VMware Tools User Guide

VMware Tools 10.1.0

This document supports the version of each product listed and supports all subsequent versions until the document is replaced by a new edition. To check for more recent editions of this document, see http://www.vmware.com/support/pubs.

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Contents

About This Book

The *VMware Tools Guide* describes how to install, upgrade, and configure VMware Tools.

Intended Audience

This information is intended for anyone who wants to install, upgrade, and configure VMware Tools. The information is written for system administrators who are familiar with virtualization.

VMware Technical Publications Glossary

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

1 Introduction to VMware Tools

VMware Tools is a set of services and modules that enable several features in VMware products for better management of, and seamless user interactions with, guests operating systems.

For example, VMware Tools has the ability to:

- Pass messages from the host operating system to the guest operating system.
- Customize guest operating systems as a part of the vCenter Server and other VMware products.
- Run scripts that help automate guest operating system operations. The scripts run when the power state of the virtual machine changes.
- Synchronize the time in the guest operating system with the time on the host operating system

VMware Tools Lifecycle Management provides a simplified and scalable approach for installation and upgrade of VMware Tools. It includes a number of feature enhancements, driver-related enhancements, and support for new guest operating systems. Run the latest version of VMware Tools or use open-vm-tools distributed with the Linux OS distribution. Although a guest operating system can run without VMware Tools, always run the latest version of VMware Tools in your guest operating systems to access the latest features and updates. You can configure your virtual machine to automatically check for and apply VMware Tools upgrades each time you power on your virtual machines. For information about enabling automatic upgrade of VMware Tools on your virtual machines, see *vSphere Virtual Machine Administration Guide*

This chapter includes the following topics:

VMware Tools Service

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

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

- Performs virtual machine power operations gracefully.

- Runs VMware provided or user configured scripts in guest operating systems during various power operations.
- Runs programs, commands, and file-system operations in guest operating system to enhance guest automation.
- Authenticates guest user operations.
- Collects network, disk, and memory usage information from the guest periodically.
- Generates heartbeats from guest operating system to hosts so that VMware High Availability can determine availability of guest operating systems.
- Synchronizes clocks between guest operating system and hosts or client desktops.
- Quiesces guest file systems so that host can capture file-system-consistent guest snapshots.
- Executes `pre-freeze-script.bat` and `post-thaw-script.bat` while quiescing guest file systems.
- Customizes guest operating systems immediately after powering on virtual machines.
- Enables Shared Folders between host and guest file systems on VMware Workstation and VMware Fusion.
- Enables copying and pasting of text, graphics, and files between guest operating systems and hosts or client desktops.

VMware Tools Device Drivers

Device drivers improve sound, graphics, networking, and storage performance. If you perform a custom VMware Tools installation or reinstallation, you can choose which drivers to install.

The set of drivers that are installed when you install VMware Tools depends on the guest operating system and the VMware product. For detailed information about the features or functionality that these drivers enable, including configuration requirements, best practices, and performance, see the documentation for your 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.

Paravirtual SCSI driver

When you create a virtual machine, if you specify that you want the virtual machine to use a BusLogic adapter, the guest operating system uses the SCSI driver that VMware Tools provides. A VMware Paravirtual SCSI driver is included for use with paravirtual SCSI devices. This driver for VMware Paravirtual SCSI adapters enhances the performance of some virtualized applications. 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.

VMware supplies a special SCSI driver for virtual machines that are configured to use the BusLogic virtual SCSI adapter. Virtual machines do not need this driver if they do not need to access any SCSI devices or if they are configured to use the LSI Logic virtual SCSI adapter.

The driver is included as part of the VMware Tools package or comes bundled with VMware ESX/ESXi. It is available on the host as a floppy image at `/vmimages/floppies/vmscsi.flp`. The driver can be used in Windows XP, Windows Server 2003, or Windows 2000.

VMXNet NIC drivers

The VMXNET and VMXNET3 networking drivers improve network performance. The set of drivers that are 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 third-party tools such as Microsoft Terminal Services.

Audio driver

This sound driver is required for 64-bit Windows XP, 32-bit Windows Server 2003, 64-bit Windows Server 2003, Windows Server 2008, Windows 7, and Windows Vista guest operating systems.

Guest Introspection Driver

The two Guest Introspection drivers are the File Introspection driver and the Network Introspection driver. You can install the two drivers separately. When you install VMware Tools, by default, the Guest Introspection drivers are not installed.

- File Introspection Driver: The File Introspection driver uses the hypervisor to perform antivirus scans without a bulky agent. This strategy avoids resource bottlenecks and optimizes memory use.
- Network Introspection Driver: The Network Introspection driver supports NSX for vSphere Activity Monitoring.

Memory control driver

This driver is required for memory ballooning and is 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, earlier 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. The modules also support quiescing snapshot on Linux OS

VMCI and VMCI Sockets drivers

The Virtual Machine Communication Interface driver supports fast and efficient communication between virtual machines and the hosts they run on. Developers can write client-server applications to the VMCI Sock (vsock) interface to make use of the VMCI virtual device.

VMware drivers for Linux

The drivers for Linux are automatically installed during your operating system installation, eliminating the need to separately install drivers after OS installation. VMware actively maintains the source code for VMware paravirtual drivers, VMXNET, VMXNET3 and kernel modules, and any Linux distributions creating new OS releases automatically include the latest VMware drivers.

Do not delete or replace existing inbox drivers for Linux that are distributed by your OS vendors. Deleting or replacing these drivers might cause conflict with future updates to the drivers. Contact your OS vendor or OS community for availability of specific updates to drivers.

See http://kb.vmware.com/kb/2073804 for information about availability, maintenance, and support policy for inbox drivers for Linux.

VMHGFS driver

If you use Workstation or Fusion, you can install the Shared Folders component. With Shared Folders, you can easily share files among virtual machines and the host computer. The VMHGFS driver is a file system redirector that allows file system redirection from the guest operating system to the host file system. This driver is the client component of the Shared Folders feature and provides an easy to use alternative to NFS and CIFS file sharing that does not rely on the network. For Linux distributions with kernel version 4.0.0 and later, a new FUSE based Shared Folders client is used as a replacement for the kernel mode client.

VMware User Process

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

In Linux, Solaris, Windows and FreeBSD guest operating systems, VMware Tools uses the VMware User process executable file that implements fit-guest-to-window feature.

The user process starts automatically when you log in to a Windows guest operating system. On Linux, the user process starts when you start a Desktop Environment session. The user process can also be started manually.

The program file for this process is called `vmtoolsd.exe` on Windows guest operating systems and `vmtoolsd` on Linux, Solaris, and FreeBSD guest operating systems. In POSIX, it is `vmtoolsd` with `–n vmusr` on command line interface. The user process supports the following tasks:

- Enables copy and paste of text between guest operating system and the vSphere Web 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, Windows, and FreeBSD guest operating systems, grabs and releases the pointer if 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 Web Client or the Workstation, Fusion, or Player host operating system, if running in full screen mode. If running in normal (windowed) mode, fits the screen resolution of the guest to the size of the window on the client or host.
- On Linux, Solaris, and FreeBSD guest operating systems, fits the screen display resolution of the guest to the screen resolution of the vSphere Web Client, 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.

VMware Tools Lifecycle Management

VMware Tools10.1.0 is a major release with several enhancements. This adds simplified and scalable approach for install and upgrade of VMware Tools, reboot less upgrade for newer Linux Tools, support for OSP upgrades, enhanced version reporting using UI and status reporting using API and UI. This version comes with a number of feature enhancements, driver related enhancements and support for new guest operating systems.

Mapping of VMware Tools and Guest Operating System

In earlier versions, VMware Tools ISO images were shipped with the ESXi image. These ISO images are deployed on ProductLocker partition of the ESXi. However, this approach poses a challenge due to limited space in ProductLocker. In order to address this space limitation, only `winPreVista.iso` , `linux.iso` and `winPreVista.iso` are bundled with ESXi. Other ISO images are available for download from https://myvmware.com. These ISO images will not be shipped with ESXi in the tools-light vib. ISO images for few end of life guest operating systems are frozen.

Table 1-1. VMware Tools support for Guest Operating Systems in version 10.1.0 and 10.0.12

ISO Images	Supported Guest Operating System	Version of VMware Tools
`winPreVista.iso`	Windows 2000, Windows XP, and Windows Server 2003	10.0.12
`linuxPreGLibc25.iso`	Linux guest operating systems earlier than RHEL 5, SLES 11, and other distributions with glibc version earlier than 2.5	10.0.12
`darwinPre15.iso`	MAC OS versions earlier than 10.10.x	10.0.12
`windows.iso`	Windows Vista and later	10.1.0
`linux.iso`	Linux guest operating systems with glibc version 2.5 and later	10.1.0
`darwin.iso`	MAC OS versions 10.11 and later	10.1.0
`freebsd.iso`	FreeBSD operating systems	10.1.0
`solaris.iso`	Solaris operating systems	10.1.0

Table 1-2. VMware Tools support for frozen Guest Operating Systems

ISO images	Supported Guest Operating System	Version of VMware Tools
`winPre2k.iso`	Versions earlier than Windows 2000	7.7.0
`netware.iso`	Netware operating systems	8.1.0

Using Open VM Tools

Open VM Tools (open-vm-tools) is the open source implementation of VMware Tools for Linux guest operating systems.

The open-vm-tools suite is bundled with some Linux operating systems and is installed as a part of the OS, eliminating the need to separately install the suite on guest operating systems. All leading Linux vendors support the open-vm-tools suite on vSphere, Workstation, and Fusion, and bundle open-vm-tools with their product releases. For information about OS compatibility check for the open-vm-tools suite, see the *VMware Compatibility Guide* at http://www.vmware.com/resources/compatibility.

Note Use of open-vm-tools with a OS distribution which is not listed under *VMware Compatibility Guide* must be certified by VMware.

Bundling open-vm-tools with Linux OS releases reduces virtual machine downtime because all updates to the open-vm-tools suite are included with the OS maintenance patches and updates. You do not have to maintain separate maintenance cycles for open-vm-tools suite updates. This is also applicable for VMware guest operating system drivers.

In some cases, open-vm-tools is installed by default when you install your guest operating systems. In other cases, the open-vm-tools suite is not installed by default, unless specifically selected during installation.

Follow the installation instructions provided by your OS vendor for your specific release or check the partner Web site at http://partnerweb.vmware.com/GOSIG/home.html.

VMware fully supports open-vm-tools that are developed in collaboration with OS vendors and open source communities and recommends using open-vm-tools that are redistributed by your OS vendors.

Open VM Tools Packages

For better managing guest operating systems, the open-vm-tools suite includes the following packages:

- The core open-vm-tools package contains the core open-vm-tools user space utilities, application programs, and libraries, including `vmtoolsd`, to help effectively manage communication between your host and guest OSs. This package includes features as, synchronizing guest OS clocks with the virtualization platform, transferring files between hosts and guests, sending heartbeat information from guest OSs to the virtualization infrastructure to support vSphere High Availability (HA), publishing resource utilization and networking information of the guest OSs to the virtualization platform, and so on.
- The `open-vm-tools-desktop` package is optional and includes additional user programs and libraries to improve the interactive functionality of desktop operations of your virtual machines. The package enables you to resize a guest display to match its host console window or the VMware Remote Console Window for vSphere. The package also allows you to copy and paste between host and guest OSs, as well as to drag and drop between guests and a host for the VMware Workstation and VMware Fusion products.
- The `open-vm-tools-devel` package contains libraries and additional documentation for developing `vmtoolsd` plug-ins and applications.
- The `open-vm-tools-debuginfo` package contains the source code for open-vm-tools and binary files. For the latest copy of the Open VM Tools source code, see the GitHub Web site at https://github.com/vmware/open-vm-tools.

Important If you use an open-vm-tools, the VMware Tools status is Guest Managed on the virtual machine **Summary** tab. The status Guest Managed means that you cannot use the vCenter Server to manage VMware Tools and you cannot use vSphere Update Manager to upgrade VMware Tools.

For information about the open-vm-tools support policy and availability, see the VMware knowledge base article at http://kb.vmware.com/kb/2073803.

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`.

Note Operating System Specific Packages are not provided for new Linux operating systems that have open-vm-tools. For information about compatibility support for guest operating system, see the *VMware Compatibility Guide*.

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 Guest Managed on the virtual machine **Summary** tab. The status Guest Managed means that you cannot use the 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 https://www.vmware.com/download/packages.html. For more information on installing OSPs, see the VMware Tools Installation Guide for Operating System Specific Packages for ESX/ESXi version 4.1 and later at https://packages.vmware.com/tools/docs/manuals/osp-esx-41-install-guide.pdf and ESXi versions 5.x and 6.x at https://packages.vmware.com/tools/docs/manuals/osp-esxi-51-install-guide.pdf

Installing 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. Although your guest operating systems can run without VMware Tools, many VMware features are not available until you install VMware Tools. When you install VMware Tools, the utilities in the suite enhance the performance of the guest operating system in your virtual machine and improve the management of your virtual machines.

For information about creating virtual machines, see the *Virtual Machine Administration Guide*.

The installers for VMware Tools are ISO image files. The CD-ROM in your guest operating system detects the ISO image file. Each type of guest operating system, including Windows, Linux, and Mac OS X, has an ISO image file. 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, you can use the Easy Install feature to install VMware Tools as soon as the operating system is finished installing.

If you are using VMware Player or Workstation, the most recent versions of the ISO files are available on http://my.vmware.com. 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.

- VMware Tools installer from `windows.iso` automatically detects the windows version. It does not proceed with installation on guest operating systems earlier than Windows Vista.
- VMware Tools installer from `winPreVista.iso` does not proceed with the installation on Windows Vista and later.
- VMware Tools installer from `linux.iso` does not proceed with installation on Linux guest operating system versions earlier than RHEL5, SLES 11, Ubuntu 10.04, and other Linux distributions with `glibc` version earlier than 2.5.
- VMware Tools installer from `darwinPre15.iso` does not proceed with installation on MAC OS X guest operating systems versions 10.11 or later.
- VMware Tools installer from `darwin.iso` does not proceed with installation on MAC OS X guest operating systems versions earlier than 10.11.

Note Users of the guest operating systems for which the necessary VMware Tools ISOs are not bundled with ESXi, have to set up ProductLockerLocation with all the VMware Tools ISO images for managing VMware Tools in these guest operating systems. Attempts to upgrade or install without setting up ProductLockerLocation fails with missing ISO error. For more information, see the VMware Knowledge base article at http://kb.vmware.com/kb/2129825.

The installation procedure varies, depending on the operating system. For information about installing or upgrading VMware Tools on your guest operating systems, see the topic about upgrading virtual machines in the *Virtual Machine Administration Guide*. For general instructions about installing VMware Tools, see the VMware Knowledge base article at http://kb.vmware.com/kb/1014294.

This chapter includes the following topics:

Disable Access Protection from the McAfee Antivirus Virus Scan Console

Access Protection has to be disabled in the McAfee Antivirus Scan Console before installing VMware Tools in a Windows guest operating system. For more information, see the VMware Knowledge Base article https://kb.vmware.com/kb/1009965

Prerequisites

- Power on the virtual machine
- Use McAfee Antivirus in Standard Mode

Procedure

1 Install VMware Tools before installing McAfee Antivirus on the Windows guest operating system.

Note McAfee Antivirus will, however, prevent VMware Tools upgrade if run in Maximum Protection mode.

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2 Disable **Access Protection** from the McAfee Antivirus Virus Scan Console when either installing or upgrading VMware Tools.

   a Select **Start > Programs > McAfee > Virus Scan Console**.

   b Right-click the **Access Protection** icon in the Tasks window and select **Disable** from the pop-up menu.

What to do next

- Install VMware Tools.
- Re-activate **Access Protection** when your VMware Tools upgrade or installation is complete.

Automating VMware Tools Installation for Multiple Windows Virtual Machines

If you are installing VMware Tools in multiple virtual machines with Windows guest operating systems, you can automate its installation and specify options for the components 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 the `setup.exe` command 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 Pro and Workstation Player, the `windows.iso` file is on the host in the directory where you installed Workstation Pro or Workstation Player.
- If you plan 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.
- 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 Features Used in Silent Installations," on page 19.
- 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 Windows Operating Systems Before Vista," on page 17 and "Add VMware as a Trusted Publisher to Suppress Driver Prompts," on page 18.

Procedure

1 In the vSphere Web Client inventory, select the host, cluster, or datacenter and click the **Virtual Machines** tab.

2 Select the virtual machines, right-click and select **Guest OS > Install VMware Tools**.

3 Provide the installation or upgrade configuration information.

Suppress Prompts About Unsigned Drivers on Windows Operating Systems Before Vista

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**, click **OK**, and click **OK** again.

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

What to do next

Install VMware Tools.

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.
- 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

Note This is applicable only for Beta or RC version of VMware Tools.

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 Follow the prompts 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 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.

Names of VMware Tools Features 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 2-1. 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.
	`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. Newer operating systems use the VSS driver.
	`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. **Note** VMware Tools does not support ThinPrint features for vSphere 5.5 and later
	`VMCI`	Virtual Machine Communication Interface driver. This driver allows virtual machines to communicate with the hosts on which they run 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.
	`FileIntrospection`	NSX File Introspection driver, `vsepflt.sys`. The first of the two guest introspection drivers. You can install it separately, without installing the NSX Network Introspection driver.

Table 2-1. VMware Tools Component Values (Continued)

Valid Component Values	Description	
	NetworkIntrospection	NSX Network Introspection driver, `vnetflt.sys`. The second of the two guest introspection drivers.
	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. Linux and older Windows operating systems use the Filesystem Sync driver.
`Toolbox`	**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"""
```

Manually Installing VMware Tools on a Windows Virtual Machine

Guest operating system Windows 2000 and earlier, Windows XP, Windows Server 2003, Windows Vista, and later support VMware Tools.

Prerequisites

- Power on the virtual machine.
- Verify that the guest operating system is running.
- For vSphere virtual machines, 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 Workstation Player, Fusion, and Workstation Pro 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 later than these, you must log in as an administrator.
- If you use vSphere and plan to install the Guest Introspection 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 Mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Action
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.

VMware Product	Action
Fusion	Virtual Machine > Install (or Upgrade) VMware Tools
Workstation Pro	VM > Install (or Upgrade) VMware Tools
Workstation 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** on the Install VMware Tools information page.

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

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. Use **`D:\setup64.exe`** for 64-bit Windows guest operating system.

4 Follow the on-screen prompts.

If you use vSphere, to install nondefault components, such as the Guest Introspection Thin Agent driver, select the **Custom** setup.

5 If the New Hardware wizard appears, follow the prompts and accept the defaults.

Note 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.

6 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

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 Installing VMware Tools on a Linux Virtual Machine

For Linux virtual machines, you manually install VMware Tools by using the command line. For later Linux distributions, use the integrated open-vm-tools version.

Prerequisites

For more information on OS compatibility for open-vm-tools, see the *VMware Compatibility Guide* at http://www.vmware.com/resoucres/compatibility

- 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, 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 Mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Action
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.
Fusion	**Virtual Machine > Install (or Upgrade) VMware Tools**
Workstation Pro	**VM > Install (or Upgrade) VMware Tools**
Workstation Player	**Player > Manage > Install (or Upgrade) VMware Tools**

2 In the virtual machine, 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 in a manner similar to the following output:

```
/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 (Optional) 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 file name of the VMware Tools tar installer.

```
ls mount-point
```

8 Uncompress the installer.

```
tar zxpf /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.

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 as a root user

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

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

Note For newer Linux distributions, users are prompted to choose the integrated open-vm-tools.

11 Follow the prompts 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

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 Installing VMware Tools in a Mac OS X Virtual Machine

For Mac OS X 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 the prompts in the installer assistant, and click **OK**.

The virtual machine restarts to have VMware Tools take effect.

Manually Installing VMware Tools on a Solaris Virtual Machine

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

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, 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 Mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Action
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.
Fusion	**Virtual Machine > Install (or Upgrade) VMware Tools**
Workstation Pro	**VM > Install (or Upgrade) VMware Tools**
Workstation 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 Follow the prompts 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

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 Installing VMware Tools on a NetWare Virtual Machine

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

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, determine whether you have the latest version of VMware Tools. In the vSphere Client inventory, select the virtual machine and click the **Summary** tab.

Note VMware Tools 10.1.0 does not support the NetWare operating system.

Procedure

1 Mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Action
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.
Fusion	**Virtual Machine > Install (or Upgrade) VMware Tools**
Workstation Pro	**VM > Install (or Upgrade) VMware Tools**
Workstation 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**.

What to do next

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 Installing VMware Tools on a FreeBSD Virtual Machine

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

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, 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 Mount the VMware Tools virtual disc on the guest operating system.

VMware Product	Action
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.
Fusion	**Virtual Machine > Install (or Upgrade) VMware Tools**
Workstation Pro	**VM > Install (or Upgrade) VMware Tools**
Workstation 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.gz` file.

```
tar zxpf /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 Follow the prompts 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

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.

Upgrading VMware Tools 3

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 your 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. The procedure is mentioned below.

Note 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.

Upgrading VMware Tools on Windows guest operation systems automatically installs the WDDM graphics drivers. The WDDM graphics driver allows the sleep mode available in guest OS power settings to adjust the sleep options. For example, you can use the sleep mode setting **Change when the computer sleeps** to configure your guest OS to automatically go to sleep mode after a certain time or prevent your guest OS from automatically switching to sleep mode after being idle for some time.

For vSphere virtual machines, you can use one of the following processes to upgrade multiple virtual machines at the same time.

- Log in to vCenter Server, select a host or cluster, and on the **Virtual Machines** tab 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 features in a particular release of a VMware product might depend on installing or upgrading to the version of VMware Tools included in that release. Upgrading to the latest version of VMware Tools is not always necessary. Newer versions of VMware Tools are compatible with several host versions. To avoid unnecessary upgrades, evaluate whether the added features and capabilities are necessary for your environment.

Table 3-1. Virtual Machine Compatibility Options

Compatibility	Description
ESXi 6.0 and later	This virtual machine (hardware version 11) is compatible with ESXi 6.0 and later.
ESXi 5.5 and later	This virtual machine (hardware version 10) is compatible with ESXi 5.5 and later.
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.
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.

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

This chapter includes the following topics:

Configure Virtual Machines to Automatically Upgrade VMware Tools

You can configure virtual machines to automatically update VMware Tools.

Note Automatic VMware Tools upgrade is not supported for virtual machines with Solaris or NetWare guest operating systems.

Prerequisites

- Verify that the virtual machines have a version of VMware Tools shipped with ESX/ESXi 3.5 or later installed.
- Verify that the virtual machines are hosted on ESX/ESXi 3.5 or later and vCenter Server 3.5 or later.
- Verify that the virtual machines are running a Linux or Windows guest OS that ESX/ESXi 3.5 or later and vCenter Server 3.5 or later support.

Procedure

1 Right-click the virtual machine and click **Edit Settings**.

2 Click the **Options** tab and select **VMware Tools**.

3 Select **Check and upgrade Tools during power cycling** in the **Advanced** pane.

4 Click **OK** to save your changes and close the dialog box.

The next time the virtual machine is powered on, it checks the ESX/ESXi host for a newer version of VMware Tools. If one is available, it is installed and the guest operating system is restarted (if required).

Manually upgrading VMware Tools in virtual machines

You can upgrade VMware Tools in one or more virtual machines by using the vSphere Web Client.

Procedure

1 Start the vSphere Web Client and log in to the vCenter Server.

2 Select the virtual machines.

   a Select a datacenter, folder, cluster, resource pool, or host.

   b Click the **VMs** tab.

3 Power on the virtual machines to upgrade.

4 Right-click your selections.

5 Select **Guest OS > Install/Upgrade VMware Tools** and click **OK**.

6 Select **Interactive Upgrade** or **Automatic Upgrade** and click **Upgrade**.

7 If you chose the interactive upgrade for a virtual machine with a Linux guest operating system, reboot the operating system by running the `reboot` command from a command-line prompt so that you can use the new network modules.

NOTE This upgrade procedure is not applicable for operating systems that are installed with OSPs or Open VM Tools

VMware Tools are upgraded.

Performing an Automatic Upgrade of VMware Tools

When you start an automatic upgrade of VMware Tools, you do not need to perform any operations in the guest operating system that is running on the virtual machine. The automatic upgrade uninstalls the previous version of VMware Tools, installs the latest version that is available for your ESXi host.

Automatic VMware Tools upgrade is supported only for virtual machines with Windows guest operating system.

Prerequisites

The following requirements are for each virtual machine in the upgrade:

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

Procedure

1 Select **Automatic Tools Upgrade**.

2 (Optional) In the **Advanced Options** text box, enter advanced options for the guest operating system.

Option	Action
Microsoft Windows Guest Operating Systems	Enter **`/s /v "/qn" /l "`*`Microsoft_Windows_location`*`\`*`filename`*`.log"`** to perform a silent upgrade of VMware Tools and create a log file in the specified location on the guest operating system.
Linux Guest Operating Systems	■ Enter **`--default`** to perform the default behavior. Perform a silent upgrade of VMware Tools. Install tools `bin`, `lib` and `doc` files in the default `/usr` directory. ■ Enter **`--prefix=`***`binary_location`*`,`*`lib_location`*`,`*`doc_location`* to perform a silent upgrade of VMware Tools and install the binary, library, and document files in the specified locations.

3 Click **OK.**

The **VMware Tools** label on the **Summary** tab changes to **OK**.

Configuring VMware Tools Components

4

VMware Tools provides drivers and services that enhance the performance of virtual machines and make several vSphere features easy to use. When VMware Tools is installed, you can configure many of these utilities and change their characteristics.

You can use one of the following methods to configure VMware Tools.

- The command-line configuration utility in the guest operating system. You can modify VMware Tools settings, shrink virtual disks, and connect and disconnect virtual devices.
- Custom scripts.
- Menu commands and dialog boxes.

For information about installing and configuring VMware Tools in other VMware products, see the documentation for your product. For information about VMware Tools in hosts that are provisioned with vSphere Auto Deploy, see VMware Knowledge Base article http://kb.vmware.com/kb/2004018.

This chapter includes the following topics:

Security Considerations for Configuring VMware Tools

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 might 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. Of these, the configuration file (`.vmx` file) governs the performance of the virtual hardware and other settings. You can use several methods to see and modify the configuration settings:

- 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 the vSphere Host Client to edit virtual machine settings. In the vSphere Host 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.

You can eliminate several potential threats by setting parameters appropriately in 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

Copy and paste

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 option 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, when 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 that is 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"
```

Threats Associated with Virtual Machine Information Flow

VMX file size

By default the configuration file is limited to a size of 1 MB 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 Linux and Microsoft Windows guest operating systems. This provides detailed information about the physical host available to the guest operating system. A malicious user could potentially use this information to perform 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
- GUESTLIB_HOST_MEM_UNMAPPED_MB

Features not exposed in vSphere that could cause vulnerabilities

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"
```

Using the VMware Tools Configuration Utility

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.

Table 4-1. VMware Tools Configuration Utilities for Guest Operating Systems

Guest Operating System	Utility
Windows	`VMwareToolboxCmd.exe`
Mac OS X	`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.
Linux, FreeBSD, Solaris	`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

Configuring Time Synchronization Between Guest and Host Operating Systems

When you enable 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 the clock 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. Use only one form of periodic time synchronization in your guests. If you are using native time synchronization software, disable VMware Tools periodic time synchronization.

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

- When you start the VMware Tools daemon, such as during a reboot or power on operation
- When you resume a virtual machine from a suspend operation
- After you revert to a snapshot
- After you shrink a disk

When the operating system starts or restarts, and when you first turn on periodic time synchronization, if the `time.synchronize.tools.startup.backward` parameter is not enabled in the `.vmx` file, the guest clock is set to forward. 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 for the VMware Tools Configuration Utility," on page 44.

Note Mac OS X guest operating systems use NTP and do not become out of sync with the host. For Mac OS X guest operating systems, 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 Type 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`
MAC OS X	`vmware-tools-cli`

4 Type the command to enable or disable periodic time synchronization.

```
utility-name timesync subcommand
```

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

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, such that the clock in the guest operating system is never synchronized with that on the host, disable time synchronization completely for the guest operating system.

Disabling Time Synchronization

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 in 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.

Use Device Connect or Disconnect

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

- 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 physical CD-ROM 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.

You can run the configuration utility to connect and disconnect virtual devices. For security reasons, this ability is disabled by default. To connect or disconnect devices, you must first change the settings in the configuration file.

Prerequisites

If you plan to script commands to connect or disconnect a virtual device, and for the exit codes are, see "Exit Codes for the VMware Tools Configuration Utility," on page 44.

Procedure

1 Configure the virtual machine to allow devices to connect or disconnect.

   a Edit 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 Type ***utility-name*** **device list** to list available devices.

For *utility-name*, use the guest-specific application name.

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

5 (Optional) Type 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 Type the command to connect or disconnect the device.

utility-name **device** ***device-name subcommand***

Option	Action
device-name	Use one of the names displayed when you used the `list` subcommand.
subcommand	Use `enable` or `disable`.

The device is connected or disconnected, as you specified.

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.

Default VMware Tools Scripts

VMware Tools includes one or more default scripts for each power state. The default script behavior depends in part on the guest operating system.

Microsoft Windows Guest Operating Systems

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.

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

Linux, Mac OS X, Solaris, and Free BSD 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.

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 4-2. Default VMware Tools Scripts

Script Name	Description
`poweroff-vm-default`	Runs when the virtual machine is being powered off or reset. Has no effect on networking for the virtual machine.
`poweron-vm-default`	Runs when the virtual machine is being powered on rather than resumed. Also runs after virtual machine restarts. Has no effect on networking for the virtual machine.
`resume-vm-default`	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`	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 power operations, see the documentation for the VMware product you are using.

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, save them with new names, and configure VMware Tools to use your custom script instead of the default script.

Scripts are run by the VMware Tools service, or daemon (`vmtoolsd`). Because `vmtoolsd` is run 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.

Note You cannot run scripts on NetWare, 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 39.
- If you plan to script commands and need to know what the exit codes are, see "Exit Codes for the VMware Tools Configuration Utility," on page 44.

Procedure

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

The default scripts for power-on and power-off operations are placeholders only. These scripts are located in the `Program Files\VMware\VMware Tools` directory.

The scripts for suspend and resume operations contain a line that releases or renews the IP address for the virtual machine. You must add this line first when you write custom scripts for these operations.

Default Script	Required IP Address Line
`suspend`	`@%SYSTEMROOT%\system32\ipconfig /release`
`resume`	`@%SYSTEMROOT%\system32\ipconfig /renew`

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 Type the command to enable the script.

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

5 Type the command to use the custom script that 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 Type the command to verify that the custom script that you specified is now being used.

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

The VMware Tools service runs the script whenever the specified power operation occurs.

Using 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 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, Solaris, and FreeBSD, 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 39.
- On Linux, Mac OS X, Solaris, and FreeBSD guest operating systems, if you plan to test, edit, or disable the running of a script, log in as root.
- If you plan to script commands and need to know what the exit codes are, see "Exit Codes for the VMware Tools Configuration Utility," on page 44.

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.

Guest Operating System	Directory
Linux, Solaris, FreeBSD	`/etc/vmware-tools`
Mac OS X	`/Library/Application Support/VMware Tools`

Do not make changes to the default scripts.

The VMware Tools service runs the script whenever the specified power operation occurs.

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 also disable the script for the other action.

Note You cannot run scripts on NetWare, 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 Type the command to disable the script.

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

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**	Use `vmware-tools-cli`.
script-name	Use `power`, `resume`, `suspend`, or `shutdown`.

4 (Optional) If you disabled the script for suspending a virtual machine, repeat this procedure for resuming the virtual machine.

5 (Optional) If you disabled the script for resuming a virtual machine, also disable the script for suspending the virtual machine.

Retrieving Status Information About the Virtual Machine

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

Prerequisites

- Determine the status information to display. See "Subcommands for the stat Command," on page 43.
- If you plan to script commands and need to know what the exit codes are, see "Exit Codes for the VMware Tools Configuration Utility," on page 44.

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`, one of the subcommands available for virtual machines hosted in a vSphere environment.

Subcommands for the stat Command

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

Table 4-3. Subcommands for the stat Command

Subcommand Name	Description
`hosttime`	Displays the date and time on the host.
`speed`	Displays the CPU speed, in MHz.

Exit Codes for the VMware Tools Configuration Utility

You can use exit codes to integrate the VMware Tools configuration utility commands with a scripting tool.

Table 4-4. Exit Codes

Code Number	Applicable Command	Description
0	All commands	The command was successful.
1	All commands	A error occurred. For the `shrink` 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	`script`	The file name does not exist.
69	`device` and `stat`	For the `device` command, 69 indicates that the specified device does not exist. Use the `list` subcommand to display valid names of devices. For the `stat` command, 69 indicates that the program could not communicate with the host (EX_UNAVAILABLE).
75	`stat`	The host does not support the query, perhaps because the host is not an ESX/ESXi host (EX_TEMPFAIL).
77	All commands	Permission error occurred

Running vmwtool to Configure VMware Tools in a NetWare Virtual Machine

In a NetWare virtual machine, use the system console, configure 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 run the `vmwtool` command to achieve some of the same functionality. This command has the following syntax:

`vmwtool` *`command`*

Table 4-5. vmwtool Commands

vmwtool Command	Description
`help`	Displays a summary of VMware Tools commands and options in a NetWare guest operating system.
`partitonlist`	Displays a list of all disk partitions in the virtual disk and whether or not a partition can be shrunk.
`shrink [`*`partition`*`]`	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.
`devicelist`	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, a floppy drive is not connected when the virtual machine powers on.
`disabledevice [`*`device_name`*`]`	Disables the specified device or devices in the virtual machine. If no device is specified, all removable devices in the virtual machine are disabled.

Table 4-5. vmwtool Commands (Continued)

vmwtool Command	Description
`enabledevice [device_name]`	Enables the specified device or devices in the virtual machine. If no device is specified, all removable devices in the virtual machine are enabled.
`synctime [on|off]`	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.
`idle [on|off]`	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.

Configuring Customer Experience Improvement Program

When you choose to participate in the Customer Experience Improvement Program (CEIP), VMware receives anonymous information to improve the quality, reliability, and functionality of VMware products and services.

Troubleshooting VMware Tools Components

5

Usually when you upgrade VMware Tools, the modules are upgraded and new features are added. If some features do not work correctly after an upgrade, you must change or repair modules. On operating systems other than Windows and Linux, 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

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 disk on the guest operating system.

VMware Product	Menu Command
vSphere Client	**Inventory > Virtual Machine > Guest > Install/Upgrade VMware**
vSphere Web Client	Right-click the virtual machine and select **Guest OS > Install VMware Tools**.
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 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 select which modules are installed.

5 Follow the on-screen prompts.

What to do next

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

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

VMware Tools in Linux, Solaris, and FreeBSD guest operating systems uses the VMware User process executable file. This program implements the fit-guest-to-window and other features.

Normally, this process starts after you configure VMware Tools, log out of the desktop environment, and log back in. The `vmware-user` program is located in the directory in which you selected to install binary programs, which defaults to `/usr/bin`. The startup script that you need to modify depends on your system. You must start the process manually in the following environments:

- If you run an X session without a session manager. For example, if you use `startx` to start a desktop session and do not use `xdm`, `kdm`, or `gdm`.
- If you are using an older version of GNOME without `gdm` or `xdm`.
- If you are using a 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

◆ Start the VMware User process.

Option	Action
Start the VMware User process when you start an X session.	Add `vmware-user` to the appropriate X startup script, such as the `.xsession` or `.xinitrc` file.
Start the process after a VMware Tools software upgrade, or if certain features are not working.	Open a terminal window and type the **`vmware-user`** command.

Uninstalling VMware Tools 6

If the upgrade process of VMware Tools is incomplete, you can uninstall and then reinstall the VMware Tools.

In a vSphere and open-vm-tools deployment, if you decide to use packages specific to Linux operating systems 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 12.

Prerequisites

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

Procedure

- Select a method to uninstall VMware Tools.

Operating System	Action
Windows 7, 8, 8.1, or Windows 10	In the guest operating system, select **Programs > Uninstall a program**.
Windows Vista and Windows Server 2008	In the guest operating system, select **Programs and Features > Uninstall a program**.
Windows XP and earlier	In the guest operating system, select **Add/Remove Programs**.
Linux	Log in as root and enter **`vmware-uninstall-tools.pl`** in a terminal window.
Mac OS X Server	Use the **Uninstall VMware Tools** application, found in `/Library/Application Support/VMware Tools`.

What to do next

Reinstall VMware Tools.

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