Virtual PC™

for Macintosh

Version 4.0

User Guide

December 2000

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Contents

Introduction

Welcome to Virtual PC 4.0—a sophisticated software emulation program that creates full PC functionality on your Macintosh.

This Introduction offers a road map to important information in subsequent chapters that can help you successfully install, configure, and use Virtual PC 4.0 with a minimum of complications—whether you are upgrading to version 4.0 or using the product for the first time.

About this User Guide

If you are upgrading from a previous version of Virtual PC, please be sure to look at Chapter 2,*What's New in 4.0,* for important information about new features. In version 4.0, for example, you can now run more than one PC operating system at the same time!

If you are new to Virtual PC, take a few minutes to read Chapter 3, *Touring Virtual PC*. It provides a useful introduction for the steps you need to take as you set up and use the product.

If you have other particular needs, such as configuring for a network or using Windows, use the following chapter overviews to find the information you require.

Chapter overviews

Here is a brief description of each chapter and appendix in this User Guide.

Chapter 1 *Introduction*
—this chapter

Chapter 2 *What's New in 4.0*
—a summary of the major new features in version 4.0 of Virtual PC

Chapter 3 *Touring Virtual PC*
—an overview of Virtual PC

Chapter 4 *Installing or Upgrading Virtual PC*
—step-by-step instructions for installing Virtual PC 4.0 for the first time, or upgrading from a previous version

Chapter 5 *Using Virtual PC*
—a comprehensive explanation of the key features of Virtual PC

Chapter 6 *Networking*
—a guide to the details of networking using Virtual PC

Chapter 7 *Using AppleScript*
—an introduction to AppleScript and Virtual PC

Chapter 8 *Using Windows*
—an introductory orientation to Windows operating systems: Windows 98, Millennium, and 2000

Chapter 9 *Using PC-DOS*
—information about using PC-DOS with Virtual PC

Chapter 10 *Using Red Hat Linux*
—information about using Red Hat Linux with Virtual PC

Chapter 11 *Frequently Asked Questions*
—useful questions and answers

Appendix A *Technical Specifications*
—technical specifications for Virtual PC

Appendix B *Volume License Guidelines*
—information about volume licensing

Appendix C *Installing Your Own OS*
—instructions for installing your own copy of an operating system to use with Virtual PC

If you need additional help

If you need additional help, please consider these options:

Online Help

Use the new online Help feature in Virtual PC 4.0. (See page 18 for details.)

Read Me file

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

Connectix Support

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

- Your registration number
- Software version number—select **About Virtual PC** from the menu and then click **Info** to get this information.
- Macintosh model
- Apple System software version—from the Apple menu, select **About This Computer...** or **About This Macintosh...**
- Your notes on the events that led to a problem

You can contact Connectix on the World Wide Web, or by e-mail, fax, or phone:

- Web: http://www.connectix.com
- E-mail: vpcsupp@connectix.com
- Fax: 650-571-0621
- Phone: 970-304-9533, 8AM to 8PM PST, Monday through Friday

In Europe, please use this contact information:

- E-mail: connectix@nl.sykes.com
- Fax: +31-20-581-9270
- Phone: +31-20-581-4385. Information is available in English, French, German, and Dutch.
- Post: SEI, Attn: Connectix, Naritaweg 70, 1043 BZ, Amsterdam, The Netherlands

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)

What's New in 4.0

This chapter describes the new features in version 4.0 of Virtual PC, many based on creative ideas from our customers. Thanks for your thoughtful suggestions!

New features in version 4.0

The major new features in Virtual PC 4.0 include:

- Faster execution
- Multiple "virtual machines" at the same time
- New Virtual PC List
- Custom RAM allocation and high RAM limits
- Expandable drive images
- Simplified global Preferences
- Bootable CDs
- Streamlined user interface
- Help
- Integration of utilities
- Required serial number

IMPORTANT Please don't miss the section on "Custom RAM allocation" in this chapter. It explains important changes in how you allocate memory when using Virtual PC.

Faster execution

Virtual PC 4.0's overall execution is significantly faster than previous versions. It is notably faster when launching and quitting applications. It is also faster when running PC applications, opening folders, displaying menus, and accessing a PC drive. In addition, Virtual PC 4.0 has enhanced support for the Macintosh G4's Velocity Engine, which speeds up certain multimedia and video applications in the Windows operating system.

Multiple virtual machines at the same time

With Virtual PC 4.0, you can now launch multiple PCs or "virtual machines" at the same time in separate windows. Each virtual machine can run a different PC operating system or a different configuration of the same PC operating system. Your only limit is the amount of RAM on your Macintosh.

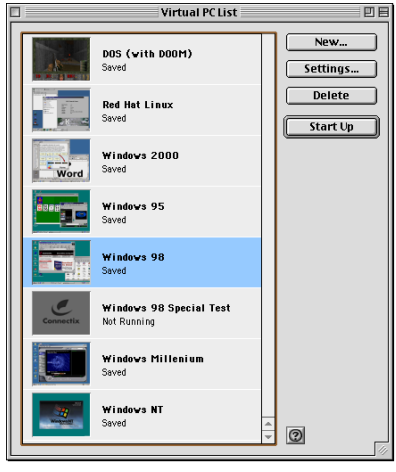
2-1

This new capability affects how you use Virtual PC in many ways—from the new Configuration Manager (now called the Virtual PC List), to changes in the Virtual PC Preferences, to changes in Virtual PC's AppleScript. Chapter 5, *Using Virtual PC*, provides details about running multiple virtual machines.

New Virtual PC List

Virtual PC 4.0 includes an expanded Configuration Manager now called Virtual PC List. Virtual PC List is your control panel for Virtual PC. It enables you to easily configure your settings for all your virtual machines, add other virtual machines, or open several virtual machines at the same time. For example, if you purchased Virtual PC 4.0 with Windows Me (Millennium Edition) and you own a personal version of Windows 98, you can install Windows 98 and then use Virtual PC List to control both virtual machines.

2-2



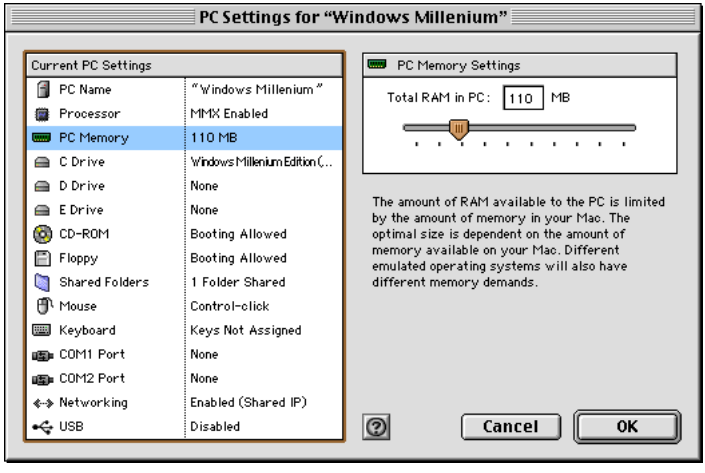
When you shut down a virtual machine, Virtual PC asks if you want to save or discard the current PC state. (In earlier versions of Virtual PC, the last saved PC state would be opened because only one virtual machine could run at a time.) The key advantage of saving the state of a virtual machine is a faster startup time.

Virtual PC List also displays a dynamically updating thumbnail picture of the desktop of each virtual machine—saved, running, or paused.

Custom RAM allocation and high RAM limits

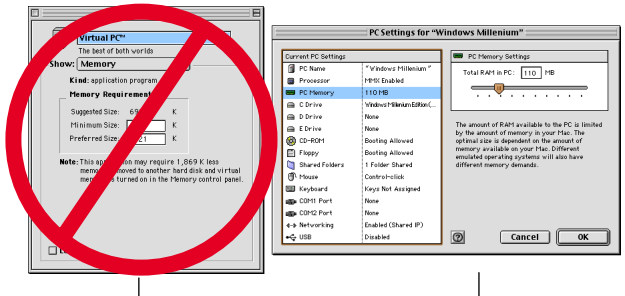
With Virtual PC 4.0, you can adjust the amount of RAM allocated to each virtual machine, even while Virtual PC is running.
Virtual PC 4.0 also allows for large RAM partitions for each virtual machine—up to 512 MB.

2-3



Memory allocation is very different than in previous versions of Virtual PC. Under **PC Memory** in the Settings dialog, you now individually set the amount of memory for each virtual machine. Consequently, there is usually no reason to change the memory allocation for Virtual PC itself, as you have in the past and as you might do for other Macintosh applications.

2-4



Don't use Get Info to change the amount of memory for a virtual machine, ...

... use Settings instead.

Also note that *each* virtual machine requires its own RAM. For example, if you want to run Windows 98, Windows Millennium, and PC-DOS all at the same time, you need a sufficient amount of RAM to run all of these virtual machines.

Expandable drive images

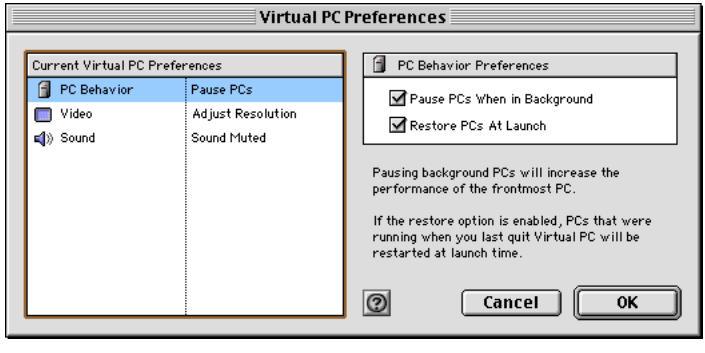
Virtual PC 4.0 supports larger drive images (up to 127 GB). But these images take up only as much room on your hard drive as required for actual content. For example, a 16 GB drive image with 1 GB of information and 15 GB of free space, only takes up 1 GB of space. This drive image expands in size as you install new applications and create new data on it. Note, however, that you *cannot* expand your existing fixed-size drive images from earlier versions of Virtual PC beyond their previous limits. Nor do these older drive images expand dynamically. To take advantage of the expandable drive image feature, you must use a drive image that ships with Virtual PC 4.0, or create a new expandable drive image with Virtual Disk Assistant.

Virtual PC 4.0 also supports an additional disk format (FAT-32) used by some PC operating systems, such as Windows 98 and Windows 2000.

Simplified global Preferences

Earlier versions of Virtual PC presented all configurable items in Preferences under the Edit menu. In Virtual PC 4.0, Preferences has only three items: PC Behavior, Video, and Sound. These three settings are now global for all virtual machines. The other preference settings have moved to Settings in the Virtual PC List window since you can now customize them for each virtual machine.

2-5



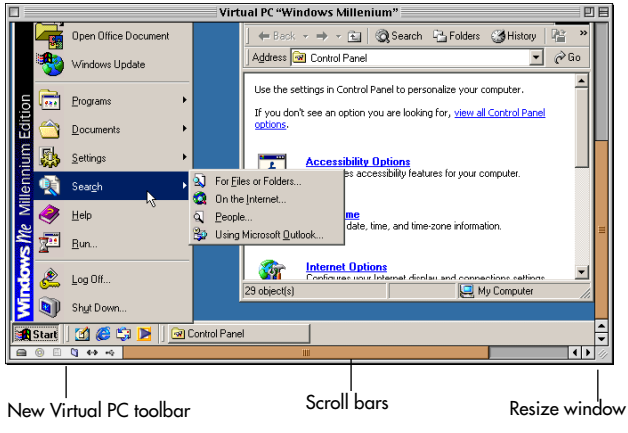
Bootable CDs

With Virtual PC 4.0, you can boot a virtual machine from a CD-ROM. If you enable CD-ROM booting in Settings and then insert a bootable CD in the CD-ROM drive, Virtual PC can start a virtual machine from the CD. This simplifies installation of your own operating system on a virtual machine.

Streamlined user interface

The user interface of Virtual PC 4.0 has been streamlined and made more "Macintosh-like," compared to earlier versions. The window running a virtual machine is resizable. The toolbar has been redesigned.

2-6



Three-button mouse devices as well as ones with scroll buttons or scroll wheels (a "scroll mouse") are now supported.

Help

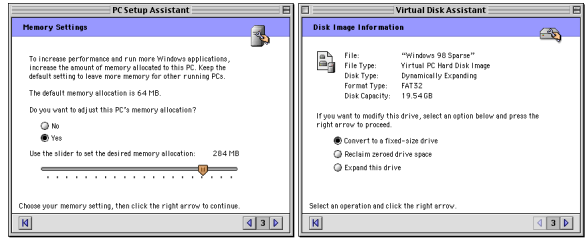
Contextual menu items are available in a number of windows as well as context-sensitive tool tips and Help buttons. Online help is available via the Apple Help Viewer, which you access from the Help menu or a Help button in many Virtual PC windows.

2-7

Integration of utilities

The capabilities of the two separate Virtual PC utilities—Virtual PC Setup Assistant and Hard Drive Expander—have been merged into Virtual PC itself and enhanced. Hard Drive Expander is now called Virtual Disk Assistant.

2-8

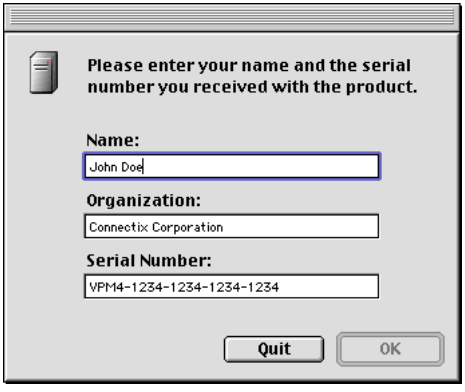


Required serial number

Virtual PC 4.0 now requires the entry of a serial number. You can find this number on the Virtual PC serial number card that accompanies the product.

IMPORTANT Be sure to save this card. You need the serial number if you ever have to re-install Virtual PC.

2-9



Touring Virtual PC

This chapter provides a brief tour of Virtual PC 4.0. Look it over to get an understanding of key features.

What is Virtual PC?

Virtual PC 4.0 is a Macintosh application that creates a software emulation of a fully functional PC on your Macintosh—including Sound Blaster 16 sound support, S3 Trio 32/64 video card support, Ethernet networking, and the Pentium™ MMX® instruction set.

With Virtual PC running, you can easily:

- run off-the-shelf PC applications on your Macintosh
- switch between Virtual PC and other Macintosh applications
- run multiple PC operating systems, or multiple configurations of a single PC operating system simultaneously
- use Macintosh peripherals such as printers, modems, CD-ROM drives, and USB devices from PC applications

How does it work?

Virtual PC 4.0 uses a drive image file and Settings to create a functioning PC on your Macintosh. The drive image is a large, expandable file that contains a PC operating system and any applications you have installed or data you have created.

The virtual machine drive image is the equivalent of the C or "boot" drive on a PC. As you install applications on the virtual machine and create data, the size of the drive image grows.

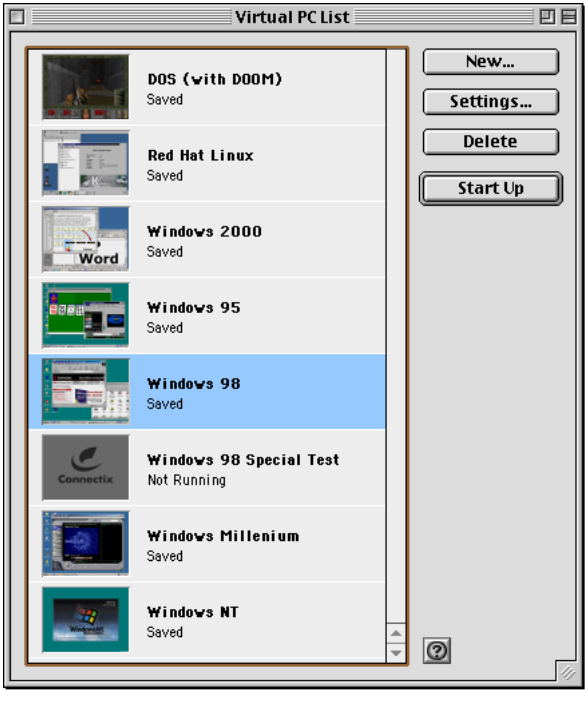
You use Settings to control certain characteristics of the virtual machine, such as the amount of RAM in which it is allocated to run, or the assignments for the COM1 and COM2 ports.

You can run several virtual machines at the same time. Each machine takes its own allocation of RAM, which you can change even while Virtual PC is running.

Virtual PC List

The Virtual PC List window is the "control panel" for Virtual PC. It lets you create a new virtual machine, change the Settings for a virtual machine, delete a virtual machine—you delete the Settings, not the drive image—and start up a virtual machine.

3-1

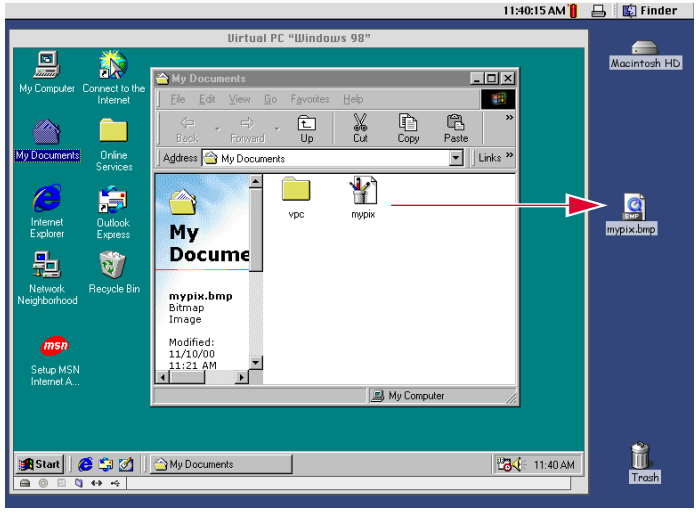


As you run a virtual machine, the thumbnail picture in Virtual PC List updates dynamically.

Drag and drop

With Virtual PC 4.0, you can drag and drop files and folders from the Macintosh desktop to a virtual machine running the Windows operating system, and vice versa.

3-2



Copy and paste

You can also copy and paste between applications running in the two environments—a virtual machine with Windows and the Macintosh. Virtual PC supports moving these types of data between clipboards:

- Text
- Bitmap images
- Unicode text

Shared folders and volumes

You can share a folder or a volume between the Macintosh and a virtual machine, making it especially easy to transfer files between operating systems.

You can even share the same folder with multiple virtual machines running at the same time.

Shared Internet connection

Virtual PC 4.0 lets your Macintosh and any of your virtual machines share a single Internet connection dynamically and transparently.

This means that if you properly configure your Macintosh to access the Web, then all the virtual machines running can also automatically access the Web.

Printing with Virtual PC

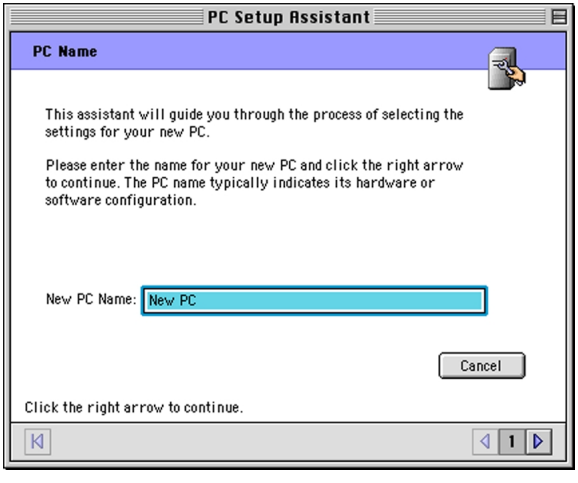
Your Windows, Linux, or DOS applications can print in several different ways:

- to a USB printer
- through a simulated parallel port to a simulated Epson printer
- through a simulated parallel port to a PostScript printer
- over a network

PC Setup Assistant

PC Setup Assistant simplifies the configuration of a new virtual machine. PC Setup Assistant allows you to specify several settings that commonly change, including memory allocation, selection or creation of a hard drive, and configuration of the serial ports. Once a machine is set up, you use Settings to change its configuration.

3-3



Install a personal copy of Windows

Since Virtual PC now supports bootable CDs, you can easily install your own personal copy of a Windows operating system as a new virtual machine. You might do this if the version of Virtual PC you have purchased provides a different PC operating system.

Scripting

Virtual PC lets you use AppleScript to manipulate the settings of virtual machines and to interact with PC operating systems running on virtual machines.

Virtual PC itself is scriptable and recordable. Its AppleScript dictionary allows commands to reference particular virtual machines, either individually or as a list.

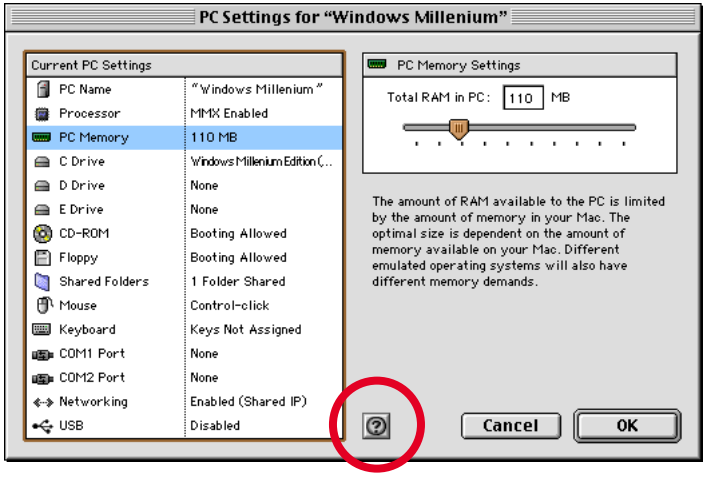
Help

Virtual PC includes context-sensitive Help available from the menu.

3-4

In addition, many windows provide a Help button. Clicking this button displays a Help screen specific to the part of Virtual PC you are using.

3-5



Installing Virtual PC 4.0

This chapter provides step-by-step instructions for installing Virtual PC 4.0 for the first time, or for installing an upgrade from an earlier version.

Installation Requirements

The following table lists the requirements for running Virtual PC 4.0 and one virtual machine on your Macintosh. (Note that the RAM referred to in the table is real, physical RAM available to Virtual PC. To run additional virtual machines, you need additional RAM.)

	Processor	Mac OS	Free Hard Disk Space	Ram Available to VPC	CD-ROM
PC-DOS	Any G3/G4 Macintosh	Mac OS 8.5 or later	260 MB	20 MB minimum 32 MB recommended	Required for installation
Windows 95	Any G3/G4 Macintosh	Mac OS 8.5 or later	350 MB	40 M Bminimum 48 MB recommended	Required for installation
Windows 98	Any G3/G4 Macintosh	Mac OS 8.5 or later	1 GB	50 MB minimum 64 MB recommended	Required for installation
Windows ME	Any G3/G4 Macintosh	Mac OS 8.5 or later	1 GB	64 MB minimum 96 MB recommended	Required for installation
Windows 2000	Any G3/G4 Macintosh	Mac OS 8.5 or later	1.5 GB	80 MB minimum 160 MB recommended	Required for installation
Windows NT	Any G3/G4 Macintosh	Mac OS 8.5 or later	500 MB	80 MB minimum 160 MB recommended	Required for installation
Red Hat Linux	Any G3/G4 Macintosh	Mac OS 8.5 or later	1 GB	80 MB minimum 96 MB recommended	Required for installation

First-time Virtual PC installation

Follow these steps if you are installing Virtual PC 4.0 for the first time. If you are upgrading from an earlier version of Virtual PC, please turn to the section on page 24.

1. Insert the Virtual PC CD.
2. Double-click the Virtual PC Installer.

   The Virtual PC installation screen appears.
3. Click **Continue.**
4. Read the agreement and click **Accept** to continue.

   The Read Me document appears.
5. Click **Continue** to continue.
6. Choose **Easy Install** to perform a standard installation.

   You can use **Custom Install** to selectively install or reinstall individual components such as the Virtual PC Extras, and to pick a different language for Virtual PC.
7. Then click **Install**.

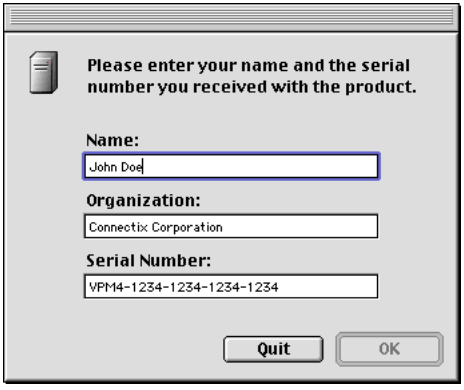
   The Installer copies the following items to your hard drive from the Virtual PC CD.
   - The Virtual PC application
   - A drive image containing a PC operating system (Windows 98, Windows Me, Windows 2000, PC-DOS 2000, or Red Hat Linux)
   - The Virtual PC Extras folder
   - The Scripts folder
   - The Virtual PC 4.0 Read Me file
8. Click **Quit** to quit the installer.

   It is not necessary to restart your Macintosh.

9 Open the Virtual PC folder on your desktop (if necessary) and double-click the Virtual PC application.

The Serial Number dialog appears:

4-1



10 Enter the required information and click **OK**.

IMPORTANT Be sure to keep your Virtual PC serial number. You need it to register your purchase with Connectix and become eligible for technical support. You also need your serial number if you ever have to re-install Virtual PC.

The Registration dialog appears.

11 Click an option for registration.

4-2

Later to register at another time. This dialog will reappear periodically until you register your software.

Print Form if you have no Internet connection. You can print out your registration information and either mail or fax it to Connectix. Follow the instructions on the form.

Register Online to let Virtual PC register you automatically. You must have an Internet connection and a Web browser to use this option.

You are now ready to use PC Setup Assistant.

Using PC Setup Assistant

PC Setup Assistant simplifies creating and configuring a new virtual machine.

IMPORTANT Follow the steps in this section if you are using an operating system on a drive image from Connectix. If you want to install your own copy of an operating system, see Appendix C.

1. If necessary, relaunch the Virtual PC application. (If it is still running, click **Start Up** in the Virtual PC List window.)

   The PC Setup Assistant introduction window appears.

2. Read the introduction and then click the right arrow to continue.

   The memory allocation window appears.

3. The default memory allocation for a new virtual machine is 64 MB. If you want to allocate a different amount of memory, click **Yes**.

   NOTE *If it is available on your computer, you can allocate up to 512 MB of RAM for a virtual machine. See the table on page 19 for recommended memory allocations.*

4. Click the right arrow to continue.

   The secondary drive option window appears.

5. Leave the option **No secondary drive** selected and click the right arrow. (See Chapter 5 for information on creating a secondary drive.)

   The modem setting window appears.

6. Choose a modem setting.

   If the virtual machine is going to share your Macintosh Internet connection, leave the option **No** selected.

   If you need to use an external modem directly with the virtual machine, select **Yes** and then specify the Macintosh port to which the modem is connected.

7. Click the right arrow.

8. Choose **No** or **Yes** to use or not use a palmtop device with the virtual machine.

   If you choose **Yes**, the device works through the COM2 port on the virtual machine.

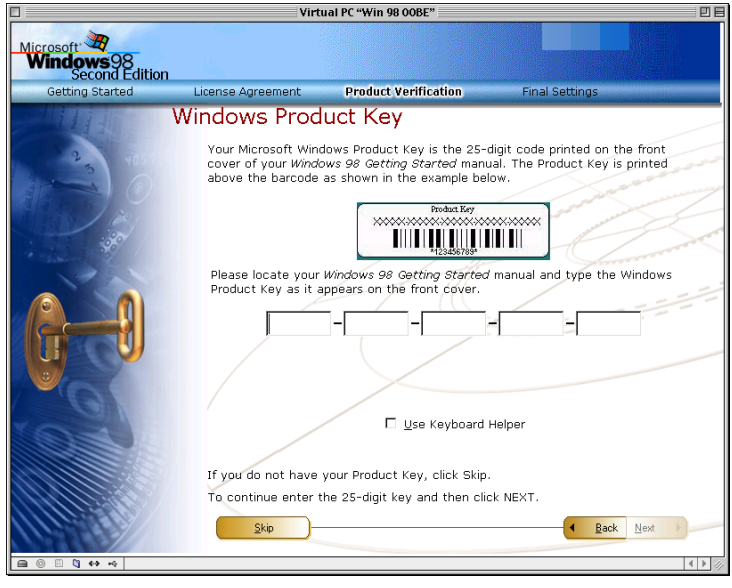
9. Click the right arrow and then click **Done.**

See Chapter 5 for information on modifying other settings on your virtual machine.

10 Click **Start Up** on Virtual PC List. The virtual machine starts up.

If you are running a version of Microsoft Windows, you must enter the product key, also known as the Certificate of Authenticity number (COA). This number is located on a card packaged with your Microsoft Windows manual.

4-3



IMPORTANT Keep your Microsoft manual in case you need to reinstall Windows or Virtual PC. You **must** have your product key or COA to re-install or to register your Microsoft software.

NOTE *If you purchased the PC-DOS version of Virtual PC, and want to install your own copy of a PC operating system, see Appendix C.*

Congratulations! Your installation of Virtual PC 4.0 is complete. If you haven't done so already, please register Virtual PC with Connectix. See page 33.

Notes on upgrading

Before you start the upgrade process, please read the following notes:

Mac OS 8.6 and Virtual PC 1.x and 2.x

Versions of Virtual PC prior to 2.1.2 do not run under Mac OS 8.6 or later. If you have a version of Virtual PC earlier than version 2.1.2, do not start the application under Mac OS 8.6 or later. Instead, upgrade to Virtual PC 4.0 and run this version only. Be sure to delete any versions of the Virtual PC application earlier than 2.1.2.

IMPORTANT When you delete old versions of the Virtual PC application, be careful **not** to delete your old drive image, unless you are prepared to reinstall all your PC applications and data.

Virtual PC 4.0 Additions

The Virtual PC 4.0 Upgrader provides a new, easy way to upgrade to the 4.0 Additions. If you are upgrading Virtual PC for Windows 98/95, follow the instructions in this section, and the 4.0 Additions file will appear on your Windows desktop. If you are upgrading Virtual PC for DOS, also follow the instructions in this section, and the additions are installed automatically.

4-4

This dialog appears when you use an existing drive image—Win95, Win98, Win2000, Red Hat Linux—with Virtual PC. In Windows, drag the Additions installer to the virtual machine window, run the installer, then reboot Windows.

Connectix recommends that all users upgrading to Virtual PC 4.0 also upgrade to the latest version of Virtual PC Additions. These Additions are on the Virtual PC Upgrade CD.

IMPORTANT Do not run any previous version of Virtual PC (1.x or 2.x) with the updated drive image.

The Windows CD

If you are upgrading Virtual PC with Windows, be sure to have your Microsoft Windows CD available during installation. The first time you boot into Windows, you are prompted to insert your Windows CD in order to complete the installation of necessary software. If your older version of Virtual PC included a separate Windows CD, use that CD. If your older version of Virtual PC did not include a Windows CD, then the necessary Windows files are included on the Virtual PC CD.

NOTE *You may need to navigate to the Windows directory of your CD in order to locate the installation files. See your Windows manual for details on navigating.*

Right mouse button settings

Virtual PC has a new default setting for the right mouse button; hold down the Control key and click the mouse to emulate the right mouse button.

Some earlier versions of Virtual PC use Shift-click to emulate the right mouse button. After you install Virtual PC 4.0, you can restore your previous setting—or change it to another key combination—in Settings for Mouse.

Control-Alt-Forward Delete key combination

Windows supports the Control-Alt-Forward Delete key combination. On some Apple USB keyboards, there is no Forward Delete key. To replicate this combination on this type of keyboard, use the Control-Shift-Alt-Delete key combination.

Upgrading to Virtual PC 4.0

If you are upgrading from an earlier version of Virtual PC, follow the instructions in this section. (If you are installing Virtual PC for the first time, please see page 20.)

Select the installation instructions appropriate to the version of Virtual PC you already have on your Macintosh:

- Upgrading Virtual PC with Windows 95/98/2000—on this page
- Upgrading Virtual PC with PC-DOS—page 29
- Upgrading Virtual PC with Red Hat Linux—page 31

NOTE *For some operating systems, Virtual PC 4.0 modifies your current hard drive image and boots your existing operating system when you first launch Virtual PC 4.0.*

Upgrading Virtual PC with Windows 95/98/2000

There are three parts of the upgrade process:

- Upgrade the Virtual PC application
- Upgrade the Windows drivers
- Install the Virtual PC 4.0 Additions

The Virtual PC application

Before you upgrade the Virtual PC application, make sure your Macintosh has an extension set that includes the File Exchange Control Panel. If it does not, open Extensions Manager, turn on this Control Panel, and then restart.

IMPORTANT The Virtual PC Upgrader doesn't run if you have a saved PC state. First open your current version of Virtual PC and then shut it down in a normal state, without saving the PC state.

Now follow these steps:

1. Double-click on **Virtual PC 4.0 Upgrade** to launch the upgrader.
2. Click the **Continue** button.
3. Click on the **Accept** button to accept the terms of the license agreement.

   The Virtual PC 4.0 Upgrade dialog box appears.

4 Leaving **Easy Install** as the installation option, click **Install**.

Use the Easy Install option unless you want to install individual components.

The Upgrader installs the Virtual PC 4.0 application files in a separate folder, while preserving the old version of Virtual PC along with your drive image.

The message "Upgrading drive image" appears indicating that the Upgrader is placing the Additions application on your Windows desktop.

5 When installation is complete, click **Quit.**

The Virtual PC 4.0 folder opens.

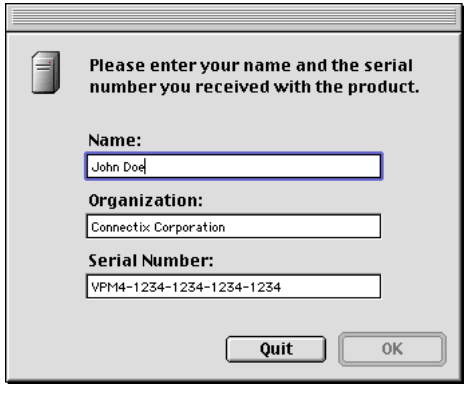
IMPORTANT Connectix recommends that you delete your previous version of the Virtual PC application. But do **not** delete the old drive image in the Virtual PC folder if you want to continue using it. Copy or move it into the new Virtual PC 4.0 folder. Otherwise, you have to reinstall your Windows applications.

6 Double-click the Virtual PC icon to launch the Virtual PC 4.0 application.

7 When the Virtual PC serial dialog appears, fill in the required information and click **OK**.

Your serial number is located on a separate card.

4-5



IMPORTANT Be sure to keep your Virtual PC serial number. You need it to register your purchase with Connectix and be eligible for technical support. You also need it if you ever have to re-install Virtual PC.

The Windows drivers

Launch Virtual PC and start the virtual machine that contains Windows. Windows detects new hardware and prompts you to insert your Windows CD.

If your version of Virtual PC includes a separate Windows CD, the necessary files are on it. If your version of Virtual PC does not include a Windows CD, the necessary Windows files are on the Virtual PC CD.

1. Insert the appropriate CD.
2. Click **OK.**

   Windows Setup launches and begins installing the necessary new drivers. You may need to browse to the proper drive letter for your CD drive and the directory (Win95, Win98, or Win2000) that contains the newer Windows drivers.
3. When Windows prompts you to restart your virtual machine, click **Yes** to restart Windows.

The Virtual PC 4.0 Additions

1. On your Windows desktop, double-click the **vpc4add** file.

   This installs the Virtual PC 4.0 Additions.

NOTE *On your Windows Desktop, you may also see the file Finder.DAT. This is a non-essential file.*

2. Click **Next** to continue.

   The Virtual PC 4.0 Additions Install wizard launches and guides you through the installation process.

   When prompted for the installation options, we recommend that you install all the components.
3. When installation is complete, you are prompted to restart. Click the **Finish** button.

About USB support

USB support in Virtual PC requires Mac OS 9.0 or later and Windows 98, Me, or 2000. There is no USB support if you are running Windows 95, PC-DOS, or Linux.

The Virtual PC 4.0 Upgrader does not enable USB support by default. The upgrader will, however, enable USB if it was enabled in your previous configuration. Otherwise, if you meet the requirements for USB, you can choose to enable it through USB in Settings. (See Chapter 5.)

Upgrading Virtual PC with PC-DOS

To upgrade to Virtual PC 4.0 when Virtual PC with PC-DOS is already installed, follow these steps:

1. Double-click on the **Virtual PC 4.0 Upgrade** icon to launch the upgrader.

   The Virtual PC 4.0 Upgrade application begins. Follow the instructions that appear on the screen.

2. Click **Accept** to accept the terms of the license agreement.

   The Virtual PC 4.0 Upgrade dialog box appears. **Easy Install** is the default setting. Use this option unless you want to install the components individually.

   The Upgrader installs the Virtual PC 4.0 application files in a separate folder, while preserving the old version of Virtual PC along with your drive image. Do **not** use the updated drive image with a version of Virtual PC prior to 4.0.

IMPORTANT Connectix recommends that you delete your previous version of the Virtual PC application. But do **not** delete the drive image in the old Virtual PC folder if you want to continue using it. Copy or move it into the new Virtual PC folder. Otherwise, you will have to reinstall your DOS applications.

3. Click the **Install** button.

   The Upgrader begins installing the Virtual PC 4.0 components.

   The message "Upgrading drive image" appears, indicating that the Upgrader is placing the FSHARE application in your CNTX directory.

4 When installation is complete, click **Quit.**

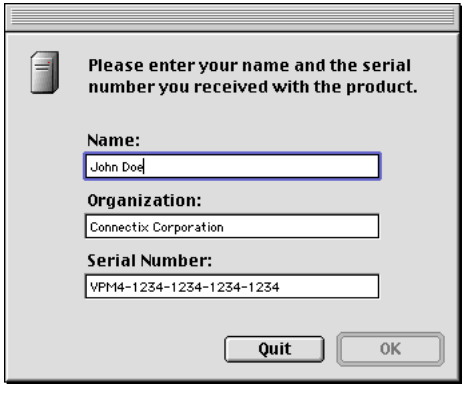
The Virtual PC 4.0 folder opens.

5 Double-click the Virtual PC icon to launch the Virtual PC 4.0 application.

6 When the Virtual PC serial number dialog appears, fill in the information and click **OK.**

Your serial number can be found on a separate card.

4-6



IMPORTANT Be sure to keep your Virtual PC serial number. You need it to register your purchase with Connectix and be eligible for technical support. You also need it if you ever need to re-install Virtual PC.

NOTE *The 4.0 Upgrader updates the additions (FSHARE) on your hard drive image.*

Upgrading Virtual PC with Red Hat Linux

To upgrade to Virtual PC 4.0 when Virtual PC with Red Hat Linux is already installed, follow these steps:

1. Double-click on the **Virtual PC 4.0 Upgrade** icon to launch the upgrader.

   The Virtual PC 4.0 Upgrade application begins. Follow the instructions that appear on the screen.

2. Click **Accept** to accept the terms of the license agreement.

   The Virtual PC 4.0 Upgrade dialog box appears. **Easy Install** is the default setting. Use this option unless you want to install the components individually.

   The Upgrader installs the Virtual PC 4.0 application files in a separate folder, while preserving the old version of Virtual PC along with your drive image. Do **not** use the updated drive image with a version of Virtual PC prior to 4.0.

IMPORTANT Connectix recommends that you delete your previous version of the Virtual PC application. But do **not** delete the drive image in the old Virtual PC folder if you want to continue using it. Copy or move it into the new Virtual PC folder. Otherwise, you will have to reinstall your DOS applications.

3. Click the **Install** button.

   The Upgrader begins installing the Virtual PC 4.0 components.

4. When installation is complete, click **Quit.**

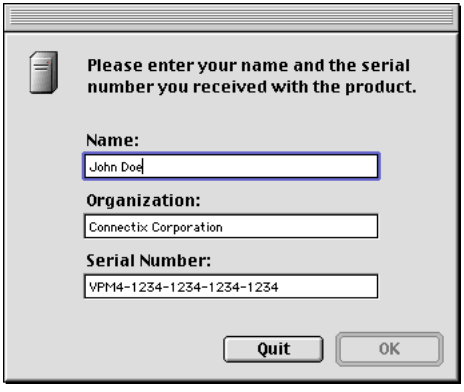
   The Virtual PC 4.0 folder opens.

5. Double-click the Virtual PC icon to launch the Virtual PC 4.0 application.

6 When the Virtual PC serial number dialog appears, fill in the information and click **OK.**

Your serial number can be found on a separate card.

4-7



IMPORTANT Be sure to keep your Virtual PC serial number. You need it to register your purchase with Connectix and be eligible for technical support. You also need it if you ever need to re-install Virtual PC.

Registering Virtual PC 4.0

To receive Connectix technical support and automatic e-mail notifications about product upgrades and free updates, be sure to register your copy of Virtual PC 4.0.

When Virtual PC launches, you are prompted with the following dialog box:

4-8

- Click **Later** to register at another time. This dialog will reappear periodically until you register your software.
- Click **Print Form** if you have no Internet connection. You can print out your registration information and either mail or fax it to Connectix. Follow the instructions on the form.
- Click **Register Online** to let Virtual PC register you automatically. You must have an Internet connection and a Web browser to use this option.

Using Virtual PC

This chapter explains how to use the key features of Virtual PC 4.0.

Topics in this chapter

Here are the topics in this chapter:

Starting up a virtual machine

To start up a virtual machine, follow these steps:

1 Open the Virtual PC List window by selecting it from the Window menu.

5-1

2 Select a virtual machine and then click **Start Up.**

Virtual PC opens a virtual machine window on your Macintosh desktop and starts up the PC operating system. (This takes a few moments.)

Changing the virtual machine display

A virtual machine runs inside a window on your Macintosh desktop (Windowed mode), or it can fill the entire screen (Full Screen mode).

You can change from one display mode to the other in two ways:

- Press **Command-M** on your keyboard to switch modes.
- Open the **Control** menu and select the other mode.

IMPORTANT In Full Screen mode, the Virtual PC menu bar and Toolbar are no longer visible. Hold down the Command key to display them.

Adjusting video resolution

If you find that the virtual machine screen in Full Screen mode is not sized properly—for example, it is surrounded by a black border indicating that Windows is not filling the screen—do one of the following:

- In the Edit menu, choose **Preferences**. Select **Video** and then make sure the option **Adjust Mac Video Resolution** is checked. Click **OK**. (See page 39).
- In Windows, open the Display control panel and select the Settings tab. In the **Screen area** box, adjust your Windows display resolution to match your monitor size. You can drag the bar to **Less** or **More** to see the resolution options. Try various resolutions until you find the one that works for your monitor.

Hiding, pausing, and restarting a virtual machine

You can hide a virtual machine so that it is no longer visible on the Macintosh desktop. Choose **Hide** from the Control menu. The virtual machine continues running while it is hidden (unless it is paused.) To redisplay the virtual machine, select it from the Window menu or double-click its thumbnail in the Virtual PC List window.

You can pause a virtual machine so that it is no longer processing. Choose **Pause** from the Control menu. (Choose **Resume** to resume processing.)

You can restart a virtual machine. Choose **Restart** from the Control menu. Alternatively, you can use the operating system running on the virtual machine to restart.

Changing global Preferences

Virtual PC Preferences allows you to change three global preferences: PC Behavior, Video, and Sound. Choose **Preferences** from the Edit menu to access these options.

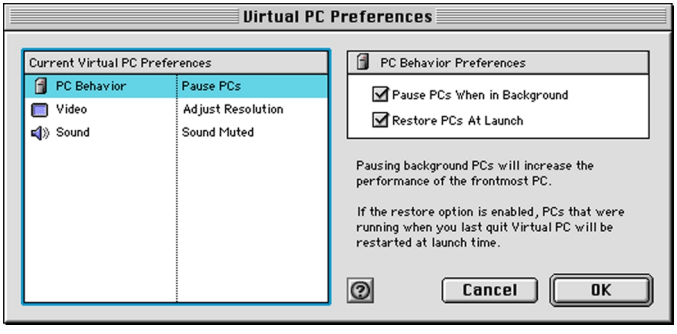
PC Behavior

To change PC Behavior Preferences, do this:

1 Choose **Preferences** from the Edit menu.

2 Select **PC Behavior**.

5-2



3 Change the settings and click **OK**.

Enabling **Pause PCs When in Background** increases the performance of the front-most virtual machine when you are running more than one virtual machine at a time.

Turning on **Restore PCs At Launch** restarts any virtual machines that were running the next time you launch Virtual PC.

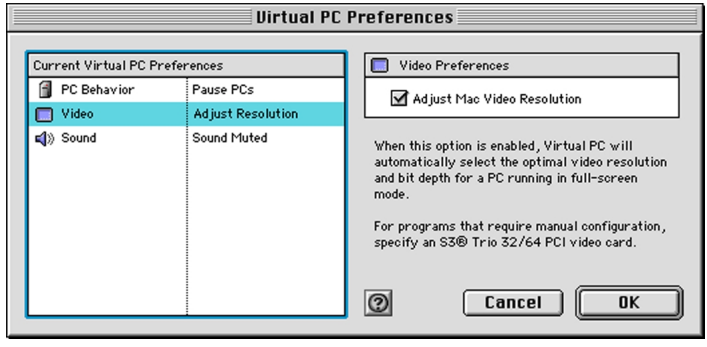
Video

To change Video Preferences, do this:

1 Choose **Preferences** from the Edit menu.

2 Select **Video**.

5-3



3 Select or deselect the option **Adjust Mac Video Resolution**.

4 Click **OK**.

Turning on the **Adjust Mac Video Resolution** option automatically sets the Macintosh monitor to display in the same screen size as the PC environment. For example, if DOS is set to 640 x 480 resolution, Virtual PC sets the Macintosh display to 640 x 480 in Full Screen mode. This provides an easier-to-read display filling the entire Mac screen.

The original Macintosh screen resolution is automatically restored when switching out of Virtual PC.

NOTE *This option only works on systems with multisync monitors. It does not work on some PowerBook models with LCD screens.*

Optimizing video performance

Virtual PC video performance is best in Full Screen mode when you:

- don't overlay other windows such as the Control Strip
- don't turn on video mirroring

To improve video performance in windowed mode, set your Macintosh display to a bit depth of 16 or higher:

PC-Bit Depth	Best Macintosh Mode
4 bit	16 bit is best
8 bit (256 colors)	16 bit is best
16 bit (Thousands of colors)	16 bit is best, 32 bit is OK
32 bit (Millions of colors)	32 bit is best, 16 bit is OK

The on-board video on your Macintosh provides the fastest display speed for Virtual PC. However, in some cases, video accelerator cards can equal that performance if they are optimized and include enough RAM—usually 8 MB.

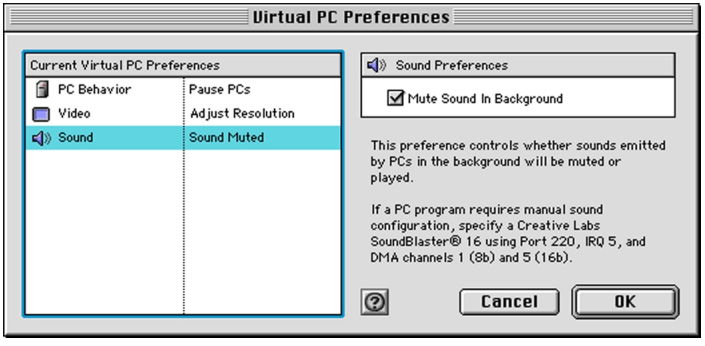
Sound

To change Sound Preferences, follow these steps:

1 Choose **Preferences** from the Edit menu.

2 Select **Sound.**

5-4



3 Select or deselect the option **Mute Sound in Background.**

Turning on this option prevents a cacophony of conflicting sounds from multiple virtual machines running at the same time.

4 Click **OK**.

Sound input

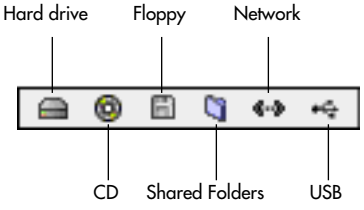
Virtual PC provides 16-bit, 44Khz sound input through Sound Blaster 16 emulation. This means that you can use a Macintosh microphone to record sound directly into PC sound applications. You can also record directly from a CD-ROM drive.

Using the Virtual PC Toolbar

The Virtual PC Toolbar appears in the lower left corner of a virtual machine window, or at the bottom of the screen in Full Screen mode when you press the Command key.

The Toolbar has six icons:

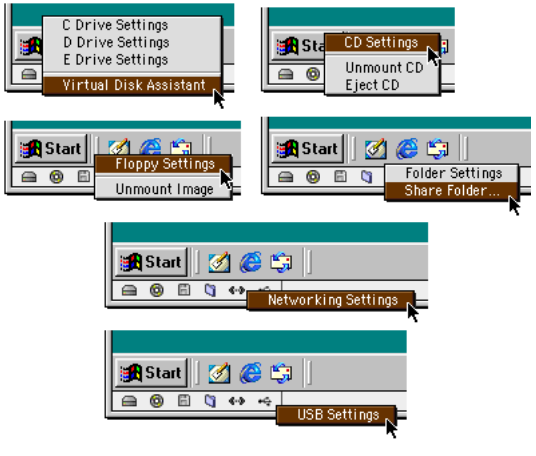
5-5



Each icon has a contextual menu you access by holding down the Control key and then clicking the icon. (See figure 5-6.) The icons on the Toolbar are:

- Hard drive—access Settings for drive images, or launch Virtual Disk Assistant
- CD—access the CD Settings, unmount, or eject a CD
- Floppy—access Floppy Settings, mount, or unmount a floppy disk image
- Shared Folders—access Shared Folder Settings, designate a folder for sharing
- Network—access Network Settings
- USB—access USB Settings

5-6



Status and lights

An icon in the Toolbar may appear as "active" or "greyed out." An active appearance indicates that the particular feature is enabled or that a removable media item is in place (CD, floppy, or hard drive).

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. Figure 5-7 shows a variety of icon states.

5-7

Crossing platforms: Macintosh integration

Virtual PC 4.0 provides several capabilities that integrate the Macintosh and a virtual machine, particularly a virtual machine running Windows. These include:

- Command key to switch to the Macintosh pointer
- Drag and drop of files and folders (Windows only)
- Copy and paste (Windows only)
- Sharing folders (DOS or Windows)
- Sharing CDs
- Sharing volumes (DOS or Windows)

Command key

Usually you can move the desktop pointer seamlessly between the Macintosh desktop and the window displaying the virtual machine. In some cases, however, the pointer may be "trapped" in the virtual machine window. Press the Command key to switch to the Macintosh pointer and move to the Macintosh desktop.

Drag and drop

If a virtual machine is running Windows, you can drag and drop files or folders from the Macintosh to the virtual machine or vice versa. Drag and drop actually duplicates the data from one machine to the other.

You can also drag a file or folder to a volume displayed in the My Computer window on the virtual machine.

NOTE *Virtual PC 4.0 does not support dragging and dropping directly from one virtual machine to another. You can, however, drag and drop from one virtual machine to the Macintosh, and then drag and drop from the Macintosh to another virtual machine.*

File extensions

Windows files have three-letter extensions—such as .txt for a text file, .doc for a document file, and so forth. When you copy a file from the Macintosh to a virtual machine running Windows, you should include the extension so that Windows can identify the right application to open the file. Use the View menu in My Computer under

Windows to see a list of the file-type extensions, and to hide or display the extensions from view.

Long file names

Windows 95, 98, Me, 2000, and NT support file names of up to 256 characters. Any PC file name longer than 32 characters is truncated when you copy it to the Macintosh. (In DOS, file names can be a maximum of eight characters with a three-character extension.)

Copy and paste

You can copy and paste text and graphics between a virtual machine Windows application and a Macintosh application.

Text files are copied unformatted. Formatting, including bold, italic, or paragraph styles, is not transferred.

For graphics, a selected Macintosh graphic is copied to the Macintosh Clipboard. When you paste it into a Windows application, Virtual PC converts the graphic to the Windows Clipboard format. Conversely, a graphic selected in Windows is converted into the Macintosh Clipboard format (PICT) at paste time.

Sharing folders

You can designate a folder for sharing between the Macintosh and a virtual machine running Windows or DOS. For example, if you download PC shareware files with a Web browser on your Macintosh, you can share the Macintosh folder the files are in and then access the files from the virtual machine.

To set up a shared folder, see the Settings directions for Shared Folders on page 57.

IMPORTANT You can also drag a folder to the Folder icon on the Toolbar to share it. Hold down the Option key to share the folder every time the virtual machine starts.

You can share the same Macintosh folder with multiple virtual machines running at the same time.

Sharing CDs

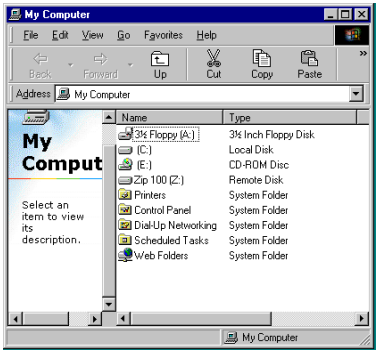
CDs inserted in a Macintosh CD-ROM drive are automatically mounted on the virtual machine—the front-most machine if you are running several. Also, note these points:

- You can mount or unmount a CD from a virtual machine using the CD contextual menu on the Toolbar. (See page 42.)
- You can set an option to boot the virtual machine from a CD. (See page 55.)
- You can eject a CD using the CD contextual menu on the Toolbar. (You can also eject a CD by selecting **Eject CD** from the Control menu, or by pressing Command+Y on your keyboard.)

Sharing other removable volumes

You can share a removable volume such as a Zip disk (or media in other types of drives) between the Macintosh and a virtual machine. In Windows 98, the volume appears in My Computer as a Remote Disk. (See figure 5-8.)

5-8



To share a volume, drag it to the Folder icon on the Toolbar. Hold down the Option key to share the volume every time the virtual machine starts.

You can share the same volume with multiple virtual machines running at the same time.

Mounting a floppy image in drive A

Installing or using some applications in Windows requires that you insert a floppy disk in drive A of the virtual machine.

If your Macintosh has a floppy drive and if the virtual machine is the front-most application, you can insert a PC-formatted floppy in the drive and it mounts automatically in drive A of the virtual machine. (It won't appear on the Macintosh desktop.)

If you are using an image of a floppy disk, you can drag it to the Floppy icon on the Toolbar to mount it on drive A. (The image has to be dismounted from the Macintosh before you can mount it on the virtual machine.)

To create a floppy disk image from an actual floppy disk, use an application such as DiskCopy from Apple Computer (either version 4.2 or version 6.x,), or Shrinkwrap from Aladdin Systems, Inc. (You can also use Virtual Disk Assistant to create a floppy image, but not from a real floppy. See page 71.) Be sure the disk image you use is uncompressed and read/write. Compressed or read-only images will not mount.

You can unmount a floppy disk image from the virtual machine using the Floppy contextual menu on the Toolbar. You can also unmount the image by choosing **Eject Floppy** from the Control menu, or by pressing Command+Shift+Y on your keyboard.

NOTE *Most USB floppy drives require that you manually eject the disk even though it has been unmounted from the operating system.*

Using a USB device with a virtual machine

USB keyboards, mouse devices, and floppy drives connected to your Macintosh are automatically shared with a virtual machine. To use other supported USB devices with a virtual machine, three components are required:

- Windows 98. Windows Millennium (Me), Windows 2000
- Windows 98/Me/2000 drivers for your USB device (provided by the manufacturer)
- Mac OS 9

Please check the Connectix Web site at www.connectix.com for an up-to-date list of USB devices supported by Virtual PC.

IMPORTANT If you install a USB device on a virtual machine, it is not available to the Macintosh.

Installing and assigning a USB device

Before installing a USB device, be sure to review the documentation for the device and make sure you have the appropriate drivers for your operating system.

Follow these steps:

1. Install the drivers on your virtual machine.
2. Go to the USB Settings for the virtual machine and select the device. (See page 64.)
3. Restart the Windows operating system.

Using a PDA with a virtual machine

You can connect a PDA such as a Handspring or Palm to a virtual machine and run Windows desktop synchronization software on the virtual machine. For the steps to do this, see page 61.

Changing Settings for a virtual machine

To make changes to the Settings of a virtual machine, follow these steps:

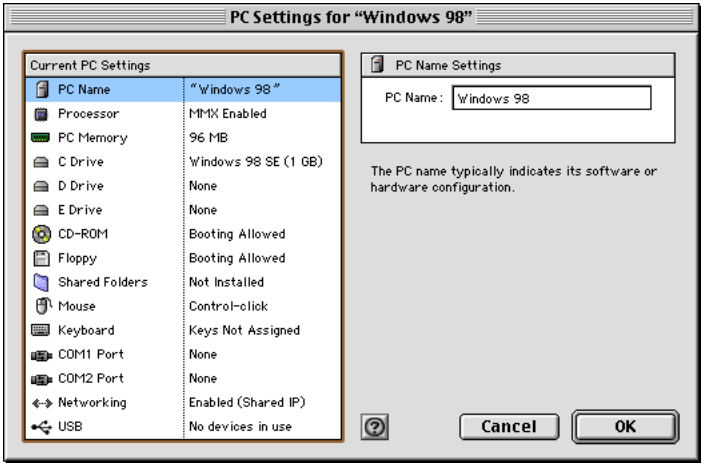
1. Open the Virtual PC List. (You can choose it from the Window menu.)
2. Select the virtual machine you want to modify and then click **Settings**.

   This displays the PC Settings window for the selected virtual machine. The following pages describe each setting.
3. Change the Settings as you wish and then click **OK**.

PC Name

PC Name typically indicates the operating system for the virtual machine. The name must be fewer than 32 characters in length. It cannot begin with a period or contain a colon.

5-9

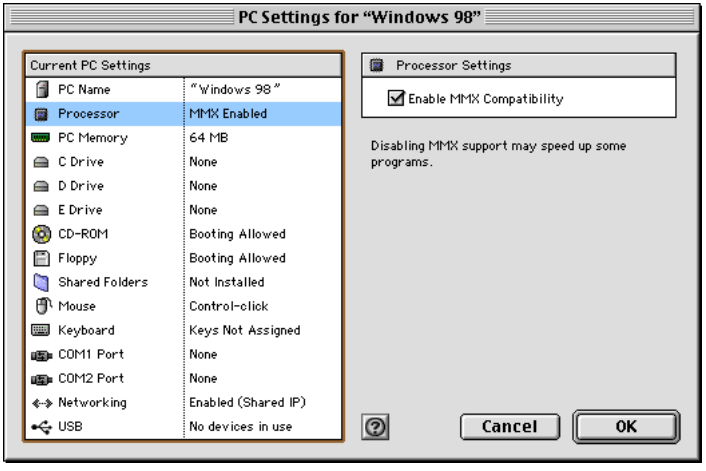


NOTE *All the virtual machines in the PC List must have unique names.*

Processor

The option **Enable MMX Compatibility** lets Virtual PC provide MMX support. If you want to speed up performance of applications that do not require MMX support, deselect this option.

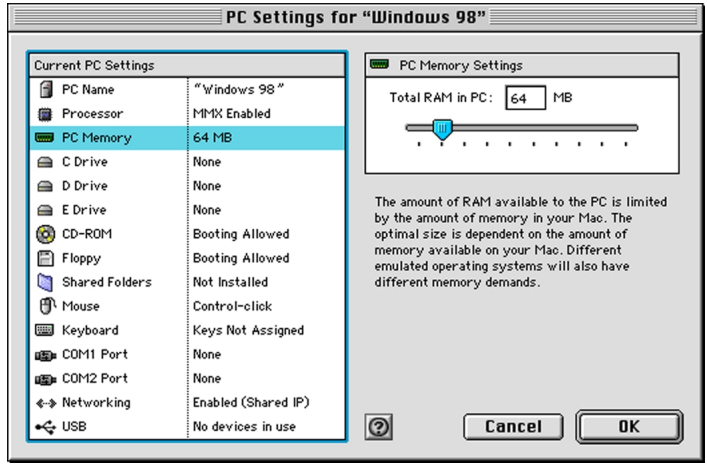
5-10



PC Memory

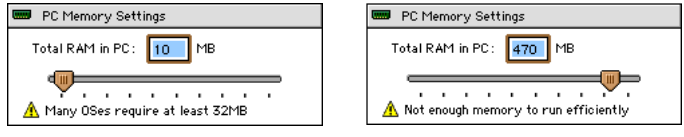
The PC Memory setting displays the current RAM allocations for the selected virtual machine. Use the slider control to make changes.

5-11



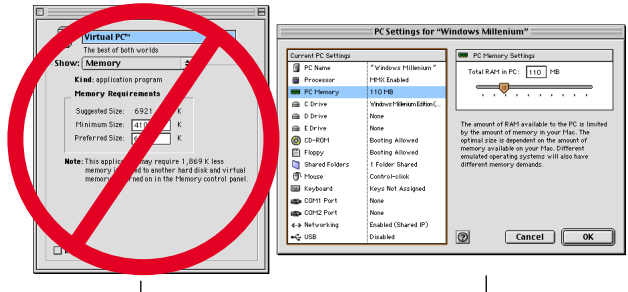
The system warns you if you set too little memory, or if you exceed the recommended maximum value based on the total physical RAM in your Macintosh.

5-12



IMPORTANT You allocate RAM memory for a virtual machine using Settings and the slider, *not* with the Get Info dialog from the Apple Finder.

5-13



Don't use Get Info to change the amount of memory for a virtual machine ...

... use the Settings window instead.

NOTE *You need to make a separate allocation of physical RAM memory for each virtual machine you have created on your Macintosh. For more information about memory allocation for virtual machines, see page 51.*

More RAM improves performance

Windows performance improves when more RAM is allocated to the virtual machine. More RAM means Windows can reduce usage of virtual memory. Windows spends less time storing information to the hard drive (virtual memory), which is much slower than RAM.

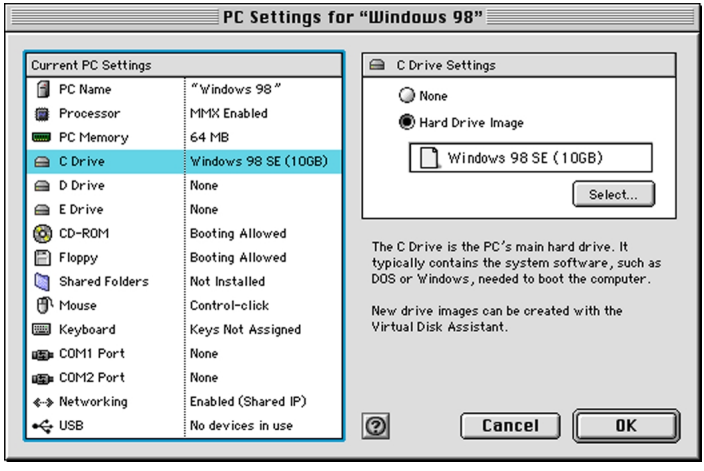
Real RAM required

Virtual machines running under Virtual PC require real physical RAM. Extended memory solutions such as Connectix RAM Doubler or Mac OS virtual memory are not recommended methods for expanding available memory for use by Virtual PC. Extended memory options degrade Virtual PC performance dramatically.

C Drive

The C drive is the drive image that contains all the files needed to run your PC operating system. When you first install Virtual PC, the program creates a drive image for the virtual machine. You can use this setting to switch to a different drive image.

5-14



Changing your C drive

If you have created or installed another drive image, you can make it the C drive by doing the following:

1. Select the option **Hard Drive Image** and then click the **Select** button. (You can also drag a drive image into the box.)

   A dialog box opens, showing the available hard drive images in your Virtual PC folder. You can also navigate to other directories and pick existing images.

2. Select the new hard drive image, and click **Open**.

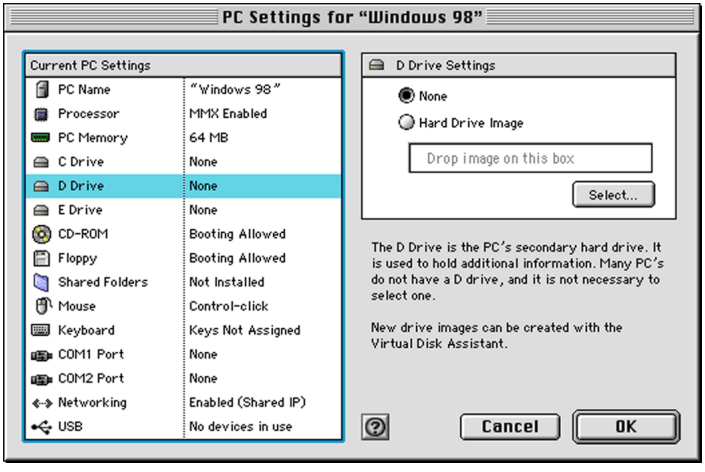
3. Click **OK** to register the new Setting.

   For information on creating a drive image, see the section Virtual Disk Assistant on page 71.

D and E Drives

The D and E drive settings control secondary and tertiary drive images. You may want to create a D or E drive for additional storage space.

5-15



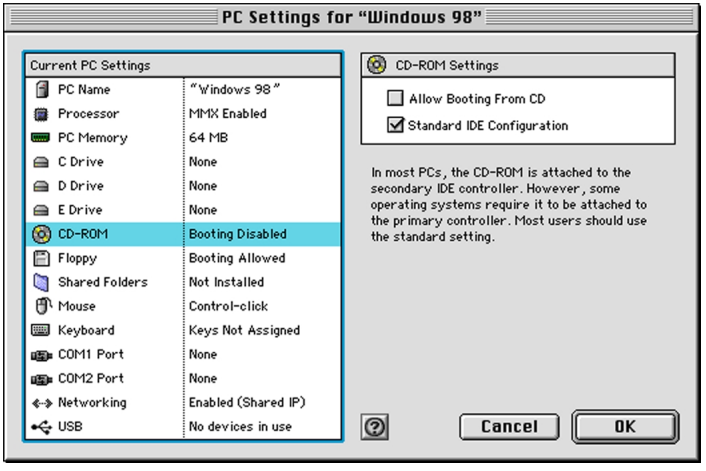
In addition to its own hard drive images, Virtual PC supports hard drive images created by SoftWindows, Real PC, and PC compatibility cards from Apple and Orange Micro. These hard drive images can only be used as D and E drives in Virtual PC.

NOTE *You cannot have a D drive without a C drive image.*

CD-ROM

Virtual PC automatically recognizes your Macintosh CD-ROM drive and reads PC CDs. This setting lets you control two CD options: **Allow Booting From CD** and **Standard IDE Configuration**.

5-16



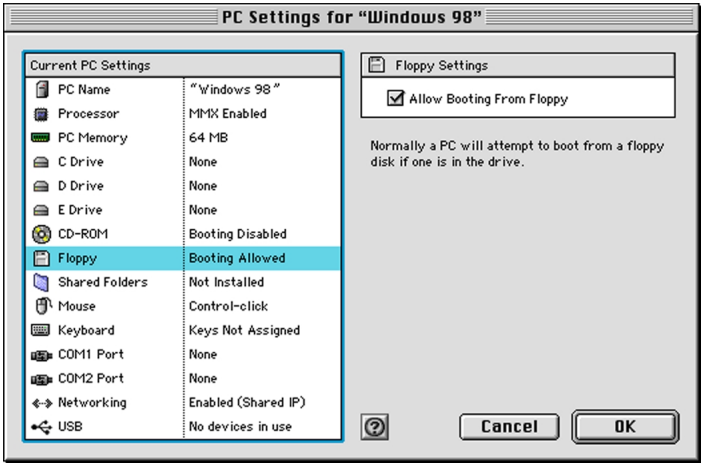
Allow Booting From CD—choose this option if you need to boot from a CD to load another operating system. (See Appendix C, *Installing Your Own Operating System*.)

Standard IDE Configuration—deselect this option only if the operating system on the virtual machine 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 Drive

You can change the booting option for floppies recognized by the virtual machine.

5-17

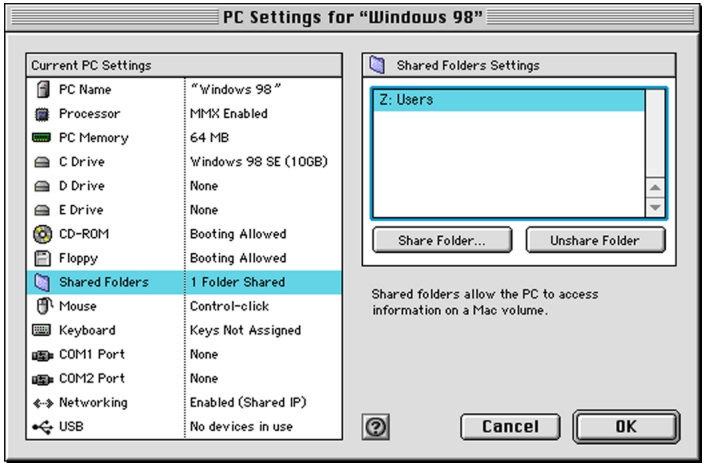


Allow Booting From Floppy—selecting this option means the virtual machine attempts to boot from a floppy inserted in the floppy drive or a floppy disk image mounted on the virtual machine.

Shared Folder

Use the Setting for Shared Folders to designate a folder that is shared by the Macintosh and the virtual machine.

5-18



To set up a folder as a Shared Folder:

1. Click **Share Folder**.
2. Navigate to the folder you want to share.
3. Choose the option **Share every time** if you want to share the folder every time you start up the virtual machine.
4. Click **Share**.

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

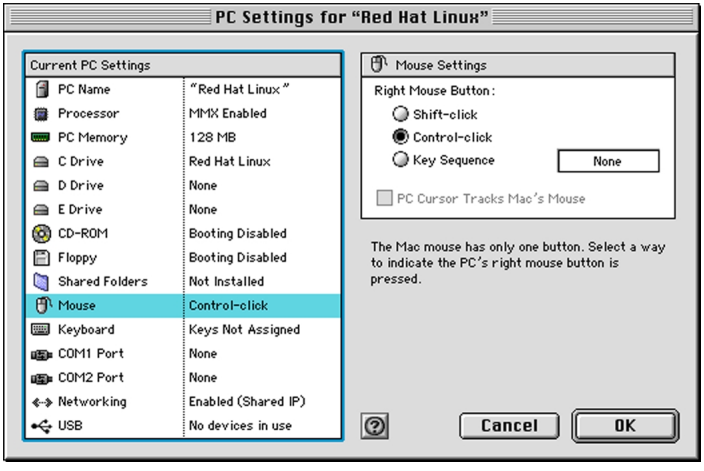
IMPORTANT You can also drag a folder to the Folder icon on the Toolbar to share it. (You can use this technique to share entire volumes such as drives, CDs, Zip disks, and so on.) Hold down the Option key to share the folder every time the virtual machine starts.

You can share the same Mac folder with multiple virtual machines running at the same time.

Mouse

Use this Setting to specify the Macintosh interface for a right button on a PC mouse.

5-19



Using a two-button or three-button mouse

If a USB mouse or trackball has one or more buttons unassigned, Virtual PC automatically uses the next available button to emulate the middle and right button. Some mouse devices that work this way with Virtual PC include Microsoft's Intellimouse Explorer and ASCII's mouse.

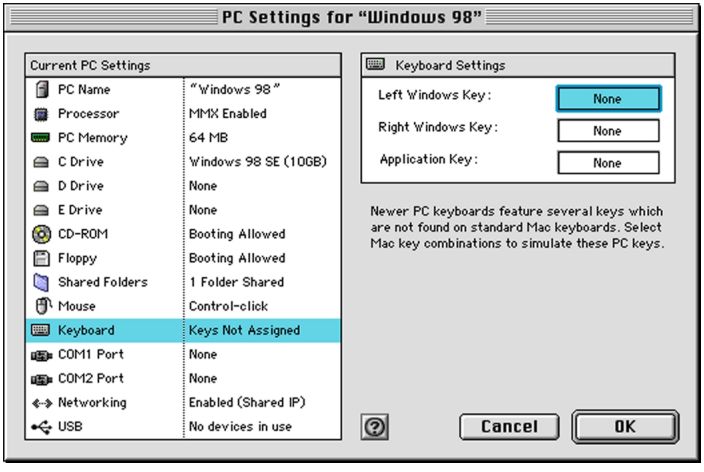
However, many mouse devices and trackballs ship with software that overrides the default behavior—allowing users to assign other actions to buttons. In this case, Virtual PC cannot take over the second or third mouse button automatically. Usually the software for these devices enables you to establish different settings for different Macintosh applications. The correct setting in the mouse software for Virtual PC is "do nothing." This setting allows Virtual PC to take advantage of the extra buttons.

If you have a two-button or three-button mouse or trackball that provides software for assigning keyboard commands to a mouse click, you can use the mouse with Virtual PC. Under Mouse Settings you will see three options for your mouse settings, Shift-click, Control-click sequence, and Key Sequence. You can choose how you want your mouse buttons to operate.

Keyboard

PC keyboards have several keys not found on standard Macintosh keyboards. This preferences panel allows you to select Macintosh key combinations to simulate these PC keys.

5-20

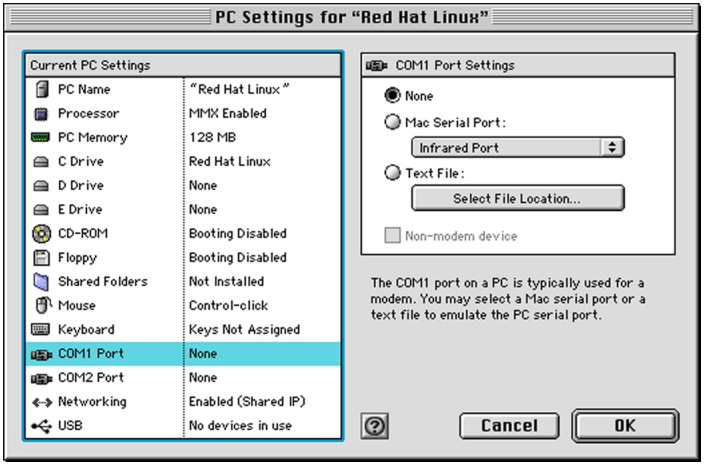


NOTE *Most Apple keyboards support Right Modifier Keys, but some third-party keyboards do not operate correctly in this mode.*

COM1 and COM2 Port

Use these Settings to support several communication options.

5-21



The COM1 port in Virtual PC is typically used for a modem. The COM2 port on a PC is typically used for a serial device or modem. If you have an external modem connected to your Mac OS system, select the appropriate port to make it accessible by your PC software. Select the port from the pull-down list under **Mac Serial Port.**

IMPORTANT If you are using the Macintosh internal modem, you do not need to configure a COM port for a modem.

If you would like PC serial output to be spooled to a Mac text file, you can select the file location through the **Text File: Select File Location** dialog box.

PDAs

Virtual PC supports serial port input for hand-held organizers such as Handspring and Palm devices.

NOTE *You must run Microsoft Windows to use a hand-held device with a virtual machine.*

To activate support for a hand-held organizer, do the following:

1. Select either the **COM1** or the **COM2** port.
2. In the **Port Settings**, click the **Mac Serial Port** radio button.
3. Select either the **Modem Port** or **Printer Port** option from the drop-down menu.
4. Check the **Non-modem device** option.
5. Click **Restart**.

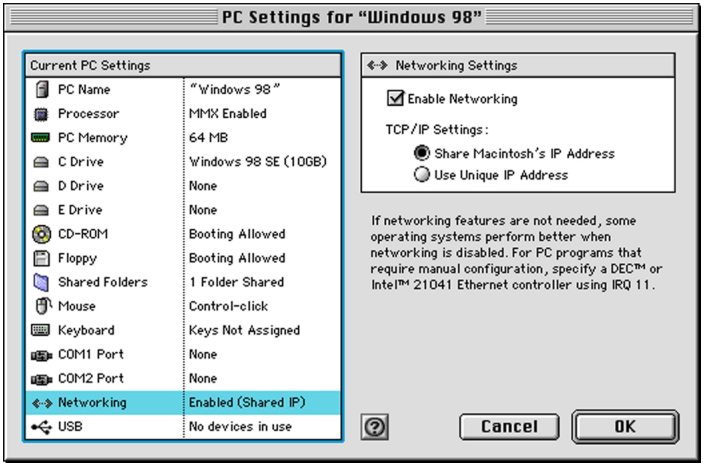
To use your PDA with the virtual machine, install the Windows version of the desktop software for the PDA and connect your PDA through the Macintosh serial port you selected.

IMPORTANT If you have the Macintosh version of your PDA software enabled, the Virtual PC and the PC version of the PDA desktop software may not function or synchronize properly. To ensure that Virtual PC and the PC version of the PDA software are able to function, disable the Macintosh version of the PDA software.

Networking

Use this Setting to control networking options.

5-22



Enable Networking—select this option to access a network. If your Macintosh is not on a network, or if you are not accessing the Internet through a virtual machine, you can deselect the option. This can prevent possible delays if PC software checks the network controller.

TCP/IP Settings—choose a shared or unique IP address for the virtual machine. See Chapter 8 for more information on this option.

Manually configuring network software

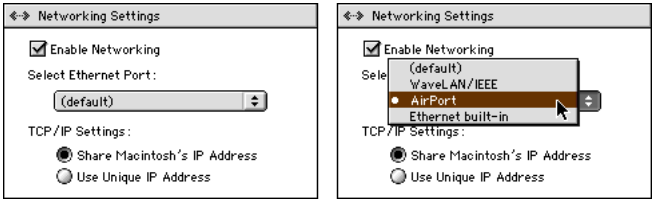
For networking, Virtual PC uses an emulation of a Digital Equipment Corporation™ (DEC) 21041-based PCI Ethernet card. Regardless of the Ethernet hardware installed in your Mac, use the DEC 21041 standard as your Ethernet card setting if you are configuring a virtual machine manually for networking.

NOTE *In some cases, the DEC 21041 may show up on your system as Intel 21041. These are the same Ethernet controllers.*

Using multiple Ethernet cards

If you have more than one Ethernet card installed, you can select the card you want to use with the virtual machine from the **Select Ethernet Port** pop-up menu. (This menu only appears when you have more than one Ethernet controller.)

5-23



Choose from the available options:

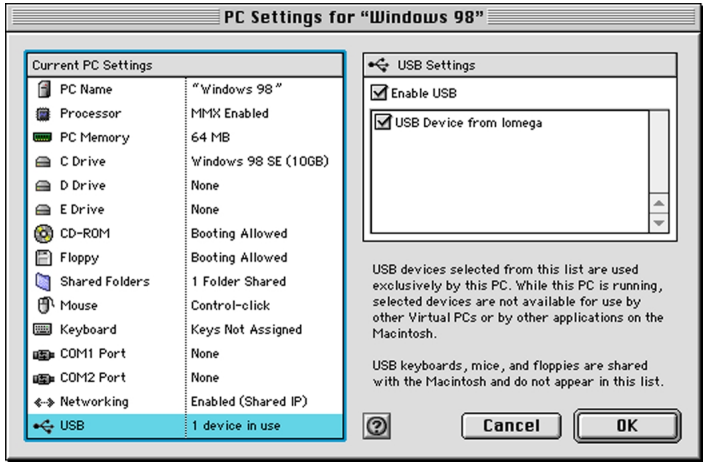
- **Default**—determined by Apple's Open Transport software.
- **Ethernet built-in**—the onboard Ethernet on your Macintosh.
- **Ethernet slot**—additional slots if they have Ethernet cards installed. In figure 5-23, an Airport card and a WaveLAN card provide additional Ethernet choices.

NOTE *If you have only one Ethernet cable connected to your Macintosh, use the same Ethernet controller for Virtual PC.*

USB

Use this Setting to select USB devices for use with a virtual machine. USB devices are only recommended for use with virtual machines running Windows 98, Windows Millennium, and Windows 2000.

5-24



Enable USB—select this option to use selected USB devices with the virtual machine. Check off the devices you want to use and click **OK**. (USB keyboards, mouse devices, and floppy drives are shared with Macintosh and do not appear in the list.)

NOTE *You can use USB devices controlled from this Setting with the virtual machine or with your Macintosh, but not both at the same time. When you select the device here, it is no longer available to your Macintosh.*

Deleting Settings for a virtual machine

To delete the Settings for a virtual machine, select it in the Virtual PC List window and then click **Delete**. Deleting the Settings for a virtual machine does not delete the machine's drive image.

NOTE *The Delete key on your keyboard will not delete your virtual machine. You must use the Delete button on the Virtual PC List control panel.*

Backing up a virtual machine

As you install applications and create data in a virtual machine, it is a good idea to periodically back up the drive image for the machine. Since this file can expand to a significant size, you may require large-capacity backup media to take this step. If you ever need to recreate the virtual machine, using the backup drive image can make restoration relatively painless and quick.

Alternatively, you should at least back up data you create on the virtual machine.

Shutting down a virtual machine

When you are finished using a virtual machine, you can click in the Close box in the upper left corner of its window. A dialog box with three options appears.

5-25

- **Save PC's State**—choose this option to shut down the virtual machine and save its current state, including the state of the operating system and any open applications. When you start up the virtual machine again, the saved state is restored and you can continue where you left off without having to reboot the PC operating system.

  NOTE *The saved state uses up to as much hard drive space as the amount of allocated RAM. Thus, if you have 32 MB allocated to the virtual machine, the saved state file could take up to 32 MB of hard drive space. Also note, that USB devices need to be re-enabled when the state is resumed.*

- **Shut Down PC**—choose this option to shut down the PC operating system on the virtual machine and then close the virtual machine. When you restart the virtual machine, the operating system will reboot.

- **Discard PC's State**—choose this option—not generally recommended—to close the virtual machine without shutting down its operating system or saving its state.

  NOTE *This is an abrupt way to shut down Windows. The next time you launch the virtual machine, you see a message that Windows was not properly shut down and that the system is now checking the integrity of all its files.*

  These options also appear if a virtual machine is running and you quit Virtual PC. (Note that this is the only way you can shut down PC-DOS.)

Running multiple virtual machines

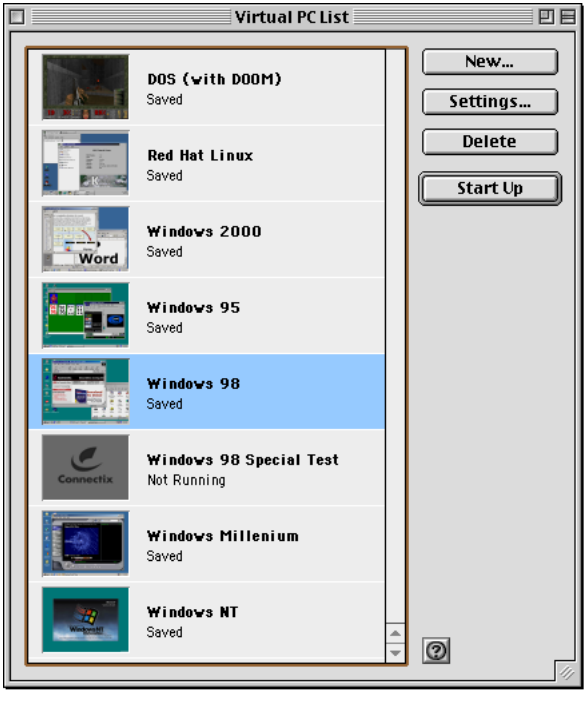
Virtual PC can run multiple concurrent virtual machines.

NOTE *If you are running more than one virtual machine, selecting* ***Pause PCs When in Background*** *from PC Behavior in Preferences increases the performance of the front-most virtual machine.*

Using the Virtual PC List

The Virtual PC List window displays all the available virtual machines by name. It also provides a thumbnail of a machine's saved state, if there is one. (This thumbnail updates dynamically as you use the virtual machine.)

5-26



You can switch between concurrently running virtual machines using Virtual PC List or the Window menu.

NOTE *When you are running multiple virtual machines, the virtual machine in front is given about 70 percent of the processing time.*

Optimizing performance

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

PowerPC processor speed

The speed of the PowerPC processor is the most important element for overall Virtual PC performance. Virtual PC 4.0 is optimized specifically for the Macintosh G3 and G4 PowerPC processors and uses the full capacity of the chip.

RECOMMENDATION: The only way to improve processor speed is to replace the current processor. Some newer Macintosh models have upgradable processor cards. Most older Macintosh models can only be upgraded with an accelerator card.

RAM

Generally, the more RAM assigned to a virtual machine, the better it performs since more RAM decreases the need for Windows to use hard disk space as virtual memory. Also, if there is additional unused RAM on the Macintosh itself, Virtual PC may be able to use this to improve performance.

Disk optimization and disk space

Disk optimization can improve the disk performance of a virtual machine. By defragmenting the Macintosh hard disk or the PC hard disk image with a PC disk optimization utility, less hard disk activity is required to retrieve data.

Microsoft Windows uses virtual memory. If you are using Windows, sufficient free hard drive space in your disk image needs to be available for the Windows virtual memory swapfile. When there is not enough hard drive space, Windows alerts you to insufficient memory and requests more free disk space.

RECOMMENDATION: Defragment your Mac disk and virtual machine drive image file regularly for best performance. If you are using Windows, be sure to leave several megabytes of free hard disk space on your drive image to support virtual memory.

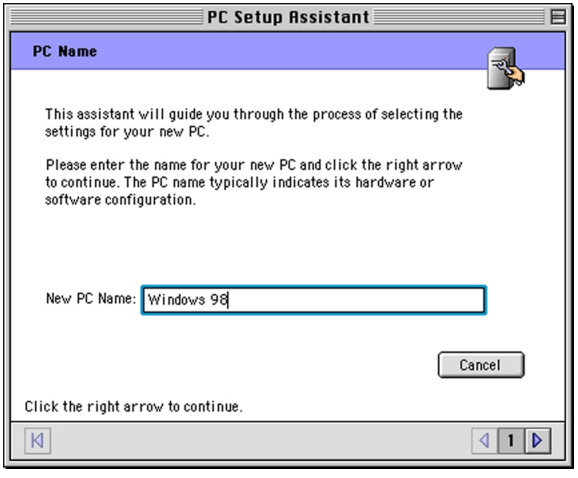
Creating a virtual machine with Virtual PC List

You can set up a new virtual machine using the Virtual PC List.

1 Click **New.**

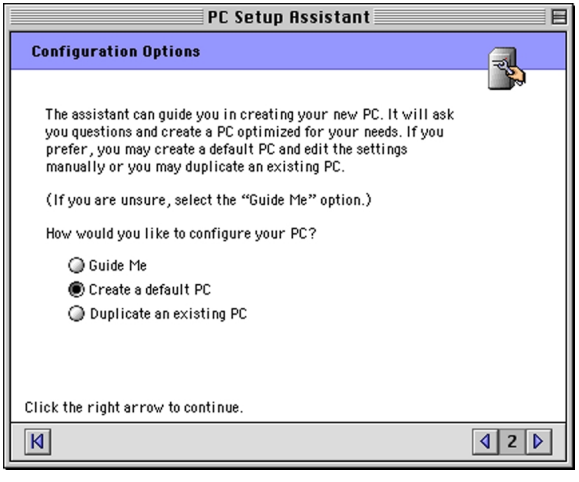
The PC Setup Assistant dialog box appears.

5-27



2 Type in a name for your virtual machine and click the right arrow.

5-28



3 Now choose an option and continue.

Guide Me—continue the set-up process using Setup Assistant. You can configure your memory allocation, create a drive C disk image, and configure Modem Settings and Palmtop Device Settings.

Create a default PC—create a virtual machine with the following features:

— Default memory allocation: 64 MB

— No C or D drive image (You can add these using the PC Settings.)

— COM1 port for modem settings: None

— COM2 port for Palmtop devices: None

Duplicate an existing PC— duplicate the Settings of an existing virtual machine.

Using Virtual Disk Assistant

Virtual Disk Assistant is an integrated utility that allows you to create, convert, expand, manipulate, and view disk images.

To open Virtual Disk Assistant, select **Virtual Disk Assistant** from the Window menu.

5-29

To examine or modify a drive image

To examine or modify a drive image for a a virtual machine:

1. Shut down the operating system on the virtual machine whose drive image you want to examine or modify. (If the machine has a saved state, you will not be able to modify the drive image.)
2. Open Virtual Disk Assist and choose the option **Examine or modify existing disk image.**
3. Click the right arrow.
4. Click **Select Disk** and navigate to the drive image. (You can also drag the drive image to this window to select it.)
5. Click **Open**.

6 Click the right arrow.

5-30

The Disk Image Information window lists information about the disk image at the top. There are three options:

Convert to a fixed-size drive—to convert an expandable drive image to a fixed-size image.

Reclaim zeroed drive space—to reduce the size of the drive image. You must first use a separate utility to zero out unused space on the drive image.

Expand this drive—to increase the theoretical upper limit to which the drive image can expand.

For drive images 0-127 MB, the upper limit is 127 MB

For drive images 128-255 MB, the upper limit is 255 MB

For drive images 256-511 MB, the upper limit is 511 MB

For drive images 512-1023 MB, the upper limit is 16 GB

For drive images 1024-2047 MB, the upper limit is 32 GB

For drive images 2048-130557 MB, the upper limit is 127 GB

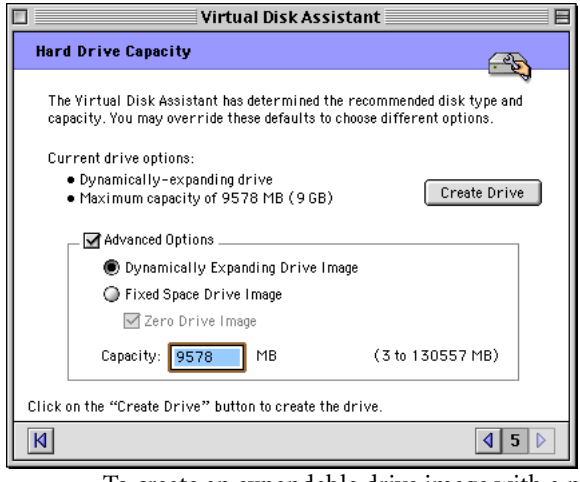
NOTE *Smaller size drive images are considered floppy images (low-density, high-density, or DMF).*

To create a new drive image

To create a new drive image, follow these steps:

1. Open Virtual Disk Assistant and choose the option **Create new floppy or hard disk image**.
2. Click the right arrow.
3. Select **Create hard disk image** and click the right arrow.
4. Choose a location and name for the disk image. Click **Select.**
5. Click the right arrow to continue.
6. Select the operating system you want to use on the new drive image. Then click the right arrow.
7. Choose options for the drive:

5-31



   - — To create an expandable drive image with a maximum capacity of 9 GB leave **Advanced Options** unchecked.
   - — To create an expandable drive image with a different maximum capacity, click **Advanced Options**, make sure the option **Dynamically Expanding Drive Image** is selected, and then enter a different **Capacity** value.
   - — To create a fixed-size drive image, click **Advanced Options**, choose the option **Fixed Space Drive Image**, check or uncheck the **Zero Drive Image** option to erase (or not) any stray data on the new drive image, and then enter a **Capacity** for the drive.
8. Click **Create Drive** and then **Done**.

To create a floppy disk image

To create a floppy disk image, follow these steps:

1. Open Virtual Disk Assistant and choose the option **Create new floppy or hard disk image**.
2. Click the right arrow.
3. Select the option **Create floppy disk image** and click the right arrow.
4. Close the **Low density** or **High density** option and click **Create Image**.
5. Select a location and name for the image and click **Save**.
6. Click **Done**.

Networking

This chapter provides information about networking with Virtual PC.

Networking background

When you create a virtual machine, it is set by default to "share" your Macintosh network connections, including Ethernet, PPP, and SLIP. This provides a single network connection for file sharing, Web browsing, and e-mail from both the Macintosh and all virtual machines.

Virtual PC uses your Mac configuration information by assigning a virtual machine a predefined "false" IP number so that your Macintosh can talk to it as though it were another computer.

In setting up a virtual machine, you can choose either to share your Macintosh's IP address or use a unique IP address. In most cases, you can use the default Shared IP setting. See the following sections for more information about using shared or unique IP addresses.

Using a shared IP address

By default, a virtual machine is set to use a shared IP address—for Windows 98, Windows Me, Windows 2000, Windows 95, PC-DOS or Red Hat Linux.

When using a shared IP address, keep the following points in mind:

- Windows on the virtual machine must be set to use DHCP. (DHCP is "Dynamic Host Control Protocol.")
- The virtual machine emulates a DEC 21041 Ethernet controller. (In some cases, the DEC 21041 may show up on your system as Intel 21041. This is the emulated Ethernet controller.)
- If your network uses a WINS server, you must enter the server information manually on the virtual machine in the Network Control Panel. Go to **Configuration**, select the **TCP/IP (Intel 21041 Ethernet based controller**. Then in **WINS Configuration**, choose the option to **Enable WINS Resolution**.
- You cannot use a virtual machine as a server over the Internet—for Web hosting, chat, or FTP, for example—when it is sharing an IP number with the Macintosh.
- Some networking software—chat programs, for example— may not function correctly without a unique IP address. (See the section "Using a unique IP address" on page 78.)
- With Shared IP you can access the network either with a modem or over a LAN.

Modem access

If you are running a virtual machine using a shared IP address and accessing the Internet over a modem, you can connect to your Internet service provider from your Macintosh. With the connection still open, you can then access the Internet from the virtual machine. In Windows 95/98/Me/2000, double-click the Internet Explorer icon on your Windows desktop.

LAN, DSL, or cable access

If you are running a virtual machine using a shared IP address and accessing the Internet over a LAN, using DSP, or using a cable modem, you have an IP address already assigned to your Mac—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 virtual machine. In Windows 95/98/Me/2000, double-click the Internet Explorer icon on your Windows desktop.

You can also do peer-to-peer file sharing over a Microsoft Network. Connect to the network and then follow these steps:

1. In Windows, select **Settings** from the Start bar.
2. Select **Control Panel**.
3. Double-click the **Network** icon.
4. Click the **Identification** tab.
5. Enter a **Computer** name, your **Workgroup** 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**.

NOTE *To retrieve the actual IP address of a virtual machine running with a shared IP address, type Control-Command-C and the address is placed on the Clipboard.*

Using a unique IP address

Some PC software—such as chat applications—may require a unique IP address. This section explains how to configure a virtual machine to meet this requirement.

DHCP and static IP addresses

Windows networking on a virtual machine works the same as it does on a hardware PC. If you are familiar with Windows, you can configure networking on a virtual machine as you would on a PC—keeping the following points in mind:

- In most circumstances, it is possible to use DHCP in a virtual machine regardless of the networking configuration of the Macintosh.
- If DHCP is not available, you must use two unique static addresses, one for the Macintosh and one for the virtual machine.

Configuring for unique addresses (Windows 98)

To configure your Macintosh and a virtual machine running Windows 98 so that they have unique IP addresses, follow these steps:

1. From Windows, open the **Network** control panel.

   There are three tabs along the top: **Configuration**, **Identification**, and **Access Control**. You need to work with settings in all three.

   NOTE *The steps for configuring other versions of Windows differ slightly. Check online Help for assistance.*

Configuration tab

1. Click the **Configuration** tab on the **Network** control panel.
2. Highlight **Client for Microsoft Networks** and click **Properties**. If you are logging onto a Windows NT domain, check the box and enter the name of the domain.
3. Click **OK**.
4. Highlight **TCP/IP PCI Ethernet DECchip 21041 Based Adapter** and click **Properties**.

NOTE *In some cases, DEC 21041 may show up on your system as Intel 21041. These are equivalent Ethernet adapters.*

If you are using DHCP on the virtual machine (and a static IP address on the Macintosh), follow these steps:

1. Make sure that the **Obtain an IP address automatically** option is selected on the **IP Address** tab.
2. On **WINS Configuration** tab, make sure that **Use DHCP for WINS resolution** is selected.

If you are not using DHCP on the virtual machine, follow these steps:

1. Enter the IP number manually on the **IP Address** tab and then the subnet mask (usually 255.255.255.0).
2. On the **WINS Configuration** tab, select **Disable WINS Resolution**.
3. On the **Gateway** tab, enter a New Gateway number that you use to access the Internet and click **Add**.
4. On the **DNS Configuration** tab, select **Enable DNS** and enter the name for the **Host** (your network logon name), the **Domain** (usually the end of your e-mail address, for example, connectix.com) and the **DNS Server Search Order** (the IP addresses for DNS servers). Click **Add**.
5. Click **OK** to close the **TCP/IP Properties** dialog box.

Identification tab

1. Click the **Identification** tab on the **Network** control panel.
2. Enter the **Computer name** as it appears on the network. (Since most networks view the virtual machine and the Macintosh as completely different computers, you need to have a separate account for the virtual machine.)
3. Enter the **Workgroup**. (This is the same as the **Client for Microsoft Networks** you entered in step 2 for the **Configuration tab.)**
4. Enter the optional **Computer Description** if you like.

Access Control tab

1. Click the **Access Control** tab on the **Network** control panel.
2. Set the access control for your shared resources.
3. Click **OK** to close the **Network** control panel.

Setting up modem access in Windows

To set up modem access from Windows running on a virtual machine with a unique IP address, you need to complete the following tasks:

Configure virtual machine communications

First, configure your communications settings on the virtual machine. Follow these steps:

1. Open **Settings** for the virtual machine from the Virtual PC List window.
2. Select either **COM1 Port** or **COM2 Port**.
3. In Port Settings, which appear on the right, select **Mac Serial Port**.
4. Select either **Modem Port** or **Printer Port** from the drop-down menu.
5. Click **OK**.

Configure Windows modem settings

In Windows, configure your modem by following these steps:

1. Open the **Modems** control panel.
2. Select **Don't detect my modem; I will select it from a list** and click **Next.**
3. The Install Modem window appears. For **Manufacturers**, select **Standard modem type.** For **Models,** select the **Standard** option with your modem's speed.
4. Click **Next.**
5. Select the port you are using for your modem: **COM1** or **COM2**. Be sure to select the same port you chose in the Settings for the virtual machine.
6. Click **Next**. The Windows wizard installs the modem.

7 Enter your **Country** and **Area Code** (if in the US or Canada). Click **Next**. Modem installation should be complete at this point.

8 Click **Finish**.

9 The **Modem Properties** dialog appears. Click **OK**.

Internet Connection Setup

IMPORTANT The steps in this section are accurate for Windows 98 only. Other operating systems have slightly different procedures to set up an Internet connection. Check online Help for assistance.

Now to set up your dial-up Internet connection for Windows 98, follow these steps:

1 Double-click the icon **Connect to the Internet** on your desktop.

The Windows Internet Connection wizard launches, and guides you through the process of configuring your connection.

2 You then choose whether to connect using a new account or an existing account with the organization the provides your Internet access—usually an Internet Service Provider (ISP).

You are presented with three options:

— I want to sign up for a new Internet account. (My telephone line is connected to my modem.)

— I want to transfer my existing Internet account to this computer. (My telephone line is connected to my modem.).

— I want to set up my Internet connection manually, or I want to connect through a local area network (LAN).

If you do not have Internet access, choose the first option, and the setup wizard can automatically dial up a number and provide you with a list of local service providers.

If you already have a dial-up ISP, you can set up Windows access by choosing the second option. You are then asked to choose between an ISP and an online service such as Microsoft Online or America Online (AOL).

If you do not have a modem set up for Internet connection, you are prompted to install a **New Modem** (see **Selecting Windows Modem Settings** earlier in this chapter)**.** If you have a modem already set up, this window does not appear**.**

3 Choose whether to set up your connection using a phone line or a local area network (LAN).

4 Enter the phone number for your ISP.

5 Enter your user name and password (also known as your Member ID or User ID).

6 The **Advanced Settings** dialog box appears where you may set your advanced settings. The default is **No**. Clicking **Yes** gives you options that allow faster DNS lookup by providing specific DNS server information.

7 If you select **Yes** to Advanced Settings, you are prompted for **Connection Type**. If you have an ISP, PPP (Point-to-Point protocol) is the most common protocol. (If you are unsure, contact your ISP.)

8 The Login Procedure screen appears. This permits you to log in manually or using a script. In most cases, you should select the first option, **I don't need to type anything when logging on.**

9 When prompted for your IP address, select either:

— My Internet Service Provider automatically assigns me on.

— Always use the following:

If you select the second option, enter your IP number.

10 When prompted for a DNS server address, select either:

— My Internet Service Provider automatically sets this when I sign in, or

— Always use the following:

If you select the second option, enter your DNS server number and an alternate number.

11 Enter your Dial-Up Connection name (this is the name used in the **Dial-Up Networking** folder in **My Computer**).

12 You are then prompted to enter your e-mail account information. This is optional; if you choose to enter it, you need to have the names for your e-mail account, incoming e-mail server, and outgoing e-mail server.

13 You may also enter an Internet News account for downloading information from news servers. This is optional.

14 You may also set up an Internet Directory services account for accessing "white pages" servers on the Internet. This is optional.

When configuration is complete, launch your Internet connection. Go to **My Computer**, open the Dial-Up Networking folder, and select your connection, or launch your browser, and the **Dial-up Connection** dialog appears.

To make changes to these settings, go to **My Computer** and open **Dial-Up Networking**. Select your connection and select **Properties** (either right-click your mouse or select from the File menu). Select the **Server Types** tab, and click on the **TCP/IP** button.

Using an AppleTalk network

If you are connected to an AppleTalk file server or printer from your Macintosh, you can access shared folders on an AppleTalk file server from a virtual machine. Follow these steps:

1. From the **Chooser** on the Apple Menu, select **AppleShare** and choose the folder you wish to access.
2. Mount it on your Macintosh desktop.
3. Drag the mounted folder to the **Folders** button on the Toolbar of the virtual machine.

Using AppleScript

You can use AppleScript to automate many Virtual PC or virtual machine operations. This chapter is an introduction to the topic.

About AppleScript

AppleScript is a scripting system that lets you directly control the Mac OS or Macintosh applications such as Virtual PC without using a mouse, keyboard, or other input device. You create a set of written AppleScript instructions—a "script"—to automate repetitive tasks, customize applications, and even control complex workflows.

Some ways of using AppleScript with Virtual PC

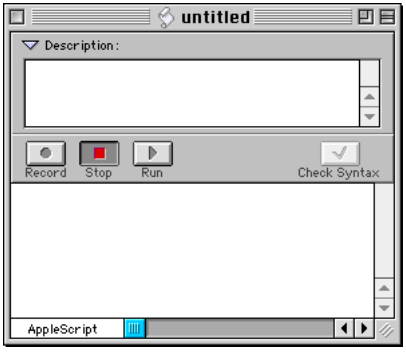
The AppleScript implementation for Virtual PC provides full access to global preferences and virtual machine Settings. It also offers access to the Windows operating systems. Here are some ways you might use these AppleScript capabilities in Virtual PC:

- You can create a single script that replicates the settings for a virtual machine on several workstations.
- You can tell Windows to automatically open a file or run an application.
- You can generate a list of running Windows applications and their open windows.
- In conjunction with Microsoft's Windows Scripting Host, you can tell Windows to execute a VBScript or JavaScript. This gives you access to Windows's native scripting capabilities.
- You can emulate user interaction on a virtual machine by scripting key presses, mouse movement, and mouse clicks. For example, you could script a series of mouse clicks and key presses that opens a program and selects a menu item.

Virtual PC is recordable

Virtual PC is a recordable application. This means you can turn on **Record** in the Script Editor and automatically create a script that records your actions with Virtual PC or the Mac OS.

7-1



You can then playback the events exactly as you recorded them or save the sequence as a script.

To learn more about AppleScript and the AppleScript Editor, read the AppleScript section of the Mac OS Help Center, or review the materials at the AppleScript Web site: www.apple.com/applescript

How AppleScript works

AppleScript works by sending messages called "Apple events" to applications. When you create a script, you write (or record) one or more groups of instructions called statements. When you run the script, the Script Editor sends these statements to the AppleScript extension, which interprets the statements and sends Apple events to the appropriate applications.

Applications respond to Apple events by performing actions, such as inserting text, getting a value, or opening a document. Applications can also send Apple events back to the AppleScript extension to report results. The AppleScript extension sends the final results to the Script Editor, where they are typically displayed in the Result window.

Running scripts in Virtual PC

Several sample scripts are included with Virtual PC. They are stored in the Scripts folder in the Virtual PC folder. They include:

- Open Keyboard Character Map
- Open Minesweeper
- Open Notepad
- Open Paint
- Open Solitaire
- Share a Folder
- Type "Hello my friend"

Use the Script menu on the Virtual PC menu bar to run any script stored in the Scripts folder. From this menu, you can also open the Scripts folder or the Script Editor.

The Virtual PC AppleScript Dictionary

An AppleScript dictionary is a set of definitions for commands that are understood by a particular application. When you write scripts, you can use both general commands provided by AppleScript and particular commands provided by an individual application such as Virtual PC. An AppleScript dictionary tells you the objects that are available in an application and the commands you can use to control them.

You can view the Virtual PC AppleScript Dictionary by selecting the **Open Dictionary** command from the Script Editor menu, or by dropping the Virtual PC icon on the Script Editor icon.

NOTE *For a complete description of the Virtual PC AppleScript Dictionary, please see the PDF file "AppleScript Dictionary" in the Virtual PC folder on your Macintosh.*

IMPORTANT The Virtual PC AppleScript Dictionary for Virtual PC 4.0 differs significantly from earlier versions of the Dictionary. If you created scripts using an earlier version, you need to modify and update them to work with Virtual PC 4.0. In many cases, this requires specifying a particular virtual machine. You also have to modify scripts that affect settings or preferences. Please check your legacy scripts against the new Virtual PC AppleScript Dictionary.

Using Windows

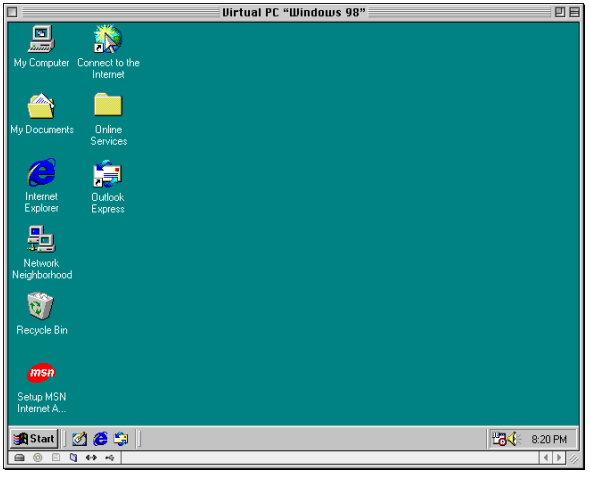
This chapter provides an introductory orientation to three versions of the Windows operating system you can run on a virtual machine—Windows 98, Windows Millennium, and Windows 2000.

The first section offers an overview of Windows 98. The following sections explain how key features of Windows Millennium and Windows 2000 differ from Windows 98. If you are new to Windows, read the section on Windows 98 even if you are using Windows Millennium or Windows 2000.

Windows 98 desktop

The Windows 98 desktop appears when you start up a virtual machine with this operating system installed.

8-1



Several icons on the left represent programs or folders.

My Computer—allows you to view and access the various drives on your virtual machine, including:

- A: Floppy drive
- C: Boot drive image for the virtual machine
- D: Optional drive image (not bootable)
- E: CD-ROM drive
- Z: Any folders or volumes shared with the Macintosh

Network Neighborhood—lets you browse through computers in your workgroup or on your entire network.

My Documents—a folder storing documents. (The default location for many operations.)

Recycle Bin—the Windows equivalent of the Macintosh Trash Can. Deleted files are moved to the Recycle Bin. Double-click the Recycle Bin to see its contents (or to restore any files). To delete a file permanently, select **Empty Recycle Bin** from the File menu.

Internet Explorer—launches Microsoft's web browser. (Another program called Windows Explorer has a similar name but a different function. It lets you browse files and folders on the PC.)

Start menu

The Start menu lets you choose a program to run. Click the **Start** button to open the Start menu—you don't have to hold down the mouse button—and then move the pointer to an item to open a sub-menu of choices.

8-2

The commands on the Start menu include:

Commands	Action
Windows Update	Provides web access to Windows update information
Programs	Display a list of the programs installed on your hard disk
Favorites	Open favorite files or web sites
Documents	Open a recently opened document
Settings	Change desktop or system settings
Find	Search for a folder, file, program or shared computer
Help	Open Help information
Run	Start or install a program
Log Off	Log off a Windows session
Shut Down	Shut down or restart the operating system

NOTE *To take an interactive tour of Windows 98, click* **Start** *and then* **Run**. *Type in* **tour98** *and then click* **OK**. *You will need to insert your Virtual PC CD to run this tour.*

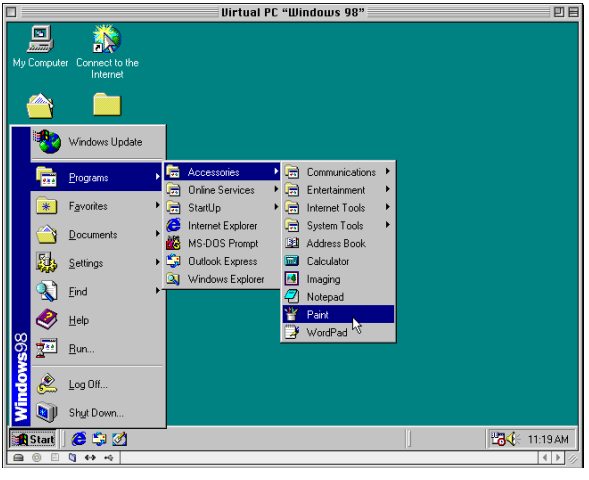
Opening a program or document

There are several ways to open a program or document in Windows 98:

From the Start Menu

1. Click the **Start** button.
2. Navigate up the **Start** list to **Programs**. A list of programs available to you opens and displays to the right.
3. Navigate down the list of programs. Select the appropriate program by scrolling the cursor down the list to highlight it.
4. Click on the program title and the program opens.

8-3



From My Computer

1. Double-click the **My Computer** icon.
2. Navigate to the folder with the program or document.
3. Double-click on the program or document icon.

From Documents

1. From the **Start** button, open the Start menu and then the **Documents** sub menu.

   A list of recently opened documents appears.
2. Select a document from this list.

The Taskbar

The Taskbar runs along the bottom of the Windows desktop. It displays buttons representing programs and files you have opened. To switch programs, click the icon representing the program on the Taskbar. When you close a window, the button on the Taskbar disappears.

8-4

NOTE *You can drag the Taskbar to either side or the top of the screen.*

Toolbars on the Taskbar

In Windows 98, the Taskbar can also display toolbars for specific tasks: Address, Links, and Quick Launch. (Right-click on the Taskbar to choose a toolbar.) The Quick Launch toolbar, for example, provides quick launch buttons for Internet Explorer and Outlook Express.

8-5

The Clock

At the right end of the Taskbar is the clock. To view or change the time, just double-click the clock.

Task Scheduler

Near the clock is the Task Scheduler. You can have Windows 98 perform routine maintenance tasks such as checking your e-mail, examining your hard disk for errors, or defragmenting your hard disk.

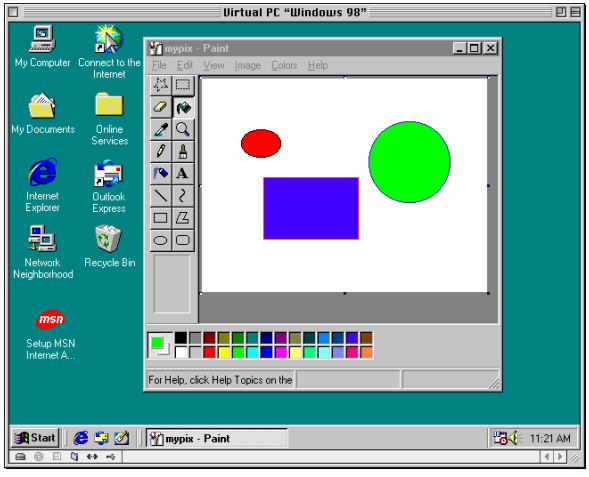
Modifying the Taskbar

You can modify the Taskbar. Open the Start menu, choose **Settings**, and then **Taskbar**.

Managing a window on the desktop

When you open a program or document, it appears in a window on the desktop.

8-6



The upper right corner of a window has three controls:

- The Minimize control hides the window. To redisplay the window, click on its icon on the Taskbar.
- The Maximize control maximizes the size of the window. Click again to restore the window to its previous size.
- The Close/Exit control closes the window and exits the currently active program.

Saving documents

To save a document, choose **Save** or **Save As** from the File menu. In Windows, letters identify the hard disk drive and floppy disk drives. Your drive image for the virtual machine is drive C. The floppy disk drive is drive A.

The pathname for a file is the complete "address" locating it on the virtual machine. For example, the pathname

C:\MyDocuments\Art\MyPix

says that the file MyPix is in the folder "Art," which is in the folder "MyDocuments" on drive C. Note that a drive name in a pathname requires a colon (:) after the drive letter.

You can change the location of a file using the **Save As** option.

Making an alias (shortcut)

In Windows, an alias is called a shortcut. You can create a shortcut by right-clicking on a document, folder, or program icon and selecting **Create Shortcut** from the contextual menu. (Use the Control key on your Macintosh keyboard to create a right click.)

Place the shortcut on the desktop or any other convenient location.

Control panels

To use a Control Panel, open the Start menu, choose Settings, and then choose Control Panel.

Control Panel functions include:

- Change your screen colors and desktop size
- Install or change settings for hardware and software
- Set up or change settings for printing and networking
- View your fonts
- View and change your date and time settings
- View and set your mouse settings
- View and set your Internet access

Getting Help

Windows 98 includes an online Help system.

1. Click the **Start** button and then choose **Help**.
2. The Help window appears with a list of online topics. Click on a topic to see the sub-topics. You can also use the Index or Search tabs to look for information in other ways.
3. Click on the topic to see its text in the window.

Using printers

The Windows 98 virtual machine includes two installed printers: **Mac Printer (PostScript)** and **Mac Printer (Inkjet)**. The Inkjet is set as the default printer.

IMPORTANT Before you print from Windows 98, make sure a printer is selected in the Chooser on the Macintosh.

Changing the default printer

To choose a different default printer, follow these steps:

1. Open the Start menu, select **Settings** and then **Printers**.
2. Click on the printer you want to make the default.
3. From the **File** menu, select **Set As Default**.
4. Click **Close**.

Printing to a Windows-networked printer

If you are printing to a printer that is attached to a Windows network, be sure to install the correct driver for the printer.

To add a Windows networked printer:

1. Double click the **Add Printer** icon in the Printers window.
2. Follow the instructions on your screen to setup an additional printer.

Installing a program

There are two ways to install a program:

- Using the Control Panel and selecting the **Add/Remove Programs** icon
- Using the Run command

IMPORTANT Connectix recommends that you use the Control Panel method of installation.

Using the Control Panel to install a program

To install a program with the Control Panel, follow these steps:

1. Click the **Start** button and navigate to **Control Panel.**
2. Click on the **Add/Remove Programs** icon.
3. Click on **Install.**
4. Follow the instructions displayed to add a program.

Adding joysticks

You can use a joystick with a virtual machine by installing the Virtual PC joystick controller software under Windows.

NOTE *Joystick support requires Apple's GameSprockets. For your convenience, the GameSprockets Installer is located on the Virtual PC 4.0 CD.*

To add a joystick:

1. Plug in the joystick.
2. From the Start menu, select **Settings** and **Control Panel**.
3. Open the **Game Controllers** control panel.
4. The **Game Controllers** dialog box appears.
5. Click the **Add** button.
6. Scroll down to the **Virtual PC Joystick** and select it.
7. Click **OK**.

   This opens the Games Controller dialog box, where you can calibrate the joystick.
8. Click **Properties**.
9. Click the **Calibrate** button.
10. Follow the instructions on the screen and then click **Finish**.

Shutting down Windows

To shut down Windows on the virtual machine, follow these steps:

1. Click the **Start** button and then **Shut Down.**
2. Selected the option **Shut down** and click **OK**.

About Windows Millennium (Me)

Windows Me is a revision of Windows 95/98, especially designed for home users. It includes new digital media tools, improvements in overall user experience, easier home networking, and a rich set of new and improved Internet features.

Protection of critical files

Windows Me won't allow your critical system files to be deleted or altered, either by accident or by a malicious virus or rogue application.

System Restore

If anything ever goes wrong on your computer, System Restore can roll your system back to the state it was in when all was well. These restoration points can be set by you, or can be taken automatically at timed intervals, for example, once a week on Fridays.

Home networking

The home networking wizard simplifies hooking up all the computers in your household. It automatically detects and shares available resources, such as printers and folders, on your home network.

Help system

Windows Me has an extensive Help system that extends beyond your desktop onto the Internet. Select the Help system by choosing Help from the Start menu.

The improved Help and Support area in Windows Me integrates help for your computer, operating system, and software programs into one location.

Revised error messages

Windows Me provides easier-to-understand error messages. Messages may also contain useful suggestions for fixing a problem. Like Help, error messages appear in HTML format and may have links to additional information.

About Windows 2000

Windows 2000 is a blend of Windows 95/98, built on the foundation of Windows NT 4.x. It is the strategic core of Microsoft's future for operating systems.

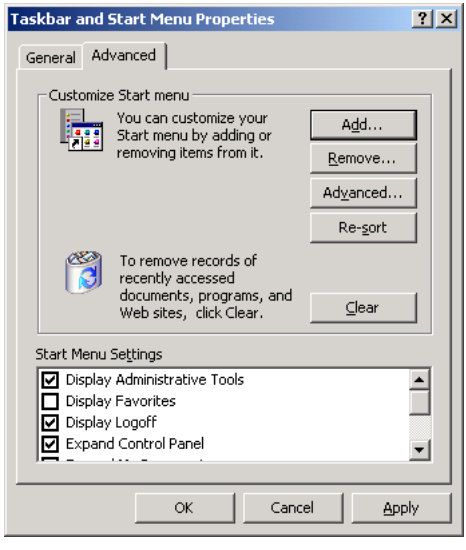
Windows 2000 comes in four product versions. This section only discusses Windows 2000 Professional, the version provided by Connectix as Virtual PC for Windows 2000. This section does not discuss the networking capability of Windows 2000. For information on networking, contact your system administrator or check the extensive Microsoft Windows 2000 Help system.

Customized Start menu

Windows 2000 lets you customize your Start menu. To modify the Start menu, right-click on the Taskbar and choose the **Properties** command to display the Taskbar Properties dialog box.

In the General tab, click **Use Personalized Menus** and click **Apply**. Click the **Advanced** tab to display this dialog:

8-7



You can now modify the Start bar by clicking in a check box for any of the following options:

- **Display Admin Tools**—provides several options for examining your system's performance such as **Performance**, **Services**, **Component Services**, and **Computer Management**.

- **Display Favorites**—shows your most commonly used files, including Web pages, text or graphics documents, and folders.
- **Display Logoff**—displays **Logoff** at the bottom of your Start menu.
- **Expand Control Panel**—expands the Control Panel item to include a sub-menu of all Control Panel items.
- **Expand My Documents**—adds the **My Documents** folder to the top of the Documents menu on your Start bar.
- **Expand Network and Dial-up Connections**—provides quicker navigation to your Network and Dial-up Connections menus.
- **Expand Printers**—provides quicker navigation to your printer settings.
- **Scroll the Programs Menu**—makes the Programs menu scrollable.

Open With option

The Open With option is now available by simply right-clicking on any file. This option lets you open a file with the application of your choice. This is especially useful if you do not have—or are not sure of—the application that created the file.

Customizable toolbars

In Windows 2000 you can customize any Toolbar. Right-click on the toolbar and choose **Customize** to display the **Customize Toolbar** dialog box.

To create a new Toolbar on your desktop, right-click on the Taskbar and select **Toolbars**. Then select the sub-menu **New Toolbar.**

Integrated searching

The Search tool for finding folders and files is now integrated with Internet Explorer, which means that you can search on your computer or outside of your computer for files, volumes, URLs, or even names and addresses over the Internet.

Open the Search menu by clicking **Search** on the Windows Explorer toolbar, or by right-clicking **My Computer** and choosing **Search...** You may also select **Search** from the Start menu.

You have a choice of searching according to the following categories:

- Files or folders
- On the Internet
- Using Microsoft Outlook
- For People

Each option provides its own search criteria options. Experiment with each category to learn its capabilities.

Other search features

Other new features make it quicker and easier to locate files in Windows 2000.

- **My Network Places**—replaces the old Network Neighborhood icon on the desktop.
- **My Documents** and **My Pictures**—A separate folder labelled My Pictures is available for storing graphics images.

Help system

Windows 2000 has an extensive Help system that extends beyond your desktop onto the Internet. Select the Help system by choosing **Help** from the Start menu.

Help pages are displayed using a browser. Links are provided to other pages in the Help system, and over the Internet.

Revised error messages

Windows 2000 provides easier-to-understand error messages. Messages may also contain useful suggestions for fixing a problem. Like the Help, error messages appear in HTML format and may have links to additional information.

About PC-DOS

This chapter provides an introduction to PC-DOS and its commands. For complete information about PC-DOS commands, please refer to the PDF file for the IBM PC-DOS manual located in the Virtual PC folder on your Macintosh desktop.

Introduction to PC-DOS

PC-DOS is a command-line interface. This means that all actions are executed by entering the commands at the PC-DOS command line or `C:\` prompt—from creating a folder, to moving or copying a file, to running an application program or game.

The mouse does not work in the PC-DOS command-line environment. To recover control of your mouse, hold down the **Command** key.

NOTE *PC-DOS is not included in Windows 98, Windows Millennium, Windows 2000, or Linux versions of Virtual PC. The Windows versions include MS-DOS, which is similar to PC-DOS in many respects, though some commands have different names.*

The following topics are included in this chapter:

- The command prompt
- The PC-DOS directory structure
- Printing under PC-DOS
- Copying files
- File naming
- Renaming files
- Deleting files
- Getting PC-DOS Help

The command prompt

When you first start up PC-DOS, installation information appears on screen. When the information stops scrolling past, you see the following on a black background in white letters:

```
C:\>_
```

This is called the command prompt. You are being prompted to enter a command that PC-DOS can execute.

The flashing underscore next to the command prompt is called the cursor. The cursor shows you where you can begin to type in the command at the prompt.

Typing a command

Try this:

1. Type the following command at the command prompt (you can uppercase or lowercase letters):

   ```
   ver
   ```

2. Press the Enter key.

The **ver** command displays the version number of PC-DOS.
There are hundreds of commands in PC-DOS. But you need to know just a few in order to perform essential tasks such as accessing files, copying and deleting files, and working with directories.

The PC-DOS directory structure

The `C:\` prompt represents your current location, which is the top or root level of drive C. Drive C is a virtual machine drive image.

To view the directory (dir) list of files

A directory list displays all the files and subdirectories in a directory. To see the directory list for drive C, do this:

1. Type this command and press Enter:

   ```
   dir
   ```

   A directory list similar to the following appears:

   ```
   Volume in drive C is PC DISK
   Volume Serial Number is 3AF1-41A7
   Directory of C:\
   CONFIG   SYS          135 07-15-97  10:03a
   COMMAND  COM       52,956 11-17-94   1:00p
   CNTX          <DIR>       07-23-98   6:33p
   DOS           <DIR>       07-23-98   6:33p
   AUTOEXEC BAT          173 07-03-97  11:55a
           5 file(s)       53,264 bytes
                        132,734,976 bytes free
   ```

To view one screen at a time

1. Type the following at the command prompt:

   ```
   dir /p
   ```

   One screen of information displays and pauses.

   When the `dir` command includes `/p`, then PC-DOS pauses after displaying each screen of information.

2. Press any key to continue. Repeat until the command prompt appears again.

`/p` is called a switch. It modifies the way PC-DOS carries out a command. Generally, a switch consists of a forward slash (/) that is followed by one or more letters or numbers.

To view the contents of a Directory in wide format

1. Type the following at the command prompt:

   ```
   dir /w
   ```

   The directory list displays with the filenames listed in wide format. Only filenames are listed. No information about file size or date and time of creation appears.

If the directory contains more files than will fit on one screen, you can combine the `/p` and `/w` switches as follows:

```
dir /w /p
```

Wildcard commands

A wildcard command allows you to include all the files you specify to be affected by the command. You can include multiple wildcards in a command. For example, the following command lists all the files from the current directory:

```
dir *.*
```

All the files in the current directory are displayed.

Changing drives

PC-DOS allows you access other drives. Drive A is your floppy disk drive. Drives C and D represent your internal hard drives, and Drive E represents your CD-ROM drive. There may be other drives, and each one is assigned a letter. Each drive can contain files you can access and view.

1. To change to drive A, enter:

   ```
   a:
   ```

   The command prompt changes to:

   ```
   A:\
   ```

   If there is no floppy disk image mounted in drive A, this message should appear:

   ```
   Not ready reading drive A Abort, Retry, Fail?
   ```

2. Mount a floppy disk image into drive A—see Chapter 5 in the Virtual PC User Guide—and then type:

   ```
   r
   ```

   for Retry.

3 To view a list of the files on the floppy disk in drive A, type the following at the command prompt:

```
dir
```

4 Now change back to drive C.

```
C:
```

The drive letter that appears in the command prompt shows which drive is the current drive. Unless you specify otherwise, any commands you type are carried out of the current drive and in the current directory.

For example, you can view the file on a disk in drive A without switching to drive A:

1 Type the following at the command prompt:

```
dir A:
```

A list of the files on the floppy disk in drive A appears, even though your command prompt indicates that drive C is current.

The `A:` you typed after the `dir` command is called a parameter. Parameters specify what a command should act on.

Changing directories

All the listed names that have <**DIR**> beside them are directories. You can see a list of the files in another directory by changing to that directory, and then using the `dir` command again.

1 To change directories, use the `cd` (change directory) command. For example, enter:

```
cd dos
```

The command prompt now appears like this:

```
C:\DOS>
```

You are now "in" the directory called DOS.

2 To see a list of the files in the DOS directory, just enter:

```
dir
```

Use the `\p` switch if you want to pause the display.

3 To switch back to the root directory, enter:

```
cd \
```

Note that the slash you type in this command is a backslash (\), not a forward slash (/). This command always returns you to the root directory of a drive.

Creating a directory and subdirectories

You create a directory with the `md` (make directory) command.

1. To create a new directory named "dogs, "enter the following:

   ```
   md dogs
   ```

   A new directory named **dogs** is created.

2. To change to the new dogs directory, enter:

   ```
   cd dogs
   ```

   The command prompt changes to:

   ```
   C:\dogs>
   ```

Now, within the dogs directory, create a subdirectory named "hounds":

1. Enter:

   ```
   md hounds
   ```

2. To confirm that you successfully created the hounds subdirectory, enter:

   ```
   dir
   ```

   Three entries appear in the dogs directory list.

   - the hounds subdirectory just created.
   - a single period (.)
   - a double period (..)

   The last two entries appear in every PC-DOS directory.

Deleting a directory

To delete a directory (or subdirectory), use the `rd` (remove directory) command.

To delete the **hounds** subdirectory:

1. Check that the command prompt looks like this:

   ```
   C:\dogs>
   ```

2. Enter:

   ```
   rd hounds
   ```

3. To confirm that you successfully deleted the **hounds** subdirectory, enter:

   ```
   dir
   ```

   The hounds subdirectory should no longer appear in the directory list under the dogs directory.

NOTE *You cannot delete a directory if you are in it. Before you can delete a directory, you must type* `cd` *at the command prompt. If the directory contains a file, the command,* `rd` *will not remove it. To remove a directory containing files, use the* `deltree` *command.*

Printing under PC-DOS

PC-DOS has built-in support for inkjet printers. To print a document:

1. Select your printer in the Macintosh Chooser.

   You can also turn off background printing for faster printing.

2. Locate the directory that contains the file you want to print.

   For example, say you want to print the **autoexec.bat** file located in the **C:** directory.

3. At the command prompt, enter:

   ```
   print autoexec.bat
   ```

   Be sure to enter the entire file name. For example, typing autoexec will not work. You must enter the complete file name, including the three-character extension.

   PC-DOS asks for the name of the printer's port:

   ```
   Name of list device [PRN]:
   ```

4. Enter the name of the printer port. In this example, specify LPT1 (the port Virtual PC uses). Enter:

   ```
   LPT1
   ```

   Once you have selected the LPT1 port, the print queue is available without specifying the LPT1 port again for the remainder of the current PC-DOS session.

PostScript printing with PC-DOS

To print from PC-DOS to a PostScript printer, you must select a printer driver for each DOS application from which you want to print. Not all DOS programs have this feature.

If you are using the PostScript printing option, choose the PostScript version of the printer driver for the printer connected to the Macintosh. If a driver is not available for that printer, you can use any PostScript Level 1 printer driver, such as Apple LaserWriter II NTX.
If you are using the Printer Specific feature, be sure to select a driver that works with the printer selected in the Chooser for each application from which you want to print.

Copying Files

To copy a file, use the `copy` command and include two parameters:

- the location and name of the file to copy, or the source
- the destination where the file copy is to go

Separate the source and destination with a space, like this:

```
copy source destination
```

Copying a single file

To copy the `EHELP.HLP` file from the PC-DOS directory to the dogs directory, do this:

1. Return to the root PC-DOS root directory. Enter:

   ```
   cd \
   ```

2. Change to the PC-DOS directory. Enter:

   ```
   cd dos
   ```

3. Enter:

   ```
   copy c:\dos\ehelp.hlp c:\dogs
   ```

   The following message appears:

   ```
   1 file(s) copied
   ```

   The command copies the file from its source to its destination.

To summarize:

- By specifying `C:\DOS\EHELP.HLP` as the source, DOS finds the source file `EHELP.HLP` on drive C in the DOS directory.
- By specifying `C:\dogs` as the destination, PC-DOS places a copy of `EHELP.HLP` in the dogs directory.

Copying multiple files

Use wildcards to copy a group of files from the PC-DOS directory to the dogs directory. The asterisk (*) wildcard matches any character in that position and all the other positions that follow it.

For example, to list all files ending with the extension `.INF` and then copy them from the PC-DOS directory to the dogs directory, do this:

1. Enter:

   ```
   dir *.inf
   ```

Note that there is a space before the asterisk (*), but not after it.

This command lists all files and subdirectories in the current directory that end with the extension .INF. The asterisk matches the first character of the filename and all other characters that follow it, up to the period (.) that separates the name from the .INF extension.

2 Now copy files with a .INF extension to the dogs directory. Enter:

```
copy *.inf c:\dogs
```

File naming

PC-DOS file naming uses the "8.3" rule. A file name may have a maximum of 8 alphanumeric characters followed by a dot, followed by an extension with a maximum of 3 letters. For example:

```
filename.doc
```

The extension of three letters at the end of the file name represents the application program that created the file. For example, the extensions:

```
.doc .ppt .cvs
```

represent files written in Microsoft Word, Microsoft PowerPoint, and Deneba Canvas, respectively.

A Macintosh file named

```
letter to my boss
```

in PC-DOS format should be named

```
bosslet.doc
```

or some other variation, such as

```
bosslet.txt, bosslet.ppt, bosslet.cvs
```

If you have not renamed your Macintosh files in PC-DOS format, they may appear in PC-DOS in truncated form with a tilde (~) representing the missing letters.

Renaming files

Use the `ren` (rename) command to rename a file. It includes two parameters:

- the file (oldname) you want to change
- the new name (newname) for the file

Separate the two names with a space using this format:

```
ren oldname newname
```

1. To rename the file `CMD.INF` that you copied into the dogs directory, first change directories by entering:

   ```
   cd\dogs
   ```

   The command prompt changes to:

   ```
   C:\dogs>
   ```

2. To rename the `CMD.INF` file to `POODLE.INF`, enter:

   ```
   ren cmd.inf poodle.inf
   ```

Deleting files

To delete a single file, for example, the `POODLE.INF` file:

1. First verify that the command prompt is as follows:

   ```
   C: \dogs>
   ```

2. Then enter:

   ```
   del ehelp.hlp
   ```

3. To confirm that the file is deleted, enter:

   ```
   dir
   ```

   The `POODLE.INF` file is no longer in the dogs directory.

Deleting a group of files

To list and then delete all the files in the dogs directory that end with the extension `.INF`, do this:

1. First enter:

   ```
   dir *.inf
   ```

   A list of all the files that end with the extension `.INF` appears. Usually before you delete a group of files, you want to check to make sure you're not going to delete a file you want to keep.

2. Now enter:

```
del *.inf
```

3 To confirm that all the files with the extension `.INF` have been deleted, enter:

```
dir
```

The dogs directory should contain no files. Now you can delete it.

Deleting a directory

To delete the dogs directory, do this:

1 Return to the root directory. Enter:

```
cd \
```

2 Verify that the dogs directory is in the list. Enter:

```
dir
```

3 Now remove the dogs directory by entering:

```
rd dogs
```

4 To verify that the dogs directory is removed, enter:

```
dir
```

The dogs directory no longer appears in the directory list.

Getting PC-DOS Help

There are two types of online help for PC-DOS commands:

- PC-DOS Command Reference— complete online reference for PC-DOS commands
- PC-DOS Error Messages—messages that display command errors and offer some tips on how to resolve a problem

To Start PC-DOS Help and choose a topic, enter the following at the command prompt:

```
view cmdref
```

To start PC-DOS Error Messages and choose a topic, enter the following at the command prompt:

```
view doserror
```

Using Red Hat Linux

This chapter introduces the basics of the Red Hat Linux operating system. For full details, consult the Red Hat Linux manuals provided with Virtual PC 4.0. Connectix recommends that you use Virtual PC with Red Hat Linux as a Linux client only, not as a server.

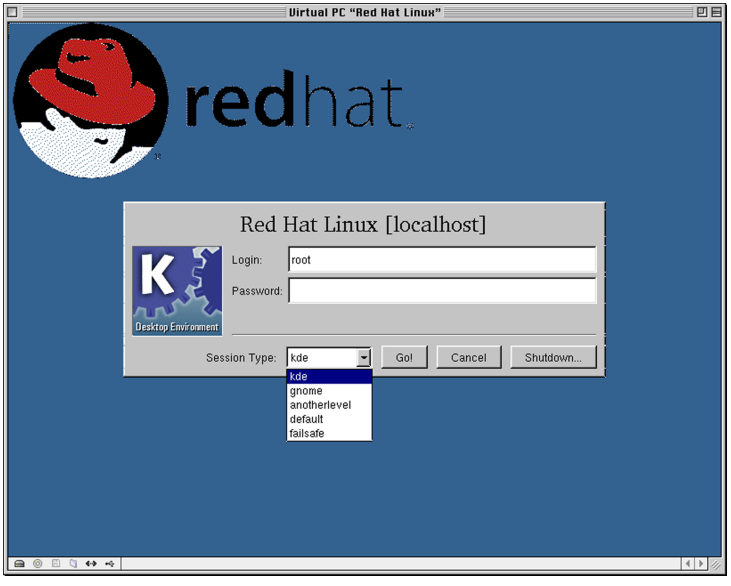
Getting Started

When you first start the virtual machine running Linux, there is only one account set up: the super user or root account. You should only use this account for system management and administrative purposes.

Your first task is to log on using the root account and then create a new user:

1 Enter the user name and password for the root account. The user name is **root** and the password is **change**. (Both these entries are case sensitive.

10-1



2 Choose KDE as the session type. This is one of the available user interfaces for Red Hat Linux.

3 Click **Go**.

NOTE *Connectix recommends that you change the root password as soon as is practical. For the steps required to do this, see the Red Hat Linux manuals.*

4 From the KDE menubar, select the terminal icon.

5 Type:

```
adduser <user name>
```

This creates a new account.

6 Type:

```
passwd <user name>
```

A prompt asks you to enter the password twice.

7 Now log out using either the control-D command (or by entering the "logout" command).

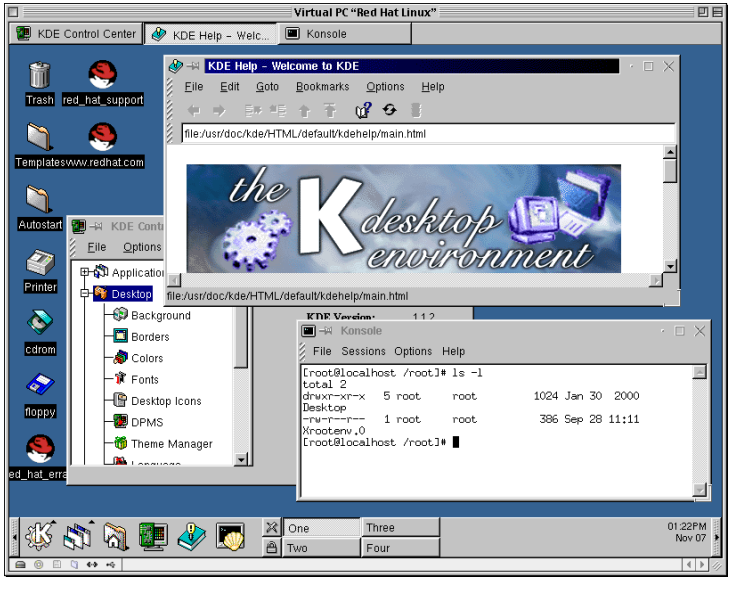
8 Log in as the new user.

Desktop interfaces

The next time you log in, Red Hat Linux remembers your previous choice of desktop user interface. To change, you can choose a different interface in Session Type and then click **Go**

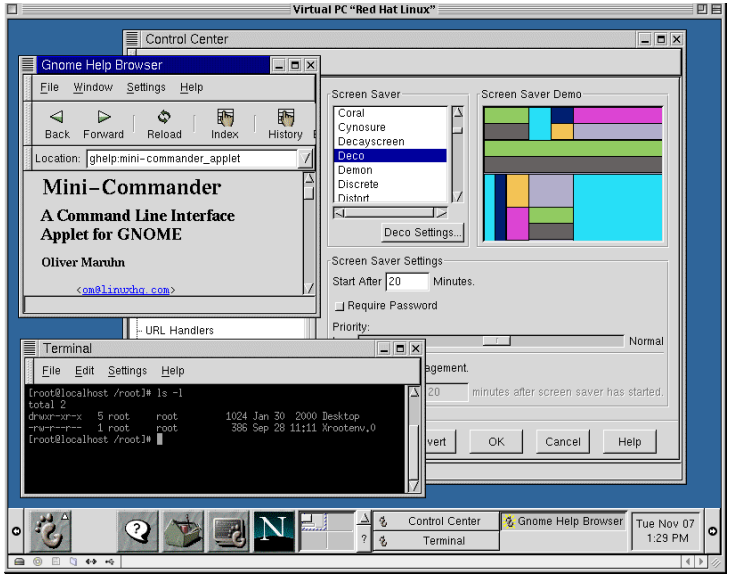
Here is the KDE interface:

10-2



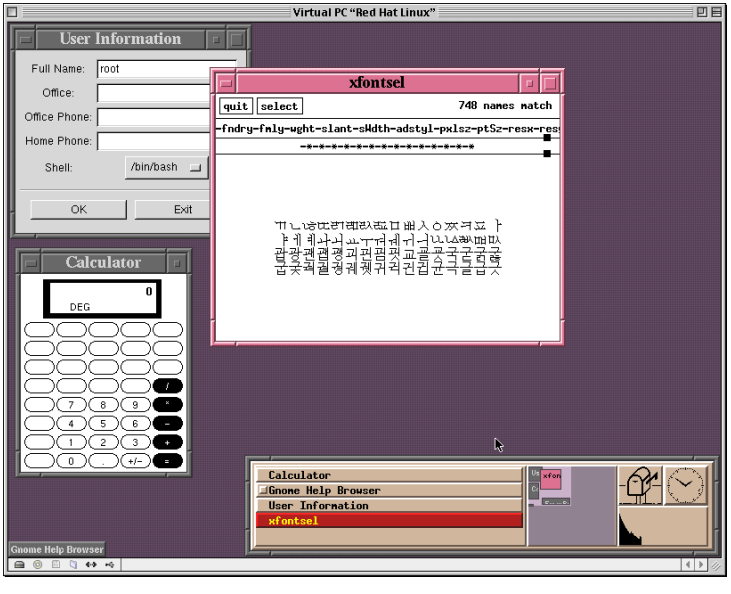
Here is the Gnome interface:

10-3



Here is the Another Level interface:

10-4



NOTE *The KDE and Gnome interfaces are more familiar to Macintosh users.*

Some key points

Here are some key points about Red Hat Linux running under Virtual PC.

Virtual Disk Assistant

Virtual Disk Assistant does not support creating or modifying Linux drive images.

Shared folders

Currently, Virtual PC with Linux does not support file sharing with the Mac OS. There are two workarounds for this issue:

- A "D" drive can be assigned. Connectix recommends that the drive be formatted as FAT16 (which Linux can read and write from). If the drive is formatted FAT16, the Mac OS can mount the drive image and be able to write to it. The Mac OS does not support EXT2 partitions (the native format for Linux).
- Virtual PC provides complete support for file sharing via FTP, NFS, and SMB. Connectix includes FTP and NFS support in the drive image.

Virtual PC Additions

The disk image that ships with Virtual PC with Linux includes the Virtual PC Additions, which provide support for dragging the cursor between the Macintosh desktop and the Virtual PC window.

Users who wish to install their own copy of Linux on a drive image should make sure that their distribution supports RPM (Red Hat Package Manager). Most major distributions include RPM, including Red Hat Linux, Linux Mandrake, and Debian. If the distribution does not include support for RPM, binaries can be downloaded from http://www.rpm.org/

After RPM is installed, you can install Additions following these steps:

1. Insert the Virtual PC with Linux disk in to your CD-ROM drive.
2. Start Virtual PC, and log in to Linux as the root user.
3. Mount the CD using the following command:

   ```
   mount/dev/cdrom/mnt/cdrom
   ```
4. Install the binaries using the following command:

   ```
   rpm-Uvh/mnt/cdrom/linux/*.rpm
   ```

Mouse support

Virtual PC emulates a two-button mouse under Linux. Currently, the Linux community is considering support for three-button mouse devices.

Video support

By default, Virtual PC with Linux ships with XWindows (the graphical user interface to Linux) configured as a 640x480 window, with 8 bit (256 color) support. If users wish to change it, they should edit the /etc/X11/XF86Config file. Uncomment the appropriate lines for the specific color mode and size. Refer to the XF86Config documentation (man XF86Config) for further details.

Printing

By default, Virtual PC with Linux ships with one printer configured.

```
lp
```

(This is the equivalent of the Epson AP3250 inkjet printer).

If you have questions regarding printing or want to configure other types of printers, consult the Red Hat Linux manual section for printtool.

Linux Client

Connectix recommends that you use Virtual PC with Linux as a Linux client, not as a Linux server.

Frequently Asked Questions

How do I get my Macintosh pointer back when I am in DOS or in Full Screen mode?

Hold down the Command Key (the "Apple" key) on your Macintosh keyboard. The Macintosh pointer and menus become visible.

Some of my function keys do not work. Why?

If you have assigned function keys in the Macintosh environment, be sure that no other Macintosh programs are using the same function key as the one you need in the Windows environment. If they are assigned by other programs, they won't be available to Virtual PC.

I just inserted a floppy while running Virtual PC. Why can't I see it on the Macintosh desktop?

A virtual machine "captures" floppy disks inserted in the floppy drive when the virtual machine is the front-most application. This is true of all floppies—including Macintosh-formatted floppies, which are generally not readable by PC software. If you want to access the floppy from the Finder, switch to the Finder first and then insert the floppy.

Can I recognize other PC drive images like SoftWindows™ or the PC Compatibility Card?

Yes, with limitations. Virtual PC recognizes these PC drive images as D or E drives. First use the Virtual Disk Assistant to convert the drive to a Virtual PC drive image. Then select the drive and make it the D or the E drive in the Settings for a virtual machine.

My DOS game says it doesn't have enough memory—what do I do?

You can increase the memory setting for the virtual machine running DOS, within the limits discussed in Chapter 5.

My USB device, connected through a USB hub to the Macintosh, seems to be having problems. What can I do?

Connecting the USB device directly the Macintosh may solve the problem.

The sound breaks up when I'm playing a game on Virtual PC. What can I do?

There are several reasons the sound quality can degrade:

— The game's sound settings are too demanding. Try reducing the number of sound channels, switching from stereo to mono, turning off music (FM Synthesis), and decreasing the sample rate (e.g., from 44KHz to 11KHz).

— The machine you're using is too slow to keep up with the demands for the PC game or program you're using.

— You are using Virtual Memory or RAM Doubler or are not giving Virtual PC enough memory. Virtual PC requires physical RAM for best performance.

— You are running background applications on your Macintosh which take up time from Virtual PC just when it is needed to generate more sound. For games, you should quit every other Macintosh application before playing.

Does Virtual PC support Token Ring?

No, Virtual PC does not support Token Ring. Virtual PC emulates an Ethernet card.

I recently installed an update to Mac OS. When I try to print, why do black bands appear on the paper?

This is an issue known by Connectix and Apple. The problem affects both Virtual PC 3.0 and 4.0 when using Epson Printer emulation. Connectix is investigating possible solutions. Possible workarounds include:

— Print to the printer using PostScript.

— Use a network printer instead of a printer directly connected to your Macintosh.

— Use a USB printer.

— Do not upgrade your Mac OS beyond 9.0.4 until Connectix resolves this issue. Performing a "clean" install of your previous Mac OS should resolve this issue.

Technical Specifications

This appendix lists the technical specifications for Virtual PC 4.0

Processor

- Emulates the Intel Pentium II®. Includes complete support for Pentium architecture: protected mode, MMU, FPU as well as MMX™.

Motherboard

- Virtual PC emulates the Intel Triton 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

- BIOS is the Microid Research Systems BIOS (MR BIOS)
- Support for CD-ROM booting following El Torito CD-ROM booting specification

Memory

- 512 MB RAM PC limit

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 C*
Primary Controller	*Drive 2: Drive D*
Secondary Controller	*Drive 1: CD-ROM*
Secondary Controller	*Drive 2: Drive E*

Alternate Configuration (needed for OPENSTEP installation)

Controller	Drive
Primary Controller	*Drive 1: Drive C*
Primary Controller	*Drive 2: CD-ROM*
Secondary Controller	*Drive 1: Drive D*
Secondary Controller	*Drive2: Drive E*

Hard Drive

- Uses hard drive container images
- Supports expandable drive images (version 4.0 only) as well as earlier fixed-sized drive images
- Supports Virtual PC, SoftPC, SoftWindows and Apple PC Compatibility Card drive images
- Supports simultaneous use of three drive images, each up to approximately 127 GB in size

CD-ROM

- Uses the CD-ROM in the Standard Macintosh (if present)
- ATAPI interface supports data and audio commands

Video

- Emulates the S3 Trio 32/64 PCI SVGA Card
- Implements 4MB of emulated VRAM (using Mac memory), allowing for up to 1600 x 1200 PC screen resolutions
- 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 Macintosh keyboard
- Allows key-combination assignments to represent Windows and application keys found on newer PC keyboards

Mouse

- Uses the standard Macintosh mouse
- Emulates a PS/2 mouse using IRQ 12
- Emulates second-button support by means of key combinations on the Macintosh
- Supports USB three-button wheel mouse devices

Floppy

- Uses a standard Macintosh floppy drive
- Emulates the standard PC floppy controller interface
- Supports uncompressed read/write Disk Copy floppy images

Serial Ports

- Virtual PC supports COM1 and COM2 ports, and allows mapping to text files or any available Macintosh serial port (e.g., Modem and Printer ports).

Printer

- Handles printing through an LPT1 parallel port.
- Output is interpreted as PostScript or Epson AP3260 print data.
- PostScript printing requires a PostScript printer to be selected in the Macintosh Chooser.
- Epson AP3260 emulation works with any standard Macintosh printer.

Sound

- Emulates Creative Labs 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).

Ethernet

- Emulates a DEC/Intel 21041-based PCI Ethernet card.
- The card is plug-and-play and can be reconfigured by the operating system, but default settings use IRQ 1.

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 4.0.

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
- 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 virtual machine 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.

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. To create a new hard drive image in Virtual PC see Chapter 5, *Using Virtual PC*.

Make sure that the Virtual PC Additions, included on the Virtual PC installation CD, for the operating system you are using are installed since these additions provide for the seamless integration of the guest OS with the Mac.

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

Also, be sure to read the legal issues section to this addendum to ensure you are properly using your licensed OS installation disk.

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 addendum to ensure that you are properly using your licensed Microsoft Certificate of Authenticity.)

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 Macintosh 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 virtual machine. Make sure that the drive image is in the same folder as the Virtual PC application.
2. Copy the entire Virtual PC 4.0 Preferences folder from the Preferences folder in the System Folder to the folder which holds the Virtual PC application.
3. Copy the entire Virtual PC folder 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. The C drive image Setting for the virtual machine may have to be re-established on each client. Just drag the disk image file to the C Drive Setting as shown in Chapter 5 *Using Virtual PC*.

Networking

Shared IP Networking is the default setting for Virtual PC networking and this default should be kept unless there are specific reasons for having a dedicated IP address for the guest operating system in Virtual PC.

For Windows 9x versions of Virtual PC, networking is set to use DHCP (for the Shared IP functionality). Other Windows settings specific to network the guest operating system have to be manually set (WINS, DNS, etc.).

The machine name for Windows networking must be manually changed to avoid network conflicts when each machine comes online.

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, etc. 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 COAs

It is your responsibility to purchase a unique Certificate of Authenticity (COA) for each Macintosh 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.

Installing Your Own OS

This appendix provides information about installing your own operating system on a virtual machine.

About other operating systems

While Connectix Virtual PC is compatible with other Pentium-based operating systems, there are important issues to consider for configuration and usage.

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

- MS-DOS 6.22 Upgrade—You must prepare the drive with PC-DOS 7, the OS_Install image for the Windows 95 or 98 will not allow you to install with the MS-DOS Upgrade disks. You must use the full install of MS-DOS 6.22.
- Windows NT and Windows 2000—Virtual PC is compatible with both NT 4.0 and Windows 2000.
- Red Hat Linux—Virtual PC is compatible with Red Hat Linux 6.1.
- Other Linux distributions—Virtual PC is compatible with many Linux distributions.
- NeXT OPENSTEP—To Install OPENSTEP, be sure to change the VPC CD-ROM setting from Standard to Alternate in the VPC preferences. Be sure to shutdown from OPENSTEP (LogOut) before quitting VPC to avoid unrecoverable data corruption.
- IBM OS/2—Virtual PC is compatible with OS/2 version 4.0.
- BeOS—Virtual PC is not compatible with BeOS.
- Windows 3.1—Virtual PC is compatible with Windows 3.1.
- Windows 2000 Server, Advanced Server—Compatible, but not recommended.

Installing Windows from a bootable CD:

1. Launch Virtual PC, and from the Virtual PC List create a new virtual machine. Give the new virtual machine an appropriate unique name, and choose Guide Me to configure the virtual machine.
2. Choose the option to create a new drive image. Choose a location for this drive image and specify which OS you will be installing in the drive image. Create the drive image.
3. Start up the virtual machine. You will receive an error message that the drive image is not bootable.
4. Insert the bootable Windows CD-ROM. (Let it auto mount.) Press any key to continue.
5. Select the option to boot from the CD. The Windows Setup program will then take you through the setup process.

Installing Windows from a non-bootable CD:

1. Using the boot floppy that came with the Windows CD, create a disk image using Apple's Disk Copy utility. (To do this, you will need access to a Macintosh with a floppy drive.)
2. Launch Virtual PC, and from the Virtual PC List create a new virtual machine. Give the new virtual machine an appropriate unique name, and choose Guide Me to configure the virtual machine.
3. Choose the option to create a new drive image. Choose a location for this drive image and specify which OS you will be installing in the drive image. Create the drive image.
4. Start up the virtual machine. You will receive an error message that the drive image is not bootable.
5. Insert the Windows CD-ROM. (Let it auto mount.) Drag the floppy disk image created in step 1 to the floppy icon in the Virtual PC Toolbar. Press any key to continue.
6. The Windows Setup program will then take you through the setup process.

Index

W