

Virtual PC™

for Windows

Version 5.1

User Guide



Second Edition

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Introduction

Welcome to Virtual PC 5.1 for Windows—a sophisticated software emulation program that lets you run multiple virtual machines each with a different operating system on a single host PC.

This introduction provides a road map to the chapters in this guide and information about getting additional assistance.

About this User Guide

Here is a brief description of each chapter and appendix in this guide. Please read Chapter 2, “Touring Virtual PC,” before you install the program.

Chapter 1 ***Introduction***
—this chapter

Chapter 2 ***Touring Virtual PC***
—reviewing the major features of Virtual PC

Chapter 3 ***Setting Up Virtual PC***
—installing Virtual PC and creating a guest PC

Chapter 4 ***Using a guest PC***
—using the key features of a guest PC

Chapter 5 ***Networking with Virtual PC***
—choosing networking options for Virtual PC

Chapter 6 ***Changing Settings and Preferences***
—changing settings for a guest PC or global preferences for Virtual PC

Chapter 7 ***Using Virtual Disk Wizard***
—creating various types of disk images with Virtual Disk Wizard

Appendix A ***Technical Specifications***

—technical specifications for Virtual PC

Appendix B ***Command Line Parameters***

—using Virtual PC command line parameters

Appendix C ***Volume License Information***

—information about volume licensing

Appendix D ***Migrating Guest PCs from Virtual PC 4.x to Virtual PC 5.1***

—information for migrating previously installed guest PCs to Virtual PC 5.1

If you need additional help

If you need additional help, please consider these options:

Online Help

Use the Online Help feature in Virtual PC. (In the Virtual PC window, on the **Help** menu, click **Virtual PC Help**.)

Read Me file

Check the Read Me file in the Connectix folder on your PC or on the Virtual PC CD. It provides late-breaking information on known problems and solutions.

Connectix Web site

Check the Connectix Web site at <http://www.connectix.com> for the latest information and updates for Virtual PC for Windows.

Connectix Support

Before you contact Connectix Support, please have the following information available:

- Your Virtual PC for Windows serial number
- Software version number—In the Virtual PC window, in the **Help** menu, click **About Virtual PC**.
- Basic information about your host PC such as the processor type and the RAM installed
- The version of Windows running on your host PC
- The operating systems running on your guest PC(s)
- Your notes on the events that led to a problem

Connectix support information is available online at <http://www.connectix.com/support>.

Other products and license information

For more information about other Connectix products or about volume license agreements for Virtual PC, please contact Connectix Sales:

- E-mail: sales@connectix.com
- Fax: 650-571-0850
- Phone: 800-950-5880 (US and Canada)
or 650-571-5100 (International)

New Features in Virtual PC 5.0

- **Performance Enhancements**—Virtual PC 5.0 contains numerous performance enhancements. These affect CPU, video, disk and networking. Virtual PC 5.0 now makes use of additional host hardware (including high-precision timers) to reduce guest interrupt latencies. This helps speed up all I/O that involves interrupts (disk, networking, etc.). Other performance enhancements were made to speed up MMU emulation and other aspects of the guest PC. Users with multi-processor machines will see the biggest performance gains, as cross-processor signaling between I/O and CPU threads was added to reduce guest interrupt latencies.
- **AMI BIOS**—Earlier versions of Virtual PC contained an older BIOS developed by Microid Research. Virtual PC 5.0 now uses an up-to-date, industry standard BIOS from American Megatrends Inc. (AMI). It includes support for APM 1.2 and ACPI. To access the BIOS setup utility, press the DEL key during the first several seconds of the boot process.
- **Persistent BIOS Settings**—Virtual PC 5.0 now saves CMOS (non-volatile RAM) changes, so modifications made in the BIOS setup utility are saved along with the guest PC's configuration.
- **Improved User Interface (UI)**— The **No boot hard drive** alert now has a **Don't show this again** checkbox. Several UI checkboxes were removed (**Boot from floppy**, **Boot from CD** and **Enable num lock at boot**) because these options are now controlled by the BIOS and can be adjusted in the BIOS setup utility (see above). The Preferences window can now be accessed through the System Tray menu. If the PC List is minimized at the time Virtual PC exits, it will remain hidden when Virtual PC is next launched.
- **SMM, SMI Support**—Support for System Management Mode and System Management Interrupts (as well as the SMBus) was added to the processor virtualization core.
- **Upgraded Ethernet NIC**—Previous versions of Virtual PC virtualized a DEC/Intel 21041 Ethernet NIC. This card was a 10Mbit card. Virtual PC 5.0 upgrades the Ethernet NIC to the 21140A, which is a 10/100MBit card.

- **Ethernet NIC Link Detection**—The new Ethernet card implementation correctly sends the 'link dropped' signal to the guest OS when restoring a saved guest PC. This tells the guest OS that it may need to reacquire a DHCP lease.
- **Improved Host CPU Usage**—Virtual PC 5.0 background CPU usage has been reduced when guests were idling. Virtual PC 5.0 is also better about obtaining host CPU cycles when needed by a guest for optimal performance.
- **Host CPU Usage Controls**—You can now control whether Virtual PC 5.0 throttles CPU usage when another program is the front-most window. In Virtual PC 4.3, it was only possible to override this default behavior through the **-fastbackground** switch. In Virtual PC 5.0, there's a checkbox in the PC panel of the Preference window, see page 62. The **-fastbackground** switch has been removed from Virtual PC 5.0. A second checkbox in the PC panel allows you to indicate whether the front-most guest PC receives more cycles than the other guest PCs. By default, the front-most VM receives about 70% of the available cycles, allowing for better interaction. However, for some applications, you may prefer that all guest PCs receive the same priority.
- **VNC Optimizations and 8-bit support**—The VNC remote control feature introduced in Virtual PC 4.3 has been optimized for better compression, increasing performance). It also now supports 8-bit video mode, useful for low-bandwidth connections.
- **Modal Alert Removal**—Previous versions of Virtual PC contained many modal alerts that caused the guest PCs to pause until the alert was acknowledged. Most of these modal alerts have been removed in Virtual PC 5.0 either replaced with status bar messages or with alerts that do not pause the guest PC.
- **CD and Floppy Capture Changes**—In response to customer requests, floppy and CD capturing has been modified slightly. First, Virtual PC doesn't always attempt to capture a CD when a guest PC is started. Second, if a floppy disk, floppy image, CD or ISO image is captured at the time a guest PC is shut down, Virtual PC now attempts to recapture that same media next time the guest PC is started. This allows you to "leave a virtual floppy disk in the drive" without having to recapture every time.

- **Virtual Switch is Default**—On hosts that support the Virtual Switch networking option (Windows NT 4.0, 2000, and XP), it is now the default option for newly-created guest PCs. In prior versions of Virtual PC, the Shared Networking mode was the default.
- **Improved Installer**—The installer for Virtual PC 5.0 acts as both an installer and an updater. Prior versions of Virtual PC shipped with a separate installer and updater. The new installer detects and uninstalls older versions of Virtual PC before installing the new version. No reboot is required for Windows 2000 and XP hosts.

New Features in Virtual PC 5.1

- **Microsoft Certified and Digitally Signed Device Drivers**—The device drivers for the Virtual PC Emulated Ethernet Switch have been validated and digitally signed by Microsoft.
- **Updated Arbitrary Resolution Behavior**—Windows guest PCs with VPC Additions installed allow the guest PC window to be resized simply by dragging an edge or corner. Pressing the CTRL key while dragging guest PC window edge or corner caused the window to snap to standard resolutions like 640x480, 800x600, etc.
- **Full Screen Mode Keyboard Toggle**—Pressing the *hostkey*+ DOWN ARROW toggles the active guest from full-screen to minimized.
- **Administrative Customizations**—Settings allow administrators to “lock down” Virtual PC on a global or per guest PC basis. These settings include the ability to:
 - Disable a guest PC’s Close Box
 - Hide the menu bar.
 - Hide the VPC Toolbar.
 - Disable **Save State** from the **Shutdown** dialog.
 - Disable **Undo Drives** from the **Shutdown** dialog.
 - Disable VNC.
 - Force a shutdown action, allowing an administrator to specify and force a guest PC to a Saved State, Shutdown, Undo Drive changes, or Turn Off.

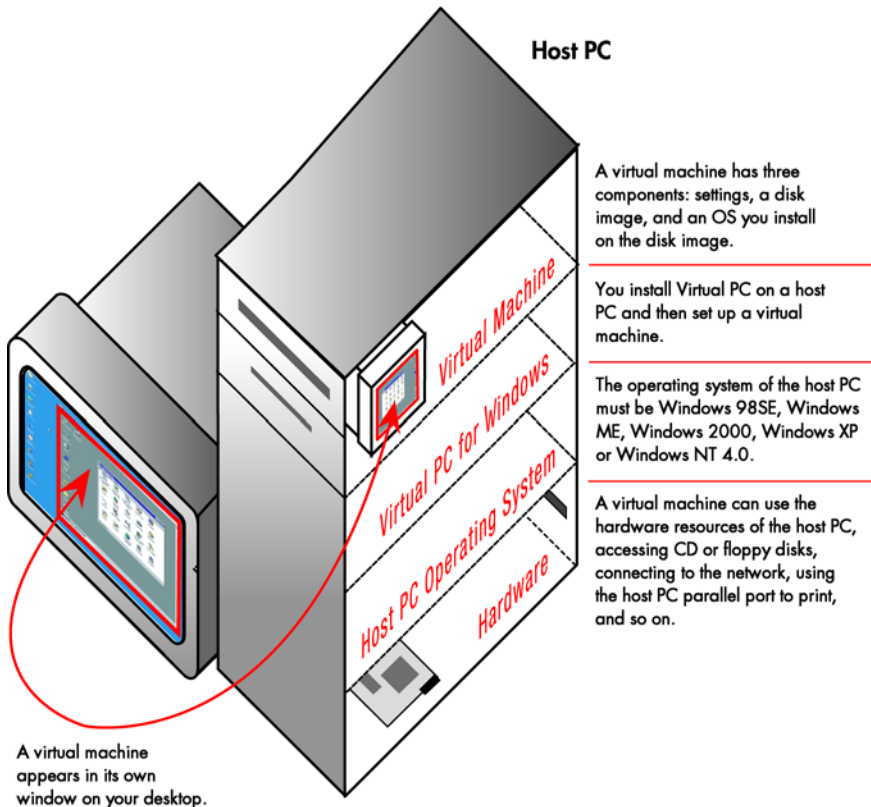
Touring Virtual PC

This chapter provides a tour of Virtual PC for Windows. Look it over to get an understanding of key features before you install the program.

What is Virtual PC?

Virtual PC lets you create one or more **virtual machines** on a **host PC**. A virtual machine runs its own operating system.

2-1



About the host PC

The host PC, where you install Virtual PC and create one or more virtual machines, must be running Windows 98SE, Windows Me, Windows NT 4.0, Windows 2000 or Windows XP. (For details of other host PC requirements, see page 16.)

Components of a virtual machine

A basic virtual machine (or guest PC) consists of three components:

- **Settings** that determine the operating relationship with the host PC, such as the amount of RAM allocated for the guest PC, or the assignments for the COM1 and COM2 ports.
- A **disk image** file that represents the boot drive (Hard Disk 1) of the guest PC. Drive images have the extension .VHD, or **Virtual Hard Drive**. By default, this disk image is a dynamically expanding file that grows in size as you install applications or store data on it. (Optionally, you can designate other disk images as Hard Disk 2 or Hard Disk 3 for a guest PC.)
- An operating system installed on the guest PC's boot disk image file. This OS can be almost any x86 compatible operating system, including Windows 95 or Windows 98.

About emulated hardware (the guest PC)

Virtual PC emulates most of the hardware components of the guest PC. The following table lists the basic hardware components.

Component	Guest PC emulated hardware
BIOS	AMI BIOS
Chipset	Intel 440BX
Sound Card	Creative Labs Sound Blaster 16 ISA
Network Card	DEC or Intel 21140 10/100
Video Card	S3 Trio 32/64 PCI with 8MB VRAM

NOTE *Virtual PC Additions may be required for the guest to properly recognize 8MB of VRAM. Some S3 Trio 64 drivers will only recognize 2 or 4MB of RAM, this is especially true in Linux and UNIX environments.*

See **Appendix A** for detailed technical specifications of the guest PC's emulated hardware.

More about disk images

Virtual PC supports several types of disk images, including:

- ***Dynamically expanding***—the size of the disk image file expands as you add information to it. For example, if you create a 1 GB dynamically expanding disk image, the initial file is only about 3 MB in size.
- ***Fixed-size***—the size of the disk image file is fixed at a size representing the entire virtual hard drive. For example, if you create a fixed-size hard disk image that represents a 1 GB hard drive, the image file is 1 GB in size.
- ***Differencing***—information you add is written to a differencing image file or ***child*** drive image only, not to its associated ***parent*** disk image.

You can create, examine, or modify disk images using the Virtual Disk Wizard. (See page 71.)

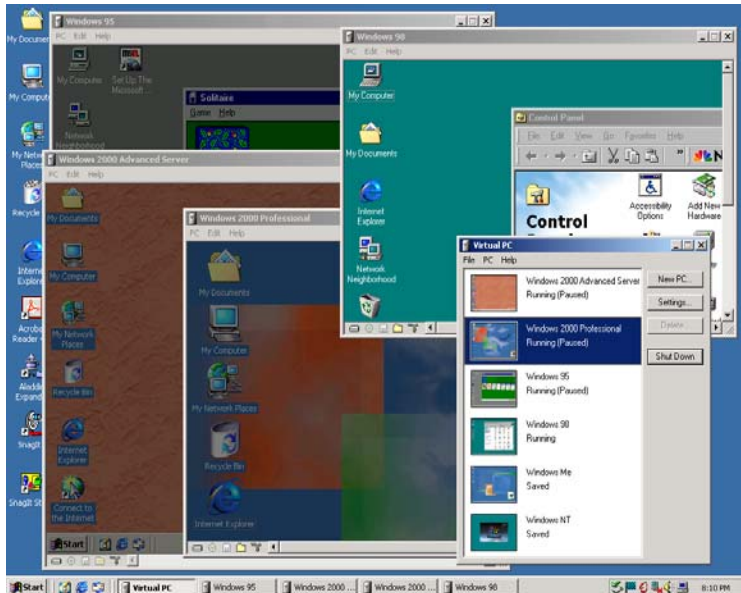
Undoable disk images

You can designate any disk image as ***undoable***. This means that any changes you make during a session with a guest PC are saved to a separate, temporary file. At the time you shut down the guest PC, you then have the option of discarding these changes, carrying the changes forward, or committing them to the disk image.

Running multiple guest PCs

You can create and simultaneously run several guest PCs on the same host PC. Since each guest PC has its own OS, you can in effect run several different operating systems at the same time on a single PC.

2-2

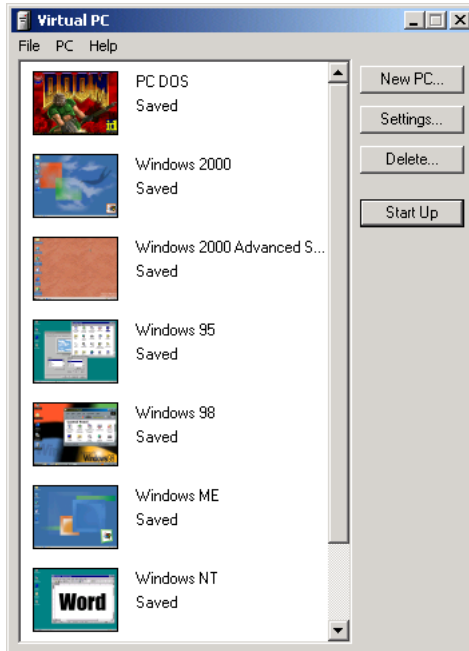


Note that each guest PC requires its own allocation of RAM on the host PC.

The Virtual PC List

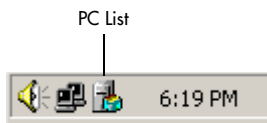
When you start up Virtual PC, the Virtual PC List or (PC List) appears. From this window, you can start up a guest PC, create a new guest PC, change the settings for a guest PC, or delete the settings for a guest PC.

2-3



As you run a guest PC, its thumbnail picture in the Virtual PC window updates dynamically.

NOTE *When minimized, the PC List is only displayed in the System Tray. To restore a minimized PC List, double-click the icon in the System Tray.*



VPC Additions and guest PC integration

A set of software components called “VPC Additions” can be installed on a guest OS. VPC Additions enable host PC and guest PC integration. (VPC Additions are already installed in disk images provided in Connectix OS Packs.)

This integration takes several forms:

- You can drag and drop files and folders from the host PC desktop to a guest PC, and vice versa.
- You can copy and paste between applications running in the two environments.
- You can share a folder or a volume between the host PC and a guest PC. (You can even share the same folder with multiple guest PCs running at the same time.)

In addition, the clock of the guest PC is synchronized with the clock of the host PC. (This is especially important when saving or restarting a guest PC.)

Printing with Virtual PC

Applications running on a guest PC can print in two ways:

- over a network
- through a parallel port on the host PC.

For information about printing, see page 38.

Networking with Virtual PC

By default, a guest PC is set for Virtual Switch networking. The Virtual Switch option addresses standard and advanced networking needs, such as joining a Microsoft or Novell network, running guest server software with predefined port numbers, remote login (rlogin), network performance analysis (netperf), or remote shells (rsh). It offers the highest degree of compatibility and control.

Two other networking options are available:

- **None**—the equivalent of removing the emulated networking card from the guest PC
- **Shared Networking**—This means the guest PC can share a single network connection transparently with the host PC. If the host

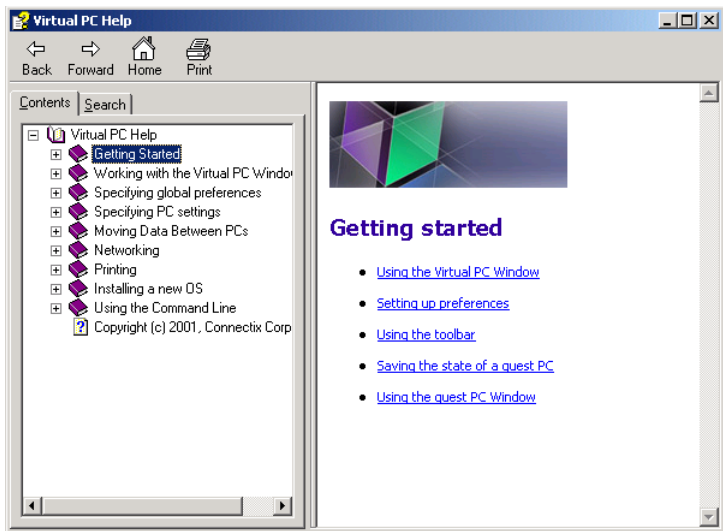
PC can access the World Wide Web, then the guest PC can also access the Web. Shared Networking works well for browsing the Web, reading e-mail, and accessing FTP sites. (See page 41 for more details.)

NOTE *Virtual PC emulates a Digital Equipment Corporation™ (DEC) 21140-based PCI Ethernet card.*

Help

Virtual PC includes Help available on the screen. In the Virtual PC List, on the **Help** menu, click **Virtual PC Help**.

2-4



Creating a guest PC

After you install Virtual PC on the host PC, you create one or more guest PCs.

You can set up a guest PC using a prepared boot disk image from a Connectix OS Pack. (See page 20.) This disk image already has an operating system and VPC Additions installed. Alternatively, you can set up a guest PC by creating a disk image and then installing your own copy of an OS on it. (See page 21.)

Setting Up Virtual PC

This chapter provides step-by-step instructions for setting up Virtual PC for Windows.

Chapter topics

The topics in this chapter include:

- Installation requirements - page 16
- Installing Virtual PC - page 17
- Registering Virtual PC - page 20
- Creating a guest PC with a Connectix OS Pack - page 20
- Creating a guest PC with your own copy of an OS - page 21
- Modifying the settings for a guest PC - page 21
- Creating a guest PC with standard settings - page 21
- Duplicating the settings of an existing guest PC - page 21
- Installing an OS - page 22
- Installing VPC Additions - page 25

Installation requirements

Before you install Virtual PC for Windows on a host PC, note these requirements:

- Host PC processor
 - Athlon, Duron, Celeron, Pentium II, Pentium III, or Pentium 4
 - 400 MHz minimum, 600 MHz recommended
 - Level 2 cache required
- Host PC OS
 - Windows 98SE
 - Windows Me
 - Windows NT 4.0 with service pack 6
 - Windows 2000 (Service Pack 2 recommended)
 - Windows XP
- Host PC Disk space

Use the following table to determine the required disk space on the host PC. The total required disk space is the sum of the disk space required for each guest PC you create on the host PC.
- Host PC RAM

Use the table below to determine the minimum physical RAM required for the host PC. First determine the minimum required RAM for the OS on the host PC (Windows XP, Windows 2000, Windows NT 4.0, Windows Me, or Windows 98SE). Then add the RAM requirement for the guest PC or machines you intend to run. Additional memory beyond this minimum amounts usually improves performance.

Note that if you are going to run multiple guest PCs ***simultaneously***, you need to add up the RAM requirements for all the guest PCs running.

Host PC or guest PC OS (H indicates Host capable OS)	Host PC Disk Space	Minimum Host PC RAM
DOS	50 MB	32 MB
Windows 3.1	100 MB	32 MB
Windows 95	500 MB	32 MB
Windows 98	500 MB	64 MB
Windows 98SE (H)	500 MB	64 MB
Windows Me (H)	2 GB	96 MB
Windows 2000 Professional (H)	2 GB	128 MB
Windows 2000 Server	2 GB	192 MB
Windows 2000 Advanced Server	2 GB	256 MB
Windows NT 4.0 Workstation (H)	1 GB	64 MB
Windows NT 4.0 Server	1 GB	128 MB
Windows NT 4.0 Enterprise	1 GB	192 MB
Windows XP Professional (H)	2 GB	128 MB
Windows XP Home (H)	2 GB	128 MB
Windows .NET Standard Server and Enterprise Server and Web Server	2 GB	256 MB
OS/2 Warp 4	500 MB	128 MB
Novell NetWare 5.x	1 GB	128 MB
Novell NetWare 6.x	2.2 GB	256 MB
Linux (Text Mode)	2 GB	64 MB
Linux (Graphical Mode)	2 GB	96 MB
Solaris 8	2 GB	64 MB

Installing Virtual PC on Windows NT, Windows 2000, or Windows XP

- 1 Log in to the host PC as a local administrator or as a user with local administrative privileges.
- 2 **Online purchase:** Launch Virtual PC for Windows 5.1 Online Installer.EXE, after extracting the setup files, the Virtual PC installation will launch.
CD-ROM: Insert the CD in the CD-ROM drive of the host PC. This will launch the Virtual PC installation program.
- 3 **Choose Setup Language:** Select the language for the installation from the choices. Click **OK** to continue.
- 4 **Welcome to the InstallShield Wizard for Connectix Virtual PC:** Click **Next** to begin installing Virtual PC on your computer.
- 5 **License Agreement:** After reviewing the license agreement, select **I accept the terms in the license agreement** to continue installing Virtual PC. Click **Next** to continue.
- 6 **Customer Information:** Enter your User Name, Organization and Serial Number. The serial number is included on a book-mark sized card in boxed versions or included in the order confirmation e-mail when purchased online. Select to install Virtual PC for all users or only the current user logged on. Click **Next** to continue.
- 7 **Setup Type:** there are two options for setup:
 - **Complete**—All program features will be installed.
 - **Custom**—Choose which program features you want installed and where they will be installed.
- 8 Click **Next** to continue.
- 9 **Ready to Install the Program:** Click **Install** to begin installing Virtual PC. To change or review any settings, click **Back**.
- 10 **InstallShield Wizard Completed:** click **Finish** to exit the wizard.
- 11 **Information:** To use the Drag and Drop feature of the VPC Additions with a guest PC, you will need to restart the Host PC. Click **OK** to continue.

Virtual PC for Windows is installed on the host PC.

Installing Virtual PC on Windows 98SE or Windows ME

Installing Virtual PC 5.1 under Windows 98SE and Windows ME

- 1 **Online purchase:** Launch Virtual PC for Windows 5.1 Online Installer.EXE, after extracting the setup files, the Virtual PC installation will launch.
CD-ROM: Insert the CD in the CD-ROM drive of the host PC. This will launch the Virtual PC installation program.
- 2 **Choose Setup Language:** Select the language for the installation from the choices. Click **OK** to continue.
- 3 **InstallShield Wizard:** Connectix Virtual PC setup is preparing the Installshield wizard, which will guide you through the program setup process. Please wait.
- 4 **Welcome to the InstallShield Wizard for Connectix Virtual PC:** Click **Next** to begin installing Virtual PC on your computer.
- 5 **License Agreement:** After reviewing the license agreement, select **I accept the terms in the license agreement** to continue installing Virtual PC. Click **Next** to continue.
- 6 **Customer Information:** Enter your User Name, Organization and Serial Number. The serial number is included on a book-mark sized card in boxed versions or included in the order confirmation e-mail when purchased online. Click **Next** to continue.
- 7 **Choose Language:** Select the language for Virtual PC to run in. Click **Next** to continue.
- 8 **Setup Type:** there are two options for setup:
 - **Complete**—All program features will be installed.
 - **Custom**—Choose which program features you want installed and where they will be installed.
- 9 Click **Next** to continue.
- 10 **Ready to Install the Program:** Click **Install** to begin installing Virtual PC. To change or review any settings, click **Back**.
- 11 **InstallShield Wizard Completed:** click **Finish** to exit the wizard.
- 12 The host PC needs to be restarted before Virtual PC can be used. Click **Yes** to restart the system immediately, or **No** if you plan to restart later.

Registering Virtual PC

Please follow the directions provided to register your product at the Connectix Web site. You must register to receive support.

Creating a guest PC with a Connectix OS Pack

With Virtual PC installed on the host PC, you can now create a guest PC using a Connectix OS Pack.

To set up a guest PC with your own copy of an OS, see page 21.

A Connectix OS Pack includes a guest PC boot disk image with a fully functional OS and VPC Additions installed. To set up a guest PC using a Connectix OS Pack, follow these steps:

- 1 Follow the instructions provided in the OS Pack and install the Connectix disk image on the host PC.

NOTE *The following steps parallel the instructions in the OS Pack for “Creating a New PC (Windows).”*

- 2 Start up Virtual PC on your host PC. Click the **Start** button on the host PC desktop and point to **Programs**, then point to the **Connectix Virtual PC**.

The Virtual PC window appears.

- 3 Click **New PC**.
The PC Setup Wizard appears.
- 4 Click **Next**.
- 5 Type a name for the guest PC and click **Next**. Choose the **Guide me** option and click **Next**.
- 6 Use the drop-down menu to choose the operating system installed on the Connectix disk image, then click **Next**.
- 7 Click **No** to keep the recommended memory setting and click **Next**. (You can always change the memory setting later.)
- 8 Click the option **Select an existing hard disk image** and click **Next**.
- 9 Click **Browse**, navigate to the Connectix disk image installed on the host PC, and click **Open**. To make the disk image undoable, click the option **Enable undo support**, (See page 49 for more information about this option.) then click **Next**.
- 10 Check the information in Setup Summary and click **Finish**.

Creating a guest PC with your own copy of an OS

With Virtual PC installed on the host PC, you can now create a guest PC using your own licensed copy of an OS.

NOTE *To create a guest PC using a Connectix OS Pack, see page 20.*

To create a guest PC running with your own licensed copy of an OS, you

- first create a disk image
- install an OS on this image
- then install VPC Additions (if available for the OS you are using)

Creating a disk image

To create the disk image for the guest PC, follow these steps:

- 1 Start up Virtual PC on your host PC. Click the **Start** button and point to **Programs**, then point to the **Connectix Virtual PC**.
The Virtual PC window appears
- 2 Click **New PC**.
The PC Setup Wizard appears.
- 3 Click **Next**.
- 4 Type a name for the guest PC and click **Next**.
- 5 Choose the **Guide me** option and click **Next**.
- 6 Use the drop-down menu to choose the operating system you plan to install on the disk image. Then click **Next**.
- 7 Click **No** to keep the recommended memory setting and click **Next**. (You can always change the memory setting later.)
- 8 Click the option **Create a new hard disk image** and click **Next**.
- 9 Click **Browse** and navigate to the location for the drive image. Type a name for the drive image and click **Save**, then click **Next**.
- 10 Check the Setup Summary and click **Finish**.

Installing an OS

Virtual PC for Windows supports a variety of Pentium-based operating systems installed on guest PCs. Operating systems you can install on the boot disk image for a guest PC include:

- Many versions of MS-DOS and PC-DOS
- Windows 3.1 and 3.11 for Workgroups
- Windows 95
- Windows 98 and 98SE
- Windows Me
- Windows NT 4.0 Workstation and Server
- Windows 2000 Professional, Server and Advanced Server
- Windows XP Home and Professional
- Windows .NET Standard and Enterprise Server
- Many distributions of BSD UNIX
- Novell NetWare 5.1, 6
- IBM OS/2 version 4.0
- Sun Solaris 8
- Many distributions of Linux.

NOTE *Do not install Linux using the low-level format option. This forces a dynamically expanding disk image to grow to maximum size.*

Installation tips for a variety of operating systems are available at the Connectix Web site.

NOTE *Connectix does not provide technical support for operating systems not purchased as Connectix OS Packs. Please contact the OS manufacturer for support.*

To install an operating system on a disk image for a guest PC:

- 1 Start up the guest PC. Select it in the Virtual PC window and click **Start Up**.
Since no OS is yet installed on the disk image, you receive an error message Reboot and Select proper Boot device or Insert Boot Media in selected Boot device.
- 2 Make sure the guest PC is the frontmost window on your desktop.

NOTE *ACPI is disabled in guest PCs by default. To enable ACPI, start the guest PC and press DEL to enter the BIOS. Select Power and change the setting for ACPI Aware OS to YES.*

With a bootable CD

If you can install the OS from a bootable CD, follow these steps.

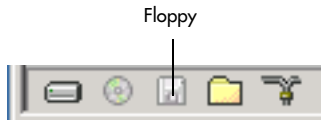
- 1 Insert the bootable CD in the CD-ROM drive. It is automatically captured by the guest PC.
- 2 Press any key to continue.
The OS setup program on the CD then takes you through the process of installing the OS on the drive image for the guest PC.
- 3 Now follow the instructions for installing VPC Additions on page 25.

With a non-bootable CD and a bootable floppy

If you install the OS from a non-bootable CD and a bootable floppy disk, follow these steps.

- 1** Insert the non-bootable OS installation CD. The CD is automatically captured by the guest PC.
- 2** Insert the bootable floppy disk required to install the OS in the floppy drive of the host PC. (It is automatically captured by the guest PC.)

If you have a bootable floppy disk image, drag the image onto the Floppy icon on the Virtual PC Toolbar to capture it.



- 3** Press any key to continue.

The OS setup program on the floppy then takes you through the process of installing the OS on the drive image for the guest PC.

Installing VPC Additions

VPC Additions enable integration between a guest PC and the host PC. (See page 35 for more information.) VPC Additions are available for most Windows operating systems installed on a guest PC. (VPC Additions are already installed on disk images provided in Connectix OS Packs.) Check the Connectix Web site for new releases of Virtual PC Additions.

IMPORTANT To install the VPC Additions in Windows NT, 2000, or XP, you must be logged on the guest PC with local administrator rights.

NOTE *The VPC Additions require Service Pack 3 or higher in Windows NT 4.0.*

To install VPC Additions:

- 1** Make sure the guest PC where you want to install VPC Additions is the frontmost window on the host PC desktop. The guest PC needs to be completely booted and at the desktop.
- 2** From the guest PC menu, click **PC**.
- 3** From the menu, click **Install/Update Additions**.
The Virtual PC installation program appears within the guest PC.
- 4** Read the license agreement and if you agree, select **I agree to the terms of this agreement**.
- 5** Click **Next**.
- 6** An Information window will appear with the details of the features the Additions add. Click **Next** to continue.
- 7** Click **Next** to proceed with the Additions installation.
- 8** The Additions require a restart of the guest PC before they will function. Click **Finish** to complete the installation and restart the guest PC.

Modifying the settings for a guest PC

Each guest PC has a number of settings you can modify. These include:

- PC Info—the name of the guest PC
- Memory—the amount of host PC RAM allocated to the guest PC
- Hard Disk 1—the disk image assigned to the boot drive of the guest PC
- Hard Disk 2 and 3—additional disk images assigned to the secondary and tertiary drive images for the guest PC
- Undo Drives—allows recent changes made to the disks to be discarded when shutting down the guest PC
- CD/DVD-ROM—option secondary IDE controller
- Floppy—option for automatically detecting a floppy inserted in the host PC
- Shared Folders—folders on the host PC designated for sharing with the guest PC
- Mouse—option for turning pointer integration on or off
- COM1 and COM2—options for using serial communication from the guest PC (such as an external modem connected to the host PC)
- LPT1—options for using the parallel port on the host PC for tasks such as printing from the guest PC
- Networking—options for networking the guest PC
- Remote Control—use a standard VNC client to control a guest PC remotely

For details about these settings and their options, see Chapter 6 on page 45.

Creating a guest PC with standard settings

You can use the PC Setup Wizard to create a new guest PC with standard settings.

- 1 Start up Virtual PC on your host PC. Click the **Start** button and point to **Programs**, then point to the **Connectix Virtual PC**.
The Virtual PC window appears.
- 2 Click **New PC** in the Virtual PC window.
The PC Setup Wizard appears.
- 3 Click **Next**.
- 4 Type a name for the guest PC and click **Next**.
- 5 Click the option **Create a default PC**, and then click **Next**.
- 6 Leave the option selected to open settings for the new guest PC when the wizard is finished. (You cannot start up a guest PC until you assign a boot disk image to Hard Disk 1.) Click **Next**.
- 7 Click **Finish**.

Duplicating settings of an existing guest PC

You can use the PC Setup Wizard to create a new guest PC that duplicates the settings of an existing guest PC.

- 1 Start up Virtual PC on your host PC. Click the **Start** button and point to **Programs**, then point to the **Connectix Virtual PC**.
The Virtual PC window appears.
- 2 Click **New PC** in the Virtual PC list.
The PC Setup Wizard appears.
- 3 Click **Next**.
- 4 Type a name for the guest PC and click **Next**.
- 5 Click the option **Duplicate an existing PC** and click **Next**.
- 6 Choose the guest PC you wish to duplicate from the drop-down menu. Leave the option selected to open settings for the new guest PC. (You cannot start up a guest PC until you assign a boot disk image to Hard Disk 1.) Click **Next**.
- 7 Click **Finish**.

Using a Guest PC

This chapter provides information about using a guest PC on the host PC.

Chapter contents

The topics in this chapter include:

- Starting up Virtual PC - page 30
- Using the host key - page 30
- Starting up a guest PC - page 31
- Using CTRL+ALT+DELETE - page 31
- Changing the guest PC display - page 32
- Pausing, resuming, and restarting a guest PC - page 33
- Running multiple guest PCs - page 33
- Using the Virtual PC Toolbar - page 34
- Host PC and guest PC integration- page 35
- Capturing a floppy image or disk- page 37
- Printing from a guest PC - page 38
- Using sound - page 38
- Optimizing performance - page 38
- Backing up a guest PC - page 39
- Shutting down a guest PC - page 39

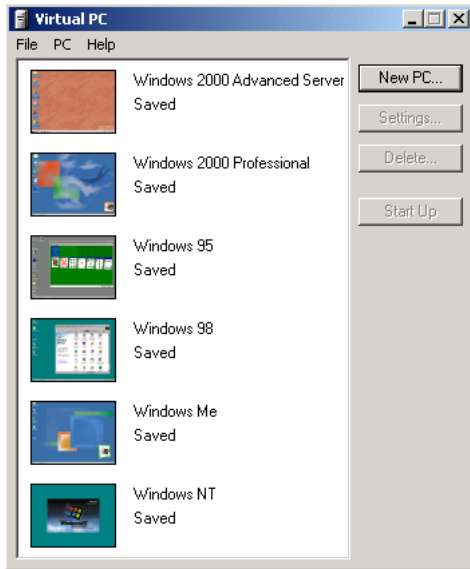
For information about settings for a guest PC or global preferences for Virtual PC for Windows, see Chapter 6 on page 45.

Starting up Virtual PC

To start up Virtual PC on your host PC, click the **Start** button and point to **Programs**, then click **Connectix Virtual PC**.

This launches Virtual PC and opens the PC List.

4-1



NOTE *With Virtual PC running you can display the Virtual PC window by pressing the host key and the L key.*

Minimizing the PC List sends it to the System Tray. To restore the PC List, double-click the Virtual PC icon in the system tray. Right-click on the Virtual PC icon to launch a short-cut menu of PC List items.

Using the host key

The host key is a designated key used to control certain behaviors of Virtual PC. For example, holding down the host key and pressing the P key, pauses or resumes a guest PC.

By default, the host key is defined as the right ALT key. You can change this using the Keyboard preference. (See page 67.)

Starting up a guest PC

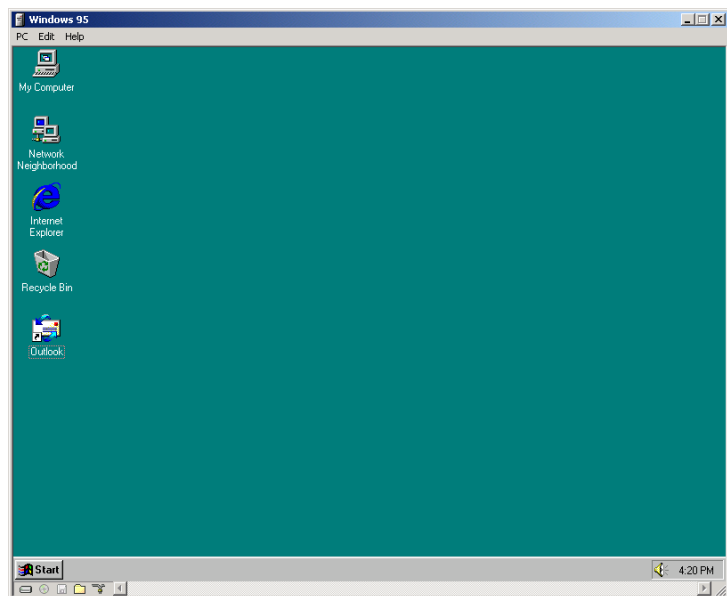
To start up a guest PC:

- Select a guest PC in the PC List and then click **Start Up**.
- Alternatively, double-click the thumbnail for the guest PC in the PC List.

NOTE *You can also start up a guest PC by right-clicking on it in the PC List and choosing **Start Up** from the shortcut menu.*

Virtual PC opens a guest PC window on your host PC desktop and starts up the PC operating system installed on it. The name you chose for the guest PC appears in the window's title.

4-2



Using CTRL+ALT+DELETE

Pressing CTRL+ALT+DELETE sends this key combination to the OS running on the host PC.

Pressing the host key and DELETE sends the equivalent of the CTRL+ALT+DELETE combination to the guest OS. (In some cases this combination is required—for example, to log in to Windows NT.)

You can also input the CTRL+ALT+DELETE command to the guest via the PC menu. Click **PC**, then click **Type CTRL+ALT+DEL**.

Changing the guest PC display

A guest PC can run inside a window on your desktop (Windowed mode), or it can fill the entire screen (Full Screen mode).

To switch from Windowed mode to Full Screen mode:

- From the **PC** menu in the guest PC window, click **Enable Full Screen**.
- Alternatively, hold down the host key and press ENTER.

To switch from Full Screen mode to Windowed mode:

- Hold down the host key and press ENTER.

To minimize a full screen mode guest:

- Hold down the host key and press DOWN ARROW.

NOTE *By default, the host key is defined as the right ALT key.*

About video resolution

In Full Screen mode, a guest PC surrounded by a black border indicates that the video display of the guest PC OS is not filling the screen. In this case, the guest PC OS requested a video resolution that is not available on the video card in your host PC or the monitor. The host PC then attempts to find the “best fit” —the next highest resolution that contains the guest PC video resolution.

Because the emulated video card on a guest PC uses standard resolutions, an exact match is usually available on the host video card.

Minimizing a guest PC window

Click the Minimize button at the top of the guest PC window to minimize the guest PC window to the taskbar. A minimized guest PC continues to run unless you have paused the machine before minimizing.

Pausing, resuming, and restarting a guest PC

You can pause a guest PC so that it is no longer running. From the **PC** menu in the guest PC window, click **Pause**. Click **Resume** to resume processing.

NOTE *You can press the host key and the **P** key to pause or resume a guest PC.*

You can restart a guest PC. From the **PC** menu in the guest PC window, click **Reset**. This is the equivalent of pressing the restart button on the front of a PC. Alternatively, you can restart from the operating system running on the guest PC.

NOTE *You can press the host key and the **R** key to restart a guest PC.*

Running multiple guest PCs

Virtual PC can run multiple guest PCs at the same time. You can switch between guest PCs by:

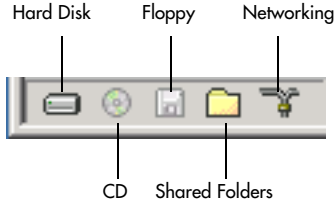
- using the Virtual PC list
- clicking on the associated taskbar buttons
- pressing the host key and the **RIGHT ARROW** or **LEFT ARROW** key

You can change the behavior and performance of multiple running guest PCs under the Preferences global menu for Virtual PC. (See page 62.)

Using the Virtual PC Toolbar

The Virtual PC Toolbar (VPC Toolbar) appears in the lower left corner of the window for a guest PC. It provides shortcuts to several settings for a guest PC as well as functions for capturing or releasing media.

4-3



The Virtual PC Toolbar has five icons. Each icon has a shortcut menu you can access by right-clicking on the icon:

- Hard Disk—access Hard Disk settings, or launch Virtual Disk Wizard
- CD—access the CD/DVD-ROM setting, capture, release, or eject a physical CD/DVD-ROM or CD-ROM .ISO image
- Floppy—access the Floppy setting, capture, release, or eject a floppy disk or floppy disk image
- Shared Folders—access the Shared Folders setting, designate a folder on the host PC for sharing
- Networking—access the Networking setting

Status and lights

An icon in the Virtual PC Toolbar may appear as **active** or **shaded**. An active appearance indicates that a particular feature is enabled or that a removable media item (CD or floppy) is in place.

An icon may display a green light indicating a device is reading or receiving information, or an orange light indicating a device is writing or sending information.

Host PC and guest PC integration

Virtual PC provides several capabilities that integrate the host PC and a guest PC. Most require the installation of the set of software components called “VPC Additions.” (See page 25.) The capabilities include:

- Pointer integration (VPC Additions required)
- Drag and drop of files and folders (VPC Additions required)
- Copy and paste (VPC Additions required)
- Sharing folders (VPC Additions required)
- Sharing CDs
- Sharing volumes (VPC Additions required)
- Clock synchronization from the host PC to the guest OS (VPC Additions required)

VPC Additions are available for most Windows operating systems installed on a guest PC. (VPC Additions are already installed on disk images provided in Connectix OS Packs.) Check the Connectix Web site for new releases of Virtual PC Additions.

Pointer integration

You can move the pointer freely between the host PC desktop and the window displaying the guest PC. By default, you must click in the guest PC window to capture the pointer to the guest PC. (You can change this behavior using the Mouse preference. See page 68.)

If VPC Additions are not installed or if pointer integration for a guest PC is not enabled (see page 54), the pointer may be “trapped” in the guest PC window. Hold down the host key to untrap the pointer and move it back to the host PC desktop.

NOTE *By default, the host key is defined as the right ALT key.*

Drag and drop

You can drag and drop files or folders from the host PC to the guest PC or vice versa. This copies the data from one machine to the other.

The source or destination for a drag operation can be almost any location: the desktop, a particular folder, a volume displayed in the My Computer window, and so on.

Copy and paste

You can copy and paste text and graphics between an application running on a guest PC and an application running on the host PC, or vice versa. You can also copy and paste between guest PCs.

Text is copied unformatted. (Formatting, including bold, italic, or paragraph styles, is not transferred.) Graphics are transferred as bit-maps.

Sharing folders

You can designate a folder or volume for sharing between the host PC and a guest PC (see page 53). For example, if you download shareware files from the World Wide Web to your host PC, you can share the host PC folder the files are in and then access the files from the guest PC.

You can share the same host PC folder with multiple guest PCs running at the same time.

Sharing CD-ROM/DVD-ROMs

A physical CD/DVD-ROM inserted in a host PC CD/DVD-ROM drive is automatically captured on the guest PC—the frontmost machine if you are running several—and mounted on the host PC. (This prevents the host PC from auto-playing the CD/DVD-ROM.) You can also capture the CD/DVD-ROM simultaneously to other guest PCs using the CD/DVD-ROM shortcut menu on the Virtual PC Toolbar.

Note that:

- You can capture or release a CD/DVD-ROM or an ISO image from a guest PC using the CD/DVD-ROM shortcut menu on the Virtual PC Toolbar.
- You can eject a CD/DVD-ROM using the CD shortcut menu on the Virtual PC Toolbar.

Sharing other removable volumes

The guest PC and host PC can share a removable volume such as a Zip disk (or media in other types of drives). To share a volume, drag it to the Folder icon on the Virtual PC Toolbar.

You can share the same volume with multiple guest PC running at the same time.

Capturing a floppy image or disk

Virtual PC supports capture of both floppy disk images and real floppy disks by a guest PC.

Floppy disk images

You can capture a floppy disk image using the **Floppy** menu, or shortcut menu for the Floppy icon on the Virtual PC Toolbar. (You can also drag a valid floppy image directly to the icon to capture it.)

Be sure the disk image you use is uncompressed. Compressed images cannot be captured.

For more information on using Virtual Disk Wizard to create a floppy disk image, see page 75. You can also use floppy images created with other programs.

Real floppy disks

You can automatically capture a real floppy on a guest PC by enabling the setting **Automatically detect floppy** in Floppy settings. (See page 52.)

You can capture a floppy disk inserted in a floppy drive of the host PC at any time using the shortcut menu for the Floppy icon on the Virtual PC Toolbar.

Releasing a disk or disk image

You can release a floppy disk or floppy disk image from a guest PC using the Floppy shortcut menu on the Virtual PC Toolbar.

NOTE *Capturing a floppy disk or image to a guest PC fails if the host PC is running Windows NT, 2000 or XP and if the host PC has opened the floppy drive inside Windows Explorer.*

Printing from a guest PC

You can print from an application running on a guest PC in two ways:

- Using the (default) Shared Networking option or the advanced Virtual Switch option (see page 57), you can print from an application running on a guest PC to a network printer.
- Using the LPT1 setting (see page 56), you can associate the emulated LPT1 port on the guest PC with a parallel port on the host PC, and then print from an application running on the guest PC to a printer connected to the parallel port on the host PC.

Using sound

Virtual PC provides 16-bit, 44-kHz sound input through Sound Blaster 16 emulation. This means that you can use a microphone to record sound directly into PC sound applications running on a guest PC.

If several guest PCs are running and playing sound, you can use the Sound preference to mute sound from guest PCs in the background (see page 65).

Optimizing performance

Virtual PC relies on hardware for performance. In general, the faster the overall performance of the host PC system, the faster Virtual PC runs.

Host PC processor speed

The speed of the host PC processor is the most important element for overall Virtual PC performance. To improve performance and as circumstances warrant, upgrade the current processor in the host PC.

Host PC processor usage

With the most current VPC Additions, Virtual PC can detect if a guest OS is executing its idle loop and give back most of the time to the host PC.

When the frontmost window on the host PC is not a guest PC, Virtual PC scales back its processor usage. (You can override this behavior with Global Preference, **Virtual PC background performance: Run at maximum speed** see page 62)

RAM allocation

Generally, the more RAM assigned to a guest PC, the better it performs. More RAM decreases the need for the OS running on the guest PC to use the hard disk for virtual memory.

Backing up a guest PC

As you install applications and create data on a guest PC, you should periodically back up the disk image (or images) for the machine. In case you need to recreate the guest PC, using the backup disk image can make restoration relatively painless and quick.

Since this disk image file can expand to a significant size, you may require large-capacity backup media to take this step.

Alternatively, you can back up only data you create within the guest PC.

Shutting down a guest PC

When you are finished using a guest PC, click the close box in the upper right corner of the guest PC window. (Alternatively, you can choose **Shut Down** from the PC menu.)

Virtual PC presents a dialog box with a number of options that you can select from a drop-down menu. Only items that apply to the current situation appear in the menu:

Save PC State—Saves the state of the guest PC to disk, allowing you to resume execution at the current place the next time you start up.

NOTE *To quit Virtual PC and save all running guest PCs in their current state, hold down the CTRL key while choosing Exit from the File menu in the Virtual PC window.*

Turn Off PC—This is the equivalent of pressing the power button on a real PC. The guest PC is turned off immediately, and no information is saved. As with a real PC, it is recommended that you normally shut down the guest OS properly. Use this option as a last resort. Any

unsaved data will be lost and you can potentially corrupt the contents of the guest PC drive image.

Shut Down Windows [95/98/NT/Me/2000/XP] — If VPC Additions are running on the guest PC, you can shut down the OS. This is equivalent to shutting down the machine from the Start menu in Windows. Note that it may take several seconds for the shutdown process to complete. If the guest PC OS has crashed, the shutdown process may not complete correctly, forcing you to use an alternative shutdown option.

Save State and Keep Changes—This option saves the state of the guest PC and commits any information written to the hard drive(s) since the machine was last started up. Please note that this option will not commit unless the option is checked under the **Shut Down** window.

Turn Off and Keep Changes / Turn Off and Undo Changes—These options turn off the guest PC, and commit or discard any information written to the hard drive(s) since the guest PC last started up. Please note that this option will not commit unless the option is checked under the **Shut Down** window.

Shut Down Windows [95/98/NT/Me/2000/XP] **and Keep Changes**—

This option cleanly shuts down the guest PC OS and commits any information written to the hard drive(s) since the guest PC last started up. Please note that this option will not commit unless the option is checked under the **Shut Down** window.

NOTE *You have the option of committing the drive changes when shutting down/saving the PC state or you may carry forward the change file indefinitely. To commit or merge the change file with the guest PC's drive image, select Commit hard drive changes now.*

IMPORTANT Committing the changes is a permanent update of the guest PC's drive image, changes cannot be undone.

Networking with Virtual PC

This chapter provides information about networking with Virtual PC for Windows.

About the Networking setting

The Networking setting for a guest PC is briefly described on page 57. There are three options for the setting:

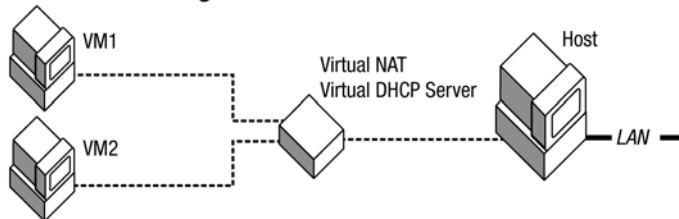
- None
- Shared Networking
- Virtual Switch (the default option)

The Shared Networking and Virtual Switch options are described in detail in this chapter

Shared Networking option

Shared Networking uses a sophisticated internal network address port translation (NAT) service built into Virtual PC that enables one or more guest PCs to share the IP address of the host PC. With this option, you should configure the guest PC OS to use Dynamic Host Control Protocol (DHCP). Virtual PC assigns the guest PC a temporary, non-routable IP address and performs any necessary packet translations.

Shared Networking



The Shared Networking option works well for standard network activities such as browsing the Web, reading e-mail, accessing FTP

sites, or accessing shared printers and files. It is not suitable for more advanced scenarios, such as running HTTP or FTP servers on the guest PC. For these advanced scenarios, use the Virtual Switch option.

NOTE *If you are running Windows NT 4.0, Windows 2000 or Windows XP on a host PC and have not logged in as an administrator, Shared Networking does not support commands such as PING that use the Internet Control Message Protocol (ICMP).*

With the Shared Networking option, note these points:

- The OS running on a guest PC must be set to use DHCP. On Windows, you enable DHCP by selecting **Obtain an IP address automatically**.
- When you use the Internet Connection Wizard to set up networking for a Windows OS on a guest PC, always specify “Connect through LAN,” even if your host PC is using a dial-up connection.
- The guest PC emulates a DEC 21140 Ethernet controller. (In some cases, the DEC 21140 may show up on your system as Intel 21140. This is normal behavior.)
- Some networking software may not function correctly without a unique IP address.
- You can access the network either with a dial-up connection or over a LAN. Virtual PC uses the currently selected TCP/IP connection on the host PC for all Shared Networking traffic.
- You can access printers and files on other computers, but you can’t share files on a guest PC. This is a server function that requires the Virtual Switch option.
- Shared Networking only supports TCP/IP. Other protocols such as IPX/SPX and NetBEUI cannot be used with the guest PC. To use other protocols in a guest PC, use the Virtual Switch option.

Modem access

If you are running a guest PC with Shared Networking and accessing the Internet over a modem, you can connect to your Internet service provider from your host PC. With the connection still open, you can then access the Internet from the guest PC.

LAN, DSL, or cable access

If you are running a guest PC with Shared Networking and accessing the Internet over a LAN, using DSL, or using a cable modem, you have an IP address already assigned to your host PC—either a static IP address, or one that is dynamically assigned by a DHCP server. With this shared IP address, you can access the Internet from a guest PC.

Virtual Switch option

The Virtual Switch option addresses standard and advanced networking needs, such as running guest server software with predefined port numbers, remote login (rlogin), network performance analysis (netperf), or remote shells (rsh). It offers the highest degree of compatibility and control. Virtual Switch also allows the guest PC to use alternate network protocols including TCP/IP, IPX/SPX, and NetBEUI.

With Virtual Switch, there are four routing options:

- **Local only**—packets are only routed between guest PCs. The host PC never sees the packets, and they never go out over the wire. This setting is useful for testing network protocols.

NOTE *The following Virtual Switch options are not available on Windows 98SE and Windows ME hosts*

- **Local and host** —packets are routed between guest PCs and the host. In this case, a virtual network exists between the guest PCs and host PC. Guest PCs are unable to see the external network.
- **Local, host, and external** —network packets are allowed to go out over the wire, to all guest PCs, and to the host PC. In this case, a guest PC appears and acts like any other “standard” PC on the local network and can communicate with the host also.

- **External only**—other guest PCs and the host PC never see the network packets, and they can only go out over the wire. This setting is useful for testing without affecting your host or other guests.

NOTE *When you create a guest PC, Networking is set by default to Virtual Switch—Local, Host, and External, on hosts that support the Virtual Switch networking option (Windows NT 4.0, 2000, and XP.)*

File sharing

If a guest PC has a Windows OS installed and is set for the Virtual Switch option with the **Local and host**, or **Local, host and external** routing option, you can do peer-to-peer file sharing over a Microsoft Network.

Connect to the network and then follow these steps:

- 1 In the guest PC OS, click the **Start** button and point to **Settings**.
- 2 Click **Control Panel**.
- 3 Double-click the **Network** icon.
- 4 Click the **Identification** tab.
- 5 Type a **Computer** name, your **Workgroup** or **Domain** name, and a computer description (optional).
- 6 Click **OK**.
- 7 Click **Yes** to restart.

You can now access other computers on the network through **Network Neighborhood** or **Network Places**.

Switching the host PC network interface card

If the host PC has more than one network interface card installed, you can use the Virtual Switch preference to designate a host PC network interface card for use by guest PCs. (See page 66.) Any external Virtual Switch traffic is routed to this network interface card.

Changing Settings and Preferences

This chapter explains the settings for a guest PC and the global preferences for Virtual PC.

Chapter topics

- PC Info setting- page 46
- Memory setting - page 47
- Hard Disk 1, 2 and 3 settings- page 48
- Undo Drives setting - page 49
- CD/DVD-ROM setting- page 51
- Floppy setting - page 52
- Shared Folders setting - page 53
- Mouse setting - page 54
- COM1 and COM2 settings - page 55
- LPT1 (Printing) setting - page 56
- Networking setting- page 57
- Remote Control setting - page 59
- Deleting settings for a guest PC - page 60
- About global preferences - page 61
- Changing preferences for a guest PC - page 61
- PC Settings preference - page 61
- Performance preference - page 62
- Full Screen preference - page 64
- Sound preference - page 65
- Virtual Switch preference - page 66
- Keyboard preference - page 67
- Mouse preference - page 68
- Security preference- page 69
- Language preference - page 70

Changing settings for a guest PC

Generally, you should only make changes to the settings of a guest PC when it is not running. To make changes to the settings of a guest PC:

- 1 Click the thumbnail of the guest PC in the Virtual PC window.
- 2 Click **Settings**.

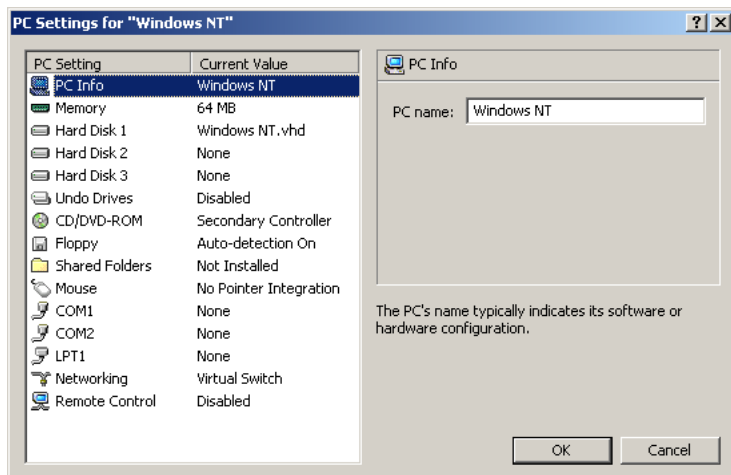
The PC Settings window appears. The following pages describe each setting.

- **IMPORTANT** Some guest PC settings may be disabled if the machine is currently running or is saved to disk. Some settings that are editable while the guest PC is running require a restart before they take effect, for example, changing a hard disk image or turning off networking. In these cases, the **OK** button changes to **Restart**.

PC Info setting

Use this setting to name the guest PC. Typically, the name indicates the operating system running on the guest PC. It must be fewer than 31 characters in length. It cannot begin with a period or contain the *, ?, :, <, >, /, |, or \ characters.

6-1

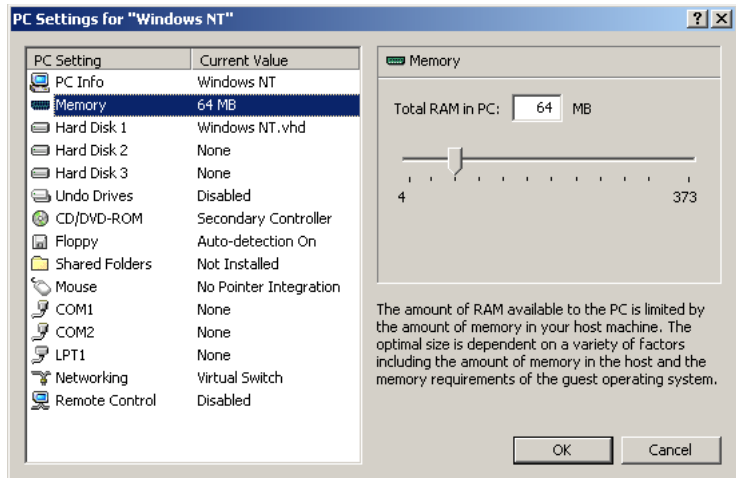


NOTE *All the guest PCs in the Virtual PC window must have unique names.*

Memory setting

Use this setting to allocate RAM for a guest PC.

6-2



Use the slider control to make changes. The system warns you if you set too little memory. The maximum value allowed is based on the total physical RAM in your host PC.

NOTE *You need to make a separate allocation of physical RAM on the host PC for each guest PC.*

More RAM improves performance

Performance of the OS running on a guest PC may improve when more RAM is allocated to the guest PC. More RAM means that the guest PC OS uses less virtual memory, spending less time storing swapping data to and from the hard drive paging file.

NOTE *A maximum of 1 gigabyte of RAM can be set to for each guest PC.*

Real RAM required

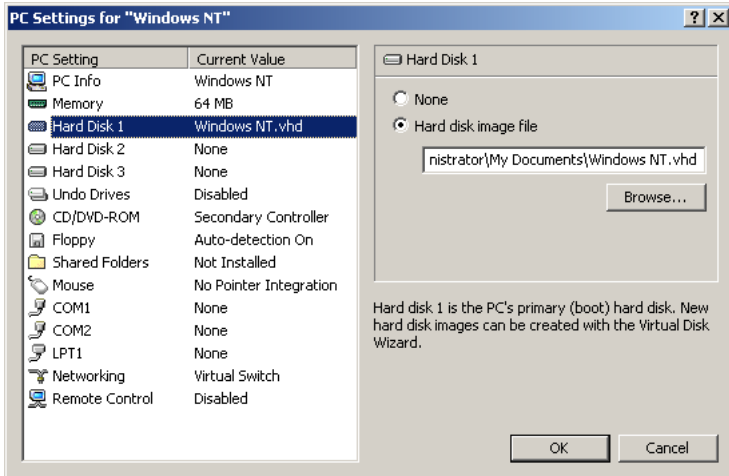
Guest PCs running under Virtual PC require real physical RAM. Your ability to run guest PCs with large memory settings, or multiple guest PCs simultaneously will be limited by the amount of RAM installed in your host PC.

NOTE *See page 17 for RAM requirements for guest PCs*

Hard Disk 1 setting

Use this setting to designate a disk image file as Hard Disk 1—the boot or C drive for a guest PC. Hard Drive 1 contains the files needed to run a guest OS.

6-3



The available options are:

None—click this option if no disk image is assigned to Hard Disk 1. If Hard Disk 1 is not specified, you can only start up the guest PC from a bootable floppy or bootable CD.

Hard disk image file - this option is selected by default and a file location will be displayed with the filename and location of the hard drive image associated with the guest PC.

NOTE *Most modern operating systems require a hard drive for installation and operation.*

Hard Disk 2 and Hard Disk 3 settings

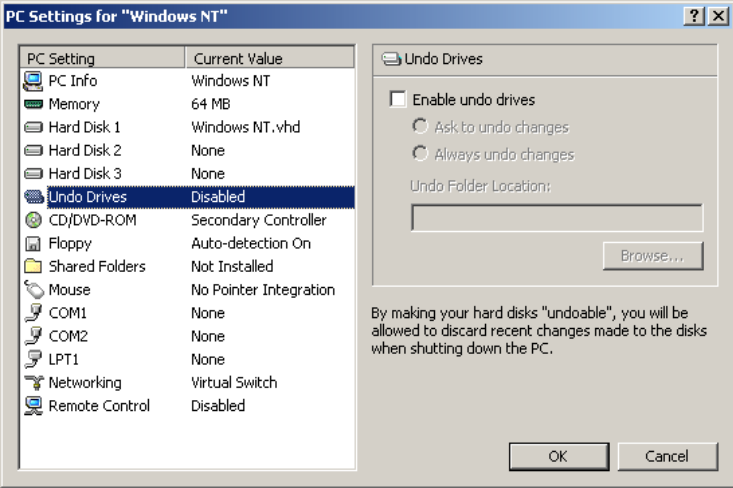
Use the settings for Hard Disk 2 and Hard Disk 3 to control secondary and tertiary drive images for a guest PC. (Hard Drive 2 and Hard Drive 3 function as drive D and drive E, respectively, on the guest PC.) You may want to specify a Hard Disk 2 or a Hard Disk 3 for additional storage space.

NOTE *Most operating systems do not allow read-only drive images to be assigned as secondary drives (Hard Disk 2 or Hard Disk 3).*

Undo Drives setting

The Undo Drives setting allows you to manage how and if you want changes in your sessions of Virtual PC to carry forward. You can choose to eliminate the undo drive feature altogether, thus always carrying forward any work or changes you make to the drive image your guest runs on. You can select to have Virtual PC prompt you to decide if you want current changes to carry forward when ending a session with a guest PC.

6-4



If you operate in a laboratory, educational or controlled environment, you can select to have changes always undo when a user is completed with any given session on a guest. Coupled with the security lockout global preference, this feature is popular in environments where it is necessary to return to a pristine guest with predictable behavior.

When you designate a disk image as undoable, information written to the disk image by the guest is not immediately written to the disk image file. Rather, changes are written to a temporary change file through out the session. The temporary change file can be carried forward or discarded at the end of a session.

The temporary undo file can grow large if you make significant changes to the drive image during the course of the session, for example if you install a large program on the guest. Choose a location for the undo file that has adequate space. By default, it is stored in the application data folder of the current user.

By default, undo drives are disabled. To change the setting Undo Drives:

- 1 From the ***PC List***, select **Settings**.
- 2 Select the PC Setting, **Undo Drives**.
- 3 Select **Enable Undo Drives** to activate the setting and choose from the following:

Always undo changes: does not allow any changes made to the temporary file to be recorded. Changes will be discarded and the next time the guest is started, it will start from the original disk image.

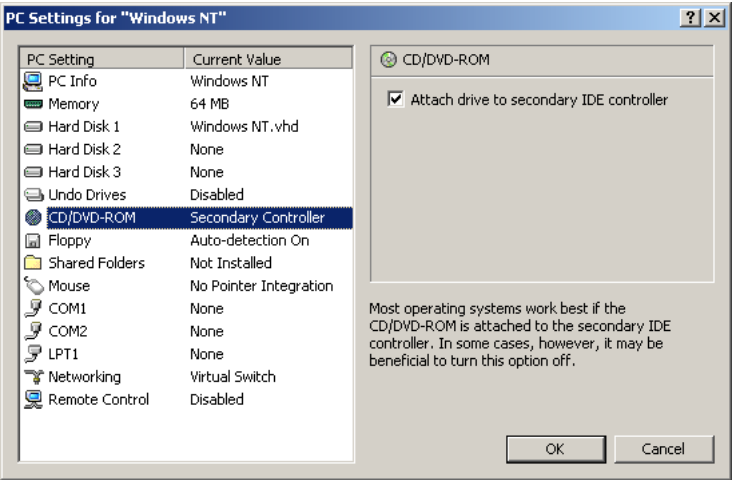
Ask to undo changes: gives the user an option at the end of each session to discard (undo) or keep changes.

- 4 You can select the undo file location. Use the browse button to navigate, select, and create (if necessary) a directory for the **Undo Folder Location**.

CD/DVD-ROM setting

Use this setting to control the behavior of CDs or DVDs. Virtual PC automatically recognizes your host PC CD/DVD-ROM drive and reads CD/DVDs inserted in it. When a guest is the active and front most window, it will capture the CD or DVD-ROM and you will be able to read from it.

6-5



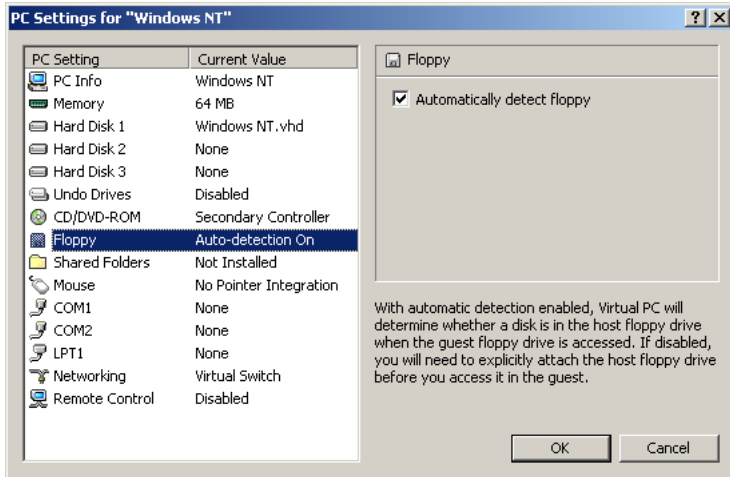
The available option is:

Attach drive to secondary IDE controller—clear this only if the operating system on the guest PC requires that the CD-ROM drive is attached to the primary controller. On most PCs, the CD-ROM is connected to the secondary IDE controller and you should leave this option selected.

Floppy setting

Use this setting to control the behavior of the emulated floppy drive in the guest PC.

6-6



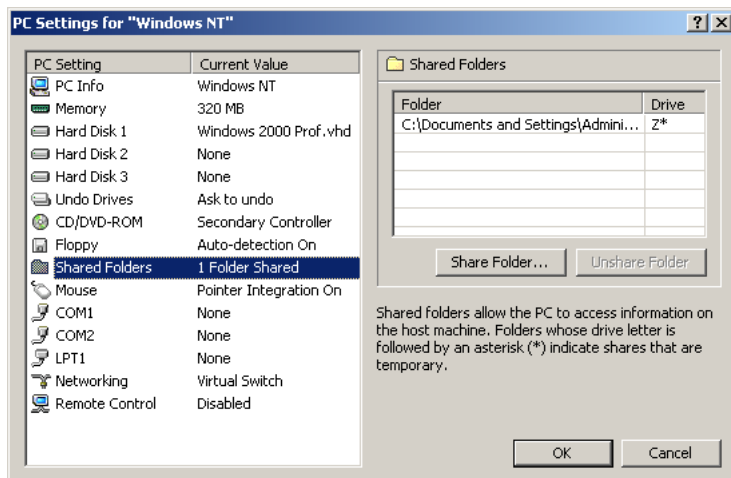
The available option is:

Automatically detect floppy—select this to allow the guest PC to search for a real floppy disk in the host PC at the time that the guest PC OS accesses the emulated floppy drive. (If no floppy disk is inserted on the host PC, you may hear a distinctive sound from the host PC.) With this feature disabled, you can still capture real floppy disks from the host PC to the guest PC using the shortcut menu for the Floppy icon on the Virtual PC Toolbar.

Shared Folders setting

Use this setting to designate a folder on the host PC that is shared with the guest PC. Shared Folders require the VPC Additions.

6-7



To set up a folder as a Shared Folder:

- 1 Click **Share Folder**.
- 2 Navigate to the folder you want to share.
- 3 Select **Share every time** if you want to share the folder every time you start up the guest PC.

NOTE Click this option if you are using an application installer in a shared folder that may reboot the guest PC.

- 4 Click **Share**.

The host PC folder now appears on the guest PC as a drive with a drive letter assigned.

NOTE Since Windows labels shared folders as drives, you cannot share more folders than can be labeled from the range of available letters, usually from F to Z.

- **IMPORTANT** You can also drag a host PC folder to the Folder icon on the Virtual PC Toolbar to share it. (You can use this technique to share entire volumes such as drives, CDs, Zip disks, and so on.)

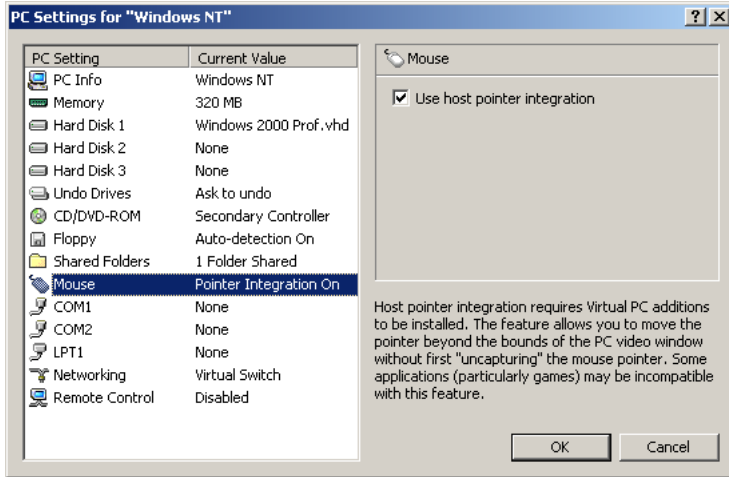
You can share the same host PC folder with multiple guest PCs running at the same time.

To unshare a folder, select it in the list of shared folders and click **Unshare Folder**.

Mouse setting

Use this setting to control integration of the mouse pointer between the host PC and the guest PC.

6-8



The available option is:

Use host pointer integration—select this to allow the pointer to move freely between the host PC desktop and the window displaying the guest PC.

This option is not active if VPC Additions are not installed (see page 25.)

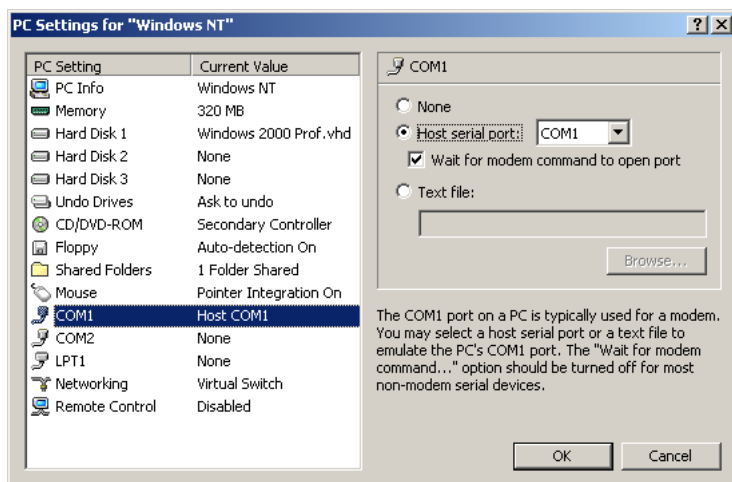
NOTE *You may need to unselect this option for some programs that are incompatible with host pointer integration.*

COM1 and COM2 settings

Use these settings to support various serial communication options.

The COM1 port on a PC is typically used for a modem. The COM2 port is typically used for a serial device or modem. If you have an external modem connected to your host PC, select the appropriate host PC serial port to make it accessible by your guest PC.

6-9



The options are:

None—select this to disable the COM port in the guest PC, this is the default setting.

Host serial port—select this to redirect the COM port to the selected COM port on the host PC.

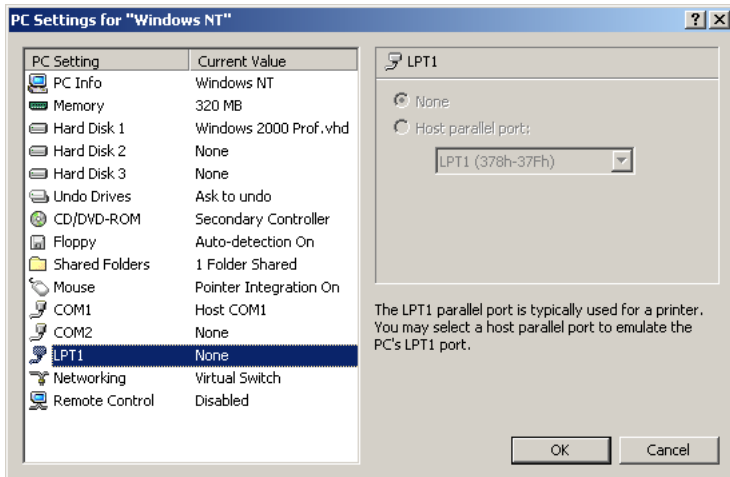
Wait for modem command to open port—select this to not open the COM port on the host PC until Virtual PC sees a modem command sent to the COM port. (You should unselect this option for most non-modem serial devices.)

Text file—select this to direct the output from the port to a text file. Click the **Browse** button to select a location for the file.

LPT1 (Printing) setting

Use this setting to select a host PC parallel port that the guest PC can use for its emulated LPT1 port. This feature is typically used to print from a guest PC.

6-10



The options are:

None—select this if you do not want to use a parallel device connected to a parallel port on the host PC, this is the default setting.

Host parallel port—select this to redirect the emulated LPT1 port on the guest PC to a parallel port on the host PC. Open the drop-down menu and select a host PC parallel port.

Networking setting

Under the networking setting, you can enable sophisticated functions by using the Connectix Virtual Switch. The Virtual Switch enables the running of guest server software with predefined port numbers, remote login (rlogin), network performance analysis (netperf), or remote shells.

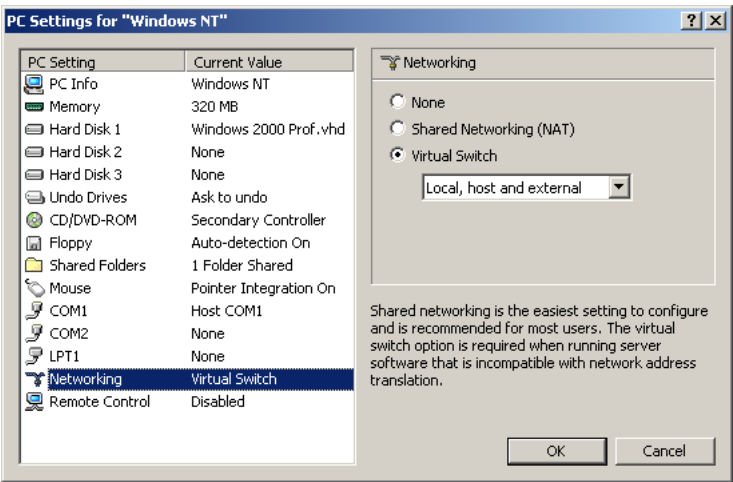
It provides a means for a guest to operate off a dynamic host configuration protocol (DHCP) and use it's own IP address, becoming a member of an enterprise network. With this capability, a user can operate in environments which require the use of a Virtual Private Network (VPN) or with various remote control applications.

Full functionality with Virtual Switch is supported on hosts running Windows NT 4.0, 2000 Professional (and server family) and XP.

NOTE *You must login to NT 4.0, Windows 2000 and XP as the administrator to use a guest configured with an active virtual switch.*

Under Windows 98SE and Windows ME hosts, Virtual Switch is limited to providing Local Only connectivity. External connectivity for Windows 98SE and ME is best provided by shared networking (NAT).

6-11



The default networking setting is **Virtual Switch: local, host and external**. To change settings for networking:

- 1 From the **PC List**, select Settings.
- 2 In PC Settings, select networking.

Selecting None will allow the guest to act as a stand-alone unit with no network connectivity. The emulated network interface card (NIC) is removed.

Selecting Shared **networking (NAT)** will allow the guest to share the IP address of your host PC, including Ethernet, PPP, and SLIP. (This option works well for simple network activities such as browsing the Web, sharing printers and files, and so on.)

Selecting Virtual Switch will allow the guest to be able to do a variety of network activities, this is the default setting.

Using the pull-down menu with the Virtual Switch selection allows you to choose the following:

Local Only - the host never sees packets sent by the guest, and they never go out over the connection to the network. You can set up other guests to exchange packets between one another with this option.

Local and Host - guest PCs can communicate with other guest PCs and the host PC. Packets from a guest PC never go out over the host's network connection.

Local, Host and External - Network packets go out over the connection to other network citizens, local guests and the host. In this case the guest operates as any other citizen on the network and can communicate with the host too. The guest acts as any network citizen and can be administered an IP address for TCP/IP functionality.

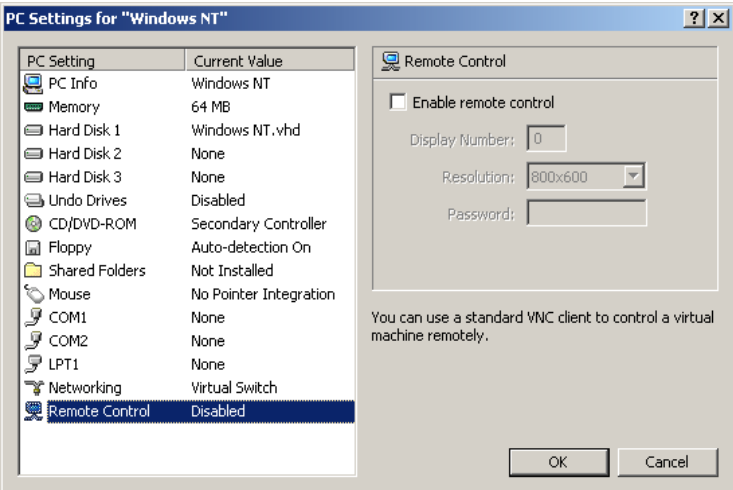
External Only - Network packets are restricted to only being placed to go out over the physical connection (network); not to any other local guests or the host.

Remote Control

Remote control allows a guest to act as a Virtual Network Computing (VNC) server. VNC is a remote display system which allows a user to view a computing desktop environment from another machine (remotely, from the host, or another guest) on a network.

VNC consists of two components, a server, which generates a display, and a viewer, which draws the display on a remote computer screen. With Remote Control enabled, a Virtual PC guest can act as a VNC server. Viewer software must be obtained to remotely access the VNC functionality in a guest. VNC viewer software is available for download on the Internet.

6-12



When running the viewer, you need to specify the name of the server and guest PC's **Display Number**. For example, if you have started a server as **display 0** on a machine called **Win2000PC**, you can start a viewer for it by typing the following:

vncviewer WIN2000PC:0

You will be prompted to provide a password, if required. If you are connecting to a Windows server, the display number will be 0, unless you have explicitly changed it.

An optional method of connecting to the server remotely is to provide the host PC's IP address followed by the display number of the guest PC.

Example: **192.168.11.3:0**

Remote Control is disabled by default. To enable the use of Remote Control, complete the following:

- 1** From the **PC List**, select Settings.
- 2** Select Remote Control.
- 3** Select **Enable remote control**.
- 4** Assign a display number, the default is **0**.
- 5** Select a desired resolution from the pull down menu.
- 6** Provide a password if necessary.

NOTE *If the host PC is running VNC server software, you may experience a conflict when attempting to run the Virtual PC VNC software. The VNC server on the host may need to be disabled for guest PC's VNC server to work correctly.*

Deleting settings for a guest PC

To delete the settings for a guest PC and remove the guest PC from the Virtual PC window, select it in the Virtual PC window and then click **Delete**. Deleting the settings for a guest PC does not delete the drive image for the machine.

NOTE *The Delete key on your keyboard will not delete your guest PC. You must use the Delete button on the Virtual PC window.*

About global preferences

Virtual PC Preferences allow you to change nine global preferences: PC Settings, Performance, Full Screen Mode, Sound, Virtual Switch, Keyboard, Mouse, Security and Language.

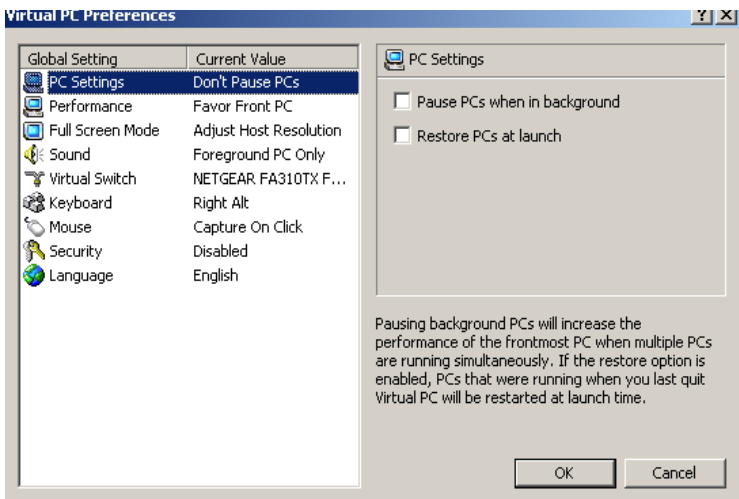
Changing preferences for a guest PC

To change the preferences for Virtual PC, click File from the PC List, then click Preferences. Some preferences require Virtual PC to be restarted.

PC Settings preference

PC Settings allow you to pause guest PC's when they are in the background and restore PC's at launch.

6-13



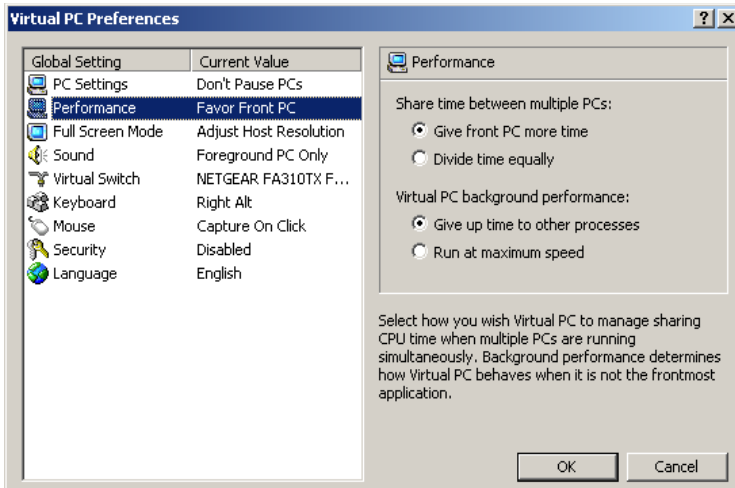
The available options are:

Pause PCs when in background—The default setting is to not pause guest PCs when they are in the background. Pausing background guest PCs allows more processor power to go to the front-most, active guest PC. PCs in a paused state will also suspend network or other connected peripheral activity.

Restore PCs at launch—This preference is enabled by default. With the restore preference enabled, guest PCs that were running when you last quit Virtual PC will be restarted at launch time.

Performance preference

Performance settings allow you to determine behavior regarding how time is shared between multiple instances of guest PC's, and the performance of guest PC's in the background.



The available options are:

Share time between multiple PC's—If you have multiple guest PC's running, it becomes necessary to manage CPU resource distribution. The default setting (**Give front PC more time**) sets the guest in the foreground to use about 70% of the CPU and other guest PC's in the background to use equal amounts of the remaining percentage. This setting ensures the best responsiveness in an active guest PC.

You can change this behavior by selecting to **Divide time equally** among the guest PC's running in Virtual PC. This setting allows all guest PC's equal CPU resource distribution.

Virtual PC background performance—Managing processor resources becomes complicated when you run an application other than Virtual PC at the same time. When running one or more guest PC's that are utilizing 100% CPU resources, other processes on the host machine can become starved. This is especially noticeable when you attempt to use other applications on the host machine while Virtual PC is running in the background.

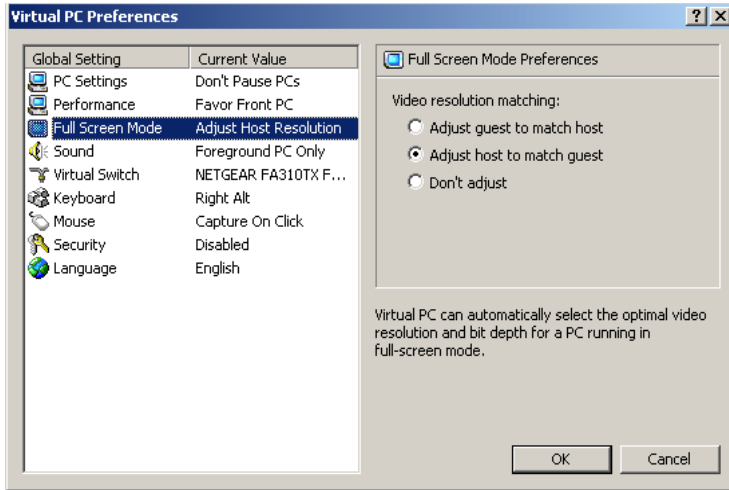
The default setting, **Give up time to other processes**, will reduce this effect. Virtual PC lowers overall CPU usage for all running guest PC's by half when it is not the front most application. Under this setting, performance in each guest PC while in the background will drop by about 50%.

Changing the setting to **Run at maximum speed** disables this behavior allowing Virtual PC to continue giving all available processor cycles to the guest PC's. This may affect the performance of other applications running on the host. When running server software, benchmarks, or other CPU intensive workloads within the guest PC, the **Run at maximum speed** option is recommended. The presence of multiple processors enhances operations under this setting.

Full Screen Mode

Virtual PC automatically selects the optimal video resolution and bit depth for guestPC's running in full screen mode. Some older applications will look and perform better running in full screen.

6-14



The available options are:

Adjust guest to match host—resizes the guest's video resolution to match the host when entering full screen. This option requires VPC Additions.

NOTE *Some operating systems, like DOS, cannot change to higher resolutions, this will result in a blank band surrounding the guest PC's window. The black band will also surround the guest PC, if the VPC Additions are not installed.*

Adjust host to match guest—resizes the host's video resolution to match the guest's current resolution

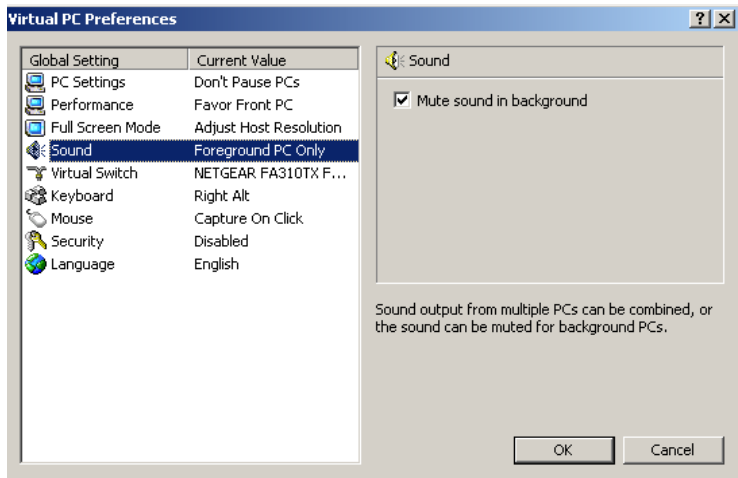
Don't adjust—guest resolution does not change when switching to full screen mode, this may result is a black band surrounding the guest PC

Sound preference

To change the Sound preference:

- 1 On the **File** menu in the Virtual PC window, click **Preferences**.
- 2 In the Global Setting list, click **Sound**.

6-15

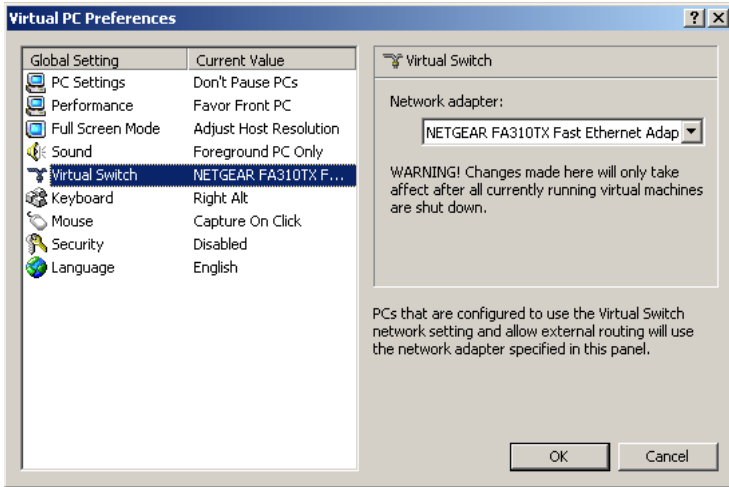


- 3 Select or deselect **Mute sound in background**.
Enabling this option mutes sounds from all guest PCs running except the active guest PC.
- 4 Click **OK**.

Virtual Switch preference

Virtual Switch preferences are available on host machines running operating systems that are mentioned in system requirements. There are limitations associated with using the Virtual Switch global preferences with Windows98SE and Windows ME. (See page 43 for details about Virtual Switch.) You may choose among the available network interface cards installed in your host PC. All external virtual switch network traffic is routed to the selected network interface card.

6-16



To change the Virtual Switch preference:

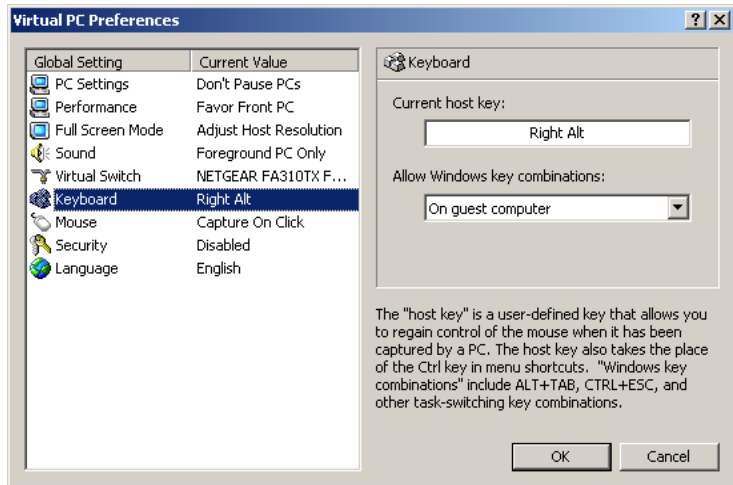
- 1 On the **File** menu, select **Preferences**.
- 2 In the Global Setting list, click **Virtual Switch**.
- 3 In the **Network adapter** menu, select the preferred network interface card. Note that the current value will be set to your network adapter.
- 4 Click **OK**.

Keyboard preference

The Keyboard preference lets you determine the host key setting and Windows key combinations.

The host key is used in certain key sequences. For example, pressing the host key in combination with the ENTER key switches between Full Screen display mode and Windowed mode. Also, pressing the host key allows you to regain control of the mouse when it has been captured by a guest.

6-17



Windows key combinations that allow task switching and other features can be set in the keyboard preferences as well. This would include combinations such as ALT+TAB and CTRL+ESC.

By default, the host key is set to the **right ALT** key, and the windows key combination operates on the active guest computer.

To change the Keyboard preference:

- 1 From the **File** menu in the Virtual PC window, click **Preferences**.
- 2 From the Global Setting list, click **Keyboard**.
- 3 To change the host key, make sure the current host key definition is highlighted. Then press the new host key. Note that the current value will change to the newly selected key.
- 4 Changing the Windows key combinations is completed by pulling down a menu and selecting On host computer or In full screen mode only.
- 5 Click **OK**.

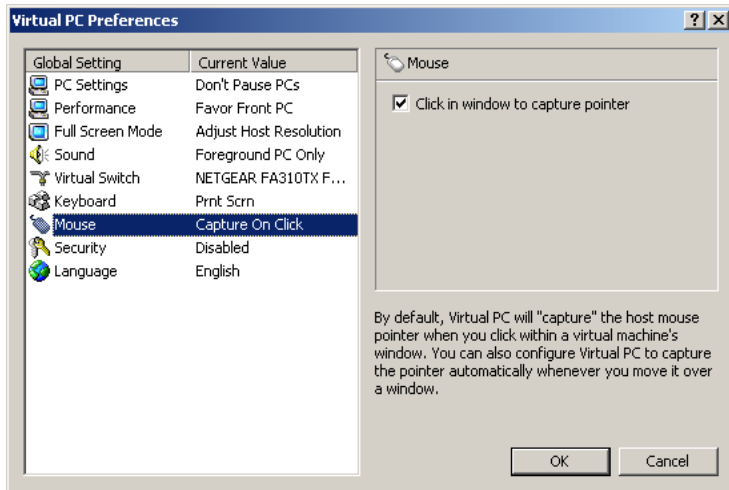
Mouse preference

The Mouse preference lets you set the behavior of the mouse pointer when you move it into a guest PC window. By default, you must click in a guest PC window to have the guest PC capture the pointer.

To change the Mouse preference:

- 1 On the **File** menu in the Virtual PC window, click **Preferences**.
- 2 In the Global Setting list, click **Mouse**.

6-18



- 3 Select or clear the option **Click in window to capture pointer**. With the option cleared, the guest PC automatically captures the pointer.
- 4 Click **OK**.

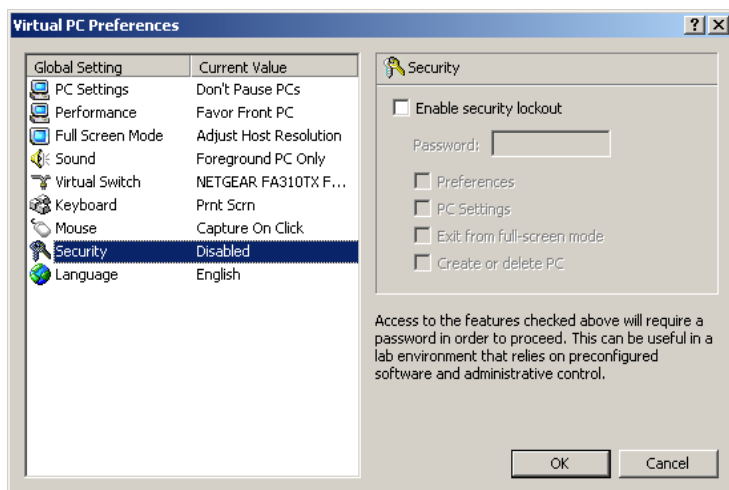
Security preferences

Security settings allow administrators to set global passwords for settings on guest PC's and preferences on the Virtual PC application. This feature is useful in an environment where it may be necessary to preclude users from changing the setting of a guest PC. When a password is set in the security lockout feature, an operator will need to provide a password to change any combination of settings on individual guests and global preferences. The default install disables security.

To enable the security lockout feature:

- 1 Select the File menu, select Preferences.
- 2 In the Global Setting list, select Security.
- 3 Select Enable security lockout. .

6-19



- 4 Select the parameters you want to designate a security lockout password to: Preferences, PC Settings, Exit from Full Screen, Create or Delete a PC. You may choose any or all options.
- 5 Type your password. A password may be up to any 32 characters in length. Function keys cannot be used as password characters. Blank passwords are not allowed. Click OK.
- 6 You will be given a dialog box requesting that you verify your password. Click OK.
- 7 The designated options are now password protected.

Language preference

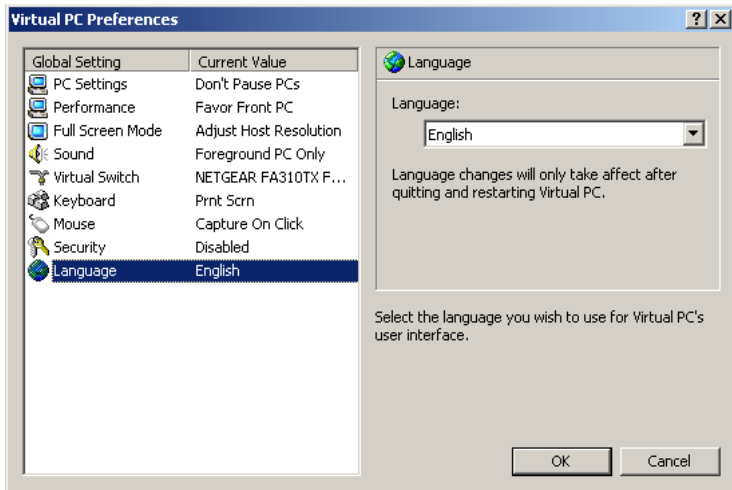
The Virtual PC application is localized in the following languages: English, German, French, Japanese, Italian and Spanish. Under the language preferences, you can assign a language to the application. When a different language is chosen, Virtual PC will function with that language independent of the host operating system. The default language is set to English.

To change the language preference setting:

- 1 Select the File menu, select Preferences.
- 2 In the Global Setting list, select Language.
- 3 Use the pull down menu to display all the language options.
- 4 Select your desired language option.
- 5 Click OK.

NOTE *You must quit and restart Virtual PC for global Language preferences to take effect.*

6-20



Using Virtual Disk Wizard

This chapter provides information about using **Virtual Disk Wizard**, an integrated utility that allows you to create, modify, and examine disk images.

Creating a hard disk image

Virtual PC stores data on virtual hard disks that take the form of disk image files stored on your host machine (or on a networked file server).

To create a hard disk image:

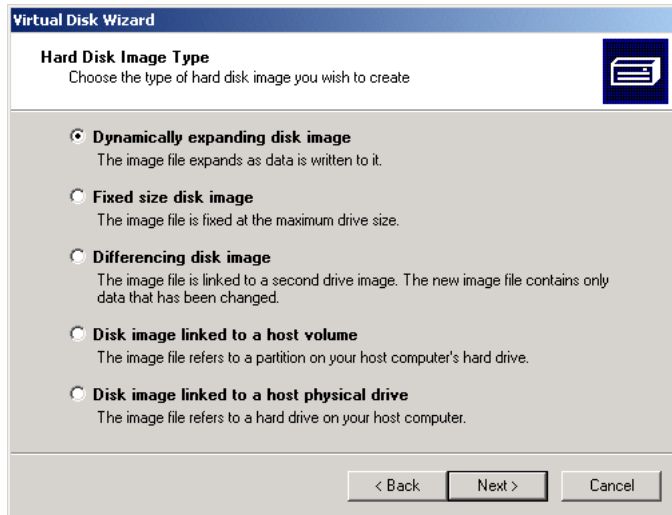
- 1 In the Virtual PC list, on the **File** menu, click **Virtual Disk Wizard**.
- 2 Click **Next**.
- 3 Select **Create new floppy or hard disk image**, and then click **Next**.
- 4 Select **Create hard disk image**, and then click **Next**.
- 5 Click **Browse** and select a name and location for the disk image. Click **Save**.
- 6 Click **Next**.

The panel for choosing a disk image type appears.

- 7 Choose the type of disk image you want to create and click **Next**. See the section “More about hard disk image types” below.

NOTE *The last two linked disk image types should only be used by advanced users logged in to the host PC as an administrator. They cannot be used by users on host operating systems of Windows 98SE and Windows ME. (See page 74.)*

7-1



- 8 Follow the Virtual Disk Wizard on-screen instructions to complete the creation of the disk image.

More about hard disk image types

Here are the details about the hard disk image types available in Virtual Disk Wizard.

Dynamically expanding disk image—A dynamically expanding disk image is the most commonly used type of disk image in Virtual PC. By default, the PC Setup Wizard creates disk images of this type. Dynamically expanding disk images are similar to fixed-size disk images, except that areas of the disk that haven't yet been written to are not included in the hard disk file. For example, if you create a 1-GB dynamically expanding disk image, the initial file will only be about 3 MB in size. As you write more information to the disk image, it grows to accommodate the new data. Along with this convenience, however, there is the danger that Virtual PC may be unable to expand the drive due to host hard drive size constraints. Virtual PC attempts to monitor the available space on the hard drive of your host PC and

warn you if the dynamically expanding drive starts to approach the limits of available space left on the host volume.

Fixed-size disk image—The simplest type of hard drive image is a fixed-size disk image that represents the entire virtual hard drive in a single disk image file. All of the space is pre-allocated, so these files are typically quite large. For example, if you create a fixed-size hard disk image that represents a 1-GB hard drive, the resulting file would be 1 GB in size. Although conceptually simple, fixed-size hard disk images are not generally recommended because of their large resource requirements. They do offer a slight performance advantage over other types of hard disk images, but this difference is small.

Differencing disk image—A differencing disk image is used in conjunction with one of the other types of disk images. The disk image associated with it is known as its *parent* disk image. The differencing file itself is similar to a dynamically expanding disk image file in that it starts small and grows to accommodate new data. However, data is only added to the differencing drive image when drive data is modified. In other words, contents of a differencing drive represents only the changes from the original disk image. There are several scenarios when this is useful:

- Several Virtual PC users want to share the same base disk image located on a network file server. In this case, each user creates a differencing disk image on his or her local hard drive. Any modifications made to the parent disk image are written to the local differencing disk image, leaving the parent disk image in a “pristine” state.
- You want to configure a single guest OS in multiple ways. You can duplicate the original hard disk image, but this requires substantially more hard drive storage space. Instead, you can create two differencing disk images, both with the same parent.

NOTE *Regardless of the scenario, Connectix strongly recommends that you write-protect or lock the parent disk image. If a parent disk image is modified, all differencing disk images related to it become invalid, and any data written to them is effectively lost.*

- **IMPORTANT** In general, the two linked disk image types should only be used by advanced users logged into the host PC as an administrator. In this mode, Virtual PC is accessing data from the host PC hard drive at a very low level. If the guest PC's OS crashes or contains bugs, the host volume might be corrupted.

Disk image linked to host volume—You can link a disk image to a volume on the host PC. In this case, the disk image is a small placeholder that simply refers to a partition on the host system. If the associated volume is mounted by the host PC OS, Virtual PC can only read from it. If the volume is not mounted by the host PC OS, you can choose to allow writing to the volume.

With this type of disk image, Virtual PC creates a virtual boot partition and partition map containing one entry. The virtual boot partition is saved to the disk image file, so changes to the sector are persistent. All other read/write requests are forwarded directly to the host volume.

NOTE *This option is not available on Windows 98SE and Windows ME hosts.*

Disk image linked to a host physical drive—This type of disk image is similar to an image linked to a host PC volume except that it represents an entire host PC hard drive, potentially with multiple volumes.

With this type of disk image, Virtual PC uses the real boot partition and partition map from the host PC drive. All read/write requests are forwarded directly to the host drive.

NOTE *This option is not available on Windows 98SE and Windows ME hosts.*

Disk image file splitting

Because of limitations inherent in some host operating system and volume formats, it is sometimes necessary to split dynamically expanding disk image files. In particular, FAT16 and FAT32 volume formats only support files up to 2 GB and 4 GB in size, respectively.

For example, if you use an 8-GB dynamically expanding drive image formatted for FAT32, Virtual PC splits the drive image into four 2-GB files. Dynamically expanding images and differencing images are split at the point where they cross the file size limit imposed by the underlying volume format. If the disk image is located on a volume that

doesn't impose these limitations (such as NTFS), the disk image is left intact.

If you want to copy an existing disk image from one location to another, be careful to include not only the primary file, but any split files associated with it. Also, keep in mind that if a disk image on an NTFS volume grows beyond 2 GB, you cannot copy it to a FAT volume.

Creating a floppy disk image

To create a floppy disk image:

- 1** In the Virtual PC window, on the **File** menu, click **Virtual Disk Wizard**.
 - 2** Click **Next**.
 - 3** Select **Create new floppy or hard disk image**, and then click **Next**.
 - 4** Select **Create floppy disk image**, and then click **Next**.
 - 5** Click **Browse** and select a name and location for the floppy disk image. Click **Save**.
 - 6** Select the floppy disk type (low or high density).
 - 7** Click **Next**.
 - 8** Click **Finish**.
- **IMPORTANT** Virtual PC can mount most flat-file representations of a floppy disk. Many popular Windows utilities are able to create such images. However, make sure to disable any compression features.

Examining or modifying a disk image

To examine or modify a disk image for a guest PC:

- 1 Shut down the operating system on the guest PC whose drive image you want to examine or modify. (If the machine has a saved state, you cannot modify the drive image.)
- 2 In the Virtual PC window, from the **File** menu, click **Virtual Disk Wizard**.
- 3 Click **Next**.
- 4 Select **Examine or modify existing disk image**, and then click **Next**.
- 5 Click **Browse** and navigate to the location of the disk image. Select the image and click **Open**.
- 6 Click **Next**.
- 7 Examine the disk image and click **Cancel**.
Or choose an option to modify the image and click **Next**. (The options available to modify a disk image depend on the type of image. See the relevant information below.) Follow the on-screen Wizard directions. Click **Finish** to make the modification.

Fixed-size disk images

Expand the disk image—increase the size of the disk image, increasing the primary partition and modifying the file system contents for consistency with the new partition size. The size to which you can expand a disk image is limited by the file system cluster size. For FAT16 drives, you can normally increase a disk image size up to the next power of two. For FAT32 disk images, this limitation doesn't exist.

Convert to dynamically expanding disk image—convert the fixed-size disk image to a dynamically expanding disk image. Any zeroed data in the fixed-size disk image is discarded, resulting in a smaller disk image file.

Dynamically expanding disk images

Expand the disk image—increase the maximum (fully expanded) size of the disk image. The same limit exists as for fixed-size disk expansion.

Convert to a fixed-size disk image—convert the dynamically expanding disk image to a fixed-size disk image.

Compact the disk image—attempt to “shrink” the dynamically expanding disk image by removing portions that have been “zeroed” with a disk utility program.

NOTE *When you delete files from a disk image, the data associated with these files is usually not removed. You must run a disk utility program to “zero” the deleted data before using the option Compact the disk image.*

Differencing disk images

Merge the differencing drive with its parent—write data from the differencing disk image back into its parent image. This requires that the parent disk image is writable.

Merge the differencing drive and its parent to a new file—combine data from the differencing disk image and its parent image into a new, dynamically expanding hard or fixed-size disk image.

Disk images linked to a host volume

Convert the host volume to a fixed-sized drive image—write the volume contents to a newly created, fixed-size disk image. Note that you cannot create the new disk image on the associated host volume.

Convert the host volume to a dynamic drive image—write the volume contents to a newly created, dynamically expanding disk image. Note that you cannot create the new disk image on the associated host volume.

NOTE *This option is not available on Windows 98SE and Windows ME hosts.*

Disk images linked to a host physical drive

Convert the host physical drive to a fixed-sized drive—write the host drive contents to a newly created, fixed-size disk image. Note that you cannot create the new disk image on the associated host drive.

Convert the host physical drive to a dynamic drive image—write the host drive contents to a newly created, dynamically expanding disk image. Note that you cannot create the new drive image on the associated host drive.

NOTE *This option is not available on Windows 98SE and Windows ME hosts.*

Technical Specifications

This appendix lists the technical specifications for Virtual PC for Windows

Processor

- The emulated environment “sees” the same processor model as the processor in your host PC. For example, if your host machine contains a Pentium III, the OS on a guest PC reports running on a Pentium III as well. All functionality of your host processor is supported within the guest PC, including MMX, SSE, SSE-2, and 3DNow.

Motherboard

- Virtual PC emulates the Intel 440BX chipset, including all auxiliary chips needed for a PC:
 - 8259 PIC (programmable interrupt controller)
 - 8254 PIT (peripheral interval timer)
 - 8237 DMA (direct memory access) controller
 - CMOS (persistent RAM)
 - RTC (real-time clock)

BIOS

- American Megatrends BIOS (AMIBIOS)
- Support for APM 1.2 and ACPI

Memory

- Maximum 1GB RAM per guest PC

IDE controller

- Uses standard dual IDE/ATAPI controllers configured according to two options listed here: Standard Configuration and Alternate Configuration.

Standard configuration

Controller	Drive
Primary Controller	Drive 1: Drive 1
Primary Controller	Drive 2: Drive 2
Secondary Controller	Drive 1: CD-ROM
Secondary Controller	Drive 2: Drive 3

Alternate configuration

Controller	Drive
Primary Controller	Drive 1: Drive 1
Primary Controller	Drive 2: CD-ROM
Secondary Controller	Drive 1: Drive 2
Secondary Controller	Drive 2: Drive 3

Hard drive images

- Uses hard drive container images
- Supports five types of hard disk images:
 - Dynamically expanding images
 - Fixed-size images
 - Differencing images
 - Images linked to host volumes
 - Images linked to host drives
- Compatible with hard disk images created with other versions of Virtual PC 4.0 or later
- Supports simultaneous use of three drive images, each up to approximately 127 GB in size

CD-ROM/DVD-ROM

- Uses the CD-ROM or DVD-ROM in the host PC (if present)
- ATAPI interface supports data and audio commands

NOTE *Encrypted DVD media such as DVD movies is not supported.*

Video

- Emulates the S3 Trio 32/64 PCI SVGA Card
- Implements 8 MB of emulated VRAM, allowing for up to 1600 x 1200 PC screen resolutions with 32 bit color

NOTE *VRAM availability is dependent upon the guest OS's video driver. Some video drivers may only recognize 2MB or 4MB of VRAM. Virtual PC Additions may be required for the guest PC to recognize 8MB of VRAM.*

- Fully implements S3 Trio 32/64 graphic acceleration features and is compatible with S3 Trio 32/64 drivers
- Supports 1600 x 1024 and 800 x 512 16:9 aspect ratio modes
- Also backwards compatible with MDA, CGA, EGA, and VGA video modes
- VESA 2.0 compliant

Keyboard controller

- Controller emulates 8255 keyboard controller for interface between PC and keyboard/mouse

Keyboard

- Uses the standard PC keyboard

Mouse

- Emulates a PS/2 mouse with Intellimouse extensions for scroll wheel support using IRQ 12

Floppy

- Uses a standard PC floppy drive
- Emulates the standard PC floppy controller interface
- Supports floppy disk image files (720-KB or 1.44-MB flat-mapped files)

Serial ports

- Emulates COM1 and COM2 serial ports
- Redirects emulated COM1 and COM2 ports to specified host PC serial port or a text file

Parallel port

- Emulates LPT1 parallel port
- Redirects emulated LPT1 output to selected host parallel port

Sound

- Emulates Creative Labs ISA Sound Blaster 16 card
- Supports both DSP (sound effects) and FM synthesis (music)
- Emulation includes two Yamaha OPL2 chips as well as a CT1345 mixer
- Sound card is configured to use a base port of 0x220, IRQ 5, and DMA channel 1 (for 8 bit) or 5 (for 16 bit)
- Supports 8-bit and 16-bit sound input and output

Ethernet

- Emulates a DEC/Intel 21140A-based PCI Ethernet card
- The card is plug-and-play and can be reconfigured by the operating system, but default settings use IRQ 11

Command Line Parameters

This appendix provides information about the command line parameters available in Virtual PC for Windows.

If you launch Virtual PC for Windows using the Run command line interface, you can specify certain parameters.

For example, typing

```
Virtual PC.exe -quiet
```

launches Virtual PC for Windows, but does not start up any guest PCs.

Each command line parameter must be preceded by a hyphen (-). For example, typing:

```
Virtual PC.exe -pc windows98 -launch -fullscreen
```

launches Virtual PC and starts up the guest PC named “windows98” in Full Screen mode.

Also, names of guest PCs that contain a space character must be enclosed in quotation marks. For example, typing:

```
Virtual PC.exe -pc "Test DOS" -launch
```

launches Virtual PC and starts up the guest PC called Test DOS.

See the next page for a complete list of command line parameters.

Parameter	Action
pc [name]	Targets a guest PC by name
launch	Launches the target virtual PC
fullscreen	Puts the target virtual PC in Full Screen mode
nofullscreen	Puts the target virtual PC in Windowed mode
pause	Pauses the target virtual PC
nopause	Resumes the target virtual PC
show	Redisplays the target virtual PC from the host PC taskbar
noshow	Minimizes the target virtual PC to the host PC taskbar
help	Displays help information for all Virtual PC command line parameters
quiet	Suppresses guest PCs from launching when Virtual PC for Windows starts up
version	Displays version information about Virtual PC for Windows

Volume License Guidelines

This appendix provides information for anyone who needs to perform a Virtual PC volume license installation. Before you start the installation, you should be familiar with Virtual PC.

Preparing for large-scale deployment of Virtual PC

Check to make sure the Virtual PC Volume License pack contains the following items:

- Virtual PC installation CD(s)
- Virtual PC manual with serial number
- Virtual PC Volume License Addendum
- Microsoft Windows manual (if Virtual PC with a bundled Microsoft OS product)
- Microsoft Certificate of Authenticity (COA) registration numbers (one for each of the number of installations purchased)

Also check the system requirements for the guest PC operating system you are using. Make sure all the client machines for the installation meet these requirements.

Building a disk image for deployment

In large-scale deployment, it is often easier to create a single drive image with the guest operating system installed and then copy that image to all target machines. You can also use this single drive image to re-install if the user needs to return to a known starting point.

Note that in this case, all target machines would have the same Microsoft Windows Certificate of Authenticity (COA) registration number in their drive images. This has legal implications that are covered in a later section of this appendix. (See page 88.)

In building a drive image for deployment within your organization, you can either:

- start with the drive image purchased from Connectix as part of this volume license and then customize it for your organization
- build the drive image yourself “from scratch”

Each option is explained below.

Building a drive image “from scratch”

It is possible to build a disk image yourself using a licensed OS installation disk. For instructions on creating a new hard disk image with your own copy of an OS, see page 21.

Make sure that VPC Additions for the operating system you are using are also installed. These Additions provide for the seamless integration of the guest OS with the host PC, see page 25.

A way to test if your VPC Additions have been installed correctly is by checking the pointer function. If the pointer does not change back and forth from a host PC pointer to a guest PC pointer as you cross the border of the Virtual PC window, then the VPC Additions have **not** been installed correctly.

Also, be sure to read the legal issues section of this appendix to ensure you are properly using your licensed OS installation disk. (See page 88.)

You can also install properly licensed Windows applications, utilities, and fonts in this disk image, as well as any data files needed by your users. Doing this step once saves your users start-up time, and probably saves you maintenance time later on.

Starting with a disk image from Connectix

Starting with a drive image from Connectix can save you considerable time. (Be sure to read the legal issues sections in this appendix to ensure that you are properly using your licensed Microsoft Certificate of Authenticity. See page 88.)

You can also install properly licensed Windows applications, utilities, fonts in this disk image, as well as any data files needed by all your users. Doing this step once saves your users start-up time, and probably saves you maintenance time later on.

Deployment

After installing Virtual PC on a single host PC and properly configuring the drive image for your organization, here are the recommended steps for deploying Virtual PC throughout your organization:

- 1** Quit Virtual PC without saving the state of your guest PC.
- 2** Install Virtual PC on each client machine, using the Virtual PC Installation CD. Each client machine needs to be restarted after installation.
- 3** Copy the disk image to each client machine. As this may consume both time and network bandwidth, you might consider mechanisms for broadcasting this to many target machines simultaneously, or multiple staging servers for the image.
- 4** On each client machine, create a new guest PC that uses the disk image copied in step 3. (This is similar to the instructions for creating a guest PC using a Connectix OS Pack. See page 20.)

Legal Issues

Volume deployment of Virtual PC also implies a volume deployment of a guest operating system (typically Windows), as well as applications, utilities, and fonts, and so on for this operating system. You are responsible for ensuring that you have properly licensed all of these for deployment in your organization.

A special case is the deployment of the Windows operating system. Microsoft has stated that special agreement site licenses do not exist for Windows Operating Systems. If you are installing your own version of a Microsoft OS, you should review your site's agreement with Microsoft.

Managing Multiple Certificates Of Authenticity

It is your responsibility to purchase a unique Certificate of Authenticity (COA) for each computer using a Windows operating system with Virtual PC. To assist you with this, any volume purchase of Virtual PC with a Windows operating system comes complete with a unique COA for each seat purchased. While you must maintain these COAs in order to prove proper ownership and be prepared to present these COAs in the case of an audit by Microsoft, by the Software Publishers Association, or by Connectix, you do not need to actually use a unique COA in each deployed drive image. The total number of drive images copied to target machines may not exceed the number of COAs purchased.

Migrating Guest PCs from Virtual PC 4.x to Virtual PC 5.1

Introduction

Virtual PC 5.0 introduced a number of significant changes to the emulated hardware of prior versions of Virtual PC 4 for Windows.

Major changes to the Virtual PC 5.0/5.1 emulated hardware:

- A new BIOS from AMI (American Megatrends Incorporated)
- A new emulated motherboard chipset. The Intel 440BX chipset, which fully supports the new ACPI (Advanced Configuration and Power Interface) standard, is now used.

NOTE *ACPI is disabled in guest PCs by default. To enable ACPI, start the guest PC and press DEL to enter the BIOS. Select Power and change the setting for ACPI Aware OS to YES.*

- A new emulated network card (DEC/Intel 21140A based PCI 100Base-T Ethernet card)

See **Appendix A** for a complete list of technical specifications.

The changes to the emulated hardware will cause most operating systems that were installed into guest PCs using versions of Virtual PC prior to 5.0 to go through hardware redetection ("plug and play") when the old images are booted with Virtual PC 5.0 the first time.

This appendix describes the update process and troubleshooting steps for the most popular operating systems.

Migrating Virtual PC 4.x to 5.1 is a two step process. Step 1 involves updating the Virtual PC application on the host machine. Step 2 involves old virtual hard disk images going through a "hardware detection" the first time it is booted with Virtual PC 5.1 application.

Step 1: Update the Virtual PC 5.1 application on the host

- 1 “Saved states” of Virtual PC 4.x are not compatible with Virtual PC 5.1. Properly shutdown all guest PCs before running the Virtual PC 5.1 updater. Connectix recommends deleting or committing any “Undo Drives” before updating.
- 2 Make sure to log into the host PC with local administrator privileges before running the Virtual PC 5.1 updater on Windows NT 4.0, 2000, or XP. On the host PC, run the Virtual PC 5.1 Updater. The updater will attempt to uninstall the old version and then immediately reboot the host machine. Log in again as with the same account and the Virtual PC updater will continue automatically after the reboot. Install the application using the standard installation instructions.
- 3 The updater will automatically import all the old PC List Configurations and the old Virtual PC 4.x serial number to Virtual PC 5.1.

Step 2: Update existing virtual hard disk images created with Virtual PC versions prior to 5.1.

Operating systems which support automatic detection of new hardware will go through “plug-and-play” the first time they are booted with Virtual PC 5.1. The expected results of this process and known issues for a number of popular guest operating systems are listed below.

IMPORTANT Be sure to have the installation media available for the guest operating systems you will be upgrading. Some operating systems will require the installation media to install drivers for the new emulated hardware discovered.

DOS

DOS does not support automatic detection of new hardware but older DOS hard disk images should function normally under Virtual PC 5.1. DOS images with networking already configured should be able to use the same network drivers with the new emulated network card without modification.

Some custom EMM386 settings might need to be adjusted due to the changes in upper memory. If DOS does not boot, reboot the guest PC and press **CTRL+F8** to confirm each line at startup. Skip the

EMM386 line in **CONFIG.SYS**. After DOS boots, make sure EMM386 does not use the memory range E000 to EFFF.

If you wish to use the DOS Shared Folders feature, install the new DOS Additions downloadable from the Connectix website at http://www.connectix.com/support/vpcw_online.html

Windows 95 Retail (A) Version

Windows 95a hard disk images will go through a lengthy hardware redetection process. The **default** Windows driver can be selected when the **CPU Bridge** and **ISA Bridge** are redetected. However, when the **PCI Bridge** is detected, select **Do not install a driver (Windows will not prompt you again)**. Continue the hardware detection process normally. When the guest PC boots to the desktop, the new hardware drivers should be installed properly.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows 95 OSR 2.x (B, C or D) Version

Windows 95 OSR-2 guest PCs will go through a lengthy hardware redetection process and will likely require installing new device drivers from the Windows 95 installation CD-ROM. The **default** Windows driver can be selected when the CPU Bridge and ISA Bridge are redetected. However, when the PCI Bridge is detected, bypass this dialog by clicking **Cancel**. The PCI Bridge will be detected each time you reboot. Once the guest PC successfully boots to the Windows 95 desktop, verify the CD-ROM drive is working and reboot. Now, when the PCI Bridge is detected, install the drivers by clicking **Browse**. Navigate to the Windows 95 install CD-ROM to locate the new PCI Bridge drivers. When the guest PC boots to the desktop, all the new hardware drivers should be installed properly.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows 98 (First and Second Editions)

Windows 98 and Windows 98SE hard disk images will go through a lengthy hardware redetection process and will likely require installing new device drivers from the Windows 98 install CD-ROM. However, since the new emulated CD-ROM device will not be initially loaded, users should bypass ALL hardware driver install dialogs by clicking **Cancel** at each prompt. After the first reboot, the CD-ROM drive will be properly loaded. Continue the hardware redetection and new driver installation normally. Under Device Manager, some devices may appear to not have loaded correctly. Delete these devices from Device Manager and reboot. All the devices should load correctly after the reboot.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows Millennium

Windows ME guest PCs will go through the lengthy hardware re-detection phase normally and successfully detect the new hardware. When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows 2000 Pro, Server and Advanced Server

The first time a Virtual PC 4.x Windows 2000 guest PC is booted with Virtual PC 5.1, the mouse and keyboard will not accept input. Boot Windows 2000 in Safe Mode (press F8 at startup) and then reset the guest PC. To reset the guest PC, click **PC** from the guest menu and click **Reset**, or press the **host key** and **R (hostkey+R)**. After rebooting, Windows 2000 will go through the hardware re-detect phase normally and find all the new hardware. The mouse and keyboard should also function correctly.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows XP Home and Professional

Virtual PC 4.x Windows XP Pro guest PCs configured to display a login screen, will not have mouse or keyboard input when first booted with Virtual PC 5.1. You will need to reset the guest PC. To reset the guest PC, click **PC** from the guest menu and click **Reset**, or press the **host key** and **R (hostkey+R)** to reboot and regain mouse and keyboard input. After the reboot, Windows XP will boot normally to the Windows XP desktop. Redetection of all the new emulated hardware will happen in the background without user interaction. The changes to the new emulated hardware will **not** require Windows XP to be re-activated.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Windows NT 4.0 (all Service Packs)

NOTE *Be sure to have the install CD-ROMs of the guest operating systems you will be upgrading available. This operating systems will ask for the install CD-ROMs to install new hardware drivers.*

Virtual PC 4.x Windows NT 4.0 images will boot to the desktop normally under Virtual PC 5.1. However, the emulated network card driver will need to be manually re-installed. Click **Start**, **Settings**, then **Control Panel**. Double-click **Network** and then click the **Adapter** tab. Remove the old DEC 21041 Ethernet driver and add the DEC PCI Fast Ethernet DECchip 21140. Reboot the guest PC to complete the install.

When the guest PC finishes installing all the new hardware drivers, install the new Virtual PC Additions into the guest for the latest host/guest integration features. To install the VPC additions: click **PC** from the guest menu and click **Install/Update Additions**.

Linux & Solaris 8

Most distributions of Linux will detect all the new hardware automatically. Some distributions may require the user to manually install the new DEC 21140A (Tulip) ethernet drivers. Specific distribution notes are listed below:

Red Hat Linux 7.3

KUDZU should automatically detect all hardware changes and install the correct drivers automatically.

Solaris 8

Follow these steps to insure that Solaris will autodetect the new hardware changes correctly:

- At the boot prompt, **Select (b)oot or (i)nterpreter** type:
b -r and press **Enter**.
NOTE There is a space between b and -r. Enter the command quickly, there is only a 5 second boot delay.
- At the prompt, enter the root password and press **Enter**.
- **kdmconfig Mismatch Detected:** Press **F2** to edit and test the configuration.
- **kdmconfig – View and Edit Window System Configuration:** Select **No changes needed – Test/Save and Exit**. Press **F2** to continue.
- **kdmconfig Window System Configuration Test:** Press **F2** to continue.
- Click **Yes** inside the test X Window screen.

Presently, there are no Virtual PC Additions for Linux or Solaris. However, there is a TimeSync daemon freely available for download. See the Online Forums at <http://www.connectix.com> for more information.

OS/2

All OS/2 drive images created with older versions of Virtual PC should boot and function normally.

Novell

Novell 5.1 and 6.0 should properly redetect most of the new hardware and boot normally with Virtual PC 5.1. However, the ethernet card will need to be manually re-configured with NWCONFIG. Select PCI slot 2 for the ethernet card and rebind the protocols.

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