Reviewer's Guide

VMware 2.0 for Windows NT and Windows 2000

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Welcome to the reviewer's guide for VMware™ 2.0 for Windows NT® and Windows® 2000. On the following pages you will find several exercises to assist you with the installation, configuration, and evaluation of our new product. We thank you for your time and hope you enjoy reviewing and using VMware 2.0 for Windows NT and Windows 2000.

Most of the exercises in this guide are designed so you can work through them on a stand-alone computer. The final exercise, which simulates a tech support environment, assumes that you have a network connection to a computer where you can store one or more large files — about 500MB each.

You can find extensive product documentation in the support section of the VMware Web site at *http://www.vmware.com/support/*.

If you encounter any issues in using the product, please contact pr@vmware.com.

Contents

About VMware

VMware is an application that gives you a fully functional PC in a window. Each of these fully functional PCs is a virtual machine, running directly on your host computer. With these virtual machines, VMware delivers flexible computing. That means

- Support organizations can save money by reproducing multiple end-user environments on a single PC.
- Developers and QA departments can test across a wide range of operating systems and PC configurations with much less investment in hardware and setup time.
- Linux users can run Windows applications on Linux.

Multiple virtual machines can run side-by-side. For example, users can simultaneously run Microsoft® Windows 95, Windows 2000, and Linux®.

With VMware, sharing files is easy — it works just as it does on any PC. VMware also lets you cut and paste from one virtual machine to another and between virtual machines and the host computer.

Instant Restore brings back the state of a running virtual machine in seconds. You can pop in and out of applications in a virtual machine as you need them — without going through a full boot cycle.

VMware's virtual disks allow new operating systems to be added without repartitioning. Virtual disks can be shared from a repository on a network file server — saving administration costs and storage overhead.

VMware supports full-screen, full-color graphics. Users are not limited to 256 colors. When running virtual machines, users can switch between full-screen mode and windowed mode with a hot key.

Each virtual machine is independent from the host computer — operations done in the virtual machine will not affect the host. A "blue screen of death" in a virtual machine won't affect the host computer at all.

VMware delivers all of these features in an easy to install and manage package. It's powerful stuff.

What's New in Version 2.0?

With this new release, VMware improves the performance of virtual machines and adds a number of features to provide greater power and flexibility to users.

- Suspend to disk and Instant Restore let you put your virtual machine to sleep, then wake it quickly when you need to use it again. Your virtual machine picks up right where you left off, with the same applications and documents opening, and there's no wait for the virtual machine to boot up.
- Bidirectional parallel port support lets you use devices ranging from scanners and digital cameras to dongles with suitable programs running in a virtual machine.
- SCSI support allows you to define virtual disks and CD-ROM devices as either SCSI or IDE, providing added flexibility for users who need to test software in a variety of configurations.
- Removable devices may be disconnected while the virtual machine is running. You can also disconnect the device and edit its properties, then reconnect it.
- VMware Tools for Linux and VMware Tools for Windows are installed from floppy image files that are included in the product.
- Shrink disk lets you reclaim space that's not being used in a virtual disk file.
- Direct serial connections are supported.
- Sound input is supported and sound output is improved.
- Raw disk support is improved.

Why use VMware?

The list of very practical uses of VMware is long, but here is a sample of users who may want to run multiple operating systems:

- Software developers who write software for different kernels or operating systems.
- Software developers and quality assurance staff who need to run different service pack levels for software testing.
- Web developers who want to install different Microsoft Internet Explorer versions in each virtual machine for Web site testing. Different Internet Explorer versions cannot be installed on a Windows operating system because of system registry conflicts.
- Technical and customer support staff who want to maintain multiple virtual machines, each configured to match different end-user operating systems and applications configurations. They can then quickly switch to whatever environment they need to try to reproduce a problem or work with a customer.
- Corporate IT organizations that insist users run the corporate "standard desktop" yet also allow users to install their own applications in a virtual machine "secure sandbox" without affecting the standard desktop.

Who Uses VMware?

- Over 300,000 users worldwide.
- Users at IBM, HP, Rational, and Lucent access Windows applications from Linux.
- Network Associates, LinuxCare, and Excel.Net use VMware to improve technical support and help desk operations.
- Over 600 universities and research institutions use VMware.

The VMware product line

VMware, Inc. currently produces two products. VMware 2.0 for Windows NT and Windows 2000 runs on Windows NT and Windows 2000 host computers. Users with Linux host machines can take advantage of this breakthrough virtual machine technology in VMware 2.0 for Linux.

Exercise I
Installing and Getting Started with VMware

Total estimated time to complete: about 85-90 minutes

Introduction

This exercise starts with installing VMware and follows through to completing the installation of a guest operating system. . This is the longest of all the exercises, and most of that time is taken in installing a guest operating system inside a virtual machine. You'll need just a little longer to install a guest operating system in a VMware virtual machine than on a native host computer.

To get a jump-start, you can skip the installation steps and instead use a VMware Ready to Run virtual machine. Ready to Run virtual machines featuring several Linux distributions are available on CD-ROM. It takes about five minutes to set up a Ready to Run virtual machine.

Exercise I follows through the steps needed to get a VMware virtual machine and guest operating system installed, configured, and running. This exercise is divided into five parts:

- Installing VMware
  Time needed: about 10 minutes
- Configuring a Virtual Machine Using the VMware Configuration Wizard
  Time needed: about 5 minutes
- Installing a Windows 2000 Guest Operating System
  Time needed: about 60 minutes
- Installing VMware Tools for Windows
  Time needed: about 10-15 minutes
- Using the Virtual Machine

We recommend that reviewers complete at least this first exercise.

A very quick way to install a guest operating system in a virtual machine is covered in Exercise IV, which simulates a tech support environment. In Exercise IV, you will use the virtual disk you create in Exercise I to conduct an almost-instant installation of a guest operating system over a network connection.

VMware for Windows NT and Windows 2000 can be installed on computers running Microsoft® Windows NT 4.0 SP3 or later or on Windows 2000 RC3 or later. To make things easier to follow, we assume that you are working on a system running Windows NT 4.0. It is also possible for a technical reviewer to work on a Windows 2000 host system and use this document as a general guide, referring also to the Windows 2000 host installation instructions at *http://www.vmware.com/support/win/doc/quickstart_w2k/.*

Note: The VMware installer currently cannot automatically install support for host-only networking on Windows 2000 hosts. VMware is working with Microsoft to resolve this problem. Exercise III on virtual networking assumes you have support for host-only networking configured. If you want to conduct Exercise III and are running on a Windows 2000 host, follow the instructions at *http://www.vmware.com/support/reference/win/hostonly_w2k.html* to manually install support for host-only networking.

Exercise I (B) steps through installing Windows 2000 as a guest operating system inside a virtual machine. **You will need a Microsoft Windows 2000 (RC3 or later) installation CD-ROM to work through this exercise.**

Note: If you attempt to install a guest operating system from an OEM distribution or recovery CD-ROM that came with your computer, you should be aware that a few of these OEM CD-ROMs have device

drivers specific to the hardware they came with and may fail to install within a virtual machine. Even though the CD-ROM may be compatible with the actual host hardware, it may not be compatible with the generic PC environment within the virtual machine. If the installation process fails with errors about incompatible hardware, you should try installing from a genuine Microsoft retail Windows 2000 CD-ROM or installing another operating system such as Windows NT 4.0 or Windows 98. In that case, follow along with the instructions in the exercises as a general guide to what steps to take, even if the details are different. Also refer to the detailed guest operating system installation notes at *http://www.vmware.com/support/win/doc/guest_os_win.html*.

System Requirements

VMware for Windows NT and Windows 2000 requires a host computer that meets the following system requirements:

- Standard uniprocessor or MPS (multiprocessor system) compliant PC, including laptop computers
- Intel® Pentium® II, 266 MHz or faster, or compatible processor
- 96MB or more memory recommended
- A graphics display capable of displaying more than 256 colors (greater than 8-bit display depth)
- Microsoft Windows NT 4.0 SP3 or higher operating system or Windows 2000 RC3 or RTM
- 10MB of available disk space for installing VMware
- At least 500MB of free disk space for installing a guest operating system and applications
- Optional: Microsoft Internet Explorer 4.0 or higher required for online help. VMware will install and work on a PC without Internet Explorer 4.0 or higher, but the context-sensitive HTML-based help will not be available.

The exact amount of memory required by VMware is really dictated by the guest operating system and applications that the user will run within a virtual machine. For most desktop applications 128MB is a good starting point if you are running one virtual machine and have applications active in the virtual machine and on the host.

Typical personal computers today — especially those used by power users, software developers, and similar users — exceed the minimum recommended requirements for VMware. Pentium III based PCs running at 600 MHz are common among power users, and Celeron™ PCs running at 400 MHz or faster power many sub-US$1,000 PCs. Please be sure that the computer you are using to review VMware meets the minimum requirements. VMware does not run on non-x86 architecture computers such as Apple Power Macintosh or Sun Microsystems workstations.

Note: Some Cyrix processors such as the Cyrix 5x86 are not strictly compatible with the Pentium processor and do not include a Pentium processor instruction required by VMware. Later Cyrix processors do work with VMware.

Exercise I (A)
Installing VMware

Estimated time to complete: about 10 minutes

If you upgrade

If you're already using VMware on your test computer, be sure to read the downgrade information on the VMware Web site before installing VMware 2.0.

Prerequisites: You will need both the VMware installer and a license key for this version of the product. (Licenses for VMware 1.*x* for Windows NT and Windows 2000 will not work with VMware 2.0 for Windows NT and Windows 2000. Also, licenses for VMware for Linux do not work with any version of VMware forWindows NT and Windows 2000.) You will find links to download the software and register for the evaluation license key at *http://www.vmware.com/download/download_win_pre.html*.

Note: If you are currently using VMware 1.*x* for Windows NT and Windows 2000 on your test

computer and think you may wish to return to that version after testing VMware 2.0 for Windows NT and Windows 2000, review the downgrade instructions at *http://www.vmware.com/support/win/doc/beta_win/downgrade_win_beta.html* **before** you install the new version.

Installing VMware is simple — much like installing any other application on your computer. The following assumes that you are installing VMware 2.0 for Windows NT and Windows 2000 on a Windows NT 4.0 host computer. The process is the same whether you are using an installer file downloaded from the VMware Web site or one from the CD in the packaged distribution of the product.

1. Log on to Microsoft Windows NT as an administrator or equivalent.
2. From the Start menu, select Run and browse to where the VMware installer is stored.
3. Select and open the file, then click OK at the Run dialog.
4. You are presented with the Welcome screen.
5. Click Next.
6. Acknowledge the end user license agreement (EULA).
7. Choose the directory in which to install VMware. If you prefer to install it in a directory other than the default, you may click the Browse button and change to your directory of choice. If the directory does not exist, it will be created for you.
8. Type the name of the Start menu program folder or choose an existing one. The default is VMware.

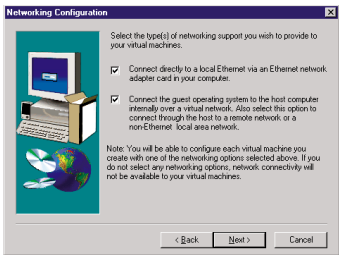

Figure 1 - 1

9. Select the type of networking support that you wish to provide to your virtual machines:
   - Connect directly to a local network via an Ethernet network adapter card.

     Choose this option if you have an Ethernet card in your PC and wish to connect your virtual machines to the local area network that your Ethernet card is connected to. This option is also referred to as "bridged networking."

     Note: If your PC has more than one Ethernet card or has been configured for Dial-Up Networking, you will be prompted later to select which network card to use to connect the virtual machines to the network.
   - Connect the guest operating system to the host computer internally.

     This option allows your virtual machines to communicate with each other and with the host even if you do not have an Ethernet card in your PC.

     You may also use this option if your network adapter is something other than an Ethernet card.

     This option is ideal for standalone PCs in a home office or a lab environment. This option is also referred to as "host-only networking."
   - If you do not select any options, network connectivity will not be available to your virtual machines. This is also referred to as "no network."
10. You are prompted with the option to disable the CD-ROM autorun feature. Doing so will prevent undesirable interactions with the virtual machines.
11. You are given the option to have a shortcut created for you on your desktop. Answer Yes so you will have easy access to VMware directly from the desktop in later exercises.

Networking note

For most of the exercises in this guide, you do not need a connection to an external network. Some do not involve any network activity. Others can use a virtual network running entirely on the host computer.

The final exercise calls for a connection to an external network.

In the installation and configuration instructions we suggest that you install all the VMware networking capabilities and initially configure your virtual machine for host-only networking.

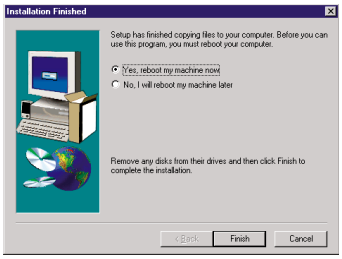

Figure 1 - 2

12. Finally, you are prompted to reboot your PC.It is important that you do so to allow VMware to complete the installation correctly.

Installing the VMware License

After restarting your computer, you will need to install the VMware license.

The license you received is in the format of a registry file. Save it to a directory of your choice on your host computer. To install it, simply use Windows NT Explorer to browse to the directory where you saved the license file, then double-click it. This will merge the content of the license file into your Windows NT 4.0 registry.

Exercise I (B)
Configuring a Virtual Machine

Estimated time to complete: about 5 minutes

You may start VMware by double-clicking the VMware shortcut on your desktop.

1. Start the configuration wizard.

   When VMware is executed, the startup screen has three options:

   - Run the Configuration Wizard.
   - Run the Configuration Editor.
   - Open an existing configuration.

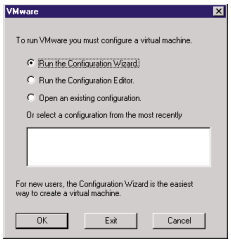

Figure 1 - 3

Defaults

The default settings will give good results for a general-purpose configuration. For purposes of these exercises, there are a few places where you should select different settings. We will highlight those special cases.

   The default selection is Run the Configuration Wizard. Clicking the OK button starts the Configuration Wizard. The Configuration Wizard can also be started from the File menu (select File > Configuration Wizard).

   Clicking the Help button will open a pop-up window with context-sensitive help. That text will also include links to relevant help topics (text in blue — clicking on it will take you to the corresponding help topic).

2. Select an operating system.

   The first screen asks which operating system will be installed in the virtual machine. The configuration wizard uses this information to select appropriate default values, such as the amount of memory needed. The wizard also uses this information when naming associated

virtual machine files.

If the operating system you are using is not listed, select Other.

For the purposes of this exercise, select Windows 2000.

Selecting a Directory for the Virtual Machine

Each virtual machine should have its own directory. All associated files, such as the configuration file and the disk file, are placed in this directory. This screen lets you select the virtual machine's directory.

The default location for this exercise is the directory
`C:\Program Files\VMware\VMs\Win2000`.

Virtual machine performance may be slower if your virtual hard disk is on a network drive. For best performance, be sure that the virtual machine's directory is on a local drive.

3. Select the disk type.

   For this exercise select Virtual Disk.

4. Select the size of the virtual disk.

   Fill in the size of the virtual disk that you wish to create. For this exercise, use the default of 2000 (megabytes).

Set disk size 2000

The size you set in this step limits the maximum size of the virtual disk. The actual file on your host machine will initially be quite small. It will grow as needed to hold the operating system, applications, and data files. Once this size is set, it cannot be changed.

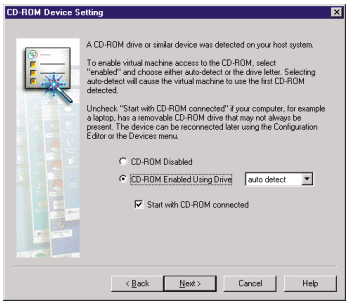

Figure 1 - 4

Windows 2000 requires the use of a CD-ROM for installation.
For the purposes of this exercise, select the "CD-ROM Enabled Using Drive" option.
Leave this option set to auto detect.
Also leave the option to "Start the virtual machine with the CD-ROM connected" checked.

If you have more than one CD-ROM installed on your machine, you may select which drive letter to use. Otherwise, you may leave the option set to auto detect.

Even if the virtual machine has CD-ROM access enabled, you can disable access to the CD-ROM device later during the operation of the virtual machine by using the Devices menu. This is useful if you wish to control which of several running virtual machines is allowed to access the CD-ROM.

6. Enable the floppy disk drive.

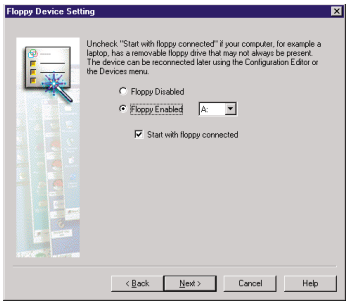

Figure 1 - 5

Select the "Floppy Enabled" option and choose the drive letter that corresponds to your physical floppy drive.

Note that some operating systems may require the use of a floppy drive during installation.

Even if the virtual machine has floppy disk access enabled, you can disable access to the floppy disk device later during the operation of the virtual machine by using the Devices menu. This is useful if you wish to control which of several running virtual machines is allowed to access the floppy disk.

7. Configure the networking capabilities of the virtual machine.

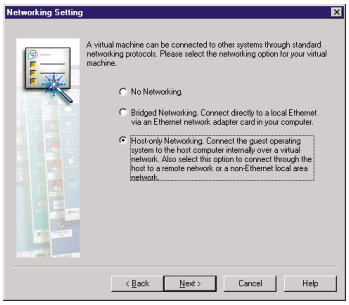

Figure 1 - 6

Self-contained virtual network

For most uses, connecting directly to the external network (bridged networking) is the simplest choice. However, selecting host-only networking in this step prepares you for Exercise III, which lets you explore VMware networking without a connection to a physical network.

For this exercise, select Host-only Networking.

This screen lets you select the option that applies to this virtual machine. **See Exercise III for more details about VMware networking options.**

8. Review and finish the configuration:

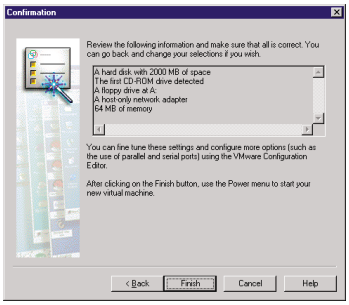

Figure 1 - 7

This final screen presents you with all the options that you have selected. Review it for accuracy and click Finish to complete the virtual machine configuration.

If you want to change any of these settings, the Back button will take you to the earlier screens, where you can make the changes.

Note that most configuration settings can be viewed and modified using the Configuration Editor, which you can find on the Settings menu (Settings > Configuration Editor).

Exercise I (C)
Installing a Windows 2000 Guest Operating System

Estimated time to complete: about 60 minutes

To install the operating system on your virtual machine, you may follow this procedure:

1. Insert the Windows 2000 CD in your CD-ROM drive.

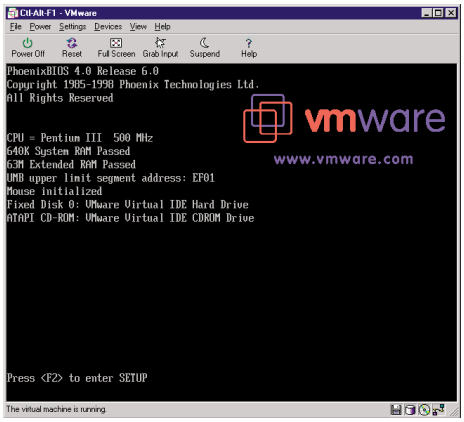

Figure 1 - 8

2. Power on the virtual machine (by clicking the Power On button). You will see the VMware BIOS identification, and the virtual machine will run the power on self test.

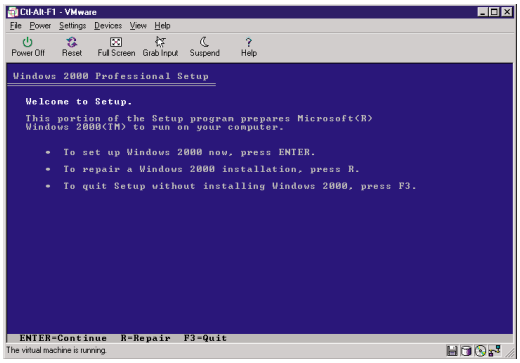

Figure 1 - 9

3. The virtual machine will boot from the Windows 2000 CD-ROM and Windows 2000 Setup will start.
4. Click anywhere inside the virtual machine window and continue installing Windows 2000 on the virtual machine in the same manner you would on a physical PC, with the following considerations:
    a. During this session, the keyboard and the mouse are grabbed by the virtual machine. If you need to release the cursor, you may do so by selecting the Ctrl-Alt-Esc keyboard combination.
    b. Note that Windows 2000 Setup will detect the virtual devices rather than the physical devices installed in your computer.

Fdisk, format

You need to run fdisk and format during the installation, as if you were preparing a new, unformatted hard drive. These steps affect only your virtual disk, which is contained in a file on your host computer's file system. They do not repartition or reformat the physical hard disk on your host computer.

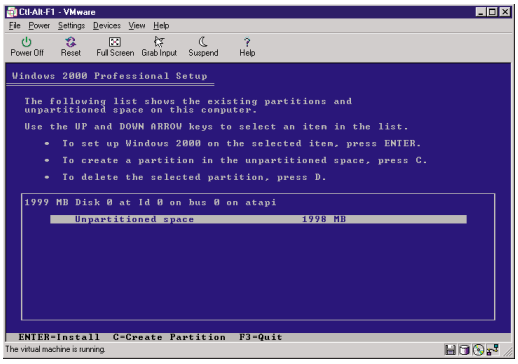

Figure 1 - 11

c. When fdisk displays your hard disk information, it is actually referring to the virtual disk rather than your physical hard disk. Partitioning and formatting the virtual disk will NOT affect your physical hard disk partitions.

Exercise I (D)
VMware Tools for Windows

Estimated time to complete: about 5 minutes

Prerequisites: complete Exercises I (A) through I (C)

Introduction to VMware Tools

Tools needed for best performance

It is very important that you install VMware Tools in the guest operating system.

Although VMware will run a guest operating system even if you do not install VMware Tools, the graphics environment within the virtual machine will be limited to VGA mode (640x480, 16 color). The graphics within the virtual machine will also be slow and make no use of any hardware acceleration. This graphics slowdown can make the virtual machine annoyingly slow.

VMware Tools are available for:

- Windows (Windows 95, Windows 98, Windows NT 4.0, and Windows 2000 all use the same VMware Tools)
- Linux
- FreeBSD

With the VMware Tools SVGA driver installed, VMware supports up to 32-bit displays and high display resolution, limited by the capabilities of the host computer's display adapter. The VMware SVGA driver will also make use of 2-D hardware acceleration, significantly speeding up overall graphics performance within a virtual machine.

In addition to the SVGA driver, the VMware Tools package includes a small background VMware Tools utility that implements the following features:

- Text buffer for cut and paste between virtual machines and the host operating system and among virtual machines
- Control of the VMware mouse cursor behavior, allowing you to move the mouse cursor freely from the virtual machine window to the host machine's display and back
- The ability to connect VMware removable devices (such as floppy and CD-ROM drives) to the virtual machine — and disconnect them — from within the guest operating system
- The ability to shrink the virtual disk file to reclaim unused space
- Time synchronization between guest and host

These enhancements are available only when VMware Tools is running.

Installation files for VMware Tools for Linux and VMware tools for Windows are built into VMware (**Settings** > **VMware Tools Install**).

Installing VMware Tools for Windows

The following instructions assume that this is the first time you have installed and configured VMware on the computer you are using for these exercises. If you previously installed an earlier version of VMware and wish to use a virtual machine you defined at that time, be sure that VMware Tools is *not* running when you install the upgrade.

To install VMware Tools in a Windows guest operating system:

1. Power on the virtual machine.
2. Prepare your virtual machine to install the VMware Tools. Choose Settings > VMware Tools Install
3. Answer Yes when asked if you want to view the instructions.
4. Double-click the My Computer icon on your desktop.
5. Double-click the A: drive.

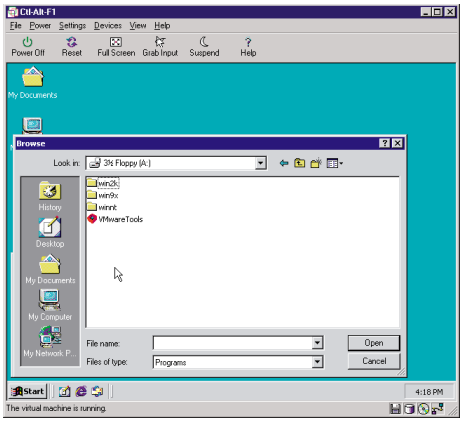

Figure 1 - 11

6. Double-click `VMwareTools.exe` and follow the instructions.

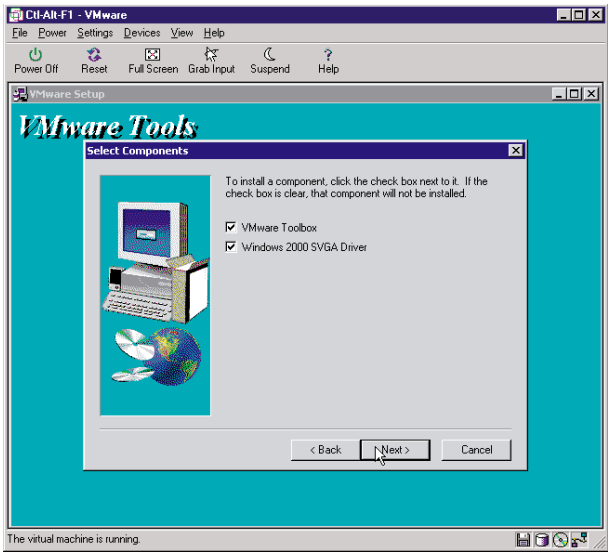

Figure 1 - 12

Instructions for configuring the video driver will open automatically in Notepad at the end of the installation process. If the Notepad window is hidden, bring it to the front by clicking the Notepad button on the Windows 2000 taskbar.

7. The VMware Tools background application will be launched automatically when you reboot the virtual machine.
8. After restarting the Windows 2000 virtual machine, open the device manager and verify that the display adapter is VMware SVGA.

   You should notice the presence of a Standard PCI Graphics Adapter too.

Configuring VMware Tools

VMware Toolbox is loaded on startup and its icon appears in the system tray.

To configure VMware tools:

1. Right-click the VMware Tools icon in the system tray.

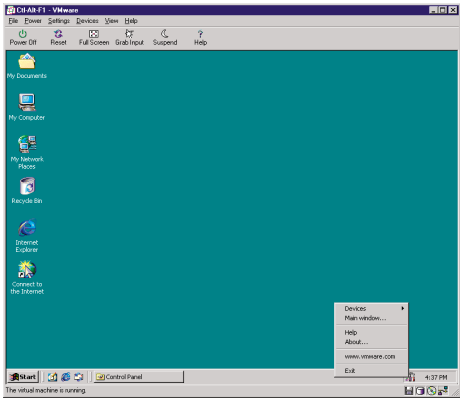

Figure 1 - 13

2. Click Options ... . (The above two steps can be achieved by double-clicking the icon in the system tray.)

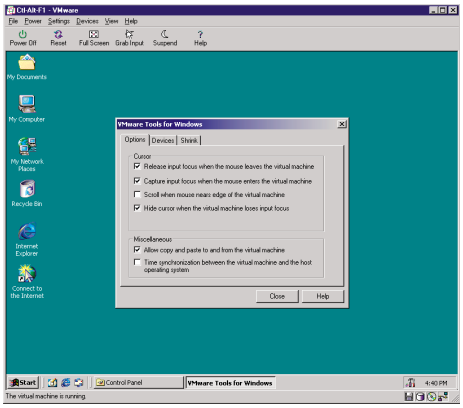

Figure 1 - 14

3. The VMware Toolbox cursor options are:
   - Release input focus when the mouse leaves the virtual machine
   - Capture input focus when the mouse enters the virtual machine
   - Scroll when mouse nears edge of the virtual machine
   - Hide cursor when the virtual machine loses input focus
   - Bring the virtual machine to top when it gets input focus

   The VMware Miscellaneous Options are:
   - Allow copy and paste to and from the virtual machine
   - Time synchronization between the virtual machine and the host operating system (new feature in this release)

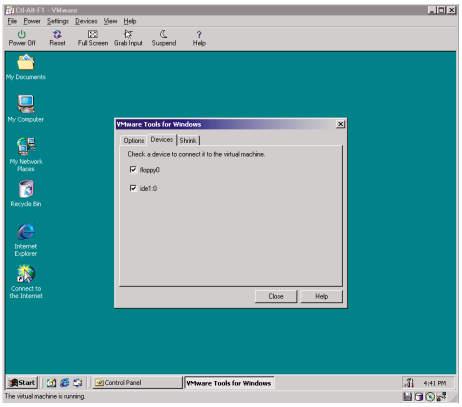

Figure 1-15

4. The Devices tab of the VMware Toolbox options allows you to enable or disable removable devices. (You can also set these options by right-clicking the VMware Tools icon in the system tray, then clicking Devices, or navigate to them from the Devicess menu of the VMware application.)

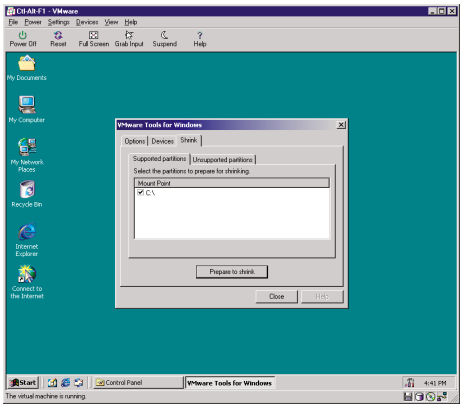

Figure 1-16

5. The Shrink tab gives you access to the settings you need if you wish to reclaim unused space in a virtual disk.
   Note: Shrinking a virtual disk may be a time-consuming operation.

Exercise I (E)
Using the Virtual Machine

Shutting Down a Virtual Machine

To shut down a virtual machine, you may follow this procedure:

1. Select Shut Down from the Start menu of the guest operating system (inside the virtual machine).
2. Select "Shut down the computer."

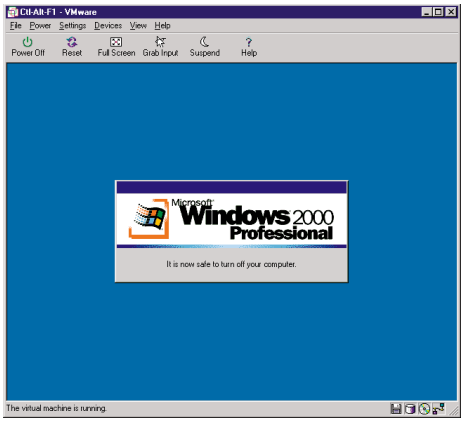

Figure 1 - 17

3. When you see the dialog saying it is safe to turn off your computer, click the VMware Power Off button.
4. Now it is safe to exit the VMware application.

Starting a Virtual Machine

To start the virtual machine that you configured above:

1. Start VMware by double-clicking the shortcut on your desktop.

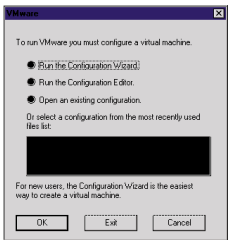

Figure 1 - 18

2. Highlight the virtual machine configuration file listed under "Or select a file from the most recently used files list" (in our exercise this file is called `Win2000.vmx`), then click OK.

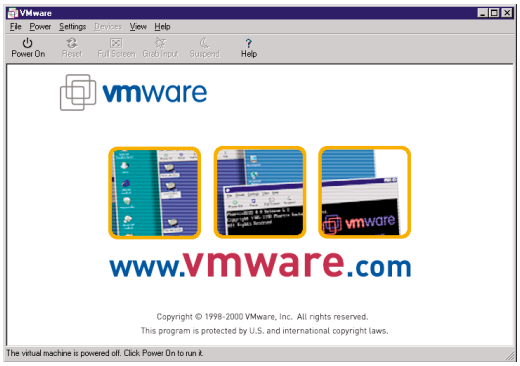

Figure 1 - 19

3. Click the Power On button to power the virtual machine on.

Another method to start the virtual machine:

1. Start the Windows NT Explorer and browse to the directory `c:\Program Files\VMware\VMs\Win2000`.

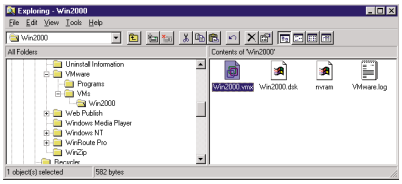

Figure 1 - 20

2. Double-click on the `Win2000.vmx` icon or file name.
   - Optionally, you may create a shortcut for the VMX configuration file on the desktop or in a folder of your choice.
3. Click the Power On button to power the virtual machine on.

Using Suspend and Instant Restore

In VMware 2.0 for Windows NT and Windows 2000, you can now save the current state of your virtual machine to disk. Then the new Instant Restore feature lets you quickly pick up work right where you stopped — with all the applications and documents you were working on open and at the ready.

The speed of the suspend and restore operations depends on how much has changed during your working session. In general, the first suspend will take a bit longer than later suspends do.

Quick switch

If you have several virtual machine configurations suspended to disk, you can move quickly from one to another.

Click Suspend to save the state of the current virtual machine. Then use File → Instant Restore VMs to display a list of quickly available virtual machines.

Or if you want to have both virtual machines running at the same time, just launch a new instance of VMware.

To suspend a virtual machine:

1. When the virtual machine you started in the last section is running, open WordPad.
   Start > Run
   `WordPad`
2. Type in a few words.

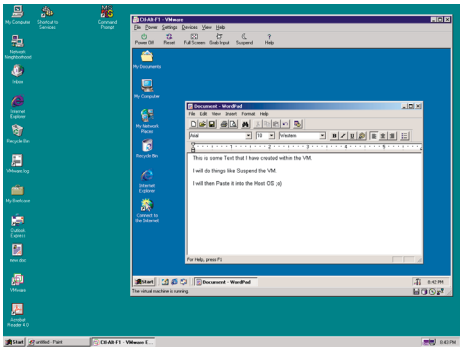

Figure 1 - 21

3. If your virtual machine is running in full-screen mode, return to window mode by pressing the Ctrl-Alt-Esc key combination.
4. Click Suspend on the VMware button bar.

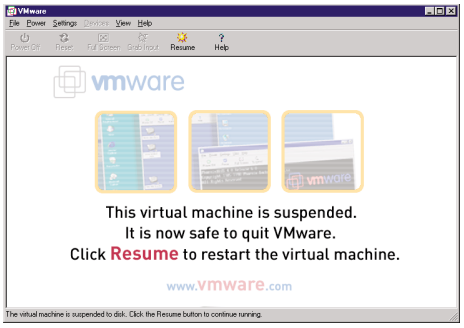

Figure 1 - 22

5. Quit VMware.
   File > Exit

To restore a virtual machine that you have suspended:

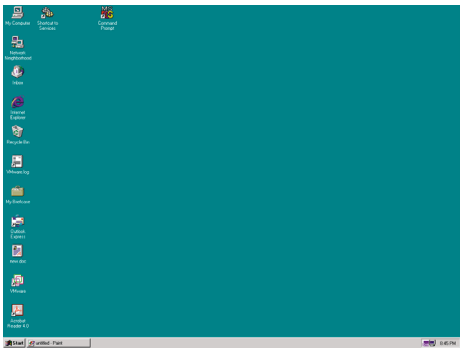

Figure 1 - 23

1. Start VMware and choose the virtual machine you just suspended. The process is the same as that described in steps 1–3 of Starting a Virtual Machine above.
2. Click Resume on the VMware button bar.

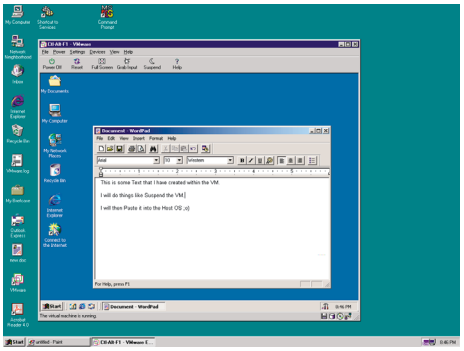

Figure 1 - 24

3. Note that WordPad is running and the text you typed before suspending the virtual machine is displayed.

Exercise II
VMware Virtual Machine Sharing and Isolation

Estimated time to complete: about 15 minutes

Introduction to VMware Virtual Machine Isolation

VMware virtual machines provide a high degree of isolation from other virtual machines and from the host operating system. Installing software in the virtual machine, accidentally infecting a virtual machine with a computer virus or even having a virtual machine crash will not affect other virtual machines or the host operating system.

Although it provides a high level of isolation, VMware still allows convenient sharing when a user desires, including cutting and pasting, networking, and file sharing between virtual machines and the host operating system or between two or more virtual machines.

Exercise II (A) demonstrates simple sharing using cutting and pasting between virtual environments. In a later exercise you can see other forms of sharing between environments with VMware virtual networking and file sharing.

Exercise II (B) demonstrates the robust isolation provided by VMware by deliberately crashing the Windows 2000 guest operating system without affecting the operation of the host operating system.

Prerequisites

- Exercises I (A) through I (D) completed
- A floppy disk drive in your computer and a blank, formatted floppy disk
- Access to the Web to download the VMware bluescreen software

Exercise II (A)
Cutting and Pasting

The VMware Tools installed in Exercise I (D) provide the capability to cut and paste between one virtual machine and another or between a virtual machine and the host operating system. In this exercise we will use a very simple example of copying and pasting between Microsoft WordPad and Notepad on the host and guest operating systems.

VMware's copy and paste functions allow a user to use the native copy and paste methods for a particular operating system. Because we are using Windows operating systems in both the guest and host operating system environments, the same method is used in both environments. If the guest operating system were Linux, then X window-style cut and paste using the mouse buttons would work within the virtual machine.

1. Start VMware and power on the Windows NT 2000 guest operating system if it is not already running.
2. Log in to Windows 2000 running inside the virtual machine as any user.

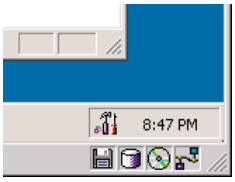

Figure 2 - 1

3. Check to be sure VMware Tools is running in the guest operating system. There will be a tools icon in the system tray (the default position is the right end of the taskbar) in the guest operating system.
4. On the guest operating system select Start > Run and enter WordPad.
5. Start typing any text into WordPad.

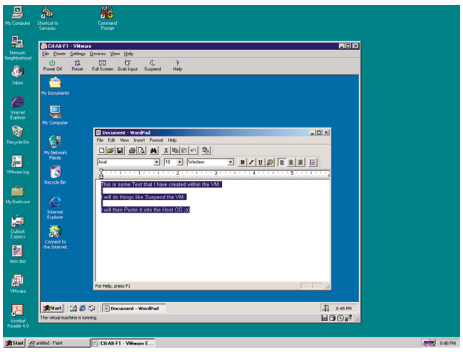

Figure 2 - 2

6. Select a range of the text you have entered and copy the text using Ctrl-C or the Edit > Copy menu item.
7. On the host computer select Start > Run and enter Notepad.

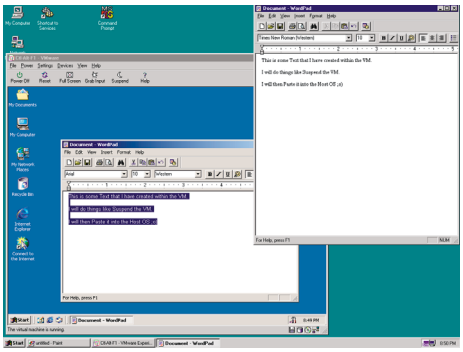

Figure 2 - 3

8. Click inside the Notepad window and paste the contents of the clipboard into Notepad using Ctrl-V or the Edit > Paste menu item.
9. You can repeat this exercise going in the reverse direction by typing more text, copying this, then pasting it back into WordPad running inside the virtual machine.

Exercise II (B)
The Blue Screen Application – Crashing a Guest Operating System

To demonstrate the isolation of the virtual machines, VMware has created a special software package called bluescreen. This consists of a program and small device driver that deliberately crash a Windows NT 4.0 or Windows 2000 system. To avoid accidents the installer only allows the program to be installed in a virtual machine. The operation of this application is not based on a weakness in Windows NT 4.0 and Windows 2000; typically, any errant device driver can crash an operating system.

The purpose of this exercise is to demonstrate the protection provided if you are installing untrusted software or taking other actions that may crash your computer. With VMware you can use a virtual machine for testing without risking the stability of the host operating system.

1. Download `bluescreen2.exe` (1.3MB) from *http://www4.vmware.com/software/bluescreen2.exe*.
2. Copy the `bluescreen2.exe` file to floppy diskette.
3. Start VMware and power on the Windows 2000 guest operating system if it is not already running.
4. Log in to Windows 2000 running inside the virtual machine as Administrator or as a user who is a member of the Administrators group.
5. Inside the virtual machine browse to floppy disk A: and double-click the `bluescreen.exe` installer program.

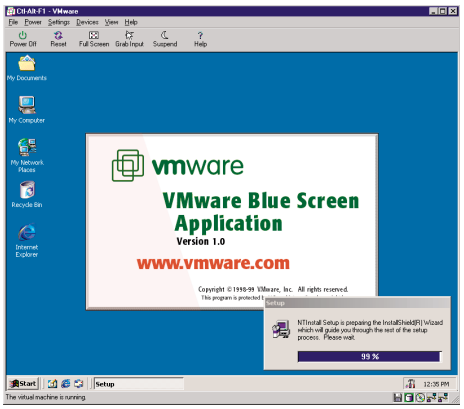

Figure 2 - 4

6. The installation will start. At the Welcome dialog, press Next.
7. Accept the default installation path by clicking Next.
8. Accept the default program folder by clicking Next.
9. Click Finish to restart your virtual machine.

Running the VMware Blue Screen Application

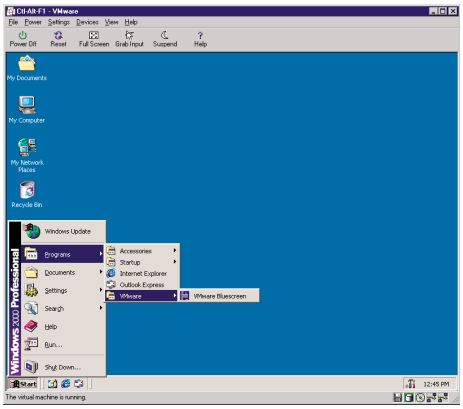

Figure 2 - 5

1. Once the virtual machine has been restarted, select Start > Programs > VMware > VMware Bluescreen.

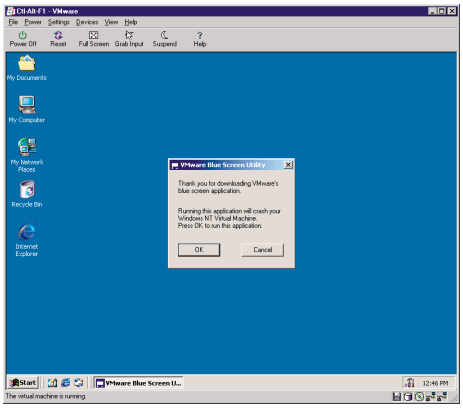

Figure 2 - 6

2. Click OK at the VMware Bluescreen Utility dialog.

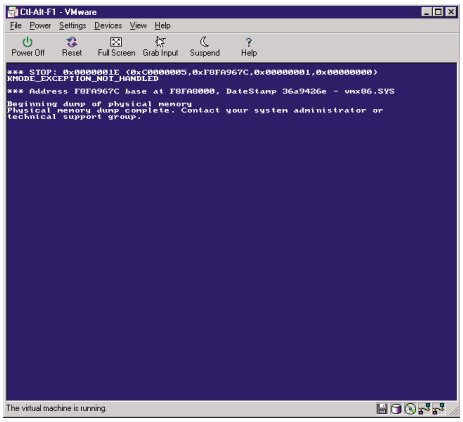

Figure 2 - 7

3. The guest operating system will crash with a blue screen. That felt good, didn't it! Windows 2000 will recover from the crash by initiating a soft restart.

4. The host operating system and any applications running on it remain running and usable even though the guest operating system has crashed. On the host operating system you can try running some applications and confirm that the computer is working normally.

Exercise III
Virtual Networking in VMware

Estimated time to complete: about 10-15 minutes

Each virtual machine can have its own distinct network configuration. There are four choices for configuring networking:

- No networking
- Bridged networking
- Host-only networking
- Custom networking

No networking

- The virtual machine is run in isolation.
- It will not be able to communicate with the host operating system.
- It will not be able to communicate with any other virtual machine running on the host.
- This option is useful if you desire complete isolation for testing or security purposes.
- To set up your virtual machine in this way, simply do not install a network interface adapter when configuring the virtual machine.

Bridged networking

- The virtual machine runs on a virtual network that is connected to an existing physical network.
- It permits the virtual machine to appear as a full-fledged host on an existing physical network.
- The virtual machine may transparently use any of the services available on the network that it is bridged to: printers, file servers, gateways, etc.
- Any physical host, or other virtual machine configured with bridged networking, can use resources on that virtual machine.
- This is the most commonly used networking configuration.

Host-only networking

- The virtual machine can communicate with the host operating system.
- It can also communicate with other virtual machines set up to use host-only networking.
- The virtual machine cannot communicate with any systems beyond the host machine without the use of a proxy server or network address translation.
- It utilizes VMware's DHCP service, installed on the host during VMware installation.

This networking type is most useful when:

- You want to isolate your virtual machines from systems outside the host computer.
- The host is not connected to any physical network.
- No Ethernet network adapter is installed on the host.
- The network adapter is something other than Ethernet (for example, Token Ring).
- A modem is installed and Dial-Up Networking is configured to dial to an Internet service provider.

Custom networking

Refers to any network configuration other than those described above. This is outside the scope of this exercise.

Configuring Host-Only Networking

To configure host-only networking you may follow this procedure:

1. Start VMware by double-clicking the shortcut on your desktop.
2. Choose the Win2000 configuration file from the recently used files and click OK.
3. Choose the Settings > Configuration Editor menu item.

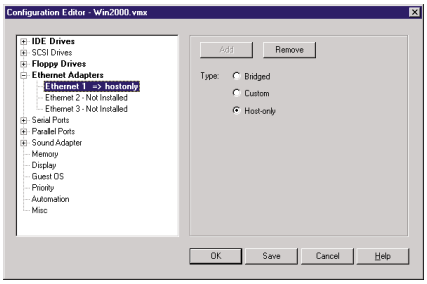

Figure 3 - 1

4. Expand the Ethernet Adapters by clicking the + next to it.
5. Highlight Ethernet and select the radio button beside Host-only if is not already selected.
6. Click OK.
7. Choose the File > Save menu option to save the changes to the configuration file.
8. Power on the virtual machine (by clicking the Power On button).
9. After the Windows 2000 guest operating system is started and you have logged in, view the network interface card information by opening the Network and Dial-Up Connections control panel from Start > Settings > Network and Dial-Up Connections, then open the Local Area Connection. Double-click the Local Area Conection and choose the Properties button.

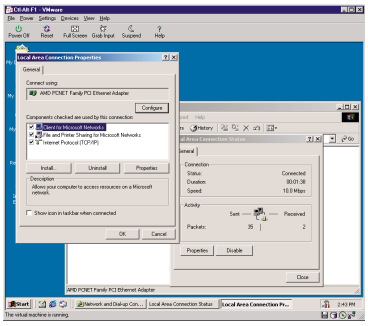

Figure 3 - 2

10. Select Internet Protocol (TCP/IP).
11. Click Properties.

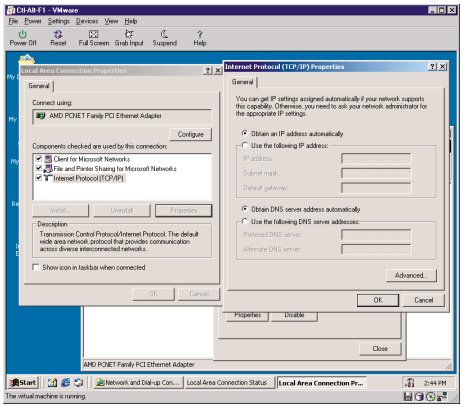

Figure 3 - 3

12. Verify that "Obtain an IP address automatically" is selected.
13. If you did not need to make any changes, click Cancel, then Cancel again. If you made any changes, click on OK, then OK again and restart Windows 2000 if prompted.

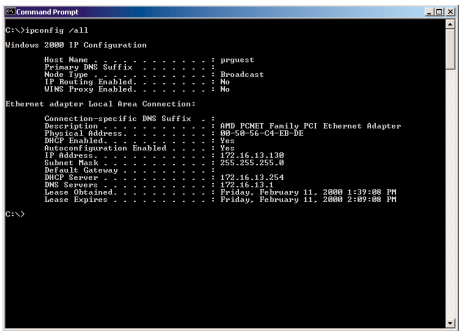

Figure 3 - 4

14. Open a command prompt and type: `ipconfig /all`
15. Verify that an IP address lease has been assigned (in our example it is 172.16.13.130).
16. Switch to the host operating system and repeat step 14 above.

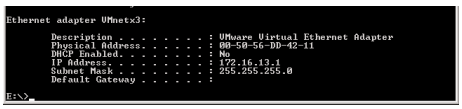

Figure 3 - 5

17. Notice that the host has been configured with a virtual Ethernet adapter named Vmnet1 (the number may vary in your installation).
18. Also notice that the host's IP address is the first in the subnet (in our example the IP address is 172.16.13.1 and the network number is 172.16.13.0 based on subnet mask of 255.255.255.0).
19. Another important item to notice is that the guest operating system is acquiring its IP lease from a DHCP server whose IP address is the last in the above subnet (in our example it is 172.16.13.254).

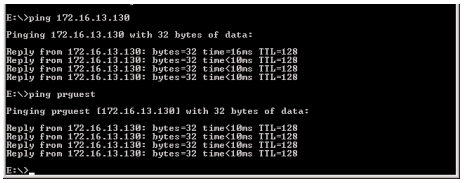

Figure 3 - 6

20. While still at the host's command prompt, ping the virtual machine's IP address. It should respond successfully.
21. Repeat the above step using the virtual machine's host name instead of the IP address. It should respond successfully.
22. Exit the command prompt.

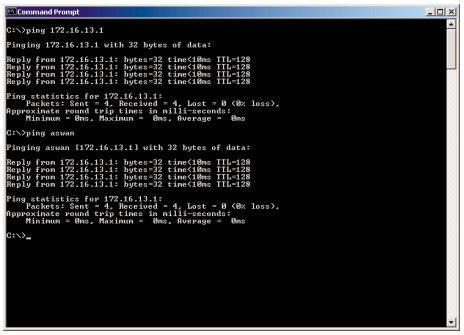

Figure 3 - 7

23. Switch back to the guest's command prompt and ping the host's IP address. It should respond successfully.
24. Repeat the above step using the host machine's host name instead of the IP address. It should respond successfully. (It may take a little longer to respond, compared to step 23.)
25. Exit the command prompt.
26. On your virtual machine do the following:
    a. Start the Windows 2000 Explorer and browse to the C: drive.
    b. Create a new folder off the root of the C: drive and set up sharing for this folder.

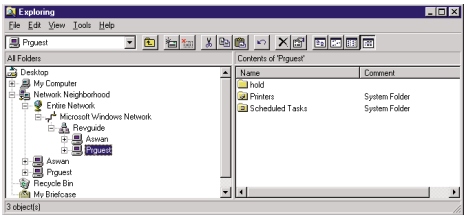

Figure 3 - 8

27. Switch to the host's desktop and browse My Network Places. Expand the Entire Network tree, then expand the guest's Workgroup tree (if it is different from the host's workgroup). You should be able to see the guest's virtual machine listed.
28. Select the guest's virtual machine. Notice that the newly created share is listed.
29. Switch to the guest's desktop and repeat steps 26 through 28, reversing the guest and host roles.

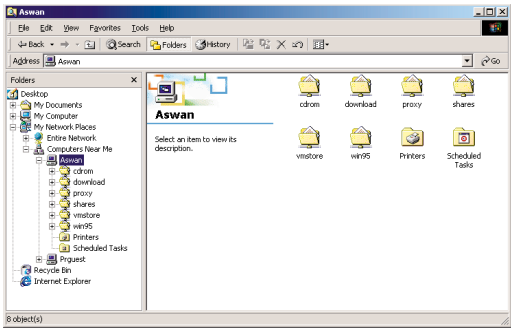

Figure 3 - 9

30. You should be able to see the host's newly created share listed.

Exercise IV
Sharing VMware Virtual Disks on a Network

Estimated time to complete: about ?? minutes

Introduction to VMware Disk Capabilities

VMware supports two disk types: existing disk partitions (also known as raw disks) and virtual disks.

Virtual disks are particularly convenient for many users — for example, technical support representatives or quality assurance groups — because they encapsulate a virtual machine in a file on the host computer's file system. This file can then be stored on a file server or CD-ROM for later use and can be shared with other users. A variety of operating systems and system configurations can be maintained as virtual disk files for quick access by anyone in the group.

A virtual disk file created under VMware for Windows NT and Windows 2000 can be used under VMware for Linux and vice versa.

A VMware virtual machine can use disks in three modes: persistent, nonpersistent, and undoable. The default mode is persistent. Persistent disks behave as conventional disks do, with changes made permanently. With nonpersistent disks, changes are discarded at the end of each session. Undoable disks allow users to choose whether to keep or discard changes.

In this exercise you will see how to change disk modes, then set up client and server computers for easy sharing of virtual disks.

Protect your work

Many VMware users routinely use undoable disk mode as an easy way to protect their system configurations.

When you have your virtual machine set up in a way you like, commit all changes as outlined in this section.

You should also click the Commit button any time you shut down a session where everything worked as you wanted it to.

Or if you're not sure about changes you made, click Keep. This lets you decide later whether to commit or discard the changes.

But if something goes wrong — errors while installing a program, document changes you wish you hadn't made, even a system crash — shut down the virtual machine and click Discard instead. Next time you start your virtual machine, you'll be back were you were before the session that spelled disaster.

Exercise IV (A)
Configuring an Undoable Disk

To configure a virtual machine to use undoable disk mode, you may follow this procedure:

1. Start VMware by double-clicking the shortcut on your desktop.

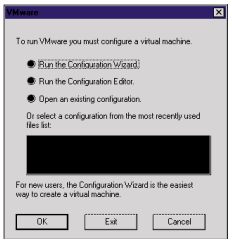

Figure 4 - 1

2. Choose the Windows 2000 configuration file from the most recently used files and click OK.
3. Choose the Settings > Configuration Editor menu item.

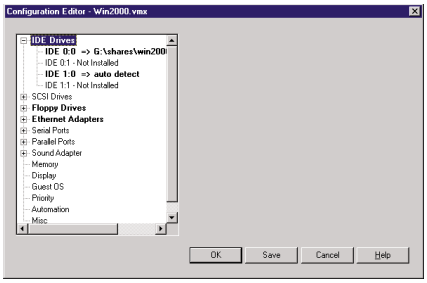

Figure 4 - 2

4. Expand the IDE Drives tree by clicking the + next to it.

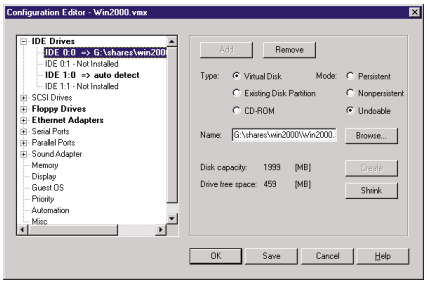

Figure 4 - 3

5. Choose the drive IDE 0:0 and select the radio button beside Undoable.
6. Click Save to save the changes to the configuration file.
7. Power on the virtual machine (by clicking the Power On button).

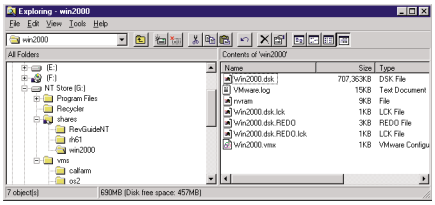

Figure 4 - 4

8. After the Windows 2000 guest operating system is started and you have logged in, use the Windows NT Explorer on the host operating system to browse to the Win2000 virtual machine directory. Notice the presence of a new file called `Win2000.dsk.REDO`. This is the redo log mentioned in the previous section.
9. Install an application of your choice on the virtual machine. Use something that doesn't take long to install, because you will discard this application in one of the following steps.
10. Shut down Windows 2000 on the virtual machine and click the Power Off button.

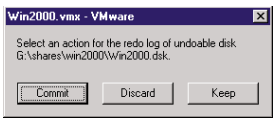

Figure 4 - 5

11. You are prompted with three possible actions for the redo log:
    - Commit
    - Discard
    - Keep
12. Click Keep.

13. Power on the virtual machine.

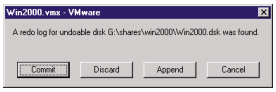

Figure 4 - 6

14. You are prompted with four options for the redo log:
    - Commit: to commit the contents of the redo log to the virtual disk
    - Discard: to discard the contents of the redo log and start with a new log
    - Append: to append new changes in this session to the existing log
    - Cancel: to cancel the redo operation, after which you will have an option to cancel the session or continue with the disk disabled
15. Click Append
16. After Windows 2000 has started and you are logged in, check for the application you installed in step 9 above. Notice that it is still installed.
17. Shut down Windows 2000 and power off the virtual machine.
18. You are again presented with the same dialog as in step 11 above.
19. Click Keep.
20. Power on the virtual machine.
21. The dialog listed in step 14 above is displayed again. Click Discard.
22. After Windows 2000 has started and you are logged in, check for the application you installed in step 9 above. Notice that it is no longer there.
23. Now install an application that you want to keep.
24. Shut down Windows 2000 and power off the virtual machine.
25. Click Commit. A progress bar will appear while the changes are committed to the virtual disk.
26. Power on the virtual machine.
27. Notice that you no longer see the dialog listed in step 14.
28. After Windows 2000 has started and you are logged in, check for the application you installed in step 23 above. Notice that it is still installed.
29. Shut down Windows 2000 and power off the virtual machine.
30. Click Commit. To change the disk mode back to persistent, follow Steps 1 through 6, but this time select the radio button beside Persistent (instead of Undoable) in step 5.

Exercise IV (B)
Sharing Virtual Disks from a Network Drive

In this exercise you will go through the basic steps needed to set up virtual disks so they can be shared from a network drive. Shared virtual disks are important time-savers for VMware customers like Internet service provider Excel.Net.

"VMware lets us quickly fire up a virtual machine to match the customer's configuration," says Excel.Net President Larry Weidig. "It's great for customer support."

Reference library

The customer support group at Excel.Net has a shared file server that contains virtual disks with the many operating system and browser combinations their customers use. Each customer support representative has VMware installed and can use any of the virtual disks to replicate the customers' environments.

For example, one user may call and have Windows 95 running Microsoft Internet Explorer 4, while the next customer will have Windows NT and Internet Explorer 5. It is invaluable to be able to step through exactly what the user sees, since the network configuration dialogs are different on each operating system.

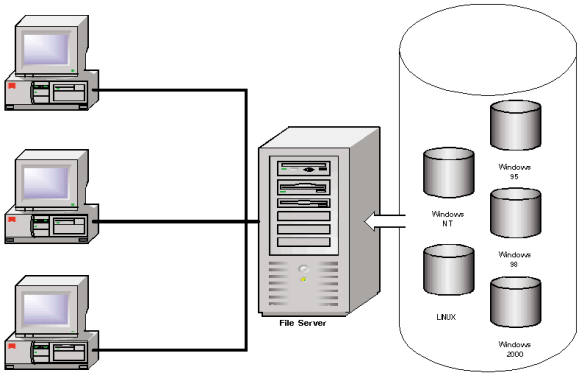

Figure 4 - 7

In this exercise, you will store virtual disk files on a network drive and set up a client computer to use that virtual disk without changing the shared files. You willl need to copy some files to the network server and modify your VMware configuration to run the virtual machine from the server.

1. Locate the virtual machine directory you created in Exercise I (in our example it was `C:\Program files\VMware\VMs\Win2000`).
2. Map a drive to the network share on which you will store the files.
3. Copy the `.vmx` and `.dsk` files from the directory identified in step 1 to the network drive.
4. Start the Windows NT Explorer and browse to the above network drive.
5. Double-click the `.vmx` file; this will launch VMware using this file.
6. Start the configuration editor (Settings > Configuration Editor).

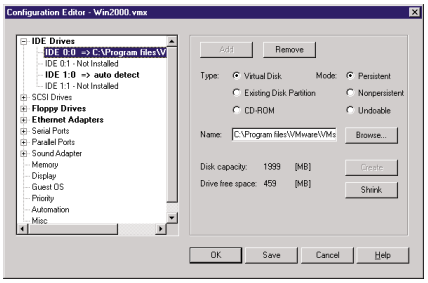

Figure 4 - 8

7. Expand the IDE Drives tree, then highlight IDE 0:0.
8. Notice that the virtual disk name field is still pointing to the original path.
9. Edit the above path to reflect the new location on the network. You may use a mapped drive or simply use a UNC (in our example `\\home\disks\win2000` where `home` is the server name and `disks` is the share name on which the virtual disks are stored).
10. Change the virtual disk mode to Nonpersistent.

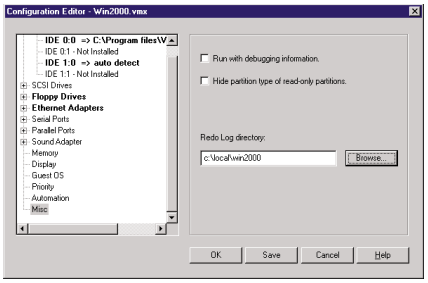

Figure 4 - 9

11. To improve disk I/O performance, set the redo log directory to a local drive. To do so:
    a. Click the Misc item in the window on the left.
    b. In the panel on the right, type in the path to a directory on the local drive. In our example, the directory is on `c:\local\win2000`

    Note: You MUST set the disk mode to nonpersistent since multiple users will be modifying it at the same time. You want to prevent their modifications from being committed to the disk. This is the safest method for sharing the same virtual disk.

    If you want to allow users to keep their changes between sessions (but not commit the changes to the shared virtual disk), you can do the following:
    a. Set the disk mode to undoable. You can do that by selecting Undoable instead of Nonpersistent in step 10 above.
    b. Change the file attribute of the shared `.dsk` file to read only.This will allow the users to keep their changes but not commit them to the virtual disk.
    Note: If you use undoable disk mode, only one user at a time will have access to a given virtual disk file.

From the user's workstation, do the following:

1. Install VMware as outlined in Exercise I.
2. Create a directory on the local drive named `c:\local\win2000`.
3. Temporarily map a network drive to the share where you stored the virtual machine files.
4. Copy the `.vmx` file to the `c:\local\win2000` directory.
5. Open the Windows NT Explorer and browse to the above directory.
6. Double-click the `.vmx` file. This will launch VMware using this configuration file.
7. Now, power the virtual machine on.
8. If you are using nonpersistent mode, you should receive the following dialog:

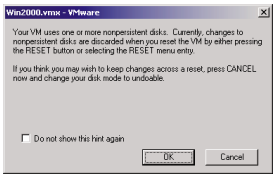

Figure 4 - 10

9. This is a reminder that when you are using the nonpersistent mode, all changes will be discarded when you reset the virtual machine.
10. If you are using undoable disk mode (flagged read only), you should receive this dialog instead:

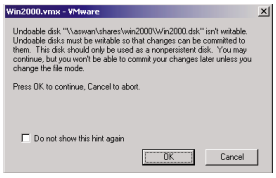

Figure 4 - 11

11. Click OK.
12. Verify that Windows 2000 boots successfully.
13. Shut down the guest operating system.
14. If you are using undoable disk mode, you will receive this dialog:

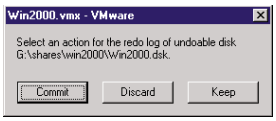

Figure 4 - 12

15. Click Keep. You will not be allowed to commit the contents of the redo log since the DSK file has already been flagged read only. Otherwise, click Discard and your virtual disk will revert to its original form the next time you start this virtual machine.
16. The next time this virtual machine is restarted, you will receive the following dialog if you did not discard the redo log.

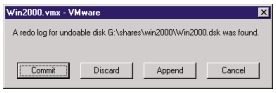

Figure 4 - 13

17. Click Append to allow the new session to add the changes to this redo log. Otherwise, click Discard to start the virtual disk in its original form (as if this were the first time you were using it).

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