these tasks.

If you are using vCenter Server, the **VMware Tools** label on the **Summary** tab changes to **OK**.

What to do next

(Recommended) If you upgraded VMware Tools as part of a vSphere upgrade, next determine whether to upgrade the virtual machines in your environment. To review and compare the hardware available for different compatibility levels, see the *vSphere Virtual Machine Administration* documentation.

Manually Install or Upgrade VMware Tools in a FreeBSD Virtual Machine

For FreeBSD virtual machines, you manually install or upgrade VMware Tools by using the command line.

Install the latest version of VMware Tools to enhance the performance of the virtual machine's guest operating system and improve virtual machine management. When you power on a virtual machine, if a new version of VMware Tools is available, you see a notification in the status bar of the guest operating system.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.
- For vSphere virtual machines, to determine whether you have the latest version of VMware Tools, in the vSphere Client inventory, select the virtual machine and click the **Summary** tab.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines .
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 In the virtual machine, log in to the guest operating system as root and open a terminal window.
- 3 If the distribution does not automatically mount CD-ROMs, mount the VMware Tools virtual CD-ROM image.

For example, type **mount /cdrom**.

- 4 Change to a working directory (for example, /tmp).

```
cd /tmp
```

- 5 Untar the VMware Tools tar file.

```
tar xzpf /cdrom/vmware-freebsd-tools.tar.gz
```

- 6 If the distribution does not use automounting, unmount the VMware Tools virtual CD-ROM image.

```
umount /cdrom
```

- 7 Run the installer and configure VMware Tools.

```
cd vmware-tools-distrib
./vmware-install.pl
```

Usually, the `vmware-config-tools.pl` configuration file runs after the installer file finishes running.

- 8 Respond to the prompts by pressing Enter to accept the default values, if appropriate for your configuration.

- 9 Follow the instructions at the end of the script.

Depending on the features you use, these instructions can include restarting the X session, restarting networking, logging in again, and starting the VMware User process. You can alternatively reboot the guest operating system to accomplish all these tasks.

If you are using vCenter Server, the **VMware Tools** label on the **Summary** tab changes to **OK**.

What to do next

(Recommended) If you upgraded VMware Tools as part of a vSphere upgrade, next determine whether to upgrade the virtual machines in your environment. To review and compare the hardware available for different compatibility levels, see the *vSphere Virtual Machine Administration* documentation.

Manually Install or Upgrade VMware Tools in a NetWare Virtual Machine

For NetWare virtual machines, you manually install or upgrade VMware Tools by using the command line.

Install the latest version of VMware Tools to enhance the performance of the virtual machine's guest operating system and improve virtual machine management. When you power on a virtual machine, if a new version of VMware Tools is available, you see a notification in the status bar of the guest operating system.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- Because the VMware Tools installer is written in Perl, verify that Perl is installed in the guest operating system.
- For vSphere virtual machines, to determine whether you have the latest version of VMware Tools, in the vSphere Client inventory, select the virtual machine and click the **Summary** tab.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . <ol style="list-style-type: none"> a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines.
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 Load the CD-ROM driver so that the virtual CD-ROM device mounts the ISO image as a volume.

Operating System	Command
NetWare 6.5	LOAD CDDVD
NetWare 6.0 or NetWare 5.1	LOAD CD9660.NSS
NetWare 4.2 (not available in vSphere)	load cdrom

When the installation finishes, the message **VMware Tools for NetWare are now running** appears in the Logger Screen for NetWare 6.5 and NetWare 6.0 guest operating systems and in the Console Screen for NetWare 4.2 and 5.1 operating systems.

- 3 For NetWare 4.2 guest operating systems, restart the guest operating system.
 - a In the system console, shut down the system.
down
 - b In the system console, restart the guest operating system.
restart server
- 4 If the VMware Tools virtual disc (`netware.iso`) is attached to the virtual machine, right-click the CD-ROM icon in the status bar of the console window and select **Disconnect** to disconnect it.

What to do next

(Recommended) If you upgraded VMware Tools as part of a vSphere upgrade, next determine whether to upgrade the virtual machines in your environment. To review and compare the hardware available for different compatibility levels, see the *vSphere Virtual Machine Administration* documentation.

Manually Install or Upgrade VMware Tools in a Mac OS X Virtual Machine

For Mac OS X Server virtual machines you install or upgrade VMware Tools using an installer assistant.

If you use VMware Fusion or ESXi on a computer with an Apple label, you can create Mac OS X Server (10.5 or later) virtual machines and install VMware Tools.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.

Procedure

- 1 Select the menu command to mount and open the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools and select Interactive Tools Installation or Interactive Tools Upgrade
vSphere Web Client	Right-click the virtual machine in the vCenter inventory and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools

- 2 Open **Install VMware Tools** on the VMware Tools virtual disc, follow all the steps in the installer assistant, and click **OK**.

The virtual machine restarts to have VMware Tools take effect.

Repairing, Changing, and Uninstalling VMware Tools Components

3

Usually when you upgrade VMware Tools, the modules are upgraded and new features are added. On Windows guests, however, if you do not perform a custom upgrade, new modules might not be added. If some features do not work correctly after an upgrade, you must change or repair modules. On operating systems other than Windows, you must manually start the VMware User process after an upgrade.

This chapter includes the following topics:

- [“Repair or Change Modules in Windows Virtual Machines,”](#) on page 27
- [“Uninstall VMware Tools,”](#) on page 28
- [“Start the VMware User Process Manually If You Do Not Use a Session Manager,”](#) on page 29

Repair or Change Modules in Windows Virtual Machines

If you have problems with enhanced graphics display or mouse actions or with features that depend on VMware Tools, you might need to repair or modify installed modules.

Occasionally, some new modules are not installed during a VMware Tools upgrade. You can manually install new modules by modifying installed modules.

IMPORTANT Do not use the guest operating system’s **Add/Remove Programs** item in the Windows Control Panel to repair or modify VMware Tools.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system.

Procedure

- 1 Select the menu command to mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Menu Command
vSphere Client	Inventory > Virtual Machine > Guest > Install/Upgrade VMware Tools
vSphere Web Client	Right-click the virtual machine and select All vCenter Actions > Guest OS > Install/Upgrade VMware Tools . a To locate a virtual machine, select a datacenter, folder, cluster, resource pool, host, or vApp. b Click the Related Objects tab and click Virtual Machines .
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools

VMware Product	Menu Command
Workstation	VM > Install (or Upgrade) VMware Tools
Player	Player > Manage > Install (or Upgrade) VMware Tools

- 2 If autorun is not enabled for the CD-ROM drive, to manually launch the VMware Tools installation wizard, click **Start > Run** and enter **D:\setup.exe**, where **D:** is your first virtual CD-ROM drive.
- 3 On the Welcome page of the wizard, click **Next**.
- 4 Specify whether to repair or modify the modules.
 - Click **Repair** to repair the files, registry settings, and so on of components that are already installed.
 - Click **Modify** to specify which modules are installed.
- 5 Follow the on-screen instructions.

What to do next

If features still do not work, uninstall VMware Tools and reinstall.

Uninstall VMware Tools

Occasionally, an upgrade of VMware Tools is incomplete. You can usually solve the problem by uninstalling VMware Tools and then reinstalling.

In a vSphere deployment, if you decide to use Linux operating system specific packages to manage VMware Tools, and if you already used vSphere to install VMware Tools, you must uninstall the existing VMware Tools. For more information about Linux OSPs for VMware Tools, see [“Operating System Specific Packages for Linux Guest Operating Systems,”](#) on page 22.

Prerequisites

- Power on the virtual machine.
- Log in to the guest operating system.

Procedure

- ◆ Use the appropriate operating-system-specific procedure to uninstall VMware Tools.

Operating System	Action
Windows 7	Use the guest operating system's Programs > Uninstall a program item.
Windows Vista and Windows Server 2008	Use the guest operating system's Programs and Features > Uninstall a program item.
Windows XP and earlier	Use the guest operating system's Add/Remove Programs item.
Linux	On a Linux guest operating system that has VMware Tools installed by using an RPM installer, enter the following command in a terminal window: rpm -e VMwareTools
Linux, Solaris, FreeBSD, NetWare	Log in as root and enter the following command in a terminal window: vmware-uninstall-tools.pl
Mac OS X Server	Use the Uninstall VMware Tools application, found in /Library/Application Support/VMware Tools .

What to do next

Reinstall VMware Tools.

Start the VMware User Process Manually If You Do Not Use a Session Manager

One of the executables used by VMware Tools in Linux, Solaris, and FreeBSD guest operating systems is the VMware User process. This program implements the fit-guest-to-window feature and Unity mode, among other features.

Normally, this process is started automatically after you configure VMware Tools and then log out of the desktop environment and log back in. You must start the process manually in the following environments:

- If you run an X session without a session manager (for example, by using `startx` and getting a desktop and not using `xdm`, `kdm`, or `gdm`).
- If you are using certain older versions of GNOME without `gdm` or `xdm`.
- If you are using any session manager or environment that does not support the Desktop Application Autostart Specification, available from <http://standards.freedesktop.org>.
- If you upgrade VMware Tools.

Procedure

- To have the VMware User process start when you start an X session, add `vmware-user` to the appropriate X startup script, such as the `.xsession` or `.xinitrc` file.

The `vmware-user` program is located in the directory where you selected to install binary programs, which defaults to `/usr/bin`. The startup script that needs to be modified depends on your particular system.

- To start the process after a VMware Tools software upgrade or if you notice certain features are not working, open a terminal window and enter the `vmware-user` command.

Using the VMware Tools Configuration Utility

4

The VMware Tools configuration utility is a command-line interface that you can use in the guest operating system to modify VMware Tools settings, shrink virtual disks, and connect and disconnect virtual devices.

The VMware Tools configuration utility provides a command-line interface for functionality that was previously available only in the VMware Tools control panel. The name of this program depends on the guest operating system:

- On Windows operating systems the utility is called `VMwareToolboxCmd.exe`.
- On Mac OS X operating systems the utility is called `vmware-tools-cli`.

Because the VMware Tools installer does not modify any PATH environment variables on Mac OS X operating systems, you must type `./` before the command.

- On Linux, FreeBSD, and Solaris operating systems, the utility is called `vmware-toolbox-cmd`.

Use the utility's `help` command to display complete usage information and syntax.

The VMware Tools configuration utility is included in the following VMware products:

- VMware vSphere 4.1 and later
- VMware Workstation 7.0 and later
- VMware Fusion 3.0 and later
- VMware Player 3.0 and later
- VMware ACE 2.6 and later

NOTE The graphical user interface for VMware Tools, which is sometimes called the VMware Tools control panel and which is available from the notification area in the guest operating system, has been deprecated and will be removed from the product in a future release. The preferred method of configuring VMware Tools is to use the settings available from within your VMware product or to use the command-line VMware Tools configuration utility.

This chapter includes the following topics:

- [“Configure Time Synchronization Between Guest and Host Operating Systems,”](#) on page 32
- [“Disable Time Synchronization Completely,”](#) on page 33
- [“Connect or Disconnect a Virtual Device,”](#) on page 34
- [“Shrink a Virtual Disk,”](#) on page 35
- [“Using Custom VMware Tools Scripts,”](#) on page 36
- [“Retrieve Status Information About the Virtual Machine,”](#) on page 40

Configure Time Synchronization Between Guest and Host Operating Systems

When you turn on periodic time synchronization, VMware Tools sets the time of the guest operating system to be the same as the time of the host.

After time synchronization occurs, VMware Tools checks once every minute to determine whether the clocks on the guest and host operating systems still match. If not, the clock on the guest operating system is synchronized to match the clock on the host.

If the clock on the guest operating system falls behind the clock on the host, VMware Tools moves the clock on the guest forward to match the clock on the host. If the clock on the guest operating system is ahead of that on the host, VMware Tools causes the clock on the guest to run more slowly until the clocks are synchronized.

Native time synchronization software, such as Network Time Protocol (NTP) for Linux and the Mac OS X, or Microsoft Windows Time Service (Win32Time) for Windows, is typically more accurate than VMware Tools periodic time synchronization and is therefore preferred. Use only one form of periodic time synchronization in your guests. If you are using native time synchronization software, turn off VMware Tools periodic time synchronization.

Regardless of whether you turn on VMware Tools periodic time synchronization, time synchronization occurs after certain operations:

- When the VMware Tools daemon is started (such as during a reboot or power on operation)
- When resuming a virtual machine from a suspend operation
- After reverting to a snapshot
- After shrinking a disk

When the operating system starts or reboots, and when you first turn on periodic time synchronization, synchronization can be either forward or backward in time. For other events, synchronization is forward in time.

To disable time synchronization completely, you must edit the configuration file (.vmx file) of the virtual machine and set several synchronization properties to FALSE.

Prerequisites

- Disable other periodic time synchronization mechanisms. For example, some guests might have NTP or Win32Time clock synchronization turned on by default.
- If you plan to script the commands used in this procedure and need to know what the exit codes are, see [“Exit Codes,”](#) on page 42.

NOTE Mac OS X guests use NTP and do not become out of sync with the host. For Mac OS X guests, there is no need to turn on VMware Tools time synchronization.

Procedure

- 1 Open a command prompt or terminal in the guest operating system.
- 2 Change to the VMware Tools installation directory.

Operating System	Default Path
Windows	C:\Program Files\VMware\VMware Tools
Linux and Solaris	/usr/sbin
FreeBSD	/usr/local/sbin
Mac OS X	/Library/Application Support/VMware Tools

- 3 Enter the command to determine whether time synchronization is enabled.

```
utility-name timesync status
```

For *utility-name* use the guest-specific program name.

Operating System	Program Name
Windows	VMwareToolboxCmd.exe
Linux, Solaris, and FreeBSD	vmware-toolbox-cmd

- 4 Enter the command to enable or disable periodic time synchronization.

```
utility-name timesync subcommand
```

For *subcommand*, use `enable` or `disable`.

After you complete this procedure, the VMware Tools service enables or disables periodic time synchronization, as you specified. Disabling periodic time synchronization does not disable all VMware Tools time synchronization.

What to do next

If you need to keep a fictitious time in a virtual machine, so that the clock in the guest operating system is never synchronized with that on the host, disable time synchronization completely.

Disable Time Synchronization Completely

A virtual machine occasionally synchronizes time with the host even if you do not turn on periodic time synchronization. To completely disable time synchronization, you must set some properties in the virtual machine configuration file.

Prerequisites

Power off the virtual machine.

Procedure

- 1 Open the configuration (`.vmx`) file of the virtual machine with a text editor.
- 2 Add lines for the time synchronization properties and set the properties to `FALSE`.

```
tools.syncTime = "FALSE"
time.synchronize.continue = "FALSE"
time.synchronize.restore = "FALSE"
time.synchronize.resume.disk = "FALSE"
time.synchronize.shrink = "FALSE"
time.synchronize.tools.startup = "FALSE"
```

- 3 Save and close the file.

What to do next

Power on the virtual machine.

Connect or Disconnect a Virtual Device

You can connect and disconnect removable devices such as floppy drives, DVD/CD-ROM drives, ISO images, USB devices, sound adapters, and network adapters.

IMPORTANT Note the following restrictions for connecting devices:

- Some devices cannot be shared between the host and guest operating systems or between two guest operating systems. For example, only one virtual machine or the host can access the floppy drive at any one time.
 - The controls for connecting and disconnecting devices might not be available, depending on whether your system administrator has enabled them.
-

For security reasons, this feature is disabled by default. The first part of this procedure describes how to enable the feature in the virtual machine configuration file. After you enable the feature, you can run the configuration utility to connect and disconnect virtual devices.

Prerequisites

If you plan to script the commands used in this procedure and need to know what the exit codes are, see [“Exit Codes,”](#) on page 42.

Procedure

- 1 Configure the virtual machine to allow connecting and disconnecting devices.
 - a Open the configuration (.vmx) file of the virtual machine with a text editor.
 - b If the following properties are not listed in the file, add them and set them to FALSE.


```
isolation.device.connectable.disable = "FALSE"
isolation.device.edit.disable = "FALSE"
```
 - c Save and close the file.

- 2 Open a command prompt or terminal in the guest operating system.

- 3 Change to the VMware Tools installation directory.

Operating System	Default Path
Windows	C:\Program Files\VMware\VMware Tools
Linux and Solaris	/usr/sbin
FreeBSD	/usr/local/sbin
Mac OS X	/Library/Application Support/VMware Tools

- 4 Enter the command to list available devices: ***utility-name device list***.

For *utility-name* use the guest-specific program name.

Operating System	Utility Name
Windows	VMwareToolboxCmd.exe
Linux, Solaris, and FreeBSD	vmware-toolbox-cmd
Mac OS X	vmware-tools-cli

- 5 (Optional) Enter the command to determine whether a device is connected.

utility-name device status device-name

For *device-name*, use one of the names displayed when you used the list subcommand.

- 6 Enter the command to connect or disconnect the device.

```
utility-name device device-name subcommand
```

Option	Action
<i>device-name</i>	Use one of the names displayed when you used the <code>list</code> subcommand.
<i>subcommand</i>	Use <code>enable</code> or <code>disable</code> .

After you complete this procedure, the device is connected or disconnected, as you specified.

Shrink a Virtual Disk

Shrinking a virtual disk reclaims unused space in the virtual disk and reduces the amount of space the virtual disk occupies on the host.

IMPORTANT Shrinking disks is not allowed under the following circumstances:

- The virtual machine is hosted on an ESX/ESXi host. ESX/ESXi can shrink the size of a virtual disk only when a virtual machine is exported. The space occupied by the virtual disk on the server, however, does not change.
- The virtual machine has a Mac OS X guest operating system.
- You preallocated all the disk space to the virtual disk when you created it.
- The virtual machine contains a snapshot.

The exception is if the virtual machine is used in VMware Fusion 4 and has a Windows guest operating system. In this case, you can use the **Clean Up Virtual Machine** button in Fusion to shrink disks.

- The virtual machine is a linked clone or the parent of a linked clone.
 - The virtual disk is an independent disk in nonpersistent mode.
 - The file system is a journaling file system, such as an ext4, xfs, or jfs file system.
-

Shrinking a disk is a two-step process. In the preparation step, VMware Tools reclaims all unused portions of disk partitions (such as deleted files) and prepares them for shrinking. This step takes place in the guest operating system. During this phase, you can still interact with the virtual machine.

In the shrink step, the VMware application reduces the size of the disk based on the disk space reclaimed during the preparation step. If the disk has empty space, this process reduces the amount of space the virtual disk occupies on the host drive. The shrink step takes place outside the virtual machine and takes considerable time, depending on the size of the disk. The virtual machine stops responding while VMware Tools shrinks the disks.

IMPORTANT For your convenience, some newer versions of some VMware products include a button or menu command that performs the same function as the shrink-disk command. For example, Workstation includes a **Compact** menu command that you can use when the virtual machine is powered off. VMware Fusion 4 includes a **Clean Up Virtual Machine** button that can shrink disks even if you have snapshots.

Under some conditions, the ability to invoke a shrink-disk command might be considered a security risk. To configure a setting that disables the ability to shrink disk, see [“Threats Associated with Unprivileged User Accounts,”](#) on page 46.

Prerequisites

- On Linux, Solaris, and FreeBSD guest operating systems, log in as root. If you shrink the virtual disk as a nonroot user, you cannot prepare to shrink the parts of the virtual disk that require root-level permissions.

- On Windows guests, log in as an administrator.
- Verify that the host has free disk space equal to the size of the virtual disk that you plan to shrink.

Procedure

- 1 Open a command prompt or terminal in the guest operating system.
- 2 Change to the VMware Tools installation directory.

Operating System	Default Path
Windows	C:\Program Files\VMware\VMware Tools
Linux and Solaris	/usr/sbin
FreeBSD	/usr/local/sbin
Mac OS X	/Library/Application Support/VMware Tools

- 3 Enter the command to list available mount points.

utility-name disk list

For *utility-name* use the guest-specific program name.

Operating System	Utility Name
Windows	VMwareToolboxCmd.exe
Linux, Solaris, and FreeBSD	vmware-toolbox-cmd

- 4 Enter the command to shrink the disk at a specified mount point.

utility-name disk *mount-point*

For *mount-point*, use one of the mount points displayed when you used the list subcommand.

Using Custom VMware Tools Scripts

You can associate custom scripts with power operations.

When VMware Tools is installed, one or more default scripts run on the guest whenever you change the power state of the virtual machine. You change the power state by using menu commands or by clicking the **Suspend**, **Resume**, **Power On**, and **Power Off** buttons. For example, when you power off a virtual machine, by default the poweroff-vm-default script runs.

For Windows guest operating systems, you can write new scripts or modify default scripts and save them with new names and then configure VMware Tools to use your custom script instead of the default script.

For Linux, Mac OS X, Solaris, and FreeBSD guests, you can write scripts and place them in a certain directory, and then VMware Tools runs your scripts in addition to the default scripts. For power-on and resume operations, the default scripts run before the custom scripts. For suspend and power-off, the default scripts run after the custom scripts. This way, VMware Tools stops services only after the custom scripts finish their work and, conversely, restores the same services before the custom scripts attempt to use the services.)

Use Custom VMware Tools Scripts in Windows Guests

On Windows guest operating systems, you can write scripts to automate guest operating system operations when you change the power state of a virtual machine.

For Windows guest operating systems, you can write new scripts or modify default scripts and save them with new names and then configure VMware Tools to use your custom script instead of the default script.

The default scripts are located in the Program Files\VMware\VMware Tools directory.

On Windows guests, the default scripts for power-on and power-off operations are placeholders only. The script for resume operations contains a line that renews the IP address for the virtual machine. If you write a custom script for the resume operation, you must include this line first.

```
@%SYSTEMROOT%\system32\ipconfig /renew
```

The script for suspend operations contains a line that releases the IP address. If you write a custom script for the suspend operation, you must include this line first.

```
@%SYSTEMROOT%\system32\ipconfig /release
```

Scripts are run by the VMware Tools service, or daemon (`vmtoolsd`). Because `vmtoolsd` is run as root on Linux, Mac, Solaris, and FreeBSD and as System on Windows, the scripts are run in a separate session from the session of the logged-in user. The VMware Tools daemon does not detect desktop sessions, which means that it cannot display graphical applications. Do not attempt to use custom scripts to display graphical applications.

IMPORTANT You cannot run scripts on Windows NT, Me, Windows 98, and Windows 95 guest operating systems.

Prerequisites

- Familiarize yourself with the default VMware Tools scripts. See [“Default VMware Tools Scripts,”](#) on page 38.
- If you plan to script the commands used in this procedure and need to know what the exit codes are, see [“Exit Codes,”](#) on page 42.

Procedure

- 1 Write new scripts or modify default scripts and save them as `.bat` files with new names.

The default scripts are located in the Program Files\VMware\VMware Tools directory.

For suspend scripts, be sure to include the line that releases the IP address. For resume scripts, be sure to include the line that renews the IP address.

- 2 Open a command prompt in the guest operating system.
- 3 Change directories to the VMware Tools installation directory.

The default installation directory is C:\Program Files\VMware\VMware Tools.

- 4 Enter the command to enable the script.

```
VMwareToolboxCmd.exe script script-name enable
```

- 5 Enter the command to use the custom script you created.

```
VMwareToolboxCmd.exe script script-name set script-path
```

For *script-path*, use the full path to the file, such as, "C:\Temp\poweron-my-vm.bat".

- 6 Enter the command to verify that the custom script you specified is now being used.

```
VMwareToolboxCmd.exe script script-name current
```

After you complete this procedure, the VMware Tools service runs the script whenever the specified power operation occurs.

Use Custom Scripts in Operating Systems Other Than Windows

On Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, you can write scripts to automate guest operating system operations when you change the power state of a virtual machine.

For Linux, Mac OS X, Solaris, and FreeBSD guests, you can write scripts and place them in a certain directory, and then VMware Tools runs your scripts in addition to the default scripts. For power-on and resume operations, the default scripts run before the custom scripts. For suspend and power-off, the default scripts run after the custom scripts. This way, VMware Tools stops services only after the custom scripts finish their work and, conversely, restores the same services before the custom scripts attempt to use the services.)

Scripts are run by the VMware Tools service, or daemon (`vmtoolsd`). Because `vmtoolsd` is run as root on Linux, Mac, Solaris, and FreeBSD and as System on Windows, the scripts are run in a separate session from the session of the logged-in user. The VMware Tools daemon does not detect desktop sessions, which means that it cannot display graphical applications. Do not attempt to use custom scripts to display graphical applications.

Prerequisites

- Familiarize yourself with the default VMware Tools scripts. See [“Default VMware Tools Scripts,”](#) on page 38.
- On Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, to test, edit, or disable the running of a script, log in as root.
- On Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, to edit a script, make sure `xterm` and `vi` are installed in the guest operating system and are in your `PATH`, or specify which editor to use by setting the `EDITOR` environment variable.
- If you plan to script the commands used in this procedure and need to know what the exit codes are, see [“Exit Codes,”](#) on page 42.

Procedure

- 1 Log in to the guest operating system as root.
- 2 Write the custom scripts and place them in the correct directory, as instructed by the comments in the default script files for each power operation.

On Linux, Solaris, and FreeBSD guest operating systems, the default scripts are located in the `/etc/vmware-tools` directory. On Mac OS X operating systems the default scripts are located in the `/Library/Application Support/VMware Tools` directory.

Do not make changes to the default scripts.

After you complete this procedure, the VMware Tools service runs the script whenever the specified power operation occurs.

Default VMware Tools Scripts

One or more default scripts for each power state are included in VMware Tools.

What the default scripts do depends in part on the guest operating system:

- On most Microsoft Windows guest operating systems, the default script that runs when you suspend a virtual machine releases the IP address of the virtual machine. The default script that runs when you resume a virtual machine renews the IP address of the virtual machine. This behavior affects only virtual machines configured to use DHCP.

On Windows guest operating systems, the default scripts are located in the Program Files\VMware\VMware Tools folder.

IMPORTANT You cannot run scripts on Windows NT, Me, Windows 98, and Windows 95 guest operating systems.

- On most Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, the default script that runs when you suspend a virtual machine stops networking for the virtual machine. The default script that runs when you resume a virtual machine starts networking for the virtual machine. Scripts cannot be run on NetWare guest operating systems.

On Linux, Solaris, and FreeBSD guest operating systems, the default scripts are located in the /etc/vmware-tools directory. On Mac OS X operating systems the default scripts are located in the /Library/Application Support/VMware Tools directory.

Table 4-1. Default VMware Tools Scripts

Script Name	Description
poweroff-vm-default	This script runs when the virtual machine is being powered off or reset. This script has no effect on networking for the virtual machine.
poweron-vm-default	This script runs when the virtual machine is being powered on rather than resumed. This script also runs after virtual machine restarts. This script has no effect on networking for the virtual machine.
resume-vm-default	This script runs when the virtual machine is resumed after it was suspended. On Windows guest operating systems, if the virtual machine is configured to use DHCP, this script renews the IP address of the virtual machine. On Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, this script starts networking for the virtual machine.
suspend-vm-default	This script runs when the virtual machine is being suspended. On Windows guest operating systems, if the virtual machine is configured to use DHCP, this script releases the IP address of the virtual machine. On Linux, Mac OS X, Solaris, and FreeBSD, this script stops networking for the virtual machine.

For information about how to configure various power operations, see the documentation for the specific VMware product you are using.

Disable a VMware Tools Script

Default scripts for suspending and resuming a virtual machine are written to work together. If you disable the script for one of these actions, you must disable the script for the other action as well.

IMPORTANT You cannot run scripts on Windows NT, Me, Windows 98, and Windows 95 guest operating systems.

Prerequisites

On Linux, Solaris, and FreeBSD guest operating systems, to test, edit, or disable the running of a script, log in as root.

Procedure

- 1 Open a command prompt or terminal in the guest operating system.
- 2 Change to the VMware Tools installation directory.

Operating System	Default Path
Windows	C:\Program Files\VMware\VMware Tools
Linux and Solaris	/usr/sbin
FreeBSD	/usr/local/sbin
Mac OS X	/Library/Application Support/VMware Tools

- 3 Enter the command to disable the script.

```
utility-name script script-name disable
```

Option	Action
<i>utility-name</i> (On Windows)	Use VMwareToolboxCmd.exe.
<i>utility-name</i> (On Linux, Solaris, and FreeBSD)	Use vmware-toolbox-cmd.
<i>script-name</i>	Use power, resume, suspend, or shutdown.

What to do next

If you disabled the script for suspending a virtual machine, repeat this procedure to disable the script for resuming, or if you disabled the script for resuming, also disable the script for suspending.

Execute Commands During Power Off or Reset of a Virtual Machine

In a Linux, Solaris, or FreeBSD guest operating system, you can use the VMware Tools service to execute specific commands when you shut down or restart the guest operating system. You can run commands in addition to any script that is set to run when you shut down the guest operating system.

Procedure

- 1 Use a text editor to open the `/etc/vmware-tools/tools.conf` file.
- 2 To the `tools.conf` file, add one or both of the commands to execute when shutting down or restarting the virtual machine.

Command	Description
halt-command = <i>command</i>	For <i>command</i> specify the command to execute when shutting down.
reboot-command = <i>command</i>	For <i>command</i> specify the command to execute when rebooting.

Retrieve Status Information About the Virtual Machine

You can display information about host time and CPU speed. For virtual machines hosted in a vSphere environment, you can display additional information about memory and CPU reservations and limits.

Prerequisites

- Determine what status information you want to display. See [“Subcommands for the stat Command,”](#) on page 41.
- If you plan to script the commands used in this procedure and need to know what the exit codes are, see [“Exit Codes,”](#) on page 42.

Procedure

- 1 Open a command prompt or terminal in the guest operating system.
- 2 Change to the VMware Tools installation directory.

Operating System	Default Path
Windows	C:\Program Files\VMware\VMware Tools
Linux and Solaris	/usr/sbin
FreeBSD	/usr/local/sbin
Mac OS X	/Library/Application Support/VMware Tools

- 3 Type the command to display the status information.

utility-name stat subcommand

Option	Action
utility-name (On Windows)	Use VMwareToolboxCmd.exe.
utility-name (On Linux, Solaris, and FreeBSD)	Use vmware-toolbox-cmd.
utility-name (On Mac OS X)	Use vmware-tools-cli.
subcommand	Use hosttime or speed, or, if applicable, one of the subcommands available for virtual machines hosted in a vSphere environment.

Subcommands for the stat Command

You can use the stat command to display information such as host time and CPU speed. Additional subcommands are available for virtual machines in a vSphere environment.

Table 4-2. Subcommands for the stat Command

Subcommand Name	Description
hosttime	Displays the date and time on the host.
speed	Displays the CPU speed, in MHz.
balloon	(vSphere only) Displays the amount of memory that is currently reclaimed from the virtual machine through ballooning, in megabytes.
swap	(vSphere only) Displays the current amount of memory swapped out to the virtual machine's swap file, in megabytes.
memlimit	(vSphere only) Displays memory limit information, in megabytes.
memres	(vSphere only) Displays memory reservation information, in megabytes.
cpures	(vSphere only) Displays CPU reservation information, in MHz.
cpulimit	(vSphere only) Displays CPU limit information, in MHz.
sessionid	(vSphere only) Displays the current session ID.

Exit Codes

You might use exit codes if you want to integrate the VMware Tools configuration utility commands with a scripting tool.

Table 4-3. Exit Codes

Code Number	Applicable Command	Description
0	All commands	The command was successful.
1	All commands	Always indicates that an error occurred. For the <code>shrink</code> command, 1 indicates that although shrinking is enabled, the shrink command cannot be carried out.
64	All commands	The command-line argument is not valid.
66	<code>script</code>	The file name does not exist.
69	<code>device</code> and <code>stat</code>	For the <code>device</code> command, 69 indicates that the specified device does not exist. Use the <code>list</code> subcommand to display valid names of devices. For the <code>stat</code> command, 69 indicates that the program could not communicate with the host (EX_UNAVAILABLE).
75	<code>stat</code>	The host does not support the query, perhaps because the host is not an ESX/ESXi host (EX_TEMPFAIL).
77	All commands	Permission errors.

Using Other Methods to Configure VMware Tools

5

Some VMware Tools configuration settings are available from within your VMware product. Also, if you have a NetWare virtual machine, you must use the `vmwtool` program because the VMware Tools Configuration Utility is not available for that operating system.

This chapter includes the following topics:

- [“Configuring VMware Tools from Within VMware Products,”](#) on page 43
- [“Using `vmwtool` to Configure VMware Tools in a NetWare Virtual Machine,”](#) on page 44

Configuring VMware Tools from Within VMware Products

You can use menu commands and dialog boxes from within VMware Workstation, Player, Fusion, and vCenter Server to configure several settings for VMware Tools.

VMware Workstation and VMware Player

You can use the Virtual Machine Settings dialog box and the Preferences dialog box to automatically check for, download, and install VMware Tools upgrades. The Virtual Machine Settings dialog box also contains a command to shrink virtual disks and to enable and disable VMware scripts for power operations.

VMware Fusion

In Fusion 4 you can use the **Automatically check for updates** button to update both Fusion and VMware Tools, and use the **Clean Up Virtual Machine** button to shrink virtual disks.

vSphere

You can use the virtual machine Edit Settings dialog box to automatically check for and upgrade VMware Tools. Also use this dialog box to enable and disable VMware Scripts for power operations or to set the virtual machine to synchronize its clock with that on the host.

In addition, in many VMware products, you can connect and disconnect removable devices by using menu commands or buttons in the virtual machine's status bar.

NOTE The graphical user interface for VMware Tools, which is sometimes called the VMware Tools control panel and which is available from the notification area in the guest operating system, has been deprecated and will be removed from the product in a future release. The preferred method of configuring VMware Tools is to use the settings available from within your VMware product or to use the command-line VMware Tools configuration utility.

Using vmwtool to Configure VMware Tools in a NetWare Virtual Machine

In a NetWare virtual machine, using the system console, you can configure certain virtual machine options such as time synchronization, CPU idling, and device configuration with VMware Tools. The VMware Tools command-line program is called `vmwtool`.

Although you cannot use the VMware Tools configuration utility in a NetWare virtual machine, you can use the `vmwtool` command to achieve some of the same functionality. This command has the following syntax:

`vmwtool command`

For *command*, you can use the commands and options listed in the following table.

Table 5-1. vmwtool Commands

vmwtool Command	Description
<code>help</code>	Displays a summary of VMware Tools commands and options in a NetWare guest operating system.
<code>partitonlist</code>	Displays a list of all disk partitions in the virtual disk and whether or not a partition can be shrunk.
<code>shrink [partition]</code>	Shrinks the listed partitions. If no partitions are specified, all partitions in the virtual disk are shrunk. The status of the shrink process appears at the bottom of the system console.
<code>devicelist</code>	Lists each removable device in the virtual machine, its device ID, and whether the device is enabled or disabled. Removable devices include the virtual network adapter, CD-ROM, and floppy drives. By default, floppy drive is not connected when the virtual machine powers on.
<code>disabledevice [device_name]</code>	Disables the specified device or devices in the virtual machine. If no device is specified, all removable devices in the virtual machine are disabled.
<code>enabledevice [device_name]</code>	Enables the specified device or devices in the virtual machine. If no device is specified, all removable devices in the virtual machine are enabled.
<code>synctime [on off]</code>	Lets you turn on or off synchronization of time in the guest operating system with time on the host operating system. By default, time synchronization is turned off. Use this command without any options to view the current time synchronization status.
<code>idle [on off]</code>	Lets you turn the CPU idler on or off. By default, the idler is turned on. The CPU idler program is included in VMware Tools for NetWare guest operating systems. The idler program is needed because NetWare servers do not idle the CPU when the operating system is idle. As a result, a virtual machine takes CPU time from the host regardless of whether the NetWare server software is idle or busy.

Security Considerations for Configuring VMware Tools

6

Some VMware Tools settings might expose security risks. For example, VMware Tools enables you to connect virtual devices such as serial and parallel ports to virtual machines. A connected device could be a potential channel of attack. To harden a virtual machine and reduce security risks as much as possible, disable the VMware Tools features that might be vulnerable to security threats.

For complete information about securely deploying VMware vSphere in a production environment, including security recommendations for hosts, virtual machines, management components, and a networking infrastructure, see the *vSphere Hardening Guide*. VMware Tools settings relate only to the virtual machine aspect of a deployment.

Virtual machines are encapsulated in a small number of files. One of the important files is the configuration file (.vmx file). This file governs the performance of the virtual hardware and other settings. You can use several methods to see and modify the configuration settings:

- Open the .vmx file directly in a text editor.
- Use the vSphere Client to edit virtual machine settings. In the vSphere Client, editing these configuration parameters is an advanced option in the virtual machine Edit Settings dialog box.
- Use the vSphere Web Client to edit virtual machine settings. In the vSphere Web Client, editing these configuration parameters is an advanced option in the virtual machine Edit Settings dialog box.
- Use a vSphere API-based tool, such as Power CLI, to view and modify .vmx parameters.

After you edit a setting, the change does not take effect until you restart the virtual machine.

Review the following list of potential security threats and the corresponding VMware Tools parameters to set in the virtual machine's .vmx file. The defaults for many of these parameters are already set to protect virtual machines from these threats.

Threats Associated with Unprivileged User Accounts

Disk shrinking feature

Shrinking a virtual disk reclaims unused disk space. Users and processes without root or administrator privileges can invoke this procedure. Because the disk-shrinking process can take considerable time to complete, invoking the disk-shrinking procedure repeatedly can cause a denial of service. The virtual disk is unavailable during the shrinking process. Use the following .vmx settings to disable disk shrinking:

```
isolation.tools.diskWiper.disable = "TRUE"
isolation.tools.diskShrink.disable = "TRUE"
```

Copy and paste feature

By default, the ability to copy and paste text, graphics, and files is disabled, as is the ability to drag and drop files. When this feature is enabled, you can copy and paste rich text and, depending on the VMware product, graphics and files from your clipboard to the guest operating system in a virtual machine. That is, as soon as the console window of a virtual machine gains focus, nonprivileged users and processes running in the virtual machine can access the clipboard on the computer where the console window is running. To avoid risks associated with this feature, retain the following .vmx settings, which disable copying and pasting:

```
isolation.tools.copy.disable = "TRUE"
isolation.tools.paste.disable = "TRUE"
```

Threats Associated with Virtual Devices

Connecting and modifying devices

By default, the ability to connect and disconnect devices is disabled. When this feature is enabled, users and processes without root or administrator privileges can connect devices such as network adapters and CD-ROM drives, and they can modify device settings. That is, a user can connect a disconnected CD-ROM drive and access sensitive information on the media left in the drive. A user can also disconnect a network adapter to isolate the virtual machine from its network, which is a denial of service. To avoid risks associated with this feature, retain the following .vmx settings, which disable the ability to connect and disconnect devices or to modify device settings:

```
isolation.device.connectable.disable = "TRUE"
isolation.device.edit.disable = "TRUE"
```

Virtual Machine Communication Interface (VMCI) for ESXi 5.0 and Earlier

This setting applies to ESXi 5.0 and earlier virtual machines. It does not apply to ESXi 5.1 and later virtual machines.

If VMCI is not restricted, a virtual machine can detect and be detected by all others with the same option enabled within the same host. Custom-built software that uses this interface might have unexpected vulnerabilities that lead to an exploit. Also, a virtual machine could detect how many other virtual machines are within the same ESX/ESXi system by registering the virtual machine. This information could be used for a malicious objective. The virtual machine can be exposed to others within the system as long as at least one program is connected to the VMCI socket interface. Use the following .vmx setting to restrict VMCI:

```
vmci0.unrestricted = "FALSE"
```

Threats Associated with Virtual Machine Information Flow

Configuring virtual machine log size

Because often a new log file is created only when a host is rebooted, log files can grow to be quite large. Uncontrolled logging can lead to denial of service if the datastore runs out of disk space. VMware recommends saving 10 log files, with each one limited to 1,000KB. Use the following .vmx settings to set these limits:

```
log.rotateSize = "10000"
log.keepOld = "10"
```

A more extreme strategy is to disable logging altogether for the virtual machine. Disabling logging makes troubleshooting challenging and support difficult. Do not consider disabling logging unless the log file rotation approach proves insufficient. Use the following .vmx setting to disable logging altogether:

```
logging = "FALSE"
```

VMX file size

By default the configuration file is limited to a size of 1MB because uncontrolled size for the file can lead to a denial of service if the datastore runs out of disk space. Informational messages are sometimes sent from the virtual machine to the .vmx file. These setinfo messages define virtual machine characteristics or identifiers by writing name-value pairs to the file. You might need to increase the size of the file if large amounts of custom information must be stored in the file. The property name is tools.setInfo.sizeLimit, and you specify the value in kilobytes. Retain the following .vmx setting:

```
tools.setInfo.sizeLimit = "1048576"
```

Sending performance counters into PerfMon

You can integrate virtual machine performance counters for CPU and memory into PerfMon for Microsoft Windows guest operating systems. This feature makes detailed information about the physical host available to the guest operating system. An adversary could potentially use this information to inform further attacks on the host. By default this feature is disabled. Retain the following .vmx setting to prevent host information from being sent to the virtual machine:

```
tools.guestlib.enableHostInfo = "FALSE"
```

This setting blocks some but not all metrics. If you set this property to FALSE, the following metrics are blocked:

- GUESTLIB_HOST_CPU_NUM_CORES
- GUESTLIB_HOST_CPU_USED_MS
- GUESTLIB_HOST_MEM_SWAPPED_MB
- GUESTLIB_HOST_MEM_SHARED_MB
- GUESTLIB_HOST_MEM_USED_MB
- GUESTLIB_HOST_MEM_PHYS_MB
- GUESTLIB_HOST_MEM_PHYS_FREE_MB
- GUESTLIB_HOST_MEM_KERN_OVHD_MB
- GUESTLIB_HOST_MEM_MAPPED_MB

Features not exposed in vSphere that could cause vulnerabilities**■ GUESTLIB_HOST_MEM_UNMAPPED_MB**

Because VMware virtual machines run in many VMware products in addition to vSphere, some virtual machine parameters do not apply in a vSphere environment. Although these features do not appear in vSphere user interfaces, disabling them reduces the number of vectors through which a guest operating system could access a host. Use the following .vmx setting to disable these features:

```
isolation.tools.unity.push.update.disable = "TRUE"
isolation.tools.ghi.launchmenu.change = "TRUE"
isolation.tools.ghi.autologon.disable = "TRUE"
isolation.tools.hgfsServerSet.disable = "TRUE"
isolation.tools.memSchedFakeSampleStats.disable = "TRUE"
isolation.tools.getCreds.disable = "TRUE"
```


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