NeTraverse Win4Lin™ 3.0

Installation and Operations Guide

NETRAVERSE

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Preface

Welcome to the family of NeTraverse Win4Lin users, and thank you for purchasing our product. We are very proud of NeTraverse Win4Lin, the continuation of a product set that provides more than 800,000 users with the ability to run Windows applications on Linux, SCO UNIX, and other related platforms. The core technology of NeTraverse Win4Lin has a pedigree evolved over the past seventeen years to ensure that you, as a Linux user, can access almost any Windows application within your Linux environment with the best possible performance and user experience.

At NeTraverse, we are committed to quality service and support. As part of this commitment, our Web site offers product updates, a support database, Frequently Asked Questions, and the option of contacting our professional support team. These product experts are the same people that test our new product versions and help our corporate customers integrate NeTraverse solutions into their computing environments. The information on our Web site represents our collective knowledge gained from years of valuable customer experience and input.

New features in this release make NeTraverse Win4Lin 3.0 an integral part of your business, whether you are self-employed, running a small business or practice, or part of a larger enterprise. Win4Lin 3.0 can serve not only as a stand-alone desktop product, but also as a client, providing groups of Linux users with Windows Network Neighborhood file and print access. Additionally, our just-announced NeTraverse Server Standard Edition provides the ability to host multiple Windows users on a single, low-cost Linux server. This multi-user capability allows small and medium size business and departmental workgroups to provide users with access to the latest Windows productivity applications while centralizing administration and eliminating the need to upgrade each user's desktop PC. Our server product will be improved in coming releases adding enhanced user and resource management layers to facilitate deployment of larger server configurations, including the ability to run more than 100 concurrent Windows sessions from a single server.

Ultimately, our objective is to provide the enterprise and user community with a seamless bridge from Windows to Linux. Enterprises and users are looking for ways to improve productivity and reduce the cost of desktop management. Win4Lin provides a stable, resource-efficient method of running Windows while providing the security and performance advantages of Linux.

Thank you again for purchasing Win4Lin 3.0—we look forward to hearing your comments and suggestions!

James P. Curtin
President and CEO
NeTraverse Inc.

INTRODUCTION

Welcome to NeTraverse Win4Lin

▶ What Is NeTraverse Win4Lin?

▶ How Does Win4Lin Work?

▶ About this Manual

▶ NeTraverse Win4Lin Specifications

What Is NeTraverse Win4Lin?

Win4Lin is a Linux application that installs the Microsoft Windows 95/98 operating system into your Linux environment. Win4Lin uses the X Window System to display the familiar Windows desktop in a window on your Linux desktop (e.g., GNOME or KDE) or in full-screen mode. Running Windows via Win4Lin in full-screen mode is indistinguishable from a native Windows session.

After installing Win4Lin and any supported version of Microsoft Windows, you are ready to install your favorite Windows applications. You can then run Linux and Windows applications at the same time—no need to dual boot or create separate disk partitions.

Win4Lin provides a fast and stable way to run the Windows operating system and Windows applications in your Linux environment. With Win4Lin you can avoid many Windows corruption problems and recover quickly from Windows errors. The result is a system that is easy to use, with low overhead and great performance.

Win4Lin Lets You...

▸ Run Windows applications and Linux applications at the same time
▸ Run Windows applications at native speed
▸ Create, save, and delete files in the familiar Windows environment
▸ Navigate Windows in full-screen mode or in a window on your Linux desktop
▸ Share files, directories, and folders between Linux and Windows
▸ Boot Windows quickly and easily by starting Win4Lin
▸ Reboot Windows in seconds just by re-running the Win4Lin application

How Does Win4Lin Work?

Win4Lin provides the operating system modules that allows Windows to run as a Linux process. Linux functions as the master operating system, controlling the hardware and file systems, while Win4Lin provides the environment for the Windows operating system and Windows applications to execute. Win4Lin is not an emulator, nor does it depend on Windows high-level function calls being translated to drive Linux operations. Thus Win4Lin allows Windows and Windows applications to run at native speed.

Linux Applications	Windows Apps Windows Desktop Windows OS Win4Lin Windows Drivers	Win4Lin Fileserver (dosexec)	Win4Lin Display Xclient (xcrt)	Win4Lin Audio Server (auserver)	Win4Lin WinSock Server (winsock)	Linux App	Linux App
Linux OS & Drivers	Win4Lin -Enabled Kernel			Linux OS			
PC Hardware	Hardware						
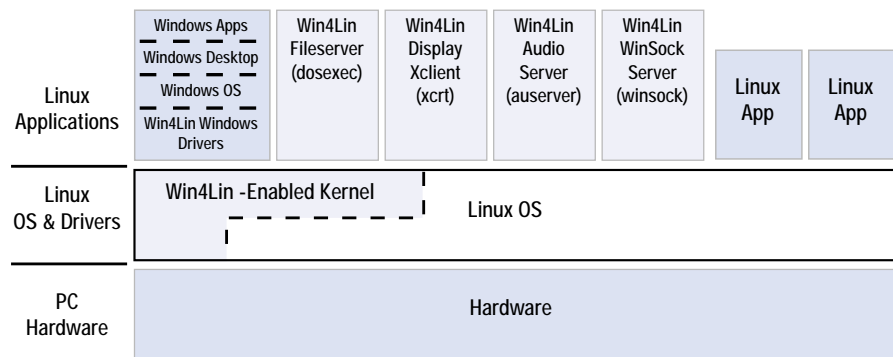
How Win4Lin Ensures Production-Level Performance

In order to provide the best possible performance, Win4Lin has been designed specifically to operate on an Intel-compatible PC (i.e., an x86 processor). Because Microsoft Windows was designed for the same x86 CPU architecture, Win4Lin doesn't need to decode every hardware instruction and then emulate it in software. Instead Win4Lin allows most instructions in Windows applications and within the Windows operating system to execute directly on the x86 CPU in native mode. However, there are a few infrequently-used instructions in the x86 architecture that are reserved for low-level operating system functions. Because Windows is running as a guest operating system in the Win4Lin/Linux environment, these low-level functions need to be performed in concert with Linux. Thus Win4Lin does not allow an application to execute these instructions directly. Instead, Win4Lin traps these low-level instructions and then substitutes a sequence of instructions that ensure the appropriate orchestration with Linux. Even though this substitution adds some slight overhead that could result in reduced performance, this cost is offset by (1) a number of finely-tuned system optimizations that are a fundamental part of Win4Lin's design and (2) the gains that result from letting Linux perform the actual hardware I/O functions (e.g., disk reads and writes) as well as memory management. Thus Win4Lin makes it possible for most

Windows applications to operate at or near the same speeds you would achieve with a native Windows installation.

How Win4Lin Lets Windows Access Hardware Devices

In order to integrate more tightly with Linux, Win4Lin's design includes the concept of support servers. At startup, Win4Lin launches several of these support servers (as Linux background processes) to act as conduits for the communications that enable Windows and Linux device sharing. The Win4Lin file server provides access to the Linux filesystem and performs Linux filesystem calls (open, close, read, write) on behalf of the Windows file system driver. An X11 client program (xcrt) is included that translates Windows display operations into X11 function calls for subsequent display (via an X-server) to your desktop or a remote workstation. The Win4Lin audio server is used to take Windows sound playback requests and route them to the Linux audio subsystem. Finally, Win4Lin gives you the option to use either a WinSock server that translates each Windows WinSock operation to its equivalent Linux Socket operation, or a Virtual Networking (VNET) implementation that offers support for all Windows IP-based networking services (including Network Neighborhood).

For the file system, audio, display, and CD-ROM cases, Win4Lin includes Windows device drivers that communicate with the support servers instead of interfacing directly to physical hardware devices. These support servers use standard Linux system calls to communicate with and control hardware devices, so if a device is supported by the Linux operating system, then in most cases Windows will support it in a Win4Lin session.

Win4Lin-Enabled Kernels

During installation, the Win4Lin software installs a modified kernel, called the Win4Lin-enabled kernel, into your Linux system. The kernel is a collection of statements in computer language that instruct the computer how to operate, and is the core of your Linux operating system. The Win4Lin-enabled kernel provides the interface between the Win4Lin application, Windows, and Linux. Installing the Win4Lin-enabled kernel on your computer does not modify or affect your current kernel in any way, leaving the original kernel available for future use.

The kernel interacts with the hardware and executes software. A number of variants of the kernel exist, and various Linux distributors release new ones periodically. Win4Lin supports most of the generic kernels released by Linus Torvalds and most popular Linux distributions.

To add functionality, you can modify a kernel. Linux vendors commonly modify kernels to accommodate hardware such as video and sound devices, to add new features, and to fix bugs. You can also extend the functionality of a kernel by a process called patching. When you patch a kernel, using the patch command, you modify the source code by

adding or deleting lines of code according to the changes specified in a patch file. Modifying a kernel requires that you recompile the kernel source code.

Vendors also produce pre-patched kernels with the patches applied and compiled. These kernels are ready to use. NeTraverse will configure a Win4Lin-enabled kernel for each such release and will make these available on our Web site (www.netraverse.com). NeTraverse also provides patches so that you can manually create a Win4Lin-enabled kernel in the event that we do not yet offer a Win4Lin-enabled kernel for your distribution. You could also use these patches to Win4Lin-enable a kernel that you have previously modified.

About this Manual

How this Manual Is Organized

Introduction
This overview describes the features and benefits of Win4Lin and explains how the product works.

Chapter 1: Installing Win4Lin
This chapter guides you through installing Win4Lin using the graphical installer. Also included are directions for removing Win4Lin and for updating an installed copy of Win4Lin to a newer version.

Chapter 2: Using NeTraverse Win4Lin
This chapter assists you in customizing and using your Win4lin environment following installation. Topics include starting and ending a Win4Lin Windows session, configuring your network settings, and addressing performance issues.

Chapter 3: Working in the Win4Lin Environment
This chapter explains adding and using Windows applications in the Win4Lin environment. Topics include browsing the Internet, installing Windows applications, printing from the Win4Lin environment, and sharing files between Linux and Windows. You'll also find information on how to minimize the impact of viruses on your system.

Chapter 4: The Win4Lin System Setup
This chapter explains how to make changes to the Win4Lin environment to better suit your needs. Topics include configuring and using devices such as modems, ports, PDAs, and disk drives. You'll also find information about using Win4Lin on a laptop computer.

Chapter 5: Technical Support
This chapter describes how to contact NeTraverse Technical Support and what information you can provide to help us respond more effectively.

Appendix A: Win4Lin-Enabled Kernels
This appendix discusses building a custom Win4Lin-enabled kernel, if you require this special functionality.

Appendix B: Installation Troubleshooting
This appendix provides solutions for some problems you may encounter during installation.

Conventions Used in this Manual

Important Tips and Warnings
The following icons are used throughout this guide to direct your attention to topics of special interest.

Technical Tips
A "Tech Tip" is a technical elaboration on a subject, offering more details and discussion.

Technical Alerts
A "Tech Alert" recommends specific action you should take to avoid future problems or degraded performance.

Warnings
"Warnings" contain critical information that you must consider to prevent Win4Lin or your system from malfunctioning.

Terms You Should Know
If you are an experienced Linux administrator, you will probably be familiar with these terms. If you are somewhat new to Linux, please take a few minutes to read over these important technical terms which are used in this manual.

Root / Supervisor
Many aspects of your Win4Lin configuration must be set up by the Linux root user. By convention, root is the username of the superuser account. The superuser is the user with unrestricted access to all system files and commands for administrative purposes.

The command to change from regular user status to the root user is `su - root`. You must know the root user password in order to become the root user. The command to exit root user access and return to regular user status is exit.

File Permissions
The root user has exclusive access rights to many of the files and directories on a Linux system. By issuing the chmod command, the root user can change access permissions to a file, allowing other users to also access that file.

X Window System
The X Window System (also called X and X11) is the graphical user interface used by Linux systems for managing the mouse, keyboard, and basic window display.

Shell / Terminal Window
The shell is the user interface to the Linux operating system. Specific user commands are typed at a shell prompt, in a terminal window, or a console display.

GNOME / KDE
GNOME is a suite of free, open source applications and a windows-based desktop environment developed by the GNU Project (www.gnu.org).

KDE is another open source graphical desktop environment frequently installed on Linux workstations (www.kde.org).

Linux File System
The Linux file system is the collection of hierarchically structured directories and files that organize both the user and system information in the Linux environment. The base level for all files and directories is called the root directory, and is designated by the forward-slash character (/).

$HOME
$HOME is an environment variable which points to the Linux user's directory. Most Linux users have the $HOME environment variable set to the directory `/home/username`, where username is the login name of the user. You can find your home directory by typing the following command at a shell prompt: `echo $HOME`

Processes
The Linux kernel can be considered a process manager, executing a series of programs. Working with Win4Lin in the Linux environment often requires identifying specific processes or programs, and issuing shell commands to interact with these processes.

Mounting Devices
In the Linux operating system, hardware devices are treated as files. A specific device file associated with a given hardware device can be made accessible using the mount command. For example, the command `mount /dev/hdc /mnt/cdrom` will allow access to the file system on the device file `/dev/hdc` through the mount point `/mnt/cdrom.`

Configuration Examples

Throughout this manual, you will find information to help you understand how to configure your system for Win4Lin. Depending on the environment, you will be asked to enter Linux commands, configure Win4Lin parameters, or configure Windows settings. The screens below show examples of each configuration scenario.

Configuring Linux:

```
joeuser@joebox.netraverse.com:/home/joeuser

File   Edit   Settings   Help

[test@joebox joeuer]$ ps -A | grep dosexec
16542 pts/5   00:00:02 dosexec
16731 pts/5   00:00:21 dosexec
[test@joebox joeuer]$ []
```

Configuring Win4Lin:

Win4Lin Setup

Select one of the following and then press OK

System-Wide Win4Lin Administration
Personal Windows Setup
Personal Win4Lin session configuraton: dos
Personal Win4Lin session configuraton: win

OK   Delete   Exit   Help

Configuring Windows:

Display Properties

Background | Screen Saver | Appearance | Effects | Web | Settings

Display:
Generic Merge Compatible Monitor on Merge Windows/X (Win 98 version)

Colors
High Color (16 bit)

Screen area
Less ———|——— More
800 by 600 pixels

Extend my Windows desktop onto this monitor.   Advanced...

OK   Cancel   Apply

NeTraverse Win4Lin 3.0 Specifications

Supported Distributions

‣ Red Hat Linux - 6.0, 6.1, 6.2, 7.0, 7.1
‣ Caldera OpenLinux - 2.3
‣ Caldera eDesktop - 2.4
‣ SuSE Linux - 6.2, 6.3, 6.4, 7.0, 7.1
‣ Linux-Mandrake - 7.0, 7.1, 7.2, 8.0
‣ Generic kernels - 2.2.16, 2.2.17, 2.2.18, 2.2.19, 2.4.3

  NeTraverse regularly adds support for new Linux distributions and kernels by providing equivalent Win4Lin-enabled kernels for each such release. For the latest information, please visit our Web site (www.netraverse.com).

Hardware Requirements

‣ Intel Pentium-class or compatible processor
‣ 32 MB RAM (64 MB recommended)
‣ CD-ROM drive
‣ Floppy drive (if your Windows installation CD is not bootable)
‣ 20 MB disk space for Win4Lin
‣ 40 MB - 135 MB additional disk space for system-wide Windows installation
‣ Additional disk space required for Windows applications
‣ Sound cards that are Open Sound System (OSS) compatible

Software Requirements

‣ Linux kernel 2.2.x or 2.4.x
‣ Microsoft Windows 95/98 (one license per user)
‣ Microsoft Windows 95/98 full installation CD and boot floppy disk if CD is not bootable
‣ X Window System (16-bit color recommended)

Administrative User Requirements

‣ Root user access

Current Limitations of NeTraverse Win4Lin

Memory
The maximum memory that can be assigned to Win4Lin is 64 MB.

Sound
Win4Lin provides support for PCM (Pulse Code Modulation) sound output only. PCM allows Windows .wav files as well as many multimedia players to play sound. Windows sound input, Midi, Mixer and CD players are not currently supported.

Networking
Win4Lin does not provide support for the NetBEUI or IPX networking protocols.

Operating Systems
Win4Lin supports only US, Western European, and some Eastern European versions of Windows 95, Windows 95 OSR2, Windows 98, and Windows 98 SE. Media must be installable on any computer and not tied to a machine-specific BIOS. Windows ME, Windows NT, and Windows 2000 are not supported at this time.

Devices
Keyboard, mouse, sound, disk, and display devices are supported in Win4Lin via the existing Linux drivers. Serial (COM) port and parallel port devices can be accessed via Win4Lin virtual device drivers. USB support is limited to keyboard, mouse, display, sound, printer, floppy, CD-ROM, and hard disks via the Linux driver for these devices.

Video
Current versions of Win4Lin do not support the DirectX multimedia Application Programming Interface (API), including the DirectDraw component of DirectX. Most games programmed for Windows use this API and thus are not supported under Win4Lin. Additionally, DOS VGA (video graphics array) applications do not work with Win4Lin in DOS emulation mode. Currently only the sound features of RealPlayer 8 are supported by Win4Lin, as this version uses DirectX for video display. You should download an earlier version of RealPlayer if you wish to use its video features with Win4Lin.

File Systems
Win4Lin does not currently support using NFS, or other remote file systems, as the `C:\` drive in Windows.

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Installing NeTraverse Win4Lin

▶ Graphical Installer

▶ Preparing for Installation

▶ Installing Win4Lin for the First Time

▶ Updating a Previous Version of Win4Lin

▶ Removing Win4Lin from Your System

Graphical Installer

NeTraverse Win4Lin comes with a graphical installer that performs the various tasks that make up the 3-stage installation process:

Installation Stage	Actions Performed During This Stage of Installation	You Must Be Logged In As:
Stage 1: Package Installation	• Installs Win4Lin-Enabled Kernel • Installs Win4Lin Application • Updates Your Linux Bootloader to Use the Win4Lin-Enabled Kernel on Reboot • Prompts You to Reboot Your System	**a root user**
Stage 2: System-Wide Windows Installation	• Copies Windows Installation Files to Your Disk for Use in Personal Windows Installation	**a root user**
Stage 3: Personal Windows Installation	• Runs the Microsoft Installer to Set Up Windows in a User Account	**a non-root user**

In the first stage of Win4Lin installation, the packages containing the Win4Lin application program and operating system modules are installed. In the second stage the installer copies the Windows installation files from your Windows installation CD to disk. The third stage runs the Microsoft Installer to perform a full Windows installation from the files copied to disk in the previous stage.

After installing Win4Lin, you are ready to install your favorite Windows applications. Installing Windows applications is straightforward — just run Win4Lin to launch Windows and then install your applications as you would on a native Windows system.

Preparing for Installation

Before running the Win4Lin graphical installer, there are a few issues you should consider to ensure the installation process goes smoothly.

Do You Have a Previous Version of Win4Lin Installed?

The Win4Lin installer always examines your system to see if Win4Lin is already installed. If the installer finds a previous version of Win4Lin, it will automatically remove the older version and install a newer version in its place. The installer also checks to see if the

version of the Win4Lin-enabled kernel installed on your system needs to be updated and replaces the older Win4Lin-enabled kernel with a new version if necessary.

If you have an earlier version of Win4Lin installed on your system, please read the remainder of this section (*Preparing for Installation*) and then see the section *Updating a Previous Version of Win4Lin*, which follows *Installing Win4Lin for the First Time*.

Choosing a Windows Networking Option

Win4Lin offers two ways of supporting the ability of Windows and Windows applications to access networks: WinSock and Virtual Networking (VNET).

If you are installing Win4Lin for the first time on a particular system, you will be asked which of these two options you wish to use. Review the characteristics of each option as summarized in the following chart and decide which best fits your networking needs.

WinSock

WinSock redirects Windows networking operations to use the Linux implementation of TCP/IP communication protocols. With WinSock, you won't need to configure any networking settings. Most applications work with this option, but WinSock doesn't support Network Neighborhood and doesn't allow access to a Microsoft Exchange Server.

Virtual Networking (VNET)

VNET provides Windows with access to a virtual network, accessed through a virtual network interface card (NIC). This virtual network forwards IP packets to the external network through the physical NIC that it shares with the Linux network protocols. VNET most closely duplicates native Windows networking and offers support for a wide range of networking applications, including easy access to file and printer sharing through Network Neighborhood. If you select this option, you may also need to configure your Windows network settings using the Network control panel in Windows.

VNET requires that you configure a unique IP address for your virtual network card. If you are connected to a local area network (LAN), you will need to ask your network administrator if your network includes automatic assignment of IP addresses (via DHCP). If not, you can ask your network administrator to provide you with a unique IP address for your virtual network card, and then you can update your Windows Network settings to reflect this address.

Win4Lin Networking Option	Requires 2nd IP Address	Applications Supported by This Networking Option						
		Internet Explorer, Netscape Communicator	AOL, MSN, Chat, Instant Messenger	Microsoft Windows Network Neighborhood	Microsoft Exchange Server	Remote Login (Telnet, SSH)	Most Other Modern Networking Applications	Virtual Private Network (VPN)
WinSock	NO	YES	YES	NO	NO	YES	YES	NO
VNET	YES	YES	YES	YES	YES	YES	YES	YES

Network Connection

If you have no network interface card (NIC) in your computer or if you are not connected to a local area network (LAN), you should choose WinSock. Note that WinSock will allow you to connect to the Internet through a modem, cable modem, or a DSL connection used by your Linux system.

Local Area Network

If you are connected to a network of computers on a local area network (LAN), you should probably choose the VNET option. With this choice you will be able to use the Network Neighborhood tool to simplify the process of locating and connecting to other computers and to printers on your network.

Not Sure Which Option to Use?

If you are uncertain which networking option will work best for you, we recommend that you initially choose WinSock. This option supports Internet browsing and many other networking applications, and lets you get up and running quickly. You can switch between networking options at any time using the win_network command.

Please note: If you are using Windows 95 (classic—not OSR2), you cannot switch to WinSock from VNET except by reinstalling Windows. Thus if you will be installing Windows 95, you should probably choose WinSock for your initial installation unless you are certain that VNET will better meet your needs. (For more information on networking options, see *Configuring the Win4Lin Windows Network* in *Chapter 2 – Using Win4Lin.*)

Creating a Windows Boot Floppy

If your Windows 95/98 installation CD is not bootable, you will need a Windows boot disk (floppy disk) for use during Stage 2 of the installation process. The Windows version of this disk must match the version of your Windows installation CD. For example, if you are using a Windows 98 SE installation CD, you must also use a Windows 98 SE boot floppy. You can only create such a boot floppy on a Windows system that is running the version of Windows that exactly matches your Windows installation CD.

To create a Windows boot floppy (if you don't already have one), follow these steps:

1. Double click on **My Computer**.
2. Double click on **Control Panel**.
3. Double click on **Add/Remove Programs**.
4. Click on the **Startup Disk** tab.
5. Insert a floppy in the drive.
6. Click the **Create Disk** button, and follow the instructions.

Installing Windows from Upgrade Media

If you have purchased a Windows upgrade (i.e., from Windows 95 to Windows 98, or Windows 98 to Windows 98 SE), you will need your Windows installation CD or floppy disks from that earlier version to install Win4Lin. Because you will be installing Windows from upgrade media (e.g., you bought the newer version as an upgrade package, rather than repurchasing the full product at a higher price), the Microsoft Installer used in Stage 3 of the Win4Lin installation will require proof that you purchased an earlier version. You will be asked to insert the CD or the first floppy disk from your earlier Windows version during Stage 3 of the Win4Lin installation.

Troubleshooting

Here are a few details that might be useful if you encounter any problems during installation:

Backing Store

When using Win4Lin, your display performance is affected by an X server setting called backing store. In many distributions this setting is turned off by default, and should be turned on when using Win4Lin. In most cases the Win4Lin installer can automatically enable this setting. If during installation you see a message indicating that the installer cannot enable backingstore, you should enable it manually. (See the section entitled *Manually Enabling Backing Store* in *Appendix B – Installation Troubleshooting* for details.)

CD Automounting

The GNOME and KDE graphical desktop environments are frequently configured to automatically mount your CD-ROM drive when you insert a CD, so that you can access the CD immediately without having to type a command or click an icon. This behavior is usually very convenient, but it interferes with the Win4Lin installation process. Even if you are not using GNOME or KDE, your system may be enabling automounting of CDs using other software. In most cases the Win4Lin installer can automatically disable automounting during installation. In a few situations, you may need to disable automounting manually before starting the installation process. (See the section entitled *Manually Disabling CD Automounting* in *Appendix B – Installation Troubleshooting* for details.)

Partial or Failed Installation

If your system should lock up or suffer a power failure during the installation of Win4Lin, you should first try to restart the installation process from the beginning. The graphical installer is designed to detect partial installations and to perform any cleanup required. If after an incomplete installation you find that the installer cannot complete the installation of Win4Lin successfully, you should try to manually remove any Win4Lin components that may have been installed before the process was interrupted. You should then be able to restart the installation process from the beginning (if you removed all components) or at the stage where the interruption occurred (if you removed just the

components installed during that stage.) (See *Manually Removing Win4Lin Components* in *Appendix B – Installation Troubleshooting* for details.)

Installing Win4Lin for the First Time

Once you have reviewed the preparation issues, you are ready to begin the installation process. (If you have an earlier version of Win4Lin installed on your system, please see the section entitled *Updating a Previous Version of Win4Lin*, which follows this section.)

Connecting to the Internet

If you are installing Win4Lin from CD, and if you connect to the Internet before starting the installation process, you will be able to register your copy of Win4Lin. Once you are registered, the Win4Lin graphical installer can automatically check for updates on the NeTraverse Web site during installation. We hope you choose to register with us so that we can keep you informed of future Win4Lin releases, support for new Linux distributions, and any bug fixes we post to our Web site. If you are installing Win4Lin via download, you will be required to enter your license code and registration information before proceeding with the installation.

Starting the X Window System

Most current Linux distributions install the X Window System by default and may also set up your system to automatically start X upon system boot.

If your system displays a graphical login screen at startup, then X is already running–just enter your username and password at the prompts to log in and start an X session. If your system does not show a graphical login screen, you will need to start the X Window System manually. To start an X session, log in and type the following command at your shell prompt:

```
startx
```

If X has been configured properly, the system will switch to a graphical screen and your desktop environment will start. If X fails to start, refer to the documentation that accompanies your Linux operating system for assistance.

Stage 1 — Package Installation

In the first stage of Win4Lin installation, the packages containing the Win4Lin application program and Win4Lin-enabled kernel are installed. Once this stage is completed, you will be prompted to reboot your system. Follow these steps to perform Stage 1:

1   Close any applications you may have running as you will need to reboot your system during the installation process.

2   Start the X Window System, if necessary, by typing:

```
startx
```

3   Connect to the Internet if you want the installer to check for product updates or for new Win4Lin-enabled kernels on our web site. (*This is optional for CD-based installation, but required for installation via download.*)

4   Open a terminal window, and become the root user by typing:

```
xhost +localhost
su - root
```

5   If you are installing Win4Lin from CD-ROM, place the CD in your drive at this time. If you are installing Win4Lin via download, make sure that you have already downloaded the installer to a directory on your hard drive. Run the installer by typing the appropriate commands:

If you are installing Win4Lin from a CD, type the following commands to run the installer from that CD:

For most Linux distributions:
```
mount -o exec /mnt/cdrom
cd /mnt/cdrom
./win4lin-install
```

For SuSE Linux:
```
mount -o exec /cdrom
cd /cdrom
./win4lin-install
```

If you are installing Win4Lin via download, type the following commands to unpack the installer archive you previously downloaded from our Web site and then run the installer from disk:

```
cd directoryname
tar xzvf netraverse_installer.tgz
cd netraverse_installer
./win4lin-install
```

Where *directoryname* is the name of the directory into which you downloaded the installer archive.

6   Follow the on-screen instructions.

• **Updating a Previous Version of Win4Lin**
   If you have an earlier version of Win4Lin installed on your system, the Win4Lin installer will offer to remove it or update it with version 3.0. Choose the Update option to remove the old version and continue the installation of the new version.

- **Registering Your Copy of Win4Lin**
  During the update process you will be given the option to register your copy of Win4Lin, if you are installing from CD. If you do not wish to register now, you can register later at our Web site: www.netraverse.com. We recommend registering so that you will have access to the latest Win4Lin updates. If you are installing Win4Lin via download, you must enter your license code and registration information. In order to register and download product updates, you must be connected to the Internet.

- **Entering Your License Code**
  You will be asked to enter the license code for your copy of Win4Lin during this stage of installation. If installing Win4Lin from CD, the license code can be found on the Win4Lin 3.0 CD sleeve. If you are installing Win4Lin via download the license code will be sent to you by email. Please type the license code exactly as it appears, omitting the hyphens.

- **Unsupported Kernels**
  The Win4Lin installer checks your system to determine if the Linux kernel you are presently using can be automatically updated to a Win4Lin-enabled version. If you are using a kernel that you have modified, a kernel from a beta release version of Linux, or another unsupported kernel, you will see this message:

  ```
  You do not appear to be running a standard
  kernel.
  ```

  If you see this message, you will need to follow the instructions in *Appendix A* to update your specific kernel to be Win4Lin-enabled. Once you have completed this procedure, you should restart the installation process at Stage 1.

7   At the conclusion of Stage 1, you will be prompted to reboot your system. If you are installing Win4Lin from CD, you may remove your Win4Lin Installation CD from your CD drive at this time. After rebooting, log in as the non-root user who will be using Win4Lin and proceed with Stage 2.

Stage 2 — System-Wide Windows Installation

In the second stage, the installer copies the Windows installation files from your Windows installation CD to your hard drive. Follow these steps to perform Stage 2:

1   Start the X Window System, if necessary, by typing:

    ```
    startx
    ```

2   Open a terminal window, and become the root user by typing:

    ```
    xhost +localhost
    su - root
    ```

3   Type the following command to run the Win4Lin installer from your hard drive:

    ```
    /usr/bin/win4lin-install
    ```

4   Follow the instructions presented.

- **Insert Boot Floppy**
  If your Windows installation CD is not bootable, you will be prompted to insert a boot floppy during this stage. (For instructions on creating a boot floppy see *Creating a Windows Boot Floppy* in the *Preparing for Installation* section.)

5   At the conclusion of Stage 2, you should proceed to Stage 3. You may remove your Microsoft Windows installation media at this time.

Stage 3 — Personal Windows Installation

This third and final stage runs the Microsoft Installer to perform a full Windows installation from the files copied to disk in Stage 2. This step creates your personal Windows environment in your home directory. In order to ensure that all files are placed in the correct place, you must log in and run this last stage as the non-root user who will be using Win4Lin and Windows.

1   Start the X Window system, if necessary, by typing:

```
startx
```

2   Open a terminal window, and type the following command to run the Win4Lin installer from your hard drive.

```
/usr/bin/win4lin-install
```

3   Follow the on-screen instructions.

- **Windows Upgrade Proof of Purchase**
  If you purchased a Windows upgrade, you will have to insert the CD or the first floppy from your earlier Windows version. If your earlier version is on floppy disks (very rare), select the Use Floppy Drive option when it appears.

  Note: If you don't have a floppy drive on your system (e.g. a laptop with the floppy drive disconnected or removed), be sure Use Floppy Drive is not selected or your system may hang.

  When asked for the path to your upgrade media, click the Browse button and then use the Drives drop-down menu to select the `N:/` drive (for CD) or the `A:/` drive (for floppy).

- **Networking Style**
  Win4Lin offers two ways of supporting the ability of Windows and Windows applications to access networks: WinSock and Virtual Networking (VNET). During this stage of installation you will be asked which of these two options you wish to use. If you are uncertain which networking option will work best for you, we recommend that you initially choose WinSock. You can switch between networking options at any time. (For more information see *Configuring the Win4Lin Windows Network* in *Chapter 2 – Using Win4Lin*.)

4   At the conclusion of Stage 3, you will have completed the installation of Win4Lin, a Win4Lin-enabled kernel, and your copy of Microsoft Windows. You will then be ready to use Win4Lin to run a Windows session. (Please see *Chapter 2 – Using Win4Lin* for details of configuring and using Win4Lin and *Chapter 3 – Working in the Win4Lin Environment* for details of installing and using Windows applications.)

Updating a Previous Version of Win4Lin

Once you have reviewed the preparation issues, you are ready to begin the update process. The Win4Lin graphical installer always examines your system to see if Win4Lin is already installed. If the installer finds an older version of Win4Lin, it will offer to automatically remove the older version and install a newer version in its place. The installer also checks to see if the version of the Win4Lin-enabled kernel installed on your system needs to be updated and replaces the older Win4Lin-enabled kernel with a new version if necessary.

Where to Find the Graphical Installer

Win4Lin 3.0 is the first version of our product to include a graphical installer for automating installation and updating. The first step in performing an installation of a new version of Win4Lin is to determine the quickest and easiest way to get access to a copy of the installer.

Installing a New Version from CD

If you will be upgrading to a new version of Win4Lin from a CD, you will want to run the graphical installer on that CD to begin the update process. The installer can then update your older version of Win4Lin by replacing the Win4Lin components on your system with the newer versions from your CD. Additionally, you have the option of directing the installer to look on our Web site before performing the update to see if there might be even more current Win4Lin components available for download. This ensures that you can perform the update process just one time to have all the latest components installed.

Updating a Pre-3.0 Version of Win4Lin via Download

If you have a pre-3.0 version of Win4Lin installed on your system and you have acquired a valid license code for upgrading to version 3.0 from our Web site, you can perform an upgrade via download from our Web server using the graphical installer. Because this installer was not a part of earlier versions of Win4Lin, you must download a copy of it from our Web site to your hard drive before beginning the update process. (You will find directions for downloading the installer in the same location where you arrange to receive your license code.) You can then run the installer from your hard drive and

update your older version of Win4Lin by replacing the Win4Lin components on your system with the newer versions available from our Web site.

Updating Win4Lin 3.0 or Later from Our Web Site

Once you have installed any Win4Lin version 3.0 or later, you will already have a copy of the graphical installer on your hard drive. You can simply run this older version of the installer to begin the update process to a newer version of Win4Lin. The older version of the installer always checks to see if a newer version of the installer is available for download and offers to automatically download it to your system and switch to the newer version for the remainder of the update process. To take advantage of Web-based updates, you will need to connect to the Internet before starting the update process, and you will need to register your new copy of Win4Lin. We hope you choose to register with us so that we can keep you informed of future Win4Lin releases, support for new Linux distributions, and any bug fixes we post to our web site.

Starting the X Window System

Most current Linux distributions install the X Window System by default and may even set up your system to automatically start X upon system boot.

If your system displays a graphical login screen at startup, then X is already running — just enter your username and password at the prompts to log in and start an X session.

If your system does not show a graphical login screen, you will need to start the X Window System manually. To do so, log in and then issue the following command at your shell prompt:

```
startx
```

If X has been configured properly, the system will switch to a graphical screen and your desktop environment will start. If X fails to start, refer to the documentation that accompanies your Linux operating system for assistance.

Updating Win4Lin

Follows these steps to update a previously installed version of Win4Lin to a newer version:

1   Close any applications you may have running, as you may need to reboot your system following the update process.

2   Start the X Window System, if necessary, by typing:

```
startx
```

3   Connect to the Internet so that the installer can check for product updates and new Win4Lin-enabled kernels on our web site. (*This is optional.*)

4   Open a terminal window, and become the root user by typing:

```
xhost +localhost
su - root
```

5   If you are upgrading to a new version of Win4Lin from a CD, place the CD in your drive at this time. If you are upgrading a pre-3.0 version of Win4Lin via download, make sure that you have already downloaded the new graphical installer to a known directory on your hard drive.

Run the installer by typing the command(s) appropriate to your situation:

If you are upgrading to a new version of Win4Lin from a CD, type the following commands to run the installer from that CD:

For most Linux distributions:
```
mount -o exec /mnt/cdrom
cd /mnt/cdrom
./win4lin-install
```

For SuSE Linux:
```
mount -o exec /cdrom
cd /cdrom
./win4lin-install
```

If you are upgrading a pre-3.0 version of Win4Lin via download, type the following commands to unpack the installer archive you previously downloaded from our Web site and then run the installer from disk:

```
cd directoryname
tar xzvf netraverse_installer.tgz
cd netraverse_installer
./win4lin-install
```

Where *directoryname* is the name of the directory into which you downloaded the installer archive.

If you are updating a version 3.0 or later copy of Win4Lin via download, type the following command to run the copy of the installer that was left on disk from the previous installation of Win4Lin:

```
/usr/bin/win4lin-install
```

6   Follow the on-screen instructions.

- **Updating a Previous Version of Win4Lin**
  If you have an earlier version of Win4Lin installed on your system, the Win4Lin installer will offer to remove it or update it with version 3.0. Choose the Update option to remove the previous version and continue the installation of the new version.

- **Registering Your Copy of Win4Lin**
  During the update process you will be given the option to register your copy of Win4Lin, if you are installing from CD. If you do not wish to

register now, you can register later at our Web site: www.netraverse.com. We recommend registering so that you will have access to the latest Win4Lin updates. If you are installing Win4Lin via download, you must enter your license code and registration information. In order to register and download product updates, you must be connected to the Internet.

- • **Entering Your License Code**
  You will be asked to enter the license code for your copy of Win4Lin during this stage of installation. If installing Win4Lin from CD, the license code can be found on the Win4Lin 3.0 CD sleeve. If you are installing Win4Lin via download the license code will be sent to you by email. Please type the license code exactly as it appears, omitting the hyphens.

7   If you installed an updated Win4Lin-enabled kernel, you will need to reboot your system after completing the update process.

Switching to VNET When Upgrading to Version 3.0

The VNET networking option was not available with Versions 1.0 or 2.0 of Win4Lin. If you have just installed Win4Lin version 3.0 to upgrade from one of these earlier versions and you wish to switch from WinSock to VNET, you will need to use the win_network command to make this change. (Please see *Configuring the Win4Lin Windows Network* in *Chapter 2 - Using Win4Lin* for details.)

Removing Win4Lin from Your System

A typical installation of Win4Lin is made up of several components, including:

- ▸ The Win4Lin application files (located in `/opt/win4lin` in your Linux directory)
- ▸ The Win4Lin kernel (usually located in `/boot`)
- ▸ The Win4Lin system-wide configuration files and the Windows installation file (located in `/var/win4lin`)
- ▸ Your personal installation of Windows (usually located in `$HOME/win`). This also includes any Windows applications that you might have installed and perhaps your data files if you placed them on the Windows `C:\` drive
- ▸ Your personal My Documents folder containing your data files (which may be located in `$HOME/mydata` for new Win4Lin 3.0 Windows installations)

Removing the Win4Lin application file and the Win4Lin kernel will not cause loss of user data. They may be reinstalled later and you will be able to reuse your Windows environment without having to reload the Windows installation files or reinstalling a personal copy of Windows.

If you remove the Win4Lin system-wide configuration files and the Windows installation files, then any system-wide configuration changes you have made will be lost. Should you

want to reload Win4Lin, you would have to reload the same Windows media that you had previously loaded in order to make use of your personal Windows installation.

The Win4Lin installer does not remove your personal Windows installation. You can do this by removing the `$HOME/win` directory, but note that you will lose all customization you have made to Windows as well as any data files you may have stored on your `C:\` drive. Do this with utmost caution!

New with Win4Lin 3.0, the installer automatically creates a `D:\` drive that maps to `$HOME/mydata`. The installer places the Windows My Documents folder on this `D:\` drive. We recommend that you store all of your personal data files on the `D:\` drive to make sharing easier with Linux applications. Using the `D:\` drive for your data files also simplifies the task of backing up your Windows data files.

Removing Win4Lin Components

You can remove an installed version of Win4Lin using the graphical installer. When you first start the installer, it checks to sees if Win4Lin is already installed on your system. If the installer finds a version of Win4Lin installed on your system, you are offered the choices of removing that version or updating it to a newer version.

Follows these steps to remove Win4Lin from your system:

1   Close any applications you may have running.

2   Start the X Window System (if not already running) by typing:

    startx

3   Open a terminal window, and become root user by typing:

    xhost +localhost
    su - root

4   In the terminal window, type the following commands to run the Win4Lin installer from disk:

    /usr/bin/win4lin-install

5   Follow the on-screen instructions.

- Options
  If you have an earlier version of Win4Lin installed on your system, the Win4Lin installer will offer to remove it or update it. You have 3 options for removing all or part of Win4Lin:

  - Remove the Win4Lin application.

  - Remove the Win4Lin application and the Win4Lin-enabled kernel, restoring your original kernel.

  - Remove the Win4Lin application, the Win4Lin-enabled kernel and restore your original kernel.

6   You will need to reboot your system after removing Win4Lin.

2

Using NeTraverse Win4Lin

▶   Running a Win4Lin Session

▶   Configuring the Win4Lin Windows Network

▶   Enhancing System Performance

Running a Win4Lin Session

The information in this chapter assumes that you have successfully installed Win4Lin on your computer. If you have not already installed Win4Lin, please see *Chapter 1 - Installing Win4Lin.*

Win4Lin automatically sets up your Windows session with the devices listed below. This configuration provides the basic environment that you need to start using Win4Lin.

▸	monitor	▸	diskette drive(s)
▸	keyboard	▸	hard drive
▸	mouse	▸	CD-ROM drive

Starting a Win4Lin Windows Session

Win4Lin can be run as an application on your desktop or in full screen mode. If your system supports it, you may also double-click the Win4Lin icon which is placed on your desktop during installation.

To start a Win4Lin Windows session as a window on your Linux desktop type:

```
win &
```

To start a Win4Lin Windows session in full screen mode type:

```
fwin &
```

TECH TIP

Switching between Virtual Consoles
To toggle between the X Window System environment and your full-screen Win4Lin Windows session, hold down the CTRL and ALT keys and press the F7 key or the F8 key. For most users F7 will be the X session and F8 will be the full-screen Win4Lin Windows session.

TECH TIP

The Win4Lin Icon on Your Desktop
You may need to refresh your desktop in order to see the Win4Lin icon. GNOME users should right click on an empty section of the desktop and choose Rescan Desktop Directory. KDE users should right click on an empty section of the desktop and choose Refresh Desktop.

Ending a Win4Lin Windows Session

To end a Win4Lin Windows session, follow these steps:

1   Click the **Start** button in Windows.

2   Choose **Shut Down...**

3   When prompted with the question, *What do you want the computer to do?* Choose **Shut Down**.

4   Click **OK**.

> **WARNING**
>
> **Do Not Shut Down Your Win4Lin Windows Session Incorrectly!**
>
> Do NOT click the close button on your Windows desktop. Ending a Win4Lin Windows session in this manner bypasses the Windows shut down procedure and may prevent Windows from starting up properly in future sessions.

> **TECH ALERT**
>
> **Recovering from a Locked Windows Session**
>
> If Windows does not respond to standard shut down procedure, you can force Windows to shut down. *(For more information, see the section Recovering from a Locked Windows Session.)*

Escaping From a Locked Windows Application

As in Windows, the CTRL + ALT + DEL key combination will also work to end a locked application in your Win4Lin Windows session.

> **TECH ALERT**
>
> **Using CTRL+ALT+DEL**
>
> Several X Window System managers assign the CTRL+ALT+DEL key combination to execute certain Linux tasks (usually log off). In order to use the CTRL+ALT+DEL key combination in your Win4Lin Windows session, you may need to disable the command that is bound to the CTRL+ALT+DEL key combination in your X Window System manager. Please consult your window manager's documentation to determine how to customize key bindings.

Recovering From a Locked Win4Lin Windows Session

Recovering from a locked Windows session may require a forced shut down. There are three ways this can be done.

Win4Lin menu bar

Hold down the SHIFT and F12 keys. A menu will appear a the top of the screen. Select **Exit** under the Window menu. The **Exit** option will end all processes associated with Win4Lin.

`killall` **command**

Two of the processes that Win4Lin runs are called dosexec. End all Win4Lin processes by opening a terminal window in Linux and typing:
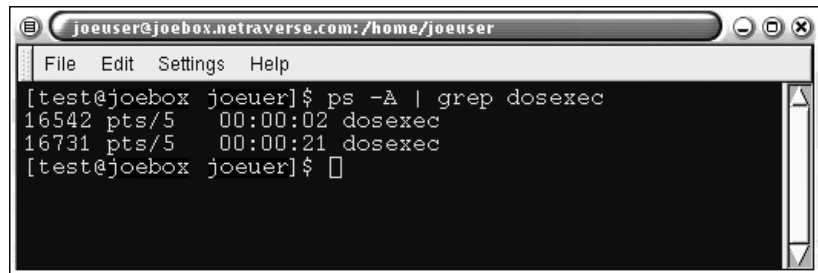
```
killall dosexec
```

`kill -9` **command**

If the first two methods fail to end your locked session, then you must end each Win4Lin process individually. The processes that Win4Lin runs are called dosexec, xcrt, and auserver. You can view a list of running processes by using the command **`ps ax`**. If you want to find a specific process, like dosexec, you can pipe the **`ps`** command into a grep command:

```
ps as | grep dosexec
```

If you have a Win4Lin session running, you will get a listing similar to the following:

```
joeuser@joebox.netraverse.com:/home/joeuser

 File   Edit   Settings   Help

[test@joebox joeuer]$ ps -A | grep dosexec
16542 pts/5   00:00:02 dosexec
16731 pts/5   00:00:21 dosexec
[test@joebox joeuer]$ []
```

Identify the PID of each process and issue the command:

```
kill -9 PID
```

For example, if you wished to terminate a process with the ID number 554, you would type:

```
kill -9 554
```

⚠ WARNING

Do Not Terminate the vnetd Process!

Do not terminate the process called vnetd. This is a Win4Lin process that must be running at all times, even when no Win4Lin session is active.

Resizing the Win4Lin Windows Desktop

To change the size of your default Win4Lin Windows desktop, you can change the screen resolution by following these steps

1   Right click on the Windows desktop and choose **Properties**.:
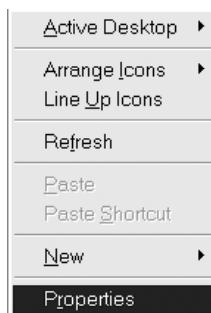
2   Click on the **Settings** tab.
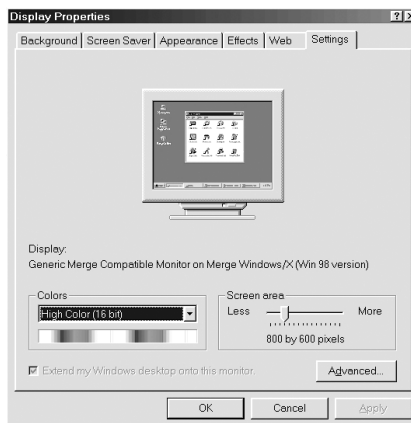
3   In the section named **Screen area** move the slide bar to the desired screen resolution.

4   Click **Apply**.

5 You will be prompted to confirm your decision to resize your window. Click **OK**.

6 After your Win4Lin Windows desktop changes size, the Windows dialog box will ask you if you wish to keep these settings. Click **Yes**, then click **OK.**

TECH TIP

Specify a Custom Windows Desktop Size

You can start a Win4Lin Windows session with a specific window size by using the -g option of the win command. To execute this command, type either:

```
win -g 1200x768
```

or

```
win --geometry 1200x768
```

TECH ALERT

KDE Window Size

If you are running Win4Lin under KDE version 2.x and cannot see your entire Windows desktop, you can override the incorrect window size that KDE chooses using an application called kstart, part of the KDE suite. Type this command from a terminal window:

```
kstart win --geometry 1152x864
```

Where geometry sets the geometry of the Windows windor. If you are using Win4Lin at a screen resolution of 800x600 then this option should aslo be 800x600. Upgrading to KDE 2.1 or greater (www.kde.org) will also solve the KDE 2.0 window size problem.

Configuring the Win4Lin Windows Network

During the installation of Win4Lin, you had the option of choosing VNET networking option or WinSock networking option. This section provides information for configuring your network option.

What is WinSock?

WinSock provides the interface that most TCP/IP-based network applications, such as Internet Explorer and Netscape Navigator, use to access the network. The Win4Lin 3.0 WinSock implementation is based on the WinSock 1.1 specification. Some applications may require a more recent WinSock 2 interface, which is not currently supported. WinSock does not provide the interface required to support Network Neighborhood and communications between Microsoft Outlook and Microsoft Exchange Server. If you require these, and have installed the WinSock networking option, then you will need to

upgrade to the VNET networking option. (For more information, see *Upgrading from WinSock to VNET*, later in this section.)

What is VNET?

VNET stands for Virtual Network. VNET provides support for the native Windows. WinSock 2 implementation and other important Windows networking features such as Network Neighborhood and communications with a Microsoft Exchange Server. VNET, therefore, allows access to a broader range of applications and gives you more powerful tools to manage your network.

VNET does not share the Linux TCP/IP network implementation, and therefore requires that each Win4Lin session be provided with unique IP configuration information. In most office environments, and some home environments, a second IP address can often be obtained through the use of a DHCP server, or by assigning a static IP address. If you do not have the use of a DHCP server, the second IP address either needs to be acquired from an Internet service provider, or assigned by your system administrator. If you have set up your own network, the IP Masquerade feature of your firewall must be enabled. If you do not have IP Masquerade enabled or cannot obtain a second IP address, the WinSock option would be the preferred choice.

TECH TIP

Protect Your System with a Firewall

If you are connected to the Internet with Linux and are *not* using a firewall, your system is vulnerable to hacker attacks. You should read the Firewall-HOWTO from the Linux Documentation Project (LDP) at www.linuxdocs.org.

TECH TIP

Using IP Masquerade with a Firewall

If you are using a firewall but do not know how to enable IP Masquerade, please consult the IP Masquerade HOWTO from the Linux Documentation Project (LDP) at www.linuxdocs.org.

Using VNET with a DHCP Server—Automatic IP Address Assignment

If you use a DHCP server, most of the required network settings will be supplied by that server during the startup of a Win4Lin Windows session. If your computer is part of a local area network (LAN) from which you would like to access other computers, you may wish to change the following settings:

Network Neighborhood Workgroup
The name of the group of computers which will share files and printers. The default setting for this field is WORKGROUP.

Computer Name
The name that you choose for your computer which will be seen by other computers on the network. The default setting for this field is your hostname and username separated by a dash (i.e., hostname-username).

Network Neighborhood Description
A brief description of your computer which will be seen by other computers on the network. The default setting for this field is the Windows session of username on hostname.

Network Neighborhood Logon Domain
The domain name of the Windows NT server that you would like to access (if any). You can leave the default setting of this field if you do not wish to access a Windows NT server. The default setting for this field is WORKGROUP.

To change these network settings, follow these steps:

1 Start a Win4Lin Windows session by typing one of the following:

   win & (runs in a window on your Linux desktop)
   or
   fwin & (runs in full screen mode)

2 Click **Start** -> **Settings** -> **Control Panel** and double-click on **Network.**

3 In the **Network** window, choose **File and printer sharing for Microsoft Networks**. Click **Properties**.
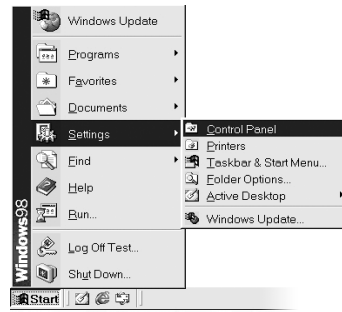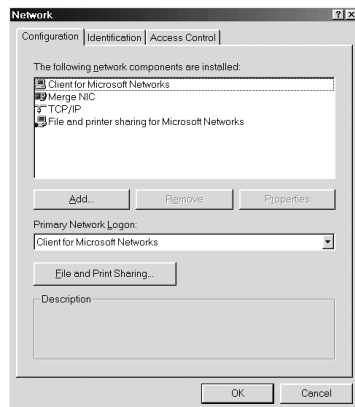
4   Click on **LM Announce** in the **Property** box of the **File and printer sharing for Microsoft Networks Properties** window. The LM Announce property should normally be set to **No**. If your LM Announce property requires a **Yes** value, then the shutdown of Windows may be quite slow. Check with your system administrator to determine which LM Announce property setting is correct.

5   Choose the correct setting from the **Value** drop down menu, then click **OK**.

6   Click on the **Identification** tab to set the **Network Neighborhood** properties, which include **Computer name, Workgroup,** and **Computer Description**.
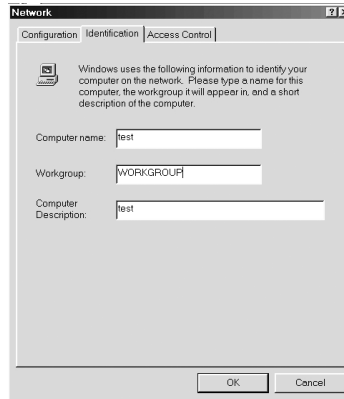
7   In the **Configuration** tab of the Network window, select **Client** for Microsoft Networks and click **Properties**, where you can set the Windows NT domain.

8   Click **OK**, then click **OK** again.

9   Click **Yes** when asked, *Do you want to restart your computer?*

Using VNET without a DHCP Server—Manual IP Address Assignment

If you are not using a DHCP server, you will need to manually configure your Win4Lin Windows network environment. You will need to configure the following items:

IP Address
A unique IP address provided by your ISP or system administrator, or the IP address which you have set up for your private network. There is no default setting for this field.

IP Mask
If an ISP or system administrator has assigned your IP address(es), then they will provide the IP mask as well. If you are assigning an IP address within your private network, then the IP mask should be the IP mask of your private network. The default setting for this field is the IP mask of your configured Linux network.

Internet Name (Host)
The name you select for your computer. The default setting for this field is your hostname and username separated by a dash, i.e., hostname-username.

DNS Domain
If an ISP or system administrator has assigned your IP address(es), then they will provide the DNS domain as well. The default setting for this field is the DNS domain of your configured Linux network.

DNS Servers (Server Search Order)
If an ISP or system administrator has assigned your IP address(es), then they will also provide the DNS server address. The default setting for this field is the DNS server of your configured Linux network.

DNS Domain (Suffix) Search Order
If an ISP or system administrator has assigned your IP address(es), then they will also provide the DNS domain search order. The default setting for this field is the DNS domain search order of your configured Linux network.

Gateway Address
If an ISP or system administrator has assigned your IP address(es), then they will also provide the gateway address. If you have set up your own private network, then the gateway address is the address of the computer that should be contacted to request information from the Internet. The default setting for this field is the gateway address of your configured Linux network.

Network Neighborhood Workgroup
The name of the group of computers which will share files and printers. The default setting for this field is WORKGROUP.

Network Neighborhood Name
The name that you choose for your computer which will be seen by other computers on the network. The default setting for this field is your hostname and username separated by a dash, i.e., hostname-username.

Network Neighborhood Description
A brief description of your computer which will be seen by other computers on the network. (The default setting for this field is the Windows session of username on hostname.)

Network Neighborhood Logon Domain
The domain name of the Windows NT server that you would like to access (if any). You can accept the default setting of this field if you do not wish to access a Windows NT server. The default setting for this field is WORKGROUP.

To configure your Win4Lin Windows network environment, follow these steps:

1   Start a Win4Lin Windows session by typing one of the following:

> **win &**   (runs in a window on your Linux desktop)
>
> or
>
> **fwin &**   (runs in full screen mode)

2   Click **Start** -> **Settings** -> **Control Panel** and double click on **Network**.

3   Select **TCP/IP** and click the **Properties** button.

**4**   Check **Specify an IP address** in the **IP Address** tab and enter the IP address and subnet mask.
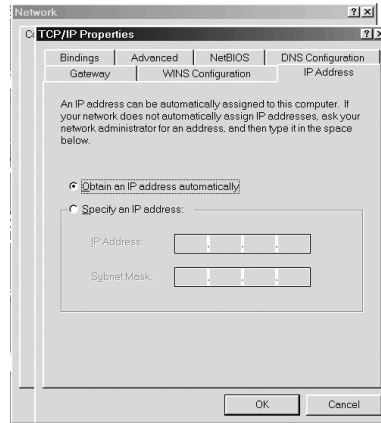
5   In the **DNS Configuration** tab, enter the required information for these fields:

> •   Host
> •   Domain
> •   DNS Server Search Order
> •   DNS Suffix Search Order

In the fields that have an **Add** button, you must enter the information and click **Add** to submit that information.

6   Click on the **Gateway** tab. Enter the gateway IP address in the **New gateway field** and submit with the **Add** button. Click **OK**.

7   In the **Network** window, choose **File and printer sharing for Microsoft Networks**. Click **Properties**. Click on the **LM Announce** in the **Property** box of the **File and printer sharing for Microsoft Networks Properties** window.
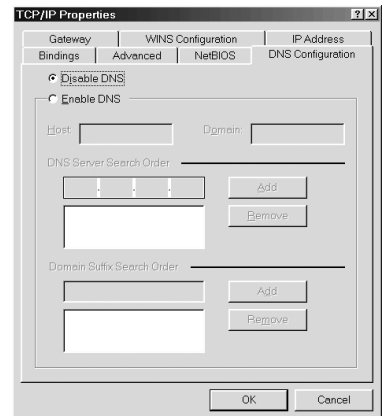
The **LM Announce** property should normally be set to **No**. If your **LM Announce** property requires a **Yes** value, then the shutdown of Windows may be quite slow. Check with your system administrator to determine which **LM Announce** property setting is correct.

8 Click on the **Identification** tab to set up the **Network Neighborhood** properties, which include **Computer name**, **Workgroup**, and **Computer Description**.

9 In the **Configuration** tab of the **Network** window, select **Client for Microsoft Networks** and click **Properties**, where you can set the **Windows NT Domain**.

10 Click **OK**, then click **OK** again.

11 Choose **Yes** to *Do you want to restart your computer now?*
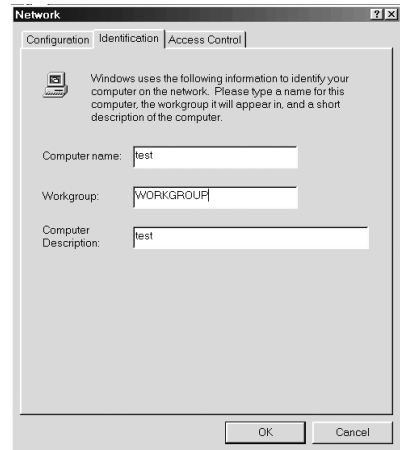
TECH TIP

Using IP Masquerade with a Firewall

If you are using a firewall but do not know how to enable IP forwarding, please consult the IP Masquerade HOWTO from the Linux Documentation Project (LDP) at www.linuxdocs.org.

Switching from WinSock to VNET

If you chose the Win4Lin WinSock network setup during installation you can reconfigure your network settings to use VNET.

To reconfigure your network settings, follow these steps:

1 Open a terminal window and type:

```
win_network -v
```

If VNET has not been configured, the win_network command will automatically start a Win4Lin Windows session. If VNET has already been configured, then you will need to start a Win4Lin Windows session.

2 Click **Start** -> **Settings** -> **Control Panel** and double click on **Network**.

3 In the **Network** window, click on the **Add...** button to bring up the **Select Network Component Type** window for installing network components.

- Click on **Adapter**, then click **Add...**

- In the **Select Network adapters** window, choose **Merge/NIC** from the **Manufacturer: list**.

- Choose **Merge NIC** from the **Network Adapters** box, then click **OK**.

- Click **Add...** in the **Network** window, then click **Service** in the **Select Network Component Type** window. Click **Add...**.

- Choose **File and printer sharing for Microsoft Networks** in the **Select Network Service** window then click **OK**. Windows 95 users need to add the TCP/IP protocol.

- Click **Add...** from the **Network** window.

- Click **Protocol** in the **Select Network Component Type** window then click **Add...**.

- Choose **Microsoft** from the **Manufacturer: list** then choose **TCP/IP** from the **Network Protocols** box, then click **OK**.

4 Remove unnecessary protocols. If IPX or IPX/SPX is listed in the Network window, select the **IPX** entry and then click the **Remove** button. Remove the NetBEUI protocol as well. (You should now follow the steps in the section, *Assigning an IP Address* in *Chapter 2 - Using Win4Lin.*)
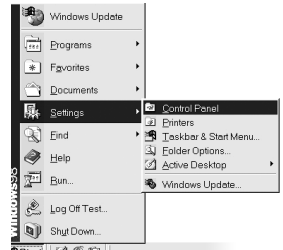
Switching from VNET to WinSock

If, during the Win4Lin installation process, you chose the Win4Lin VNET network setup, you can reconfigure your network settings to use WinSock.

Reconfigure your network settings with the following command:

```
win_network -w
```

No other configuration is needed.

> ⚠️ **WARNING**
>
> **Warning!**
>
> Windows 95 users cannot switch from VNET to WinSock. If you are using Windows 95 and have configured VNET you will need to remove your entire $HOME/win directory and complete Stage 3 of the installation process again. You can remove your $HOME/win directory by typing these commands from a terminal window as the non-root user:
>
> ```
>     cd
>     rm -Rf win
> ```
>
> IMPORTANT: These commands will remove all files, including data files that you have stored in your $HOME/win directory.

Enhancing System Performance

Memory Allocation

You can enhance the performance of your system by changing the memory allocation for a Win4Lin session.

- ‣ To enhance Windows performance: allocate more memory toWin4Lin sessions.
- ‣ To enhance Linux performance: allocate less memory to Win4Lin sessions.

To change the memory allocated to Win4Lin:

1 Open a terminal window and type:

```
    winsetup &
```
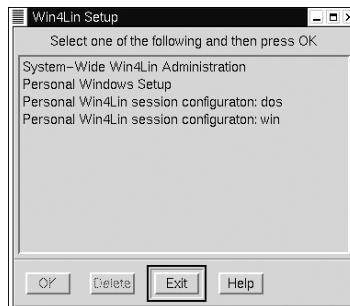
2   Choose **Personal Win4Lin configuration: win** and click **OK**.
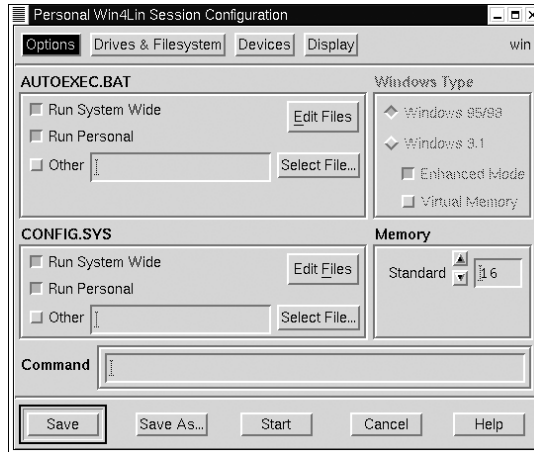
3   Click the arrows in the **Memory** section of the **Options** window to the desired amount of virtual memory (maximum 64 MB).

4   Select **Save** to make this amount of memory the default setting for your Win4Lin configuration.

5   Click **Exit** to exit the Win4Lin Setup utility window.

TECH TIP

Adjust System Memory for Optimal Performance

Win4Lin simulates standard memory by using standard Linux system virtual memory. Virtual memory is a finite resource. Assigning more than is strictly necessary is a waste of memory resources. We suggest increasing memory in 4 MB increments until your Windows applications appear to be running at normal speed. Allocating too much memory to your Windows session can actually slow down your Linux system. You can increase the virtual RAM up to 64 MB; however, we have found that in most cases, 32 MB is sufficient.

TECH TIP

Starting a Win4Lin Session with Specific Memory Allocation

You can start a Win4Lin session with a specific memory allocation from the command line without using the Win4Lin Setup utility with the following command:

```
win +mMB
```

Where, **MB** represents the amount of memory in megabytes you wish to assign to Win4Lin. Starting a Win4Lin session in this manner does not change any of your default memory settings.

Installing Fonts in Win4Lin

To use any application that uses TrueType fonts, place a third party .ttf file into your fonts folder (accessed from the Control Panel in Windows).

Enhancing the Display

Icon Presentation

If the Windows icons are displayed in the wrong colors or the icon labels are unreadable: Shut down your Win4Lin Windows session as described in Ending a Win4Lin Windows session.

1   Open a terminal window.

2   Remove the ShellIconCache file by typing:

```
rm $HOME/win/windows/ShellIconCache
```

3   Restart your Win4Lin Windows session.

Display Performance

Using a display setting of 24-bits-per-pixel (16 million colors) may cause problems with display performance. We recommend 16-bits-per-pixel or 32-bits-per-pixel for optimal performance.

You can determine if your system display setting is 24-bits-per-pixel by opening a terminal window and typing:

```
xdpyinfo | grep bits per pixel
```

If the output of this command shows:

```
depths 24, bits per pixel 24, scanline pad 24
```

then consult the Linux system documentation in order to change your display resolution.

Not Enough Colors

Problems with color may result from less than optimal video settings or older video hardware. If you are running an X Window System with a color depth of 8 bits or lower, you may experience color problems in your Win4Lin Windows session.

You can confirm your color depth setting by typing in a terminal window:

```
xdpyinfo | grep depths
```

If the output of this command shows:

```
depths (1):    8
```

and your video card cannot support a higher color depth, then you should allocate a private color map for Win4Lin.

TECH TIP

Upgrade Your Video Card for Better Display

8-bit color is not sufficient for many current applications. If you are using 8-bit color or less, you may want to consider replacing your video card. We strongly recommend that the display be 16-bit color or more. We have found that using 16-bit color (64K colors) works well for most applications and is generally faster than using more colors.

3

Working in the Win4Lin Environment

- ► Browsing the Internet

- ► Installing Windows Applications

- ► Printing from the Win4Lin Environment

- ► Sharing Files between Win4Lin Windows and Linux

- ► Virus Protection

Browsing the Internet

Once Win4Lin is installed, you can browse the Internet from either the Windows desktop or your favorite Linux desktop environment. You must have an Internet connection set up on your Linux system in order to browse the Internet from Win4Lin.

> ⚠️ **WARNING**
>
> **Protect Your System with a Firewall**
> If you are connected to the Internet with Linux and are not using a firewall, your system is vulnerable to hacker attacks. You should read the Firewall-HOWTO from the Linux Documentation Project (LDP) at www.linuxdocs.org.

> **TECH ALERT**
>
> **Configuring the Win4Lin Windows Network**
> If you have improperly set up your VNET networking configuration during installation, you will not be able to browse the Internet from your Win4Lin session. You will need to correct those settings. (For more information on correcting the settings, see Configuring Your Win4Lin Windows Network, in Chapter 2.)

Installing Windows Applications

You will use the familiar Windows desktop to install your favorite Windows applications. Installing Windows applications in Win4Lin is essentially the same as installing applications in native Windows. Most applications can be installed by clicking the Start button, choosing Run, and entering the name of the setup program as described in the application documentation. There are, however, some small but important differences.

By default your C: drive in Win4Lin Windows is labeled ~/win (C:). An application CD will not automatically execute when inserted into the CD-ROM drive as it does in native Windows. When attempting to access your CD-ROM drive or floppy drive(s), you may receive the message shown in the screen to the right:

Be sure the permissions of the Linux device files have been properly set by following these steps:

1 Open a terminal window and become the root user by typing:

```
su root
```

2 Change to the devices directory by typing:

      `cd /dev`

3 Change the device permissions:

For CD-ROM device:

Identify the CD-ROM device file by typing:

      `ls -l cdrom`

The output of this command shows the link that points to the actual device file (for example, hdc).

To make your CD-ROM device accessible to a Windows session, type:

      `chmod 555 device`

Where device is the device file shown in the output of the `ls -l cdrom` command.

For floppy device(s):

- For Floppy A, type: `chmod 666 fd0`
- For Floppy B, type: `chmod 666 fd1`

TECH TIP

Icons on Your Win4Lin Windows Desktop

In Win4Lin you have to refresh the desktop or window to see the icons after an application is installed. To refresh the desktop, right click on an empty space on the Windows desktop, then choose Refresh from the menu

---

TECH TIP

Ejecting the CD-ROM

You will need to wait 18 seconds before ejecting the CD-ROM after Win4Lin has accessed it, because Win4Lin Windows and Linux share the CD-ROM device.

TECH ALERT

Incorrect Installation Time

The installation time reported by an application's installation wizard may be incorrect. You should not abort an installation based on this incorrect information.

DirectX

Win4Lin does not support DirectX or DirectDraw at this time.

Printing from the Win4Lin Environment

Printing tasks are handled by the Linux operating system in which Win4Lin is installed. Win4Lin provides the interface between Windows and Linux. Therefore, you will be able to print from the Win4Lin Windows environment if your printer is set up properly for Linux.

TECH ALERT

Be Careful How You Install Your Printer Drivers

Only use the printer installation wizard provided by the printer manufacturer if the procedure described below does not work. Many of these wizards attempt to access your computer hardware. *(For further information about access to computer hardware by Win4Lin, see the section, Devices That Use the Parallel Port, in Chapter 4.)*

The preferred method of printing from the Win4Lin Windows environment is described in the following steps.

1 In Windows, click **Start** -> **Settings** -> **Control Panel**.

2 Double click on the **Printers** icon, then double click on the **Add Printer** icon.

3 Click **Next** until you are presented with a list of printers.

4 Select the correct manufacturer and printer. If the exact model of your printer is not listed, you may need to install the drivers provided for your specific printer. Click **Have Disk** and insert the installation media that came with your printer.
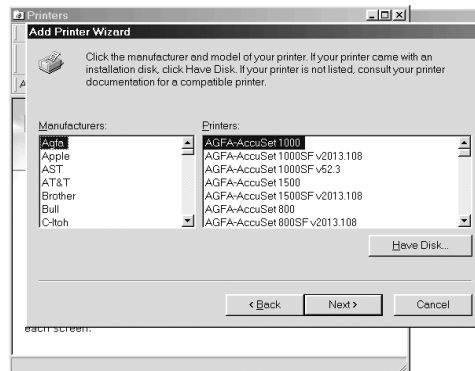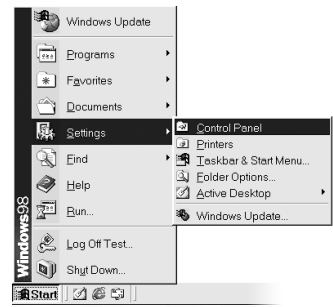
TECH ALERT

Downloading Printer Drivers

If the drivers cannot be found by the Add Printer utility, you may need to download the drivers from the printer manufacturer Web site.

5 From the list of available ports, select **default-raw** to use the default Linux printer and click **Next**.

6 Click **Finish** to complete the installation after checking either **Yes** or **No** to print a test page.

TECH ALERT

Printing Problems

When you install a printer and print a test page, the system will appear to hang for a short period, and then the print request will fail. Just ignore this and click OK when asked if the test page printed correctly. Try printing again from an application. Printing should proceed normally. This type of problem is not unique to Win4Lin but may also be observed on native Windows systems when printing to some types of network printers. If, however, the printed output is not correct, try an alternate configuration by following the above six steps for Printing From the Win4Lin Environment and substituting default for default-raw in step 5.

TECH TIP

Network Printer Setup

If you have VNET networking installed, you have another option for setting up your printer. Any printers accessible through Network Neighborhood can be configured by double-clicking on Network Neighborhood on the Win4Lin Windows desktop and following the instructions.

Sharing Files between Win4Lin Windows and Linux

You can easily share files between your Win4Lin Windows environment and your Linux environment. Files and folders that are created in the Windows environment are automatically visible as files and directories in Linux; files and directories created in the Linux environment are seen as files and folders in Windows.

When you install Windows, the ~/mydata (D:) drive is created, and can be seen in Windows Explorer. In the Linux environment, the ~/mydata (D:) drive is the directory $HOME/mydata. This drive setup allows you to easily share or move files between the Linux environment and your Win4Lin Windows environment.

TECH ALERT

The Windows 98 My Documents Folder

Win4Lin sets up the Linux directory $HOME/mydata/MyDocuments which can be seen in
Windows as D:\MyDocuments and as the My Documents icon on the Windows 98
desktop. For Windows 98 users only, the desktop My Documents folder points to the
D:\MyDocuments directory instead of C:\My Documents directory as in native
Windows.

When working in the Win4Lin Windows desktop, store files you wish to share in the
~ / mydata (D :) drive. When working in Linux, store files you wish to share in
the Linux directory $HOME/mydata.

In Windows:
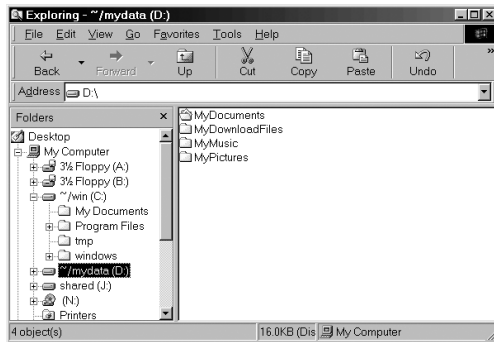
In Linux:
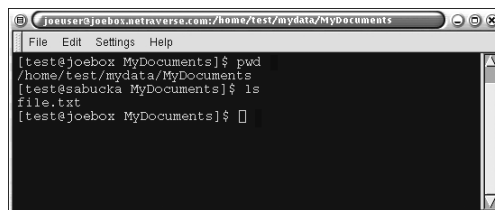
You can create other directories under $HOME/mydata/, such as MyMusic,
MyPictures, and MyDownloadFiles which can also be shared between Linux and
Windows.

TECH TIP

Easy Backup

Making a backup of your data is easy when you store your data files in the Linux directory
$HOME/mydata or the Win4Lin Windows drive ~/mydata (D:). Simply
back up the Linux directory $HOME/mydata or the Windows drive ~/mydata (D:)
using your favorite backup utility.

Sharing Any Linux Directory With Win4Lin Windows

You can link any Linux directory to a Win4Lin Windows drive by following these steps:

1   Open a terminal window and type:

```
winsetup &
```

2   Click on **Personal Win4Lin session configuration: win** and click OK.
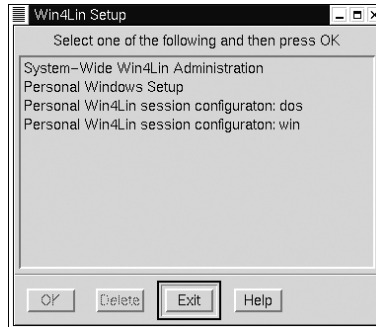
3   Click on **Drives & Filesystems** and click **Add**. Note the drive letter that is being assigned (for example, E:).
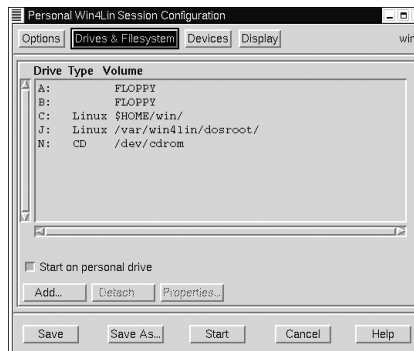
4   In the **Directory** text box, type the full Linux path of Linux directory that you wish to use for sharing files and click OK (i.e., $HOME/directoryname).

5   Click **Save** then click **Exit**.

6   If the directory directoryname does not exist, create this directory with the mkdir command:

```
mkdir directoryname
```

7   Restart your Win4Lin Windows session from the Windows **Start** button.

To Share Files Using the Common Drive:

You can share any file by placing that file in the Linux directory you entered in Step 4 above. When working in Windows, the file will be in the drive assigned in Step 3 above.

Example:

- In Linux:
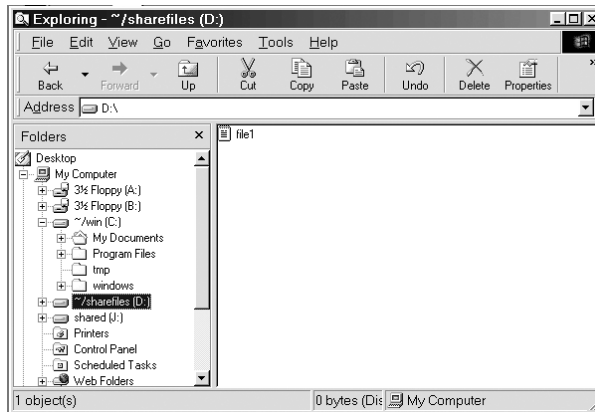
- In Windows:

Virus Protection

Win4Lin installs Windows in a Linux environment, which provides greater virus protection than a stand-alone Windows installation. Many Windows viruses will have no effect on your system.

One way you can help protect yourself from viruses is to make backups of your Win4Lin directories. For example, you can use the following command to make a backup copy of your Win4Lin C: drive (usually $HOME/win):

```
cd $HOME
tar cvfz win.tgz win
```

The result will be a compressed tar archive of your win directory stored in the `win.tgz` file. The following are some examples of the types of Windows viruses that may or may not affect your Win4Lin Windows environment:

Boot Sector or Other Boot Time Viruses

Boot sector and boot time viruses have no effect on Windows under Win4Lin because Win4Lin has no boot sector for Windows. The DOS boot files are read-only and enforced by Linux file access permissions.

Filesystem Related Viruses

Windows uses filesystems called FAT32 and VFAT. Win4Lin installs Windows files on a subdirectory of the Linux Ext2 filesystem. Therefore, any virus that depends on the FAT32 or VFAT filesystem functionality will have no effect.

Executable File Viruses

Windows executable viruses do not affect Linux programs. However, executable file viruses may still affect your Windows environment, but damage should be limited.

Macro Viruses

Most macro viruses don't affect Linux applications, so damage is generally limited to Windows. Macro viruses are still a problem, but you can restrict the damage they cause. Make shared files un-writable by adjusting Linux file permissions.

4

The Win4Lin
System Setup

▶ **Win4Lin Configuration**

▶ **Creating Alternative Configurations**

▶ **Devices**

▶ **3-Wheel Mouse**

▶ **Using a Laptop with Win4Lin**

▶ **Drives**
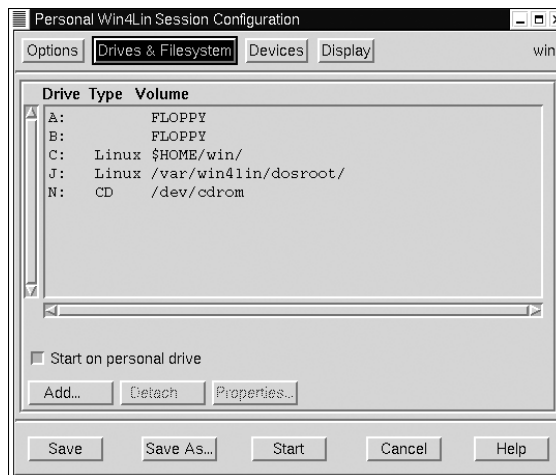
Win4Lin Configuration

Installing Win4Lin on your computer creates a default configuration. This configuration can be modified or customized. Saving these customizations will then allow you to keep the modified configuration as your default.
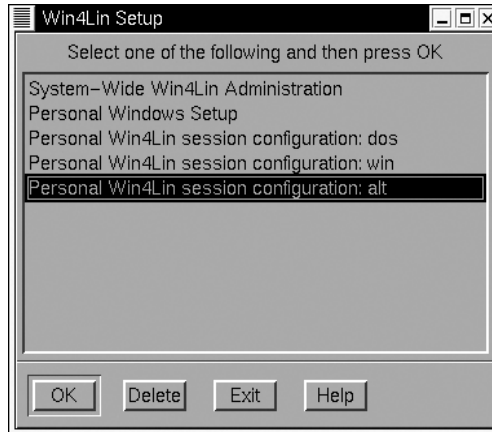
Creating Alternative Configurations

When you customize your Win4Lin configuration, you may not wish to have those customizations incorporated into your default configuration. Therefore, you can create additional environment configurations, which will enable you to run many different kinds of Windows sessions. You can create and name multiple configurations so that, for example, one set of devices is automatically available when you start Windows with one configuration and a different set of devices is available when you start Windows with another configuration.

To Create an Alternative Configuration:

1   After customizing your configuration with the Win4Lin Setup utility, choose **Save As** instead of **Save**.

2 Type the name you've chosen for your custom configuration in the text box of the **Selection** window and click **OK**. The name of your alternative configuration will now appear in the main window of the Win4Lin Setup utility.

```
Win4Lin Setup                                    _ □ ×
        Select one of the following and then press OK
System−Wide Win4Lin Administration
Personal Windows Setup
Personal Win4Lin session configuration: dos
Personal Win4Lin session configuration: win
Personal Win4Lin session configuration: alt




    OK      Delete      Exit      Help
```

To Start an Alternative Configuration:

Start a Win4Lin session with your alternative configuration by typing the following at a shell prompt:

win +kname

Where name is what you called your alternative configuration.

Devices

Win4Lin supports many devices attached to a parallel or COM port. Win4Lin does not support USB ports, as discussed in the USB devices section. You will need to configure Win4Lin to access your peripheral device. You can configure Win4Lin to access a device in one of two ways.

▸ Make access to the device the default configuration for Win4Lin.

▸ Save access to the device as an alternative configuration.

TECH ALERT

Device Access Limitation
A port can only be accessed by processes from one operating environment at a time. Therefore, if the Win4Lin Windows environment is accessing a port, then the Linux environment will not be able to access that port. For this reason, we recommend that you save any device configurations as alternative configurations, and not as your default.

Before you make a peripheral available to Win4Lin sessions, you should be aware of some limitations.

▸ Devices that are highly timing-dependent may fail in the Linux system's multi-tasking environment.

▸ Devices that need to be initialized or reset when the system is rebooted may fail since Windows is not started immediately after the system boots.

▸ Devices that are sensitive to various configuration changes. Changing the environment by adding more users, changing the load, tuning Linux parameters, adding memory or subtracting memory can have unpredictable effects on the operation of the devices.

▸ Devices that use Plug-and-Play with Win4Lin because some device parameters (such as I/O ports) might automatically be changed each time you reboot your computer.

Devices that Use the Serial (COM) Port

The serial (COM) ports can be shared among Linux and Windows processes. However, only processes from one environment, either Linux or Windows, can access a particular serial port at one time. Therefore, devices cannot be used by both Linux and Windows simultaneously.
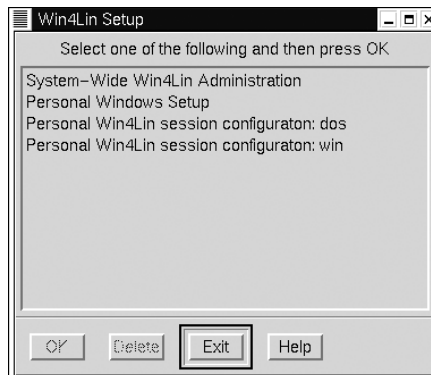
To configure a serial (COM) port for an external device, you will need to:

- • Configure the device in Win4Lin
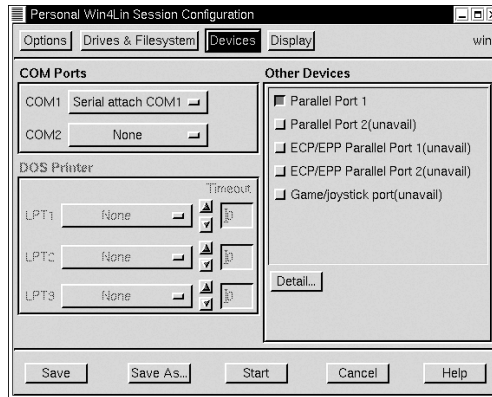- • Install a serial port under Windows

Configure the Device in Win4Lin

1 From a terminal window, type:

```
winsetup &
```

2 Choose **Personal Win4Lin session configuration: win** then click **OK**.

3 Click **Devices**. Under **COM Ports** choose **Serial attach COM1** from the drop down menu next to the **COM1** field. Click **Save** or **Save As** then **Exit**.


TECH ALERT

COM Port Configuration

A COM port should be configured only for the session requiring its use. You should not make the access to a COM port part of your default configuration.

Install a Serial Port under Windows

Now you must install a serial port under Windows. Restart your Win4Lin session and follow the steps below:

4 Click **Start** -> **Settings** -> **Control Panel**.

5 Double click on **Add New Hardware**.

6 Click **Next** until you are presented with a choice to select hardware from a list. Choose this option and click **Next**.

7 Select **Ports [COM & LPT]** from the hardware types list and click **Next**.

8 Select **Communications Port** and click **Next**.

9 Click **Next** then **Finish**.

10 Choose **Yes** to *Do you want to shut down your computer now?*
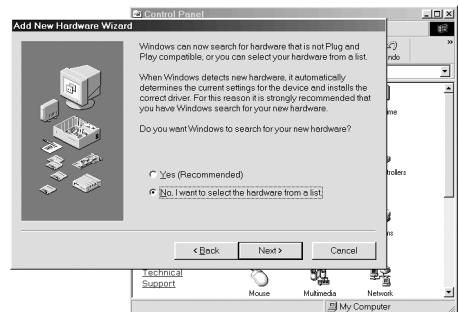
11 Start another Win4Lin session after the current session has completely shut down

---

TECH TIP

Interrupt Request (IRQ) and Input/Output Range (IO) Settings

Check that the IRQ and IO settings are correct:

- COM1: IRQ 4, 3F8-3FF
- COM2: IRQ 3, 2F8-2FF

Check that the IRQ and IO settings are correct by following these steps:

1 Click **Start** -> **Settings** -> **Control Panel**.

2 Double click on the System icon.

3 Click on the Device Manager tab.

4 Click on the plus sign (+) next to Ports.

5 Click on Communications Port (COM 1) then click Properties.

6 Click on the Resources tab in the Communications Port (COM 1) in the Properties window.

7 If the Input/Output settings under the Setting heading are incorrect, then click on the Change Setting... button.

8 Use the Value up or down arrows to select the correct setting and click OK.

9 If you receive the message, *This resource setting cannot be changed,* then sequentially select the Basic configurations from the pull down menu, Settings based on. Repeat Steps 7 and 8 until you are able to change the settings.

TECH TIP

COM Port Access at Startup

You can start a Win4Lin session with COM port access without having to set up the COM port in the Win4Lin Setup utility, by using the +a option:

`win +acom1`

Accessing the COM port in this manner is only temporary. Once you have ended the Win4Lin session, the next time you execute the `win` command without the `+a` option, your default configuration will be active.

TECH ALERT

Device File Permissions

Be sure that the serial port device file in Linux has proper read/execute permissions for the user using Win4Lin, by following these steps:

1 Open a terminal window and become the root user by typing:

**su root**

2 Change the device permissions by typing:

chmod 555 /dev/ttyS0

which will make your serial port accessible to a Win4Lin Windows session.

Syncing a PDA with Win4Lin

To sync your PDA to a Win4Lin session, you will need to use a COM port. Make sure the settings for your Windows COM port and the PDA syncing software are set to **Hardware** control. To set the Windows COM port to **Hardware** control, follow these steps:

1 Click **Start** -> **Settings** -> **Control Panel**.

2 Double click on the **System** control panel.

3 Click on **Device Manager**.
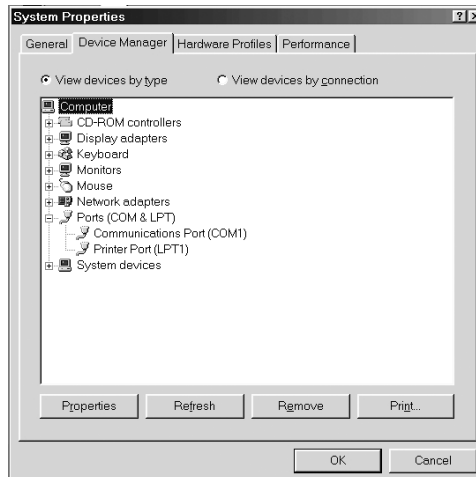
4 Click on the plus sign **(+)** next to **Ports**.

5 Select **Communications Port (COM1)** and click **Properties**. Click on the **Port Settings** tab. Select **Hardware** from the **Flow control** drop down menu.
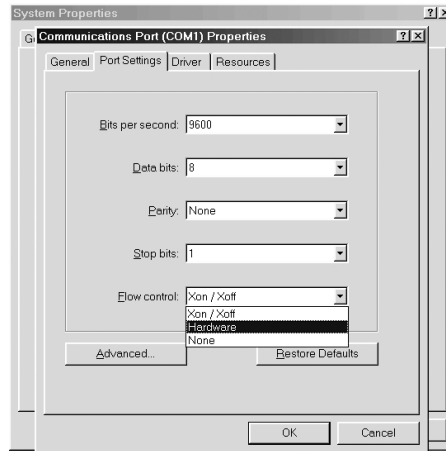
Using a Modem with Win4Lin

You may wish to use a modem in your Win4Lin Windows environment. The modem must be an external modem connected to either serial (COM) port 1 or 2.

Connecting your modem to an ISP requires the VNET networking option. (For more information on VNET, see the section *Configuring the Win4Lin Windows Network* in *Chapter 2 - Using NeTraverse Win4Lin*.)

USB Devices

USB support is limited to keyboard, mouse, display, sound, printer, floppy, CD-ROM, and hard disks via the Linux drivers for these devices. Other common USB devices which are not currently supported in Win4Lin are scanners, digital cameras, sync devices for handhelds, and MP3 players. These devices may be supported by Linux; however, Win4Lin will not recognize these as USB devices.

Devices that Use the Parallel Port

You may wish to use devices that require attachment to the parallel port. Using the parallel port in Win4Lin requires an extended setup procedure consisting of four phases:

‣ Determining the address and mode of your parallel port
‣ Making the parallel port accessible to all users
‣ Setting up the parallel port in your Win4Lin configuration
‣ Installing the Windows parallel port drivers

Determining the Address and Mode of Your Parallel Port

Your computer system BIOS setup utility typically sets a parallel port to one of three modes: standard, ECP and EPP.

A parallel port device may require a specific mode setting. If you need to change the settings of your parallel port, consult your computer hardware documentation. Changing these settings will involve altering the configuration of your system BIOS.

In most Linux distributions, to find the address and mode of your parallel port, open a terminal window and type the following (this example is for parallel port 1):

```
cd /proc/parport/0
cat hardware
```

The output of the previous command will be similar to the following:

```
base:        0x378
irq:         none
dma:         none
modes:       SPP
```

where, base is the address and modes indicates the mode of your parallel port.

If you receive the error message No such file or directory then your parallel port is not setup in your Linux environment. Consult your Linux documentation to properly setup your parallel port.

Win4Lin defines four tokens, associated with the parallel port modes, which are used in the Win4Lin configuration of the parallel port.

- Standard Parallel Port 1 (token name **lpx1**)
- Standard Parallel Port 2 (token name **lpx2**)
- ECP/EPP Parallel Port 1 (token name **ecp1**)
- ECP/EPP Parallel Port 2 (token name **ecp2**)

TECH TIP

Win4Lin Does Not Support DMA

The use of an ECP mode parallel port may require DMA support, which is not supported by Win4Lin.

Making the Parallel Port Accessible to All Users

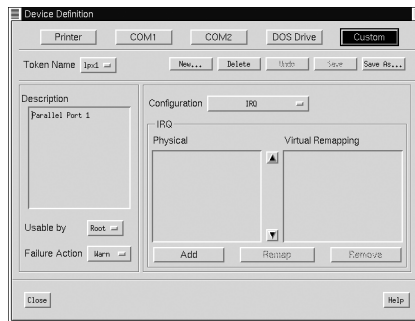**1** Open a terminal window and log in as root by typing:

```
xhost +localhost
```

```
su - root
```

2   Type:

```
winsetup &
```

3   Choose **System-Wide Win4Lin Administration** and click **OK**.

4   Click **View/Create/Modify Device Definitions**.

5   Click **Custom**.

6   From the **Token Name** drop down menu, select the token name that is associated with the mode of your parallel port.

7   Be sure that **Usable by** is set to **All**.

8   Click **Save, Close, Close,** and **Exit**.

Setting Up the Parallel Port in Your Win4Lin Configuration

1   From within a terminal window, type:

```
winsetup &
```

2 Click **Personal Win4Lin session configuration: win** then click **OK**.
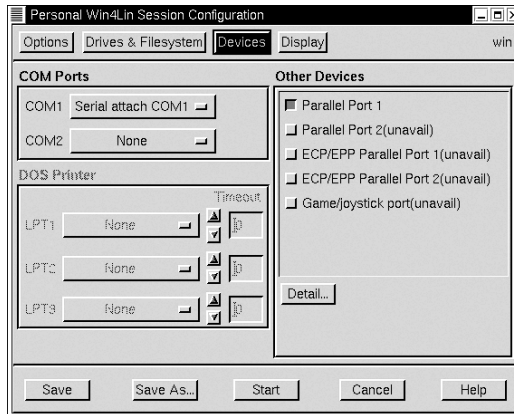
3 Click **Devices**.

4 In the **Other Devices** section, click the token name that is associated with the mode of your parallel port.

5 Click **Save** then **Exit**.

TECH TIP

Parallel Port Access at Startup

You can start a Win4Lin session with parallel port access without having to set up the parallel port in your Win4Lin configuration. Use the +a option with the win command (using lpx1 as an example):

```
win +alpx1
```

Accessing the parallel port with the +a option is only temporary. Once you have ended the Win4Lin session that was started with the +a option, your default configuration will be active for your next session.

Installing the Windows Parallel Port Drivers

These steps may vary with different versions of Windows.

1 In Windows, click **Start** -> **Settings** -> **Control Panel**

2 Double click on the **Add New Hardware** icon.

3 In the **Add New Hardware Wizard** window, click **Next** until you are presented with the question, *Do you want Windows to search for your new hardware?*
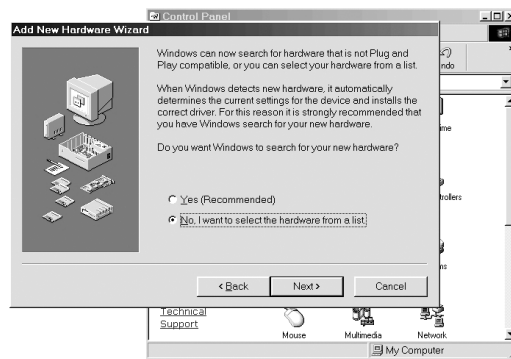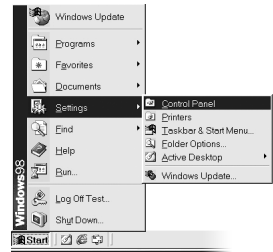
4 Select **No, I want to select the hardware from a list**. Then click **Next**.

5 In the list, Hardware types:, select the entry **Ports (COM & LPT)** then click **Next**.

6 Referring to the information about your parallel port, which you determined in the section, *Determining the Address and Mode of Your Parallel Port,* select **ECP Printer Port** or **Printer Port** in the list of models, then click **Next**.

7 The port settings may be displayed under Settings. Confirm that these settings are as follows:

- Parallel port 1: 0378 - 037A

- Parallel port 2: 0278 - 027A

If these settings are incorrect, then you will need to change them after the drivers are installed.

8 Click **Next**, then click **Finish**.

9 The drivers will install and you will be asked *Do you want to shut down the computer now?* If the parallel port values were correct, click **Yes**.

This completes the parallel port setup procedure, and you can now use your parallel port device. If the parallel port values were incorrect, click **No** and follow the steps below.

1   In the **Control Panel** window, double click on the **System** icon.

2   Click on the **Device Manager** tab.
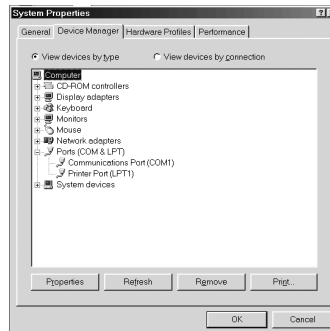
3   You may need to click on the plus sign **(+)** next to **Ports** to see your printer port entry.

4   Select the parallel port that you installed in Step 5 of this section *(Installing the Windows Parallel Port Drivers)* then click **Properties**.

5   Click on the **Resources** tab in the **Printer Port Properties** window.
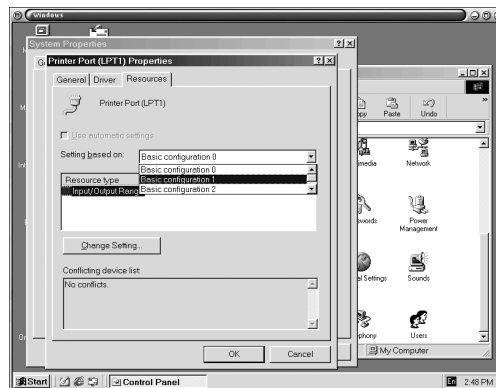
6   If the **Input/Output** settings under the Setting heading are incorrect, then click on the **Change Setting...** button.

7   Use the Value **up** or **down** arrows to select the correct setting and click **OK**. If you receive the message, this resource setting cannot be changed, then sequentially select the **Basic** configurations from the pull down menu, **Settings based on**, and repeat Steps 6 and 7 until you are able to change the settings.

TECH ALERT

Printer Configurations

Do NOT use the steps above to configure your printer in Win4Lin. Accessing your printer in Win4Lin via the parallel port will prevent the Linux system from using the printer. *(Refer to the section, Printing From the Win4Lin Windows Environment in Chapter 3 - Working in the Win4Lin Environment, for the preferred method of printer setup.)*

TECH ALERT

Dongle-protected Software

The parallel port can run in bi-directional mode, allowing you to run dongle-protected software. Note, however, that parallel port DMA and interrupts are not supported by Win4Lin 3.0.

Wheel Mouse

Although the wheel mouse is not supported by Win4Lin 3.0, the popular Linux driver, **imwheel**, will provide some functionality.

Using a Laptop with Win4Lin

Most laptop computers have proprietary, non-standard chipsets for the sound cards and video cards. If a Linux kernel works well with these components, then the Win4Lin-enabled kernel will work as well.

Kernel 2.2.x does not contain the source code for PCMCIA support; PCMCIA support must be patched from separate code. Once the patch is applied, then the PCMCIA cards should work. To determine whether your distribution source code includes PCMCIA support, you can issue these commands:

```
cd /usr/src
find | grep pcmcia
```

All Win4Lin-enabled kernels include PCMCIA support. Most PCMCIA network cards should work with the Win4Lin-enabled kernel. Given the vast number of PCMCIA devices, it is not possible for NeTraverse to test them all.

Drives

Win4Lin allows you to modify your system drives. With these modifications, you can access Linux directories and native Windows partitions as virtual hard drives in your Win4Lin Windows environment.

The Win4Lin Default Drives Configuration

Floppy Drive(s)

Win4Lin automatically makes floppy drive(s) available as A and B.

Hard Drive Setup

Win4Lin configures several virtual hard drives on your existing physical hard drive.

Drive C: The personal applications drive

On a conventional personal computer running Windows, you typically install Windows, your applications, and store your data files on the `C:` drive. Win4Lin provides a drive called `~/win(C:)` which functions the same as the Windows `C:` drive.

When you install a personal Win4Lin session, a directory is created in the Linux filesystem under your personal home directory, usually $HOME/win. This directory is the Win4Lin `~/win(C:)` drive. We recommend that you install your Windows applications on the `~/win(C:)` drive and store your data on the `~/mydata(D:)` drive.

Drive D: The personal data drive

The `~/mydata(D:)` drive in the Win4Lin Windows environment provides access to the Linux directory `$HOME/mydata`. This drive setup provides an easy place to share or move files between the Linux environment and your Win4Lin Windows environment.

When you install Windows, the directories `$HOME/mydata` and `$HOME/mydata/ MyDocuments` are automatically created in your Linux file system.

For Windows 98 users, the desktop My Documents folder points to this new `D:\MyDocuments` directory instead of `C:\`My Documents directory.

Drive J: The shared drive

Drive J is designated as the shared drive, for sharing files with other users who have set up Win4Lin sessions on the same computer.

Drive J contains the subdirectories `J:\share` and `J:\tmp`. By default, the Win4Lin Windows drive `J:\tmp` is the same directory as the Linux directory `/var/tmp`. Files in `/var/tmp` may be automatically and periodically deleted, so only temporary files should be placed in `J:\tmp`.

Drive N: The CD-ROM drive

For Win4Lin Windows sessions, the first CD-ROM drive is automatically set up to be accessible as drive `N:`.

# Configuring a Linux Directory as a Windows Drive

Win4Lin shows the Linux directories and associated files (collectively called a Linux filesystem) as drive letters in Windows. For example, your Win4Lin Windows `~/win(C:)` drive is your Linux directory $HOME/win.

You can configure Win4Lin to recognize any Linux directory as a drive letter in Windows by following these steps:
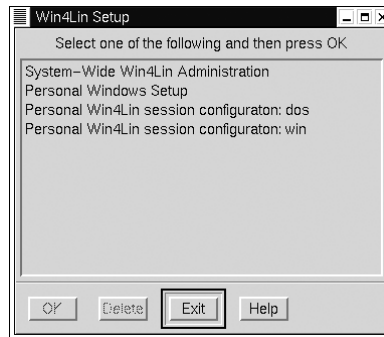
1   Open a terminal window and type:

   winsetup &

2   Click on **Personal Win4Lin session configuration: win** and click **OK**.

3   Click on **Drives & Filesystems** and click **Add**.
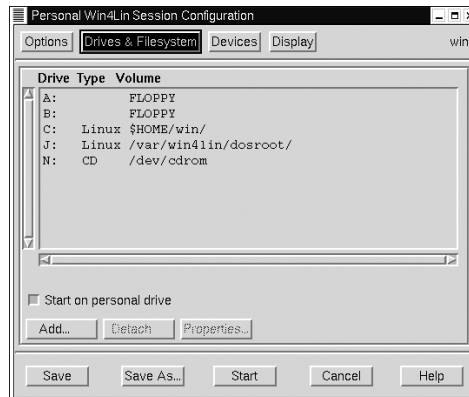
4   Type the full Linux path of the directory you would like to add and click **OK**.

5   Click **Save** then click **Exit**.

Customizing Drive Labels

Win4Lin allows you to customize the names of your drives which map to the Linux filesystem. The way you do this is different from the standard Windows approach to customizing drive labels.

Follow these steps to customize a drive label. In this example, the Win4Lin Windows C: drive, labeled by default ~/win(C:), will be changed to MyLabel(C:).

1. Open a terminal window.

2. Change to the root directory which corresponds to the Windows drive you wish to customize.

   cd $HOME/win

3. Type:

   mkdir -p .labeldosdrive

4. Type:

   cd .labeldosdrive

5. If you have customized this drive's label before, remove the old label. You can determine an existing drive label by typing:

   ls

   If the ls command displays any names, remove those names.

6. Type:

   touch MyLabel

   Where MyLabel is the name you've given the drive.

> **TECH ALERT**
>
> Custom Drive Label Limitations
> Windows 95 restricts the label to 11 characters.

7. Restart your Win4Lin Windows session.

Accessing the Windows Partition of a Dual Boot System

In a dual boot system, you may want to access files in your native Windows environment from Win4Lin Windows. Win4Lin recognizes all physical Windows VFAT and FAT32 partitions that exist on your system and creates a token name for each partition. The tokens are named **dosc** and **dosd** to correspond to the native Windows C and native Windows D partitions, respectively.
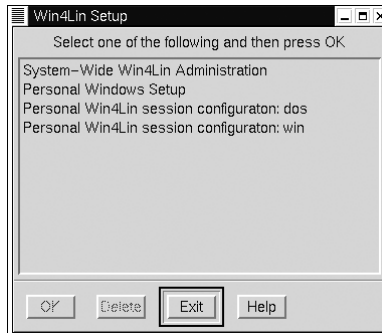
Before you can access tokens, they must be made accessible to all users:

1. Open a terminal window and log in as the root user by typing:

   xhost +localhost
   su root

2   Type:

```
winsetup &
```


3   Choose **System-Wide Win4Lin Administration**, then click **OK**.
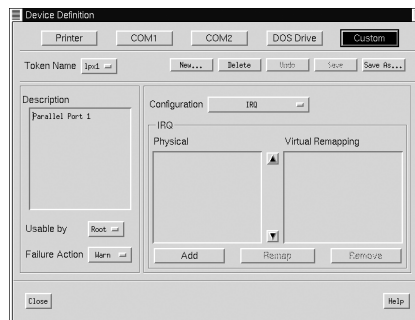
4   Click **View/Create/Modify Device Definitions**.

5   Click **DOS Drive**.

6   Click the drop down menu next to **Token Name** and choose the DOS drive you wish to make accessible to all users.

7   Click the drop down menu next to **Usable by** and select **All**.

8   Click **Save**, then **Close**, **Close** again, then **Exit**.

Set Up the Token(s) in Your Win4Lin Configuration.

9   From a terminal window, type:

```
winsetup &
```

10   Click on **Personal Win4Lin configuration: win** and click **OK**.

11   Click **Drives & Filesystems**.

12   Click **Add**. Note the drive letter that will be assigned to the token.

13   Click **DOS Drive**.

14   Choose the token which corresponds to the Windows partition you wish to access.

15   Click **OK**, **Save**, then **Exit**.

16   Restart your Win4Lin Windows session.

You can now access files on your native Windows partition from within Win4Lin Windows by browsing to the drive letter in step 4 above.

Adding an Additional CD-ROM Drive to Win4Lin

By default, Win4Lin provides access to one CD-ROM drive. You must configure Win4Lin for access to more than one CD-ROM by following these steps.

1   Open a terminal window and type:

```
winsetup &
```

2   Click on **Personal Win4Lin session configuration: win** and click **OK**.

3   Click on **Drives & Filesystems** and click **Add**.
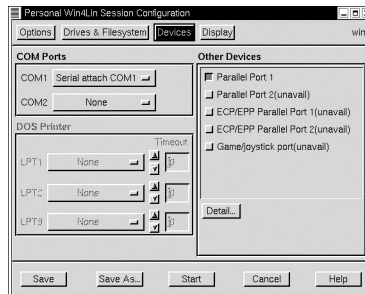
4   Choose **CD-ROM**.

5   In the drop down menu labeled **Devices** choose the path of your second **CD-ROM**.

6   If your second CD-ROM is not listed, choose **Other**.

7   Determine the path of the second CD-ROM, by typing:

```
ls -l /dev/cdrom*
```

This command will show all links to the CD-ROM drives on your system. Your first CD-ROM drive is /dev/cdrom. If you have set up another drive, the link to the second drive will be reported as /dev/cdromX, where X is a

number. Type in the full Linux path of the device file link of the CD-ROM drive (e.g., `/dev/cdrom1`) and click **OK**.

8   Click **Save** then click **Exit**.

Detaching a Drive from Win4Lin

Follow these steps to detach a drive from your Win4Lin configuration:

1   Open a terminal and type

    winsetup &
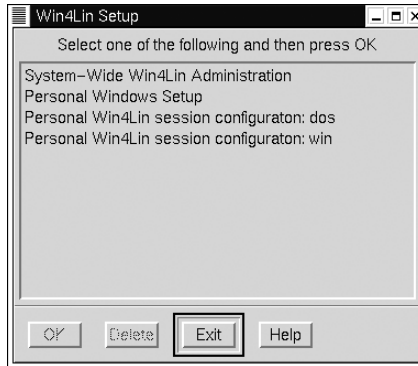
2   Click on **Personal Win4Lin session configuration: win** and click **OK**.

3   Click on **Drives & Filesystems**.
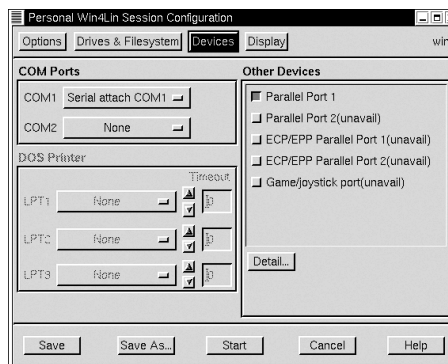
4   Select the drive you wish to detach from the list and click **Detach**.

5   Click **Save** then click **Exit**.

5

Support for
NeTraverse Win4Lin

▶   Contact NeTraverse Support

Contact NeTraverse Support

Find the support you need, the latest product information, and on-line documentation at our Web site, www.netraverse.com.

When you have a question or a problem, check the support section of the NeTraverse Web site for help. Your question may have been asked before, and we already have an answer on our site.

If you have further questions, contact NeTraverse support. You can use the customer support form at the Ask a Question section of our Web site, or E-mail us at support@netraverse.com.

When submitting a problem, attach the output of the support.sh script to your E-mail or the form.

1   Type the following commands:

```
su - root
cd /opt/win4lin/bin
sh support.sh > /tmp/support_log.txt
```

2   Send the support_log.txt file from your /tmp directory as an attachment to your E-mail message, not in the body of the text.

Win4Lin-Enabled Kernels

▶ Enabling a Pre-Patched Generic Kernel

▶ Patching to Enable Your Distribution Kernel Source

Win4Lin-Enabled Kernels

The Win4Lin-enabled kernel provides the interface between the Win4Lin application, Windows, and Linux. Win4Lin requires a number of enhancements to the standard Linux kernel in order to function.

Installing a Win4Lin-enabled kernel on your computer does not modify or affect your current kernel in any way. For an in-depth discussion of kernels, see http://linuxdocs.org/HOWTOs/Kernel-HOWTO.html

> **WARNING**
>
> **Kernel Configuration is for Experts Only!**
>
> Kernel configuration is not for the novice Linux user. If done incorrectly your system could be totally disabled. Kernel configuration is an involved and complex process. The instructions in this appendix are intended for the Linux expert only
>
> **Do NOT modify your kernel if:**
> - You have not previously modified a kernel.
> - You have never built a kernel.
> - You are uncomfortable with this level of system configuration.

You can obtain a Win4Lin-enabled kernel in three ways:

- **Install a pre-compiled kernel RPM**
  NeTraverse provides pre-compiled kernels, called the Win4Lin-enabled kernels, for each supported Linux distribution. During installation, the Win4Lin software installs a pre-compiled Win4Lin- enabled kernel into your Linux system. *(See the discussion in Chapter 1 - Installing Win4Lin.)*

- **Use a Pre-Patched Generic Kernel**
  NeTraverse provides pre-patched kernel sources that can be configured and compiled in the event that your distribution is not currently supported by Win4Lin. *(See the discussion below in Enabling a Pre-Patched Generic Kernel for Win4Lin.)*

- **Patch Your Kernel**
  NeTraverse provides patches for manually building a new kernel in the event that you have modified the default distribution kernel. NeTraverse will release patches for new supported distributions and kernel versions after the distributions are released. *(See the discussion below in Patching to Enable your Distribution Kernel Source for Win4Lin.)*

Enabling a Pre-Patched Generic Kernel for Win4Lin

You will need a generic Win4Lin-enabled kernel if:

‣ Win4Lin does not support your Linux distribution

　　or

‣ The Win4Lin supported distribution that you use has installed modified modules (because of a special hardware configuration) that are not compatible with one of the NeTraverse pre-compiled kernels.

Pre-patched generic kernels are available on the Win4Lin CD and on the NeTraverse Web site. The most current kernels can always be found online at the NeTraverse Web site. The generic kernels from NeTraverse have been modified, providing the functionality to run Win4Lin after configuring and compiling.

Enabling a NeTraverse supplied pre-patched generic kernel for Win4Lin requires four steps:

‣ Extracting the Pre-Patched Source
‣ Configuring the Kernel Source Code
‣ Compiling the Kernel Source Code
‣ Installing the Win4Lin-Enabled Kernel

Extracting the Pre-Patched Source

1　Copy the generic kernel source from the CD directory `LINUX/ PREPATCHED` into your home directory. Alternatively, you can download the generic kernel source from the NeTraverse Web site (www.netraverse.com).

```
cp kernelname $HOME
```

Where kernelname is the name of the generic kernel you are downloading. Example: `cp linux-win4lin-2.2.18.tar.gz $HOME`

2　Change to your home directory by typing:

```
cd
```

3　Extract the kernel files:

```
tar -xzvf kernelname
```

Extracting the kernel files will create a new subdirectory. Example: `tar - xzvf linux-win4lin-2.2.18.tar.gz` will create the subdirectory `linux-win4lin-2.2.18.4`.

4　Enter the new subdirectory by typing:

```
cd directoryname
```

Where *directoryname* is the name of the subdirectory created in Step 3.

Configuring the Kernel Source Code

You will now need to configure the kernel source code by following following these steps:

5   Open a terminal window and become the root user by typing:

```
su root
```

6   Type the command:

```
make menuconfig
```

The make menuconfig command generates a text-based menu that can be used to configure the kernel. Use the UP and DOWN arrow keys to navigate through the menu. To move into a submenu, press the ENTER key. You can check and uncheck items using the SPACE bar. Use the TAB key or the right and left arrow keys to switch between Select, Exit, and Help at the bottom of the menu. Once you are in a submenu, you can go back to the main menu by choosing **Exit**.

If you are running an X session you can use the command **make xconfig** instead of **make menuconfig**, which will access a graphical user interface configuration tool.

7   In addition to your system specific configurations, you must make the following configuration settings in order for your kernel to work properly with Win4Lin.

- Kernel versions 2.2.12 and newer can support memory configurations greater than 1 GB. However, Win4Lin requires memory configuration to be no greater than 1 GB. Therefore, under **Processor type and features**, be sure that **Maximum Physical Memory** is set to 1GB. Selecting 1GB creates the entry CONFIG_1GB=y in the .config file.

- Be sure the ISO 9660 CD-ROM filesystem support is enabled in your new kernel configuration so that Windows can be installed from a CD-ROM. This option is found under the Filesystems submenu.

- Be sure an asterisk (*) is next to **Include NeTraverse Win4Lin Support** under the Windows Application Support menu. If an asterisk is not present, press the SPACE bar once. The entry CONFIG_MKI=y will be created in your .config file.

- Once you have fully customized your kernel, **Exit** from the configuration tool.

- Choose **Yes** to save the current configuration.

Compiling the Kernel Source

Modifying a kernel requires that you compile the source code with the following sequence of commands. Your system must complete execution of each command before you can enter the next command:

```
make dep
make clean
make bzImage
make modules
make modules_install
```

Installing the Win4Lin-Enabled Kernel

Install the compiled Win4Lin-enabled kernel as the final step before installing Win4Lin by following these steps:

1 Copy the compiled Win4Lin-enabled kernel into your boot directory by typing:

```
cp ./arch/i386/boot/bzImage /boot/win4lin
```

2 Add the following lines to the end of the /etc/lilo.conf file, using your favorite text editor:

```
image = /boot/win4lin
label = win4lin
root = /dev/hda1
```

TECH ALERT

> **Be Consistent With Your System Configuration**
>
> If your root partition is not /dev/hda1, you should change the line
>
> root = /dev/hda1 in the /etc/lilo.conf file accordingly. In a default Linux installation, the root partition of your Win4Lin-enabled kernel, indicated by label=win4lin, should be the same as the root partition of your Linux kernel, indicated by label=linux.

3 Execute this command to apply your configuration changes:

```
/sbin/lilo
```

4 Reboot your system to load your new Win4Lin-enabled kernel by typing:

```
/sbin/init 6
```

5 Once the computer shuts down properly and begins to reboot, you will see a LILO prompt. At this prompt, boot the Win4Lin enabled kernel by typing:

```
win4lin
```

6 Confirm that your Win4Lin-enabled kernel has compiled properly by typing:

```
grep mki_install_hook /proc/ksyms
```

If your system does not respond to the command, then your kernel did not compile correctly. However, if the Win4Lin-enabled kernel compiled properly, the following message will be displayed:

```
c010e4d0 mki_install_hook
```

Where c010e4d0 is a memory address that varies from system to system.

7 You may wish to make your Win4Lin-enabled kernel the default kernel so that you do not have to type win4lin at the LILO prompt every time you boot your computer. To make the Win4Lin-enabled kernel the default kernel, open the file /etc/lilo.conf as the root user.

- Change the default kernel line from default=linux to default=win4lin
- Save the /etc/lilo.conf file
- Change your system boot default by typing:

  /sbin/lilo

TECH ALERT

Identify Your Default Kernel

The output of the /sbin/lilo command displays all the kernels that are defined in the /etc/lilo.conf file. The default kernel is marked iwth an asterisk (*).

STOP

Stop

Once you have successfully configured, compiled, and booted your Win4Lin-enabled kernel, you may install Win4Lin. *(See Chapter 1- Installing Win4Lin Desktop for information about preparing your system to install Win4Lin.)*

If you encounter any problems while configuring and rebuilding your kernel, contact NeTraverse support for additional assistance (www.netraverse.com).

Patching to Enable Your Distribution Kernel Source for Win4Lin

You can enable your existing kernel for Win4Lin installation through a process called patching. If you are running a supported distribution and you have customized your kernel, you can patch your kernel to run Win4Lin. Patching your kernel will allow you to use Win4Lin without losing the special functionality of your customized kernel.

In some cases your kernel may have been modified during the installation of Linux because of a unique hardware configuration and cannot be patched with one of the NeTraverse distribution patches. In this situation, we recommend that you configure and compile one of the pre-patched generic kernels supplied by NeTraverse. (This is discussed in the previous section, *Enabling a Pre-Patched Generic Kernel for Win4Lin.*)

Patching to enable your distribution kernel source for Win4Lin requires four steps:

▸ Patching Your Kernel Source.
▸ Configuring the Kernel Source Code.
▸ Compiling the Kernel Source Code.
▸ Installing the Win4Lin-Enabled Kernel.

Patching Your Kernel Source

When you patch a kernel, you modify the source code by adding or deleting lines of code according to the changes specified in a patch file.

1 You will need to obtain the correct patch file from the Win4Lin CD in the `LINUX/PATCH` directory or from the NeTraverse Web site, www.netraverse.com.

2 Copy the patch file into your $HOME directory. You will need to select the patch that matches your distribution, version, and kernel number. Please read the information about patches on the Web site carefully. Important information is provided regarding patch selection.

3 Copy the kernel source directory into your home directory by using these three commands:

```
cd $HOME
mkdir patched-linux
cp -av /usr/src/linux/* patched-linux
```

TECH ALERT

Disk Space Requirements for the Kernel Source

Building a kernel requires approximately 100 MB of hard disk space. You should copy the kernel source directory into a directory that has at least that amount of space available. The home directory is usually a good choice. Do not use /tmp or /root, as these directories usually have limited space available.

4   Copy the patch file into the patched-linux directory you created in Step 2:

```
cp patchname patched-linux
```

Where patchname represents the name of the patch you will be using. For example, if you were running a modified Red Hat 7.0, 2.2.17 kernel, you would have used the corresponding patch and the command would be:

```
cp Kernel-Win4Lin2-RedHat7.0_2.2.17.14-1.patch patched-linux
```

5   Apply the patch by typing these commands:

```
su root
cd patched-linux
patch -p1 < patchname >& 2>& patch.log
```

6   Check the file patch.log for errors using the following command:

```
less patch.log
```

If patch.log reports errors, you may not be able to install Win4Lin. If no errors are reported, you have successfully patched your kernel, and will be able to install Win4Lin.

TECH ALERT

Patching Errors

The patch.log file message HUNK FAILED means that specific code lines of the file being patched differ from what the patch program expected to find. If you receive this message, you cannot proceed in the build process until the changes specified by the HUNK FAILED message are applied to the kernel source. You can make these changes either by obtaining a new patch or by implementing the changes in the kernel source.

Configuring the Kernel Source Code

You will now need to configure the kernel by following these steps:

1   Become the root user by typing:

```
su root
```

2 Type the following sequence of commands. Your system must complete execution of each command before you can enter the next command:

```
make clean
make distclean
make mrproper
make menuconfig
```

The make menuconfig command generates a text-based menu that can be used to configure the kernel. Use the UP and DOWN arrow keys to navigate through the menu. To move into a submenu, press the ENTER key. You can check and uncheck items using the SPACE bar. Use the TAB key or the RIGHT and LEFT arrow keys to switch between **Select**, **Exit**, and **Help** at the bottom of the menu. Once you are in a submenu, you can go back to the main menu by choosing **Exit**.

If you are running an X Window System session you can use the command **make xconfig** instead of **make menuconfig**, which will create a GUI based configuration tool.

3 In addition to your system specific configurations, you must make the following configuration settings in order for your kernel to work properly with Win4Lin.

- Kernel versions 2.2.12 and newer can support memory configurations greater than 1 GB. However, Win4Lin requires memory configuration to be no greater than 1 GB. Therefore, under **Processor type and features**, be sure that **Maximum Physical Memory** is set to 1GB. Selecting 1GB creates the entry CONFIG_1GB=y in the `.config` file.

- Be sure the **ISO 9660 CD-ROM filesystem support** is enabled in your new kernel configuration so that Windows can be installed from a CD-ROM. This option is found under the **Filesystems** submenu.

- Be sure an asterisk (*) is next to **Include NeTraverse Win4Lin Support** under the Windows Application Support menu. If an asterisk is not present, press the SPACE bar once. The entry CONFIG_MKI=y will be created in your .config file.

- Once you have fully customized your kernel, **Exit** from the configuration tool.

- Choose **Yes** to save the current configuration.

Compiling the Kernel Source

Modifying a kernel requires that you compile the source code with the following sequence of commands. Your system must complete execution of each command before your can enter the next command:

```
make dep
make clean
make bzImage
make modules
make modules_install
```

These commands complete the process of creating a Win4Lin-enabled kernel and the modules necessary for installing Win4Lin.

Installing the Win4Lin-Enabled Kernel

Install the compiled Win4Lin-enabled kernel as the final step before installing Win4Lin by following these steps:

1   Copy the compiled Win4Lin-enabled kernel into your boot directory by typing:

```
cp ./arch/i386/boot/bzImage /boot/win4lin
```

2   Add the following lines to the end of the /etc/lilo.conf file, using your favorite text editor:

```
image = /boot/win4lin
label = win4lin
root = /dev/hda1
```

TECH TIP

> **Be Consistent with Your System Configuration**
>
> If your root partition is not /dev/hda1, you should change the line
>
> root = /dev/hda1 in the /etc/lilo.conf file accordingly. In a default Linux installation, the root partition of your Win4Lin-enabled kernel, indicated by label=win4lin, should be the same as the root partition of your Linux kernel, indicated by label=linux.

3   Execute this command to apply your configuration changes:

```
/sbin/lilo
```

4   Reboot your system to load your new Win4Lin-enabled kernel by typing:

```
/sbin/init 6
```

5   Once the computer shuts down properly and begins to reboot, you will see a LILO prompt. At this prompt, boot the Win4Lin-enabled kernel by typing:

```
win4lin
```

6 Confirm that your Win4Lin-enabled kernel has compiled properly by typing:

```
grep mki_install_hook /proc/ksyms
```

If your system does not respond to the command, then your kernel did not compile correctly. However, if the Win4Lin-enabled kernel compiled properly, the following message will be displayed:

```
c010e4d0 mki_install_hook
```

Where c010e4d0 is a memory address which will vary from system to system.

7 You may wish to make your Win4Lin-enabled kernel the default kernel so that you do not have to type win4lin at the LILO prompt every time you boot your computer. To make the Win4Lin-enabled kernel the default kernel, open the file /etc/lilo.conf as the root user.

- Change the default kernel line from

   default=linux to **default=win4lin**

- Save the /etc/lilo.conf file.

- Type the following command to change your system boot default:

   /sbin/lilo

TECH ALERT

Identify Your Default Kernel

The output of the **/sbin/lilo** command displays all the kernels that are defined in the /etc/lilo.conf file. The default kernel is marked with an asterisk (*).

STOP

Stop

Once you have successfully configured, compiled, and booted your Win4Lin-enabled kernel, you may install Win4Lin using the Win4Lin graphical installer. (See Chapter 1- Installation, for information about preparing your system to install Win4Lin.)

If you encounter any problems while configuring and rebuilding your kernel, contact NeTraverse support for additional assistance (www.netraverse.com).

APPENDIX B

Installation Troubleshooting

▶ **Manually Enabling BackingStore**

▶ **Manually Disabling CD Automounting**

▶ **Manually Removing Win4Lin Components**

Manually Enabling BackingStore

When using Win4Lin, your display performance is affected by an X server setting called backingstore. In many distributions this setting is turned off by default, and should be turned on when using Win4Lin. In most cases the Win4Lin graphical installer can automatically enable this setting.

If during installation you see a message indicating that the installer cannot enable BackingStore, you should enable it by updating your XFree86 configuration file. Your XFree86 configuration file is located in `/etc/X11`. Version 4 of XFree86 uses a configuration file named `XF86Config-4`. Earlier versions of XFree86 use a file named `XF86Config`. Follow these steps to make the required changes:

1   Open a terminal window, and become root user by typing:

```
su - root
```

2   Locate your XFree86 configuration file:

```
cd /etc/X11
ls
```

If you see a file listed with the name XF86Config-4, you are using Version 4 of XFree86, and you should make the required changes in this file. If no file with this name is listed, then you are using an earlier version of XFree86, and you should makes the changes in the file named XF86Config. (If you see both files listed, select the newer file: XF86Config-4.)

3   Make a backup copy of your XFree86 configuration file:

```
cp XF86Config-4 XF86Config-4.copy
```

or

```
cp XF86Config XF86Config.copy
```

4   Use the text editor of your choice to open the file, and look for a block of text that begins with the words Section "Device" which looks similar to this:

```
Section        "Device"
# no known options
Identifier    "ATI Rage Mobility M4 AGP"
Driver        "r128"
VendorName    "ATI Rage Mobility M4 AGP"
BoardName      "ATI Rage Mobility M4 AGP"
#BusID
EndSection
```

Note that the details of the "Device" section of your configuration file will vary according to the make and model of your display device (e.g., CRT or LCD), thus what you see in this section of your file will look somewhat different from the example.

5 Add a line just before the last line of the block to turn on the backing store option so that the text now looks like this:

```
Section        "Device"
# no known options
Identifier     "ATI Rage Mobility M4 AGP"
Driver         "r128"
VendorName     "ATI Rage Mobility M4 AGP"
BoardName      "ATI Rage Mobility M4 AGP"
#BusID
Option "backingstore"
EndSection
```

6 Check to see if there are additional Section "Device" text blocks in your file, and update any you find in the same way (i.e., adding the Option "backingstore" line just ahead of the last line in the block). There should be one such block for each display on your system.

7 Save the file, log out of your current X session, and log back in. (Changes made to the XFree86 configuration file take effect at the beginning of the next X session.)

8 You can check to see if the change you made has taken effect as follows:

```
xdpyinfo | grep back
```

The output from this command will indicate whether the backing store option is on or off. If the backing store option is not set to on, you should check to see that the changes you made to your XFree86 configuration file were done exactly as specified above.

Manually Disabling CD Automounting

The GNOME and KDE graphical desktop environments are frequently configured to automatically mount your CD-ROM drive when you insert a CD so that you can access the CD immediately without having to type a command or press a button. This behavior is usually very convenient, but it interferes with the Win4Lin installation process. Even if you are not using GNOME or KDE, your system may be enabling automounting of CDs using other software. In most cases the Win4Lin graphical installer can

automatically disable auto mounting during installation. In a few situations, you may need to disable automounting manually before beginning the installation process.

Disabling CD Automounting in GNOME

If you are using the GNOME desktop environment, perform the following steps to ensure that CD automounting is turned off:

1 Click on the foot icon in the GNOME Panel.

2 Choose **Programs** -> **Settings** -> **Peripherals** -> **CD Properties** from the menus that appear. (Note: If you cannot find **Programs** in the foot menu, skip it and go directly to **Settings**).

3 Unselect all options for both **Data CDs** and **Audio CDs**.

4 Choose **OK**. Then close the **Control Center** window.

 To turn CD automounting back on following installation of Win4Lin, follow the same steps, but select (rather than deselect) each option you wish to enable.

Disabling CD Automounting in KDE

If you are using the KDE desktop environment, perform the following steps to temporarily disable CD automounting:

1 Click on the **K** menu in the **KDE** panel. Choose **Utilities** -> **Konsole** to open a terminal window.

2 Type the following command:

```
killall autorun
```

 This procedure disables the CD automounting for the current KDE session only. Once you log out and log into a new KDE session, the CD automounting will function as usual.

Disabling Other CD Automounting Software

Whether or not you are using the GNOME or KDE desktop environments, running other CD automounting software such as **autofs** and **amd** may cause you to be unable to install Win4Lin. If you are not sure whether **autofs** or **amd** is running, perform the following steps in order to ensure they are turned off:

1 Open a terminal window.

2 Become the root user by typing the following command:

```
su - root
```

3 Stop the **autofs** service:

```
/etc/rc.d/init.d/autofs stop
```

The message No such file or directory is a normal occurrence which means that **autofs** is not installed on your system. The message FAILED is a normal occurrence indicating that **autofs** is installed but was not running.

4   Stop the amd service:

```
/etc/rc.d/init.d/amd stop
```

As above, the message No such file or directory is a normal occurrence indicating that **amd** is not installed on your system. The message FAILED is a normal occurrence, which indicates that **amd** is installed but was not running.

Manually Removing Win4Lin Components

If for some reason you are unable to remove Win4Lin from your system using the Win4Lin graphical installer, then you can use the following steps instead. You must become a root user to perform these operations. You should perform these steps in order.

1   To remove the Win4Lin application files:

```
su - root
rpm -e Win4Lin
```

2   To remove your Win4Lin-enabled kernel:

```
rpm -qa | grep -i Kernel-Win4Lin
```

This command will display the name of the particular Win4Lin-enabled kernel RPM that was installed on your system.

```
rpm -e Kernel-Win4LinX
```

Where Kernel-Win4LinX is the output of the previous grep command. At this point you can reinstall Win4Lin without losing any configuration changes and without having to reload the Windows installation files (assuming you had previously installed Win4Lin successfully).

3   To remove the Win4Lin system-wide configuration files and the copy of the Windows installation files:

```
cd /
sh /var/win4lin/final_remove.sh
```

At this point, you can reinstall Win4Lin and reload the Windows media without losing your personal Windows data files (assuming you had previously installed Win4Lin successfully).

4 To remove your personal Windows installation, any Windows applications that you have installed, and any data files you have created on your Windows C:\ drive:

```
cd ~username
rm -rf .merge win
```

Where username is your Linux username. The rm command will remove the files and directories associated with your C:\ drive. Note that you will not be prompted to confirm the removal of your files. Please make certain you want to do this before you execute the rm command.

5 To remove your My Document files which are, by default, located in $HOME/mydata for new Win4Lin 3.0 Windows installations:

```
cd ~user
rm -rf mydata
```

Again, username represents your Linux username and the rm command will remove the files and directories associated with you D:\ drive. Note that you will not be prompted to confirm the removal of your files. Please make certain sure you want to do this before you execute the rm command.