

Virtual PC™

for OS/2™

Version 5.0

User Guide

innotek
innovative business solutions

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NOTE *Some screenshots and descriptions in this manual may not exactly reproduce the current level of functionality found in Virtual PC for OS/2. See the README.TXT file shipped with the product for updates to this manual.*

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Introduction

Welcome to Virtual PC for OS/2 — a sophisticated software emulation program that lets you run multiple guest PCs each with a different operating system on a single host PC.

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

About this User Guide

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

Chapter 1 *Introduction*

—this chapter

Chapter 2 *Touring Virtual PC*

—reviewing the major features of Virtual PC

Chapter 3 *Setting Up Virtual PC*

—installing Virtual PC and creating a guest PC

Chapter 4 *Using a guest PC*

—using the key features of a guest PC

Chapter 5 *Networking with Virtual PC*

—choosing networking options for Virtual PC

Chapter 6 *Changing Settings and Preferences*

—changing settings for a guest PC or global preferences for Virtual PC

Chapter 7 *Using Virtual Disk Wizard*

—creating various types of disk images with Virtual Disk Wizard

Appendix A *Technical Specifications*

—technical specifications for Virtual PC

Appendix B *Command Line Parameters*
—using Virtual PC command line parameters

Appendix C *Volume License Information*
—information about volume licensing

Appendix D *Migrating Guest PCs from Virtual PC 4.x to Virtual PC 5.0*
—information for migrating previously installed guest PCs to Virtual PC 5.0

Appendix E *Installing OS/2 as a Virtual PC guest operating system*
—information and tips on getting OS/2 to work under Virtual PC

If you need additional help

If you need additional help, please consider these options:

Online Help

Virtual PC for OS/2 comes with an online version of this manual that can be opened with Acrobat Reader from Adobe (<http://www.adobe.com>).

Read Me file

Check the Read Me file (README.TXT) in the Virtual PC directory on your PC or on the Virtual PC CD. It provides late-breaking information on known problems and solutions.

InnoTek Web site

Check the InnoTek Virtual PC Web site at:

<http://www.innotek.de/products/virtualpc>

for the latest information or updates for Virtual PC for OS/2.

InnoTek Corporate Support options

Contact InnoTek for individual fee-based support options at:

virtualpc@innotek.de

InnoTek Support

Free support is available through the InnoTek Online Support Forums at:

<http://www.innotek.de/support/forums>

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

- Your Virtual PC for OS/2 serial number
- Software version number—In the Virtual PC window, on the **Help** menu, click **About Virtual PC**.
- Basic information about your host PC such as the processor type and the RAM memory installed
- The version of OS/2 Warp running on your host PC
- The operating systems running on your guest PCs
- Your notes on the events that led to a problem

Other products and license information

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

- E-mail: sales@innotek.de
- Worldwide Web: <http://www.innotek.de>

New Features in Virtual PC 5.0

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

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

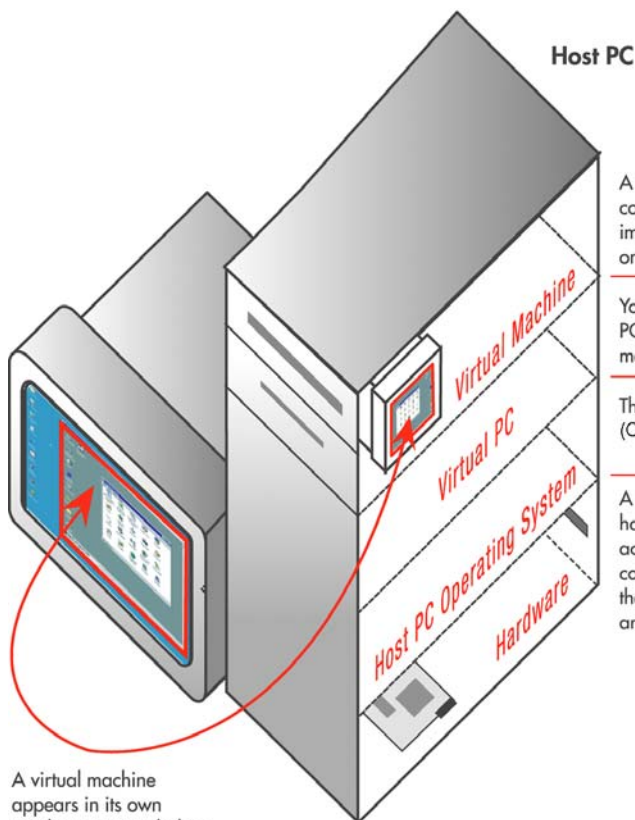
- **Virtual Switch is Default**—The Virtual Switch networking option is now the default option for newly-created guest PCs. In prior versions of Virtual PC, the Shared Networking mode was the default.
- **New OS/2 keyboard monitor**—This (optional) component of Virtual PC for OS/2 intercepts “dangerous” keystrokes like <CTRL>-<ALT>-<DELETE> to prevent accidental reboots of your host Operating System.
- **Improved Installer**—The installer for Virtual PC 5.0 acts as both an installer and an updater. Prior versions of Virtual PC shipped with a separate installer and updater. The new installer detects and uninstalls older versions of Virtual PC before installing the new version. Also, the Virtual PC setup tool (VPCSETUP.EXE) has been enhanced significantly.

Touring Virtual PC

This chapter provides a tour of Virtual PC for OS/2. Look it over to get an understanding of key features before you install the program.

What is Virtual PC?

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



A virtual machine appears in its own window on your desktop.

A virtual machine has three components: settings, a disk image, and an OS you install on the disk image.

You install Virtual PC on a host PC and then set up a virtual machine.

The operating system of the host PC (OS/2 Warp)

A virtual machine can use the hardware resources of the host PC, accessing CD or floppy disks, connecting to the network, using the host PC parallel port to print, and so on.

About the host PC

The host PC where you install Virtual PC and create one or more guest PCs must be running OS/2 Warp. (For details of other host PC requirements, see page 16.)

Components of a virtual machine

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

- *Settings* that determine the operating relationship with the host PC, such as the amount of RAM allocated for the guest PC, or the assignments for the COM1 and COM2 ports.
- A *disk image* file that represents the boot drive (Hard Disk 1) of the guest PC. Drive images have the extension .VHD, or *Virtual Hard Drive*. By default, this disk image is a dynamically expanding file that grows in size as you install applications or store data on it. (Optionally, you can designate other disk images as Hard Disk 2 or Hard Disk 3 for a guest PC.)
- An operating system installed on the guest PC's boot disk image file. This OS can be almost any x86 compatible operating system, including OS/2, Linux and Windows 95/98/ME/NT/2000/XP.

About emulated hardware (the guest PC)

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

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

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

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

More about disk images

Virtual PC supports several types of disk images, including:

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

You can create, examine, or modify disk images using the Virtual Disk Wizard. (See page 79.)

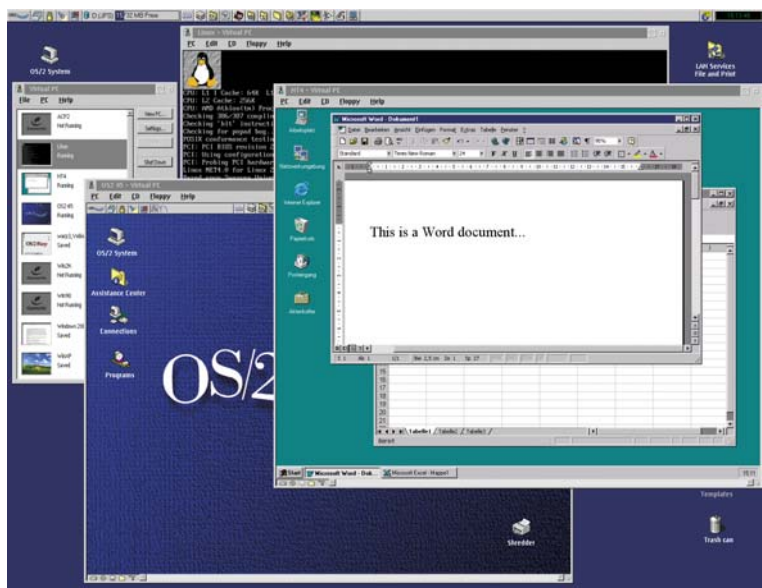
Undoable disk images

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

Running multiple guest PCs

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

2-1

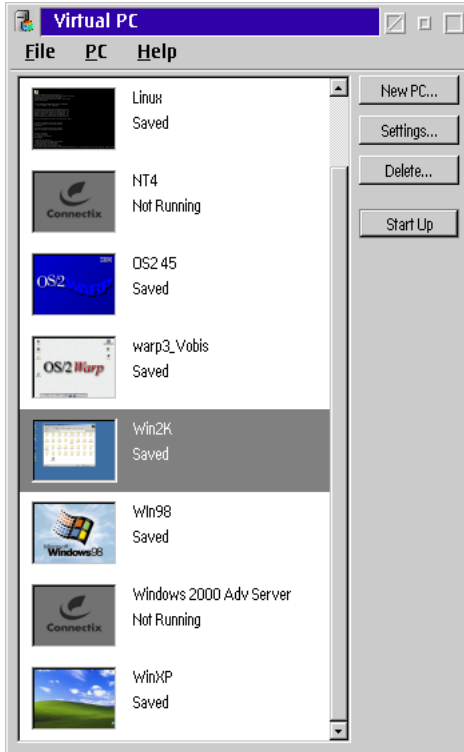


Note that each guest PC requires its own allocation of RAM on the host PC.

The Virtual PC list

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

2-2



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

VPC Additions and guest PC integration

A set of software components called “VPC Additions” can be installed on a guest OS. VPC Additions enable host PC and guest PC integration.

This integration takes several forms:

- You can drag and drop files and folders from the host PC desktop to a guest PC, and vice versa.

NOTE *Drag and Drop support is not available in the current release of Virtual PC for OS/2.*

- You can copy and paste between applications running in the two environments.
- You can share a folder or a volume between the host PC and a guest PC. (You can even share the same folder with multiple guest PCs running at the same time.)

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

Printing with Virtual PC

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

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

For information about printing, see page 44.

Networking with Virtual PC

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

Two other networking options are available:

- *None*—the equivalent of removing the emulated networking card from the guest PC

- *Shared Networking*—This means the guest PC can share a single network connection transparently with the host PC. If the host PC can access the World Wide Web, then the guest PC can also access the Web. Shared Networking works well for browsing the Web, reading e-mail, and accessing FTP sites. (See page 49 for more details.)

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

Help

In the current release, there is no other online help than this document. This may change in future releases of Virtual PC for OS/2.

Creating a guest PC

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

You can set up a guest PC by creating a disk image and then installing your own copy of an OS on it. (See page 24.)

Setting Up Virtual PC

This chapter provides step-by-step instructions for setting up Virtual PC for OS/2.

Chapter topics

The topics in this chapter include:

- Installation requirements - page 16
- Installing Virtual PC for OS/2 - page 18
- Unattended Installation - page 22
- Starting Virtual PC for the first time - page 22
- Registering Virtual PC - page 24
- Creating a guest PC with your own copy of an OS - page 24
- Installing an application on a guest PC - page 32
- Modifying the settings for a guest PC - page 33
- Creating a guest PC with standard settings - page 34
- Duplicating the settings of an existing guest PC - page 34

Installation requirements

Before you install Virtual PC for OS/2 on a host PC, note these requirements:

- Host PC processor
 - Athlon, Duron, Celeron, Pentium II, Pentium III, or Pentium 4
 - 400MHz minimum, 600 MHz recommended
 - Level 2 cache required
- Host PC OS
 - OS/2 Warp 4 (FixPak 15 or higher)
 - OS/2 Warp 4.51 (Convenience Pack 1)
 - OS/2 Warp 4.52 (Convenience Pack 2)
- Host PC Disk space

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

Use the table below to determine the minimum physical RAM required for the host PC. First determine the minimum required RAM for the OS on the host PC (usually 32-64MB for OS/2 Warp 4.x). Then add the RAM requirement for the guest PC(s) you intend to run. Additional memory beyond this minimum amounts usually improves performance.

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

For example, on a host PC running OS/2 Warp 4 with a single guest PC running Windows 95 you need a minimum of 32MB plus 32 MB (or 64 MB) of host PC RAM. On the same host PC, simultaneously running a second guest PC with Windows Me installed would require 32 MB plus 32 MB plus 96 MB (or 140 MB) of host PC RAM. If you only intend to run one of these guest PCs at a time on this host PC, you would need a minimum of 32 MB plus 96 MB (or 128 MB) of RAM.

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

Installing Virtual PC for OS/2

NOTE For unattended installation, see the next chapter.

NOTE The install program can be used to update an existing installation of Virtual PC for OS/2 as well as to install the product on a new machine.

To install Virtual PC for OS/2, follow these steps:

- 1 Start the host PC.
- 2 If you acquired Virtual PC for OS/2 Warp online, decompress the ZIP file (i.e. “VPC5_OS2.zip”) you downloaded. Then open the extracted folder and double-click the file “INSTALL.EXE”. Alternatively, you can open an OS/2 Command Prompt, change to the directory created by unzipping the downloaded file and type “INSTALL”.

If you purchased a Virtual PC for OS/2 with an installation CD, insert this CD in the CD-ROM drive of the host PC and run the INSTALL.EXE program in the root directory of the CD.

This will launch the Virtual PC installation program.

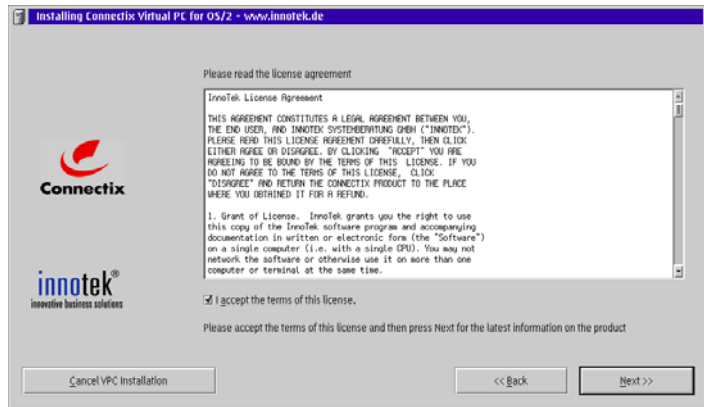
3-1



- 3 Click Next.

4 The license agreement dialog is shown:

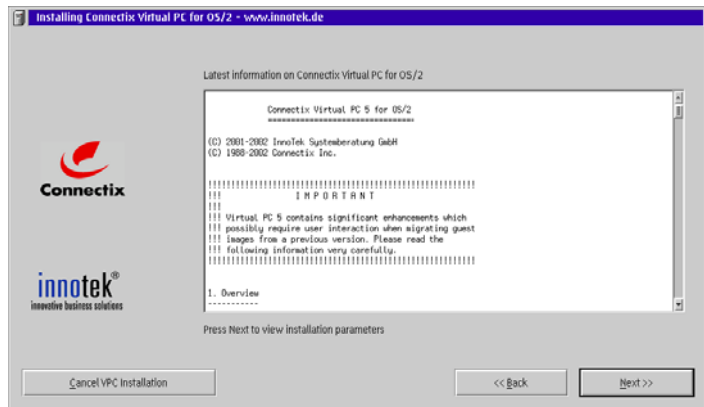
3-2



Read the license agreement and click “I Accept the terms of this license.”, then click Next.

5 The product README file is shown. Read it carefully as it contains the latest updates that did not make it into this manual.

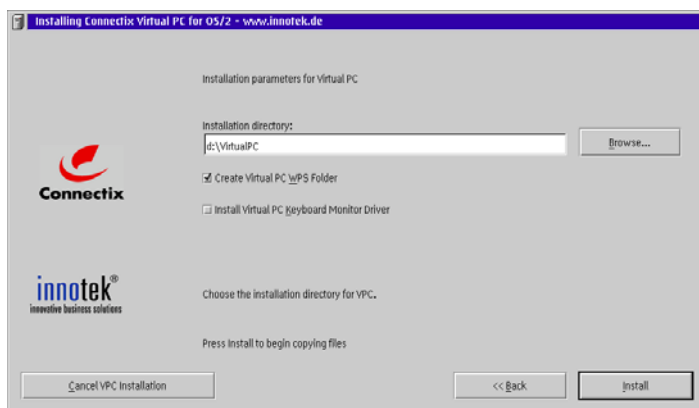
3-3



Then, click Next to continue.

6 The following screen appears:

3-4



On this screen, you can choose three different installation parameters:

- Creation of a folder object on the Workplace shell that contains the Virtual PC for OS/2 program object, setup program object and the readme file text objects.
- Installation of the Virtual PC keyboard monitor driver. This optional tool captures system relevant key combinations (like <Ctrl>+<Alt>+) and optionally passes them to the guest OS. This improves usability and eliminates the risk of accidentally rebooting the host PC.

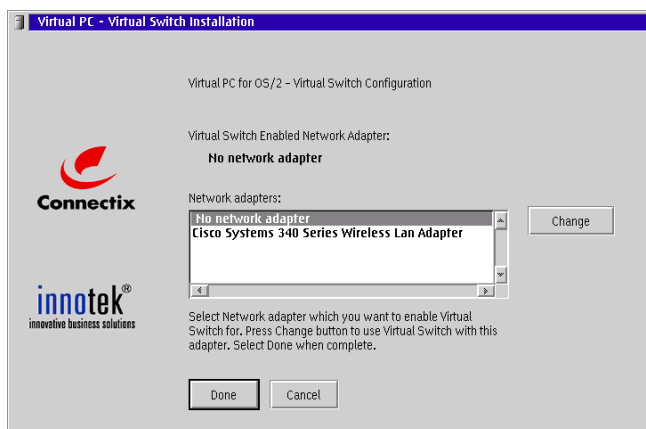
NOTE Use the VPCSETUP.EXE program together with the /tweakvpc parameter to modify the behavior of the keyboard monitor.

- The install path. Use the default location for the installation, or change the location, and click Next.

NOTE If you are upgrading from a previous version of Virtual PC for OS/2, leave the proposed path unchanged. All necessary updates will be performed to you existing installation. It is not necessary to uninstall the old version first.

At this point, the installer will copy the required files to the selected directory. This will take up to one minute.

7 Next, the Virtual Switch Configuration dialog appears:

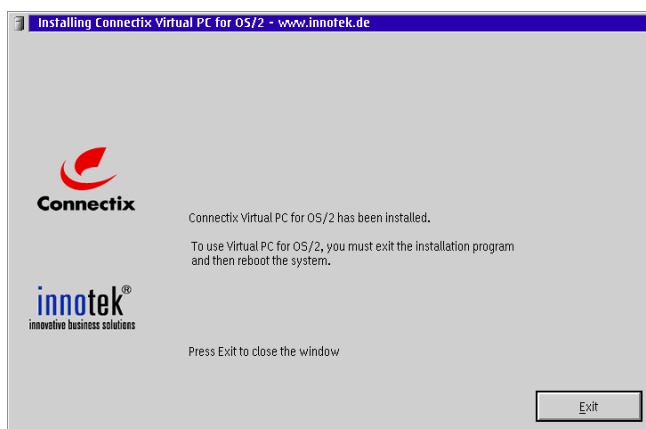


Select the network adapter that you want to use for Virtual Switch networking and click **Change**, then click **Done**.

NOTE Be sure to select an Ethernet adapter here, Token Ring network adapters are currently not supported for Virtual Switch networking.

NOTE If you do not want to use Virtual Switch networking, just click on **Cancel**.

- 8 Finally, the following screen will appear:



This indicates that the installation has completed. Click **Exit**.

- 9 Reboot the system to activate the changes made by the installer. Virtual PC for OS/2 is now installed on the host PC.

Unattended installation of Virtual PC for OS/2

Virtual PC for OS/2 supports unattended installation in a CID environment. The following parameters are supported:

Parameter	Description
<code>/d=<directory></code>	Specifies the directory that Virtual PC will be installed to.
<code>/wps=[yes no]</code>	Specifies whether the Workplace Shell folder is going to be created or not.
<code>/config=[yes no]</code>	Specifies whether the Virtual PC device driver is added to CONFIG.SYS or not.
<code>/update=[force yes no]</code>	Specifies whether existing files are overwritten during installation or not. "force" always updates all files, "yes" updates older files only, "no" leaves all existing files unchanged.

The following example shows the use of these parameters:

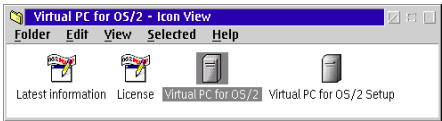
```
INSTALL /d='C:\VirtualPC' /wps=yes /config=yes /update=yes
```

Starting Virtual PC for the first time

Follow these steps to set up your copy of Virtual PC for OS/2:

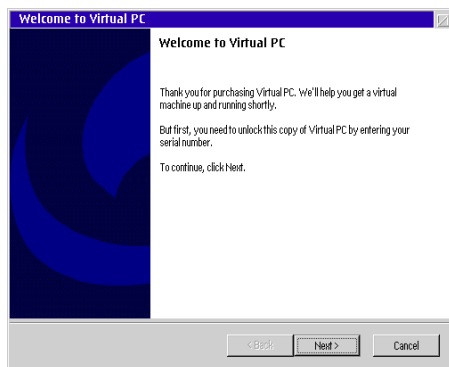
- 1 After rebooting your system following the installation, you will find a folder called “*Virtual PC for OS/2*” on your desktop. Double click on it to open the folder:

3-7



- 2 Double click on the “*Virtual PC for OS/2*” icon inside the folder.
- 3 The following welcome screen will be displayed:

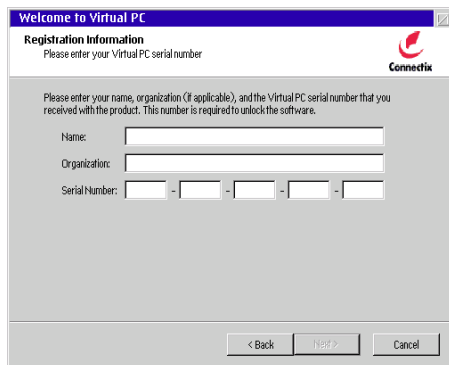
3-8



Click **Next** to continue.

- 4 Now you need to enter the required information into the next panel:

3-9



NOTE For the boxed version of Virtual PC, the personal serial number is located on the small sticker included in the package. For the download version, you should have received that number electronically.

After filling in all the fields, click **Next** to continue.

- 5 The following panel explains the most important terminology used throughout Virtual PC. Click **Next** again.
- 6 Click **Finish** on the last panel.

You're ready to configure your first guest PC now.

Registering Virtual PC

If you purchased Virtual PC for OS/2 with an installation CD, please follow the directions provided to register your product at the InnoTek Web site. You must register to receive support.

If you purchased Virtual PC for OS/2 online, you have already completed the registration process.

Creating a guest PC with a copy of an OS

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

These are the required steps to do this:

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

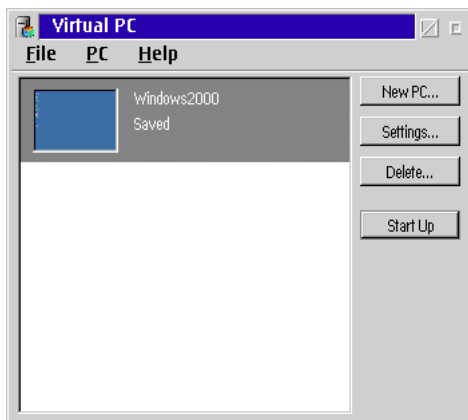
Creating a disk image

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

- 1 Start up Virtual PC on your host PC.

The Virtual PC window appears.

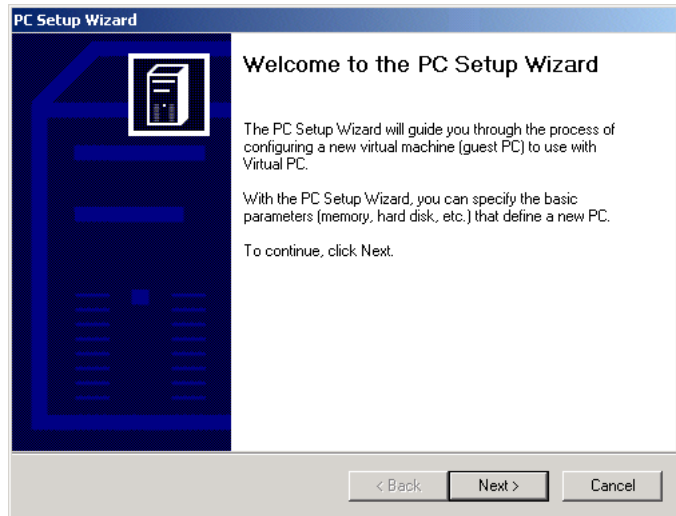
3-10



2 Click New PC.

The PC Setup Wizard appears.

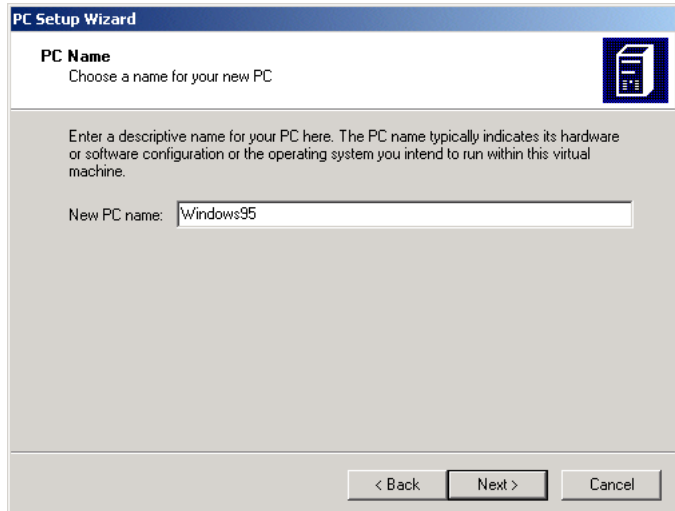
3-11



3 Click Next.

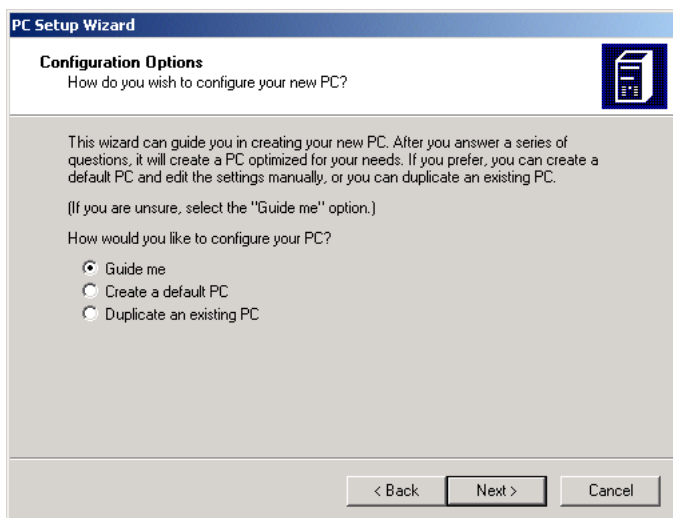
4 Type a name for the guest PC and click Next.

3-12



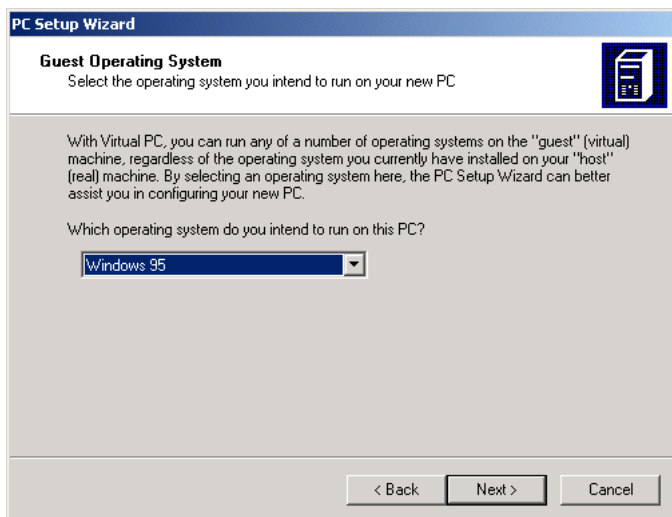
5 Choose the **Guide me** option and click **Next**.

3-13



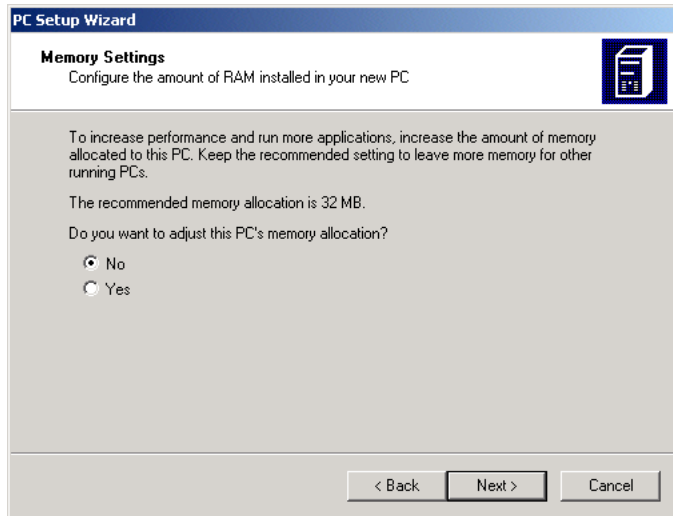
6 Use the drop-down menu to choose the operating system you plan to install on the disk image. Then click **Next**.

3-14



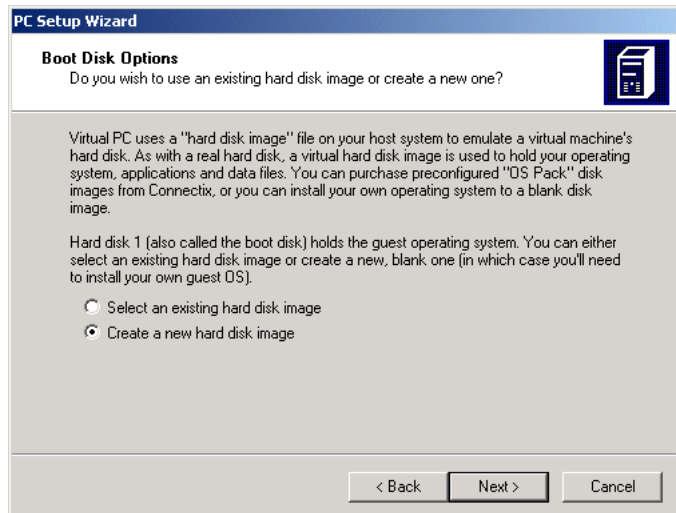
- 7 Click **No** to keep the recommended memory setting and click **Next**. (You can always change the memory setting later.)

3-15



- 8 Click the option **Create a new hard disk image** and click **Next**.

3-16



- 9 Click **Browse** and navigate to the location for the drive image. Type a name for the drive image and click **Save**. Then click **Next**.
- 10 Check the Setup Summary and click **Finish**.

Installing an OS

Virtual PC for OS/2 supports a variety of Pentium-based operating systems installed on guest PCs. Operating systems you can install on the boot disk image for a guest PC include:

- IBM OS/2 Warp version 3.0 and higher
- IBM PC-DOS and Microsoft MS-DOS in various versions
- Windows 3.1
- Windows 3.11 for Workgroups
- Windows 95
- Windows 98 & 98SE
- Windows Me
- Windows NT 4.0
- Windows 2000 Professional, Server, Advanced Server
- Windows XP Home and Professional editions
- Many distributions of Linux

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

- Solaris 8
- Many distributions of BSD UNIX

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

- 1** Start up the guest PC. Select it in the Virtual PC window and click **Start Up**.
Since no OS is yet installed on the disk image, you receive an error message “Invalid System disk.”
- 2** Make sure the guest PC is the frontmost window on your desktop.

With a bootable CD

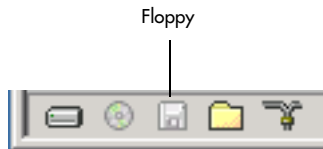
If you can install the OS from a bootable CD, follow these steps.

- 1** Insert the bootable CD in the CD-ROM drive. It is automatically captured by the guest PC.
- 2** Press any key to continue.
The OS setup program on the CD then takes you through the process of installing the OS on the drive image for the guest PC.
- 3** Now follow the instructions for installing VPC Additions on page 30.

With a non-bootable CD and a bootable floppy

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

- 1** Insert the non-bootable OS installation CD.
The CD is automatically captured by the guest PC.
- 2** Insert the bootable floppy disk required to install the OS in the floppy drive of the host PC. (It is automatically captured by the guest PC.)
If you have a bootable floppy disk image, drag the image onto the Floppy icon on the VPC Toolbar to capture it.



- 3** Press any key to continue.
The OS setup program on the floppy then takes you through the process of installing the OS on the drive image for the guest PC.
- 4** Now follow the instructions for installing VPC Additions on page 30.

Installing VPC Additions

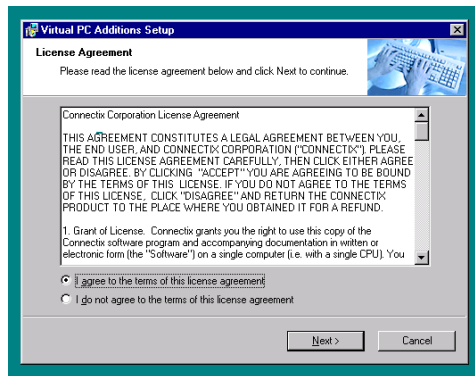
VPC Additions enable integration between a guest PC and the host PC. (See page 41 for more information.) VPC Additions are available for OS/2 Warp 3, Warp 4.x and most Windows operating systems installed on a guest PC. Check the InnoTek Web site for new releases of Virtual PC Additions.

NOTE *OS/2 Additions (for running OS/2 as a guest OS) are sold separately.*

To install VPC Additions for Windows guests:

- 1** Make sure the guest PC where you want to install VPC Additions is the frontmost window on the host PC desktop. The guest PC needs to be completely booted and at the desktop.
- 2** From the guest PC menu, click **PC**.
- 3** From the menu, click **Install/Update Additions**.
The Virtual PC installation program appears within the guest PC.
- 4** Read the license agreement and if you agree, select **I agree to the terms of this agreement**.

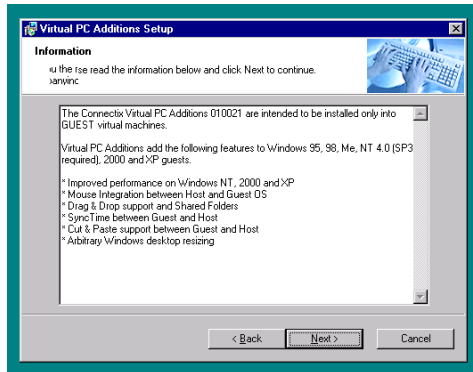
3-17



- 5** Click **Next**.

- 6 An Information window will appear with the details of the features the Additions add.

3-18



- 7 Click **Next** to proceed with the Additions installation.
- 8 The Additions require a restart of the guest PC before they will function. Click **Finish** to complete the installation and restart the guest PC.

You may now want to install an application on the new guest PC. See the next section.

Installing an application on a Windows guest PC

To install an application on a guest PC:

- 1** Start up Virtual PC on your host PC.
This opens the Virtual PC window.
- 2** Select the guest PC in the Virtual PC window and then click **Start Up**.
The guest PC appears in a window on the desktop of the host PC.
- 3** Insert the CD for the application in the CD-ROM drive of the host PC.
The CD is automatically captured by the guest PC.
- 4** From the guest PC, navigate to the installation file on the CD (if necessary) and launch it.
- 5** Follow the onscreen directions for installation of the application.
- 6** When installation is complete, release the CD from the guest PC using the VPC Toolbar (see page 40.)

Modifying the settings for a guest PC

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

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

For details about these settings and their options, see Chapter 6 on page 53.

Creating a guest PC with standard settings

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

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

Duplicating settings of an existing guest PC

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

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

Using a guest PC

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

Chapter contents

The topics in this chapter include:

- Starting up Virtual PC for OS/2 - page 36
- Using the host key - page 36
- Starting up a guest PC - page 37
- Using CTRL+ALT+DELETE - page 37
- Changing the guest PC display - page 36
- Pausing, resuming, and restarting a guest PC - page 39
- Running multiple guest PCs - page 39
- Using the VPC Toolbar - page 40
- Host and guest PC integration- page 41
- Capturing a floppy image or disk- page 43
- Printing from a guest PC - page 44
- Using sound - page 44
- Optimizing performance - page 44
- Backing up a guest PC - page 45
- Shutting down a guest PC - page 45

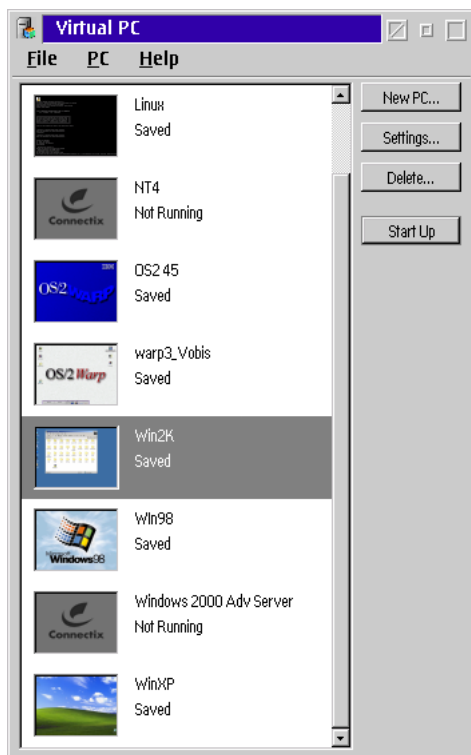
For information about settings for a guest PC or global preferences for Virtual PC for OS/2, see Chapter 6 on page 53.

Starting up Virtual PC

To start up Virtual PC on your host PC, open the **Virtual PC** folder and double click the **Virtual PC** icon.

This opens the Virtual PC window.

4-1



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

Using the host key

The host key is a designated key used to control certain behaviors of Virtual PC for OS/2. For example, holding down the host key and pressing the P key, pauses or resumes a guest PC.

By default, the host key is defined as the right ALT key. You can change this using the Keyboard preference. (See page 75.)

Starting up a guest PC

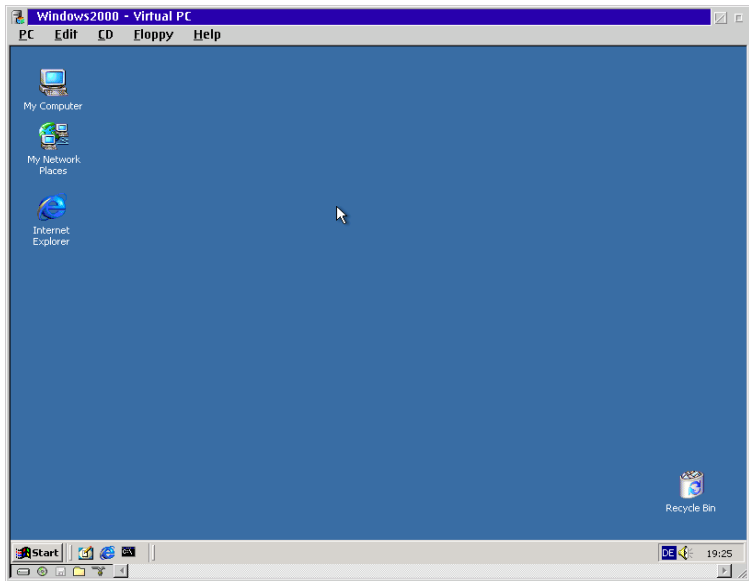
To start up a guest PC:

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

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

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

4-2



Using CTRL+ALT+DELETE

Pressing CTRL+ALT+DELETE sends this key combination to the OS running on the host PC. In OS/2 this typically results in a reboot.

However, if the "VPC Keyboard monitor" has been selected during installation, VPC will capture this "dangerous" keyboard combination and optionally send it to the guest PC. You can define the behavior of the keyboard monitor using the VPCSETUP.EXE utility with the "/tweakvpc" parameter.

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

Changing the guest PC display

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

To switch from Windowed mode to Full Screen mode:

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

To switch from Full Screen mode to Windowed mode:

- Hold down the host key and press ENTER.

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

About video resolution

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

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

NOTE *While Windows guests are usually able to dynamically switch resolutions and adapt to the host PCs screen size, this is currently not possible for OS/2 guest PCs. The user has to make sure an appropriate resolution is selected in the OS/2 guest before using Full Screen mode.*

Minimizing a guest PC window

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

Pausing, resuming, and restarting a guest PC

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

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

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

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

Running multiple guest PCs

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

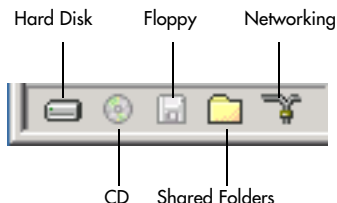
- using the Virtual PC list
- clicking on the associated entry in the OS/2 window list
- pressing the host key and the RIGHT ARROW or LEFT ARROW key

You can change the behavior and performance of multiple running guest PCs under the Preferences global menu for Virtual PC. (See page 69.)

Using the Virtual PC Toolbar

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

4-3



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

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

Status and lights

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

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

Host and guest PC integration

Virtual PC provides several capabilities that integrate the host PC and a guest PC. Most require the installation of the set of software components called “VPC Additions.” (See page 30.) The capabilities include:

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

VPC Additions are available for OS/2 and most Windows operating systems installed on a guest PC. Check the Connectix or InnoTek Web site for new releases of Virtual PC Additions.

Pointer integration

You can move the pointer freely between the host PC desktop and the window displaying the guest PC. By default, you must click in the guest PC window to capture the pointer to the guest PC. (You can change this behavior using the Mouse preference. See page 76.)

If VPC Additions are not installed or if pointer integration for a guest PC is not enabled (see page 62), the pointer may be “trapped” in the guest PC window. Hold down the host key to untrap the pointer and move it back to the host PC desktop.

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

Copy and paste

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

Text is copied unformatted. (Formatting, including bold, italic, or paragraph styles, is not transferred.)

Sharing folders

You can designate a folder (directory) or volume (drive) for sharing between the host PC and a guest PC (see page 61). For example, if you download shareware files from the World Wide Web to your host PC, you can share the host PC folder the files are in and then access the files from the guest PC.

As an example, you can share your D:\data directory which is on an HPFS drive or volume as drive “X:” in the Windows guest.

NOTE *The shared folder is presented to the guest OS as a (virtual) LAN drive. This enables a Windows guest to read and write to a directory on an OS/2 HPFS drive that it normally could not access.*

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

Sharing CD-ROM/DVD-ROMs

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

Note that:

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

Sharing other removable volumes

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

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

Capturing a floppy image or floppy disk

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

Floppy disk images

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

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

For more information on using Virtual Disk Wizard to create a floppy disk image, see page 79. You can also use floppy images created with other programs.

Real floppy disks

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

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

Releasing a disk or disk image

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

NOTE *Capturing a floppy disk or image to a guest PC fails if the host PC has opened the floppy drive object in the Drives folder.*

Printing from a guest PC

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

- Using the Shared Networking option or the (default) Virtual Switch option (see page 65), you can print from an application running on a guest PC to a network printer.
- Using the LPT1 setting (see page 64), you can associate the emulated LPT1 port on the guest PC with a parallel port on the host PC, and then print from an application running on the guest PC to a printer connected to the parallel port on the host PC.

Using sound

NOTE *Sound is currently disabled in Virtual PC for OS/2. For details, see the README.TXT file that comes with the product.*

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

If several guest PCs are running and playing sound, you can use the Sound preference to mute sound from guest PCs in the background (see page 73).

Optimizing performance

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

Host PC processor speed

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

Host PC processor usage

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

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

RAM allocation

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

Backing up a guest PC

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

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

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

Shutting down a guest PC

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

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

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

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

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

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

Shut Down OS/2 — If VPC Additions are running on an OS/2 guest PC, you can shut down the OS. This is equivalent to shutting down the machine from the desktop context menu or the WarpCenter shutdown button.

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

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

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

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

Shut Down OS/2 and Keep Changes—

This option cleanly shuts down the OS/2 guest PC and commits any information written to the hard drive(s) since the guest PC last started up. Please note that this option will not commit unless the option is checked under the **Shut Down** window.

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

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

Networking with Virtual PC

This chapter provides information about networking with Virtual PC for OS/2.

About the Networking setting

The Networking setting for a guest PC is briefly described on page 65. There are three options for the setting:

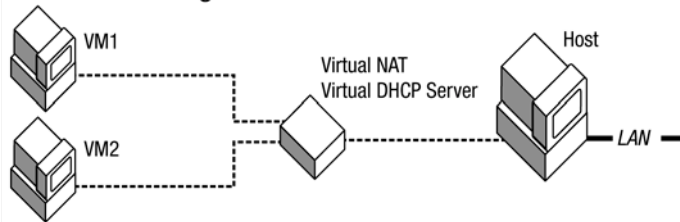
- None
- Shared Networking
- Virtual Switch (the default option)

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

Shared Networking option

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

Shared Networking



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

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

With the Shared Networking option, note these points:

- The OS running on a guest PC must be set to use DHCP. On Windows, you enable DHCP by selecting **Obtain an IP address automatically**.
On OS/2, use the `tcpcfg2` command to set DHCP mode.
- When you use the Internet Connection Wizard to set up networking for a Windows OS on a guest PC, always specify “Connect through LAN,” even if your host PC is using a dial-up connection.
- The guest PC emulates a DEC 21140 Ethernet controller. (In some cases, the DEC 21140 may show up on your system as Intel 21140. This is normal behavior.)
- Some networking software may not function correctly without a unique IP address.
- You can access the network either with a dial-up connection or over a LAN. Virtual PC uses the currently selected TCP/IP connection on the host PC for all Shared Networking traffic.
- You can access printers and files on other computers, but you can’t share files on a guest PC. This is a server function that requires the Virtual Switch option.
- Shared Networking only supports TCP/IP. Other protocols such as IPX/SPX and NetBEUI cannot be used with the guest PC. To use other protocols in a guest PC, use the Virtual Switch option.

Modem access

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

LAN, DSL, or cable access

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

Virtual Switch option

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

With Virtual Switch, there are four routing options:

- **Local only**—packets are only routed between guest PCs. The host PC never sees the packets, and they never go out over the wire. This setting is useful for testing network protocols.
- **Local and host**—packets are routed between guest PCs and the host. In this case, a virtual network exists between the guest PCs and host PC. Guest PCs are unable to see the external network.
- **Local, host, and external**—network packets are allowed to go out over the wire, to all guest PCs, and to the host PC. In this case, a guest PC appears and acts like any other “standard” PC on the local network and can communicate with the host also.

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

NOTE *When you create a guest PC, Networking is set by default to Virtual Switch—Local, Host, and External.*

File sharing

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

Connect to the network and then follow these steps:

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

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

Switching the host PC network interface card

If the host PC has more than one network interface card installed, you can use the Virtual Switch preference to designate a host PC network interface card for use by guest PCs. (See page 74.) Any external Virtual Switch traffic is routed to this network interface card.

NOTE *Token Ring network cards are currently not supported for Virtual Switch mode. Shared networking mode should be used instead.*

Changing Settings and Preferences

This chapter explains the settings for a guest PC and the global preferences for Virtual PC for OS/2.

Chapter topics

- PC Info setting - page 54
- Memory setting - page 55
- Hard Disk 1 , 2 and 3 settings - page 56
- CD/DVD-ROM setting - page 59
- Floppy setting - page 60
- Shared Folders setting - page 61
- Mouse setting - page 62
- COM1 and COM2 settings - page 63
- LPT1 (Printing) setting - page 64
- Networking setting- page 65
- Remote Control setting - page 67
- Deleting settings for a guest PC - page 68
- About global preferences - page 69
- PC Settings preference - page 69
- Performance preference - page 70
- Full Screen preference - page 71
- Sound preference - page 73
- Virtual Switch preference - page 74
- Keyboard preference - page 75
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- Security preference- page 77
- Language preference - page 78

Changing settings for a guest PC

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

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

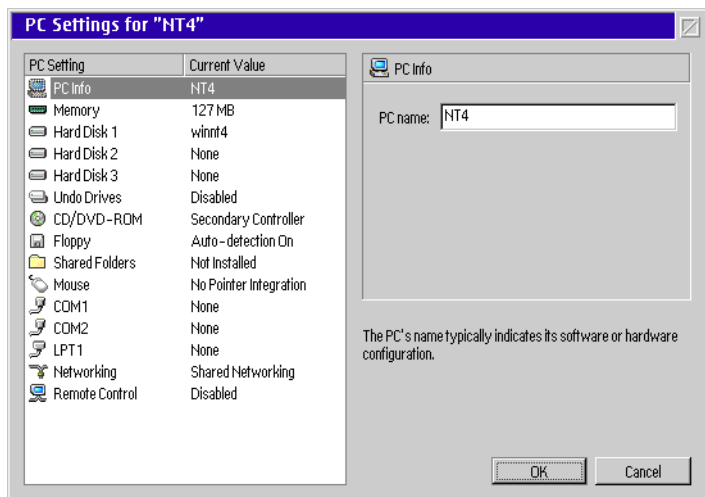
The PC Settings window appears. The following pages describe each setting.

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

PC Info setting

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

6-1

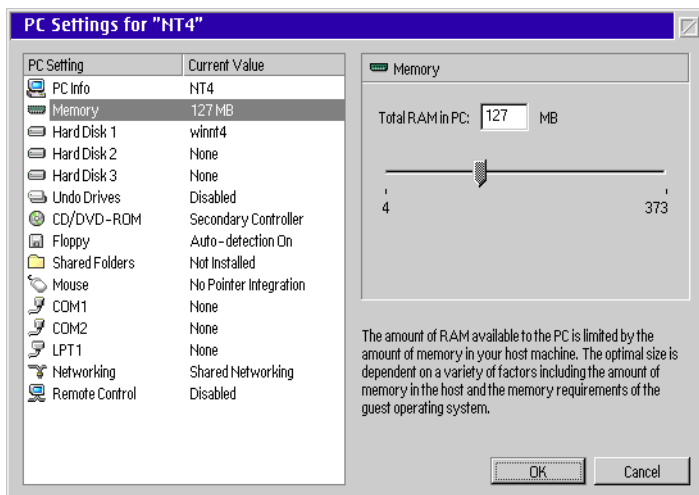


NOTE All the guest PCs in the Virtual PC List must have unique names.

Memory setting

Use this setting to allocate RAM for a guest PC.

6-2



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

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

More RAM improves performance

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

NOTE A maximum of 1 gigabyte of RAM can be set to for each guest PC. See page 17 for RAM requirements for guest PCs.

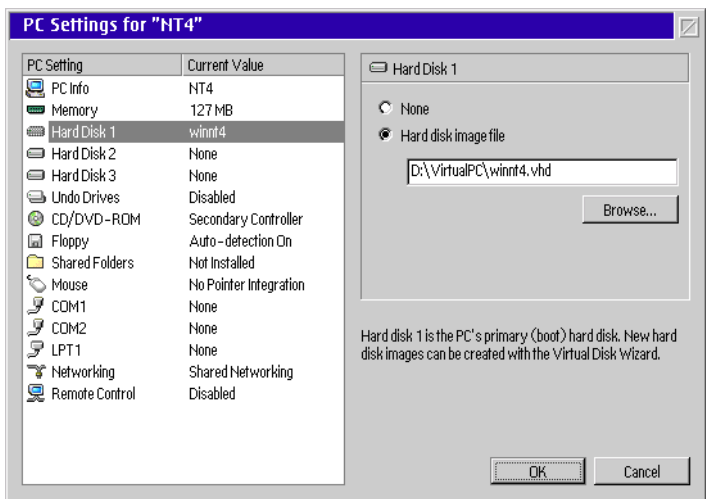
Real RAM required

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

Hard Disk 1 setting

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

6-3



The available options are:

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

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

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

NOTE *Virtual PC for OS/2 is compatible with disk images created with other versions of Virtual PC 4.0 or later. For example, you can use a disk image created with the Windows version of Virtual PC 4.0.*

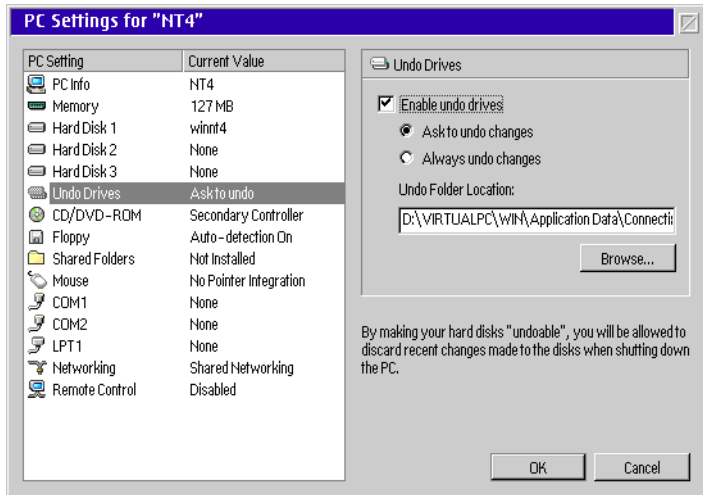
Hard Disk 2 and Hard Disk 3 settings

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

Undo Drives setting

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

6-4



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

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

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

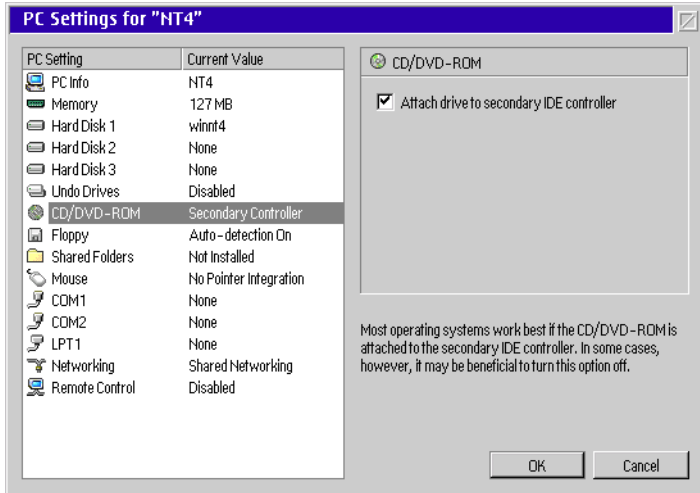
By default, undo drives are disabled. To change the setting Undo Drives:

- 1 From the *PC List*, select **Settings**.
- 2 Select the PC Setting, **Undo Drives**.
- 3 Select **Enable Undo Drives** to activate the setting and choose from the following:
Always undo changes: does not allow any changes made to the temporary file to be recorded. Changes will be discarded and the next time the guest is started, it will start from the original disk image.
Ask to undo changes: gives the user an option at the end of each session to discard (undo) or keep changes.
- 4 You can select the undo file location. Use the browse button to navigate, select, and create (if necessary) a directory for the **Undo Folder Location**.

CD/DVD-ROM setting

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

6-5



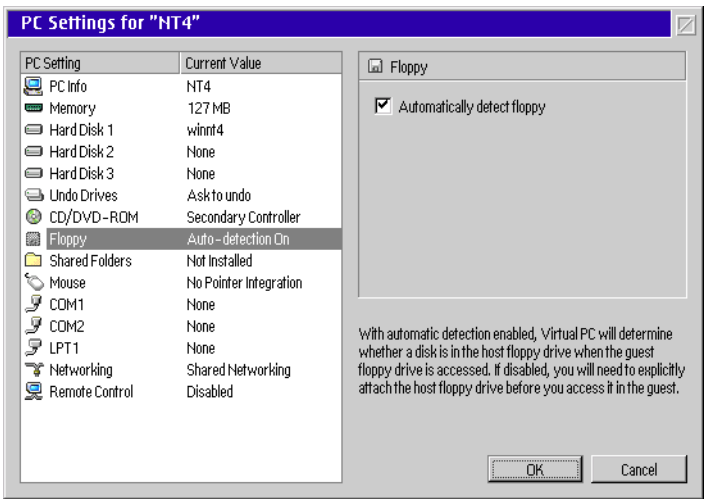
The available option is:

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

Floppy setting

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

6-6



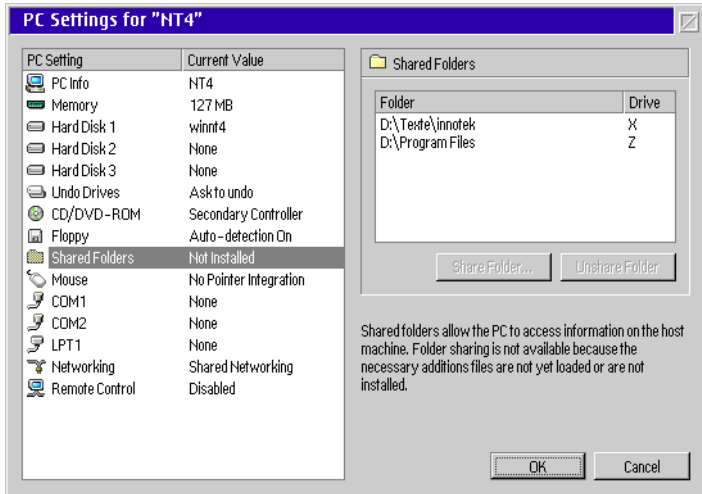
The available option is:

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

Shared Folders setting

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

6-7



To set up a folder as a Shared Folder:

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

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

- 4 Click **Share**.

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

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

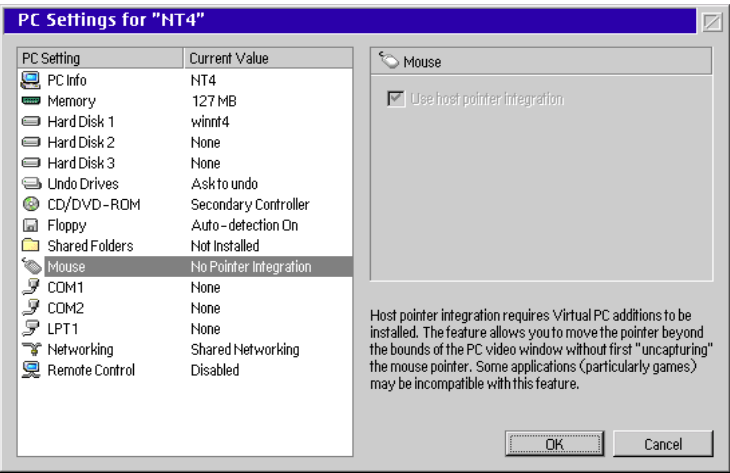
You can share the same host PC folder with multiple guest PCs running at the same time.

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

Mouse setting

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

6-8



The available option is:

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

This option is not active if VPC Additions are not installed (see page 30.)

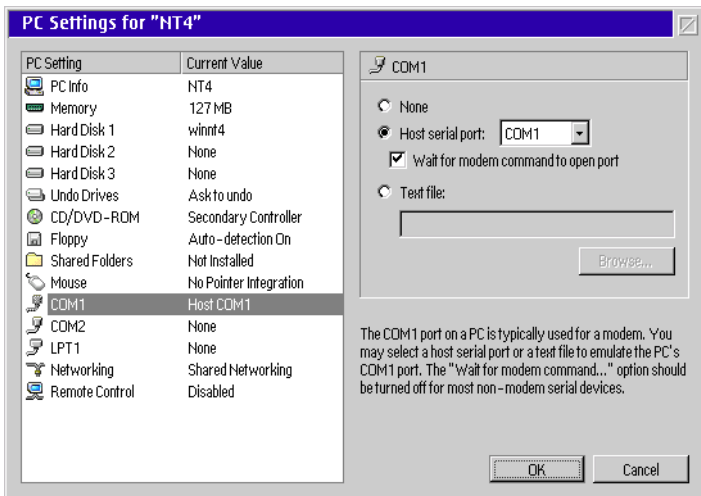
NOTE *You may need to clear this option for some programs that are incompatible with host pointer integration.*

COM1 and COM2 settings

Use these settings to support various serial communication options.

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

6-9



The options are:

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

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

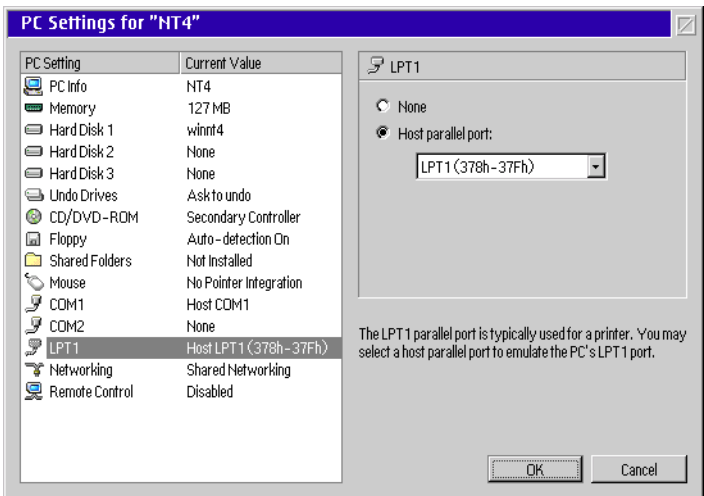
Wait for modem command to open port—select this to not open the COM port on the host PC until Virtual PC sees a modem command sent to the COM port. (You should unselect this option for most non-modem serial devices.)

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

LPT1 (Printing) setting

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

6-10



The options are:

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

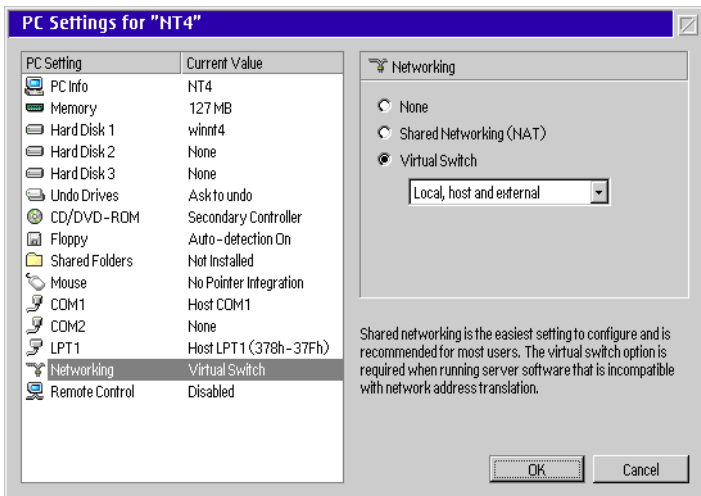
Host parallel port—select this to redirect the emulated LPT1 port on the guest PC to a parallel port on the host PC. Open the drop-down menu and select a host PC parallel port.

Networking setting

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

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

6-11



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

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

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

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

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

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

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

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

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

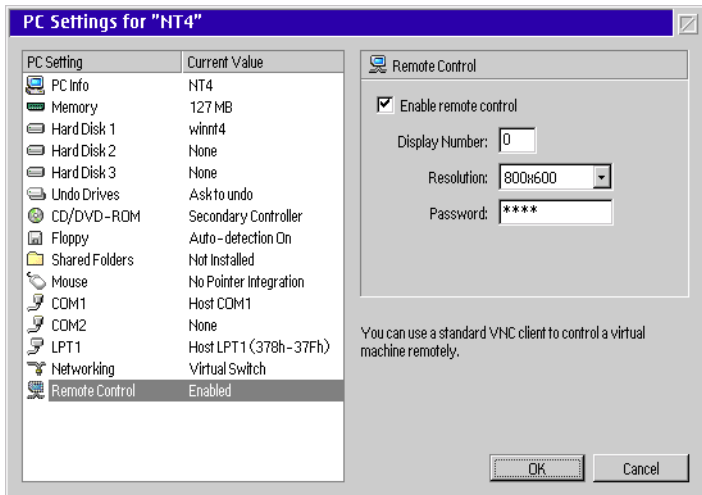
External Only - Network packets are restricted to only being placed to go out over the physical connection (network); not to any other local guests or the host.

Remote Control

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

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

6-12



When running the viewer, you need to specify the name of the server and guest PC's **Display Number**. For example, if you have started a server as **display 0** on a machine called **NT4**, you can start a viewer for it by typing the following:

vncviewer NT4:0

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

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

Example: **192.168.11.3:0**

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

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

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

Deleting settings for a guest PC

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

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

About global preferences

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

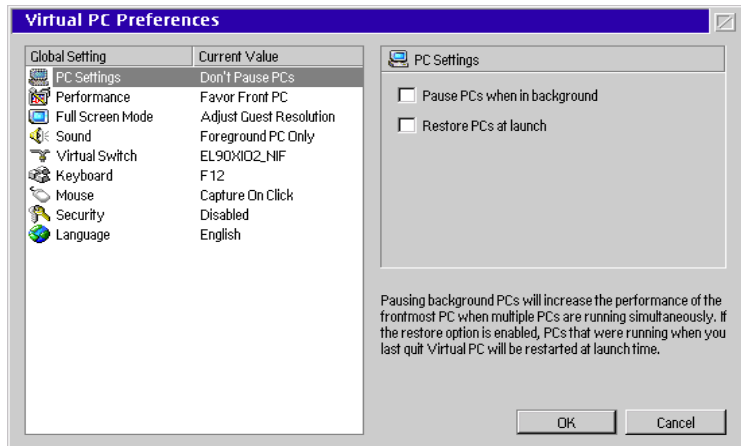
Changing preferences for a guest PC

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

PC Settings preference

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

6-13



The available options are:

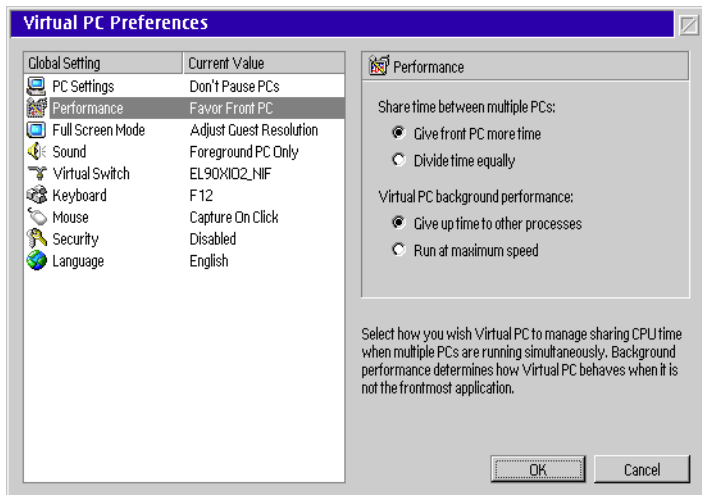
Pause PCs when in background—The default setting is to not pause guest PCs when they are in the background. Pausing background guest PCs allows more processor power to go to the front-most, active guest PC. PCs in a paused state will also suspend network or other connected peripheral activity.

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

Performance preference

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

6-14



The available options are:

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

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

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

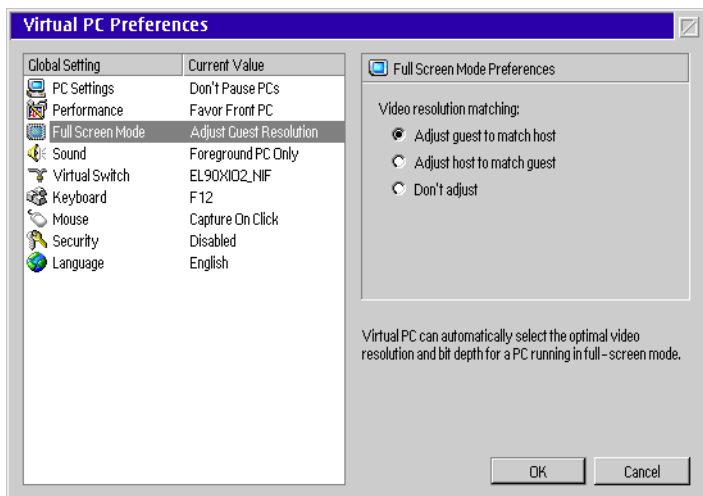
The default setting, **Give up time to other processes**, will reduce this effect. Virtual PC lowers overall CPU usage for all running guest PCs by half when it is not the front most application. Under this setting, performance in each guest PC while in the background will drop by about 50%.

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

Full Screen Mode

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

6-15



The available options are:

Adjust guest to match host—resizes the guest's video resolution to match the host. This option requires VPC Additions and should **always** be selected. It works both in Full Screen mode and in Windowed Mode. In Windowed Mode, you can change the resolution of your guest PC by dragging the window to the desired size. In Full Screen mode, the guest PCs resolution is adapted to the host PCs resolution automatically so that it fills the whole screen.

NOTE *Dynamic resolution changing is currently only supported on Windows guest OSes that have the guest Additions installed. Other operating systems, like OS/2 and DOS, cannot dynamically change to higher resolutions. This will result in a blank band surrounding the guest PC's window. The black band will also surround the guest PC, if the VPC Additions are not installed.*

Adjust host to match guest—resizes the host's video resolution to match the guest's current resolution. However, since OS/2 is currently not able to dynamically change its resolution, this option doesn't work and should not be selected.

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

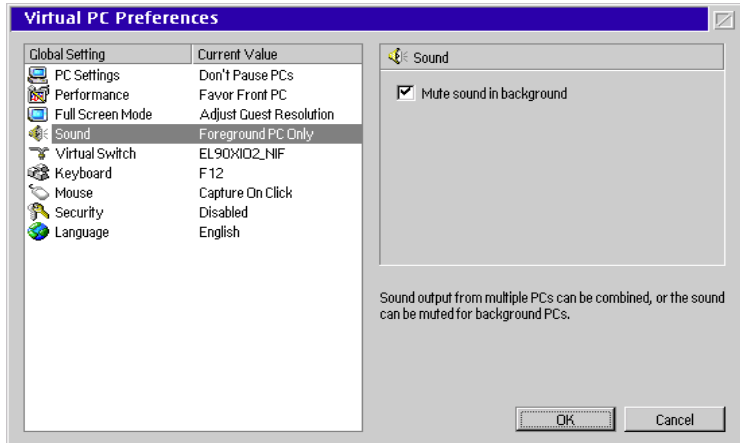
Sound preference

NOTE Sound support in Virtual PC guests is not enabled in the current release. See README.TXT for details.

To change the Sound preference:

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

6-16

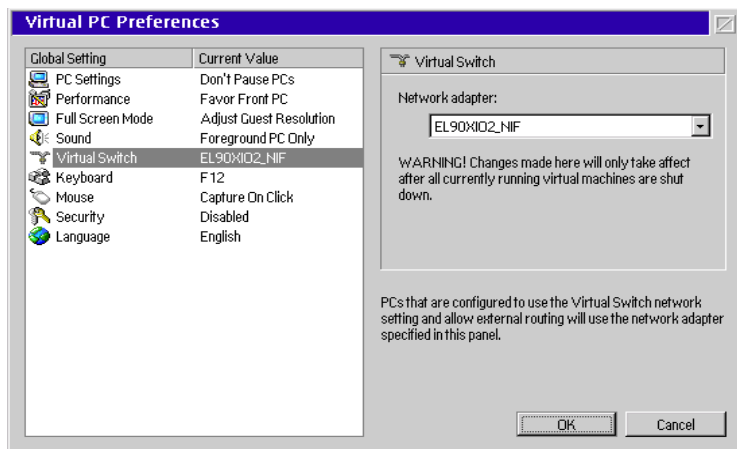


- 3 Select or clear the option Mute sound in background.
Enabling this option mutes conflicting sounds from multiple guest PCs running at the same time.
- 4 Click OK.

Virtual Switch preference

Virtual Switch preferences are available on host machines running operating systems that are mentioned in system requirements. There are limitations associated with using the Virtual Switch global preferences with Windows98SE and Windows ME. (See page 51 for details about Virtual Switch.) You may choose among the available network interface cards installed in your host PC. All external virtual switch network traffic is routed to the selected network interface card.

6-17



To change the Virtual Switch preference:

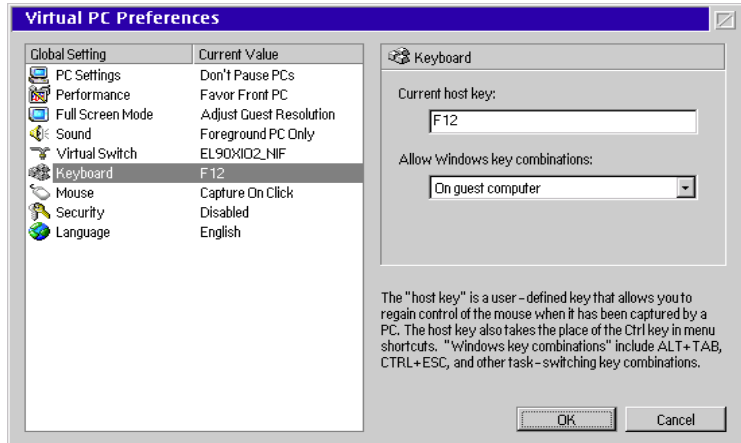
- 1 On the **File** menu, select **Preferences**.
- 2 In the Global Setting list, click **Virtual Switch**.
- 3 In the **Network adapter** menu, select the preferred network interface card. Note that the current value will be set to your network adapter.
- 4 Click **OK**.

Keyboard preference

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

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

6-18



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

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

To change the Keyboard preference:

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

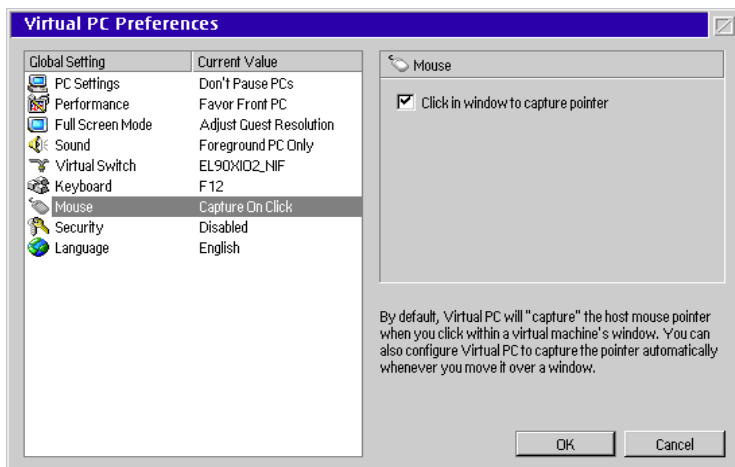
Mouse preference

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

To change the Mouse preference:

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

6-19



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

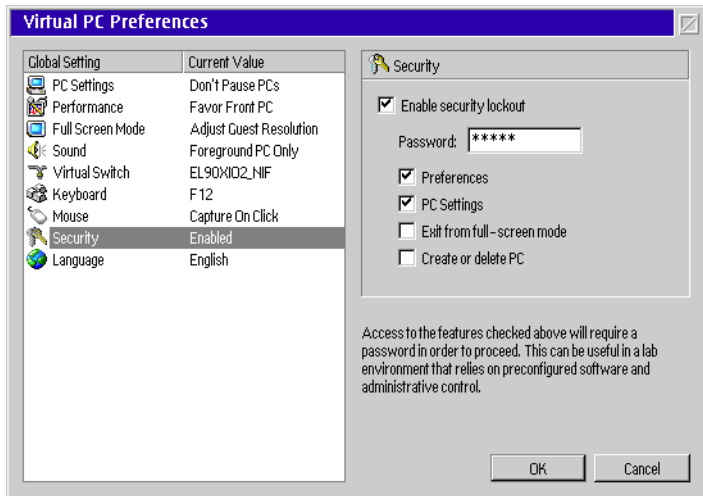
Security preferences

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

To enable the security lockout feature:

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

6-20



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

Language preference

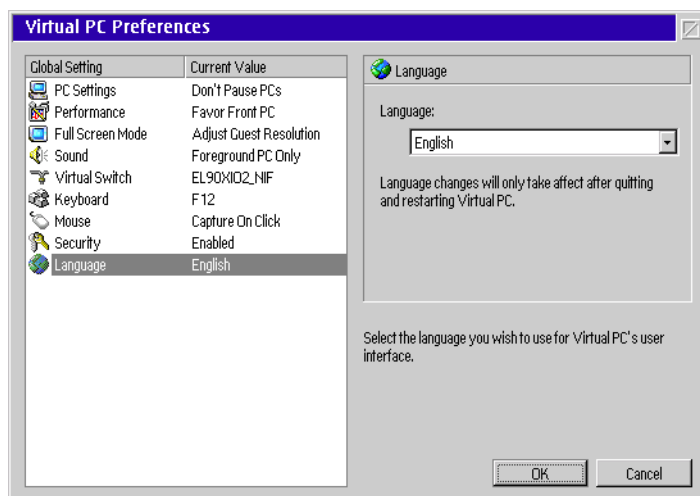
The Virtual PC application is localized in the following languages: English, German, French, Japanese, Italian and Spanish. Under the language preferences, you can assign a language to the application. When a different language is chosen, Virtual PC will function with that language independent of the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

To change the language preference setting:

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

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

6-21



Using Virtual Disk Wizard

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

Creating a hard disk image

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

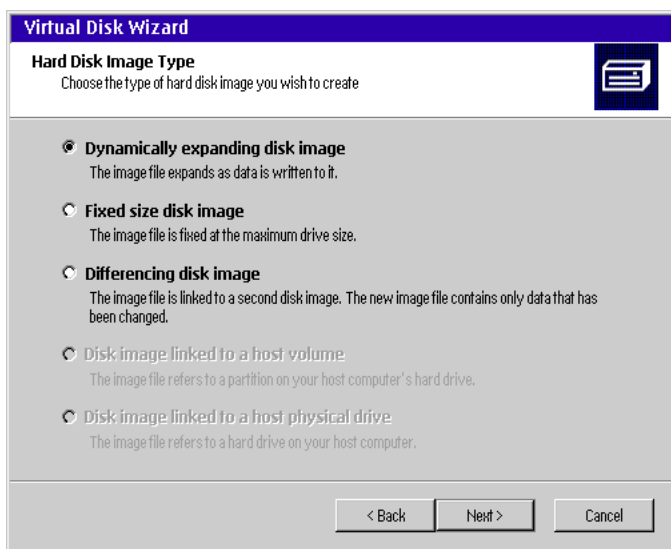
To create a hard disk image:

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

The panel for choosing a disk image type appears.

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

7-1



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

NOTE For security and consistency reasons, the last two options are currently not available. InnoTek will consider to enable these options in a future release of Virtual PC for OS/2.

More about hard disk image types

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

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

to monitor the available space on the hard drive of your host PC and warn you if the dynamically expanding drive starts to approach the limits of available space left on the host volume.

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

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

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

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

Disk image file splitting

Because of limitations inherent in OS/2 and some OS/2 file systems, it is necessary to split dynamically expanding disk image files. In particular, FAT and HPFS partitions only support files up to 2 GB in size.

For example, if you use an 8-GB dynamically expanding drive image on a FAT partition, Virtual PC splits the drive image into four 2-GB files. Even if the disk image is located on a volume that doesn't impose these limitations (such as JFS or UDF), the disk image is split at the 2GB boundary since there are no tools available to handle larger files on OS/2 (backup, copying, etc.).

If you want to copy an existing disk image from one location to another, be careful to include not only the primary file, but any split files associated with it.

Creating a floppy disk image

To create a floppy disk image:

- 1 In the Virtual PC window, on the **File** menu, click **Virtual Disk Wizard**.
- 2 Click **Next**.
- 3 Click the option **Create new floppy or hard disk image**, and then click **Next**.
- 4 Click the option **Create floppy disk image**, and then click **Next**.
- 5 Click **Browse** and select a name and location for the floppy disk image. Click **Save**.
- 6 Select the floppy disk type (low or high density).
- 7 Click **Next**.
- 8 Click **Finish**.

⋮ **IMPORTANT** Virtual PC can mount most flat-file representations of
⋮ a floppy disk. Many popular OS/2 utilities are able to create such
⋮ images. However, make sure to disable any compression features.

Examining or modifying a disk image

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

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

Fixed-size disk images

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

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

Dynamically expanding disk images

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

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

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

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

Differencing disk images

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

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

Technical Specifications

This appendix lists the technical specifications for Virtual PC for OS/2

Processor

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

Motherboard

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

BIOS

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

Memory

- Maximum 1GB RAM per guest PC

IDE controller

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

Standard configuration

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

Alternate configuration

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

Hard drive images

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

CD/DVD-ROM

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

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

Video

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

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

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

Keyboard controller

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

Keyboard

- Uses the standard PC keyboard

Mouse

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

Floppy

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

Serial ports

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

Parallel port

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

Sound

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

Ethernet

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

Command Line Parameters

This appendix provides information about the command line parameters available in Virtual PC for OS/2.

If you launch Virtual PC for OS/2 using the Run command line interface, you can specify certain parameters.

For example, typing

```
VPC.exe -quiet
```

launches Virtual PC for OS/2, but does not start up any guest PCs.

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

```
VPC.exe -pc windows98 -launch
```

launches Virtual PC and starts up the guest PC named “windows98”.

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

```
VPC.exe -pc "Test DOS" -launch
```

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

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

Parameter	Action
pc [name]	Targets a guest PC by name
launch	Launches the target virtual PC
fullscreen	Puts the target virtual PC in Full Screen mode
nofullscreen	Puts the target virtual PC in Windowed mode
pause	Pauses the target virtual PC
nopause	Resumes the target virtual PC
show	Redisplays the target virtual PC from the host PC's Minimized Window Viewer
noshow	Minimizes the target virtual PC to the host PC's Minimized Window Viewer
help	Displays help information for all VPC command line parameters
pclist	Displays information about all guest PCs currently set up in Virtual PC for OS/2
quiet	Suppresses guest PCs from launching when Virtual PC for OS/2 starts up
version	Displays version information about Virtual PC for OS/2

Volume License Guidelines

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

Preparing for large-scale deployment of Virtual PC

Building a disk image for deployment

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

Note that in this case, all target machines would have the same Microsoft Windows Certificate of Authenticity (COA) registration number in their drive images. This has legal implications that are covered in a later section of this appendix. (See page 93.)

Building a drive image

You need to build a disk image yourself using a licensed OS installation disk. For instructions on creating a new hard disk image with your own copy of an OS, see page 24.

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

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

Also, be sure to read the legal issues section of this appendix to ensure you are properly using your licensed OS installation disk. (See page 93.)

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.

Deployment

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

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

Legal Issues

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

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

Managing Multiple Certificates Of Authenticity

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

Migrating Guest PCs from Virtual PC 4.x to Virtual PC 5.0

Introduction

Virtual PC 5.0 introduces a number of significant changes to the emulated hardware of prior versions of Virtual PC 4.x.

Major changes to the Virtual PC 5.0 emulated hardware:

- A new BIOS from AMI (American Megatrends Incorporated)
- A new emulated motherboard chipset. The Intel 440BX chipset, which fully supports the new ACPI (Advanced Configuration and Power Interface) standard, is now used.
- A new emulated network card (DEC/Intel 21140A based PCI 100Base-T Ethernet card)

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

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

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

Migrating Virtual PC 4.x to 5.0 is a two step process. Step 1 involves updating the Virtual PC application on the host machine. Step 2 involves old virtual hard disk images going through a "hardware detection" the first time it is booted with Virtual PC 5.0 application.

Step 1: Update the Virtual PC 5.0 application on the host

- 1 “Saved states” of older versions are not compatible with Virtual PC 5.0. Properly shutdown all guest PCs before running the Virtual PC 5.0 updater. Connectix recommends deleting or committing any “Undo Drives” before updating.
- 2 On the host PC, run the Virtual PC 5.0 Installer. Install the application using the standard installation instructions.
- 3 The updater will automatically import all the old PC List Configurations and the old Virtual PC 4.x serial number to Virtual PC 5.0.

Step 2: Update existing virtual hard disk images created with Virtual PC versions prior to 5.0.

Operating systems which support automatic detection of new hardware will go through “plug-and-play” the first time they are booted with Virtual PC 5.0. The expected results of this process and known issues for a number of popular guest operating systems are listed below.

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

DOS

DOS does not support automatic detection of new hardware but older DOS hard disk images should function normally under Virtual PC 5.0. DOS images with networking already configured should be able to use the same network drivers with the new emulated network card without modification.

Some custom EMM386 settings might need to be adjusted due to the changes in upper memory. If DOS does not boot, reboot the guest PC and press **CTRL+F8** to confirm each line at startup. Skip the EMM386 line in *CONFIG.SYS*. After DOS boots, make sure EMM386 does not use the memory range E000 to EFFFF.

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

Windows 95 Retail (A) Version

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

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

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

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

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

Windows 98 (First and Second Editions)

Windows 98 and Windows 98SE hard disk images will go through a lengthy hardware redetection process and will likely require installing new device drivers from the Windows 98 install CD-ROM. However, since the new emulated CD-ROM device will not be initially loaded, users should bypass ALL hardware driver install dialogs by clicking

Cancel at each prompt. After the first reboot, the CD-ROM drive will be properly loaded. Continue the hardware redetection and new driver installation normally. Under Device Manager, some devices may appear to not have loaded correctly. Delete these devices from Device Manager and reboot. All the devices should load correctly after the reboot.

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

Windows Millennium

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

Windows 2000 Pro, Server and Advanced Server

The first time a Virtual PC 4.x Windows 2000 guest PC is booted with Virtual PC 5.0, the mouse and keyboard will not accept input. Boot Windows 2000 in Safe Mode (press F8 at startup) and then reset the guest PC. To reset the guest PC, click **PC** from the guest menu and click **Reset**, or press the **host key** and **R** (**hostkey+R**). After rebooting, Windows 2000 will go through the hardware re-detect phase normally and find all the new hardware. The mouse and keyboard should also function correctly.

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

Windows XP Home and Professional

Virtual PC 4.x Windows XP Pro guest PCs configured to display a login screen, will not have mouse or keyboard input when first booted with Virtual PC 5.0. You will need to reset the guest PC. To reset the guest PC, click **PC** from the guest menu and click **Reset**, or

press the **host key** and **R** (**hostkey+R**) to reboot and regain mouse and keyboard input. After the reboot, Windows XP will boot normally to the Windows XP desktop. Redetection of all the new emulated hardware will happen in the background without user interaction. The changes to the new emulated hardware will **not** require Windows XP to be re-activated.

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

Windows NT 4.0 (all Service Packs)

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

Virtual PC 4.x Windows NT 4.0 images will boot to the desktop normally under Virtual PC 5.0. However, the emulated network card driver will need to be manually re-installed. Click **Start**, **Settings**, then **Control Panel**. Double-click **Network** and then click the **Adapter** tab. Remove the old DEC 21041 Ethernet driver and add the DEC PCI Fast Ethernet DECchip 21140. Reboot the guest PC to complete the install.

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

Linux & Solaris 8

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

Red Hat Linux 7.3

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

Solaris 8

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

- At the boot prompt **Select (b)oot or (i)nterpreter** type:
boot -r
NOTE There is a space between boot and -r. Enter the command quickly, there is only a 5 second boot delay.
- When the warning message **The window system device configuration may be incomplete or incorrect** is displayed, enter your root password.
- When kdmconfig starts, press **F2** to continue
- Select **No changes needed - Test/Save and Exit** and press **F2**
- Click **Yes** inside the test X Window screen.

Presently, there are no Virtual PC Additions for Linux or Solaris. However, there is a TimeSync daemon freely available at:
http://www.connectix.com/support/vpcw_online.html

OS/2

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

Novell

Novell 5.1 and 6.0 should properly redetect most of the new hardware and boot normally with Virtual PC 5.0. However, the ethernet card will need to be manually re-configured with NWCONFIG. Select PCI slot 2 for the ethernet card and rebind the protocols.

Installing OS/2 as a Virtual PC guest Operating System

Introduction

Virtual PC 5.0 has been specifically enhanced to support a variety of OS/2 versions to be run as a guest OS. Special software, the so-called “OS/2 Additions” are available to tightly integrate the OS/2 guest with your host OS (Windows or OS/2).

The following versions of OS/2 are officially supported as Virtual PC guests:

- OS/2 Warp Version 4.51 (Convenience Pack 1)
- OS/2 Warp Version 4.52 (Convenience Pack 2)

Though not officially supported, the following versions of OS/2 will also work in a guest PC:

- OS/2 Warp Version 3 (Fixpak 39 and higher)
- OS/2 Warp Server Version 4 (Fixpak 39 and higher)
- OS/2 Warp Version 4 (Fixpak 6 and higher)

Support for running these OS/2 versions within Virtual PC is available on a special bid base.

Steps required to install OS/2 as a guest OS

Installing OS/2 as a guest OS under Virtual PC requires 3 steps:

- 1 Creating a guest PC
- 2 Installing OS/2 on the guest PC
- 3 Installing OS/2 Additions

Step 1: Creating a guest PC for OS/2

This step is already described in detail in Chapter 3 (“Creating a guest PC with a copy of an OS” on page -24). Here is a short summary:

- 1 Click the “New PC...” button on the Virtual PC window.
- 2 Let the “PC setup wizard” guide you through the creation process by choosing the corresponding option.
- 3 The wizard will create a unformatted, dynamically expanding hard disk image with a maximum size of 2GB.

NOTE *If your OS/2 installation requires a larger hard disk, you can use the “Virtual Disk Wizard” to create the hard disk image and manually assign it to the guest PC instead.*

Step 2: Installing OS/2 on the guest PC

This step is similar to installing OS/2 on a “real” PC using boot diskettes. Even though the later versions of OS/2 come with a bootable CD, it will not be used here because of a problem with the boot code running within Virtual PC.

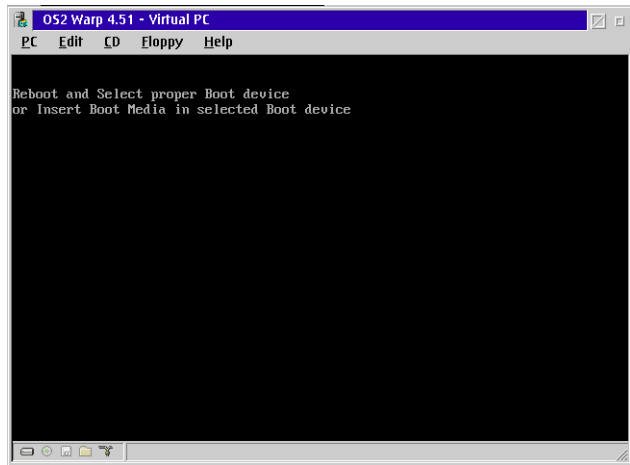
NOTE *The following description uses OS/2 Warp Version 4.51 as an example. The differences between this and other OS/2 Versions are minimal as far as installation is concerned.*

- 1 Insert the OS/2 Installation CD into your CD-ROM drive
- 2 Start the guest PC created in step one by double-clicking its icon (the grey Connectix logo) in the Virtual PC window. This will boot the new, “empty” PC for the first time. You will see some BIOS messages telling you about the hardware configuration of the guest PC, and the PC will try to load an operating system from the virtual hard disk.

NOTE *When you click into the guest PC window, the mouse pointer will be “captured” by the guest PC. To “uncapture” it again (for example, to operate the menus of the guest PC window) press the “Host” key. This key is defined in the “File/Preferences” menu of the Virtual PC window and is per default assigned to the right <Alt> key.*

- 3 A window similar to the following will appear:

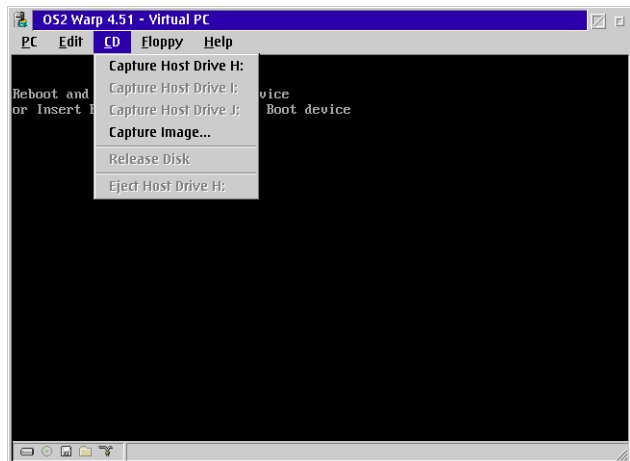
E-1



This boot error message is normal because there is no software installed on the guest PC yet.

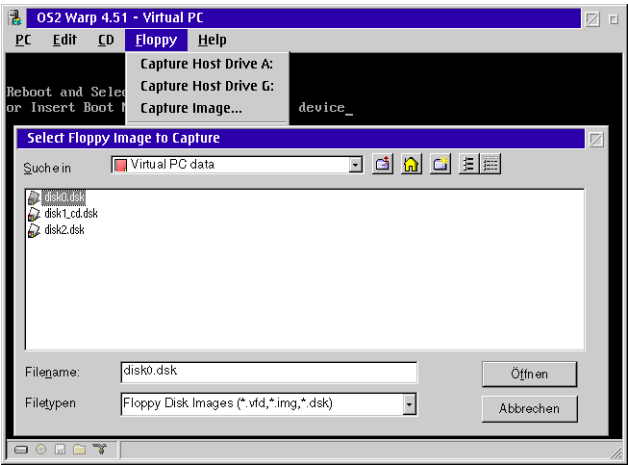
- 4 Select the "CD/Capture Host Drive <X:>" menu (where <X:> represents the drive letter under which the OS/2 Installation CD is accessible):

E-2



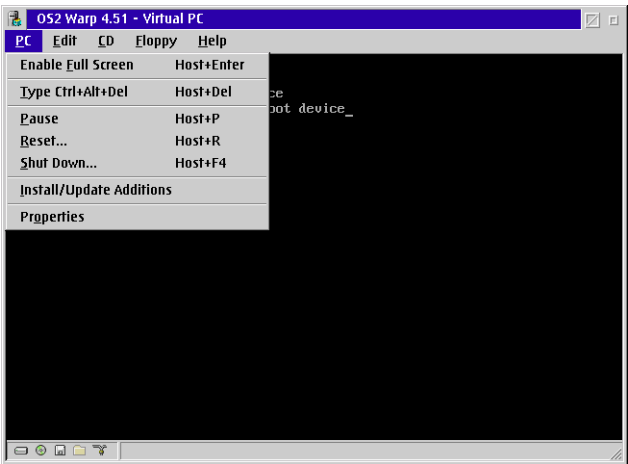
- 5 Select the “Floppy/Capture Image...” menu, navigate to the location where you copied the boot diskette images and select the file “disk0.dsk”:

E-3



- 6 Select “Type Ctrl+Alt+Del” from the “PC” menu to reboot the virtual machine:

E-4



- 7 The PC will now boot from the first OS/2 boot diskette. The following screen will appear:

E-5



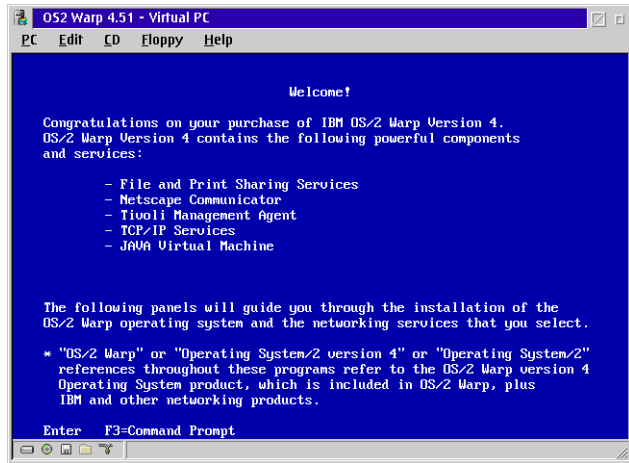
- 8 Using the “Floppy/Capture Image...” menu again, select the next boot diskette image “disk1_cd.dsk”. Hit <Enter> and the OS/2 boot process will continue. You will see the OS/2 boot logo followed by a screen that prompts you to insert diskette 2:

E-6



- 9 Do so by repeating step 8 with the file “disk2.dsk” and hitting <Enter> again. The following screen will appear:

E-7



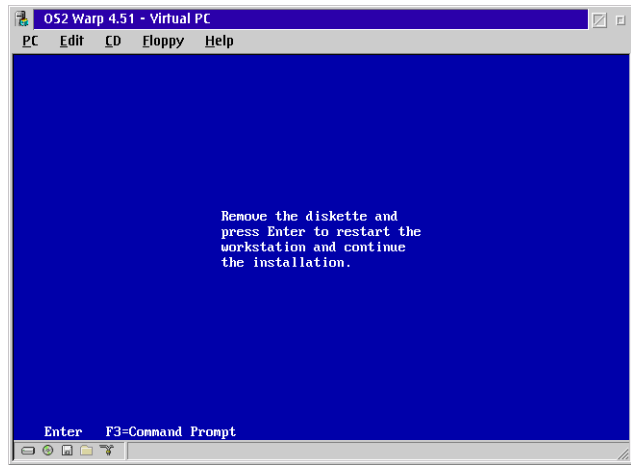
At this point, a normal OS/2 installation should be done using the following parameters:

- Create a bootable volume/partition using the full size of your virtual hard disk (i.e. 2GB).
- Format it using the HPFS file system (Long format is not required).

NOTE *Creating a partition or volume may require restarting the guest PC. If the install program demands a reboot, simply repeat steps 5 to 9, i.e. “Reinsert” the first virtual boot diskette and restart the guest PC using the menu.*

- 10 Continue until you see the following screen:

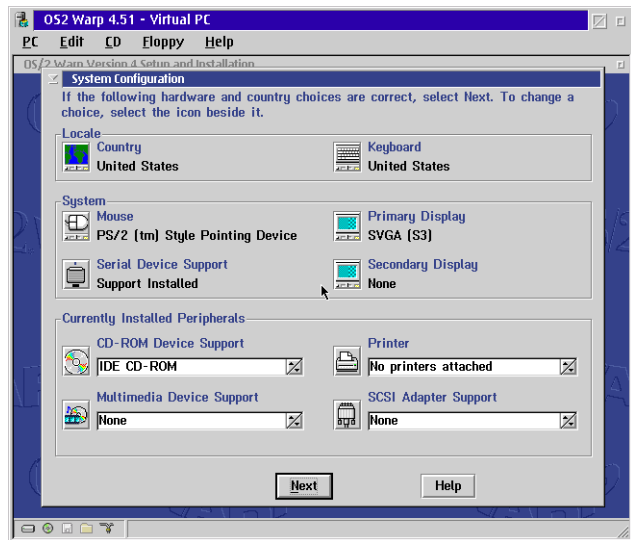
E-8



Now “remove” the virtual diskette using the “Floppy/Release “disk2.dsk” menu, then press <Enter> to perform the reboot requested by the install program.

- 11 OS/2 will now - for the first time - boot from the virtual hard disk drive and the installation will continue. The following screen will appear:

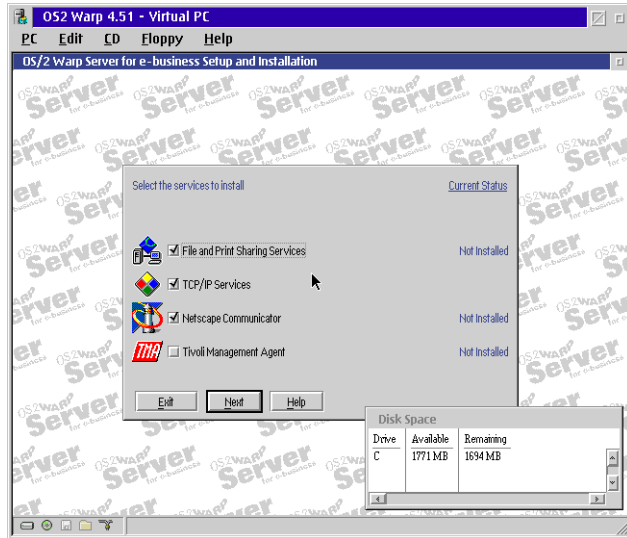
E-9



Choose “VGA” or “VGA-GRADD” as your “Primary Display”.

- 12 Continue with the OS/2 installation as usual until you get to the networking configuration panel. Depending on the networking mode chosen for this guest PC, select the networking components you need:

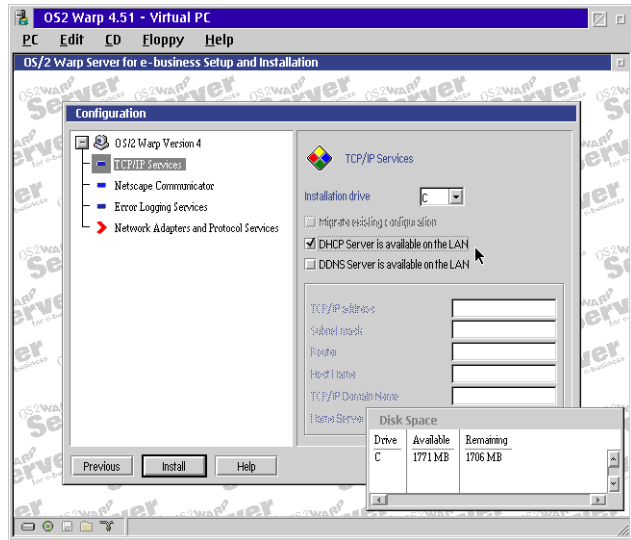
E-10



- **No Networking:**
In this mode, no networking functions are available, so you can leave the OS/2 installation at this point by clicking the “Exit” button on this panel.
- **Virtual Switch Networking:**
All network protocols and services (LAN Services, TCP/IP Services, Netscape, etc.) are allowed in this mode.
- **Shared Networking:**
Since this mode only uses the TCP/IP protocol, it is not recommended to install any OS/2 LAN Services if the guest PC is configured to use this networkin mode. Select TCP/IP Services and configure them to use DHCP as shown in Figure A-11.

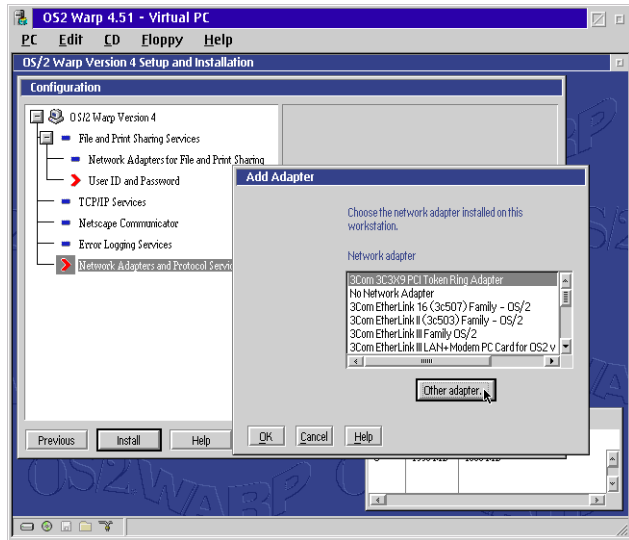
- 13 After selecting the desired networking services, click the “Next” button to get to the Configuration menu:

E-11



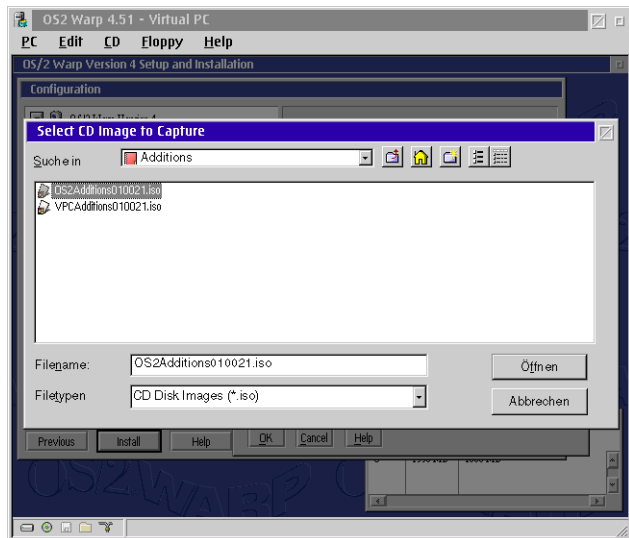
- 14 Select “Add adapter” on the “Network Adapters and Protocol Services” page of this panel.

NOTE Since most OS/2 versions do not come with a device driver for the virtual network card that Virtual PC provides to its guest PCs, it is necessary to copy the driver to the OS/2 boot partition at this point. For your convenience, the correct device driver is provided as part of the OS/2 Additions. To make it available to the OS/2 installation program, use the following instructions to mount the OS/2 Additions ISO image, let the install program copy the driver and mount the OS/2 Installation CD again to continue the install process.



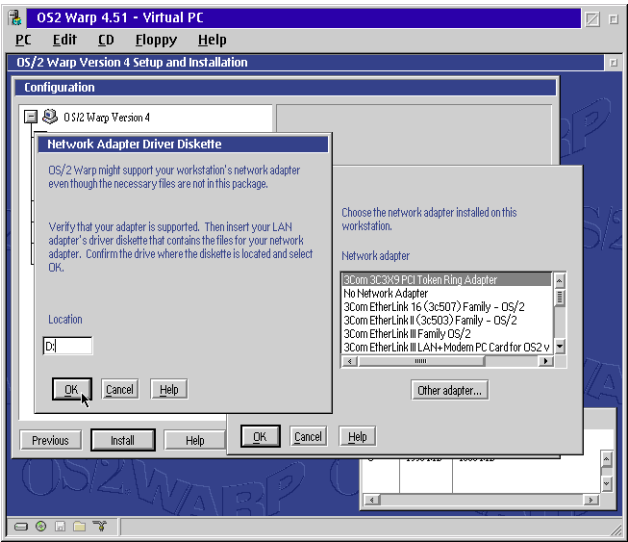
- 16 Use the “CD/Capture image...” menu to capture the OS/2 Additions ISO file that contains the required NDIS driver for the network adapter:

E-12



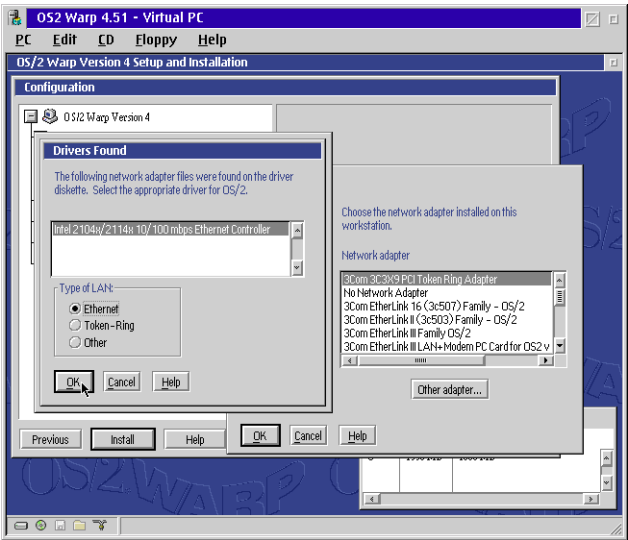
- 17 Click on “Other adapter...”, select “D:” as the location in the following dialog and click “OK”:

E-13



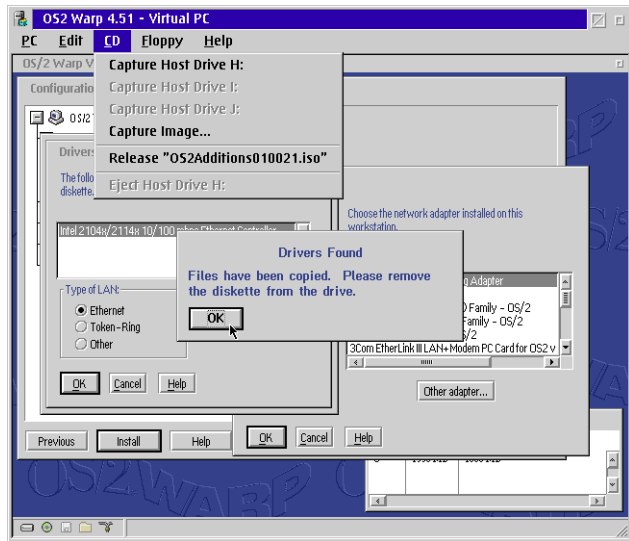
- 18 The system will now search the mounted ISO file for any network drivers. It will find the “Intel 2104x/2114x” driver and ask for the type of LAN:

E-14



- 19 Select “Ethernet” and click “OK”. The driver is now being copied to the OS/2 boot drive. When this is done, a small popup message will appear in the middle of the screen:

E-15



- 20 Now, mount the OS/2 Installation CD again using the “CD/Capture Host Drive <X:>” menu and click the “OK” button of the “Drivers found” message box.
- 21 Continue the OS/2 installation as usual.
- 22 Install any OS/2 Fixpak’s that you want to apply.

Step 3: Installing the OS/2 Additions

Once OS/2 is completely set up, the OS/2 Additions should be installed to improve system integration. The OS/2 Additions provide the following functions:

- Mouse Pointer Integration

This allows you to move the mouse pointer inside and outside of the OS/2 guest PC window without capturing and uncapturing.

- Better graphics performance

The driver has been specifically tuned for best performance with the Virtual PC graphics subsystem.

- More graphics resolutions

All resolutions supported by Virtual PC (up to 1600x1200) are now available in the OS/2 guest.

- Shared Folders

You can map any directory on your host system (even remote filesystems such as network drives) as a drive letter in your OS/2 guest.

- Automated Shutdown

Shutdown of OS/2 from the guest PC's close dialog.

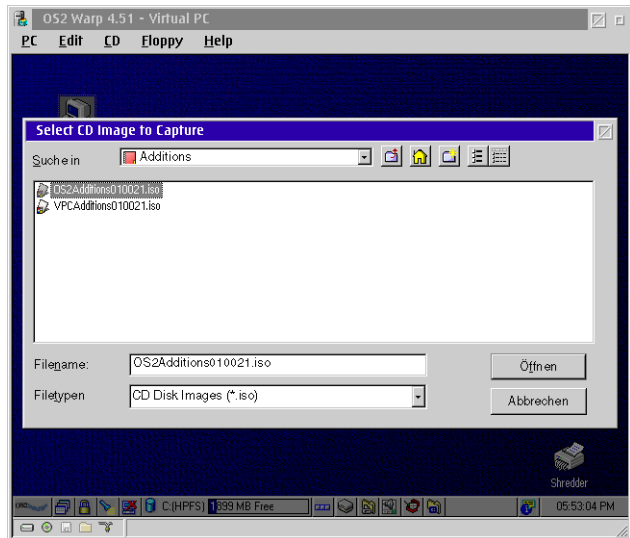
- Clipboard Integration

This allows you to cut and paste between your host operating system and the OS/2 guest. When you put something in the clipboard on the host, it will also be put in the guest clipboard and vice versa.

To install the OS/2 Additions, do the following:

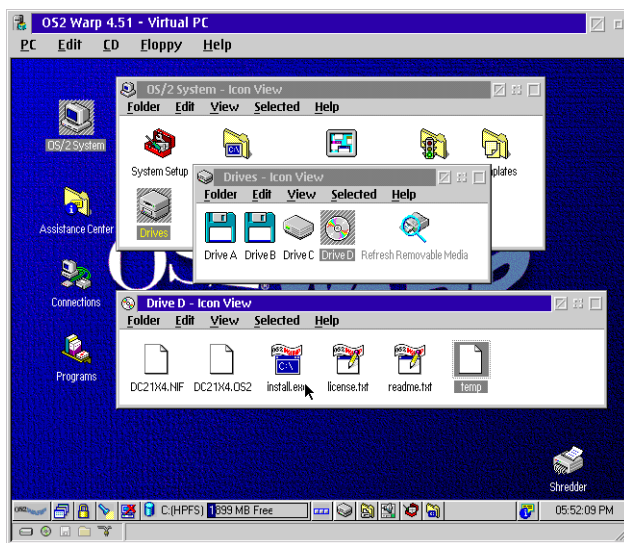
- 1 Make sure the OS/2 guest PC is started and OS/2 is running
- 2 Mount the OS/2 Additions ISO file using the “CD/Capture image...” menu of the guest PC window:

E-16



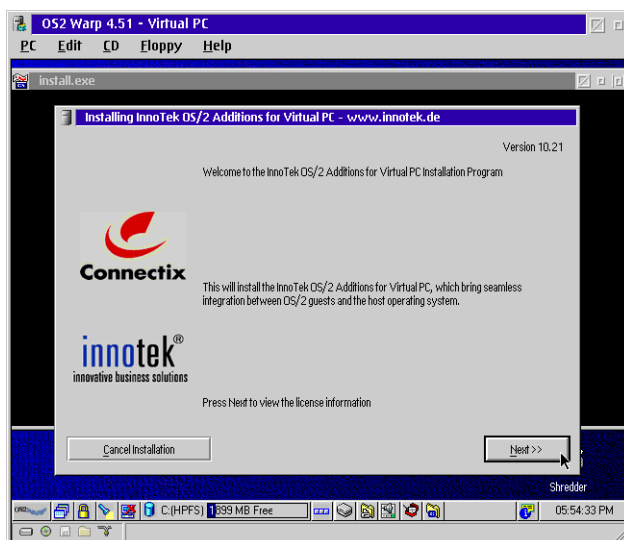
- 3 Open the OS/2 Drives object and double click on the “Drive D:” icon which represents the CD-ROM drive
- 4 Double click on the “INSTALL.EXE” icon in the root directory of drive D:

E-17



- 5 The following screen will appear:

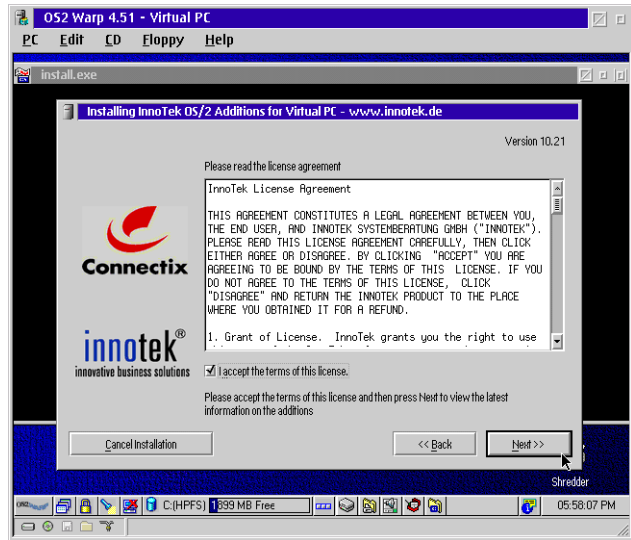
E-18



Click “Next” to continue.

- 6 Carefully read and check the “I accept” box to accept the license agreement, then click “Next” to continue:

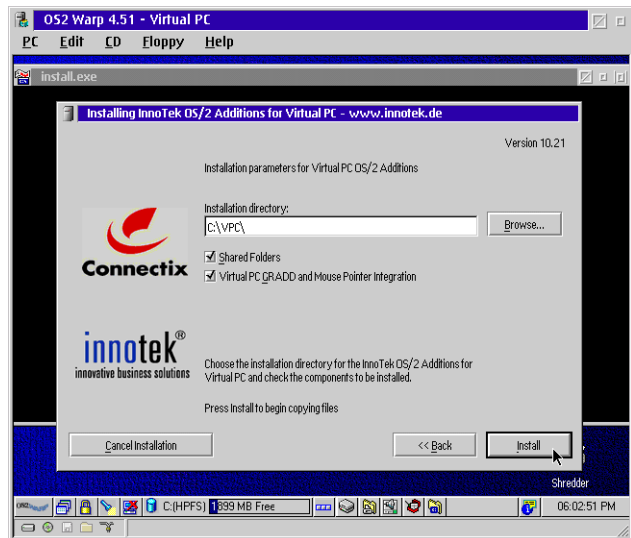
E-19



- 7 Read the latest information about the OS/2 Additions and click “Next”

- 8 The installation options panel will appear:

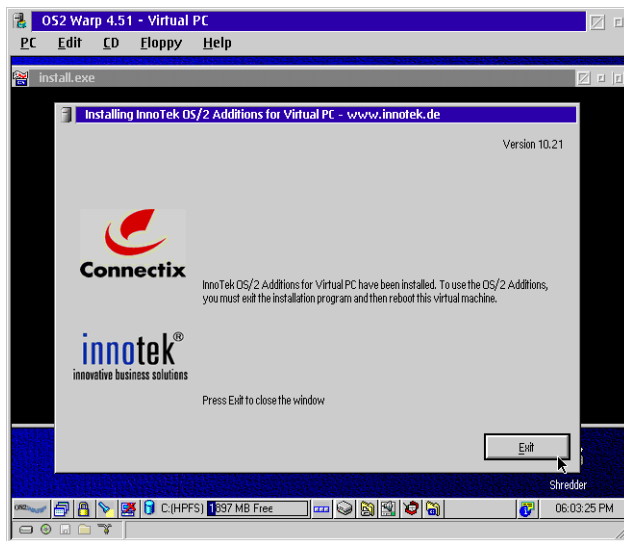
E-20



Accept the suggested options and click “Next”.

- 9 Confirm the creation of a new subdirectory on your OS/2 boot drive that contains the OS/2 Additions.
- 10 The OS/2 Additions will be installed. After a short moment, you will see the following panel:

E-21



- 11 Reboot your guest PC to activate the changes.
- Your OS/2 guest PC is now ready to be used.

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