Connectix VIRTUAL PC™ FOR WINDOWS®

TECHNICAL REFERENCE

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Chapter 1

Introduction

Overview of the Technical Reference

About the Technical Reference

The Technical Reference is a "living document" that provides the most current information regarding Virtual PC. The Technical Reference also provides deeper and more technical information than what is covered in the Virtual PC Users Guide.

Information contained in the Technical Reference supersedes any information in the User's Guide.

Here is a quick overview of each chapter in the Technical Reference.

Chapter 1 *Introduction*

—this chapter, provides a quick overview of Virtual PC and how to install

Chapter 2 *Preparing to install Guest PCs*

—overview of the tools and preparations for creating guest PCs

Chapter 3 *Guest PC Installation Guides*

—individual installation guides by OS

Chapter 4 *Advanced Topics*

—exploring advanced applications of Virtual PC

Installation Requirements for Virtual PC 5.2

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

Processor

- AMD Athlon or Duron, Intel Celeron, Pentium II, Pentium III, or Pentium 4
- 400 MHz minimum, 600 MHz recommended. (1.3 GHz or higher recommended for multiple guests)
- Level 2 cache required

OS

- Windows XP (Recommended Host OS*)
- Windows 2000 (Service Pack 2 or higher recommended) (Recommended Host OS*)
- Windows NT 4.0 with service pack 6

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.

RAM

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

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

Minimum RAM Requirements

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

Installing Virtual PC on Windows NT, 2000, or XP

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

Virtual PC for Windows is installed on the host PC.

NOTE Virtual PC 5.2 no longer supports Windows 98SE and Windows ME as host operating system. Virtual PC 5.2 will only run on Windows 2000, NT4 and Windows XP based host operating systems. Users intending to run Virtual PC on Windows 98SE or Windows ME should continue to use Virtual PC 5.1.

Virtual PC Concepts and Terminology

Virtual PC emulates a standard x86-based PC. All the basic hardware components of Virtual PC are emulated, the only exception is the processor.

Host PC

The host PC, where you install Virtual PC and create one or more virtual machines, must be running Windows NT 4.0, Windows 2000 or Windows XP.

Guest PC

A guest PC runs inside of the Virtual PC application. Many guest PCs may be run on a single host PC.

A 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 *hard disk image* file that represents the boot drive (Hard Disk 1) of the guest PC. Drive images have the extension .VHD, or *Virtual Hard Disk*. 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.

Emulated Guest PC Hardware Components

Listed below is the basic hardware emulated by Virtual PC.

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.

If you need additional help

If you need additional help, please consider these options:

Online Help

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

Read Me file

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

Connectix Web site

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

Connectix Online Forums

View the Connectix Online Forums at http://www.connectix.com/cgi-bin/ubb/ultimatebb.cgi for the latest information and participate in discussions with other Virtual PC users and Connectix employees.

This Reference

See the end of this Technical Reference for common questions regarding Virtual PC 5.2.

Connectix Support

Before you contact Connectix Support, please register Virtual PC and have the following information available:

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

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

Chapter 2

Guest PCs—Getting Started

This chapter provides an introduction to creating guest PCs and the tools used to create a new guest PC

Chapter Topics

Virtual PC - Guest Specifications - page 8

Using The PC Setup Wizard - page 9

“New PC Wizard” Default Hard Disk Image Size and Partitioning - page 15

Using the Virtual Disk Wizard - page 16

Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images - page 16

Differencing Disks - Explained - page 18

Creating a differencing disk image - page 19

Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images - page 20

Creating a Windows 98 SE Emergency Boot Disk (EBD) from PC DOS 2000 - page 21

Virtual PC - Guest Specifications

Each guest virtual machine has the following specifications:

Processor

- Intel Pentium II or later, or AMD Athlon or later, dependent upon host processor

Memory

- Up to 1GB, dependent upon available host memory
- Maximum of 1.6 to 2.0 GB total available for all virtual machines, depending on host OS

IDE Drives

- Up to three IDE hard drives, and one CD/DVD-ROM
- Hard disks can be virtual disk images or physical disk devices
- IDE virtual hard drives up to 128GB
- CD/DVD-ROM can be physical discs or ISO CD-ROM images

Graphics

- VGA and SVGA support
- S3 Trio 64 4MB (8MB with VPC Additions)
- Support for 8-bit, 16-bit, and 32-bit color
- DirectX compatible

Remote Connectivity Server

- Customized VNC (Virtual Network Computing) Server
- Supports most VNC clients, including Java 8-bit clients
- 8-bit direct-mapped and CLUT (color lookup table) based encoding
- 16-bit and 32-bit pixel encoding

Floppy Drives

- One 1.44MB floppy device
- Floppy media may be physical disks or disk images (720KB or 1.44-MB flat-mapped files)

Serial (COM) Ports

- Up to two serial (COM) ports
- Output to serial ports or host files

Parallel (LPT) Ports

- One bi-directional parallel (LPT) port

Keyboard and Mouse

- 104-key Windows enhanced keyboard
- PS/2 mouse with Intellimouse® extensions for scroll wheel support
- Serial tablets supported

Ethernet Card

- DEC/Intel 21140-A PCI Ethernet controller
- 10/100BASE-TX Ethernet
- Full-Duplex Operation

Sound

- Sound output and input
- 16-bit, 44kHz input
- Creative Labs Sound Blaster 16 ISA

Virtual PC - Guest Specifications, Cont.

BIOS

- AMIBIOS core 8.0 based BIOS
- ACPI Compliant

Virtual Networking and File Sharing

- One Virtual Ethernet switch (configuration options for "local only", "local and host", "local, host and external" or "external only")
- Virtual Ethernet supports all Ethernet-based protocols including, TCP/IP, NetBEUI, Microsoft Networking, Samba, DLC, IEEE, AppleTalk, IPX/SPX, SNA, APPC, APPN, and NFS
- Built in NAT (Shared Networking) supports clients using TCP/IP, FTP, DNS, HTTP, SMB, Tenet, etc. as well as PPTP VPN

Using The PC Setup Wizard

The PC Setup Wizard creates the necessary configuration information and can also create the Virtual Hard Drive image. To launch the PC Setup Wizard, after starting Virtual PC, click **New PC...**.

PC Name—The PC Name should be a descriptive name of the guest PC's OS, software or hardware configuration, or some descriptive combination. A guest PC's name must be 31 characters or less and cannot contain the following characters, * ? : ; < > / | \.

2-1 PC Setup Wizard - PC Name

After entering a name, click **Next** to continue.

Configuration Options—The New PC Wizard can guide you through creating a new PC, create a default PC and edit the PC's settings manually, or duplicate an existing guest PC.

2-2 PC Setup Wizard - Configuration Options

Select a configuration option and click **Next** to continue. The remaining steps follow the **Guide me** configuration path.

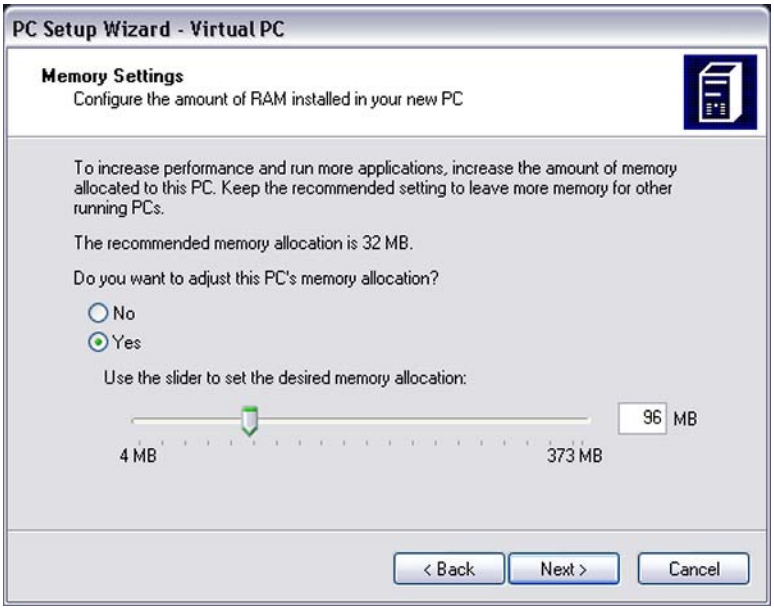
Guest Operating System—Select the operating system which will be installed. The OS selection will determine the minimum recommended RAM, default VHD size and format for the guest PC. See ""New PC Wizard" Default Hard Disk Image Size and Partitioning" on page 15 for more information regarding default hard disk images.

2-3 PC Setup Wizard - Guest Operating System

After selecting an operating system, click **Next** to continue.

Memory Settings—Based on the operating system selected in the previous step, the PC Setup Wizard will recommend a specific memory allocation. Memory should also be increased if a large application or several applications will run in the guest PC. Additional memory will usually increase the Guest PC's performance.

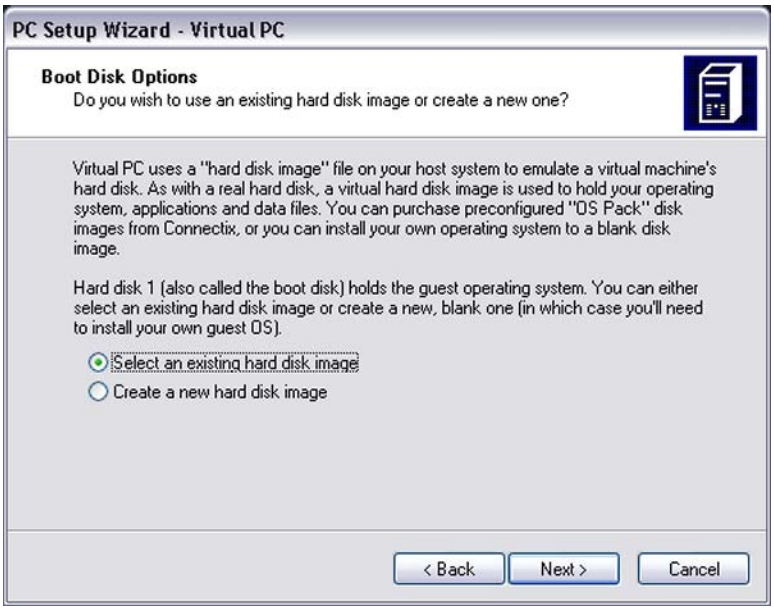
2-4 PC Setup Wizard - Memory Settings



After adjusting the memory allocation, if necessary, click **Next** to continue.

Boot Disk Options—The PC Setup Wizard can create a new hard disk image for the guest PC or an existing hard disk image can be selected. To create a custom drive image, see Using Virtual Disk Wizard on page

2-5

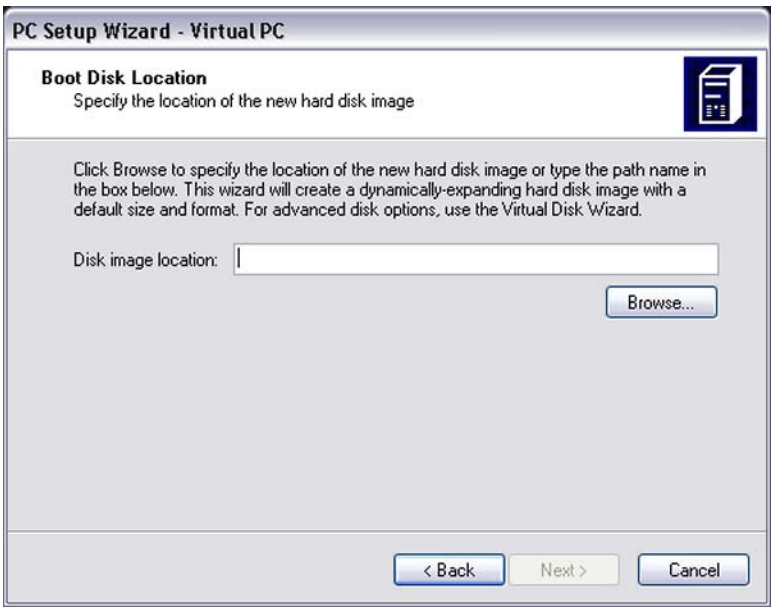


Click **Next** to continue.

Boot Disk Location—Specify the location of an existing hard disk image or the location to create a new hard disk image.

2-6 Select an existing hard disk image

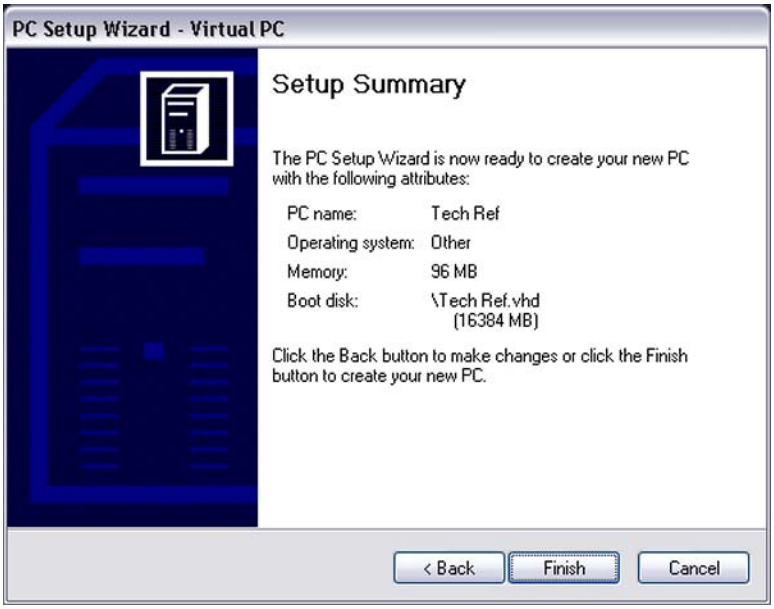
2-7 Specify the location of a new hard disk image



Use the **Browse** button to locate an existing hard disk image or select the location to create a new hard disk image. Click **Next** to continue.

Setup Summary—The PC Setup Wizard is ready to create a new guest PC.

2-8 Setup Summary



Click **Finish** to create the guest PC.

The newly created guest will now appear in the VPC List. To change the settings of the guest PC, click **Settings**. The PC Settings allows you to change the following:

- PC Info—Change the guest PC's name
- Memory—Adjust the RAM assigned to the guest PC
- Hard Disk 1—Guest PC's primary or boot hard disk image
- Hard Disk 2—Guest PC's secondary hard disk image
- Hard Disk 3—Guest PC's third hard disk image
- Undo Drives—Keeps changes made to the hard disk image(s) in a separate file that can be discarded or merged with the original hard disk image
- CD/DVD-ROM—Attach the CD/DVD-ROM drive to the primary or secondary IDE controller
- Floppy—Enable/disable automatic floppy detection. If automatic floppy detection is disabled, a floppy disk or floppy disk image must be manually mounted to be read by the guest PC
- Shared Folders—Requires the VPC Additions. Shared folders allows the guest PC access to a specified folder or drive on the host PC
- Mouse Pointer Integration—Requires the VPC Additions. Allows the mouse point to move freely between the host and guest PCs

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

"New PC Wizard" Default Hard Disk Image Size and Partitioning

When using the New PC Wizard to create a new PC using the **Guide Me** method, you are prompted for which operating system you want to install. This selection determines the minimum amount of RAM that the wizard suggests and how the default hard disk image is formatted.

The following operating system selections create a FAT16 2GB partition:

- DOS
- Windows 3.1
- Windows 95
- Windows NT

The following operating system selections create a FAT32 16GB partition:

- Windows 98
- Windows ME
- Windows 2000
- Windows XP
- Windows .NET

The following operating system selection creates an unpartitioned 2GB hard disk image:

- OS/2

The following operating system selections create an unpartitioned 16GB hard disk image:

- Linux
- BSD
- NetWare
- Solaris
- Other

Using the Virtual Disk Wizard

The Virtual Disk Wizard guides you through the process of working with floppy and hard disk images.

The Virtual Disk Wizard allows you to create new floppy and hard disk images. You can also examine and modify existing disk images. The Virtual Disk Wizard also allows you to create custom sized hard drive images and select the initial format of the hard disk image.

Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images

The Virtual Disk Wizard allows the user more precise control over the type, format, and size of a Virtual Hard Disk (.VHD).

To start the Virtual Disk Wizard, first start Virtual PC, then click File, Virtual Disk Wizard.

To create a custom virtual hard drive image:

1. **Welcome to the Virtual Disk Wizard:** Click **Next** to start the Wizard.
2. **Select Operation:** Select **Create new floppy or hard disk image** and click **Next**.
3. **Select New Disk Type:** Select **Create hard disk image** and click **Next**.
4. **Hard Disk Location:** Click **Browse** to select a location.
5. **Hard Disk Location:** Enter a name for the drive image, and click **Save**.
6. **Hard Disk Location:** Click **Next** to continue.
7. **Hard Disk Image Type**:
   a. **Dynamically expanding disk image**—this image expands it's size by 2MB to the maximum size specified or the limit of the hard disk.
   b. **Fixed size disk image**—creates a disk image file that is the actual size specified, i.e., a 10GB fixed drive image, will take up 10GB of drive space, regardless of how much data is loaded in it.
   c. **Differencing disk image**—this image file is linked to a second 'parent' disk image. The new image only contains the data/files that have been changed from the 'parent image.' The 'parent' drive image that will be linked to must be created prior to the 'child' differencing image.
   d. **Disk image linked to a host volume**—The image file refers to a partition on your host computer's hard drive. Please see the Virtual PC manual for important information regarding this drive image.
   e. **Disk image linked to a host physical drive**—The image file refers to a hard drive on your host system. Please see the Virtual PC manual for important information regarding this drive image.
8. Select the type of disk image you want:
   a. **Dynamically expanding** and **fixed size** disk images:
      i. **Hard Disk Image Type:** Click **Next**.
      ii. **Hard Disk Format and Size:** Select the **Disk Format** and **Size**. Check with the OS you will be installing for compatibility of drive images.

— FAT32—Windows 95 2.x, 98, ME, 2000, XP. Maximum size is 130557MB*

— FAT16—DOS, Windows 3.x, 95a, NT. Maximum size is 2000MB*

— Unformatted—Linux, Unix, Windows installations with NTFS. Maximum size is 130557MB*.

— *Fixed disk images can only be as large as available space on the host's hard drive. Dynamically expanding drives can be created up to the IDE drive limit 127GB. However, a dynamically expanding disk image can only expand to the limit of the host's available disk space.

iii. Click **Next** to continue.

iv. Skip to step 9 below.

b. **Differencing disk image:**

i. **Hard Disk Image Type:** Click **Next**.

ii. **Differencing Hard Disk Image:** Click **Browse...** to locate the 'parent' disk image the differencing or 'child' disk image will link to. The parent disk image must be created prior to creating the child image. ***The parent image must be write-protected. If a parent disk image is modified in any way, all data and files on a linked child image will be irrevocably lost.***

iii. **Differencing Hard Disk Image:** Select the parent disk image and click **Open**. Click **Next**.

iv. Skip to step 9 below.

c. **Disk image linked to a host volume:**

i. **Caution - Virtual PC:** After reading the warning, click **OK**.

ii. **Hard Disk Image Type:** Click **Next**.

iii. **Create Image Linked to Volume:** Select the volume to link to the disk image. Volumes mounted by the host OS are read-only. A volume must be unmounted from the host OS to be writable. Unmount a volume by removing the drive letter in **Disk Administrator** or **Disk Management**. Click **Next**.

iv. Skip to step 9 below.

d. **Disk image linked to a host physical drive:**

i. **Caution - Virtual PC:** After reading the warning, click **OK**.

ii. **Hard Disk Image Type:** Click **Next**.

iii. **Create Image Linked to Physical Drive:** Select the physical drive to link to the disk image. Physical disks mounted by the host OS are read-only. A physical disk must be unmounted from the host OS to be writable. Unmount a physical disk by removing the drive letter in **Disk Administrator** or **Disk Management**. Click **Next**.

9. **Hard Disk Creation Summary:** Click **Finish** to create the disk image.

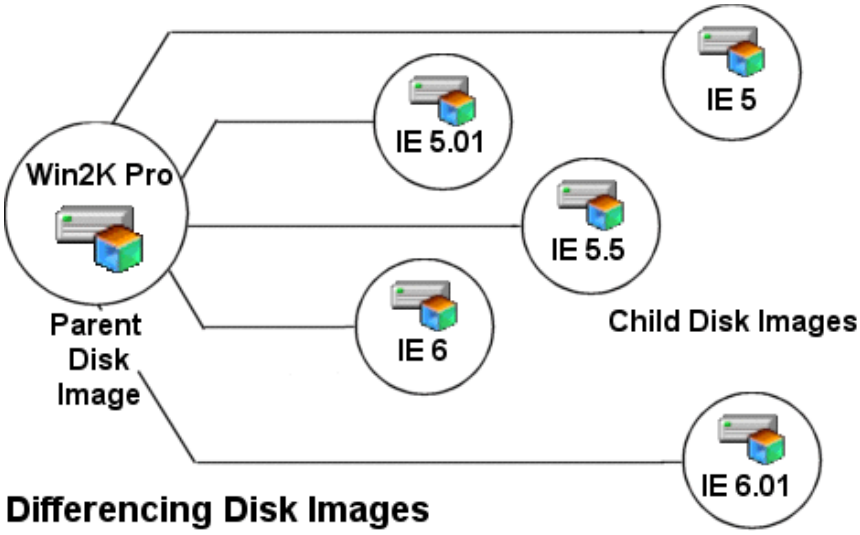
10. **The disk was created successfully:** Click **Close** when the Wizard has completed the disk creation

Differencing Disks - Explained

A differencing disk image is used in conjunction with another type of disk image. There are two components of a differencing disk image, the 'parent' or 'base' disk image and the 'child' or 'change' disk image. The parent disk image has a full OS installation on it and can function as a standard guest PC. A child disk image contains only the changes made to the parent disk image. A child disk image is unusable without the parent disk image. A parent disk image should be write-protected to prevent it from being modified in any way. If a parent disk image is modified after a child image has been created and linked to the parent image, the child image will be unusable and all data stored in the child image will be unrecoverable.

Another way to think of differencing disk images is to view the parent image as a template OS installation and the child disk image is the additions or deletions that are added on top of the template.

A single parent disk image can have multiple child disk images. This allows a single OS installation to be modified or customized in many ways without needing to reinstall the OS or requiring the disk overhead of having multiple OS installations. Since a child image only records the changes to the original parent disk image, a large part of the OS files will be unchanged and not duplicated in the child disk image. In other words, data is only added to the differencing drive image when drive data is modified so contents of a differencing drive represents only the changes from the original disk image.



Some scenarios where differencing drive images are 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. For example, using a single Windows 2000 Professional parent disk image, a webmaster can create a unique and separate child disk image for each version of Internet Explorer to review web pages on IE 5, IE5.01, IE 5.5, IE 6, and IE 6.01. In this case, each child image will only contain the IE files and any modifications that the IE setup makes to the OS.

Creating a differencing disk image

Create the parent or base image:

1. Create a new PC using the New PC Wizard.
2. Install the OS and any other software or updates desired for the base image. See the Chapter 3 for OS installation details.
3. Optionally, defragment and compact the disk image to reduce the overall size of the parent image.
4. Write-protect the parent image to prevent it from being modified.

IMPORTANT If the parent disk image is modified after a child disk image is created from it, the child disk image will be unusable and all data will be unrecoverable from the child image.

Create the child or change disk image:

5. Launch the Virtual Disk Wizard. Start Virtual PC, click File, then select Virtual Disk Wizard.
6. Welcome to the Virtual Disk Wizard: Click Next to start he Virtual Disk Wizard.
7. Select Operation: Select Create new floppy or hard disk image and click Next.
8. Select New Disk Type: Select Create hard disk image and click Next.
9. Hard Disk Location: Enter or browse to a location to store the disk image and enter a name for the Child disk image. Click Save. Click Next to continue.
10. Hard Disk Image Type: Select Differencing disk image and click Next.
11. Select the parent disk image: Click Browse and locate the disk image created in steps 1-4 above. Select the disk image and click Open. Click Next to continue.
12. Hard Disk Creation Summary: Click Finish to create the new Differencing Disk Image.
13. The disk was created successfully: Click Close.

Set up new guest PC using the differencing drive image:

14. From the PC List, click New PC…
15. Follow the PC Setup Wizard, when prompted for the Boot Disk Options, select Select an existing hard disk image and click Next.
16. Boot Disk Location: Click Browse and locate the differencing disk image created in step 9. Note: be sure to select the child image created in step 9, not the parent disk image created in steps 1-4.
17. Complete the PC Setup Wizard.

Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images

Floppy disk images allow for the full functionality of floppy disks with hard drive speed and drag and drop functionality. A floppy disk drive is not required to create and/or use floppy disk images.

To create a custom floppy disk image:

1. **Welcome to the Virtual Disk Wizard:** Click **Next** to start the Wizard.
2. **Select Operation:** Select **Create new floppy or hard disk image** and click **Next**.
3. **Select New Disk Type:** Select **Create floppy disk image** and click **Next**.
4. **New Floppy Disk:** Click **Browse** to select a location.
5. **New Floppy Disk:** Enter a name for the drive image, and click **Save**.
6. **New Floppy Disk:** Click **Next** to continue.
7. **Floppy Disk Creation Summary:** Click **Finish**.
8. **The disk was created successfully:** Click **Close** when the Wizard has completed the disk creation.

NOTE A quick alternative to creating many floppy disk images with the Virtual Disk Wizard is to simply create a base, blank floppy disk image named *Blank.vfd*, save it to an easily accessible location. Then when additional disk images are needed, copy the *Blank.vfd* and rename the disk image.

Creating a Windows 98 SE Emergency Boot Disk (EBD) from PC DOS 2000

1. Start the PC DOS 2000 guest. Only retail versions of Virtual PC 5.x include PC DOS 2000.
2. Run the Virtual Disk Wizard and create a new floppy disk image (.VFD).
   a. For details, see "Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images" on page 20
   b. Enter a name for the disk image, `Windows 98SE Emergency Boot Disk`, browse to a location to save the disk, click **Save**. Note the location of the disk.
   c. Click **Next** to continue and click Finish to complete the disk creation.
3. Mount the new disk image, *Windows 98SE Emergency Boot Disk*, created in step 2.
   a. Drag and drop the *Windows 98SE Emergency Boot Disk.VFD* disk image on the PC DOS 2000 guest's floppy disk icon located in the lower left corner of the Virtual PC toolbar.
   b. Alternately, right-click the floppy icon, select **Capture Image**, and browse to the location the *Windows 98SE Emergency Boot Disk* was saved to in step 1e. Double-click the file to mount it.
4. Insert and capture Windows 98 SE CD-ROM.
5. Change to the CD-ROM drive, by typing `e:` and press **Enter**.
6. Change to the *OLDMSDOS* directory by typing `CD\TOOLS\OLDMSDOS` and press **Enter**.
7. Run *SMARTDRV.EXE* by typing `SMARTDRV.EXE` and press **Enter**. Note: *Smartdrv.exe* is not needed to create the disk image, but increases the speed of the creation of the EBD diskette.
8. Change to the *FAT32EBD* directory by typing `CD\TOOLS\MTSUTIL\FAT32EBD` and press **Enter**.
9. Run *FAT32EDB.EXE* by typing `FAT32EBD.EXE` and press **Enter**.
10. Follow the prompts to create a FAT32 EBD.
    a. Type `Y` to continue, and press **Enter**.
    b. Copy *Smartdrv.exe* to the disk image by typing `COPY E:\TOOLS\OLDMSDOS\SMARTDRV.EXE A:` and press **Enter**.
11. Reboot the PC DOS 2000 guest to verify that the disk works.
    a. If the disk was created correctly, the screen should display **Microsoft Windows 98 Startup Menu** and give 2 options. Press **Enter** to select **1. Start computer with CD-ROM support**.
    b. When the disk has finished booting, there should be an *A:\>* prompt.
12. Verify that the CD-ROM drive is accessible.
    a. Verify that the Windows 98 CD-ROM is still in the drive and captured by the PC DOS 2000 guest. If a CD-ROM is mounted, the CD-ROM icon in the VPC Toolbar will not be grayed out.
    b. Change to the CD-ROM drive by typing `d:` and press **Enter**.
    c. Type `dir` and press **Enter**. This should display the contents of the Windows 98 SE CD-ROM. There should be a *Win98 <DIR>* listed on the screen.
13. This Emergency Startup Disk is a feature-limited emergency floppy disk and is not the same as the Windows 98 Startup Disk that is created during the Windows 98 installation or from the Control Panel in Windows 98SE.
14. To install Windows 98SE from a non-bootable CD-ROM, see "Microsoft Windows 98" on page 36

Chapter 3

Guest OS Installation Guides

This chapter provides step-by-step instructions for installing popular OSes in Virtual PC 5.2.

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Sun Solaris 8 for i386 - page 89

IBM OS/2 Warp 4 - page 93

SuSe Linux 7.3 - page 98

MS DOS and PC DOS 2000

Background:

There are many versions and publishers of DOS for PC Compatible systems. This guide only covers IBM PC DOS 2000, Microsoft DOS 6.x, and IBM PC DOS 5.

While only documenting the IBM PC DOS 2000, Microsoft DOS 6.x, and IBM PC DOS 5 versions, the core of most DOS versions are very similar and information here can be adapted for other unlisted versions. Prior to version 4, DOS had very limited hard drive partitioning capacity. For this reason, the main focus of this document will be using DOS 5 and higher. With DOS 4.x and higher, DOS had a limit of a 2GB FAT16 drive partition.

The retail version of Virtual PC includes IBM PC DOS 2000 pre-installed in a .VHD disk image file. The drive image needs to be copied from the CD-ROM or downloaded executable file.

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

IBM PC DOS 2000 included with Virtual PC for Windows

PC DOS 2000 isn't installed automatically with Virtual PC. It is located in the `PC DOS` folder of the Virtual PC CD-ROM or in the folder the online download was expanded (the default is `C:\Program Files\Connectix\Connectix Virtual PC 5.x Online Installer`). Located in the PC DOS folder is a PC DOS 2000 floppy boot disk image (`PC DOS Boot Disk.vfd`) and the PC DOS 2000 virtual hard disk image (`PC DOS 2000.vhd`).

Copying and creating a new PC DOS 2000 Virtual PC:

Copy the `PC DOS 2000.vhd` from the PC DOS folder on the CD-ROM or in the zip file to your hard drive (`C:`)

1. Start Virtual PC, and click **New PC**. Click **Next**.
2. Follow the New PC Wizard. Enter a PC Name.
3. Select **Guide me**, and click **Next**.
4. Select **DOS** from the selection box and click **Next**.
5. If you would like to adjust the amount of memory allocated to the new DOS PC, select **Yes**, otherwise, select **No**. Click **Next**.
6. Select **Select an existing hard disk image** and click **Next**.
7. Click **Browse** and locate the **PC DOS 2000.vhd** file copied to your hard drive from step 1.
8. Select **PC DOS 2000.vhd** and click **Open**.
9. Click **Next**. You may receive a warning that the drive image is marked as read-only. Click **Change** to remove the read-only attribute. Click **Finish** to complete the setup.
10. From the Virtual PC list, double-click the newly created virtual PC or click **Start Up**.

PC DOS Notes:

PC DOS 2000 doesn't have an EDIT command for editing files in DOS. The edit command in PC DOS is called **e**. It can be launched from a PC DOS prompt by simply typing `e` and pressing **enter**.

Installing MS DOS 6.x

NOTE A full version of MS DOS is required to install DOS on an empty hard drive or drive image.

1. Use the New PC Wizard to create a new guest OS, click **New PC...** from the Virtual PC menu.
2. Click **Next** to begin the New PC Wizard.
3. Enter a PC Name for the MS DOS 6.x guest and click **Next**.
4. Select **Guide Me** and click **Next** to continue.
5. Select **DOS** from the operating system drop box and click **Next** to continue.
6. If you would like to adjust the amount of memory allocated to the new DOS PC, select **Yes**, and make the memory adjustment, otherwise, select **No**. Click **Next**.
7. Select **Create a new hard disk image** and click **Next**.
8. If the default disk image location is acceptable, click **Next**. To change the location, click **Browse** and select or create the desired folder. Click **Save** to save the image and click **Next** to continue.

9. A Setup Summary screen will be displayed, showing the new PC's summary, click **Finish** to complete the PC Setup Wizard.
10. Select the new MS DOS guest, and click **Start Up**.
11. Insert the DOS disk 1 in the floppy drive, or drag and drop the floppy disk image on the floppy icon in the lower left corner of the screen. Restart the DOS guest PC; press the *hostkey*+**R** or *hostkey*+**DEL**.
12. After the DOS disk boots, a Setup screen will appear with instructions for installing DOS.
13. Press **Enter** to continue the MS DOS setup.
14. Select the system settings and press **Enter** to continue.
15. Select the directory DOS will be installed, the default is **C:\DOS**. Press **Enter** to continue.
16. At the screen prompts, insert the second DOS setup disk and press **Enter** to continue. If using floppy disk images, drag and drop disk 2 on the floppy icon located on the lower left corner of the DOS guest PC's window.
17. Repeat step 16 with Disk 3 and Disk 4, if applicable.
18. When the setup is finished, remove any disks or disk images (right-click the floppy icon and select **Release** *diskname* to un-mount the image file. Press **Enter**.
19. Press **Enter** again to restart the DOS guest.

To install the DOS additions:

1. Locate the `DOS Additions.VFD` file.
   a. **CD-ROM**: the file is located on the CD-ROM in `\Additions\DOS Additions` folder.
   b. **Online version**: the file is located in `\Virtual PC 5.x Online Installer\Additions\Dos Additions`. The default location is `C:\Program Files\Connectix`
2. Drag and drop the `DOS Additions.VFD` on the floppy icon to mount it in the guest OS.
3. Change to the A: prompt, type `A:` and press **Enter**.
4. Install the additions, type `dosadd` and press **Enter**.
5. Verify that the *config.sys* has the entry `LASTDRIVE=Z.` Type `C:` and press **Enter** to change to the C: drive. Type `edit config.sys` and press **Enter**, add the line above, if necessary.
6. To access the CD-ROM Drive in DOS, the following line must be added to the *autoexec.bat*.*C:\DOSDIR*`\MSCDEX /D:IDECD001 /L:E`. To add the line, type `edit autoexec.bat` and press **Enter**. Enter the line above, modifying the drive and DOS directory, if necessary. Most versions of DOS will add the MSCDEX.EXE in the DOS directory on the C: drive.
7. When the DOS guest is configured, release the `DOS Additions.VFD` disk image and restart the guest using the *hostkey*+**R** or *hostkey*+**DEL**.
8. Restart the guest PC to load the additions files.

Installing PC DOS 5

NOTE A full version of PC DOS is required to install DOS on an empty hard drive or drive image. PC DOS 5.02 was used for this procedure.

1. Use the New PC Wizard to create a new guest OS, click **New PC...** from the Virtual PC menu.
2. Click **Next** to begin the New PC Wizard.
3. Enter a PC Name for the MS DOS 5.x guest and click **Next**.
4. Select **Guide Me** and click **Next** to continue.
5. Select **DOS** from the operating system drop box and click **Next** to continue.
6. If you would like to adjust the amount of memory allocated to the new DOS PC, select **Yes**, and make the memory adjustment, otherwise, select **No**. Click **Next**.
7. Select **Create a new hard disk image** and click **Next**.
8. If the default disk image location is acceptable, click **Next**. To change the location, click **Browse** and select or create the desired folder. Click **Save** to save the image and click **Next** to continue.
9. A Setup Summary screen will be displayed, showing the new PC's summary, click **Finish** to complete the PC Setup Wizard.
10. Select the new MS DOS guest, and click **Start Up**.
11. Insert the DOS disk 1 in the floppy drive, or drag and drop the floppy disk image to the floppy icon in the lower left corner of the screen. Restart the DOS guest PC, press the *hostkey*+ **R** or *hostkey*+**DEL.**
12. After the floppy finishes booting, a welcome screen will be displayed with instructions for installing DOS. Press **Enter** at the welcome screen to begin the installation.
13. Modify the system settings if necessary and press **Enter** to continue.
14. Modify the installation directory, if desired, and if the DOS Shell should be launched on startup. Press **Enter** to continue.
15. When prompted, insert the second DOS setup disk and press **Enter** to continue. If using floppy disk images, drag and drop disk 2 on the floppy icon located on the lower left corner of the DOS guest's window. Repeat step 16 with Disk 3.
16. When the setup is finished, remove any disks or disk images (right-click the floppy icon and select **Release** *diskname* to un-mount the image file.
17. Press **Enter** after removing all disks and images to restart the DOS guest.

To install the DOS additions:

1. Locate the `DOS Additions.VFD` file.
   a. **CD-ROM**: the file is located on the CD-ROM in `\Additions\DOS Additions` folder.
   b. **Online version**: the file is located in `\Virtual PC 5.x Online Installer\Additions\Dos Additions`. The default location is `C:\Program Files\Connectix`
2. Drag and drop the `DOS Additions.VFD` on the floppy icon to mount it in the guest OS.
3. Change to the A: prompt, type `A:` and press **Enter**.
4. Install the additions, type `dosadd` and press **Enter**.
5. Verify that the *config.sys* has the entry `LASTDRIVE=Z.` Type `C:` and press **Enter** to change to the C: drive. Type `edit config.sys` and press **Enter**, add the line above, if necessary.
6. To access the CD-ROM Drive in DOS, the following line must be added to the *autoexec.bat*.*C:\DOSDIR*`\MSCDEX /D:IDECD001 /L:E`. To add the line, type `edit autoexec.bat` and press **Enter**. Enter the line above, modifying the drive and DOS directory, if necessary. Most versions of DOS will add the MSCDEX.EXE in the DOS directory on the C: drive.
7. When the DOS guest is configured, release the `DOS Additions.VFD` disk image and restart the guest using the *hostkey*+**R** or *hostkey*+**DEL**.
8. Restart the guest PC to load the additions files.

Microsoft Windows 3.1

Background:

Windows 3.x requires a DOS to be installed before Windows can be installed. Copy an existing DOS guest PC or create a new DOS installation before beginning this procedure. `EMM386.EXE` from the `config.sys` and `IDLE.COM` from `autoexec.bat`, must be disabled before running the Windows 3.1 setup.

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *`diskname`*.

Installing Windows 3.1

1. Use the New PC Wizard to create a new guest OS, click **New PC...** from the Virtual PC menu.
2. Click **Next** to begin the New PC Wizard.
3. Enter a PC Name for the MS Windows 3.1 guest and click **Next**.
4. Select **Guide Me** and click **Next** to continue.
5. Select **Windows 3.1** from the operating system drop box and click **Next** to continue.
6. If you would like to adjust the amount of memory allocated to the new DOS PC, select **Yes**, and make the memory adjustment, otherwise, select **No**. Click **Next**.
7. Select **Select an existing hard disk image** and click **Next**.
8. Click **Browse** and locate the DOS guest PC you wish to install Windows 3.1 in. To change the location, click **Browse** and to locate the desired folder. Click **Save** to save the image and click **Next** to continue.
9. A Setup Summary screen will be displayed, showing the new PC's summary, click **Finish** to complete the PC Setup Wizard.
10. After the wizard is complete, additional options can be configured for networking, serial and parallel ports. Select the new Windows 3.1 guest and click **Settings** to view the configuration of the new guest PC. The serial and parallel ports should be enabled before starting the guest PC.
11. Select the new Windows 3.1 guest, and click **Start Up**.

12. After DOS has finished loading, insert the Windows 3.x disk into the floppy drive and capture the disk image by right-clicking the folder in the lower left corner of the VPC window and select **Capture Host Drive A:**.
13. Change to the A: prompt, type `A:` and press **Enter.** Type **setup** and press **Enter**.
14. Follow the installation guide and replace the disks when necessary. Since floppies are legacy devices and do not communicate when inserted or ejected, each time a new floppy is inserted it will need to be captured in the guest so the guest will recognize it as a different disk.
15. By default, Windows 3.x does not include drivers for the S3 Trio 64 Video card and the only available drivers that will work is the default VGA driver. S3 Trio 64 drivers are available on the Internet at www.s3graphics.com. Download `w3117004.zip` and extract to a folder (example: `c:\video`) on the guest's C: drive.
    a. Change to the Windows directory and run `setup.exe`.
    b. Select **Display**, and press **Enter**.
    c. Scroll to the bottom of the list, select **Other**, and press **Enter**.
    d. Enter the drive letter and path specified above (example: `c:\video`)
    e. Select a resolution from the list and press **Enter**.
    f. Press **Enter** again to accept the options. Windows setup will copy the necessary files and exit to DOS.

Additions for Windows 3.x

Shared Folders

Since Windows 3.x requires a DOS environment to boot up. The DOS File-sharing addition FSHARE.EXE can be used in Windows as well. See "MS DOS and PC DOS 2000" on page 24

Mouse Integration

Mouse drivers for host to guest integration are available from the Connectix website. You can download the mouse drivers here: `ftp://win3xadd:win3xadd@care.connectix.com/users/win3xadd/`

Installing Mouse Integration in Windows 3.x

1. Mount the *win3xadd.vfd* to the Windows 3.x guest.
2. Copy the three files (`HstMouse.386, HstMouse.drv,` and `SyncTime.386`) to the *C:\Windows\System* directory.
3. Edit the *SYSTEM.INI* located in *C:\Windows*
    a. Under the **[386Enh]** section, add the lines `Device=HstMouse.386` and `Device=SyncTime.386`
    b. Under the **[boot]** section, add the lines `HST.MOUSE.DRV=MOUSE.DRV` and `MOUSE.DRV=HSTMOUSE.DRV`

Microsoft Windows 95

Background:

There are several different versions of Windows 95. Only one version, Windows 95a was publicly available. This first version was the retail version. It was also available in diskette format, approximately 13 3.5” disks.

Microsoft followed up with several releases that were only available to OEMs. These included Microsoft Windows 95 OEM Service Release (OSR), versions 2, 2.1, 2.5.

The first release of Windows 95 did NOT include FAT32 support. Windows 95 OSR 2.x versions do have FAT32 capability.

Notes for installing Windows 95 in Virtual PC:

Some versions of Windows 95 may look for specific components, like BIOS or motherboard types and will not install if the setup is unable to find these components.

When installing Windows 95 following the New PC Wizard, the wizard will create a 2GB FAT16 partition for maximum compatibility with all versions of Windows 95. If you are installing a 2.x version of Windows 95, use the Virtual Disk Wizard to create a custom FAT32 drive image or select Windows 98 in the New PC Wizard. For additional information Virtual Disk Wizard usage, see “Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images” on page 16.

Installing Windows 95 requires a floppy boot disk or image with CD-ROM drivers. Very few, if any Windows 95 CD-ROMs were bootable. A DOS boot disk will only recognize the FAT16 format. To successfully install Windows 95 2.x on a FAT32 drive image, a Windows 98 startup disk, Windows 98 Emergency Boot Disk (see “Creating a Windows 98 SE Emergency Boot Disk (EBD) from PC DOS 2000” on page 21), or a Windows 95 2.x startup disk with CD-ROM drivers configured is required.

Virtual PC Notes:
Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest’s window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows 95 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. Enter a descriptive **PC Name** and click **Next**.
4. Select **Guide Me** and click **Next**.
5. Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format.
   a. Select **Windows 95** for the original version of Windows 95.
   b. Select **Windows 98** for later versions if a default FAT32 drive image is desired
6. Click **Next** to continue.
7. Adjust the memory if necessary and click **Next** to continue.
8. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**.

   NOTE If Windows 95 was selected in step 5 above, the drive image will be limited to a 2GB FAT16 drive image. To install Windows 95 2.x and higher on a FAT32, create a custom drive image using the Virtual Disk Wizard, or go back and select Windows 98 as the OS to install.
9. Click **Next** to continue. If a new drive image is being created, click **Browse** to change the location or **Next** to accept it.
10. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
11. Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows 95

12. Insert the Windows 95 CD-ROM and a bootable floppy with CD-ROM drivers and click **Start Up** to start up the guest PC.
13. When the floppy has finished booting, change to the CD-ROM drive, usually `D:` or `E:`.

14. To reduce the installation time, launch `smartdrv.exe`. This file is usually located in the *Win95* directory. Type `smartdrv` and press **Enter** to launch. SMARTDRiVe is a disk caching utility that will reduce the amount of time required to copy the setup files. Note: this step is not necessary to install Windows 95.
15. Change to the C: drive, type `C:` and press **Enter**. Create a Win95 directory, type `md win95` and press **Enter**.
16. Copy the Win95 directory from the CD-ROM drive to the C: drive. Type `copy X:\win95\*.* c:\win95\*.*` , where *X:* is the CD-ROM drive, usually D: or E:. Note: Copying the Win95 directory to the C: drive, avoids certain driver installation issues with Windows 95. Under certain circumstances, Windows 95 will prompt for the Windows 95 CD-ROM to install devices, but the necessary CD-ROM drivers have not yet been loaded.
17. Change to the Win95 directory, type `cd Win95` and press **Enter**.
18. Type `setup` and press **Enter** to begin the installation. This will start the Windows 95 setup Wizard.
19. The first setup screen varies by version: Windows 95 v2.x has an initial screen, click **Continue** to begin the setup. Windows 95 A or Retail version, does not have this step.
20. **Software License Agreement**: Click **Yes** to accept the software license agreement.
21. **Windows 95 Setup**: Click **Next** to start.
22. **Choose Directory**: Choose the installation directory, the default should be `C:\Windows`, click **Next** to continue.
23. **Setup Options:** Select the setup option desired and click **Next** to continue.
24. **User Information:** Enter a user name and company, click **Next** to continue.
25. **Analyzing Your Computer:** Check the boxes next to **Network Adapter** and **Sound, MIDI, or Video Capture Card**. Click **Next** to continue.
26. **Get Connected:** Select any additional items and click **Next** to continue installation.
27. **Windows Components:** Select **Install the most common components (recommended),** and click **Next** to continue.
28. **Startup Disk:** Select **Yes** if a Startup disk is wanted. Click **Next** to continue.
29. **Start Copying Files:** Click **Next** to begin file transfer.
30. **Finishing Setup:** Remove the floppy disk or disk image. Click **Finish** to complete the first phase of installation.
31. **Network:** Click **OK** to enter a computer and workgroup name.
    a. Enter a unique name for the Windows 95 guest PC
    b. Enter the Workgroup the guest PC will be part of, if unknown, use **Workgroup**.
    c. Note: the workgroup and name can be changed after the installation is complete.
    d. Click the **Configuration** tab
       i. Add the TCP/IP Protocol for Internet or network connectivity
          — Click **Add.**
          — Select **Protocol**, click **Add**.
          — Select **Microsoft**, then **TCP/IP** and click **OK.**
       ii. Remove the IPX/SPX protocol if not connecting to a Novell NetWare network.
    e. Click **Close** to install/remove any protocols.

32. **Date/Time Property:** Select the correct time zone from the world map and click **Close**.
33. **Add Printer Wizard:** click **Cancel**.

    NOTE A printer can be added after the installation is completed.

34. **Windows 95 Setup:** Click **OK** to reboot and boot Windows 95.
35. **Enter Network Password:** Enter a username and password, and press **Enter. V**erify the password when prompted and press **Enter**. Leaving the password space blank will prevent future logon prompts and boot directly into Windows 95.
36. When prompted to create a startup disk, it's possible to use either a real floppy disk or a floppy disk image. See "Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images" on page 20

Post-Installation Notes:

By Default, Windows 95 does not install the TCP/IP protocol. The TCP/IP protocol is necessary for Internet access. If the TCP/IP Protocol was not installed during the initial installation, it can be installed manually by right-clicking on **Network Neighborhood** and selecting **Properties**. If **Network Neighborhood** is not available, you can access the Network options via, Start, Settings, Control Panel, Network.

Windows 95 Retail, (A or OSR1) does not include drivers for the BX Chipset. Intel offers a Bus Master IDE driver for Windows 95 Retail that reduces the CPU time required for retrieving/storing data on hard drives. **This driver is for retail version of Windows 95 only, do not install this driver in Windows 95OSR2.x versions of Virtual PC.**
Intel 440BX Bus Master IDE Driver for Windows 95

Several large files can be safely deleted from the `C:\win95` directory after the installation is complete, freeing up approximately 35MB of drive space:

1. `WOWKIT.EXE`—20MB, Compuserve ISP software
2. `CS3KIT.EXE`—6MB, Compuserve 3 ISP client
3. `Setup25i.EXE`—2 MB, AOL v.2.5 software
4. `Setup32.EXE`—7 MB, AOL software

References:
MS-DOS Partitioning Summary (Q69912)
Description of Windows 95 OEM Service Release 2 (Q155003)
Windows 95 CD-ROM Directory Listing (1 of 5) (Q135540)
Windows 95 Installation Requirements (Q138349)

Installing VPC Additions

1. Release the mouse pointer from the Windows 98 guest by pressing the *hostkey.*
2. Click **PC** from the guest PC's menu bar.
3. Click **Install/Update Additions**.
4. **License Agreement:** Select **I agree to the terms of this license agreement** and click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows 98

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows 98 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows 98**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.

— Select the guest PC from the PC List and click **Settings**.

— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows 98

9. Starting the Windows 98 installation from CD-ROM.
   a. Insert the Windows 98 CD-ROM into the computer and click **Start Up** to launch the guest PC. **Note:** Not all Windows 98 CD-ROMs are bootable.
      i. If using an ISO image, click **Start Up** and then mount the ISO image. **Note**: you may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
   b. If the CD-ROM is bootable, skip to step 11.
   c. If the CD-ROM is not bootable, see the next step:
10. Starting the Windows 98 installation from Floppy disk:
   a. Insert the Windows 98 CD-ROM and a bootable floppy with CD-ROM drivers (if necessary) and click **Start Up** to start up the guest PC.

      NOTE Make sure that the bootable floppy disk can read FAT32. PC DOS and MS DOS boot disks cannot read FAT32 partitions. See "Creating a Windows 98 SE Emergency Boot Disk (EBD) from PC DOS 2000" on page 21 for instructions on creating a bootable floppy disk with the ability to read FAT32 partitions.

      i. If using an ISO image, click **Start Up**, and mount the ISO image to the guest.
   b. When the floppy has finished booting, change to the CD-ROM drive, usually `D:` or `E:`. To change to drive X:, type `X:` and press **Enter.**
   c. To reduce the installation time, launch `smartdrv.exe`. This file is usually located in the `Win98` directory. Type `smartdrv` and press **Enter** to launch. SmartDRiVe is a disk caching utility that will reduce the amount of time required to copy the setup files. **Note**: this step is not necessary to install Windows 98.
   d. Type `setup` and press **Enter** from the `win98` directory on the CD-ROM.
11. Press **Enter** for the Windows 98 setup to run scandisk and verify the disk.
12. **Microsoft Scandisk:** Press **Tab** to select **Exit** and press **Enter** to exit scandisk and continue the installation.
13. **License Agreement:** Select **I accept the Agreement** and click **Next** to continue the installation.
14. **Product Key:** Enter the 25 digit product key and click **Next** to continue.
15. **Select Directory:** The default directory for Windows 98 is `C:\Windows`, to accept this and continue, click **Next** to continue.
16. **Setup Options:** Select the setup option **Typical** and click **Next** to continue.
17. **User Information:** Enter **Name** and **Company** information and click **Next** to continue.

NOTE Company information is not required, only a name.

18. **Windows Components:** Select **Install the most common components (Recommended** and click **Next** to continue.
19. **Establishing Your Location:** Select the appropriate country or region from the list and click **Next** to continue.
20. **Startup Disk:** Click **Next** to launch the Startup Disk Wizard.
    a. Insert Disk:
       i. To cancel and not make a Startup Disk, click **Cancel**.
       ii. To create a Startup Disk, insert a blank floppy disk or capture a floppy disk image (.VFD) using the VPC Toolbar and click **OK** to continue. **Note:** see "Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images" on page 16 for details on creating a floppy disk image.
       iii. Remove the floppy disk, or release the disk image and click **OK** to continue.
21. **Start Copying Files:** click **Next** to begin copying the Windows 98 files to the guest PC.
22. **Restart Computer:** When Setup has finished copying files, click **Restart Now** or wait and let Setup restart the guest PC.

    NOTE Be sure to remove any floppy disks, floppy disk images, or CD-ROMs before restarting the Windows 98 guest PC.
23. **Network:** Click **OK** to provide a computer and workgroup name.
    a. Enter a unique **Computer name**, **Workgroup**, and, if desired, a **Computer Description**.
    b. Click **Close.**
24. **Date/Time Properties:** Select the correct **Time Zone**.
    a. Click **Date & Time** to verify the date and time, adjust if necessary.
    b. Click **Close**.
25. **Restart Computer:** When Setup has finished copying files, click **Restart Now** or wait and let Setup restart the guest PC.

    NOTE Be sure to remove any floppy disks, floppy disk images, or CD-ROMs before restarting the Windows 98 guest PC.
26. **Enter Network Password:** The Windows 98 installation is nearly complete. There is no password set up yet. Click **OK** to log onto Windows 98.
27. Windows will finalize the installation and boot to the desktop. Installation is complete.

Installing VPC Additions

1. Release the mouse pointer from the Windows 98 guest by pressing the *hostkey.*
2. Click **PC** from the guest PC's menu bar.
3. Click **Install/Update Additions**.
4. **License Agreement:** Select **I agree to the terms of this license agreement** and click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows NT 4

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *`diskname`*.

Creating a new Windows NT 4 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows NT**. Click **Next** to continue. With Windows NT, the New PC Wizard will create a 2GB FAT16 disk image. Use the Virtual Disk Wizard, see "Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images" on page 16, to create a custom disk image.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save**) then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows NT 4

9. Installing Windows NT via bootable CD-ROM:
   a. Insert the Windows NT CD-ROM in the host PC and click **Start Up**.
      i. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
   b. If the CD-ROM is bootable, the Windows setup will begin loading.
   c. **Welcome to Setup:** Press **Enter** to continue the installation., Skip to step 11.
   d. If the CD-ROM is not bootable, see the next step:
10. Starting the Windows NT installation from floppy disk:
   a. Windows NT should include 3 floppy disks to begin the Windows NT setup. These disks can also be created manually.
      i. Boot the PC DOS 2000 guest included with Virtual PC. Only the retail version of Virtual PC 5.x includes PC DOS 2000. To setup and configure PC DOS 2000, see "MS DOS and PC DOS 2000" on page 24.
      ii. Three floppy disks or floppy disk images are required.
      iii. To create floppy disk images, see "Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images" on page 20.
      iv. Mount the Windows NT CD-ROM in the PC DOS guest.
      v. At the *C:*\> in PC DOS, type `e:` and press **Enter**.
      vi. Change to the *i386* directory by typing `cd\i386` and press **Enter.**
      vii. Run the Windows NT setup to create the disks by typing `winnt /ox` and press **Enter.** This launches the Windows NT setup.

viii. Press **Enter** to accept the location where the Windows NT setup files are located.

ix. Insert/mount a blank floppy disk/disk image that will be the *Windows NT Workstation Setup Disk #3* and press **Enter.**

x. When prompted, insert/mount the next blank floppy disk/disk image that will be the *Windows NT Workstation Setup Disk #2* and press **Enter.**

xi. Again, when prompted, insert/mount the next blank floppy disk/disk image that will be the *Windows NT Workstation Setup Boot Disk* and press **Enter.**

xii. Eject/unmount the Windows NT CD-ROM and floppy disk and shutdown the PC DOS 2000 guest PC.

b. Start up the Windows NT guest by selecting it from the PC List and clicking **Start Up.**

i. Insert/mount the Windows NT 4 CD-ROM and the *Windows NT Workstation Setup Boot Disk*

c. At the prompt, insert *Windows NT Workstation Setup Disk #2* and press **Enter**.

d. **Welcome to Setup:** Press **Enter** to continue the installation.

e. Press **Enter** to begin Setup's mass storage device detection.

f. At the prompt, insert *Windows NT Workstation Setup Disk #3* and press **Enter**.

11. **IDE CD-ROM (ATAPI 1.2)/PCI IDE Controller**: Press **Enter** to continue.
12. Setup may inform you that your disk has more than 1024 cylinders, press **Enter** to continue. This will only occur if you are using a custom disk image, as the New PC Wizard creates to a 2GB FAT16 disk image for Windows NT guests.
13. Setup may warn you that your hard disk is new or been erased, press **C** to continue setup.
14. **Windows NT Licensing Agreement:** Press **PAGE_DOWN** to reach the end of the agreement. If you agree to the licensing, press **F8**.
15. Press **Enter** to accept the hardware and software components determined by Windows Setup.
16. Windows NT 4 Setup will not accept and install on a boot partition greater than 4GB. If you have created a larger custom disk image, you will need to create a partition on it using Windows Setup that is 4GB or less.

    a. Creating a partition:

    i. Press **c** to **Create Partition**

    ii. Enter a partition size of 4GB or less and press **Enter**.

    b. Press **Enter** to install Windows on the selected partition.

    c. Partition format: if you have an unformatted partition you have the option to format it with FAT or NTFS. If the partition is already formatted, you will have the option of reformatting it, converting it to NTFS, or leaving it intact. Select the option you want and press **Enter**.

    NOTE Formatting with FAT will limit the boot partition to 2GB, regardless of the disk image's size. If you created a partition larger than 2GB, it should be formatted with NTFS.

    d. Follow the on-screen instructions required to complete the format, if necessary.
17. Install location: the default location for Windows NT is the *\winnt* directory. To accept the default, press **Enter**.
18. Press **Enter** to allow Setup to perform an exhaustive examination of the hard drive.
19. When prompted that the first portion of Setup is complete, remove any floppy disk, floppy disk images, CD-ROMs, or .ISO images and press **Enter** to restart the guest PC.

20. **Insert Disk**: Insert or mount the Windows NT CD-ROM or .ISO Image and click **OK**.
21. **Files Needed:** Click **OK** to continue the installation.

    NOTE This may not occur on all installations.
22. **Windows NT Setup:** Click **Next** to continue.
23. **Setup Options:** Select **Typical** and click **Next**.
24. **Name and Organization:** Enter your **Name** and **Organization**. Click **Next**.
25. **Registration:** Enter your **CD Key** and click **Next**.
26. **Computer Name:** Enter the **Name** the guest PC will be identified with. This should be a unique name.
27. **Administrator Account:** Enter a **Password** for the Administrator account and confirm the password.
28. **Emergency Repair Disk:** If you would like to create an ERD, click **Yes** and follow the on-screen instructions, otherwise select **No** and click **Next**. An ERD can be created after the installation has completed also.
29. **Windows NT Components:** Click **Next** to **Install the most common components (recommended)**.
30. **Windows NT Setup:** Click **Next** to continue.
31. **Windows NT needs to know how this computer should participate on a network:** Click **Next**.to accept the default **This computer will participate on a network**.
32. **Network Adapter:** Click **Start Search** to locate the network adapter. Setup should locate the **DEC PCI Fast Ethernet DECchip 21140**. Click **Next**.
33. **Network Protocol:** Click **Next** to accept the default protocol of TCP/IP.
34. Click **Next** to install selected components.
35. **DEC DECchip 21140 Based Adapter Setup:** Click **Continue** to accept the default network adapter settings.
36. **TCP/IP Setup:** If you have a DHCP server on your network, are using Shared Networking, or are unsure, click **Yes**, otherwise click **No**. If you click **No**, you will need to manually enter in the correct TCP/IP information for your network. DHCP settings can also be changed after the installation completes.
37. Click **Next** to start the network.
38. Setup will now allow you to either have Windows NT join a domain or a workgroup. If you are unsure, click **Next** and join the default **Workgroup**: Workgroup.
    a. To join a domain, click **Domain** and enter in the domain you wish to join.
    b. If a computer account needs to be created, select **Create a Computer Account in the Domain**. You will need network administrative privileges to add an account to the domain.
    c. Enter a domain **User Name** and **Password** with the add workstations to the specified domain. Click **OK**.
39. Click **Finish** to continue.
40. **Date/Time Properties:** Select the correct time zone and click **Close**.
41. **Detected Display:** Click **OK**.
42. **Display Properties:** Select a **Color Palette** and **Desktop Area** and click **Test**.
43. **Testing Mode:** Click **OK**.

44. **Testing Mode:** If you saw the test bitmap, click **Yes**, otherwise click **No** and adjust your **Desktop Area** and/or **Color Palette.**
45. **Display Settings:** Click **OK** to save the display settings.
46. **Display Properties:** Click **OK** to continue.
47. **Windows NT Setup:** Click **Restart Computer** to complete the installation are reboot the guest PC. Make sure to remove the CD-ROM or ISO image before restarting.

Installing the VPC Additions in Windows NT 4

The VPC Additions require Service Pack 3 or higher.

1. Log on to Windows with local Administrator rights.
2. Once Windows has finished loading and at the desktop, press the *hostkey* to release the mouse and click **PC** from the Windows NT guest menu bar.
3. Select **Install/Update Additions**. This will launch a Setup Wizard to guide you through installing the VPC Additions in Windows.
4. **License Agreement:** Read the License Agreement and select **I agree to the terms of this license agreement**. Click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.
7. **Restart Guest OS:** click **Finish** to restart the Windows 2000 guest PC and reboot with the VPC Additions.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows 2000

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows 2000 Professional guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows 2000**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save**) then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows 2000 Professional

9. Installing Windows 2000 via bootable CD-ROM:
   a. Insert the Windows 2000 CD-ROM in the host PC.
      i. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
   b. Click **Start Up**. If the CD-ROM is bootable, when prompted, press any key to boot from the CD-ROM. Skip to step 11.
   c. If the CD-ROM is not bootable, see the next step:
10. Starting the Windows 2000 installation from Floppy disk:
   a. Windows 2000 CD-ROMs include 4 floppy disk images for booting. These images can be directly mounted in Virtual PC and booted from. The floppy disk images are located in the `BOOTDISK` directory of the Windows 2000 CD-ROM, the files are: `cdboot1.img`, `cdboot2.img`, `cdboot3.img`, and `cdboot4.img`.
   b. Copy the four boot disk images to an easily accessible location on the host machine.
   c. Click **Start Up** and mount the first disk image, `cdboot1.img`. If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. Alternately, press the *hostkey*+**R** to restart the system with the floppy disk image.
   d. Verify that the Windows 2000 CD-ROM or ISO image is mounted in the guest PC. Follow the on-screen prompts and mount the remaining three floppy disk images when asked.

NOTE After setup copies files from the CD-ROM, be sure to remove the floppy disk image before rebooting.

11. **Welcome to Setup:** Press **Enter** to set up Windows 2000.
12. **Windows 2000 Licensing Agreement:** Read the license agreement, press **F8** to accept the license and continue the installation.
13. The default drive image created by the New PC wizard for Windows 2000 guests is a 16GB FAT32 partition. To accept the default size and format, press **Enter** to continue. Note: the next step will allow the partition to be formatted in NTFS.
14. Press **Enter** to leave the current file system intact, or use the arrow keys to select an alternate option: **Format the partition using NTFS file system, Format the partition using the FAT file system, or Convert the partition to NTFS.** To install Windows 2000 on an NTFS partition, select **Format the partition using the NTFS file system** and press **Enter**.

    NOTE If a custom disk image was created and the **Unformatted** option was selected, the only options available will be **Format the partition using NTFS file system or Format the partition using the FAT file system**, select the partition type and press **Enter** to format the drive image. Verify the format by pressing **F**.

15. **Regional Settings:** Click **Next** to accept the default settings and continue.
    a. Click **Customize** to change the system locale, user locale, and/or the keyboard layout.
16. **Personalize Your Software:** enter a name and optionally an organization. Click **Next** to continue.
17. **Your Product Key:** Enter the 25-character Product key from the Windows 2000 Certificate of Authenticity. Click **Next** to continue.
18. **Computer Name and Administrator Password:** Setup will suggest a computer name, or enter a custom name. Enter an Administrator password and confirm it. Click **Next** to continue.
19. **Date and Time Settings:** Verify the correct date and time are displayed, click **Next** to continue.
20. **Network Settings:** Select **Typical Settings** and click **Next** to continue.
21. **Workgroup or Computer Domain:** Select whether this Windows 2000 installation will be part of a domain or workgroup. Click **Next** to continue.

    NOTE It is also possible to join the Windows 2000 guest to a domain after the installation has completed. To join a domain, a user account with permissions to add a computer account to the domain is necessary. Select **No, this computer is not on a network, or is on a network without a domain** and click **Next**.

22. **Completing the Windows 2000 Setup Wizard:** remove or release and CD-ROM or ISO image and click **Finish** to restart Windows 2000.
23. **Welcome to the Network Identification Wizard:** click **Next** to continue.
24. **Users of This Computer:** select an option for logging in. Select **Users must enter a user name and password to use this computer** and click **Next**.
25. **Completing the Network Identification Wizard:** click **Finish.**

Installing the VPC Additions in Windows 2000 Professional

1. Log on to Windows with local Administrator rights.

2. Once Windows has finished loading and at the desktop, press the *hostkey* to release the mouse and click **PC** from the Windows 2000 guest menu bar.
3. Select **Install/Update Additions**. This will launch a Setup Wizard to guide you through installing the VPC Additions in Windows.
4. **License Agreement:** Read the License Agreement and select **I agree to the terms of this license agreement**. Click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.
7. **Restart Guest OS:** click **Finish** to restart the Windows 2000 guest PC and reboot with the VPC Additions.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows ME

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows Me guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows Me**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default 16GB FAT32 image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows Me

9. Insert the Windows Me CD-ROM, select the Windows ME guest PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and mount the Windows Me ISO image.**Note:** you may need to reset the guest PC to boot from the ISO image. Press *hostkey*+**R** to reset the guest PC.
10. Press **Enter** for the Windows ME setup to run scandisk and verify the disk.
11. **Welcome to Windows Me Setup:** Click **Next** to begin the Windows Me Setup.
12. **License Agreement:** Select **I accept the Agreement** and click **Next** to continue.
13. **Windows Product Key:** Enter the 25-digit product key and click **Next** to continue.
14. **Select Directory:** Select the directory to install Windows Me, select **C:\Windows (recommended)** and click **Next.**
15. **Setup Options:** Select **Typical** and click **Next**.
16. **User Information:** Enter a **Name**, and optionally, **Company**. Click **Next** to continue.
17. **Windows Components:** Select **Install the most common components (Recommended)** and click **Next**.
18. **Network Identification:** Enter the correct network information. If the correct Workgroup is unknown, leave it at the default **Workgroup**. The computer name, workgroup, and description can be modified at the completion of the setup. Click **Next** to continue.
19. **Country/Region:** Select the appropriate country or region and click **Next** to continue.
20. **Establishing Your Time Zone:** Select the correct time zone and click **Next** to continue.
21. **Startup Disk:** Click **Next** to launch the Startup Disk Wizard.
    a. Insert Disk:
       i. To cancel and not make a Startup Disk, click **Cancel**.
       ii. To create a Startup Disk, insert a blank floppy disk or capture a floppy disk image (.vfd) using the VPC Toolbar and click **OK** to continue.

    NOTE See See "Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images" on page 20.

b. Remove the floppy disk, or release the disk image and click **OK** to continue

22. **Ready to Begin Copying Files:** Click **Finish** to complete the Windows Me setup and begin copying files.
23. **Restart Computer:** When Setup has finished copying files, click **Restart Now** or wait and let Setup restart the guest PC.

    NOTE Be sure to remove any floppy disks, floppy disk images, or CD-ROMs before restarting the Windows Me guest PC.

24. **Enter Network Password:** The Windows Me installation is nearly complete. There is no password set up yet. Click **OK** to log onto Windows Me.
25. After the initial video introduction has played, click **Exit** to get to the Windows desktop.
26. Installation is complete.

Installing VPC Additions

1. Release the mouse pointer from the Windows Me guest by pressing the *hostkey*.
2. Click **PC** from the guest PC's menu bar.
3. Select **Install/Update Additions**.
4. **License Agreement:** Select **I agree to the terms of this license agreement** and click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.
7. **Restart Guest OS:** click **Finish** to restart the Windows Me guest PC and reboot with the VPC Additions

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows XP Professional

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows XP Professional guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows XP**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

- The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
- Select the guest PC from the PC List and click **Settings**.
- Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
- For LPT1, select **Host parallel port** and select a host parallel port to emulate.
- For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
- Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows XP Professional

9. Installing Windows XP via bootable CD-ROM:
   a. Insert the Windows XP CD-ROM in the host PC and click **Start Up**.
      i. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.

   b. When prompted, press any key to boot from the CD-ROM.
10. **Welcome to Setup:** Press **Enter** to set up Windows XP.
11. **Windows XP Licensing Agreement:** Read the license agreement, press **F8** to accept the license and continue the installation.
12. The default drive image created by the New PC wizard for Windows XP guests is a 16GB FAT32 partition. To accept the default size and format, press **Enter** to continue.

    NOTE The next step will allow the partition to be formatted in NTFS.
13. Press **Enter** to leave the current file system intact, or use the arrow keys to select an alternate option: **Format the partition using NTFS file system (Quick), Format the partition using the FAT file system (Quick), Format the partition using NTFS file system, Format the partition using the FAT file system, or Convert the partition to NTFS.** To install Windows XP on an NTFS partition, select **Format the partition using the NTFS file system (Quick)** and press **Enter**.

    NOTE If a custom disk image was created and the **Unformatted** option was selected, the only options available will be **Format the partition using NTFS file system (Quick), Format the partition using the FAT file system (Quick), Format the partition using NTFS file system**

or Format the partition using the FAT file system, select the partition type and press **Enter** to format the drive image. Verify the format by pressing **F**, if necessary.

14. **Regional and Language Settings:** Click **Next** to accept the default settings and continue.
    a. Click **Customize** to change the regional and language settings.
    b. Click **Details** to change the text input language and method.
15. **Personalize Your Software:** enter a name and optionally an organization. Click **Next** to continue.
16. **Your Product Key:** Enter the 25-character Product key from the Windows XP Certificate of Authenticity. Click **Next** to continue.
17. **Computer Name and Administrator Password:** Setup will suggest a computer name, or enter a custom name. Enter an Administrator password and confirm it. Click **Next** to continue.
18. **Date and Time Settings:** Verify the correct date and time are displayed, click **Next** to continue.
19. **Network Settings:** Select **Typical Settings** and click **Next** to continue.
20. **Workgroup or Computer Domain:** Select whether this Windows XP installation will be part of a domain or workgroup. Click **Next** to continue.

    NOTE It is also possible to join the Windows XP guest to a domain after the installation has completed. To join a domain, a user account with permissions to add a computer account to the domain is necessary.

21. **Display Settings:** Click **Ok** to continue.
22. **Monitor Settings:** Click **Ok** if the text box is readable.
23. **Welcome to Microsoft Windows:** Click **Next** to continue.
24. **Checking Internet connectivity:** If there is no Internet connection, click **Skip.**
25. **How will this computer connect to the Internet:** Select the type of connection you have and click **Next**, or click **Skip** to cancel.
26. **Ready to Activate Windows:** Select **Yes** or **No** and click **Next**.
27. **Register with Microsoft:** Select whether or not to register with Microsoft and click **Next.**
28. **Who will use this computer:** Enter at least one name and click **Next.**
29. Click **Finish** to complete setup.

Installing the VPC Additions in Windows XP Professional

1. Log on to Windows with local Administrator rights.
2. Once Windows has finished loading and at the desktop, press the *hostkey* to release the mouse and click **PC** from the Windows XP guest menu bar.
3. Select **Install/Update Additions**. This will launch a Setup Wizard to guide you through installing the VPC Additions in Windows.
4. **License Agreement:** Read the License Agreement and select **I agree to the terms of this license agreement**. Click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.
7. **Restart Guest OS:** click **Finish** to restart the Windows XP guest PC and reboot with the VPC Additions.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

Microsoft Windows XP Home

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

Creating a new Windows XP Home guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Windows XP**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Windows XP Home

9. Installing Windows XP via bootable CD-ROM:
   a. Insert the Windows XP CD-ROM in the host PC and click **Start Up**.
      i. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
   b. When prompted, press any key to boot from the CD-ROM.
10. **Welcome to Setup:** Press **Enter** to set up Windows XP.
11. **Windows XP Licensing Agreement:** Read the license agreement, press **F8** to accept the license and continue the installation.
12. The default drive image created by the New PC wizard for Windows XP guests is a 16GB FAT32 partition. To accept the default size and format, press **Enter** to continue.

    NOTE The next step will allow the partition to be formatted in NTFS.
13. Press **Enter** to leave the current file system intact, or use the arrow keys to select an alternate option: **Format the partition using NTFS file system (Quick), Format the partition using the FAT file system (Quick), Format the partition using NTFS file system, Format the partition using the FAT file system, or Convert the partition to NTFS.** To install Windows XP on an NTFS partition, select **Format the partition using the NTFS file system (Quick)** and press **Enter**.

    NOTE If a custom disk image was created and the **Unformatted** option was selected, the only options available will be **Format the partition using NTFS file system (Quick), Format the partition using the FAT file system (Quick), Format the partition using NTFS file system**

or Format the partition using the FAT file system, select the partition type and press **Enter** to format the drive image. Verify the format by pressing **F**, if necessary.

14. **Regional and Language Settings:** Click **Next** to accept the default settings and continue.
    a. Click **Customize** to change the regional and language settings.
    b. Click **Details** to change the text input language and method.
15. **Personalize Your Software:** enter a name and optionally an organization. Click **Next** to continue.
16. **Your Product Key:** Enter the 25-character Product key from the Windows XP Certificate of Authenticity. Click **Next** to continue.
17. **Computer Name:** Setup will suggest a computer name, or enter a custom name. Click **Next** to continue.
18. **Date and Time Settings:** Verify the correct date and time are displayed, click **Next** to continue.
19. **Network Settings:** Select **Typical Settings** and click **Next** to continue.
20. **Display Settings:** click **Ok** to continue.
21. **Monitor Settings:** click **Ok** if the text box is readable.
22. **Welcome to Microsoft Windows:** click **Next** to continue.
23. **Checking Internet connectivity:** if there is no Internet connection, click **Skip.**
24. **Will this computer connect to the Internet directly, or through a network:** select the type of connection you have and click **Next**, or click **Skip** to cancel.
25. **Ready to activate Windows?:** Select **Yes** or **No** and click **Next**.
26. **Register with Microsoft:** Select whether or not to register with Microsoft and click **Next.**
27. **Who will use this computer:** enter at least one name and click **Next.**
28. Click **Finish** to complete setup.

Installing the VPC Additions in Windows XP Home

1. Log on to Windows.
2. Once Windows has finished loading and at the desktop, press the *hostkey* to release the mouse and click **PC** from the Windows XP guest menu bar.
3. Select **Install/Update Additions**. This will launch a Setup Wizard to guide you through installing the VPC Additions in Windows.
4. **License Agreement:** Read the License Agreement and select **I agree to the terms of this license agreement**. Click **Next** to continue.
5. **Information:** Click **Next** after reading the VPC Additions information.
6. **Ready to Install:** Click **Next** to proceed with the installation.
7. **Restart Guest OS:** click **Finish** to restart the Windows XP guest PC and reboot with the VPC Additions.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- SyncTime between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

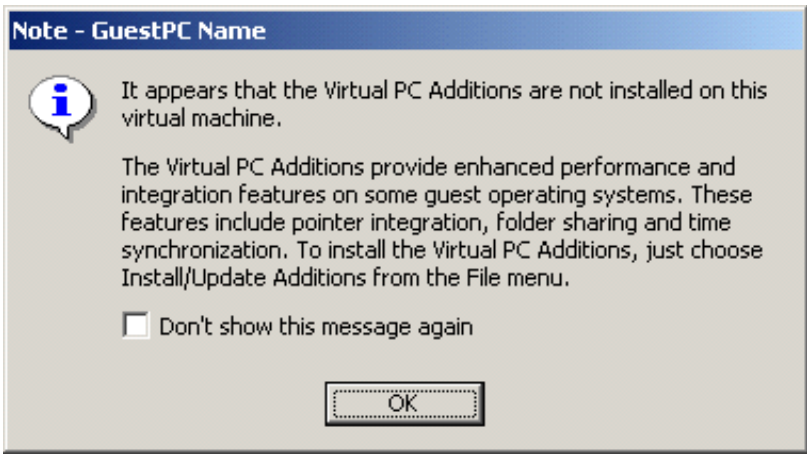
Red Hat Linux 7.3

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Red Hat Linux 7.3 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Red Hat Linux 7.3

9. Insert the Red Hat Linux disc 1 CD-ROM in the host PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

   NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
10. **Welcome to Red Hat Linux 7.3 (**text**):** Press **Enter** to install Linux.
11. **Welcome to Red Hat Linux:** Click **Next** to begin the installation process.
12. **Language Selection:** Select the correct language and click **Next**.
13. Keyboard Configuration:
    a. **Model:** Select **Generic 105-Key (Intl) PC**
    b. **Layout:** Select **U.S. English**

    NOTE Select the correct layout for your installation

    c. **Dead Keys:** Select **Enable dead keys**.
    d. Click **Next** to continue.
14. **Mouse Configuration:** select **3 Button Mouse (PS/2)** ** (Microsoft Intellimouse PS/2) and click **Next**.
15. **Install Options:** Select **Install - Workstation** and click **Next**.
16. **Choosing Your Partitioning Strategy:** Select **Have the installer automatically partition for you** and click **Next.**
    a. Click **Yes** to confirm the drive initialization.
17. **Automatic Partitioning:** Select **Remove all partitions on this system** and click **Next**.
    a. Click **Yes** to confirm the removal of all partitions.
18. **Partitions:** Click **Next** to accept the partition scheme.
19. **Boot Loader Installation:** Accept the default selections and click **Next**.
20. **GRUB Password:** Select **Use a GRUB Password,** enter and verify a GRUB password, if desired, click **Next**.
21. **Network Configuration:** Accept the defaults, **Configure using DHCP** and **Activate on boot** and click **Next**.
22. **Firewall Configuration:** Accept the default selections and click **Next**.
23. **Language Support Selection:** Select any additional languages and click **Next.**
24. **Time Zone Selection:** Select the correct time zone and click **Next**.
25. **Account Configuration:** Enter a root password, re-enter the root password to confirm it. Click **Add** to create at least one additional account.
    a. **Add a New User:** Enter a user name, full name, and password, click **Ok.**
    b. Click **Next** to continue.
26. **Selecting Package Groups:** select **KDE, Software Development,** and **Games and Entertainment**. Click **Next**.

27. **Video Configuration:** Select the **S3 Trio64V+ (generic)** video card with **4MB** of video card RAM and click **Next**.
28. **About the install:** Click **Next** to begin the writing the Red Hat Linux OS to the hard drive.
29. **Please insert disc 2 to continue:** Insert and capture or mount disc 2, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
30. **Please insert disc 3 to continue:** Insert and capture or mount disc 3, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
31. **Boot Disk Creation:** insert a floppy disk or floppy disk image and click **Next**. Select **Skip boot disk creation** and click **Next** to skip creating the disk.
32. **Monitor Selection:** Select **Unprobed Monitor** and click **Next**.
33. **Custom X Configuration:**
    a. Select a **Color Depth** and **Screen Resolution;** click **Test Setting** to verify. The following resolutions will work with Virtual PC:
       i. 256 Colors (8 Bit): 1280x1024, 1152x854, 1024x768, 800x600, 640x480
       ii. High Color (16 Bit): 1024x768, 800x600, 640x480
       iii. True Color (24 Bit): 800x600, 640x480
    b. **Choose your default desktop environment:** Select either **GNOME** or **KDE.**
    c. **Choose your login type:** Select **Graphical** or **Text**
    d. Click **Next**.
34. **Congratulations:** Red Hat Linux 7.3 installation is complete. Remove or release any floppy disk, floppy disk images, CD-ROM or ISO images and click **Exit**.
35. After system reboots, log in as a user created in step 25.
    a. **KDE KPersonalizer**:
       i. **Introduction:** Choose a county and language for KDE, click **Next**.
       ii. **System Behavior:** select a preferred system behavior and click **Next.**

    NOTE Selecting an option will display a description.

       iii. **Eyecandy-O-Meter:** adjust the slider to increase or decrease visual effects and click **Next.**

    NOTE Increasing visual effects will reduce the guest's overall performance.

       iv. **Everybody loves Themes:** Select a color theme and click **Next**.
       v. **Configure the KDE Panel:** Select the **Amount of application icons in the panel** and click **Next**.
       vi. **Time to Refine:** click **Finish**.

Configure Sound in Red Hat Linux 7.3

1. Log into Red Hat Linux.
2. Click **Ok** to clear the Sound Server informational message.
3. Start a console, click the computer screen from the kicker panel.
4. Click **Session** from the console menu, and select **New root console.**
5. Enter the root password and press **Enter**.
6. Type `cd /sbin` and press **Enter**
7. Type `./sndconfig` and press **Enter**.

8. **Introduction:** Press **Enter**.
9. **Probe Results:** Press **Enter**.
10. **Card Type:** Select **Sound Blaster 16** and press **Enter**.
11. **Card Settings:**
    a. **I/O Port:** Select **0x220** and press **Tab.**
    b. **IRQ:** Select **5** and press **Tab.**
    c. **DMA 1:** Select **1** and press **Tab.**
    d. **DMA 2:** Select **5** and press **Tab.**
    e. **MPU I/O:** Select **0x330** and press **Tab.**
    f. Press **Enter**
12. **Sound Card Test:** Press **Enter**

    NOTE Sound volume may be very low, adjust speakers accordingly.
13. **Test Result:** Press **Enter** if sound was heard, if not, **Tab** to select **No** and press **Enter**.

    NOTE If no sound was heard, the most likely cause is lack of volume
14. **File Exists:** press **Enter** to overwrite the existing config file.
15. Type `exit` and press **Enter** to exit the root console.
16. Type `exit` and press **Enter** to exit the standard console.

Configure Time Sync Addition in Red Hat Linux 7.3 (Unsupported)

NOTE Connectix offers an unsupported time sync addition for Linux and BSD guests; however, Connectix does not support the time sync addition.

1. Log onto Red Hat Linux as root.
2. Launch an Internet browser.
3. In the address bar, type `ftp://linuxadditions:password@care.connectix.com/users/linuxadditions`
4. From the *`LinuxAdditions`*, download *vpctimed-1.0-src.tar.gz* , and save to / (root) directory.
5. Open a console: click the console icon on the kicker panel
6. Change to the root directory: type `cd /` and press **Enter**. Verify that *vpctimed-1.0-src.tar.gz* is available, type `ls` and press **Enter.**
7. Unzip and untar the file: type `gzip -cd vpctimed-1.0-src.tar.gz | tar -xvf -`
8. Change to the *vpctimed* directory: type `cd vpctimed` and press **Enter.**
9. Change to the *linux* directory: type `cd linux` and press **Enter.**
10. Compile the program: type `make` and press **Enter.**
11. Install the software: type `make install` and press **Enter.**
12. Type `exit` and press **Enter.**
13. Restart Linux and the time sync addition will load automatically.

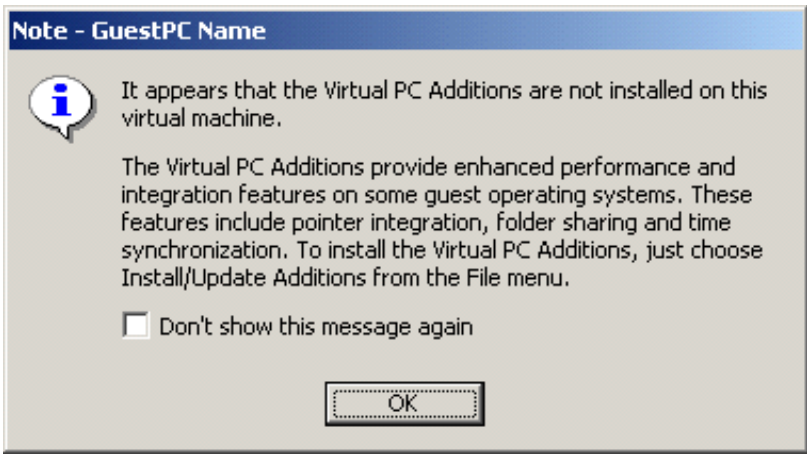
Red Hat Linux 8.0

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Red Hat Linux 8.0 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue. 128MB of RAM is recommended as a minimum with Red Hat 8.0
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Red Hat Linux 8.0

9. Insert the Red Hat Linux disc 1 CD-ROM in the host PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
10. **Red Hat Linux 8.0:** Press **Enter** to install Linux.
11. **CD Found:** Select **Skip** and press **Enter**.
12. **Welcome to Red Hat Linux:** Click **Next** to begin the installation process.
13. **Language Selection:** Select the correct language and click **Next**.
14. **Keyboard**: Select the appropriate keyboard and click **Next**.
15. **Mouse Configuration:** select **Microsoft Intellimouse** and click **Next**.
16. **Installation Type:** Select **Personal Desktop** and click **Next**.
17. **Disk Partitioning Setup:** Select **Automatically partition for you** and click **Next.**
    a. **Warning:** Click **Yes** to confirm the drive initialization.
18. **Automatic Partitioning:** Select **Remove all partitions on this system** and click **Next**.
    a. **Warning:** Click **Yes** to confirm the removal of all partitions.
19. **Boot Loader Configuration:** Accept the default selections and click **Next**.
20. **Network Configuration:** Accept the defaults, **DHCP, eth0** and **Activate on boot**.
    a. **Hostname:** Select **manually** and enter a name for the system, if desired. Click **Next**.
21. **Firewall Configuration:** Accept the default selections and click **Next**.
22. **Additional Language Support:** Select any additional languages and click **Next.**
23. **Time Zone Selection:** Select the correct time zone and click **Next**.
24. **Account Configuration:** Enter a root password, re-enter the root password to confirm it. Click **Add** to create at least one additional account.
    a. **Add a New User:** Enter a user name, password, and full name, click **Ok.**
    b. Click **Next** to continue.
25. **Personal Desktop Defaults:** To add additional packages like KDE, select **Customize the set of packages to be installed** and click **Next**.
    a. **Package Group Selection:** Click **Details** for the **Sound and Video** package and select **sndconfig**. sndconfig is required to configure the Sound Blaster 16 sound card. Click **OK**.
    b. Select **Development-Development Tools** to install **make** and **gcc** required for the host to guest time sync daemon installation below.
    c. Select any other packages wanted and click **Next** to install.
26. **About to Install:** Click **Next** to begin the installation.
27. **Please insert disc 2 to continue:** Insert and capture or mount disc 2, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
28. **Please insert disc 3 to continue:** Insert and capture or mount disc 3, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
29. **Boot Disk Creation:**

   a. To create a boot diskette, insert a floppy disk or floppy disk image and click **Next**. Click **Make boot disk**.
   b. Select **No, I do not want to create a boot disk** and click **Next** to skip creating the disk.
30. **Graphical Interface (X) Configuration:**
   a. Select **Other-VESA driver (generic)**
   b. Select **8MB** for **Video card RAM**
   c. Click **Next**.
31. **Monitor Configuration:** Select a generic monitor that is close the that actual monitor, or laptop screen that is close. Click **Next** to continue.
32. **Customize Graphical Configuration:** Select a **Color Depth** and **Screen Resolution**. Virtual PC does not support 15 or 24-bit color depths. Click **Next** to continue. Do not test the resolution as a driver bug will cause the screen to redisplay incorrectly.
33. **Congratulations:** Red Hat Linux 8.0 installation is complete. Remove or release any floppy disk, floppy disk images, CD-ROM or ISO images and click **Exit**.
34. After system reboots, log in as a user created in step 24.

Configure Sound in Red Hat Linux 8.0

1. Log into Red Hat Linux.
2. Start a terminal session, click the 'Red Hat', **System Tools**, then **Terminal**.
3. Type `su` and press **Enter**.
4. Enter the root password and press **Enter**.
5. Type `cd /sbin` and press **Enter**
6. Type `./sndconfig` and press **Enter**.
7. **Introduction:** Press **Enter**.
8. **Probe Results:** Press **Enter**.
9. **Card Type:** Select **Sound Blaster 16** and press **Enter**.
10. **Card Settings:**
   a. **I/O Port:** Select **0x220** and press **Tab.**
   b. **IRQ:** Select **5** and press **Tab.**
   c. **DMA 1:** Select **1** and press **Tab.**
   d. **DMA 2:** Select **5** and press **Tab.**
   e. **MPU I/O:** Select **0x330** and press **Tab.**
   f. Press **Enter**
11. **Sound Card Test:** Press **Enter**

   NOTE Sound volume may be very low, adjust speakers accordingly.

12. **Test Result:** Press **Enter** if sound was heard, if not, **Tab** to select **No** and press **Enter**.

   NOTE If no sound was heard, the most likely cause is lack of volume

13. **File Exists:** press **Enter** to overwrite the existing config file.
14. Type `exit` and press **Enter** to exit the root console.
15. Type `exit` and press **Enter** to exit the standard console.

Configure Time Sync Addition in Red Hat Linux 8.0 (Unsupported)

NOTE Connectix offers an unsupported time sync addition for Linux and BSD guests; however, Connectix does not support the time sync addition. To install the timesync daemon, the **make** and **gcc** utilities and libraries must be installed.

1. Log onto Red Had Linux.
2. Launch an Internet browser.
3. In the address bar, type `ftp://linuxadditions:password@care.connectix.com/users/linuxadditions`
4. From *`LinuxAdditions`*, download *vpctimed-1.0-src.tar.gz* , and save to */tmp* directory.
5. Open a console: click the console icon on the kicker panel. Open a root console.
6. Change to the root directory: type `cd /tmp` and press **Enter**. Verify that *vpctimed-1.0-src.tar.gz* is available, type `ls` and press **Enter.**
7. Unzip and untar the file: type `gzip –cd vpctimed-1.0-src.tar.gz | tar –xvf –`
8. Change to the *vpctimed* directory: type `cd vpctimed` and press **Enter.**
9. Change to the *linux* directory: type `cd linux` and press **Enter.**
10. Compile the program: type `make` and press **Enter.**
11. Install the software: type `make install` and press **Enter.**
12. Type `exit` and press **Enter** to exit the root console.
13. Type `exit` and press **Enter** to exit the terminal session.

Restart Linux and the time sync addition will load automatically.

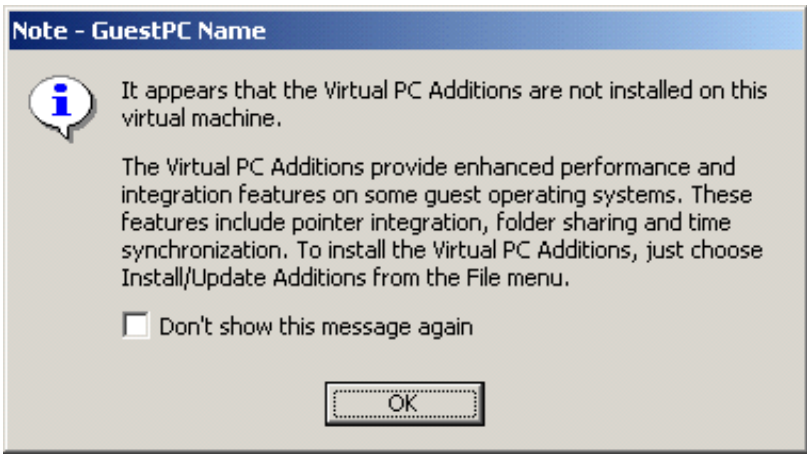
Red Hat Linux 9.0

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *`diskname`*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Red Hat Linux 9.0 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue. 128MB of RAM is the minimum RAM for a graphical installation of Red Hat 9.0, 192MB is recommended.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Red Hat Linux 9.0

9. Insert the Red Hat Linux disc 1 CD-ROM in the host PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

      NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
10. **Red Hat Linux 9.0:** Press **Enter** to install Linux.
11. **CD Found:** Select **Skip** and press **Enter**.
12. **Welcome to Red Hat Linux:** Click **Next** to begin the installation process.
13. **Language Selection:** Select the correct language and click **Next**.
14. **Keyboard**: Select the appropriate keyboard and click **Next**.
15. **Mouse Configuration:** select **Generic Wheel Mouse (PS/2)** and click **Next**.
16. **Installation Type:** Select **Personal Desktop** and click **Next**.
17. **Disk Partitioning Setup:** Select **Automatically partition for you** and click **Next.**
    a. **Warning:** Click **Yes** to confirm the drive initialization.
18. **Automatic Partitioning:** Select **Remove all partitions on this system** and click **Next**.
    a. **Warning:** Click **Yes** to confirm the removal of all partitions.
19. **Boot Loader Configuration:** Accept the default selections and click **Next**.
20. **Network Configuration:** Accept the defaults, **DHCP, eth0** and **Activate on boot**.
    a. **Hostname:** Select **manually** and enter a name for the system, if desired.
    b. Click **Next**.
21. **Firewall Configuration:** Accept the default selections and click **Next**.
22. **Additional Language Support:** Select any additional languages and click **Next.**
23. **Time Zone Selection:** Select the correct time zone and click **Next**.
24. **Set Root Password:** Enter a root password, re-enter the root password to confirm it.
25. **Personal Desktop Defaults:** To add additional packages like KDE, select **Customize the set of packages to be installed** and click **Next**.
    a. **Package Group Selection:** Click **Details** for the **Sound and Video** package and select **sndconfig**. sndconfig is required to configure the Sound Blaster 16 sound card. Click **OK**.
       i. Select **Development-Development Tools** to install **make** and **gcc** required for the host to guest time sync daemon installation below.
       ii. Select any other packages wanted and click **Next** to install.
26. **About to Install:** Click **Next** to begin the installation.
27. **Please insert disc 2 to continue:** Insert and capture or mount disc 2, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
28. **Please insert disc 3 to continue:** Insert and capture or mount disc 3, make sure that the CD-ROM icon is no longer grayed out, and click **Ok.**
29. **Boot Disk Creation:**
    a. To create a boot diskette, insert a floppy disk or floppy disk image and click **Next**. Click **Make boot disk**.

   b. To skip creating the disk, select **No, I do not want to create a boot disk** and click **Next**.
30. **Graphical Interface (X) Configuration:**
   a. Select **Other-VESA driver (generic)**
   b. Select **8MB** for **Video card RAM**
   c. Click **Next**.
31. **Monitor Configuration:** Select a generic monitor that is close the that actual monitor, or laptop screen that is close. Click **Next** to continue.
32. **Customize Graphical Configuration:** Select a **Color Depth** and **Screen Resolution**. Virtual PC does not support 15 or 24-bit color depths. Click **Next** to continue. Do not test the resolution as a driver bug will cause the screen to redisplay incorrectly.
33. **Congratulations:** Red Hat Linux 9.0 installation is complete. Remove or release any floppy disk, floppy disk images, CD-ROM or ISO images and click **Exit**. Red Hat Linux 9.0 will now reboot.
34. **Welcome:** Click **Forward**.
35. **User Account:** Create a user account. Enter a **Username**, **Full Name**, **Password**, and **Confirm Password**. Click **Forward**.
36. **Date and Time**: Verify the time and date are correct. Click **Forward**.
37. **Red Hat Network:** If desired, register with Red Hat. Click **Forward**.
38. **Additional CDs:** Click **Forward**.
39. **Finish Setup:** Click **Forward**.

Configure Sound in Red Hat Linux 9.0

1. Log into Red Hat Linux.
2. Start a terminal session, click the 'Red Hat', **System Tools**, then **Terminal**.
3. Type `su` and press **Enter**.
4. Enter the root password and press **Enter**.
5. Type `cd /sbin` and press **Enter**
6. Type `./sndconfig` and press **Enter**.
7. **Introduction:** Press **Enter**.
8. **Probe Results:** Press **Enter**.
9. **Card Type:** Select **Sound Blaster 16** and press **Enter**.
10. **Card Settings:**
   a. **I/O Port:** Select **0x220** and press **Tab.**
   b. **IRQ:** Select **5** and press **Tab.**
   c. **DMA 1:** Select **1** and press **Tab.**
   d. **DMA 2:** Select **5** and press **Tab.**
   e. **MPU I/O:** Select **0x330** and press **Tab.**
   f. Press **Enter**
11. **Sound Card Test:** Press **Enter**

   NOTE Sound volume may be very low, adjust speakers accordingly.

12. **Test Result:** Press **Enter** if sound was heard, if not, **Tab** to select **No** and press **Enter**.

NOTE If no sound was heard, the most likely cause is lack of volume

13. **File Exists:** press **Enter** to overwrite the existing config file.
14. Type `exit` and press **Enter** to exit the root console.
15. Type `exit` and press **Enter** to exit the standard console.

Configure Time Sync Addition in Red Hat Linux 9.0 (Unsupported)

NOTE Connectix offers an unsupported time sync addition for Linux and BSD guests; however, Connectix does not support the time sync addition. To install the timesync daemon, the **make** and **gcc** utilities and libraries must be installed.

1. Log onto Red Had Linux.
2. Launch an Internet browser.
3. In the address bar, type `ftp://linuxadditions:password@care.connectix.com/users/linuxadditions`
4. From *`LinuxAdditions`*, download *vpctimed-1.0-src.tar.gz* , and save to */tmp* directory.
5. Open a console: click the console icon on the kicker panel. Open a root console.
6. Change to the root directory: type `cd /tmp` and press **Enter**. Verify that *vpctimed-1.0-src.tar.gz* is available, type `ls` and press **Enter.**
7. Unzip and untar the file: type `gzip -cd vpctimed-1.0-src.tar.gz | tar -xvf -`
8. Change to the *vpctimed* directory: type `cd vpctimed` and press **Enter.**
9. Change to the *linux* directory: type `cd linux` and press **Enter.**
10. Compile the program: type `make` and press **Enter.**
11. Install the software: type `make install` and press **Enter.**
12. Type `exit` and press **Enter** to exit the root console.
13. Type `exit` and press **Enter** to exit the terminal session.

Restart Linux and the time sync addition will load automatically.

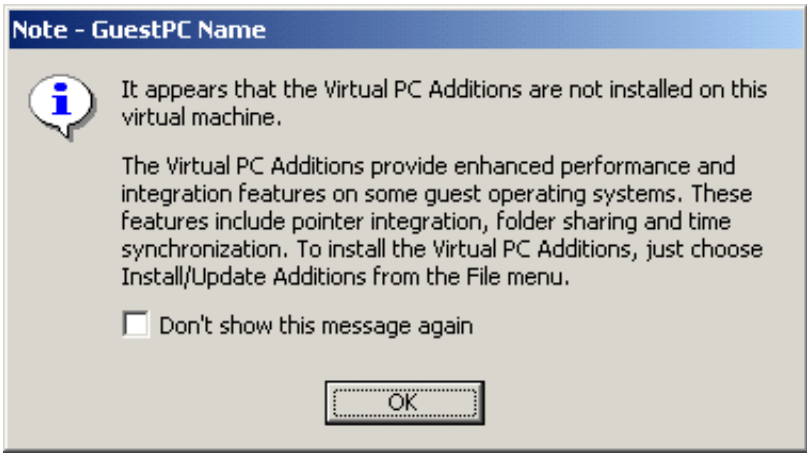
Mandrake Linux 8.2

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Mandrake Linux 8.2 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Mandrake Linux 8.2

9. Insert the Mandrake Linux install (cd1) CD-ROM in the host PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

   NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
10. **Welcome to release 8.2:** Press **Enter** to install Mandrake Linux.
11. **Please choose a language to use:** Select the correct language and click **Ok** to continue.
12. **Introduction:** Read the introduction and license agreement, and click **Accept** to continue.
13. **Please choose one of the following classes of installation:** Select **Recommended** and click **Install** to continue.
14. **The DrakX Partitioning Wizard found the following solutions:** Click **Custom disk partitioning**.
15. Click **Auto Allocate** to allow DrakX to automatically configure the hard drive image. Click **Done** to continue.
16. **Partition table of drive hda is going to be written to disk:** Click **Ok**.
17. **Package Group Selection:** Select the packages to install and click **Ok** to continue the installation. **Note:** if you select certain packages that install servers that are activated by default, a prompt may appear with a security notification.
18. When prompted, insert or mount cd2 and click **Ok** to continue the installation.
19. **Set Root Password:** enter a root password, verify it, and click **Ok** to continue.
20. **Enter a user:** Create at least one standard user by entering a **Real name**, **User name**, and **password**. Verify the password and click **Accept user**. When finished entering users, click **Done.**
21. **Automatically log on one user:** Click **Yes** or **No** for this option.
22. **Welcome to the Network Configuration Wizard**: Click **Ok** to start the wizard.

    NOTE **use auto detection** is selected by default.
23. **Choose the connection you want to configure:** select the appropriate network connection and click **Ok** to continue.

    NOTE The following steps detail configuring a LAN connection only.
24. Select **LAN connection – Ethernet card(s) detected** and click **Ok**.
25. Click **Ok** to continue.
26. **Configuring network device eth0 (driver tulip)**: enter an IP address, or select **Automatic IP (bootp/dhcp)** and click **Ok.**
27. **Hostname:** enter a hostname, (a fully qualified hostname if possible), and click **Ok.**
28. Summary:
    a. A printer can be set up here, click **No Printer**, to install follow the printer wizard to complete the installation.
    b. Click the empty box next to **Sound card** to prepare Linux for a sound card.

i. Click **Yes**, when asked if you have an ISA sound card.

ii. **Run sndconfig after installation to configure your sound card:** click **Ok.**

c. Click **Ok** to continue the installation.

29. **Choose a monitor:** Select **Multi-frequency that can do 1280x1024 at 60Hz** and click **Ok.**
30. Click **More** to have complete options for setting up X and testing.
31. What do you want to do:
    a. Select **Change Graphic Card** and click **Ok.**

       i. Select **Trio64V+** and click **Ok.**
32. **Which configuration of Xfree do you want to have:** select **Xfree 4.2.0.**
33. What do you want to do:
    a. Select **Change Resolution** and click **Ok.**

       i. Select **1024x768, 65 thousand colors (16 bits)** and click **Ok.**

    b. Select **Test Again** and click **Ok.**
    c. If you can see the test display, click **Yes**, if not, wait for 10 seconds for the time out and change the resolution or color settings.
34. **Download Updated packages:** click **No.**
35. **Congratulations:** Mandrake 8.2 Linux installation is complete. Remove any CD-ROMs from the drive or release any ISO images and click **Ok** to reboot.
36. After logging in the first time, you will be greeted with a **First Time Wizard**.
37. The wizard can be cancelled at any time by clicking **Cancel**. Click **Next** to begin the Wizard.
38. **Desktop Appearance:** Select a desktop from the drop down menu and click **Next.** The **KDE** Manager has very good integration with Mandrake Linux.
39. **Mandrake Privacy Policy**: Read the policy and click **Next**.
40. **Personal Identity:** fill out the required fields and click **Next** to continue.
41. **Mail configuration:** if desired, fill out the e-mail configuration, or leave blank and click **Next.**
42. Click **Finish** to complete the **First Time Wizard**.

Configure Sound in Mandrake 8.2 Linux

1. Log into Mandrake Linux.
2. Start a terminal session, click the monitor from the taskbar.
3. Type `su` and press **Enter**.
4. Enter the root password and press **Enter**.
5. Type `cd /sbin` and press **Enter**
6. Type `sndconfig` and press **Enter**.
7. **Introduction:** Press **Enter**.
8. **Probe Results:** Press **Enter**.
9. **Card Type:** Select **Sound Blaster 16** and press **Enter**.
10. **Card Settings:**
    a. **I/O Port:** Select **0x220** and press **Tab.**
    b. **IRQ:** Select **5** and press **Tab.**
    c. **DMA 1:** Select **1** and press **Tab.**

d. **DMA 2:** Select **5** and press **Tab.**
e. **MPU I/O:** Select **0x330** and press **Tab.**
f. Press **Enter**

11. **Sound Card Test:** Press **Enter**

    NOTE Sound volume may be very low, adjust speakers accordingly.

12. **Test Result:** Press **Enter** if sound was heard, if not, **Tab** to select **No** and press **Enter**.

    NOTE If no sound was heard, the most likely cause is lack of volume

13. **File Exists:** press **Enter** to overwrite the existing config file.
14. Type `exit` and press **Enter** to exit the root console.
15. Type `exit` and press **Enter** to exit the standard console.

Configure Time Sync Addition in Mandrake 8.2 (Unsupported)

NOTE Connectix offers an unsupported time sync addition for Linux and BSD guests; however, Connectix does not support the time sync addition. To install the timesync daemon, the **make** and **gcc** utilities and libraries must be installed.

1. Log onto Mandrake 8.2.
2. Launch an Internet browser.
3. In the address bar, type `ftp://linuxadditions:password@care.connectix.com/users/linuxadditions`
4. From *`LinuxAdditions`*, download *vpctimed-1.0-src.tar.gz* , and save to */tmp* directory.
5. Open a console: click the console icon on the kicker panel. Open a root console.
6. Change to the root directory: type `cd /tmp` and press **Enter**. Verify that *vpctimed-1.0-src.tar.gz* is available, type `ls` and press **Enter.**
7. Unzip and untar the file: type `gzip -cd vpctimed-1.0-src.tar.gz | tar -xvf -`
8. Change to the *vpctimed* directory: type `cd vpctimed` and press **Enter.**
9. Change to the *linux* directory: type `cd linux` and press **Enter.**
10. Compile the program: type `make` and press **Enter.**
11. Install the software: type `make install` and press **Enter.**
12. Type `exit` and press **Enter.**

Restart Linux and the time sync addition will load automatically.

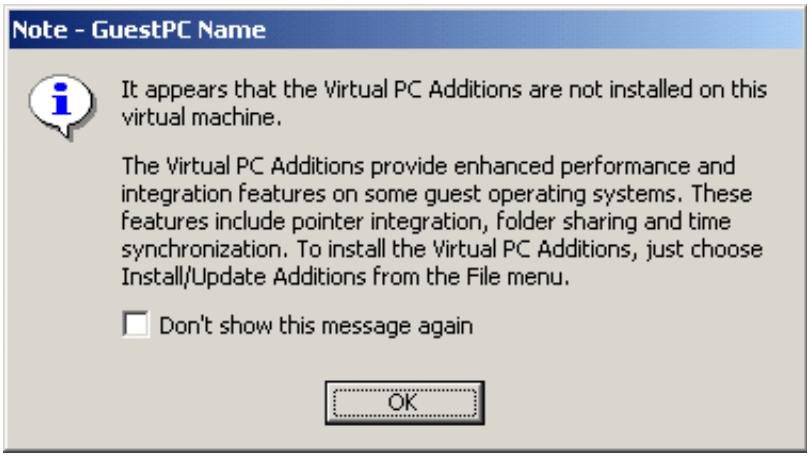
Mandrake Linux 9.0

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Mandrake Linux 9.0 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Mandrake Linux 9.0

9. Insert the Mandrake Linux install (cd1) CD-ROM in the host PC and click **Start Up**.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

   NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.
10. **Mandrake Linux:** Press **Enter** to install Mandrake Linux.
11. **Please choose a language to use:** Select the correct language and click **Ok** to continue.
12. **Introduction:** Read the introduction and license agreement, and click **Accept** to continue.
13. **Please choose one of the following classes of installation:** Select **Recommended** and click **Install** to continue.
14. **The DrakX Partitioning Wizard found the following solutions:** Click **Custom disk partitioning**.
15. Click **Auto Allocate** to allow DrakX to automatically configure the hard drive image. Click **Done** to continue.
16. **Partition table of drive hda is going to be written to disk:** Click **Ok**.
17. **Package Group Selection:** Select the packages to install and click **Ok** to continue the installation. **Note:** Selecting some packages will install servers that are activated by default, a prompt may appear with a security notification. Select the additions packages:
    a. **Configuration**
    b. **Network Computer (client)**
    c. **Console tools**
18. Click **Ok**.
19. When prompted, insert or mount cd2 and click **Ok** to continue the installation.
20. **Set Root Password:** Enter a root password, verify it, and click **Ok** to continue.
21. **Enter a user:** Create at least one standard user by entering a **Real name**, **User name**, and **password**. Verify the password and click **Accept user**. When finished entering users, click **Done.**
22. **I can set up your computer to automatically log on one user:** Click **Yes** or **No** for this option.
23. **Welcome to the Network Configuration Wizard**: Click **Ok** to start the wizard.

    NOTE **Use auto detection** is selected by default.
24. **Choose the connection you want to configure:** select the appropriate network connection and click **Ok** to continue.

    NOTE The following steps detail configuring a LAN connection only.
25. Select **LAN connection – Ethernet card(s) detected** and click **Ok**.
26. Click **Ok** to continue.
27. **Configuring network device eth0 (driver tulip)**: enter an IP address, or select **Automatic IP (bootp/dhcp)** and click **Ok.**
28. **Hostname:** enter a hostname, (a fully qualified hostname if possible), and click **Ok.**

29. Summary:
    a. A printer can be set up here, click **No Printer**, to install follow the printer wizard to complete the installation.
    b. The **keyboard language** and **timezone** can be changed here if necessary.
    c. Click **Ok** to continue the installation.
30. **Choose a monitor:** Select **Generic** that can do **1280x1024 @ 60Hz** and click **Ok.**
31. **Select the memory size of your graphics card:** Select **4MB** and click **Ok.**
32. **Choose the resolution and color depth:** Select **1024x768** and **65 thousand colors (16 bit)** and click **Ok.**
33. **Which configuration of Xfree do you want to have:** select **Xfree 4.2.0.**
34. What do you want to do:
    a. Select **Change Resolution** and click **Ok.**
       i. Select **1024x768, 65 thousand colors (16 bits)** and click **Ok.**
    b. If you can see the test display, click **Yes**, if not, wait for 10 seconds for the timeout and change the resolution or color settings.
35. **Download Updated packages and install updates?:** click **No.**
36. **Congratulations:** Mandrake 8.2 Linux installation is complete. Remove any CD-ROMs from the drive or release any ISO images and click **Ok** to reboot.
37. After logging in the first time, you will be greeted with a **First Time Wizard**.
38. The wizard can be cancelled at any time by clicking **Cancel**. Click **Next** to begin the Wizard.
39. **Desktop Appearance:** Select a desktop from the drop down menu and click **Next.** The **KDE** Manager has very good integration with Mandrake Linux.
40. **Mandrake Privacy Policy**: Read the policy and click **Next**.
41. **Personal Identity:** fill out the required fields and click **Next** to continue.
42. **Mail configuration:** if desired, fill out the e-mail configuration, or leave blank and click **Next.**
43. Click **Finish** to complete the **First Time Wizard**.

Configure Sound in Mandrake 9.0 Linux

NOTE Steps below are using KDE3 window manager

1. Log into Mandrake Linux.
2. Insert cd1.
3. Click the start application button from the task bar, under KDE, click **K**.
4. Select **Configuration**, **Packaging**, then **Install Software**.
5. If not logged in as ROOT, enter the root password when prompted and click **Close**.
6. **Software Packages Installation:** enter `sndconfig` in the **Find** text box and click **Search**.
7. Select **sndconfig-0.68-1mdk**
8. **Additional packages needed:** Click **OK** to install the additional packages. Click **Install**.
9. **Everything installed successfully:** Click **Ok.**
10. Click **Quit** to exit the **Software Packages Installer**.
11. Click the **Konsole** icon to start a console shell.
12. Type `su` to enter the super-user mode, enter the root password and press **Enter**.
13. Type `cd /sbin` and press **Enter**.
14. Type `sndconfig` and press **Enter**.
15. **Introduction:** Press **Enter**.
16. **Probe Results:** Press **Enter**.
17. **Card Type:** Select **Sound Blaster 16** and press **Enter**.
18. **Card Settings:**
    a. **I/O Port:** Select **0x220** and press **Tab.**
    b. **IRQ:** Select **5** and press **Tab.**
    c. **DMA 1:** Select **1** and press **Tab.**
    d. **DMA 2:** Select **5** and press **Tab.**
    e. **MPU I/O:** Select **0x330** and press **Tab.**
    f. Press **Enter**
19. **Sound Card Test:** Press **Enter**

    NOTE Sound volume may be **very** low, adjust speakers accordingly.
20. **Test Result:** Press **Enter** if sound was heard, if not, **Tab** to select **No** and press **Enter**.

    NOTE If no sound was heard, the most likely cause is lack of volume
21. **File Exists:** press **Enter** to overwrite the existing config file.
22. Type `exit` and press **Enter** to exit the root console.
23. Type `exit` and press **Enter** to exit the standard console.
24. Click **K** to open the start menu.
25. Select **Configuration**, **KDE**, **Sound,** then **Sound Server**.
26. Select **Start aRts soundserver on KDE startup**. Click **Ok**.
27. **Restart sound server now?**: Click **Yes**.

Configure Time Sync Addition in Mandrake 9.0 (Unsupported)

NOTE Connectix offers an unsupported time sync addition for Linux and BSD guests; however, Connectix does not support the time sync addition. To install the timesync daemon, the **make** and **gcc** utilities and libraries must be installed.

1. Log onto Mandrake.
2. Launch an Internet browser.
3. In the address bar, type `ftp://linuxadditions:password@care.connectix.com/users/linuxadditions`
4. From *`LinuxAdditions`*, download *vpctimed-1.0-src.tar.gz* , and save to */tmp* directory.
5. Open a console: click the console icon on the kicker panel. Open a root console.
6. Change to the root directory: type `cd /tmp` and press **Enter**. Verify that *vpctimed-1.0-src.tar.gz* is available, type `ls` and press **Enter.**
7. Unzip and untar the file: type `gzip -cd vpctimed-1.0-src.tar.gz | tar -xvf -`
8. Change to the *vpctimed* directory: type `cd vpctimed` and press **Enter.**
9. Change to the *linux* directory: type `cd linux` and press **Enter.**
10. Compile the program: type `make` and press **Enter.**
11. Install the software: type `make install` and press **Enter.**
12. Type `exit` and press **Enter.**

Restart Linux and the time sync addition will load automatically.

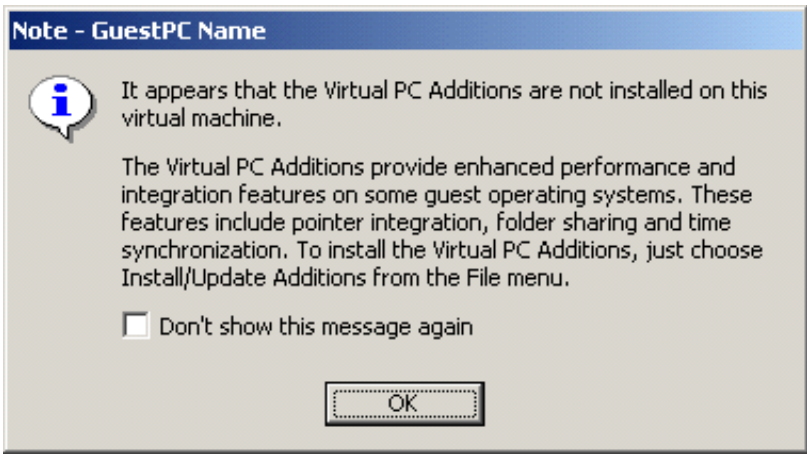
Lycoris (Redmond) Linux 1.0

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest Oses, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Lycoris Linux guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Linux**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Lycoris Linux

9. Insert the Lycoris Linux CD-ROM in the host PC.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

   NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin

booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.

10. **Install Redmond Linux Personal:** Press **Enter** to begin the installation.
11. **Welcome:** click **Next** to start the installation.
12. **Select Mouse:** The default mouse detected should be **PS/2 MS Intellimouse**, click **Next** to accept and continue.
13. **Select Keyboard:** The default keyboard detected should be **Standard with Windows Keys**. Click **Next** to accept and continue.
14. **Select Video Card:** The default video card should be the **S3 Trio32/Trio64** with **4096** KB of video memory. Click **Next** to accept and continue.
15. **Select Monitor:** Select a **Standard Monitor**, **1600x1200, 75Hz.** Click **Next** to accept and continue.
16. **Select Resolution:** The following resolutions will work in Virtual PC:

    256 Colors: 1280x1024, 1152x900, 1152x864, 1024x768, 800x600, and 640x480.

    Hicolor (15/16bpp): 1152x900, 1024x768, 800x600, and 640x480.

    True color (32bpp): 800x600 and 640x480

    Select a resolution and color depth, click **Test this mode** to verify the display, and click **Next** to continue.

    NOTE Virtual PC does not support 24 bit color. Some resolutions will not display in all the listed refresh rates.
17. **Select Target:** Select **Use the entire hard disk** and click **Next**.
18. **Select Disk:** Click **Prepare selected disk for Redmond Linux**, when the drive is partitioned, click **Next** to continue.
19. **Start Installation:** click **Next** to continue.
20. **Enter Your Name:** enter a name, login, password, and verify the password. Enter a system (root) password and verify it. Click **Add User**, if finished adding users, click **Next** to continue.
21. **Set up Ethernet:** Select the correct option for Ethernet. Select **Server-assigned configuration (DHCP)**, enter a hostname, and click **Next**.
22. **Set Up Modem:** click **Next** to continue.
23. **Set Up Printers:** click **Next** to continue.
24. **Select Time Zone:** select the correct time zone from the map or the drop down menu and click **Next**.
25. **Set Up Boot Loader:** click **Next** to continue.
26. **Entertainment:** click **Next** to continue.
27. **Installation finished:** insert a floppy disk or floppy disk image and click **Write Disk** to create a rescue disk. Remove or release the disk. Click **Finish** to complete the installation.

    NOTE Leave the CD-ROM in the drive, after the system reboots it will need to access the CD-ROM to ‘really’ complete the installation.
28. When Lycoris Linux has booted to the login screen, the installation is completed and the CD-ROM or ISO image can be removed.

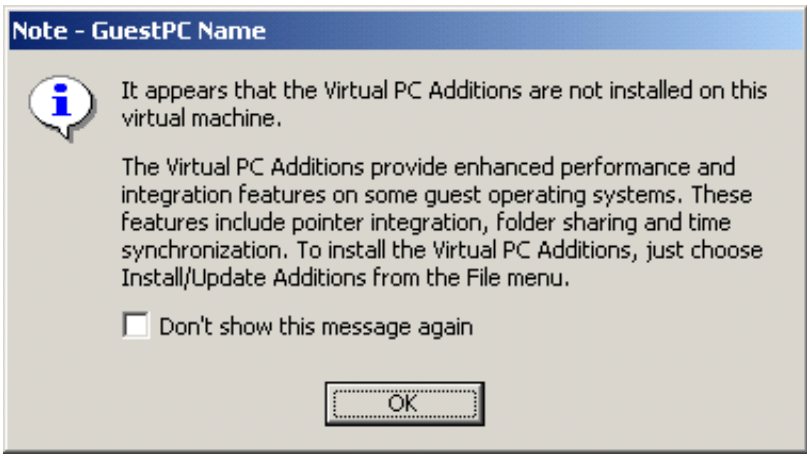
Sun Solaris 8 for i386

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest Oses, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new Solaris 8 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Solaris**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing Solaris 8

9. Insert the Solaris 8 Installation CD-ROM in the host PC.
   a. If using an ISO image, click **Start Up** and then mount the ISO image.

   NOTE If the message, **OS not found, Install an OS on this hard drive** is displayed, press the **Enter** key and another message should be displayed, **Reboot and Select proper Boot device or Insert Boot Media in selected boot device**. Press **Enter** again and the guest should begin

booting off the floppy disk image. You may need to reset the guest PC to boot from the ISO image, press *hostkey*+**R** to reset the guest PC.

10. **Solaris Device Configuration Assistant:** Press **F2** to Continue.
11. **Error: Resource Conflicts Found:** An IRQ conflict may occur between the **ISA: Sound Blaster** and the **PNP ISA: Sound Blaster**, press **F2** to resolve the conflict.
    a. **Identified Devices:** Press **F4** to view Device Tasks.
    b. **Device Tasks:** select **View/Edit Devices** and press **F2** to continue.
    c. **View/Edit Devices:** delete the **ISA: Sound blaster**. Select **ISA: Sound blaster** and press **F4** to delete.
    d. Press **F2** to continue.
    e. Press **F3** to go back to the installation
12. Press **F2** to continue.
13. **Boot Solaris:** Select **CD: Target 0: CntxCorp C/DVD-ROM** and press **F2** to continue.
14. **Select the language you want to use to run the installer:** type **1** and press **Enter**.
15. **May the Solaris Installer create a Solaris fdisk:** type **y** and press **Enter.**
    a. Type **y** press **Enter** to accept the default partition
16. **Enter a swap slice size:** enter a size between the amounts recommend, or press **Enter** to accept the default.
    a. **Can the swap slice start at the beginning of the disk:** type **y** and press **Enter**.
17. **Warning: all information on the disk will be erased:** type **y** and press **Enter.**
18. **Need to reboot to continue the installation:** Reset the system and remove the CD-ROM. To reset the guest, press *hostkey*+**R**. **Note:** the guest PC may need to be shut down and restarted for Solaris to boot properly.
19. The **Current Disk Partition Information** screen will appear, press **Enter** to continue.
20. **The Solaris Installation Program:** press **F2** to continue.
21. **kdmconfig – Introduction:** press **F2** to continue.
22. **kdmconfig – View and Edit Window System Configuration:** select **Change Video Device/ Monitor** and press **F2**.
23. **Video Device Selection:** Select **S3 Trio64V+ (4MB)** and press **F2**.
24. **Monitor Type Selection:** Select **MultFrequency 76Khz (up to 1600x1200 @ 60Hz)** and press **F2** to continue.
25. **Screen Size Selection:** Select **17-inch (43cm)** and press **F2** to continue.
26. **Resolution/Colors Selection:** Select **1024x768 – 256 Colors @75Hz** and press **F2** to continue.
27. **kdmconfig – View and Edit Window System Configuration:** Select **No changes needed – Test/Save and Exit** and press **F2** to continue.
28. **kdmconfig Window System Configuration Test:** press **F2** to test, be sure to read the on-screen information about testing video resolutions.
29. If you can see the display, click **Yes**.
30. This will launch a graphical **Welcome** screen to finish the system configuration. Click **Next** to continue.
31. **Network Connectivity:** Select the network option, **Networked** is the default, click **Next** to continue.

32. **DHCP:** Specify if the Solaris guest should use DCHP, the default is **No**, select **Yes**, in most cases, and click **Next** to continue.
33. **IPv6:** Specify whether or not IPv6 should be enabled, click **Next** to continue.
34. **Name Service:** Select the name service, generally **DNS**, and click **Next.**
35. **Domain Name:** enter the domain on which the guest resides and click **Next.**
36. **DNS Server Address:** one DNS server IP address is required, enter an IP address and click **Next.**
37. **DNS Search List:** click **Next** to continue.
38. **Time Zone:** select the method to specify the time zone and click **Next.**
    a. **Geographic Region:** select the correct country or continent and the correct time zone, click **Next** to continue.
39. **Date and Time:** click **Next** to continue.
40. **Root Password:** enter a root password and click **Next.**
41. **Proxy Server Configuration:** if a proxy server is needed to connect, select **Use Proxy Configuration Below**, and enter the information. Click **Next.**
    a. If no proxy is need, click **Next.**
42. **Confirm Information:** review, and correct if necessary, click **Confirm.**
43. **Welcome:** Click **Next** to begin installing software for Solaris.
44. **Specify Media:** Select **CD** and click **Next**.
45. Insert Solaris 8 CD 1.
46. **Insert CD:** Click **OK** to continue.
47. **Select Type of Install:** Select **Default Install** and click **Next.**
48. **Ready to Install:** Click **Install Now** to begin the installation.
49. **Installation Summary:** Click **Next** to continue.
50. **Specify Media:** Insert Solaris 8 CD 2 and click **Next**.
51. **Installation Summary:** Click **Next** to continue.
52. **Specify Media:** Click **Skip** to skip installation of the Solaris 8 Documentation European (sic)
53. **Reboot:** Click **Reboot**. Verify no media is in the floppy or CD-ROM drive.
54. Log into Solaris with the **root** account and the password entered during installation.

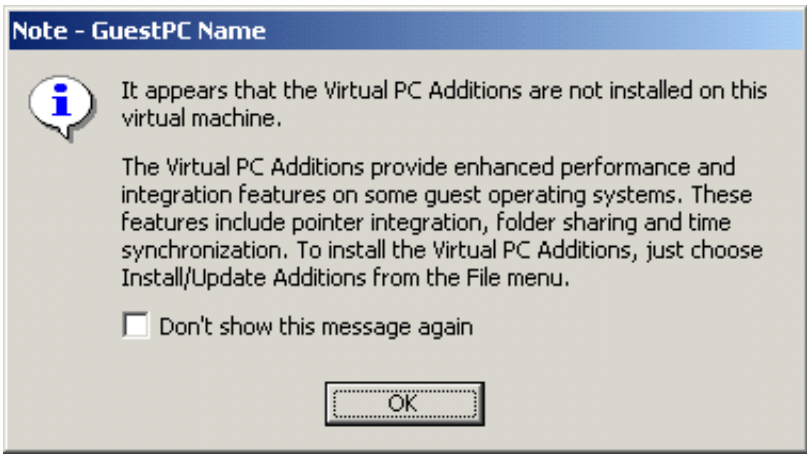
IBM OS/2 Warp 4

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

NOTE Additions for OS/2 are a licensed product and only included with the Virtual PC for OS/2 product.

NOTE Additions for OS/2 require FixPack 5 or higher for proper functionality.

Creating a new OS/2 Warp 4 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **OS/2**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
   b. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue. With OS/2, the New PC Wizard will create a 2GB FAT16 disk image. Use the Virtual Disk Wizard, see "Using Virtual Disk Wizard to Create Custom Virtual Hard Disk Images" on page 16, to create a custom disk image.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing OS/2 Warp 4

9. Installing from CD-ROM and floppy disk. The OS/2 Warp 4 CD-ROM is not bootable, so the installation must be started via floppy disk. There are 3 bootable disks that come with OS/2. If the disks are unavailable, replacement installation floppies can be made from the CD-ROM.
   a. Creating OS/2 Warp 4 boot floppy disks or floppy disk images

i. Using the Virtual Disk Wizard, create three floppy disk images. See Using Virtual Disk Wizard to Create Custom Virtual Floppy Disk Images - page 20.
   — Start up an alternate guest PC, like PC DOS 2000.
   — Mount the OS/2 Warp 4 CD-ROM or ISO image and change to the CD-ROM drive.
   — Type `cdinst` and press **Enter**.
   — Follow the on-screen directions to create the three installation disks
   — After creating the 3 disks, `Installation Diskette`, `OS/2 Diskette 1`, and `OS/2 Diskette 2`, shut down the guest used to create the disks.

ii. Creating floppy disks from the host PC.
   — Open a **CMD** or **COMMAND** prompt. Click **Start**, then click **Run**. Type **cmd** and press **Enter** on NT-based hosts or type `command` and press `Enter` on 9x-based hosts.
   — Change to the host PC's CD-ROM. Type the drive letter for the CD-ROM followed by a colon (:) and press **Enter**. For a CD-ROM on drive E:, type `E:` and press **Enter**.
   — Type `cdinst` and press **Enter**.
   — Follow the on-screen directions to create the three installation disks
   — After creating the 3 disks, `Installation Diskette`, `OS/2 Diskette 1`, and `OS/2 Diskette 2`, close the command prompt window.

10. Select the OS/2 guest from the PC list and click **Start Up**.
    a. If physical floppy disks were created in the previous, the guest PC should begin booting off the `Installation Diskette`.
    b. If floppy disk images were created in the previous step, drag and drop the `Installation Diskette` on the floppy icon in the VPC Toolbar. Press **Enter** to begin the installation.
11. Insert the OS/2 Warp 4 CD-ROM or mount the ISO image.
12. **Insert the OS/2 Diskette 1 into Drive A:** Remove the `Installation Diskette` and insert or mount the `OS/2 Diskette 1` and press **Enter**.
13. **Insert the OS/2 Diskette 2 into Drive A:** Remove the `OS/2 Diskette 1` and insert or mount the `OS/2 Diskette 2` and press **Enter**.
14. **Welcome!:** Press **Enter** to continue.
15. **Installing OS/2 Warp 4:** Select **Easy Installation** and press **Enter**.
16. **The hard disk partitioning is complete:** Remove the current floppy disk and insert the `Installation Diskette` press **Enter** to reboot the guest PC.
17. **Insert the OS/2 Diskette 1 into Drive A:** Remove the `Installation Diskette` and insert or mount the `OS/2 Diskette 1` and press **Enter**.
18. **Insert the OS/2 Diskette 2 into Drive A:** Remove the `OS/2 Diskette 1` and insert or mount the `OS/2 Diskette 2` and press **Enter**.
19. **Welcome!:** Press **Enter** to continue.
20. **Remove the diskette and press Enter to restart the workstation:** Remove or release the floppy disk or disk image and press **Enter**.
21. **System Configuration:**
    a. **Primary Display:** Click the monitor icon and select **S3 Trio 64/64V+ [32 Bit] Version**.
    b. **Multimedia Device Support:** Click the CD-ROM icon next to Multimedia Device support and select **Sound Blaster 16**. Click **Add** and then click **OK**.
    c. Click **Next** to continue.

22. **System Configuration (cont.):** Click **Next** to continue.
23. **Select System Default Printer:** Click **OK** to continue.
24. **The OS/2 Warp CD-ROM was not found:** If the OS/2 Warp 4 CD-ROM was removed from the guest PC, insert or mount it now. Click **Retry** to continue.
25. **Type of Activities:** Select **Access the Internet**, **Connect directly to a LAN** and click **Next**.
26. **File and Print Client:** Click **Next** to continue.
27. **Specify Workstation Name:** Enter a unique name for the OS/2 Warp 4 guest PC and click **Next**.
28. **Domain Name:** Enter a **Domain name** and click **Next**.
29. **Default User ID and Password:** Enter a **User ID**, **Password**, **Verify password**, and click **Next** to continue.
30. **Record Your User ID and Password:** Click **Next** to continue.
31. **Novell NetWare Client for OS/2:** Select **No, do not install** and click **Next**.
32. **TCP/IP Address Distributed?:** Select **DHCP** and/or **DDNS** if your LAN supports one or both and click **Next** to continue.
33. **TCP/IP Services Configuration:** Enter the TCP/IP information, if known, then click **Next**.
34. **Adapter Confirmation:** OS/2 should correctly detect the **Digital Semicon. DC21X4-based Ethernet Adapter**, click **Next** to continue.
35. **ISA Network Adapter Software Configuration:** Select **No, hardware settings were not changed** and click **Next**.
36. **Ready to Install:** Click **Install**.
37. **Monitor Configuration/Selection Utility:** Click **OK**.
38. **Welcome to OS/2:** Click **Close.**

Installing the VPC Additions in OS/2 Warp 4

NOTE VPC Additions for OS/2 are a licensed product and only included with Virtual PC for OS/2.

NOTE Additions for OS/2 require FixPack 5 or higher for proper functionality.

1. Boot the OS/2 Warp guest PC.
2. Once OS/2 Warp has finished loading and at the desktop, press the *hostkey* to release the mouse.
3. Mount the `VPCOS2Additions010022.iso` file to the OS/2 guest PC by dragging and dropping the file on the CD-ROM icon or by right-clicking and browsing to Additions\OS2 Additions folder on the CD-ROM or the folder where the online version was extracted to.
4. Double-click **OS/2 System**, then double-click **Drives** to access the CD-ROM.
5. Double-click the CD-ROM icon to view the contents of the CD-ROM.
6. Double-click `install.exe` to launch the VPC Additions for OS/2 Installer.
7. **Welcome to the InnoTek OS/2 Additions for Virtual PC Installation Program:** Click **Next**.
8. **Please read the license agreement:** After reviewing the license agreement, select **I accept the terms of this license** and click **Next**.
9. **Latest information on the Innotek OS/2 Additions for Virtual PC:** Click **Install**.
10. **Installation parameters for Virtual PC OS/2 Additions:** Click **Next**.
11. **Directory C:\VPC\ does not exist, create?:** Click **Yes**.
12. **InnoTek OS/2 Additions for Virtual PC have been installed:** Click **Exit**.
13. Restart the OS/2 Warp guest to activate the VPC Additions.

The VPC Additions provide:

- Improved performance on Windows NT, 2000 and XP
- Mouse Integration between Host and Guest OS
- Drag & Drop support and Shared Folders
- Time sync between Guest and Host
- Cut & Paste support between Guest and Host
- Arbitrary Windows desktop resizing

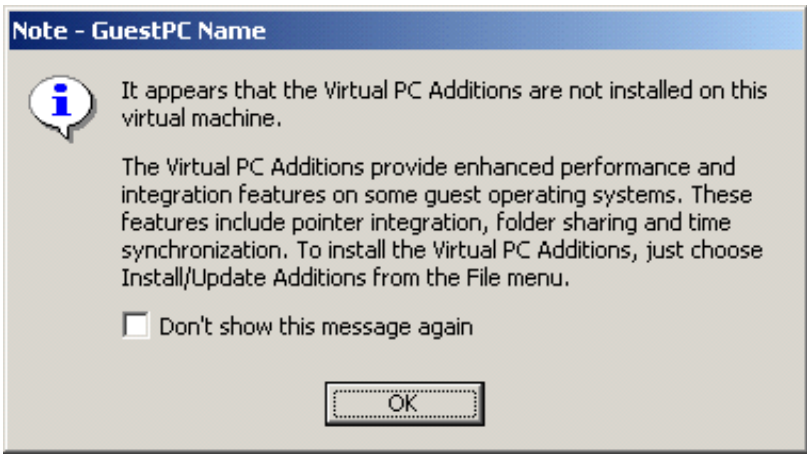
SuSe Linux 7.3

Virtual PC Notes:

Host Key: The host key is a user-defined key that allows you to regain control of the mouse when it is captured by a guest PC. The default host key is the **right-ALT** key. The host key also takes the place of the Ctrl key in menu shortcuts. Windows key combinations include **ALT+TAB**, **CTRL+ESC** and other task switching combinations. Pressing the *hostkey*+**DEL** in the guest is equivalent to pressing **CTRL+ALT+DEL** on a standard PC.

Virtual PC Toolbar: Located in the lower left corner of the guest's window, the VPC Toolbar items provide information about the status of your guest PC, from left to right: Hard Drive, CD/DVD-ROM, Floppy Disk, Shared Folders, and Network. The toolbar also provides a number of convenient features that are accessed by contextual menus (right-click the icon) or by dragging items onto the toolbar icons. A CD-ROM ISO image or floppy disk image can easily be mounted in the guest by dragging the disk image and dropping it on the respective VPC toolbar icon.See the Virtual PC help for more information. To release a CD-ROM or Floppy disk image right-click the appropriate icon and select **Release** *diskname*.

During the installation of a guest PC, a pop-up window may appear:



Currently, there are only additions for Windows 95/98/ME/NT/2000/XP guests. Please disregard this message on all other guest OSes, select **Don't show this message again** and click **Ok**. Additions can only be installed on Windows 95/98/ME/NT/2000/XP guests and only when the operating system is completely installed and has loaded to the desktop.

Creating a new SuSE Linux 7.3 guest PC:

1. Create a new guest OS using the **PC Setup Wizard** by clicking **New PC...**
2. Click **Next** to begin the wizard.
3. **PC Name:** Enter a descriptive **PC Name** and click **Next**.
4. **Configuration Options:** Select **Guide Me** and click **Next**.
5. **Guest Operating System:** Select the OS you intend to install. The OS you select here determines the recommended memory size and the default drive image format. Select **Solaris**. Click **Next** to continue.
6. **Memory Settings:** Adjust the memory if necessary and click **Next** to continue.
7. **Boot Disk Options**:
   a. If a custom drive image was created using the Virtual Disk Wizard, use **Select an existing hard disk image**. If the default image is to be used, select **Create a new hard disk image**. Click **Next** to continue.
      i. If a new drive image is being created, click **Browse** to change the location (after changing the default location or name, click **Save)** then **Next** to accept it. The default name of the drive image file is the same as the description entered in step 3.
      ii. If selecting an existing image, click **Browse** to locate the drive image. Click **Open** to select the drive image and **Next** to continue.
8. **Setup Summary:** Click **Finish** to complete the **PC Setup**.

NOTE To use serial (COM) or parallel (LPT) ports in the guest PC, these should be enabled before installing the guest operating system. To enable serial or parallel ports:

— The guest PC must be turned off and display **Not Running**, if it is **Running** or **Saved**, settings cannot be changed.
— Select the guest PC from the PC List and click **Settings**.
— Select the port you want to enable (**COM1**, **COM2**, **LPT1**)
— For LPT1, select **Host parallel port** and select a host parallel port to emulate.
— For COM ports, select **Host serial port** and pick the host COM port to emulate. **Wait for modem command to open port** should only be selected if using a modem
— Click **OK** to close **PC Settings**.

NOTE For guest ACPI support, enable ACPI in the guest PC's BIOS before installing the OS. Start up the guest OS and press **DEL**. Using the arrow keys select **Power**, then **ACPI Aware OS**. Press **Enter** and select **Yes**. Press **Enter** to close the **Options** window. Press **F10** to **Save and Exit** the BIOS. Press **Enter** to **Save configuration changes and exit now**.

Installing SuSE Linux 7.3

9. Insert the SuSe Linux DVD-ROM the host PC.
10. Click **Start Up**.
11. **SuSe:** Press **F4** to switch to 800x600 for installation. Press **Enter** to begin installation.
12. **Select your language:** Select the correct language and click **Next**.
13. **Basic Configuration:** Select a **Keyboard layout** and **Timezone**. Click **Next**.
14. **Install SuSe Linux:** Select **New Installation** and click **Next**.
15. **Suggested Partitioning:** Select **Accept suggestion** and click **Next**.
16. **Software Selection**: Select **Default system with Office** and click **Next.**
17. **System Boot Configuration:** Click **Next**.
18. **Password for "root", the system administrator:** Enter a root password, confirm it, and click **Next**.
19. **Personalize:** Enter a **First name, Last name, User login,** and **password**. Click **Next**.
20. **Confirm installation:** Click **Next.**
21. **Warning: Start installation?:** Click **Yes, install**.
22. **Now booting your system:** Click **OK**.
23. **Configure Monitor:** Select **VESA** from **Vendor** and select **1024x768@60HZ** from **Model**, click **Next**.
24. **Desktop Settings:** Click **Change**.
25. **Desktop Settings -- Details:** Verify and change the settings if necessary.
    a. **Resolution:** Select **1024x768**
    b. **Color Depth:** Select **16 bit / 65536 colors**
    c. **Refresh Rate (HZ):** Select **60** or **70**.
    d. Click **Next**.
26. **The selected video mode will now be tested:** Click **Continue**.
27. **Desktop 1024x768:** Click **Save**.
28. **Congratulations:** Click **Configure hardware**.
29. **System Component Configuration:** Click **Sound...**
    a. **Sound configuration:** Click **Add sound card**.
    b. **Manual sound card selection:**
       i. Select **Sound Blaster 16** from **Sound card driver**
       ii. Select **Sound Blaster 16** from **Sound card model**.
       iii. Click **Next**.
    c. **Sound card configuration:** Select **Advanced setup with possibility to change options** and click **Next**.
    d. **Sound card advanced options:**
       i. **Port #:** select **0x220** and click **Set.**
       ii. **MPU-401 port #:** select **0x330** and click **Set**.
       iii. **FM port #:** select **0x388** and click **Set**.
       iv. **IRQ #:** select **5** and click **Set.**
       v. **8-bit DMA #:** select **1** and click **Set.**
       vi. **16-bit DMA #:** select **5** and click **Set.**

vii. **Size of 8-bit DMA:** select **4** and click **Set**.

viii. **Size of 16-bit DMA:** select **4** and click **Set**.

ix. **Mic Auto-Gain-Control switch:** select **0** and click **Set**.

x. **ASP/CSP chip support:** select **0** and click **Set**.

xi. **ISA PnP detection:** select **0** and click **Set**.

xii. Click **Next**.

e. **Sound card volume:** Click **Test** and adjust the volume slider until the sound sample can be heard. Click **Next**.

f. **Sound configuration:** Click **Finish**.

30. **System Component Configuration:** click **Network...**

a. **Network address setup:** Click **Host name and name server.**

i. Enter a **host name** and the **domain name** the guest PC will be on.

ii. Enter **name server**(s)

iii. Click **Next**.

b. **Network address setup:** Click **Finish**.

31. **Should the network configuration be saved:** Click **Yes**.
32. **The network configuration was successfully saved:** Click **OK**.
33. **System Component Configuration:** click **Finish installation**.
34. Remove the SuSe Linux 7.3 DVD from the host PC.
35. After system reboots, log in as a user created in step 19.
36. **Welcome to SuSe Linux:** Click **Next**.
37. **Eyecandy-O-Meter:** adjust the slider to increase or decrease visual effects and click **Finish.**

Chapter 4

Advanced Topics

Chapter Topics

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Installing Virtual PC in Windows NT 4.0, Terminal Server Edition

1. Log into Terminal Server with local administrator rights or as the local Administrator.
2. Insert CD-ROM or extract the online installer.
3. When the Virtual PC for Windows splash screen appears, click **Exit**.
4. Click **Start**, **Settings**, then **Control Panel**.
5. **Control Panel:** Double-click **Add/Remove Programs**.
6. **Add/Remove Programs:** Click **Install**.
7. **Install Program from Floppy Disk or CD-ROM:** Click **Next**.
8. **Run Installation Program:** Click **Browse**, `setup.exe` and click **Open**. Click **Next**.
   - CD-ROM Version: `Setup.exe` is located in the `Installer` folder
   - Online Version: The default location of `Setup.exe` is in the `C:\Program Files\Connectix\Virtual PC 5.2 Online Installer\Installer` folder.
9. **Change User Option:** Select **All users begin with common application settings** and click **Next**.
10. **Choose Setup Language**: Select the language for the installation from the choices. Click **OK** to continue.
11. **InstallShield Wizard**: Connectix Virtual PC setup is preparing the Installshield wizard, which will guide you through the program setup process. Please wait.
12. **Welcome to the InstallShield Wizard for Connectix Virtual PC**: Click **Next** to begin installing Virtual PC on your computer.
13. **License Agreement**: After reviewing the license agreement, select **I accept the terms in the license agreement** to continue installing Virtual PC. Click **Next** to continue.
14. **Customer Information**: Enter your User Name, Organization and Serial Number. The serial number is included on a book-mark sized card in boxed versions or included in the order confirmation e-mail when purchased online. Select to install Virtual PC for all users or only the current user logged on. Click **Next** to continue.
15. **Choose Language:** Select a language for Virtual PC to run in and click **Next**.
16. **Setup Type**: there are two options for setup:
    - **Complete**—All program features will be installed.
    - **Custom**—Choose which program features you want installed and where they will be installed.
17. Click **Next** to continue.
18. **Ready to Install the Program**: Click **Install** to begin installing Virtual PC. To change or review any settings, click **Back**.
19. **InstallShield Wizard Completed**: click **Finish** to exit the wizard.
20. **Connectix Virtual PC Installer Information:** Click **No**. Do not restart the system.
21. **After Installation:** Click **Next**.
22. **Finish Admin Install**: Click **Finish**.
23. Restart Windows.

Troubleshooting Virtual Switch in Windows NT Server 4.0, Terminal Server Edition

In some cases, the Virtual PC Emulated Ethernet Switch may not bind correctly. If there is no Virtual Switch functionality in Virtual PC:

1. Right-click **Network Neighborhood** and select **Properties**.
2. **Network:** Click **Bindings**.
   a. Select **all protocols** from **Show Bindings for:**.
   b. Expand **Virtual PC Emulated Ethernet Switch (Protocol)** by clicking +.
   c. Select **Virtual PC Emulated Ethernet Switch -> [***x***]** *`networkcard`*
   d. Click **Enable**.
   e. Click **OK**.
3. **Network Settings Change:** Click **Yes** to restart Windows.

Installing Virtual PC in Windows 2000 Server with Terminal Services

To install Virtual PC in Windows 2000 Terminal Server, the server must be switched from Application Server Mode to Remote Administration Mode for the duration of the installation.

Switch to Remote Admin Mode:

1. Log on to the server with local administrator rights or as the local administrator.
2. Click **Start**, **Settings,** then **Control Panel**.
3. **Control Panel:** Double-click **Add/Remove Programs**.
4. **Add/Remove Programs:** Click **Add/Remove Windows Components**.
5. **Windows Components:** Locate **Terminal Services** and select it. Click **Next**.
6. **Terminal Services Setup:** Select **Remote administration mode** and click **Next**.
7. **Completing the Windows Components Wizard:** Click **Finish**.
8. **Add/Remove Programs:** Click **Close**.

Installing Virtual PC

1. Installing Virtual PC:
   a. If you purchased Virtual PC for Windows online, launch the file `Virtual PC for Windows 5.2 Online Installer.EXE`. After extracting the setup files, the Virtual PC installation will launch.
   b. If you purchased a Virtual PC for Windows with an installation CD, insert this CD in the CD-ROM drive of the host PC. This will launch the Virtual PC installation program.
   c. To manually launch the installer, double-click `setup.exe`.
   - CD-ROM Version: `Setup.exe` is located in the `Installer` folder
   - Online Version: The default location of `Setup.exe` is in the `C:\Program Files\Connectix\Virtual PC 5.2 Online Installer\Installer` folder.
2. **Choose Setup Language**: Select the language for the installation from the choices. Click **OK** to continue.
3. **InstallShield Wizard**: Connectix Virtual PC setup is preparing the Installshield wizard, which will guide you through the program setup process. Please wait.
4. **Welcome to the InstallShield Wizard for Connectix Virtual PC**: Click **Next** to begin installing Virtual PC on your computer.
5. **License Agreement**: After reviewing the license agreement, select **I accept the terms in the license agreement** to continue installing Virtual PC. Click **Next** to continue.
6. **Customer Information**: Enter your User Name, Organization and Serial Number. The serial number is included on a book-mark sized card in boxed versions or included in the order confirmation e-mail when purchased online. Select to install Virtual PC for all users or only the current user logged on. Click **Next** to continue.
7. **Choose Language:** Select a language for Virtual PC to run in and click **Next**.
8. **Setup Type**: there are two options for setup:
   — **Complete**—All program features will be installed.

— **Custom**—Choose which program features you want installed and where they will be installed.

9. Click **Next** to continue.
10. **Ready to Install the Program**: Click **Install** to begin installing Virtual PC. To change or review any settings, click **Back**.
11. **InstallShield Wizard Completed**: click **Finish** to exit the wizard.

After the installation is complete, the Terminal Services mode can be changed back to Application server mode.

Switch to Application server mode:

1. Log on to the server with local administrator rights or as the local administrator.
2. Click **Start**, **Settings,** then **Control Panel**.
3. **Control Panel:** Double-click **Add/Remove Programs**.
4. **Add/Remove Programs:** Click **Add/Remove Windows Components**.
5. **Windows Components:** Locate **Terminal Services** and select it. Click **Next**.
6. **Terminal Services Setup:** Select **Application server mode** and click **Next**.
7. **Completing the Windows Components Wizard:** Click **Finish**.

Add/Remove Programs: Click **Close**.

Virtual PC 5.1 and higher UI Customization

Many new features requested by our customers to aid in enterprise deployment through customization of the Virtual PC User Interface. To give our customers the maximum flexibility for their needs, the new features below can be applied globally to all guest PCs or apply to specific guest PCs.

Features added in Virtual PC 5.1

1. The ability to disable the Close Box.
2. The ability to hide the menu bar. (Please keep in mind that the Keyboard commands still work, it is just the menu that is hidden.)
3. The ability to hide the status bar. The status bar is located at the bottom of each Virtual Machine window and displays hard drive and network activity among other features.
4. The ability to disable **Save State** option from the Shutdown dialog.
5. The ability to disable the **Shut Down** option Shutdown dialog.
6. The ability to disable the **Undo Drive** option from the Shutdown dialog.
7. The ability to disable the **VNC option** from a VM's Settings dialog.
8. The ability to Force a Shutdown action from the Shutdown dialog. This allows a system administrator to force a VM to save state, shutdown, undo a drive or turn off.
9. Added the ability to specify the number of host COM ports.
10. Added the ability to reverse the default behavior of arbitrary resolution. By default, Windows Operating Systems with Virtual PC Additions installed are freely resizable. When you hold down the control-key, the windows snaps to standard resolutions such as 640x480, 800x600 etc. By creating and enabling this registry key, VM windows will snap by default and holding down the control-key will allow for arbitrary resolutions.

Applying Globally Or Per Each Vm

The new functionality can be applied globally to all VMs OR to an individual VM depending on where you create the key. The instructions for this are at the end of this document.

To Apply Globally:

`HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Preferences`

To Apply For A Specific Vm:

`HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Configuration/`*`vm config name/`*

IMPORTANT Registry keys are **case-sensitive**. Make sure that you enter the keys and DWORD values **exactly** as specified otherwise the feature will not work!

Disable The Close Box

Create new DWORD registry key: `Preferences/Main Window/Disable Close` to disable menu bar in windows.

1. If you don't have a key named **Main Window** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Main Window**.
2. Right-click on **Main Window** and create a DWORD value and name it **Disable Close**.
3. Double-click on this DWORD and enter a value of **1**.
4. Guest PCs will now launch with the close box disabled.

Value of 0 = Enable the Close Box. (Default)

Value of 1 = Disable the Close Box.

Disable Virtual PC Menus

Create new DWORD registry key: `Preferences/Main Window/Disable Menus` to disable menu bar in windows.

1. If you don't have a key named **Main Window** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Main Window**.
2. Right-click on **Main Window** and create a DWORD value and name it **Disable Menus**
3. Double-click on this DWORD and enter a value of **1**.
4. Guest PCs will now launch without the menu bar.

Value of 0= Enable the Menus. (Default)

Value of 1= Disable the Menus.

Disable Virtual PC Status Bar

Create new DWORD registry key: `Preferences/Main Window/Disable Status` to disable status bar in windows.

1. If you don't have a key named **Main Window** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Main Window**.
2. Right-click on **Main Window** and create a DWORD value and name it **Disable Status**.
3. Double-click on this DWORD and enter a value of **1**.
4. Guest PCs will now launch without the status bar.

Value of 0= Enable the Status Bar. (Default)

Value of 1= Disable the Status Bar.

Disable Save States

Create new DWORD registry key: `Preferences/Shutdown/Disable Save` to disable save option in shutdown dialog.

1. If you don't have a key named **Shutdown** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Shutdown**.
2. Right-click on **Shutdown** and create a DWORD value and name it **Disable Save**.
3. Double-click on this DWORD and enter a value of **1**.
4. Guest PCs will now launch without the **Save State** option in the **Shutdown** dialog.

Value of 0 = Enable the Save States. (Default)

Value of 1 = Disable the Save Sates.

Disable The Shut Down Command

Create new DWORD registry key: `Preferences/Shutdown/Disable Shut Down` to disable shut down option in shutdown dialog.

1. If you don't have a key named **Shutdown** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Shutdown**.
2. Right-click on **Shutdown** and create a DWORD value and name it **Disable Shut Down**.
3. Double-click on this DWORD and enter a value of **1**
4. Guest PCs will now launch without the **Shutdown** option in the **Shutdown** dialog.

Value of 0 = Enable the Shut Down Command. (Default)

Value of 1 = Disable the Shut Down Command.

Disable The Turn Off Option In The Shutdown Dialog

Create new DWORD registry key: `Preferences/Shutdown/Disable Turn Off` to disable turn off option in shutdown dialog.

1. If you don't have a key named **Shutdown** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Shutdown**.
2. Right-click on **Shutdown** and create a DWORD value and name it **Disable Turn Off**.
3. Double-click on this DWORD and enter a value of **1.**
4. Guest PCs will now launch without the **Turn off** option in the **Shutdown** dialog.

Value of 0= Enable **Turn Off** in the Close Dialog. (Default)

Value of 1= Disable **Turn Off** in the Close Dialog.

Disable Undo Drives In The Shutdown Dialog

Create new DWORD registry key: `Preferences/Shutdown/Disable Undo` to disable undo option in shutdown dialog.

1. If you don't have a key named **Shutdown** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Shutdown**.
2. Right-click on **Shutdown** and create a DWORD value and name it **Disable Undo**.
3. Double-click on this DWORD and enter a value of **1**.
4. Guest PCs will now launch without the **Undo Options** in the **Shutdown** dialog.

Value of 0 = Enable the Undo Options in the Shutdown Dialog. (Default)

Value of 1 = Disable the Undo Option in the Shutdown Dialog.

Disable The VNC Options In The Setting Dialog

Create new DWORD registry key: `Preferences/VNC/Disable` to disable VNC.

1. If you don't have a **VNC** key, you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **VNC**.
2. Right-click on VNC and create a DWORD value and name it **Disable**.
3. Double-click on this DWORD and enter a value of **1**.
4. The VNC options will no longer appear in a VM's settings dialog.

Value of 0= Enable the VNC options in a VM's setting dialog. (Default)

Value of 1= Disable the VMC options in a VM's setting dialog.

Added The Ability To Force A Specific Action Instead Of Shutdown

Create new DWORD registry key: `Preferences/Shutdown/Force Action` to specify a forced action instead of the shutdown dialog; actions are: 0=save, 1=shutdown, 2=turn off, 3=undo

1. If you don't have a key named **Shutdown** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Shutdown**.
2. Right-click on **Shutdown** and create a DWORD value and name it **Force Action**.
3. Double click on this DWORD and enter a value of **1**.
4. Guest PCs will now Shutdown in the manner prescribed by the Registry key.

Value of 0 = Force the Save Action in the Shutdown Dialog

Value of 1 = Force the Shutdown Action in the Shutdown Dialog

Value of 2 = Force the Turn Off Action in the Shutdown Dialog

Value of 3 = Force the Undo Action in the Shutdown dialog

Added The Ability To Specify The Number Of Host COM Ports

Create new DWORD registry key: `Preferences/COM Port/Host Port Count` to set how many COM ports to offer in the pop-up menu in the settings dialog. The default value is 4.

1. If you don't have a key named **COM Port** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **COM Port**.
2. Right-click on **COM Port** and create a DWORD value and name it **Host Port Count**.
3. Double-click on this DWORD and enter a value of 0-255.
4. Guest PCs will now have the ability to select from up to 256 host serial ports...

Reverse The Default Behavior Of Arbitrary Resolutions

Create new DWORD registry key: `Preferences/Main Window/Clamp Resize` to make clamp-to-nearest-resolution the default resizing behavior

1. If you don't have a key named **Main Window** you will need to create a new key. Right-click on **Preferences** and select **New Key**. When the new key is created name it **Main Window**.
2. Right click on **Main Window** and create a DWORD value and name it **Clamp Resize**.
3. Double-click on this DWORD and enter a value of **1**.

Value of 0 = Enable Arbitrary Resolutions. (Default)

Value of 1 = Disable Arbitrary Resolutions and clamp to standard screen sizes (640x480, 800x600, etc.)

Applying Globally Or Per Each Guest PC

The new functionality can be applied globally to all guest PCs or to an individual guest PC depending on where you create the key. Note that registry keys for an individual guest PCs take priority over the Global Key so that if a reg key is created both globally and for an individual basis, the keys for the individual guest PCs will take precedence. This gives you the flexibility to customize and display every guest PC as needed.

To Apply Globally:

HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Preferences/*Add_Reg_Key_Here*

To Apply For A Specific Vm:

HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Configuration/(vm config name)/*Add_Reg_Key_Here*

EXAMPLE 1: I want to disable menus for all Virtual Machines.

```
HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Preferences/Main Window/Dis-
able Menus
```

EXAMPLE 2: I want to disable menu for a specific Virtual Machine called “Windows 2000”.

```
HKEY_CURRENT_USER/Software/Connectix/Virtual PC/4.0/Configuration/Windows 2000/Main
Window/Disable Menus
```

Customizing Virtual Hard Disk Locations

New Virtual Hard Disk, Saved State and Undo Drive files can use a large amount of hard drive space so users may want to change the location where these files are kept. The default location of these files is on the system partition in a folder under Documents and Settings. Because the system partition is often smaller than partitions reserved for data it is often desirable to change the location of these files to save space on the system partition.

Users with roaming profiles may also wish to change the location to prevent long delays when logging in or out, delays can occur when large amounts of data in their user profile is stored on a remote server.

By editing the registry the default location for storing Virtual Hard Drive, Saved State and Undo Drive files can be changed to any location the user chooses.

IMPORTANT This solution involves editing the Windows Registry. If you are unfamiliar or uncomfortable with editing the registry do not attempt this solution. Implementation of this solution is intended for System Administrators. Connectix recommends backing up any systems before modifying Registry settings.

NOTE Using this solution to change the location of new Virtual Hard Drive files only affects files created with the New PC Wizard. Virtual Hard Drive files created with the Virtual Disk Wizard will always default to the last location specified when a Virtual Hard Drive file was created with the Virtual Disk Wizard, this is intentional.

Before modifying any Registry entries, exit Virtual PC. Any guest PCs that already have Saved State or Undo Drive files will not be affected by the changes.

NOTE To change the UndoDrive location for one guest PC, simply modify the *Undo Drives* setting in the *Settings* for that guest PC.

Create Default Path Key

To change any or all of the default locations you will need to create the following Registry Key:

`HKEY_CURRENT_USER\Software\Connectix\Virtual PC\4.0\Preferences\Paths`

1. Open the Registry Editor. Click **Start**, select **Run...** type `regedit`, and press **Enter**.
2. Browse to *HKEY_CURRENT_USER\Software\Connectix\Virtual PC\4.0\Preferences*. To expand a Registry key, click the plus (+) sign to left of the Registry key.
3. Expand *Preferences* key and highlight it.
4. Click **Edit**, click **New**, then click **Key**.
5. Rename the new key (New Key #1) as `Paths` and press **Enter**.

Once the *Paths* key has been created, a value for each location to be changed must be created. Not all keys need to be created. If only the location of the Saved State files needs be changed, it is not necessary to create the *DefaultNewDrivePath* and the *DefaultUndoDrivePath*.

Modify the Default New Drive Location (.VHD files)

To change the location where new Virtual Hard Drives are created:

6. Right-click on *Paths*, click **New**, then click **String Value**. This will create a value named *New Value #1*.
7. Rename the new string value `DefaultNewDrivePath` and press **Enter.**
8. Right-click *DefaultNewDrivePath* and click **Modify**.
9. Type the path desired in the Value Data field. For example, type `C:\VPCImages` to have Virtual PC store new Undo Drive information on the *C:* drive in *VPCImages* folder. A valid path and folder must be entered. Virtual PC will **not** automatically create new folders.

Modify the Default Saved State Path (.VSD files)

To change the location of where Saved State files are stored:

10. Right-click on *Paths*, click **New**, then click **String Value**. This will create a value named *New Value #1*.
11. Rename the new string value `DefaultSavedStatePath` and press **Enter**.
12. Right-click *DefaultSavedStatePath* and click **Modify**.
13. Type the path desired in the Value Data field.

Modify the Default Undo Drive Path (.VUD files)

To change the location of where Undo Drives are stored:

14. Right-click on *Paths*, click **New**, then click **String Value**. This will create a value named *New Value #1*.
15. Rename the new string value `DefaultUndoDrivePath` and press **Enter**.
16. Right-click *DefaultUndoDrivePath* and click **Modify**.
17. Type the path desired in the Value Data field. For example, type `D:\VPC Undo Drives` to have Virtual PC store new Undo Drive information on the *D:* drive in *VPC Undo Drives* folder. A valid path and folder must be entered. Virtual PC will **not** automatically create new folders.
18. Close the Registry Editor and launch Virtual PC, the changes are now in effect.

Using Virtual PC with Multiple Users

Overview

Virtual PC stores all settings and configuration data on a per-user basis by default. This means that User A will have a different configuration than User B when using the same computer. However, in the case of multiple users accessing and using the same computer and the same virtual machines, the default method configuration method may not be practical.

Virtual PC provides a solution for this by means of a command line parameter. Command line parameters are used to preset variables at the run time of an application. Virtual PC includes a number of these, which are documented in the Virtual PC Online Help. For this document we will be focusing on one specific parameter, -defaultuser.

Standard Configuration vs. Default User Configuration

Virtual PC stores each user's configuration settings in the HKEY_CURRENT_USER registry key by default. This means that each user will have a separate registry key for Virtual PC. By using the –defaultuser command line parameter, Virtual PC will store all configuration information in the HKEY_USERS\.Default registry key. This allows for the same settings to be accessed from multiple user accounts.

For example:

Standard Virtual PC Configuration

USER A:

This user logs into the host computer and configures Virtual PC. User A sets up two Windows 98 virtual machines and configures the network information, memory, and performance settings. User A then shuts down both virtual machines and logs off the computer.

USER B:

This user logs into the same machine that User A has just configured. User B launches Virtual PC and is presented with a dialogue asking to create a new Virtual PC. All of the settings and virtual machines that User A has configured are not listed.

Virtual PC with the –defaultuser command line parameter

USER A:

This user launches Virtual PC with –defaultuser parameter. User A sets up two Windows 98 virtual machines and configures the network information, memory, and performance settings. User A then shuts down both virtual machines and logs off the computer.

USER B:

This user logs into the same machine that User A has just configured. User B launches Virtual PC with the –defaultuser parameter. Virtual PC launches and all the settings and virtual machines that User A has configured are available to User B.

Configuring Virtual PC to use the –defaultuser command line parameter

Virtual PC must be correctly configured in order to use the –defaultuser command line parameter, as follows:

Creating a New Shortcut

All Virtual PC command line parameters, including the –defaultuser parameter, can be run from either a command prompt or by launching Virtual PC with a modified shortcut. As multiple users will use this parameter, a modified shortcut link should be used to launch Virtual PC. To create a modified shortcut follow these steps:

1. Double click My Computer
2. Browse to the location of the Virtual PC Application (The path is usually: *C:\Program Files\Connectix\Connectix Virtual PC*)
3. Right-click the *Virtual PC.exe* file
4. Select **Create Shortcut**
5. Right-click the newly created shortcut
6. Select **Properties**
7. Add the following line to the **TARGET** field after the last double quote: `-defaultuser`

   Example:

   `"C:\Program Files\Connectix\Connectix Virtual PC\Virtual PC.exe" -defaultuser`

   NOTE There is a space between the ” and -

8. Apply the settings and close the properties window

Configuring Virtual PC

Once you have completed these steps - launch Virtual PC using the newly created shortcut. Configure any needed Virtual PCs and general settings. Make sure that the drive images you select to use are stored in a shared location on the host computer. For example: *C:\VPC*. When you are done - exit Virtual PC.

The new settings should now be stored in the *\\HKEY_USERS\.DEFAULT\SOFTWARE\Connectix* Registry key.

Configuring the HOST Machine

Only the administrator group will access to the HKEY_USERS\.DEFAULT registry key to start with. You will need to edit the permissions so that all users will have access to the Connectix Virtual PC section of this key. To do this - follow these steps:

1. Click **START**, then **RUN**
2. Type `regedt32` and press **Enter**
3. Locate the folder view for *HKEY_USERS*
4. Expand the *.DEFAULT* folder
5. Expand the *Software* folder
6. Highlight the *Connectix* Folder
7. Select *Security*
8. Modify the permissions to allow for the necessary users to have read/write access to this key

The Drive images that you are using for Virtual PC may also need to be modified so that all users can have read/write access to them. To do this - follow these steps:

1. Double-click **My Computer**
2. Browse to the folder where the Virtual PC Drive images are stored.
3. Select the drive image you wish to modify
4. Right-click and select **Properties**
5. Select **Security**
6. Modify the permissions to allow for the necessary users to have read/write access to this file

NOTE Make sure to also change the permission settings on the folder the drive images are stored in.

Virtual PC creates a standard shortcut in that start menu when it is installed. The location of this shortcut depends on the type of install that was selected, either Single User, or All User.

If *All User* was selected during install, the location of the shortcut will be:

X:\Documents and Settings\All Users\Start Menu\Programs

X being the boot drive of the system you are working on.

If *Single User* was selected, the location of the shortcut will be:

X:\Documents and Settings\`Current User Name`\Start Menu\Programs

`X` being the boot drive of the system, and *`Current User Name`* being the login you are currently using.

Delete this shortcut, and copy the modified shortcut that was configured with the **`-defaultuser`** option to this location: *X:\Documents and Settings\All Users\Start Menu\Programs*

NOTE Virtual PC must be launched from this shortcut or with the –defaultuser option enabled in order to access the correct registry location.

If Virtual PC is launched without this option, it will default to the standard registry location of *HKEY_CURRENT_USER* instead of *HKEY_USERS\.DEFAULT.*

Reducing Windows Guest's Disk Image Size

Virtual PC drive image file is much larger in size than used space indicated by the Windows Guest OS

Issue: Windows guest OS image file is much larger than the amount of used space indicated inside the Windows guest OS.

Solution: When Windows installs, it copies a large number of temporary files during the installation that are deleted when the installation is finished. These copied temporary files cause the guest OS image to be expanded. Virtual PC includes a utility to compact the drive image, the Virtual Disk Wizard

Before the Virtual Disk Wizard can compact a drive image, the unused space in the image must be zeroed out. This procedure uses the utility Eraser, other zeroing utilities should also work.

This procedure is for Windows 9x, NT 4, ME, 2000, and XP guest operating systems.

1. Download Eraser, (http://www.tolvanen.com/eraser/) and install it in the guest OS. Alternative disk 'zeroing' software can also be used.
2. Defragment the guest OS hard drive.
3. Backup any critical data in the guest OS.
4. Run Eraser in the guest OS.
5. Click **Edit**, then **Preferences,** then **Erasing**
6. Select **Unused Disk Space**
7. Select **New**
8. Enter the description **Blank**
9. Click **Add**
10. Create a 3-byte pattern of zeros
11. Click **Save**
12. Select **Blank** under **Unused disk space**
13. Click **OK.**
14. Click **File**, then **New Task**
15. Select **Unused space on drive**
16. Select **Local Hard Drives**
17. Click **OK**
18. Select **Task,** then **Run** on the previously created task
19. Wait for completion
20. Close the report
21. Exit Eraser and shutdown the guest PC.
22. Use Virtual Disk Wizard on the Host PC to reclaim lost space. Click **File**, then **Virtual Disk Wizard**.
23. Click **Next** to start the wizard.
24. Select **Examine or modify existing disk** and click **Next**.

25. Click **Browse** to locate the disk image, double-click the image file and click **Next** to continue.
26. Select **Compact the Disk image** and click **Next**.
27. Virtual PC allows the use of a secondary file to compact the disk. Connectix recommends that the image file be compacted to a new file and then verified to prevent data loss or corruption of the original image file. Select **New File**, browse or enter a new location, click **Next** to continue.
28. Click **Finish** to start the process.

When finished, click **Close**.

Virtual Network Computing (VNC)

Overview

Remote Control allows users to utilize their Virtual PCs from remote computers that are connected to TCP/IP based networks, such as the Internet, enabling users to view the display of a Virtual PC and to manipulate the Virtual PC as though they were sitting in front of the host computer.

This document discusses the potential uses of Virtual PC's Remote control feature, as well as discussing how to utilize this feature in a corporate environment.

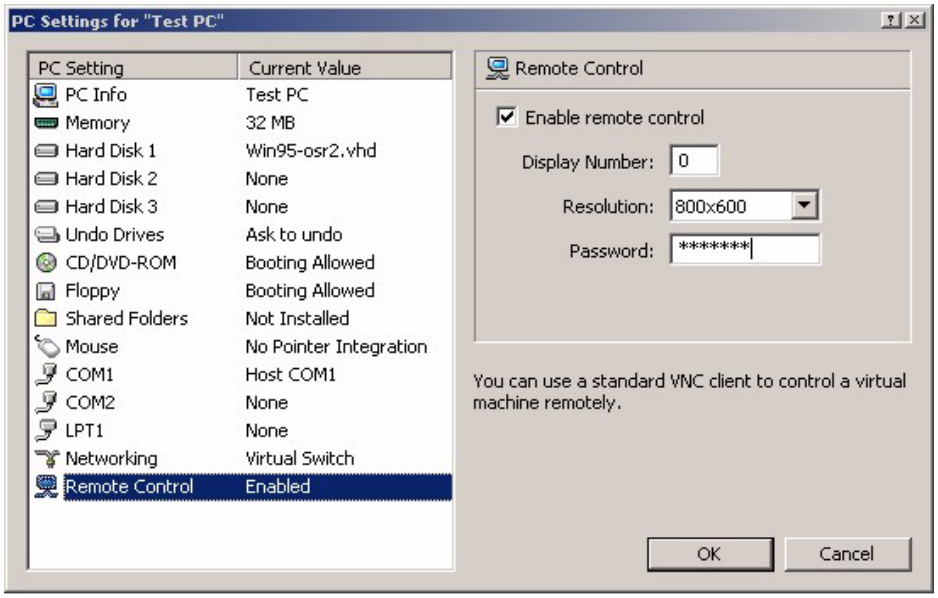
Potential scenarios for utilizing Virtual PCs Remote Control feature

The Remote Control feature of Virtual PC has been implemented to assist users in a wide range of situations. Some potential scenarios are:

- For use in conjunction with third party remote control software on the host, to provide a complete network solution. Clients who are already using other remote control software to administer a Virtual PC host computer have reported several issues involving graphical corruption and input problems. This is due to the fact that Virtual PC utilizes advanced Windows video and input libraries that are not well supported by most third party remote control software. In this scenario the customer can continue to utilize their existing software on the host, but use Virtual PCs Remote Control feature whenever they want to use a Virtual PC.
- To utilize Virtual PC technology on client machines that would be otherwise unable to run Virtual PC. As Virtual PC's Remote Control feature uses standardized protocols and technology, it is possible to use Remote Control to access Virtual PCs from computers that are either below the minimum requirements of Virtual PC or are running an unsupported host operating system.
- To remotely control an operating system that has no native "remote control" software. Virtual PC's Remote Control feature is implemented at the virtual hardware level. This means that Virtual PCs can be remotely controlled irrespective of what operating system they are running. This is especially useful for operating systems like DOS, which do not natively support remote control technology.

Configuring a Virtual PC for Remote Control

To configure a Virtual PC for Remote Control - use a pre-existing Virtual PC and select **Settings** for that particular PC. On the settings, select **Remote Control** as shown below:



Once Remote Control has been enabled, the following options will need to be configured:

- Display Number: The display number is used to allow remote control of simultaneous multiple Virtual PCs. This should be set to a number between 0 and 99. Any given display number can only be used by one active Virtual PC. If two Virtual PCs start with the same display number, Virtual PC will automatically reassign the second PC and inform the user of the change.
- Resolution: The resolution should be set to match the screen size of the Virtual PC. Virtual PC's remote control feature does not support dynamic changing of resolutions so it is necessary to manually define what resolution to use. This is a limitation of the VNC protocol which Virtual PC's remote control is based upon. If the Virtual PC displays a screen smaller than the selected resolution, it will be displayed on the remote control client with black borders. If the Virtual PC displays a screen larger than the selected resolution, it will display the top left corner of the screen on the remote control client.

Password: In order to connect to a remotely controlled Virtual PC a user will need to know the IP number of the host computer, the display number of the desired Virtual PC and the password. Connectix strongly recommends that users always set a password on the Remote Control feature of Virtual PC. When you remotely connect to a Virtual PC, the password is transmitted using the standard VNC encryption (DES encryption).

Once these settings have been configured press **OK** to save the changes. In order to remotely access a correctly configured Virtual PC the Virtual PC will need to have already been started.

Configuring clients for Virtual PC's Remote Control

The Virtual PC Remote Control feature has been designed to be compatible with an existing remote control client known as "VNC" or "Virtual Network Computer". For this reason users will be able to use any one of the many publicly available VNC client programs to remotely connect to a Virtual PC.

Once a user has obtained a VNC client they will need to launch it and enter the following details:

- Server: When prompted for the server - a user will have to enter the IP address of the remote host computer followed by the display number of the desired Virtual PC. These two values will need to be separated by a colon. For example, if a user wanted to connect to a Virtual PC with the display number of 10 on a host computer at 10.0.0.1 they would need to enter 10.0.0.1:10 as the "server".
- Password: When prompted for the password - a user should enter the same password that was entered in the settings panel when configuring the Virtual PC for Remote Control.

Potential issues with Virtual PC's Remote Control

Some potential issues:

- To use the mouse effectively in Remote Control mode the Virtual PC must have the Connectix Virtual PC additions installed. Without these additions users can still use the mouse, however "mouse scaling" will be under control of the guest OS. This means that the host and guest mouse pointers will not always coincide, it can also result in "jumpiness" and sudden movements that can make the pointer difficult to control. To avoid this the user will have to utilize the Remote Control "mouse-key mode". This mode can be activated by pressing the ALT key three times in rapid succession. Once "mouse-key mode" has been activated a small icon of a mouse will be displayed in the top left corner of the remote display. The mouse can then be controlled by using the arrow keys to move the pointer and by using the enter key to click the left mouse button.
- At the moment there is no way to configure Virtual PC to remotely launch Virtual PCs on demand. If a client is unable to directly access the host computer in order to launch a Virtual PC, two potential work arounds are:
  - Configure the Virtual PC host computer to automatically launch the required Virtual PCs after being logged in.
  - Install third party remote control software on the host computer and use this to launch any Virtual PCs.
- If a client intends to access Virtual PC's Remote Control feature and finds that they are being hindered by a network firewall, they will have to configure the firewall to allow VNC traffic through. The TCP ports that will need to be opened are 58xx and 59xx where "xx" is the display number of the Virtual PC.

Technical details of the VNC protocol

VNC or Virtual Network Computer is a remote control methodology originally developed by the Olivetti Research Laboratory. In January 1999 this group was acquired by AT&T who went on to create the AT&T Laboratories Cambridge. To obtain further technical information on the VNC protocol, reference the AT&T Laboratories Cambridge home page.

References

AT&T Laboratories Cambridge (http://www.uk.research.att.com/vnc/)

Linux Hard Drive Performance Optimization

Overview

Linux is a free UNIX type operating system originally created by Linus Torvalds with the assistance of developers around the world. As more corporate business are showing interest in Linux and investigating potential uses for Linux, Connectix has been dedicating resources to ensuring that using Linux inside of Virtual PC is an easy and logical choice. This document will specifically discuss configuring Linux Virtual PC's so as to obtain optimal hard drive performance.

Configuring Linux for optimal hard drive performance under Virtual PC

hdparm is a Linux shell utility for viewing and manipulating various IDE drive and driver parameters. Investigation and testing of multiple Linux distributions has proved the following configuration to be optimal for most Virtual PCs:

```
hdparm -m128 -u1 -c3 -W1 -A1 -d1 -X66 /dev/hda
```

To test this configuration on a specific Virtual PC, the above command can be entered in a Linux console. This command does not make any permanent changes, and the hard drive settings will revert once the Virtual PC is reset.

Once the above command has been tested, the configuration can be made permanent by adding the command to the top of the `/etc/rc.d/rc.local` startup script. To stop hdparm from displaying any output during the boot process, use the following command:

```
hdparm -qm128 -qu1 -qc3 -qW1 -qA1 -qd1 -qX66 /dev/hda
```

Analysis of the HDPARM parameters

The recommended hdparm command utilizes a number of configuration parameters. Below is a list of the parameters used, along with an explanation of what each parameter does.

- `-m128` - Enables multiple sector mode (aka IDE Block Mode) and sets the block size to 128 sectors.
- `-u1` - Permits Linux to unmask other interrupts while processing a drive interrupt.
- `-c3` - Enables 32 bit I/O support with synchronization.
- `-W1` - Enables the IDE drive's write caching feature.
- `-A1` - Enables the IDE drive's read-lookahead feature.
- `-d1` - Enables DMA support on the virtual hard drive.
- `-X66` - Sets the IDE drive to use Ultra DMA mode2
- `/dev/hda` - Specifies which IDE device to apply the configuration changes to.

Technical analysis of PIO vs. DMA in an emulated environment

Many Linux distributions use programmed I/O (PIO) over direct memory access (DMA) for their default method of accessing the hard drive - as some Linux developers debate the advantages of PIO vs. DMA when running on physical hardware.

However, in an emulated environment DMA has major advantages over PIO. PIO sends all hard drive requests through the CPU, so that during a typical hard drive operation both the CPU and the hard drive controller are heavily utilized. DMA, on the other hand, communicates directly to the hard drive controller and side steps the CPU for hard drive activity.

Virtual PC is optimized for DMA to virtualized IDE devices (CD/DVDs and hard drives). PIO requires one I/O operation (IN/OUT instruction) for every two or four bytes read from or written to an IDE device. These I/O accesses are difficult to virtualize, and the overhead for each I/O access is relatively high. DMA, on the other hand, only requires one I/O operation for each multi-sector read or write operation.

References

Linux.org (http://www.linux.org)
freshmeat.net - the hdparm project (http://www.freshmeat.net)
Cherry Hill Linux User's Group - hdparm HowTo (http://www.chlug.org/home.php)
Unix man pages: hdparm(8)

Optimizing Windows XP Professional and Home Editions for Virtual PC

This document provides information on how to optimize Windows XP Professional and/or Home Edition to improve performance under Virtual PC. Windows XP contains many visual effects, themes and other enhancements that give the operating system the new XP look and "feel". When run in Virtual PC however, these visual enhancements affect the overall feel and performance of the operating system – especially when compared to a Windows 2000 operating system. This document explains how to disable these enhancements to improve performance.

These optimizations can be applied to any version of Windows XP Home or Professional running in either Connectix Virtual PC for Mac or Connectix Virtual PC for Windows.

System Properties

The following features are controlled through the System Properties dialog which can be accessed by clicking the Start button, choosing Control Panel and then selecting System. Visual Effects Windows XP contains a variety of special effects and visual enhancements such as animated menus, fade effects, cursor shadows, menu shadows, etc. Disabling some of these settings can make Windows XP feel "snappier" when opening menus and windows. Follow the steps below to optimize the Visual Effects settings.

- Open Control Panel from the Start menu and double-click **System**.
- Click the **Advanced** tab.
- Select **Settings** button under **Performance**.
- Select **Adjust for best performance** and click **Apply**.

NOTE If you choose the "Custom" option, you can selectively enable or disable specific effects. The cursor shadowing effect can have a noticeable impact on performance. If you choose to leave some of the effects on, Connectix recommends that you at least disable the cursor shadowing effect.

Remote Desktop

Remote Desktop allows another user to control Windows from a remote location. This function can also be used for support by Microsoft technicians to provide support by controlling your operating system (upon request) for troubleshooting various issues. Unless you have a need for remote operation of Windows XP and are experienced in setting up the connections and preferences, it's recommended that you disable this option.

- Choose the **Remote** tab
- Make sure **Allow Remote Assistance**… and **Allow users to connect**… are not selected and click **OK**.

System Restore

Windows XP contains a feature known as System Restore which allows you to restore your OS back to a pre-defined point. This feature can be useful if you have significant data on your drive and you experiment with various beta software and/or drivers that could conceivably cause instability in the operating system.

This feature requires monitoring of your drive(s) and data on a continuous basis and a fair amount of overhead resources to run. Unless you have a great need for this functionality, you can opt to disable it.

NOTE You can use the Undo Drives feature in Virtual PC to reverse changes made to an operating system. Consult the Virtual PC manual or built-in help for more information on using Undo Drives.

- Select the **System Restore** tab.
- Select **Turn off System Restore on all drives** and click **OK** – confirm **OK** when asked if you're sure you want to disable System Restore.

Automatic Updates

Windows XP contains functionality to check the Microsoft Windows Update website on a regular basis to determine if any operating system updates are available. This feature may still be active even when a machine is not connected to a network. Updates can be downloaded automatically or the user may choose to simply be notified that updates are available. However, it is possible for the user to perform these operations manually whenever desired by simply clicking the "Windows Update" option in the Start menu while connected to the Internet. To improve performance, Connectix recommends that you turn off the Automatic Updating feature and invoke it manually from time to time.

- Select the **Automatic Updates** tab.
- Deselect **Keep my computer up to date**…
- If this box isn't displayed, then deselect the box that says **Turn off automatic updating**…

Once the changes above have been applied, close the System Properties dialog by clicking **OK**. You'll be asked to restart the PC – allow Windows to restart before continuing to the next section of optimizations.

Display Properties

A variety of special effects and features can be optimized in the Display Properties dialog.

To access Display Properties:

-Open Control Panel from the Start menu and choose Display.

- Choose the **Desktop** tab and set the Background to **None** (the first available option).
- Select the **Appearance** tab.
- Under **Windows and buttons**, choose **Windows Classic Style** from the drop-down menu.
- Click the **Effects** button.
- Uncheck all options and click **OK**.
- Click **OK** to close the Display Properties and apply the changes.

Start Menu and Taskbar

There are several areas of the Taskbar and Start Menu that can be optimized for better performance.

To access the Taskbar properties:

-Right-click (CTRL-click) on the Windows XP Start button and select **Properties** from the menu that appears.

- Select **Classic Start Menu**
- Click **Customize**
- Select **Show Small Icons in Start Menu**
- Uncheck any other items that you may not use to reduce the number of items that appear in the Start menu

Folder Options

The way that items in folders are displayed can have an impact on the perceived speed of

the operating system. Follow these steps to optimize folder views in Windows XP.

- Open My Computer.
- Open the C: Drive (Local Disk).
- Select **Folder Options** from **Tools**.
- Verify **Use Windows classic folders** is selected.
- Select **View**.
- Deselect **Automatically search for network folders and printers**.
- Click **Apply**.
- Click **Apply to All Folders**.
- Click **OK** to close the Folder Options dialog.

Using the Microsoft Loopback Adapter to Enable Virtual Switch Networking on Non-Networked PCs

Overview

The Virtual Switch is a powerful and flexible networking option. It allows a user to configure an isolated 'virtual network' where servers and clients can run without affecting a production environment. Virtual Switch also allows a salesperson to demonstrate client-server tools and applications on a single notebook computer. Instead of carrying and configuring multiple computers on a sales call, only a single pre-configured notebook computer is required. However, Virtual Switch requires an active network card. This can easily be accomplished with the Microsoft Loopback Adapter on Windows NT 4, Windows 2000, or Windows XP. To configure a non-networked host PC to use Virtual Switch, follow these steps:

1. Install the MS Loopback adapter. See **Installation** below for OS-specific installation instructions.
2. Start Virtual PC and change the network adapter to the MS Loopback adapter. Click **File, Preferences, Virtual Switch**. Select **MS Loopback Adapter** from the **Network Adapter** list.
3. Before starting a guest PC, verify that **Virtual Switch** is selected from the **Networking** settings.

Usage Scenarios

Sales:

A notebook pre-configured with a network-based application is carried to sales calls. The salesperson can launch a guest PC with a server OS and the server-based applications. After the guest is successfully loaded or quickly restored from a Saved State, one or more client guest PCs can be launched and logged into the server via the 'virtual network' provided by the Virtual Switch.

Education:

In the classroom, each student is allowed a single PC. Virtual PC is loaded and the students now have a 'virtual lab' that allows each student to get hands on experience building servers, configuring clients, and other networking-based activities. Using the MS Loopback adapter allows instructors to isolate each PC from the school's network and the Internet, preventing incorrectly configured servers from interfering with the network and keeping students from being distracted by Internet access.

Configuring Virtual PC to use the MS Loopback Adapter

After installing and configuring the Microsoft Loopback Adapter, you must now configure the Virtual PC for Windows and your Guest operating systems.

To configure Virtual PC for Windows:

1. Launch Virtual PC for Windows.
2. Click **File**, then **Preferences**.
3. Select **Virtual Switch**.
4. Select **Microsoft Loopback Adapter** (or **MS Loopback Adapter**).
5. Click **OK**.

Configure guest PCs to use Virtual Switch:

1. Select the Guest in the PC List window.
2. Click **Settings...**
3. Select **Networking**.
4. Click **Virtual Switch**.
5. Select **Local and Host** or **Local, Host and External**.
6. Click **OK**.

Finally, configure Guest operating system's TCP/IP protocol to use a static TCP/IP address of 192.168.1.2 and Subnet mask of 255.255.255.0. As with the Host TCP/IP configuration, there is no default gateway or DNS addresses to enter. If you have multiple Guest operating systems, configure them using TCP/IP addresses 192.168.1.3, 192.168.1.4, etc.

> **NOTE** You can actually use any TCP/IP address from the same range of addresses you used to configure the Host's TCP/IP settings on the loopback adapter. For example, if you chose 192.168.237.1 for your Host's TCP/IP address on the loopback adapter, you could use 192.168.237.2, 192.168.237.3, etc.

When accessing TCP/IP-based services on the Host computer, you simply enter the TCP/IP address of the Host computer in the Guest's client software. For example, if you run a web server on your Host computer enter http://192.168.1.1 in your Guest's web browser.

Your Host computer can access TCP/IP-based services on your Guest virtual machines. Simply enter the TCP/IP address of the appropriate Guest in you Host's client software.

If you want to use protocols other than TCP/IP you will need to configure these appropriately.

Installing the MS Loopback Adapter on Windows XP

1. Click **Start**, then right-click **My Computer** and select **Properties** from the pop-up menu.
2. **System Properties:** Click **Hardware**.
3. **System Properties:** Click **Add Hardware Wizard**
4. **Welcome to the Add Hardware Wizard:** Click **Next**. The Wizard will search for a short time.
5. **Is the hardware connected?:** Select **Yes, I have already connected the hardware** and click **Next**.
6. Scroll to the bottom of the list and select **Add a new hardware device** and click **Next**.
7. Select **Install the hardware that I manually select from a list (Advanced)** and click **Next.**
8. **Common hardware types:** Select **Network Adapter** and click **Next.**
9. **Select Network Adapter:** Select **Microsoft** as the **Manufacturer** and **Microsoft Loopback Adapter** as the **Network Adapter**, then click **Next**.
10. Click **Next** to install the MS Loopback Adapter.
11. **Software Installation:** Click **Continue Anyway** if prompted regarding driver signing.
12. Click **Finish** to complete the installation.
13. Click **Start**, then right-click **My Network Places** and select **Properties** from the pop-up menu.
14. **Network Connections:** Locate the Local Area Connection that is the MS Loopback Adapter by right-clicking each entry and selecting **Properties** until the MS Loopback Adapter is found.
15. **Local Area Connection Properties:** Verify that **Virtual PC Emulated Ethernet Switch** is selected.
16. **Local Area Connection Properties:** Select **Internet Protocol (TPC/IP)** and click **Properties**.
17. **Internet Protocol (TCP/IP) Properties:** Select **Use the following IP address**
    a. **IP Address:** Enter `192.168.1.1`
    b. **Subnet Mask:** Enter `255.255.255.0`
    c. Click **OK**.

    NOTE You can actually use any TCP/IP address, but it is best to choose one from a reserved range of non-routable TCP/IP addresses. For example, TCP/IP addresses of the form 192.168.x.y where x is a value between 0 and 255 and y is a value between 1 and 254 are non-routable. Be sure to note which value you choose for x, because you will need to use it when configuring the Guest operating system's TCP/IP settings. Also, many Cable/DSL Routers use a non-routable TCP/IP address in the same form as described. If your primary Ethernet connection uses one of these non-routable addresses, you must choose a different value for x to assign to the MS Loopback adapter.
18. **Local Area Connection Properties:** Click **Close**.
19. Press **F2** and rename **Local Area Connection** to **MS Loopback Adapter.**

Installing the MS Loopback Adapter on Windows 2000

1. Right-click **My Computer** and select **Properties**.
2. Click **Hardware**.
3. Click **Hardware Wizard…**
4. **Welcome to the Add/Remove Hardware wizard**: Click **Next.**
5. **Choose a Hardware Task**: Click **Add/Troubleshoot a device** and click **Next**.
6. **Choose a Hardware Device**: Select **Add a new device** and click **Next**.
7. **Find New Hardware**: Click **No, I want to select the hardware from a list** and click **Next**.
8. **Hardware Type**: Select **Network adapters** and click **Next**.
9. Select **Network Adapter**: Select **Microsoft** under **Manufacturers** and select **Microsoft Loopback Adapter** under **Network Adapter**. Click **Next**.
10. **Start Hardware Installation**: Click **Next**.
11. **Completing the Add/Remove Hardware Wizard:** Click **Finish**.
12. **System Properties:** Click **OK.**
13. Right-click **My Network Places** and select **Properties**.
14. Locate the Local Area Connection that is the MS Loopback Adapter by right-clicking each entry and selecting **Properties** until the MS Loopback Adapter is found.
15. **Local Area Connection Properties:** Verify that **Virtual PC Emulated Ethernet Switch** is selected.
16. **Local Area Connection Properties:** Select **Internet Protocol (TPC/IP)** and click **Properties**.
17. **Internet Protocol (TCP/IP) Properties:** Select **Use the following IP address**
    a. **IP Address:** Enter `192.168.1.1`
    b. **Subnet Mask:** Enter `255.255.255.0`
    c. Click **OK**.

    NOTE You can actually use any TCP/IP address, but it is best to choose one from a reserved range of non-routable TCP/IP addresses. For example, TCP/IP addresses of the form 192.168.x.y where x is a value between 0 and 255 and y is a value between 1 and 254 are non-routable. Be sure to note which value you choose for x, because you will need to use it when configuring the Guest operating system's TCP/IP settings. Also, many Cable/DSL Routers use a non-routable TCP/IP address in the same form as described. If your primary Ethernet connection uses one of these non-routable addresses, you must choose a different value for x to assign to the MS Loopback adapter.
18. **Local Area Connection Properties:** Click **Close**.
19. Press **F2** and rename **Local Area Connection** to **MS Loopback Adapter.**

Installing the MS Loopback Adapter Under Windows NT 4

NOTE You must be logged in as a local administrator. Installation may require the Windows NT 4.0 installation source.

1. Right-click **Network Neighborhood** and select **Properties** from the popup menu.
2. **Network:** Click **Adapters**. Click **Add…**
3. Select **Network Adapter:** select **MS Loopback Adapter** from the **Network Adapters** list. Click **OK**.
4. **MS Loopback Adapter Card Setup:** Select **802.3**. Click **OK**.
5. **Windows NT Setup:** Verify that the path is pointing to the correct location of the Windows NT 4.0 installation source. Click **Continue**.
6. **Network:** Click **Close**.
7. **Microsoft TCP/IP Properties:** Select **MS Loopback Adapter** from the **Adapter** list.
   a. **IP Address:** Click **Specify an IP Address**.
   b. Enter `192.168.1.1` in the **IP Address** field
   c. Enter `255.255.255.0` in the **Subnet Mask**
   d. Leave the **Default Gateway** blank.

   NOTE You can actually use any TCP/IP address, but it is best to choose one from a reserved range of non-routable TCP/IP addresses. For example, TCP/IP addresses of the form 192.168.x.y where x is a value between 0 and 255 and y is a value between 1 and 254 are non-routable. Be sure to note which value you choose for x, because you will need to use it when configuring the Guest operating system's TCP/IP settings. Also, many Cable/DSL Routers use a non-routable TCP/IP address in the same form as described. If your primary Ethernet connection uses one of these non-routable addresses, you must choose a different value for x to assign to the MS Loopback adapter.
8. **Network Settings Change:** Click to **Yes** restart the PC.

Using Symantec® Ghost Images with Virtual PC

Overview

Virtual PC provides a superb environment for building, modifying, testing and provisioning software configurations. For this reason, users often wish to use Virtual PC in conjunction with hard drive cloning software such as Symantec Ghost. With most operating systems Ghost images can be easily cloned onto, and off of a Virtual PC.

This document discusses the technical process of restoring a Ghost archive onto a Virtual PC.

Restoring a Ghost archive onto a Virtual PC drive image

As Virtual PC aims to emulate a real PC in as many ways as possible - most traditional methods for deploying Ghost images are still effective when working with Virtual PC. Below is a list of common methods for deploying Symantec Ghost images - and details on how to implement them with Virtual PC.

- CD Deployment:
  - Clients who use CD media as a method for deploying Ghost images should be able to use these CD's with Virtual PC in exactly the same manner as they would for a physical PC.
- Network Deployment:
  - Clients who use the Ghost network server to deploy images can use this methodology under Virtual PC with no problems. They will, however, need to get the DOS drivers for the DEC2104x network card that is emulated by Virtual PC. These can be downloaded from: http://developer.intel.com/design/network/drivers/sla_NDIS2.htm
- Parallel Deployment:
  - Clients who use Parallel cross-over cables to deploy Ghost images can use the same procedure with Virtual PC. Before attempting to transfer the file, the client will need to enable LPT1: in the Virtual PC settings.

As well as using these methods, it is also possible to use Virtual PC's Shared Folder feature to create and deploy Symantec Ghost images.

Creating a Shared Folders boot floppy

In order to use Virtual PC's Shared Folders feature to deploy Ghost images a special Shared Folders boot floppy needs to be constructed. To create this boot floppy the following things are needed:

1. A blank DOS formatted bootable floppy.
   To create a blank DOS formatted bootable floppy an existing DOS, Windows 95 or Windows 98 installation will be required. After inserting a floppy disk into the drive, execute the following command: `Format A: /S`
2. The file `GHOST.EXE`
   This file should be found in the installation directory used by Symantec Ghost. Copy this file onto the newly formatted floppy disk. Certain versions of Symantec Ghost also require the `GHOST.ENV` file, which can be located in the same directory as `GHOST.EXE`
3. The file `FSHARE.EXE`
   `FSHARE.EXE` is distributed as part of the Connectix Virtual PC additions for DOS. The DOS additions are included with both the trial and full versions Virtual PC 5. The DOS additions are distributed in a Virtual Floppy Disk (.VFD). To extract `FSHARE.EXE` from this file a third party program such as WinImage (http://www.winimage.com) can be used. Copy this file onto the newly created boot floppy.
4. 4. The file `CONFIG.SYS`
   `CONFIG.SYS` is a plain text file used as a configuration file for DOS. In order to use **Shared Folders** this file will need to contain the following line:

   ```
   LASTDRIVE=Z
   ```

   Copy this file onto the newly created boot floppy.
5. The file `AUTOEXEC.BAT`
   While this file is not necessarily needed, it does help to automate the process of restoring Ghost images. `AUTOEXEC.BAT` is a plain text file that should contain the following lines:

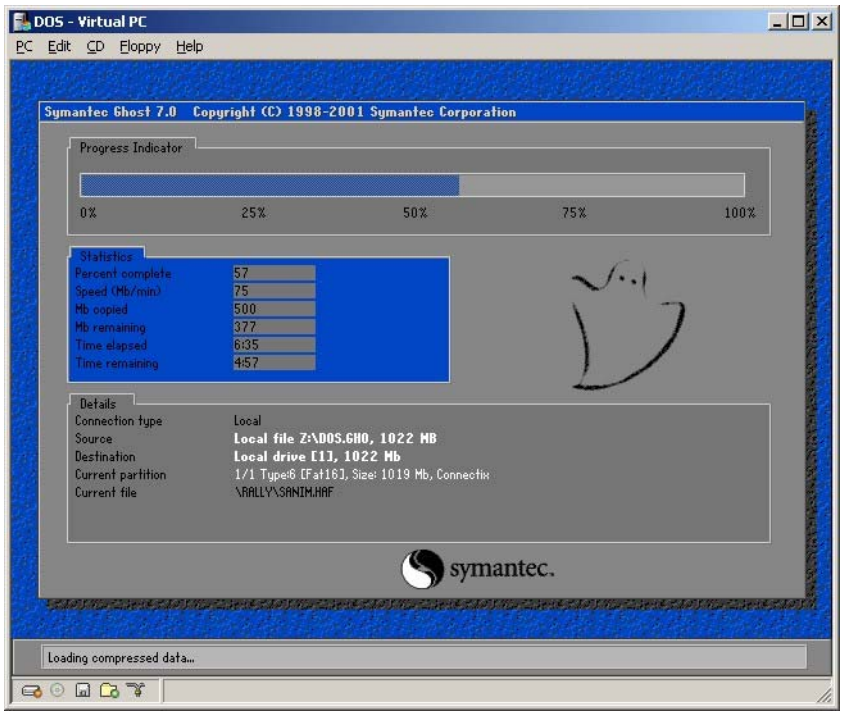
   ```
   A:\FSHARE.EXE
   A:\GHOST.EXE
   ```

   Once the boot floppy has been created, and the above four files have been copied onto the bootable floppy, this disk can now be used to quickly and elegantly load Ghost archive files into Virtual PC.

Using "Shared Folders" to restore a Ghost archive

The procedure for using "Shared Folders" to restore a Ghost archive is as follows:

1. Create a new virtual PC:
   a. Click on “New PC...” in Virtual PC’s main window
   b. Select the 'Guide Me' option
   c. Set up configuration parameters for the target OS
2. Boot the virtual machine from the prepared boot floppy. If the autoexec.bat file is configured properly as shown, Ghost will automatically start.
3. In the lower left hand corner of the PC window, right click on the small folder icon and select **Share Folder...**. Select the folder or volume that contains the Ghost archive. This will “share” the folder or volume, making the Ghost archive accessible within the virtual machine. By default, it will be shared as the **Z** drive.
4. From the main Ghost window, choose the following menu selections: **Local**, **Disk**, then **From Image**
5. Select the Ghost image to restore. It should be found at `Z:\`. (If fshare.exe wasn’t able to use the `Z` drive letter, it will choose the next available letter. Refer to the **Shared Folder** panel of the **PC Settings** window to determine which drive letter was used.)
6. The Ghost archive will now be restored to the Virtual PCs hard drive.



Splitting Ghost Images

In the above instructions, the DOS version of "Shared Folders" is used. As this is a DOS program - it is limited to files that are 2 gigabytes (GB) or smaller. Recent versions of Symantec Ghost will automatically split large archive files so that they are under 2GB. But older versions (5.1b and earlier) did not do this, so it is possible to have Ghost archives that are greater than 2GB in size

If a client is using one of these older versions and has an image file that is larger than 2 GB, Ghost can be used to split the image file into smaller segments (e.g. 2 GB) by using the -SPLIT=2040 switch.

This command can also be used to split a Ghost archive into 660MB segments, for CD based deployment.

Known Issues

One issue that has been reported is that with certain configurations, the process of restoring a Ghost file can cause Virtual PC to fully expand its virtual hard drive. This situation tends to occur when either a "raw" partition image has been created or when partition size parameters have been specified from the Ghost command line. In these situations, Ghost will fail with a "Partition Mismatch" error. To stop this error from occurring, the Virtual PC's virtual hard drive has to be configured to have a maximum size that is smaller than the available free space on the host.

Another issue that has been encountered is that problems arise when trying to load a Ghost archive of Windows 2000 or Windows XP that were created with an ACPI compliant BIOS. These images will cause an 'Unrecoverable Processor Error' to occur upon boot. To resolve this problem, ACPI will have to be enabled in the Virtual PC's BIOS, which can be modified by hitting the **DEL** key during the initial boot stage.

References

Symantec Knowledge Base Article: 2001021208382625 (http://www.symantec.com/techsupp/)

Symantec Knowedge Base Article: 2001022206484225 (http://www.symantec.com/techsupp/)

Connectix Virtual PC Additions: http://www.connectix.com/support/vpc_additions.html

Network Boot Disks for Symantec and Norton Ghost

The Ghost Boot Wizard can create network boot disks for use with the Intel/DEC 21140 network card emulated by Virtual PC. The drivers for the network card are not included, but can be downloaded from Intel's website here: http://developer.intel.com/design/network/drivers/nd2_300.htm. Make a note of the location after expanding the drivers.

Symantec Ghost Multicast Boot Disk Wizard

1. Launch the Ghost Boot Wizard
2. **Boot Package:** Select **Network Boot Disk** and click **Next**.
3. **Network Interface Card:** Click **Add**.
4. **Template Type:** Select **NDIS2 Driver** and click **OK**.
5. **Template Properties:** Click **Browse** to locate the *dc21x4.dos* driver. The default path for the driver is *MSLANMAN.DOS\DRIVERS\ETHERNET\DC21X4.* Select the driver and click **Open.**
6. Type `DC21X4$` in the **Driver Name** field and click **OK**.
7. Name the new template `VPC DC2114 NDIS` and press **Enter**.
8. **Network Interface Card:** Click **Next** to begin disk creation.
9. **Client Type:** Select **Symantec Ghost** and click **Next**.
10. **Network Settings:** Select the correct settings for the network environment, **DHCP** or static **IP**. If static, enter the correct information for **IP Address**, **Subnet Mask** and **Gateway**. Click **Next**.
11. **Destination Drive**: Insert a floppy disk in the correct drive and click **Next** to format the disk.
12. **Review:** Click **Next**
13. **Format 3.5 Floppy (A:):** Select **Create an MS-DOS startup disk** and click **Start**.
14. **Warning:** All data will be erased on this disk, if acceptable, click **OK** to continue.
15. **Format complete:** Click **OK**
16. **Format 3.5 Floppy (A:):** Click **Close**.
17. **Finished:** Click **Finish**.

The floppy disk is configured to connect to a Ghost Multicast Server. Optionally, use WinImage (www.winimage) to create a virtual floppy disk.

Norton Ghost Boot Disk Wizard

1. Launch the Norton Ghost Boot Wizard
2. Select Peer-to-Peer Network Boot Disk and click **Next**.
3. **Network Interface Card:** Click **Add**.
4. **Template Type:** Select **NDIS2 Driver** and click **OK**.
5. **Template Properties:** Click **Browse** to locate the *dc21x4.dos* driver. The default path for the driver is *MSLANMAN.DOS\DRIVERS\ETHERNET\DC21X4.* Select the driver and click **Open.**
6. Type `DC21X4$` in the **Driver Name** field and click **OK**.
7. Name the new template `VPC DC2114 NDIS` and press **Enter**.
8. **Network Interface Card:** Click **Next** to begin disk creation.
9. **DOS Version: Use PC-DOS** should be selected by default, click **Next**.
10. **Ghost executable location:** Click **Next**.

11. **Network Settings:** Select the correct IP configuration and click **Next**. If static **IP**, then you must enter the **First IP Address**, **Subnet Mask**, and **Gateway**. Click **Next**.
12. **Destination Drive:** Insert a blank floppy disk into the drive selected and click **Next**.
13. **Review:** Click **Next**.
14. **Format A:** Click **Start.**
15. **Warning:** All data will be lost, if acceptable, click **OK.**
16. **Format complete:** Click **OK** then click **Close.**
17. **Finished:** Click **Finish**

The floppy disk is configured to connect to via Norton Ghost Peer-to-Peer networking. Optionally, use WinImage (www.winimage) to create a virtual floppy disk.

Adding Additional Network Cards in Virtual PC 5.2

Prior to version 5.2, Virtual PC was limited to emulated one network card in a guest PC. With version 5.2, it is possible to have 0 to 4 network cards in a guest PC.

This procedure requires modification of the Windows Registry. Incorrect changes to the Registry can corrupt Windows and cause it to fail to boot. Connectix recommends backing up your system before modifying the Windows Registry

To Enable Multiple NICs

Add a DWORD Value `Ethernet Card Count` under *Networking* in the *Configuration* key for *`guest_PC`*. Set this item to any value from 0 to 4.

For example to configure a guest PC called *Win2k* for 4 network cards, create the following key:
`HKEY_CURRENT_USER\Software\Connectix\Virtual PC\4.0\Configuration\Win2k\Networking`

Create a DWORD value: `Ethernet Card Count` and enter the number of network cards from **0** to **4** as the Value.

NOTE A guest PC must be started before the Registry is fully populated with the Network Key.

NOTE Windows NT 4 guests do not automatically plug n play additional network cards. Additional steps are needed for this particular operating system.

NOTE While additional network cards can be added inside the guest PC, all emulated network cards from all guests will only use one host network card.

Guest OS loses connectivity after upgrade to Virtual PC 5.2

Virtual PC 5.2 networking code changed significantly from Virtual PC 5.1. These changes can cause a loss of network connectivity from one or both of the following. First, Virtual PC re-detects the host network card which can result in the incorrect network card being specified in the Virtual Switch Preferences if the host PC has multiple network cards installed.

To change the host network card Virtual PC uses

1. Start Virtual PC
2. Click **File** from the VPC List
3. Click **Preferences**.
4. Select **Virtual Switch**.
5. Select the correct, 'active' network card.
6. Restart Virtual PC.

Updating network card drivers in the guest OS

Second, the guest PC's OS may see the changes made in the networking code and re-detect the network card. Most Plug and Play OSes will correctly detect and install the correct network card.

Windows 9x-based Guests

OSes base on the Windows 9x may detect the new card and install it, but also leave the previously detected network card installed. If there is a loss of network connectivity in a Windows 9x-based guest OS:

1. Right-click *Network Neighborhood* and select *Properties*.
2. **Network:** Highlight the each network card and click **Remove**. Click **Ok**
3. **System Settings Change:** Click **Yes** to restart Windows.
4. **Add New Hardware Wizard:** Click **Next,** click **Next** again.
5. **Add New Hardware Wizard:** Select **CD-ROM,** insert the Windows CD-ROM and click **Next**.
6. **Add New Hardware Wizard: The updated driver (Recommended)** should be selected, click **Next** to continue.
7. **Add New Hardware Wizard: Windows is ready to install the best driver:** Click **Next**.
8. Click **Finish**.
9. **System Settings Change:** Click **Yes** to restart Windows.

Windows NT 4 Guests

1. Right-click **Network Neighborhood** and select **Properties**.
2. **Network:** Click **Adapters.** If necessary, make not of any special configuration information for the network card. Click **Remove.**
3. **Warning:** Click **Yes**.
4. **Network**: Click **Add**.
5. **Select Network Adapter:** Select the **DEC PCI Fast Ethernet DECchip 21140**. Click **Ok**.
6. **Windows NT Setup:** Insert the Windows NT CD-ROM and click **Continue**.
7. **Network**: Click **Close**.
8. **Network Settings Change:** Click **Yes** to restart Windows.

Appendix A

Technical Specifications

This appendix lists the technical specifications for Virtual PC for Windows

Processor

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

Motherboard

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

BIOS

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

Memory

- Maximum 1GB RAM per guest PC

IDE controller

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

Standard configuration

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

Alternate configuration

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

Hard drive images

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

CD-ROM/DVD-ROM

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

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

Video

- Emulates the S3 Trio 32/64 PCI SVGA Card
- Implements 8 MB of emulated VRAM, allowing for up to 1600x1200 PC screen resolutions with 32 bit color
- NOTE VRAM availability is dependent upon the guest OS's video driver. Some video drivers may only recognize 2MB or 4MB of VRAM. Virtual PC Additions may be required for the guest PC to recognize 8MB of VRAM.
- Fully implements S3 Trio 32/64 graphic acceleration features and is compatible with S3 Trio 32/64 drivers
- Supports 1600 x 1024 and 800 x 512 16:9 aspect ratio modes
- Also backwards compatible with MDA, CGA, EGA, and VGA video modes
- VESA 2.0 compliant

Keyboard controller

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

Keyboard

- Uses the standard PC keyboard

Mouse

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

Floppy

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

Serial ports

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

Parallel port

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

Frequently Asked Questions

Common questions concerning Virtual PC

Question: I've just created a new Guest PC and when I click **Start Up** all I get is the message `Reboot and Select proper Boot device or Insert Boot Media in selected Boot Device`, what's wrong?

Answer: This is the expected behavior. After you create a Guest PC in the PC List, you need to install an operating system. The New PC Wizard creates a virtual PC with an empty hard disk. A guest PC in Virtual PC behaves the same way as a real computer would with a blank hard drive. For details on installing OSes, see Chapter 3, Guest OS Installation Guides.

Question: I am trying to update to Virtual PC 5.2 on my Windows 98SE or Windows ME host and cannot?

Answer: Virtual PC 5.2 no longer supports Windows 98SE and Windows ME as hosts. If you intend to run Virtual PC on a Windows 98SE or Windows ME host, continue to use Virtual PC 5.1

Question: I just finished installing Windows NT or Windows 2000 and I cannot press CTRL+ALT+DEL to log into Windows. When I press CTRL+ALT+DEL, it locks the host PC.

Answer: To send a CTRL+ALT+DEL to a guest PC, press the *`hostkey`*+DEL. By default, the *`hostkey`* is defined as the right ALT key.

Question: I've installed an operating system in Virtual PC, but I can't get the network card and video drivers installed for the video card I have installed in my physical computer?

Answer: Virtual PC emulates all the hardware of a guest PC. The guest PC cannot 'see' any hardware installed in the host PC. See Appendix A for a detailed list of the hardware emulated by Virtual PC. Even though you may have an ATI or nVidia video card installed in the host PC, the guest PC has an S3 Trio64 video card.

Question: My mouse has been 'captured' by the guest OS window. How to I get it back out?

Answer: To release the mouse from the guest PC, press the *hostkey*. By default, the *hostkey* is defined as the right ALT key. If you are using Windows 95-XP, you can install the Virtual PC Additions which will allow the mouse to pass freely between the host and guest PCs.

Question: When I click **Install/Update Additions** for my Linux guest PC, nothing happens?

Answer: The **Install/Update Additions** will only work with Windows 95 through Windows XP. There are DOS file-sharing, Windows 3.1 mouse integration, and Linux time sync additions available separately. See Chapter 3, Guest OS Installation Guides for details.

Question: Does Virtual PC emulate Windows?

Answer: No, Virtual PC emulates an Intel-based PC from the BIOS to Video Card. This allows Virtual PC to run most x86-based operating systems.

Question: Can I run MacOS 9 or X in Virtual PC?

Answer: No, Virtual PC emulates an Intel-based PC which is not compatible with MacOS and the PowerPC architecture required to run it.

Question: Can I load my host video drivers into a guest OS?

Answer: No, the guest does not "see" the video card as a native device. Installing your own video card drivers into the guest OS will not work.

Question: How do I install multiple operating systems?

Answer: Just create PC configurations with the "New PC" button in the Virtual PC window. Follow the prompts to set up the parameters for that machine, including what OS you intend to install. From there, start up the virtual machine and install the OS onto this new virtual machine. You can install as many operating systems as you have disk space for without partitioning your hard disk.

Question: How do I run multiple operating systems? Can I do so simultaneously?

Answer: Just double-click on the appropriate thumbnail in the Virtual PC window. (See figure A) You can run as many virtual machines each with their own operating system, as you have RAM available. (Each virtual machine takes its own RAM to run.)

Question: What is an OS Pack?

Answer: An OS Pack is a pre-configured OS set up to work with Virtual PC. Just copy a single file over to your hard drive and run with it. All of the drivers and options are set up to take advantage of the guest environment. OS Packs save time and makes the installation process easier.

Question: What is a drive image?

Answer: A drive image is a single file which stores a guest operating system and all of its applications and other data. The drive image makes up the "C" drive that the virtual machine uses to load its operating environment.

Question: What are the limitations to a drive image?

Answer: The most common type of drive image, a dynamically expanding drive image, will grow as you install applications and data in the guest OS contained in the drive image. A drive image can grow to a size of 128 GB.

Question: What are the limitations on the number of guest operating systems I can run concurrently?

Answer: You are only limited by your physical machine's memory (RAM). If you want to run more simultaneous machines, especially the ones with demanding memory requirements (i.e., Windows 2000/XP hosts and guests) you will need to increase your amount of physical RAM in your computer.

Question: What is a saved state?

Answer: When you close a virtual machine with Virtual PC, you are given the option to save the PC's state and all of your changes -- much faster than on a hardware PC. The virtual machines within Virtual PC start right up from a "saved state." Virtual PC's saved states are very flexible, since you can put a virtual machine into a saved state at any time, even in the middle of an OS install, or while booting an OS.

Question: What are undoable drives?

Answer: An undoable drive allows the user to choose if the changes they make in a virtual machine session should be made permanent, or if they want to throw them away. Undoable drives enable you to gracefully "back out" of the installation of an application, the downloading of a Java applet from the Internet, or any other use. Undoable drives are an especially useful feature for people in training and development environments.

Question: What is a differencing drive?

Answer: Differencing drives are a way to build many virtual machines and share a large percentage of the disk space that each virtual machine requires. Thus, the overall result of differencing drives is that you are able to configure individual virtual machines for specific, unique needs, yet consume very small amounts of disk space. Differencing drives isolate all the changes to read-only base drive images, allowing that base drive image to be re-used in many different virtual machines.

There are a number of ways that differencing drives might be used.

- Remote Sales Staff - Differencing drives can help reduce the total amount of data that must be shipped to a sales staff to demonstrate new applications in the field.
- Call Centers - Technical support staff can have a working environment that matches a customer's machine within seconds of a customer's call.

See “Differencing Disks - Explained” on page 18 for more information

Question: Can I support all of the peripherals on a guest OS (parallel port printer, Zip drive, SCSI devices, scanners, tape backup, etc.)?

Answer: In general, most COM port devices and parallel devices (printers, modems, etc.) are compatible with Virtual PC. USB keyboards and mice are recognized, but USB devices that require the installation of their own USB drivers (Zip disks, scanners, etc.) are not recognized by Virtual PC. However, a Zip disk can be used as a shared medium between the host and the guest by using the Folder Sharing feature.

Question: What CPU/FPU performance does Virtual PC for Windows provide?

Answer: Virtual PC often maintains up to 95%+ of the host machine's CPU/FPU performance within the virtual machines.

Question: Can I use the free Virtual PC 5.2 updater on my foreign language version of Virtual PC?

Answer: Yes, the updater will update release versions of Virtual PC 4.0, 4.1, 4.2, 4.3.

Question: How can I improve Virtual PC's performance?

Answer: The most dramatic improvement consists of installing VPC additions. Another way to improve Virtual PC's performance is running it on a machine with a fast CPU and adequate RAM. In addition, you should ensure that applications in the system tray are kept to a minimum. Make sure that the memory of all active virtual machines Is less than half of your host system's total memory.

Question: What are the differences between Shared Networking and Virtual Switch?

Answer: With Shared Networking, each of the virtual machines connect to an external network, using a Network Address Translation (NAT) mechanism built into Virtual PC. The virtual machines can communicate to the outside world on NetBIOS and IP, but they act as client and workstation nodes only. Shared networking requires that the guest OSes are configured for DHCP.

Virtual Switch gives the virtual machines a number of other additional networking options, including the ability to run server applications, to connect to other virtual machines, and have static IP addresses assigned to them. Virtual Switch requires Windows 2000 or Windows XP as the host OS and that the user have administrator privileges.

Question: When should I use Shared Networking and when should I use Virtual Switch?

Answer: Shared Networking is the easiest to set up and has the lowest amount of configuration overhead and is best used for virtual machines that will only act as clients on the network. Virtual Switch works best (and is required) if the application that is being run on the guest OS is a network service that needs to be seen from the main network and therefore requires a static IP address or specific TCP port numbers.

Question: Does Virtual PC allow its guests to run on multi-homed systems?

Answer: Yes and no. Yes, in that Virtual PC will run on a multi-homed system, but no, you can't assign different virtual machines to multiple NIC's, nor can any virtual machine access more than one NIC. If you want to configure a machine's host to use one NIC and configure all of the virtual machines to use a secondary NIC, that's possible, but all of the virtual machines will have to use a single NIC.

Question: Does Virtual PC support Token Ring?

Answer: No, Virtual PC does not support Token Ring. Virtual PC emulates a10/100MBit Ethernet card. Virtual PC's 'Virtual Switch' features is only compatible with Ethernet, but Virtual PC's 'Shared Networking' (NAT) feature, can be used on other transports including Token Ring, PPP, etc. for TCP/IP traffic.

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