Wabi™ for Linux
User's Guide

633 South 550 East
Provo, Utah 84606
U.S.A.

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Preface

The *Wabi User's Guide* provides information about all of the product functions and procedures of Wabi™ software, and its technology for running Microsoft® Windows applications on the Linux operating system, with particular attention to using Wabi on the Caldera Network Desktop. Topics covered include: starting the Wabi program, configuring your Wabi environment, setting up drives and printers, configuring ports, and installing and running applications.

Do Not Read This Manual

Instead, scan it for exactly the information you need. This guide is organized differently than the documentation you're used to reading. The goal is simple: minimize the amount of material you must wade through in order to get your job done. To accomplish this, each chapter is divided into three sections:

- About
- Instructions
- Reference

The *About* section in each chapter explains the operating concepts of a topic and provides background material related to the tasks described in the chapter. Think of *About* as the place to go to get the "big picture" on a topic or a procedure. Read as much, or as little, of *About* as you need to get the job done. Skip *About* entirely if you grasp a concept and require only step-by-step instructions to complete a task.

The *Instructions* section is the place to turn for mouse clicks and keystrokes. This section takes a no frills approach to instructions, communicating a maximum amount of task-oriented information in a minimum amount of space. Every Wabi task is covered in *Instructions*. Yet when you use the *Instructions* section you won't be distracted from the job at hand by conceptual digressions and long-winded explanations.

A *Reference* section rounds out most chapters. This section contains charts and tables of information related to the topic under discussion. Use the *Reference* section when you encounter a problem completing a task. The problem-and-solution tables included there will help you troubleshoot problems you may encounter with the Wabi program or the applications you are running.

As you scan each chapter, keep an eye on the frequent *margin notes* in the left-hand margin. These notes usually point to a cross-reference in a related section within the same chapter. For example, a concept described in *About* carries a cross-reference to the page in *Instructions* where the steps required to perform the related task appear. (The reverse is also true.) Use margin notes to shorten the distance between where you are and where you want to be.

Who Should Use This Book

If you use the Wabi program to load and run applications, you'll find this manual essential. It describes operating concepts and procedures, and provides step-by-step instructions for completing all Wabi tasks. Similarly, if you are responsible for supporting users, or for installing or configuring the Wabi program, this manual is the place to turn for comprehensive information about concepts, procedures, and system requirements.

Before You Use This Book

To use the Wabi program, you must be familiar with the use of a mouse and with graphic user interface techniques, including: pointing, clicking, and choosing options from a menu. If you are not familiar with these operations, refer to the Caldera Network Desktop *Getting Started Guide* or a similar reference for your Linux platform. These supply information about performing tasks using a mouse. Experienced users will find that

the steps and procedures required to perform a task in the Wabi program are similar to those required to perform a task in any graphical user environment.

The Wabi program is a bridge between your Linux operating system and a Microsoft Windows-compatible application program. As a result, you need some knowledge of your operating system to fully configure the Wabi program. For example, you'll need to know the operating system files available to you in order to access those files. Similarly, you may need to supply the Wabi program with the locations and names of operating system device drivers, such as diskette device drivers, in order to use devices.

Linux and UNIX

At this time, no version of the Linux operating system has legal right to use the UNIX brand name, which is owned by The Open Group, formerly X/Open. Nevertheless, Linux uses the same conventions, devices, commands, and interfaces as other operating systems that are UNIX branded.

We thus refer throughout this manual to UNIX commands, UNIX devices, etc., while maintaining the term Linux operating system rather than UNIX operating system, in order to preserve legally held trademarks for those with authority to use them. We hope that this convention will not cause confusion as you read this *User's Guide*.

What This Guide Contains

This guide presents material as follows:

Chapter 1, "What is Wabi?" presents an overview of the Wabi system, provides system hardware and memory requirements, and lists the applications certified to run in the Wabi environment.

Chapter 2, "Installing and Starting Wabi," explains how to start a Wabi session and install Microsoft Windows software, and describes the Wabi user interface.

Chapter 3, "Configuring Your Wabi Environment," introduces you to the Wabi Configuration Manager and Microsoft Windows Control Panel, the tools you'll use to configure your Wabi environment.

Chapter 4, "Setting Up Drives," explains how the Wabi program uses diskette and network drives, and describes in detail how to create and use drives.

Chapter 5, "Printing," examines how the Wabi program interacts with printers. Here you'll learn how to configure a port for printing and assign a printer to it. You'll also learn how to establish and change the default printing setup.

Chapter 6, "Using Wabi COM Ports," describes how to set up and connect Wabi COM ports to Linux device drivers so you can use serial devices such as modems and printers.

Chapter 7, "Wabi International," describes methods of localizing the Wabi program, and explains how to set up the Wabi program to use your preferences for international settings used by applications.

Chapter 8, "On the Network," explains the ways the Wabi program uses the network.

Chapter 9, "Installing Microsoft Windows Applications," details how to install Microsoft Windows applications. .

Chapter 10, "Using Microsoft Windows Applications," describes ways to start applications in the Wabi environment, and discusses issues with X window managers that may arise when you use applications.

Chapter 11, "Using a DOS Emulator in the Wabi Environment," details how to connect a DOS emulator to the Wabi program, and install and run DOS-based applications.

Appendix A, "Wabi File Layout," outlines the structure of the directories and files that make up the Wabi software.

Appendix B, "Color From Windows to Wabi," explains Wabi color handling and describes some variables that affect Wabi color handling.

Appendix C, "Fonts From Windows to Wabi," discusses methods the Wabi program uses to provide fonts to applications.

Appendix D, "UNIX and DOS File Systems," describes utilities that help you use DOS and UNIX files in both environments.

Related Books

You may find it helpful to have the Caldera Network Desktop *Getting Started Guide* or a similar reference and your *Microsoft Windows User's Guide* on hand when you use the Wabi program. These books provide background information related to Wabi topics and detail the use of the features and functions available in Microsoft Windows software.

Getting Help

There are several sources of help you can turn to with Wabi questions and problems:

- Wabi on-line Help
- Wabi error messages
- Wabi customer support
- Electronic forums
- Caldera's Web site

On-Line Help

The Wabi program provides a comprehensive on-line Help system that describes how to use the Wabi Configuration Manager.

To use Wabi on-line Help, press F1 or choose the Help button in the Configuration Manager window to view a context-sensitive Help screen. You can choose the Contents button to see a table of contents for the help system.

Error Messages

Wabi Configuration Manager returns an error message when a problem occurs that interrupts the completion of a task. Error messages describe the problem and usually suggest a way to resolve the error condition. The Help system provides more detailed explanations and suggestions for fixing a problem.

Customer Support

If you cannot resolve a problem using Wabi documentation, on-line Help, or error messages, you may wish to contact the electronic forums available on Caldera's Web site at *http://www.caldera.com/*, or send email to *wabi-users@caldera.com*, *majordomo@caldera.com* or *support@caldera.com*. Caldera provides limited free telephone support for the Wabi program running on the Caldera Network Desktop by calling (801) 377-7687.

Typographic Conventions Used in This Manual

The following table describes the type changes and symbols used in this book.

Typeface, symbol, or term	**Meaning**	**Example**
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `system% You have mail.`
`AaBbCc123`	What you type, contrasted with on-screen computer output.	`machine_name%` **`su`** `Password:`
AaBbCc123	Command-line placeholder: replace with a real name or value.	To delete a file, type **`rm`** *filename*`.`
AaBbCc123	Book titles, new words or terms, or words to be emphasized.	Read Chapter 6 in *User's Guide*`.` These are called *class* options. You *must* be root to do this.

Typeface, symbol, or term	Meaning	Example
Key Names Alt+d F1	Keys are written as they appear on the keyboard. Keys you press sequentially are separated by a comma. Keys you press simultaneously are joined by a plus sign (+).	Press Alt+k to open the Diskette tab sheet. Press Alt + F4
Type vs. Enter	Type means press only the keys indicated. Enter means to type the indicated keys and press the Enter or Return keys.	Type a device driver name. Enter a device driver name.
Enter vs. Return	These keys are used interchangeably.	

What is Wabi? 1

The Wabi™ program is a UNIX® application that enables you to run Microsoft Windows applications on several Linux operating environments that use the X Window System™. Wabi acts as an interface between the Windows world and the UNIX world, translating the language of Microsoft Windows applications to the language of UNIX and the X Window System.

Keep an eye out for margin notes that cross-reference instructions and other useful information.

The Wabi program lets you enjoy the benefits of the security, power, and connectivity of your Linux operating system, and on the same desktop, take advantage of popular Microsoft Windows applications such as spreadsheets, word processors, databases, graphics packages, and more. The best-selling applications have been tested extensively running in the Wabi environment. Applications that have been tested and certified compatible with the Wabi program are listed in the *Wabi Release Notes*, which are located on-line in the Wabi Tools group.

How the Wabi Program Works

Wabi software is “middle-ware.” It resides between an application and your Linux operating environment. In general, the Wabi program works by intercepting a Microsoft Windows application's request, and making an equivalent request in the Linux environment to deliver the desired result. The Wabi program carries out requests by translating Windows calls to X Window and UNIX calls.

In slightly more concrete terms, an application uses Windows API calls to open an icon, for example, and Wabi translates the request to equivalent X Windows calls. A print request, and any other request involving a device, is translated and redirected to an appropriate UNIX command or device. Much of an application's "behind the scenes" activity involves Intel x86 instructions, which Wabi passes directly to the x86 processor.

Figure 1-1 depicts the Wabi program's role as translator and redirector.

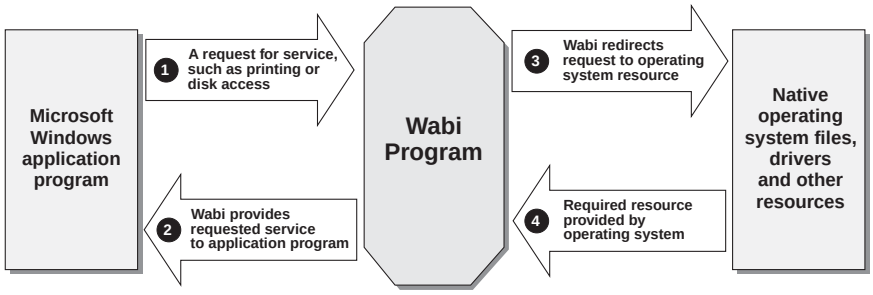

Figure 1-1 Wabi Program as Translator and Redirector

Wabi Capabilities and Functions

Because the Wabi program is an enabler for other applications, it has few visible capabilities and functions of its own. You cannot do much work without applications. The Wabi program's capabilities are based almost entirely on the applications that run within it, and the operating system on which it runs.

Wabi capabilities can be described only in the context of the applications that are certified to run in the Wabi program. Most of the functions of the certified applications are supported in the Wabi program; any exceptions are listed in the *Wabi Release Notes*.

Functions Supported for Certified Applications

In the Wabi environment, certified applications can do most of the same things they do in a Microsoft Windows environment. For example, applications are able to use the following capabilities:

- Cut, copy, and paste between Windows applications
- Access DOS-formatted diskettes
- Run in enhanced mode
- Object linking and embedding (OLE) between Windows applications
- Dynamic data exchange (DDE) between Windows applications
- Network installation and use of applications
- Windows Sockets networking

Additional Functions in the Wabi Environment

Because the Wabi program runs in the UNIX environment, it provides the certified applications with the following additional capabilities:

- Cut, copy, and paste between Microsoft Windows applications and
  X Window applications
- Transparent access to network file systems
- Use on X terminals
- Run on one system, display on another system
- Run more applications simultaneously on your desktop
- Share serial and parallel ports
- Multiple simultaneous users on one system

Functions Not Supported

Some functions are not supported for any applications. Generally, these functions require Microsoft Windows networking, special device drivers that the Wabi program does not support, or DOS commands. The Wabi program does *not* support the following features for any application:

- MIDI (Musical Instrument Digital Interface), AVI (Audio-Visual Interface) for video laser disks and music compact disks
- NetWare IPX/SPX connectivity
- Shared Wabi Windows directories

- Tutorials requiring VGA display drivers
- DOS diskette formatting through the File Manager
- Features requiring virtual device drivers

Wabi Functions

Functions unique to the Wabi program are those used to make connections to the Linux operating system. You access these functions through the Wabi Configuration Manager, as Chapter 3, "Configuring Your Wabi Environment" explains.

System Requirements

This section lists various hardware requirements for running the Wabi program.

Memory and Disk Space Requirements

Table 1-1 lists minimum and optimum memory and disk space configurations for using the Wabi program. See your operating system documentation for specifics on your hardware requirements.

Table 1-1 Wabi Memory and Disk Space Requirements

Item	Minimum	Recommended
Random-access memory (RAM)	16 Mbytes	32 Mbytes
Disk space required for Wabi system directory	15 Mbytes	Not applicable
Disk space required for `$HOME/wabi`	8 Mbytes for Microsoft Windows 3.1, 3.11 13 Mbytes for Microsoft Windows for Workgroups 3.11	Not applicable
Free swap space	20 Mbytes	40 Mbytes 10 Mbytes more for each application run concurrently

Display Requirements

The Wabi program supports displays with 1-bit, 4-bit, and 8-bit pixel depths. The Wabi program also supports 24-bit displays in 8-bit mode, *not* TrueColor mode. The X server for a 24-bit display must have available an 8-bit PseudoColor visual class in order for Wabi to display correctly. See Appendix B, "Color From Windows to Wabi," for more information about 24-bit displays.

Applications You Can Use

The certified applications listed in the *Wabi Release Notes* are the only applications that are officially supported to run in Wabi. These applications have been extensively tested with Wabi. However, many other applications have been found to work well with Wabi. For additional information about applications that may work well with Wabi, join one of the Caldera mailing lists by sending a help email to *majordomo@caldera.com* or visit Caldera's Web page:

`http://www.caldera.com/wabi/`

The following Web site also maintains a list of programs that are known to work with Wabi:

`http://wabiapps.psgroup.com/`

1

Installing and Starting Wabi 2

This chapter explains how to install and start the Wabi program, describes how your user environment is created the first time you start the Wabi program, and describes the Wabi user interface.

If you have not yet installed or started the Wabi program and want to learn about what happens the first time you start it, read the next section, "Starting Wabi Software the First Time."

If you want instructions for specific tasks, use the following table to locate the instructions you need.

Installing Wabi on your Linux system

The Wabi program is provided on a single CDROM. The program is stored in several popular formats to make installation very easy; one command in most cases.

In addition to the memory and hard disk requirements listed in the previous chapter, note that 24-bit color displays must support 8-bit PseudoColor mode or Wabi will not work. Wabi is usually run in 8-bit mode.

By default, Wabi is installed in the `/opt` directory, which is created and prepared by the `rpm` command if you install on a Caldera Network Desktop Linux system.

If you use the `.tar` file Wabi package from the CDROM to install Wabi on a non-Caldera Linux system, you should prepare a `/opt` directory and add the Wabi environment variables and man page to your environment.

Starting Wabi Software the First Time

See the section "Starting the Wabi Program" on page 21 for the Wabi start procedure.

Starting the Wabi program is easy, and you can use the same method to start it the first time or the tenth time. The method you use may depend on your operating system because the degree of integration into the graphical environment varies. However, on all systems, you can start Wabi by typing **`wabi`** at a command prompt within the X Window System, provided you have added the Wabi system directory to your path. The directory is `/opt/wabi/bin`. The command to start Wabi has several optional switches that are discussed in "Wabi Startup Options" on page 18.

The first time you start the Wabi program, it sets up your user environment, which takes a few minutes. If you are a new user, the Wabi program creates your personal `wabi` directory in your home directory,

and then prompts you to install Microsoft Windows. If you do not want your `wabi` directory in your home directory, you can set the `WABIDIR` variable before starting the Wabi program the first time. See the section "To Create Your Wabi Directory in Another Location" on page 10 for more information.

Your Personal Wabi Directory

The Wabi startup script creates your personal `wabi` directory as a subdirectory of your home directory by default. Within that directory, it creates a `windows` subdirectory. These two directories are analogous to the `C:\` and `C:\WINDOWS` directories in a Microsoft Windows environment on a PC.

After your personal `wabi` directory is created, the Wabi Windows Install Program prompts you to install Microsoft Windows software. You must do this before you can use the Wabi program.

The section "Microsoft Windows Installation" on page 10 explains how to install Microsoft Windows.

To Create Your Wabi Directory in Another Location

You can tell the Wabi program to create your personal `wabi` directory in a location other than your home directory by setting the `WABIDIR` environment variable before you start the Wabi program. You can do this by using the commands below, where *pathname* is the directory path where you want to place your personal `wabi` directory.

In the Bash, Bourne or Korn shell:

`WABIDIR=`*pathname***`; export WABIDIR`**

In the C shell:

`setenv WABIDIR` *pathname*

Include this statement in your `.cshrc` or `.profile` file in order to use this directory each time you start Wabi. If you do not, the next time you start Wabi, another `wabi` directory will be created in your home directory.

Microsoft Windows Installation

The Wabi Microsoft Windows Install program lets you install Microsoft Windows files into your personal `wabi/windows` directory. The program starts automatically the first time you start the Wabi program. You must install Windows before you can use the Wabi program.

You can install Microsoft Windows 3.1 or 3.11, or Microsoft Windows for Workgroups 3.11. However, bear in mind that if you install Microsoft Windows for Workgroups, its functionality is somewhat limited because the Wabi program does not support all its network features. Read “Microsoft Windows for Workgroups 3.11 in the Wabi Environment” on page 28 for details about supported and unsupported features.

The Wabi Microsoft Windows Install program lets you install either from diskettes or from a network drive. You cannot use the program to install Microsoft Windows onto a network server. See the section “Microsoft Windows Installation on a Network Server” on page 14 for more information.

The Wabi Microsoft Windows Install Program's initial dialog box prompts you for the location of the Windows files, as shown in Figure 2-1.

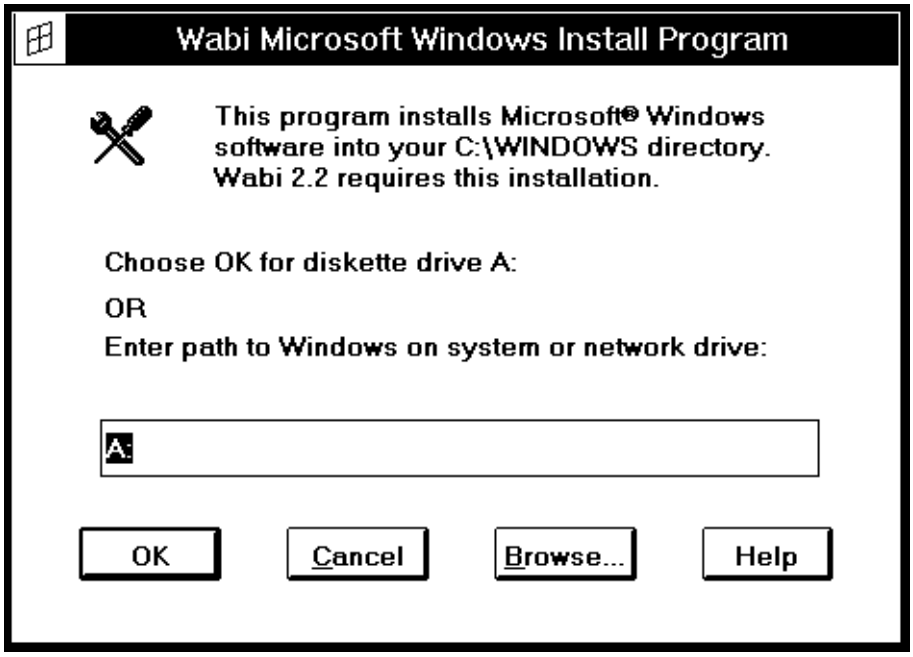

Figure 2-1 Initial Wabi Windows Install Program Dialog Box

Microsoft Windows Installation From Diskette

To install Microsoft Windows from a local diskette drive, enter the letter designation of the diskette drive. The Wabi program supports the connection of two diskette drives: drive A and drive B. The default connection is diskette drive A.

If you are using drive A to install Windows software, choose OK to accept the default designation. If you are using drive B, change the designation from A to B.

"Installing Microsoft Windows From Diskette" on page 22 provides the steps required to perform this task.

Once you enter a drive letter and choose OK, a dialog box opens and prompts you to insert disk 1 into the diskette drive. This dialog box is shown in Figure 2-2.

Figure 2-2 Wabi Microsoft Windows Install Program Dialog Box

After you insert the disk and choose OK, the files on disk 1 are installed in your `C:\WINDOWS` directory, which is mapped to your `wabi/windows` directory.

> **Note –** The destination directory, `C:\WINDOWS`, cannot be changed. The Wabi Microsoft Windows Install Program does not support installation of Microsoft Windows to another location. However, you can change the location of your personal `wabi` directory by setting the `WABIDIR` variable as explained in "To Create Your Wabi Directory in Another Location" on page 10.

A progress meter in the dialog box increments as files are installed. When disk 1 installation is complete, you are prompted to insert disk 2 and choose OK. When you insert disk 2 and choose OK, the files on diskette number 2 are installed. Repeat this procedure for the remaining disks.

As installation nears completion, the Wabi Tools group and Microsoft Windows Main, Games, Accessories, and StartUp groups open. When installation is complete, the message window shown in Figure 2-3 opens.

Figure 2-3 Microsoft Windows Install Completion Message

When you choose OK, the Wabi program exits and immediately restarts, opening the Windows Program Manager.

For a description of what you see when the Wabi program starts, skip to the section "The Wabi User Interface" on page 15.

Microsoft Windows Installation From Wabi Drive R

"Microsoft Windows Installation on a Network Server" on page 14 explains how to install Microsoft Windows to a server so users can then install it on their workstations.

If the Microsoft Windows software is copied on a hard drive or network directory accessible to your operating system, you can install it into the Wabi program using Wabi drive R, which is assigned to the / (root) directory of your Linux system.

To install the Microsoft Windows software from drive R, you enter R: and the path the Wabi program can use to locate the Windows files. You can also use the Browse button to navigate through the directories accessible to your system and locate the Microsoft Windows files.

For example, suppose the Microsoft Windows 3.1 diskettes are copied into `/usr/apps/install/win31.dsk`. In the entry field of the Wabi Microsoft Windows Install Program's initial dialog box (shown in Figure 2-1), you would enter the following path:

```
R:\usr\apps\install\win31.dsk
```

You can use either a DOS path or a UNIX path. The back slash (\) is used in DOS path names. The forward slash (/) is used in UNIX path names. The Wabi program accepts both types of path names, provided you use one type of slash within a path.

Note – You must have read permission to access the directory containing the Windows files. If you cannot access this directory due to a permission problem, change the permissions using the `chmod` command or see your system administrator.

See "Installing Microsoft Windows From Wabi Drive R" on page 22 to learn how to perform this task.

After you've entered the drive letter and path and chosen OK, the Wabi program installs the Windows files in your `$HOME/wabi/windows` directory. A progress meter in the dialog box increments as files are installed.

As installation nears completion, the Wabi Tools group and Microsoft Windows Main, Accessories, Games, and StartUp groups open. When installation is complete, the message window shown in Figure 2-3 opens.

When you choose OK, the Wabi program exits and immediately restarts, opening the Windows Program Manager.

Microsoft Windows Installation on a Network Server

The Wabi Windows Install program can only be used to install Microsoft Windows files into the Wabi user environment. If you want to install Microsoft Windows onto a network server so that users can install Windows from the server, you can use the procedure for placing Windows files on a network server that is described in your Microsoft Windows documentation.

The documented procedure requires that you run the DOS command `setup /a`. To do this, you must have a DOS computer on your network, or use the DOS emulation feature of Linux.

If you do not have a DOS computer on your network, use the `mount` or `mcopy` command to access DOS file systems on your computer. Once you are able to access the DOS diskettes from your operating system, you can use UNIX commands to copy the diskettes to a network server and set read permission on the files.

Once you have installed Microsoft Windows to a network server, Wabi users can use the Wabi Microsoft Windows Install program to install Windows files into their Wabi environments as described in “Microsoft Windows Installation From Wabi Drive R” on page 13.

Note – The Wabi Microsoft Windows Install program does not allow you to set up your system to access a shared copy of Microsoft Windows. Each user must have his or her own copy of Windows in `$HOME/wabi/windows`, and must have a Microsoft Windows software license.

The Wabi User Interface

The Wabi program presents the familiar screens, dialog boxes, and menus of a Microsoft Windows graphical user interface (GUI). You make menu selections and choose icons by pointing and clicking with a mouse, or by using keyboard accelerator commands. Accelerator keys, designated by an underlined character in a menu choice, are discussed in Chapter 3, “Configuring Your Wabi Environment.”

The Program Environment

The Wabi program uses the Microsoft Windows Program Manager as its program environment, or shell program. The shell program is specified in the `SHELL=` variable in your `$HOME/wabi/windows/system.ini` file.

The Program Manager works as it does when you run it in Microsoft Windows on a PC. If you are not familiar with the Program Manager, refer to the Microsoft Windows documentation and on-line help.

Wabi Tools Group

The Wabi Tools group contains the Wabi program items shown in Figure 2-4.

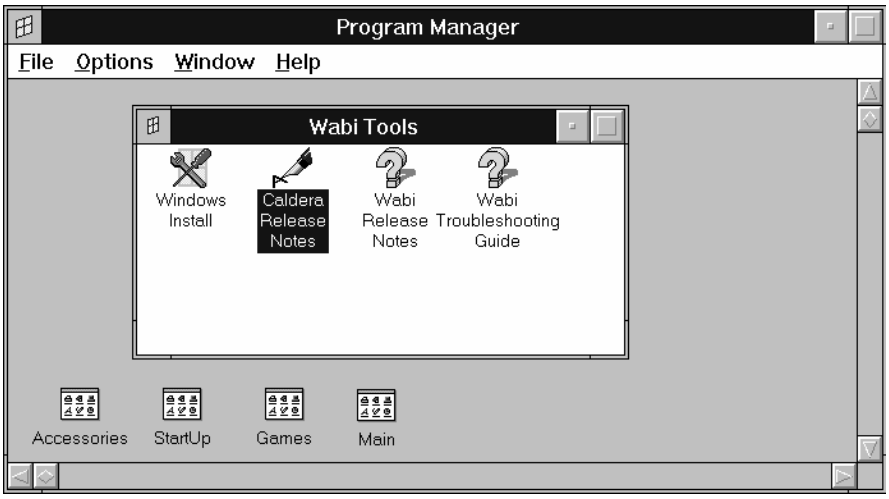

Figure 2-4 Items Within the Wabi Tools Group

Items within the Wabi Tools group may include:

- *Windows Install* – The program you use to install Microsoft Windows software. This program runs automatically the first time you start the Wabi program. If you want to upgrade or reinstall Microsoft Windows in your Wabi environment, you *must* use this tool rather than the `setup` program supplied with Microsoft Windows.

"Microsoft Windows Installation" on page 10 tells you how to use the Windows Install tool.

- *Wabi Release Notes* – A help file containing notes about installing and using particular applications, and general information.
- *Caldera Release Notes* – A Write file containing notes about installing and using particular applications on Caldera and other Linux systems, and notes relevant to devices, configuration, etc.

- *Wabi Troubleshooting Guide* – A help file containing the latest hints on diagnosing and correcting problems with devices, Windows applications, etc.

Microsoft Windows Groups

When you install Microsoft Windows software, you see the Main, Accessories, Games, and StartUp groups. In the Main group, the Print Manager and Windows Setup programs are omitted because you cannot use them in the Wabi environment. The Accessories and Games groups contain the same programs as in Microsoft Windows on a PC. The StartUp group is empty initially. Any program item placed in the StartUp group will be started automatically when you start the Wabi program.

Wabi On-Line Help

The Wabi software includes on-line help for the Configuration Manager. You can view the on-line help by choosing the Help button or pressing the F1 key in Configuration Manager's tab sheets. On-line help explains what you can accomplish with the Wabi Configuration Manager.

When you use Configuration Manager, you can view Wabi configuration error message help. A configuration error message is displayed when you try to perform an "illegal" procedure or when Wabi software cannot complete a task you ask it to do using Configuration Manager. For example, you'll see an error message if you try to assign a Wabi drive to a file system that you do not have permission to access. Error windows displayed at these times include a Help button you can choose for information about the error and help in resolving the problem.

The Wabi Man Page

A manual (man) page of information is available for the Wabi program. This man page describes command-line options, provides examples of various startup modes, and describes Wabi environment variables. Type the command `man wabi` to display the Wabi man page.

Wabi Startup Options

You can start applications from the `wabi` command line. See "About Starting Applications" on page 124" for instructions.

The `wabi` command, which you use to start the Wabi program, provides several switches you can use to specify options Wabi should use when it starts.

Display Wabi on a Remote System or X Terminal

You can direct the Wabi display to a remote system or X terminal. You might do this if you want to view and use the Wabi program on a system that cannot run the Wabi program locally, or if you want to run the Wabi program on a central computer and display it on X terminals.

You direct the Wabi display to a remote system that is open to external displays by specifying a display name with the `-display` switch when starting the Wabi program. To direct the display to a remote system every time the Wabi program is started, you can set the `DISPLAY` environment variable. If you do set this variable, be aware that the displays of all other X Window applications you start subsequently may also be sent to this system, depending on where you set the variable. See your documentation for information about setting the `DISPLAY` variable.

Note – The Wabi program accesses local resources such as the diskette drive on the system where it is running. You cannot access the diskette drive of a remote system on which the Wabi program is being displayed.

Display Wabi With Smaller or Larger System Fonts

The Wabi program adjusts the size of the system fonts it uses in dialog boxes, icon labels, and menus according to the size of the display screen you use. On a large display screen (one with more than 640 horizontal pixels), the Wabi program uses a system font approximately 20 pixels high. On a small display screen (one with 640 or fewer horizontal pixels), it uses a system font approximately 16 pixels high. You can use the `-LF` and `-SF` command-line switches to override the default and have Wabi use larger or smaller system fonts.

Start Wabi Without the Splash Screen

See "Starting Wabi Without the Splash Screen" on page 25 for the commands used to prevent the splash screen from displaying.

The Wabi program normally displays its splash screen, or startup banner, as it begins to run. The splash screen is shown in Figure 2-7.

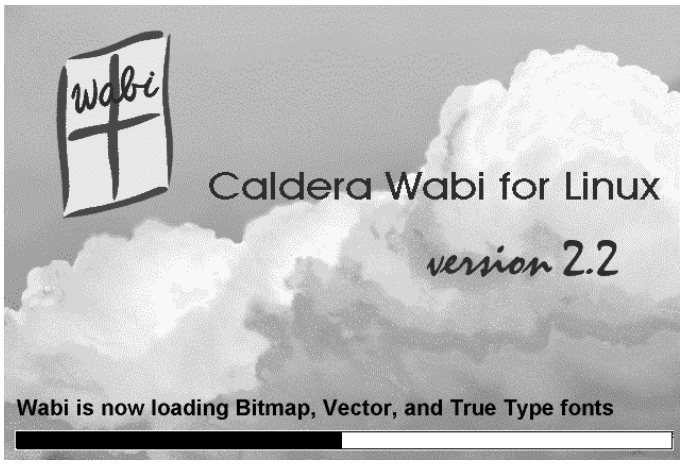

Figure 2-5 Wabi Splash Screen

If you like, you can prevent the splash screen from displaying by using the `-nosplash` switch in the `wabi` command line. Preventing display of the splash screen does not start Wabi significantly faster.

Conversely, the `-splash` switch makes Wabi display the splash screen in situations where it normally would not be displayed. For example, when you start an application directly from the `wabi` command line, the splash screen is not displayed. Using the `-splash` switch causes the splash screen to display before the application starts.

Start Wabi With or Without the Font Server

The Wabi program automatically starts its font server, `wabifs`, on platforms whose X servers use the X11R5 or X11R6 Font Service Protocol. The font server speeds up the display of fonts in the Wabi environment.

For the most part, you should let the Wabi program determine whether to use the font server. However, you can disable the font server if you find that Wabi performs slowly or erratically with respect to on-screen fonts.

To start the Wabi program without starting the font server, use the `-fs` command-line switch to disable the font server.

Although it is not likely, it is possible that the Wabi program could falsely identify your X server as one that does not support the X Font Service Protocol. XFree86, Accelerated X, and Metrolink X Server all support the Font Service Protocol. If this is incorrectly detected, you can use the `+fs` switch to force Wabi to start its font server.

Instructions for Getting Started

This section provides detailed, step-by-step instructions for performing a variety of tasks related to starting the Wabi program.

▼ Installing Wabi on your Caldera System

1. **Log in as root and insert the Wabi CDROM into your CDROM drive.**

2. **Mount your CDROM drive in your Linux filesystem.**
   `mount /dev/sonycd /mnt/cdrom`

3. **Execute the installation script on the Wabi CDROM.**
   `/mnt/cdrom/install-wabi`

   The `/opt` directory is prepared, and the Wabi program is installed to your hard disk. Note that you still must install Microsoft Windows the first time you run Wabi.

4. **Optionally, execute the `install-dti` script to update your Desktop rules to include Wabi and Windows executables.**
   `/mnt/cdrom/install-dti`

   If you are atttemping an installation on a non-Caldera Linux system, do not use the `install-dti` script. It operates on Caldera Desktop files that do not exist on other Linux systems.

▼ Starting the Wabi Program

- **Double-click the Wabi icon from a Directory window of the Caldera Network Desktop interface.**
  The icon can be dragged from a Directory window to your Desktop for easy access.

  or

- **Place the Wabi executable directory in your path and enter the following at the command line:**
  `wabi`

  The Windows Program Manager window opens.

See the section "Starting Wabi Software the First Time" on page 8 if you are a new Wabi user.

▼ Installing Microsoft Windows From Diskette

This process is started automatically the first time you run Wabi.

See "Microsoft Windows Installation From Diskette" on page 11 for detailed information about Windows installation from diskette.

1. **Open the Wabi Tools icon.**
   The Wabi Tools group displays several icons.
2. **Open the Windows Install icon.**
   The Wabi Microsoft Windows Install Program dialog box opens.
3. **Specify a diskette drive letter.**
   If you are using diskette drive A for installation, choose OK to accept the default drive designation. If you are using diskette drive B, replace A with B in the entry field and choose OK.

   The initial installation dialog box opens.
4. **Insert the Windows program disk 1 into the diskette drive and choose OK.**
   The Wabi program begins to install Windows files into your `C:\WINDOWS` directory.
5. **Follow the prompts in subsequent dialog boxes to install the files on the remaining Windows program diskettes.**
   When installation is complete, the Windows program groups open and a message box prompts you to restart the Wabi program.
6. **Remove the last disk from the diskette drive.**
7. **Choose OK in the message box to restart the Wabi program.**
   Installation of the Windows software is now complete.

▼ Installing Microsoft Windows From Wabi Drive R

1. **Open the Wabi Tools icon.**
   The Wabi Tools group displays several icons.
2. **Open the Windows Install icon.**
   The Wabi Microsoft Windows Install Program dialog box opens.

"Microsoft Windows Installation From Wabi Drive R" on page 13 discusses installation from Wabi drive R in more detail.

3. **Specify in the entry field the path to the Windows files.**
   Enter **`R:`** and the complete path from the root directory to the Windows files. You can use either DOS or UNIX slashes in the path. You can also use the Browse button to look through the directories available to your system to find the path to the Windows files.

4. **Choose OK.**
   The Wabi program begins installing files from the directory you specified into your personal `wabi/windows` directory. When installation is complete, windows open, displaying the contents of each Microsoft Windows program group, and a message box prompts you to restart the Wabi program.

5. **Choose OK in the dialog to restart the Wabi program.**
   Installation of Microsoft Windows software is now complete.

▼ Exiting the Wabi Program

1. **Save any open files and exit all applications running within the Wabi program.**
   If you try to exit before saving, the applications prompt you to save each unsaved file.

2. **Open the Program Manager's File menu, and choose Exit.**
   Alternatively, press Alt+F4, or double-click the control menu box in the top left corner of the Program Manager.

   The Exit Windows confirmation dialog is displayed.

3. **Choose OK.**
   Program Manager closes and the Wabi program terminates.

   Alternatively, choose Cancel to exit the confirmation box without ending the Wabi session.

▼ Displaying the Wabi Program on a Remote System

1. **Set the remote system to give access to its display.**
   Enter the following command at the command line on the remote system:

   xhost +*your-host-name*

See the section "Display Wabi on a Remote System or X Terminal" on page 18 for reasons you might want to do this.

2. **Start the Wabi program on your system using the** `-display` **argument followed by the remote host name and the characters** `:0`
   For example, to display to a remote system named `eastoshkosh`, enter:

   wabi -display eastoshkosh:0

   Screen output is sent to the remote system with the specified host name.

Note – To send the Wabi display to a remote system every time the Wabi program is started, you can set a `DISPLAY` environment variable. For example, to consistently display to a remote system named `eastoshkosh`, enter one of the following commands.

If you use the Bash, Bourne or Korn shell:

```
DISPLAY=eastoshkosh:0;export DISPLAY
```

If you use the C shell:

```
setenv DISPLAY eastoshkosh:0
```

If you do set this variable, be aware that all other X Window applications you start subsequently from the same UNIX command window will be displayed on the remote system.

▼ Displaying the Wabi Program With Small or Large System Fonts

- **If you have a large screen and want to display Wabi with smaller fonts in dialog boxes and menus, start Wabi by entering the following at the command line:**

```
wabi -SF
```

- **If you have a small screen and want to display Wabi with larger fonts in dialog boxes and menus, start Wabi by entering the following at the command line:**

```
wabi -LF
```

> **Note –** The `-LF` switch has no effect on large screens because large fonts are already being used, and the `-SF` switch has no effect on small screens because small fonts are already being used.

▼ Starting Wabi Without the Splash Screen

- **If you do not want the splash screen to display when you start the Wabi program, enter the following command:**

```
wabi -nosplash
```

- **If you want to display the splash screen in situations when it normally does not display, enter the following command:**

```
wabi -splash
```

▼ Starting Wabi With or Without the Font Server

- **If you know your X server supports the Font Service Protocol, but the Wabi program does not start the Wabi font server, enter the following command to start Wabi with the font server:**

```
wabi +fs
```

- **Enter the following command to start Wabi without the font server:**
  `wabi -fs`

▼ Viewing the Wabi Man Page

- **Display the Wabi man page by entering the following at the command line:**
  `man wabi`

  The initial screen of Wabi man page information is displayed. Press the spacebar to view additional screens.

  If the `man` command indicates there is no Wabi man page, you may have to add it to the man page area of your Linux system.

Reference Material for Getting Started

This section provides reference material associated with starting and using the Wabi program.

Troubleshooting Startup Problems

Table 2-1 suggests solutions to problems you might experience when starting the Wabi program and installing Microsoft Windows.

Table 2-1 Startup Problems and Solutions

Symptom	Possible Cause	Solution
Can't start Wabi	Startup command not in path.	Use the full path name for the `wabi` command. This path is specific to your operating system. Or, edit your user profile for the UNIX shell you use (e.g., `.profile` for the Bash shell) to include the Wabi `bin` directory in your search path.
	Not enough swap space or memory.	Make sure you have at least the minimum requirements listed in Table 1-1 on page 4. If you need to run several programs concurrently, you may need more memory and swap space.

Table 2-1 Startup Problems and Solutions *(Continued)*

Symptom	Possible Cause	Solution
	Too many other UNIX programs running.	Quit some of the running programs and start Wabi again.
Can't display to a remote system	System not open to external displays or no display identified.	See "Displaying the Wabi Program on a Remote System" on page 24 to make sure you've followed the correct procedure.
Can't install Microsoft Windows program from diskette.	Incorrect diskette drive specified or diskette drive not configured.	See "Troubleshooting Problems With Diskette Drives" on page 62.
Can't install Microsoft Windows program from Wabi drive R.	Drive or path incorrect or inadequate permissions to directory.	Use the Browse button to find the correct path to the Microsoft Windows files. Make sure you have read permission to the directory and files.
Can't access Program Manager.	Windows software incorrectly installed.	You must use the Wabi Microsoft Windows Install Tool to install Microsoft Windows. See page 10 for more information.
Can't change settings from Control Panel.	Some Control Panel functions are not valid under the Wabi program.	Use operating system utilities to perform some functions of Control Panel. See "The Microsoft Windows Control Panel" on page 32 for more information about the Control Panel.
Icons missing from Main group.	Some parts of Windows cannot be used in Wabi so they are not installed.	See "Microsoft Windows Groups" on page 17.

Microsoft Windows for Workgroups 3.11 in the Wabi Environment

Microsoft Windows for Workgroups is supported in the Wabi program, but its functionality is somewhat limited. Table 2-2 lists the added features of Windows for Workgroups (WFW), and describes the degree to which the Wabi program supports them.

Table 2-2 Support for Windows for Workgroups in the Wabi Environment

WFW Program	Support in the Wabi Environment
Mail	Workgroup Mail is functionally similar to Microsoft Mail and can communicate with existing Microsoft Mail post offices. It works under the Wabi program if you connect a Wabi drive to the post office and then add these lines to your `C:\WINDOWS\MSMAIL.INI` file: `[Microsoft Mail]` `ServerPath=`*postoffice-server-path* `login=`*MSMail-username* For example, if you connect drive Z: to the post office, the *postoffice-server-path* is `Z:\maildata`. The *MSMail-username* is the name given to your mail account. Please refer to your Microsoft documentation for information about the differences between Workgroup Mail and Microsoft Mail. (See Windows for Workgroups Resource Kit, Vol 1, page 12-28.)
Schedule +	This program, which replaces the Microsoft Windows Calendar, lets you schedule appointments with other users on a Windows for Workgroups network. It works under the Wabi program. You must set up your Mail before you can use Schedule +.
ClipBook Viewer	This program, which replaces the Microsoft Windows Clipboard Viewer, lets you create multiple pages of clipboard information, so you can work with more than one piece of information at a time. This functionality is supported under the Wabi program. The ClipBook Viewer also lets you share clipboard pages with other users on a Windows for Workgroups network. This sharing is *not* supported under the Wabi program because it requires Windows networking.
Hearts	This is a networked game that allows you to play with up to three other players over the network. In the Wabi environment, you can use it only as a single player against three computer-generated players.

Table 2-2 Support for Windows for Workgroups in the Wabi Environment

WFW Program	Support in the Wabi Environment
File Manager	The WFW File Manager can act as a file and print server, and mount file systems from other machines on a Windows for Workgroups network. These features require Windows networking, so they are not supported under the Wabi program. The network features are disabled, so the File Manager is functionally the same as the version in Microsoft Windows.
Chat WinPopup NetWatcher WinMeter	These programs depend on the network, so you should not try to use them.

2

Configuring Your Wabi Environment 3

This chapter explains how to set up your Wabi environment to suit your preferences and your operating system's configuration. You use the Microsoft Windows Control Panel and Wabi Configuration Manager to configure your Wabi environment.

About Configuring Your Wabi Environment

You can control your Wabi environment in much the same way you control your Microsoft Windows environment. You use the same tool, the Microsoft Windows Control Panel, to change colors, install printer drivers, configure COM ports, and so on. However, some of Control Panel's settings do not apply to the Wabi environment. The Wabi display is governed by the X Window System as well as the Wabi window manager, so some settings can only be controlled through your X Window desktop. Some X settings, such as mouse tracking speed, apply to all windows on your desktop, not just Wabi windows. If you change such a setting in the Control Panel, the Wabi program simply ignores the change.

The Wabi program installs an icon for the Wabi Configuration Manager within the Control Panel. The Configuration Manager lets you connect Wabi device names to their UNIX counterparts.

3

The Microsoft Windows Control Panel

You use the Control Panel the same way you use it in Microsoft Windows. It is located in the Main group, as shown in Figure 3-1. If you are not familiar with the Control Panel or need help using it, please refer to the Control Panel help or your *Microsoft Windows User's Guide* for more information.

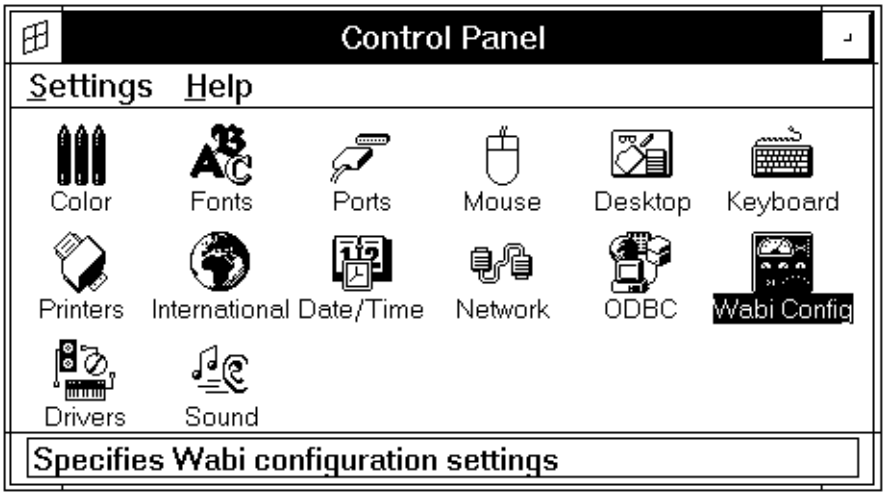

Figure 3-1 Microsoft Windows Control Panel

Table 3-1 lists the Control Panel settings and describes the degree to which you can use them in your Wabi environment.

Table 3-1 Microsoft Windows Control Panel Settings

Color	You can use the Color icon to change the colors in your Wabi desktop. Colors affect only your Wabi windows. By the same token, colors that you set using your X Window desktop's tools do not affect Wabi windows. (See also Appendix B.)
Fonts	Using the Fonts icon, you can add fonts to your Wabi environment, or remove them. You can also set TrueType options as in the Microsoft Windows environment. Not all applications use the settings, however.

Table 3-1 Microsoft Windows Control Panel Settings *(Continued)*

	You use the Ports icon to change settings such as baud rate, data bits, parity, stop bits, and flow control. However, many applications use their own settings for these port attributes, so your settings may not be used. The Control Panel also includes advanced settings for Base I/O Port Address and Interrupt Request Line, which Wabi ignores. In the Wabi environment, these port attributes are controlled by the UNIX device driver for the port. If you want to use a serial port with an application in the Wabi environment, it must be connected to the appropriate device driver for Linux. The Wabi program is set up to work with the default drivers in Linux, so you probably will not have to change the connection unless you use a non-standard driver in your operating system.
	The Double Click Speed and Swap Left/Right Buttons settings work in the Mouse dialog box. Mouse Trails is ignored, and Mouse Tracking Speed is controlled through your X Window desktop. The X Window setting for mouse button order/swapping may also affect your Wabi environment, but the Wabi setting will not affect your X Window desktop. Double-click speed for each environment is independent of the other.
	Many of the settings in the Desktop dialog box should not be used in the Wabi environment, or cannot be used. The options for decorating the desktop background (Pattern, Wallpaper) do not work because the X Window desktop controls the background, or root, window. You should use your X Window desktop's settings for colors, patterns, and bitmaps in the root window. Although the Screen Saver is not supported, it may work on some platforms. However, the Screen Saver should *not* be used even if it does work. Your X Window desktop has its own screen saver mechanism, which works more efficiently and covers the whole display. Microsoft Windows screen savers use significant CPU time creating activity on only the Wabi portion of your screen display. If you are using the Wabi program on a system you share with other users, the screen saver's CPU usage will slow everyone down.
	The Keyboard repeat settings have no effect in the Wabi environment. You can enable and disable keyboard repeat in your X Window desktop, and some desktops may also be able to set the repeat delay rate.

Table 3-1 Microsoft Windows Control Panel Settings *(Continued)*

 Printers	You use the Printers icon to install printer drivers, set your default printer, set up printers, and connect them to ports. The Print Manager and options related to it (Device Not Selected, Transmission Retry) are not used by the Wabi program. You control your Linux printers using Linux printer management utilities only.
 International	You use the International dialog just as in Microsoft Windows. The only difference for the Wabi environment is that the Keyboard Layout option has no effect. You must use the `WABI_KEYB` environment variable to specify a keyboard language, as explained in "Setting the WABI_KEYB Environment Variable" on page 100.
 Date/Time	The Wabi program uses your system clock to determine the time. You cannot change the date and time with the Date/Time dialog.
 Network	The Network icon has no function in the Wabi environment.
386 Enhanced	The 386 Enhanced icon does not appear in the Control Panel in your Wabi environment because there is no need for the 386 Enhanced settings in a Linux operating system.
 Drivers	You can use the Drivers icon to install and remove multimedia drivers just as in the Microsoft Windows environment. However, specific multimedia devices may or may not be supported.
 Sound	Linux does not support playing and recording waveform files. You can use the Sound icon only to enable and disable system sounds, if they are supported on your system.

Wabi Configuration Manager

Think of Configuration Manager as the switchboard of the Wabi program. It lets you connect Wabi devices to their counterparts on your Linux system so you can use the familiar DOS-type device names for printers, COM ports, drives, and diskettes. It also lets you configure a Linux DOS emulator, if you have it installed on your system. This lets you start up a DOS session from the MS-DOS Prompt icon in the Main group.

Connections you make in Configuration Manager apply to all Wabi windows and sessions. Common connections you might make or change include those between a Wabi drive (`E:`, `F:`, and so on) and a file system, a Wabi diskette drive (`A:` or `B:`) and a diskette device in your operating system, and a Wabi LPT port and a printer. Some Configuration Manager connections require you to supply UNIX device names. In most cases, the Wabi program recognizes your operating system and supplies the appropriate default settings, which are defined in the `wabi/windows/wabi.ini` file in your home directory. Infrequently, you may need to enter a setting other than the default value.

You open the Configuration Manager window by double-clicking the Wabi Config icon in the Microsoft Windows Control Panel, shown in Figure 3-2.

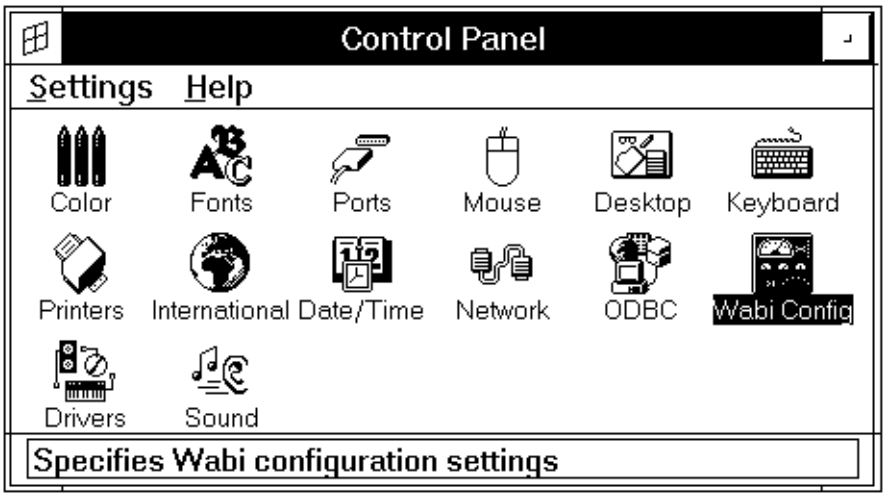

Figure 3-2 The Wabi Config Icon in Windows Control Panel

Configuration Manager consists of a tab sheet for each type of Wabi device that is connected to a counterpart on your Linux system. Figure 3-3 shows the Configuration Manager window as it appears when you open the Wabi Config icon.

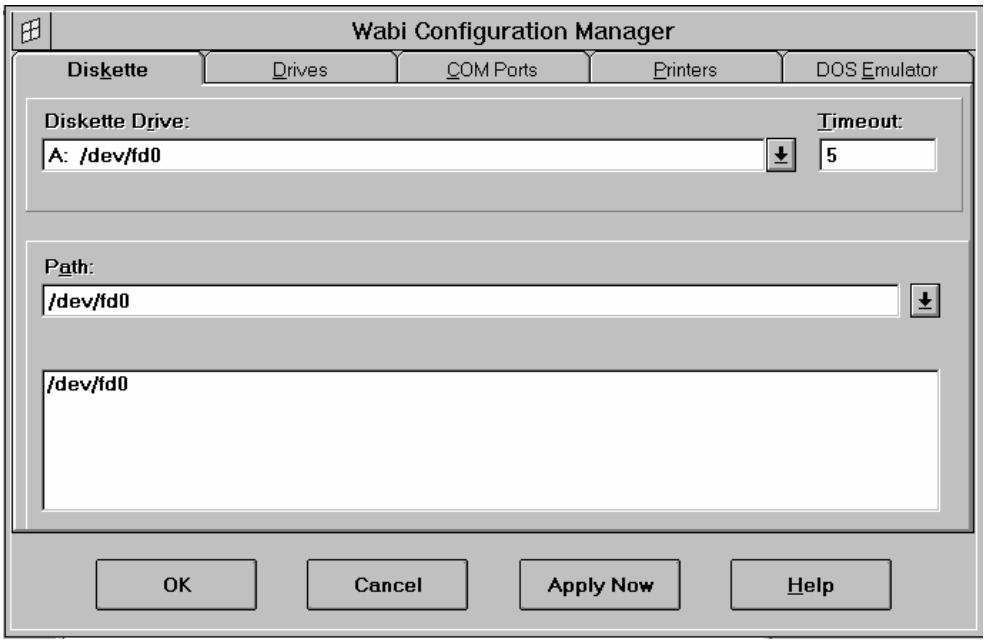

Figure 3-3 Configuration Manager Tabs

Configuration Manager Tab Sheets

Configuration Manager organizes Wabi connections into several tab sheets:

- Diskette — Assigns Wabi diskette drives A and B to UNIX diskette device drivers.
- Drives — Sets up Wabi drives and assigns a drive to a file system.
- COM Ports — Connects COM ports to UNIX serial devices.
- Printers — Connects LPT Ports to UNIX printers and commands.

- DOS Emulator — Supplies the command required to start a DOS emulator.

Tab Sheet Layout

The tab sheets for all devices have similar layouts. Most tab sheets consist of:

- A top panel, where you select a specific Wabi device, and in some cases select some options for the device. The top panel shows the current connections.
- A bottom panel, where you specify the UNIX device to connect to the Wabi device. The bottom panel often displays a Path box, where you can enter the path to a device or file system. In the Printers tab sheet, however, the bottom panel displays fields for entering a UNIX printer name and command. Tab sheets with the Path box provide a browser for searching file systems. The next section describes the file browser in detail.
- A row of buttons which you use to save or cancel your selections, or open on-line help for the tab sheet.

Path Box and File Browser

If you know the complete path to the UNIX device driver you want to use, you can type it in the Path box and press Enter. If you are not sure what the path is, you can type the beginning of the path and press Enter to see a list of subdirectories in the file browsing area, which is the box beneath the Path box. You can then construct a path from the list by double-clicking on directories within the browser.

For example, to start searching at the root directory, you can type / and press Enter. When you click on a subdirectory within the root directory, the directories within the subdirectory are displayed. Double-click on a directory to see the directories within it, and to add it to the drive path. By double-clicking on subsequent directories, you construct a path that you can assign to a drive. Double-clicking . . / takes you up a level in the directory hierarchy.

Note – A file system must be mounted in Linux before you can see it in Wabi. If your system uses an automatic mounting system (automounter) for file systems on your network, you must access the file system to mount it in Linux before you can see it in Wabi. If you enter `/net` in the Path box, you will see only the file systems that have been mounted in `/net` already. If you want to access a file system in `/net` that is not listed, you must type more of the path so that the file system can be mounted in Linux. For example, if you want to access a file system in `/net/menemsha`, you must type `/net/menemsha` in the Path box to automount the file systems on the server called `menemsha`.

UNIX File Name Substitution Characters

You can use UNIX file name substitution characters to narrow your search to directories or files matching a specific pattern. File name substitution characters let you create a list of files or directories to choose from. Table 3-2 lists the UNIX file name substitution characters you can use in the Path box.

Table 3-2 UNIX File Name Substitution Characters

Use this symbol	If you want to
?	match any single character. For example, **`/home/?quan`** would match `/home/lquan`, `/home/cquan`, but not `/home/jcquan`.

Table 3-2 UNIX File Name Substitution Characters

Use this symbol	If you want to
*	match any (zero or more) characters. For example, **/home/*** would match all directories and files under /home.
[...]	match any single character in the enclosed list or range. A list is a string of characters. A range is two characters separated by a dash (-), and includes all the characters in between. For example, **/dev/rdiskette[01]** matches /dev/rdiskette0 and /dev/rdiskette1. A range such as /files/[a-c].reports matches /files/a.reports, /files/b.reports, and /files/c.reports.
~*user*	match the home directory of the specified user. For example, **~bbaker** matches /home/bbaker, the home directory of the user bbaker.

Tab Sheet Buttons

The Configuration Manager displays several buttons under the tab sheets:

- *OK* — Choose the OK button when you are ready to save your changes and quit Configuration Manager. If you are making changes to only one tab sheet, you can use the OK button to validate your changes, save them in wabi.ini, and close Configuration Manager.
- *Cancel* – Choose this button to close Configuration Manager without changing settings. Use Cancel when you examine settings, but don't want to change them, or when you make changes but decide not to save them. Note that Cancel only discards changes that you have not applied.
- *Apply Now* — Choose the Apply Now button to have Configuration Manager validate the entries you made. This button validates all entries on all tab sheets in the current session that have not already been validated. For example, if you make changes to the Diskette tab and proceed to the Drives tab without choosing Apply Now, the Diskette tab changes will be validated when you apply the changes in the Drives tab. (This button has the same function as the OK button, except that it keeps Configuration Manager open.)

- *Help* – Choose this button to start the on-line help system and to display a context-sensitive help topic screen. Links to related help topics are included where applicable.

Accelerator Keys

Configuration Manager incorporates accelerator keys to speed operations. Once you are familiar with a tab sheet and its contents, you can access a function directly from the keyboard by sequentially pressing a combination of keys whenever the Configuration Manager window is open. Experienced users may find this technique faster than selecting items by pointing and clicking with the mouse.

Each Configuration Manager item includes an underlined letter. This letter represents the accelerator key for that item.

Using an accelerator key is easy. You type the key sequence required to choose an item. For example, when the Configuration Manager window is open, you can choose the COM Ports tab by pressing Alt+c.

Within a tab sheet, you can choose items sequentially by using the Tab key.

Entry Validation

Configuration Manager checks, or "validates," many of the entries you make. This is necessary to ensure that your instructions can be carried out. A typical example of entry validation relates to a device name.

For example, to use Wabi diskette drive B, you must connect it to a diskette device in your Linux operating system. You do so by selecting a path to a diskette device driver in the Diskette tab sheet.

Once you've entered a path and chosen the Apply Now (or OK) button, Configuration Manager examines your entry to determine whether it is valid. If the entry is valid, Wabi software assigns the device driver you've specified to Wabi diskette drive B. If the entry is not valid — for example, if the device path or file does not exist — an error message informs you of the problem.

Validation of entries occurs quickly. If a validation error occurs, you can usually recover from it by following the instructions in the resulting error message box. You may occasionally need to progress through a series of error message boxes to fully resolve an error.

Each error message box provides a Help button. Choose the Help button within an error message box to learn about the possible cause of the error and how to clear the error condition.

Configuration Manager Tasks

Configuration Manager tasks are described in individual chapters in this guide. Use the following table to locate detailed information about tasks.

Table 3-3 Additional Configuration Manager Information

To find information about...	**See...**
Wabi Drives	Chapter 4, “Setting Up Drives”
Wabi Diskette Drives	Chapter 4, “Setting Up Drives”
Printing	Chapter 5, “Printing”
COM Ports	Chapter 6, “Using Wabi COM Ports”
DOS Emulator Settings	Chapter 11, “Using a DOS Emulator in the Wabi Environment”

3

Instructions for Tasks Related to Configuration Manager

▼ Opening Configuration Manager

1. **Open the Main group.**
2. **Open the Control Panel icon.**
   The Wabi Config icon is displayed among the other Control Panel icons.
3. **Open the Wabi Config icon.**
   The Configuration Manager window opens, displaying the Diskettes tab sheet.

Note – You can also access Configuration Manager through dialog boxes within Microsoft Windows. For example, when defining printers in Control Panel, you can choose the Network button in the Connect dialog box to open Configuration Manager's Printers tab.

▼ Exiting Configuration Manager

There are several ways to exit Configuration Manager, including the following:

- **Choose the OK button when you finish making changes.**
- **Choose the Cancel button if you do not want to make changes.**
- **Double-click the top left corner of the Configuration Manager window if you do not want to save any changes.**

Setting Up Drives 4

Drives provide access to your operating system devices, files, and directories. Before you can use a drive, you must configure it. Configuring a drive means telling the Wabi program the type of drive you want, as well as some specifics about the drive. Once you configure a drive, you can access it.

If you are not familiar with drive concepts in the Wabi program and would like to learn more about them, read the next section, "About Drives."

If you want instructions for specific tasks related to drives, use the following table to locate the instructions you need.

Task	Page
Setting a Network Drive	59
Setting a Local Drive	60
Accessing a CD-ROM Drive	60

About Drives

The Wabi program uses two kinds of drives:

- *Diskette drives* – Drives A and B are diskette drives. These drives connect (map) to diskette devices defined in your operating system. Diskette drive A is set up for you and assigned automatically as the default diskette drive. (You can change this assignment.) If your computer has a second diskette drive, use diskette drive B to represent this drive.
- *Wabi drives* – Drives C through Z represent Wabi drives, which are functionally similar to the local disk drives and network drives used on DOS-based systems. A Wabi drive can be assigned to a directory on a drive physically located within your computer, or to a directory that is physically located on a remote system and accessed, or mounted, over the network by your operating system.

To learn about designating a drive as a network drive, read "Wabi Network Drives" on page 53.

The Wabi program does not know if a drive's assigned directory is local or on the network, because it accesses the drive through a directory path. The physical location of the directory is transparent to you and to the Wabi program.

Diskette Drives

To use a diskette drive, you must connect it to an operating system diskette device. A *device* is an operating system file that allows you to access a physical device, such as a diskette drive. Once you make this connection, the Wabi program retains it for all subsequent sessions, or until you change the connection. Most likely, the Wabi program's default connection will work for your operating system, and you can use the diskette drive without changing the diskette connection to the device.

Learn how to make a diskette drive connection by reading “Connecting a Diskette Drive” on page 55.

Diskette Tab Sheet

You use the Diskette tab sheet shown in Figure 4-1 to make and change diskette drive connections, and to specify a timeout period for the Wabi program’s control of your diskette drive.

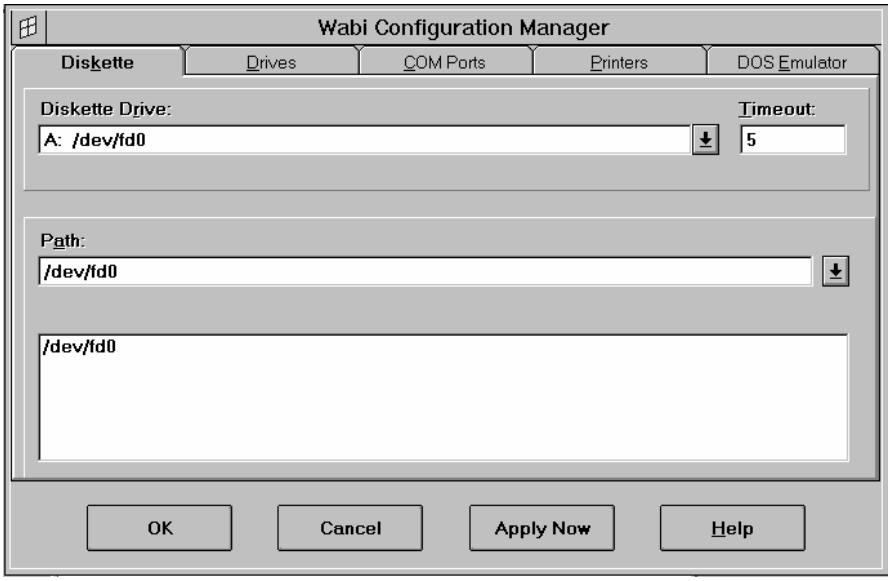

Figure 4-1 Diskette Tab Sheet

Diskette Drive

The Diskette Drive list box shows the current connection recorded in `wabi.ini` for the default diskette drive, A:. If you have two diskette drives, you can select drive B: in this list so you can assign a diskette device to B:.

Timeout

The Timeout box displays a timeout period (in seconds) for the diskette device. The Wabi program gives up control of the diskette drive if the device has not been used after this period of time, allowing other

programs to use the diskette drive while the Wabi program is running. Wabi regains control the next time you access the diskette through the Wabi program.

Path

The Path box is where you specify the complete path to the UNIX diskette device driver you want to use. If you know the complete path to the UNIX device driver you want to use, type it in the Path box and press Enter.

If you aren't sure what the path is, you can type the beginning of the path and press Enter to see a list of subdirectories in the file browsing area. You can then construct a path from the list by double-clicking on directories within the browser.

You can also use UNIX file name substitution characters such as the asterisk (*) to narrow your search to directories or files matching a specific pattern. For example, if you enter `/dev/fd*` in the Path box, the file browsing area will display all directories and files in `/dev` that begin with `fd`. For more information about using file name substitution characters, see “UNIX File Name Substitution Characters” on page 38.

You can return to the default device by opening the Path list and selecting the last device in the list.

Note – The Wabi program uses raw device files. In most Linux operating systems, raw diskette device files begin with the letters fd, as in `/dev/fd0`. (See your system documentation for more information about raw devices.)

Diskettes and DOS

See “Formatting a DOS Diskette” on page 56 for more about diskette formatting procedures.

You cannot format a DOS diskette within the Wabi program. Before you can use a diskette with the Wabi program, it must already have a DOS file format.

Within Linux, you can use the `fdformat` command to do a low-level format of a floppy diskette. Then use the `mformat` command to write a DOS filesystem to the diskette. Refer to the man pages for these utilities for more information.

If you have the DOS emulator installed and configured on your system, you could also start a DOS session and use the DOS `format` command.

> **Note –** You cannot use the Microsoft Windows File Manager's Disk Format command to format diskettes.

Wabi Drives

Wabi drives are represented by the letters C through Z. These drives serve as a gateway to the mounted file systems and directories of your operating system. By assigning drives to directories, you can access information on your computer's local hard disk, or across a network on a remote file server. The Wabi program cannot tell if a drive is local or on the network, because it accesses the drive through a directory path. The physical location of the directory is transparent to you and to the Wabi program. However, when you connect a drive to a directory, you can tell the Wabi program to represent the drive to applications as a network drive, whether the drive is local to your system or on the network. This feature is important to some applications that run in the Wabi program.

To learn more about designating a drive as a network drive, read "Wabi Network Drives" on page 53.

Drives Tab Sheet

You create and change drive assignments in the Drives tab sheet, shown in Figure 4-2. When you assign a drive to a directory, the Wabi program retains your drive assignment for all subsequent Wabi sessions, or until you change the assignment.

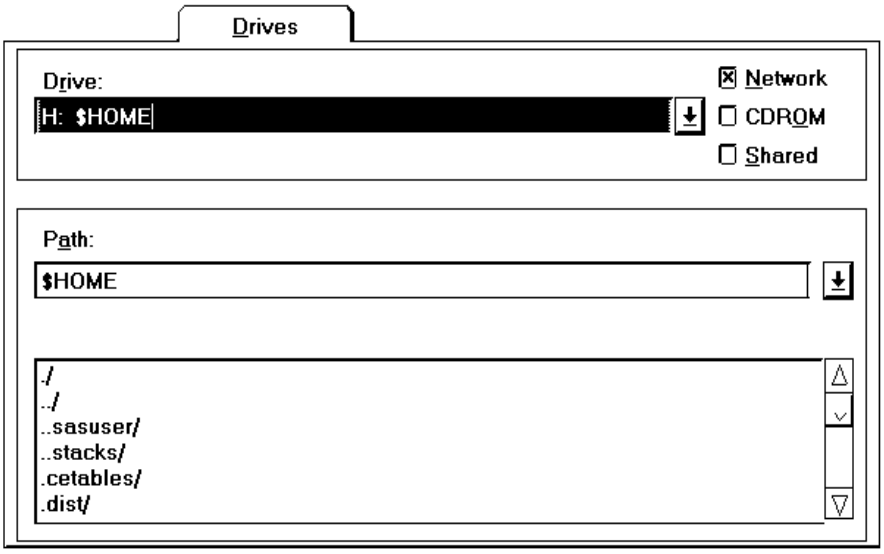

Figure 4-2 Drives Tab Sheet

Drive

Connect a drive to a file system by following the steps in “Assigning a Drive” on page 57.

The Drive list box presents a list of Wabi drives and their assignments. Open the list to see the current assignments. Drive letters that are not connected to a file system appear with no assignment in the Path field. If you want to make or change a drive connection, select the drive in the list box.

The Drive panel includes the following checkboxes for specifying options for the selected drive:

The section “Wabi Network Drives” on page 53 explains what this option means to applications.

- *Network* – Checking this box makes the drive appear to an application as a network drive, whether the assigned directory is local or on the network. An “X” indicates the selected drive is viewed as a network drive. By default, all drives except C are viewed as network drives.
- *CDROM* – Checking this box allows Wabi to correctly map file names on CD-ROM drives.
- *Shared* – This check box is used to enable file sharing on the selected drive. An “X” indicates file sharing is enabled on the selected drive.

Path

The Path box displays the current connection for the selected drive. If the Path box is blank, the selected drive is not connected. You can edit the path displayed on this field, or type a new path assignment into the field.

If you prefer to browse your file systems for a path, you can type the beginning of a path and press Enter to see a list of subdirectories in the file browsing area. You can then construct a path from the list by double-clicking on directories within the browser. Enter a slash character (/) to begin browsing at the root directory.

You can use UNIX file name substitution characters such as the asterisk (*) to narrow your search to directories or files matching a specific pattern. See “UNIX File Name Substitution Characters” on page 38 for more information about file name substitution characters.

Note – Automounted file systems may not appear in the browser until you access them directly. You can do this by entering the path in the Path box and pressing Enter. You can then browse the automounted file system’s subdirectories in the file browser.

Default Drive Assignments

When you first open the Drives tab sheet, notice that several drives are already assigned. Some of these assignments are permanent and you cannot change them.

The drives you cannot change are:

`C: -> $HOME/wabi`	The directory in which your Wabi user files are installed.
`R: -> /`	The root directory. Drive R serves as a gateway to network file systems and to all directories on your system.
`W: -> $WABIHOME`	The directory used to store Wabi program files.

If you select the C, R, or W drive, the Path box is blank.

The preassigned drives you can change are:

`E: -> $PWD`	The directory that was current when the Wabi program was started.
`H: -> $HOME`	Your home directory.

New Drive Assignments

Making a new drive connection is a simple process. You must:

- Select a drive letter.
- Specify a drive path.
- Choose the Apply Now button.

Selecting a drive letter is easy: open the Drive list and click on any unassigned letter. Type a path or the beginning of a path in the Path box. If you type only a partial path, the file browser at the bottom of the tab sheet shows you the directories matching the partial path. Single-clicking a directory in this list places the directory in the Path box. Double-clicking a directory in this list places the directory in the path and also opens the directory and displays its subdirectories. By sequentially navigating remaining directories you can construct a path to the desired file system.

To connect a network drive, follow the steps in "Assigning a Drive" on page 57.

When you reach the destination directory, choose the Apply Now button. The Wabi program assigns the drive letter you selected to the path you constructed. To save assignments you make, choose the OK button.

You need adequate file permissions to access the files and directories you assign to Wabi drives. You will see an error message indicating that a permission problem exists if you attempt to access a file or directory for which you do not have adequate permissions. See the Caldera Network Desktop *Getting Started Guide* or a similar reference for information about checking and changing file permissions.

Change a Drive Connection

Follow the steps in "Changing a Drive Assignment" on page 57 to accomplish this task.

You can change the connection for an individual Wabi drive, except for drives C, R, and W, by selecting the drive letter and editing the path displayed in the Path box, or browsing for a new path. Before you change a drive connection, make sure it is not being used by any running applications.

Disconnect a Drive

You can remove the connection for an individual Wabi drive, except for drives C, R, and W, by selecting the drive letter and deleting the path displayed in the Path box. Before you disconnect a drive, make sure it is not being used by any running applications.

File Locking and File Sharing

The Wabi program supports both file locking and file sharing. Each is important and is described as follows:

- *File Locking* – Prevents multiple users from accessing a file or a record at the same time.
- *File Sharing* – Enables you to share files and data with others by controlling who can do what with a file at a given time.

File Locking

Wabi file locking depends on the capabilities of the applications you run. If an application requests a file or record to be locked, Wabi locks it. If an application never uses locking because it assumes a single-user environment, Wabi does not lock files or records for the application. You do not have to enable file and record locking because Wabi always does it at the application's request. Wabi clears file locks when you close a file or exit the Wabi program. This includes files that are open when the Wabi program is terminated unexpectedly.

File Sharing

Wabi file sharing allows users and applications to access files simultaneously, yet safely. File sharing occurs only if you enable it. When file sharing is enabled, each file opened can be shared if the application supports file sharing. The ways in which you can share files are determined by the application, not by the Wabi program. For example, while you are using a particular file, an application may allow another user to view that file but not write to it. An application's sharing methods are integral to the application, and cannot be controlled by users.

To set a drive up for file sharing, see "Enabling File Sharing for a Drive" on page 59.

You enable file sharing drive-by-drive, using the Shared checkbox in the Drives tab sheet. The default setting on all Wabi drives is sharing disabled. This is because file sharing can increase file access time on a drive, and also may limit the number of files that all applications running in Wabi can have open at one time. You should enable file sharing only on drives where you really need it.

When file sharing is enabled on a drive, every file that applications open on that drive is shared. This means that for every open file, the Wabi program creates a share lock, which controls what can be done to the file. Share locks are cleared when you close a file or exit the Wabi program. However, unlike file locks, share locks are not automatically removed when the Wabi program terminates unexpectedly on some operating systems. If this happens, you may have to clear share locks manually.

Wabi Network Drives

In the Wabi environment, the directory to which a drive letter is connected may reside on a local disk or on a remote disk on the network. To the Wabi program, and to UNIX programs in general, it does not matter where a directory path leads; the underlying operating system and network software keep track of file systems.

However, it does matter to some Microsoft Windows applications whether a given drive letter is a local drive, or is located somewhere else on the network. These applications may check to see if a particular drive letter is local or networked, and may behave differently in each case. For example, when you install an application onto a drive, the installation program may try to determine if the drive is networked. If it finds that the drive is networked, the installation program may present you with a number of installation options specific to servers, such as the location of shared program files and user directories. Also, some applications may not use file locking if they detect that the drive is local.

To set up a drive as a network drive, see "Setting a Network Drive" on page 59.

The Wabi program lets you control how the Wabi drives appear to applications. The Drives tab sheet includes a Network option that, when enabled, specifies that the selected drive is seen by applications as a network drive. When this option is not enabled, the drive appears to be a local hard drive to an application running in the Wabi program.

By default, Wabi makes each drive appear as a network drive. In most cases you should leave the Network option enabled so applications that can use file locking will detect a network environment and lock files as you open them. However, if you install or use an application that requires a local drive, you can disable the Network option.

CD-ROM Drives

The Wabi program allows you to access a CD-ROM device, provided the CD-ROM uses a media format that Linux recognizes. For example, the ISO 9660 standard format for CDROMs can be read by Linux, so Wabi can also access those CDROMs.

Connecting to a CD-ROM drive with the Wabi program is much like connecting any Wabi drive. You mount the device on a mount directory in the native operating system, and then assign a drive letter to the mount

directory in the Drives tab sheet in the Wabi Configuration Manager. You should select the CDROM checkbox to ensure that Wabi can correctly map file names on CD-ROMs.

Note – You cannot use a CD-ROM drive to play music CDs or video laser disks in the Wabi environment. Please consult the *Wabi Release Notes* for more information.

Potential CD-ROM Problem

If you install an application that uses Microsoft CD-ROM extensions, and you have purchased the rights to use that application on your local system (not on a network), you may not be able to run your CD-ROM application.

This is due to a protection mechanism that the Microsoft Corporation has incorporated in much of its CD-ROM-based application software. This mechanism ensures that a CD-ROM application purchased for use on a local system is not capable of running on a network. Because the Wabi program accesses a local CD-ROM drive through a path in your operating system, it appears to a CD-ROM application running under the Wabi program that the application is being used on a network, not on a local CD-ROM drive.

This limitation cannot be overcome by disabling the Network option in the Drives tab sheet.

Instructions for Tasks Related to Setting Up Drives

This section provides detailed, step-by-step instructions for performing a variety of tasks related to diskette drives and Wabi drives. For certain tasks, you will see samples of the command input and output associated with the task. Margin notes refer to sections of this manual related to the task described.

▼ Connecting a Diskette Drive

Read "Diskette Drives" on page 44 for background information about how Wabi uses diskette drives.

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.
3. **Choose the Diskette tab.**
   Alternatively, press Alt+k.
4. **Select the appropriate drive (A: or B:) in the Diskette Drive list.**
5. **Enter the full path to the device name in the Path box.**
   You can use the file browser to locate the device file, as explained on page 49.
6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Changing the Diskette Drive Timeout Period

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.

Read "Timeout" on page 45 for more about the diskette drive timeout.

3. **Choose the Diskette tab.**
   Alternatively, press Alt+k.

4. **Select the Timeout field and type the number of seconds the diskette drive should be idle before the Wabi program releases control of the drive.**

5. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Formatting a DOS Diskette

You cannot format diskettes with File Manager in the Wabi environment. However, you can use Linux commands to create a DOS-format diskette. The general procedure to format a DOS diskette is:

1. **Open a command line window.**

2. **Place a diskette in the diskette drive.**
   Drive A is assumed here. The device will change depending on the drive and on your system configuration.

3. **Type the low-level format command fdformat and press Enter.**
   ```
   fdformat /dev/fd0
   ```

4. **When formatting is complete, type the command to create a DOS filesystem on the newly formatted diskette and press Enter.**
   ```
   mformat -t 80 -h 2 -s 18 A:
   ```

5. **Eject the diskette.**

Note – If you have the DOS emulator configured, you can also format a DOS diskette by using the DOS `format` command in the emulator.

▼ Assigning a Drive

"Wabi Drives" on page 47 provides an overview of Wabi drives.

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.
3. **Choose the Drives tab.**
   Alternatively, press Alt+d.
4. **Select an unassigned drive letter in the Drive list.**
5. **In the Path box, enter the path you want to assign to this drive.**
   If you would like to browse file systems, enter the beginning of a path and press Enter. To begin at the root, enter /. You can then navigate through directories until you reach the file system you want.

   Double-click a directory name to place it in the path and view the directory's contents. Double-clicking on ../ brings you up one level in the directory hierarchy.
6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Changing a Drive Assignment

1. **Make sure the drive is not being used by any running applications.**
2. **Open the Control Panel.**
3. **Open the Wabi Config icon.**
   The Configuration Manager opens.
4. **Choose the Drives tab.**
   Alternatively, press Alt+d.

5. **Select the drive you want to change.**
6. **Edit the path in the Path box or use the file browser to select a new path.**
7. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Disconnecting a Drive

1. **Make sure the drive is not being used by any running applications.**
2. **Open the Control Panel.**
3. **Open the Wabi Config icon.**
   The Configuration Manager opens.
4. **Choose the Drives tab.**
   Alternatively, press Alt+d.
5. **Select the drive you want to disconnect.**
6. **Delete the path in the Path box.**
   The path assignment is cleared for the selected drive.
7. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

Before disconnecting a drive, you may want to read "Disconnect a Drive" on page 51.

▼ Enabling File Sharing for a Drive

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.
3. **Choose the Drives tab.**
   Alternatively, press Alt+d.
4. **Select the drive for which you want to enable sharing.**
5. **Select the Shared check box.**
   An "X" appears in the box.
6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

Read "File Sharing" on page 52 for more about the issues involved with shared files.

▼ Setting a Network Drive

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.
3. **Choose the Drives tab.**
   Alternatively, press Alt+d.
4. **Select the drive that you want to appear as a network drive.**
5. **Select the Network check box to enable it.**
   An "X" appears in the box.

6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Setting a Local Drive

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   The Configuration Manager opens.
3. **Choose the Drives tab.**
   Alternatively, press Alt+d.
4. **Select the drive that you want to appear as a local drive.**
5. **Select the Network check box to disable it.**
   The box is cleared.
6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Accessing a CD-ROM Drive

Some cautions apply to CD-ROM drives. Learn about them in "Potential CD-ROM Problem" on page 54.

Follow these general steps to access a CD-ROM. The precise commands required vary, depending on your system. Some systems automatically make a compatible CD-ROM available when you insert the CD-ROM into the drive. If your system does this, begin with Step 7.

1. **Open a command line window.**
2. **Change to the root (/) directory.**

3. **Become superuser.**
   `su`

4. **Create a directory named** `/mnt/cdrom`**.**
   This directory may already exist, or may default to a different location on your Linux system.

5. **Mount the CD-ROM.**
   The following command is an example, which may need modification to work on your Linux system:

   `mount -t iso9660 /dev/cdu535 /mnt/cdrom`

   Make sure you can read the CD-ROM before proceeding. For example, try to do an `ls` command on the `/cdrom` directory.

6. **Exit from superuser status.**
   `exit`

7. **If it is not already running, start the Wabi program.**

8. **Open Control Panel, open the Wabi Config icon, and choose the Drives tab.**

9. **In the Drives tab sheet, select an unassigned drive letter.**

10. **In the Path box, type** `/mnt/cdrom` **(or whatever directory name the CD-ROM is using).**

11. **If you want the CD-ROM drive to be seen as a network drive, select the Network check box.**
    See the application's documentation to determine if the CD-ROM can be used on a network.

12. **Select the CDROM checkbox.**
    This ensures that filenames on the CD-ROM are mapped correctly.

13. **Choose OK to validate and save your changes, and exit Configuration Manager.**
    If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

    Alternatively, choose Cancel to quit Configuration Manager without making changes.

14. **Access the CD-ROM through the drive letter you assigned.**
    For example, if you connected F to `/mnt/cdrom`, you can run a `setup` program on the CD-ROM with the command `F:\setup`.

Reference Material for Drives

This section presents material you may find useful when you work with diskette drives, Wabi drives, and CD-ROM drives.

Troubleshooting Problems With Diskette Drives

Table 4-1 suggests solutions to problems you might experience when working with diskette drives A and B.

Table 4-1 Diskette Drive Problems and Solutions

Symptom	Possible Cause	Solution
"Device Not Ready (Abort, Retry, or Ignore)" error	Diskette may not be seated properly in the drive.	Remove diskette and reinsert it. Try to access the diskette again.
Can't access drive A or B	Another program is controlling the drive.	Eject the diskette with a command from the other program, reinsert the diskette, and try accessing it through Wabi again.

Table 4-1 Diskette Drive Problems and Solutions *(Continued)*

Symptom	Possible Cause	Solution
	Invalid device name specified in Configuration Manager's Diskette tab sheet.	Specify a raw diskette device file. See your system documentation for information about diskette (or floppy) devices.
	Inadequate file permissions to device file or directory.	You must have read and write permission to your system's device files and directories. Use the UNIX `chmod` command to change permissions if necessary.
Can't format DOS diskette	Not supported under Wabi program.	You can use preformatted diskettes or format them on a PC running DOS. A Linux procedure to format DOS diskettes is also provided in this chapter.

Troubleshooting Problems With Wabi Drives

Table 4-2 suggests solutions to problems you might experience when attempting to connect Wabi drives to directories.

Table 4-2 Wabi Drive Problems and Solutions

Symptom	Possible Cause	Solution
Can't connect a drive to a local directory	Inadequate file permissions.	You must have read permission or more to any directory you want to access. Use the UNIX `chmod` command to change permissions if necessary.
	Incorrect path assignment.	If you entered the path name manually, make sure the path is a directory, not a file.
Can't connect a drive to a remote directory	Inadequate file permissions.	You must have read permission or more to any directory you want to access. Contact your system administrator or the owner of the directory.
Remote directory not in Path file browser area.	Remote file system not mounted.	You must be able to access the directory from the operating system before you can access it in Wabi.

Table 4-2 Wabi Drive Problems and Solutions *(Continued)*

Symptom	Possible Cause	Solution
		If your Linux system automatically mounts any remote file systems, enter the path directly in the Path box to automatically mount the file system. If your UNIX system does not automatically mount remote file systems, see your system documentation for procedures to make remote file systems accessible. Once the file system is accessible from the operating system, open the Drives tab sheet in Configuration Manager and connect a drive to the directory.
Can't change connection for drive C, R, or W	Permanent drive connections cannot be changed.	There is no way to change the C, R, or W connections. If you want to change the C connection because you do not want your user `wabi` directory in your home directory, do *not* simply move or copy your existing `wabi` directory to another location because the numerous symbolic links will not be preserved. Instead, try the following procedure: • Exit Wabi • Rename your existing `wabi` directory to `wabi.old` • Create a directory named `wabi` in the desired new location • Create a symbolic link named `wabi` in your home directory, with the new directory as the target • Restart Wabi The Wabi program creates a new `wabi` directory, placing it in the new location. If you added any files to your original `wabi` directory, move them from `wabi.old` to the new directory, and then delete `wabi.old`.
Drive errors when using a DOS Emulator	Dissimilar drive mappings.	Assign the same drive letters to the same path names in both the DOS Emulator and Wabi. See page 135 for more information.

Troubleshooting Problems With CD-ROM Drives

Table 4-3 suggests solutions to problems you might experience when attempting to access and use a CD-ROM drive.

Table 4-3 CD-ROM Drive Problems and Solutions

Symptom	Possible Cause	Solution
Can't mount CD-ROM	CD-ROM type or device not supported by LInux.	The Wabi program can only use CD-ROMs that Linux can access. See your documentation for information about using CD-ROM drives.
Can't run application off CD-ROM	Application detects network environment.	Some applications on CD-ROM will not work in Wabi because they determine the drive is a network drive. There is no way to use such applications. See page 54 for more information.

4

Printing 5

This chapter discusses printing operations and tasks. The Wabi program supports a wide range of printers, including PostScript printers, Epson FX, LX and MX-series printers, Hewlett-Packard LaserJet III series printers, and text-only printers. In a network setting, the Wabi program allows you to direct printed output to a variety of destinations, including local and network printers and files.

If you are unfamiliar with Wabi printing concepts and procedures and want to learn more about them, read the next section, “About Printing.”

If you want instructions for specific tasks related to printing, use the following table to locate the instructions you need.

5

About Printing

Wabi print functions bridge the gap between an application's printing method and the printing mechanism of your operating system. Print functions are *transparent*. That means once you establish Wabi printer settings and connections, you can issue a print command from within an application and your document is printed.

When you issue a print command from within an application, the application passes your print request to a printer driver which, in turn, passes the print request to an assigned printer port. Up to this point, the print process is the same as in the Microsoft Windows environment. However, instead of sending the print request to an LPT port, the Wabi program redirects the request to the print spooling system of Linux, along with the name of a printer and a print command.

Your Linux printing system processes print jobs from all applications you run on your desktop, whether they run in the Wabi program or in your operating system. Printing is done in the background, so you never have to stop your work while a print request is carried out.

You manage printers, print queues, and print jobs with the same printer management utilities or commands you normally use to manage printing on your Linux system. You do not need (and cannot use) a separate tool such as the Windows Print Manager to manage printing from the Wabi program.

Supported Printer Types

The Wabi program can print to the following printer types:

- Text-only
- PostScript
- HP LaserJet III series
- Epson FX, LX, and MX series

The Wabi program supplies and installs the printer drivers for the HP LaserJet III and Epson printers. The Wabi program also installs two of the printer drivers supplied with Microsoft Windows: the Generic/Text Only and PostScript Printer drivers. This lets the Wabi program print to most printers right out of the box.

The Wabi program can also use the additional PostScript printer descriptions supplied with Microsoft Windows. You can install them through the Control Panel's Printers dialog just as you would in a Microsoft Windows environment on a PC.

Note that for HP LaserJet III and Epson printers, you can use *only* the Wabi-supplied drivers. The drivers supplied with Microsoft Windows for these printers are not supported in the Wabi program.

Before You Can Print From Wabi

Before you can print from applications running in the Wabi program, you must be able to use a printer from the Linux operating system. You (or your system administrator) must configure your operating system to recognize the printer. If you can print on a printer using a print command (such as `lp` or `lpr`) in your operating system, you will be able to access the printer from the Wabi program.

Printer Configuration

Normally, you do not need to do anything special to your printer configuration in Linux in order to print from your Wabi environment. However, if you use one printer most often, you should designate it as your default printer in Linux. That way, the Wabi program will automatically send all its print jobs to that printer unless you specify a different printer.

Note – If you want to print to an HP LaserJet III printer on an HP-UX® print server, the printer definition on the server should be set up for a “dumb device” to prevent filtering by the print server.

See your system documentation for more information about installing and accessing printers, and designating a default printer.

The Default Wabi Printing Setup

The Wabi program is ready to print in many environments without any action on your part. By default, the Wabi program assigns the PostScript Printer (or Apple LaserWriter II NTX) driver to port LPT1, and connects LPT1 to your default Linux printer. These settings will work for printing to PostScript printers in most situations. However, you can use the Microsoft Windows Control Panel and Wabi Configuration Manager to change the default printing setup if you like.

Changing Print Settings

If the default Wabi printing setup is not appropriate for your environment, you can change the print settings in Microsoft Windows Control Panel and Wabi Configuration Manager, so you can print on any supported printer that you can access from your operating system.

Control Panel’s Printers Dialog Box

You use the Control Panel for all print settings except those pertaining to the connection between Wabi LPT ports and UNIX printers.

Figure 5-1 shows the Control Panel's Printers dialog box.

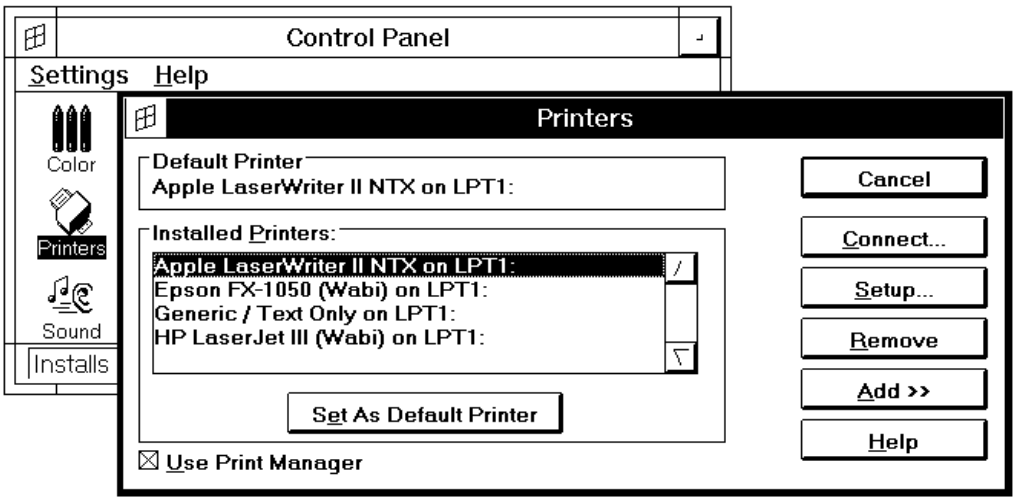

Figure 5-1 Control Panel's Printers Dialog Box

In the Wabi environment, you use Control Panel's Printers dialog box to:

- Install a different printer description for a PostScript, HP LaserJet III, or Epson printer
- Change the printer setup of an installed printer
- Specify a new Wabi default printer
- Set up to print to a file
- Assign a directly-connected serial printer to a COM port
- Assign a printer to a different LPT port

You perform these tasks in the Wabi environment the same way you would in the Microsoft Windows environment. The Printers dialog box and related dialog boxes work as they do in Microsoft Windows, with the following exceptions:

- Microsoft Windows Print Manager, whether enabled or disabled in the dialog box, does not run in the Wabi environment.

- Although you may be able to add an unsupported driver from the List of Printers, the Wabi program may not be able to use it. The only drivers supported are those described in “Supported Printer Types” on page 69.
- Several items in the Connect dialog box, which opens when you choose the Connect button, are not applicable in the Wabi environment. The settings are: Device Not Selected, Transmission Retry, and Fast Printing Direct to Port. In the Microsoft Windows environment, these settings affect Print Manager and DOS interrupts.
- The Network button located in the Connect dialog box opens the Printers tab sheet in Wabi Configuration Manager, which you use to connect a Wabi LPT port to a printer in your Linux system.

Configuration Manager’s Printers Tab Sheet

You use the Printers tab sheet, shown in Figure 5-2, to connect LPT ports to UNIX printers and to define UNIX print commands.

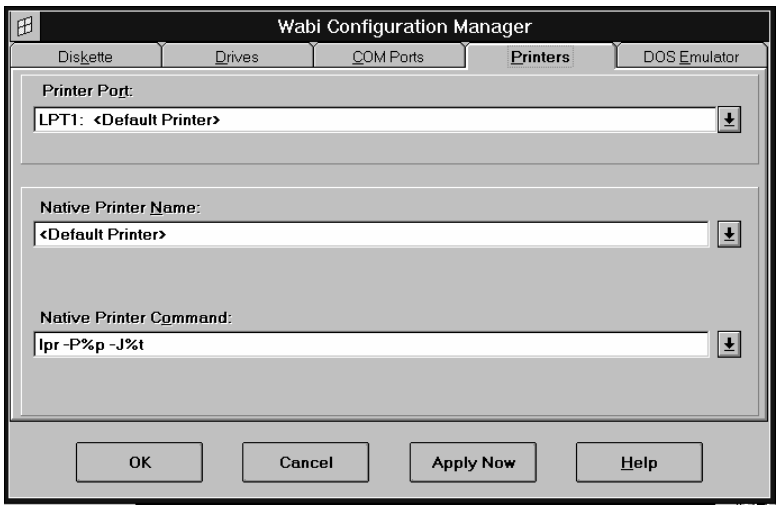

Figure 5-2 Printers Tab Sheet

Your Linux operating system recognizes and addresses printers by their names. That means that every printer you can use has a name. In addition, your operating system uses a specific command to initiate a print job. When you connect a printer to a Wabi LPT port, you indicate the name of the printer you want to assign to the port and the command required to start a print job.

The Printers tab sheet contains the following items:

- *Printer Port* – Displays a list of LPT ports, LPT1 through LPT8. You select an LPT port from this list. The other choices you make in this tab sheet apply to the LPT port you select here.
- *Native Printer Name* – Displays a list containing the names of all the printers your system is configured to recognize and which you can access. The first name, `<DefaultPrinter>`, is a variable that specifies your current Linux default printer, which is the printer used when you print without specifying a printer name. When you assign a port to `<DefaultPrinter>`, print jobs sent to that port go to the current system default printer. If you change the default printer on your system, the Wabi program immediately uses the new default printer for `<DefaultPrinter>`.
- *Native Print Command* – Displays a list of operating system print commands. You may also type in the box if you want to enter your own command.

"Connecting a Wabi Printer Port to a UNIX Printer" on page 80 provides the steps for assigning a printer to a port.

Connecting a printer to a Wabi LPT port is as simple as opening the Native Printer Name list and selecting a printer name.

In most cases, you will not have to alter the Native Print Command entry. The default entry supplied with the Wabi program will usually be correct. However, you can select the entry field and type in a command if you want. You can change the native print command to any command line that you know works in your operating system to get the output you want from the printer. See your Linux system documentation for information about commands used for printing.

If you change the print command and later want to return to the default print command, select the last command in the list.

The default print command includes two placeholders for parameters used with arguments to the print command:

- `%p` – The Wabi program replaces `%p` with a printer name. If the printer name is `<DefaultPrinter>`, the Wabi program omits the argument using `%p` when a print command is issued to the operating system. This makes the operating system use its default printer.
- `%t` – The Wabi program replaces `%t` with the print job title.

Using Other PostScript Printer Descriptions

If you find that the printer output is not exactly what you want when you use the PostScript Printer driver, you should install the PostScript printer that matches your PostScript printer model. This lets Windows applications tailor themselves according to your printer's capabilities for paper size, multiple paper trays, envelopes, and so on. It also gives the application access to all the fonts on the printer.

See "Installing Printer Drivers for PostScript, Epson, or HP LaserJet III Printers" on page 79 for the procedure.

Note – In Microsoft Windows and in the Wabi program, all PostScript printers listed in the Control Panel's Printers dialog use the same driver program, `pscript.drv`. However, each listed printer has its own printer description, which provides detailed information about the printer's capabilities. When you select and install a particular model of PostScript printer, you are installing the printer description, not the driver.

Using Epson and HP LaserJet III Printers

If you want to print to an HP LaserJet III or Epson printer, you must use the `HP LaserJet III (Wabi)` or `Epson FX-1050 (Wabi)` printer drivers. The Wabi program installs these drivers in your Wabi environment and assigns them to LPT1 the first time you start the Wabi program.

You must use the printers that include `(Wabi)` in the name in the List of Printers. The Wabi printer descriptions for Epson and HP LaserJet III printers are at the top of the List of Printers in the Control Panel's

Printers dialog, as shown in Figure 5-3. Other drivers in the list use the Microsoft Windows version of the drivers, which are not supported in the Wabi program.

Epson Models — The Epson printer driver provided with Wabi software supports many Epson printer models. If your Epson printer is not an FX-1050, you can install a printer description that matches your particular printer model. The following Epson printers are supported by the Wabi Epson printer driver:

Epson FX-80	Epson FX-80+	Epson FX-85	Epson FX-86e
Epson FX-100	Epson FX-100+	Epson FX-185	Epson FX-286
Epson FX-286e	Epson FX-800	Epson FX-850	Epson FX-1000
Epson FX-1050	Epson FX	Epson LX	Epson MX

If you have an Epson PostScript printer, you should use the appropriate PostScript driver, not the Epson FX-1050 driver.

HP LaserJet Models — The HP LaserJet III printer driver provided with Wabi also supports the LaserJet IIID and LaserJet IIIP models. If you have these models, you can install a printer description that matches them. The HP LaserJet III driver can also be used with LaserJet IV printers, although the driver may not be able to use all the LaserJet IV's capabilities. The driver *cannot* be used with LaserJet II printers. Note that the `HP LaserJet III (Wabi)` driver does not support font downloading with the HP Font Installer.

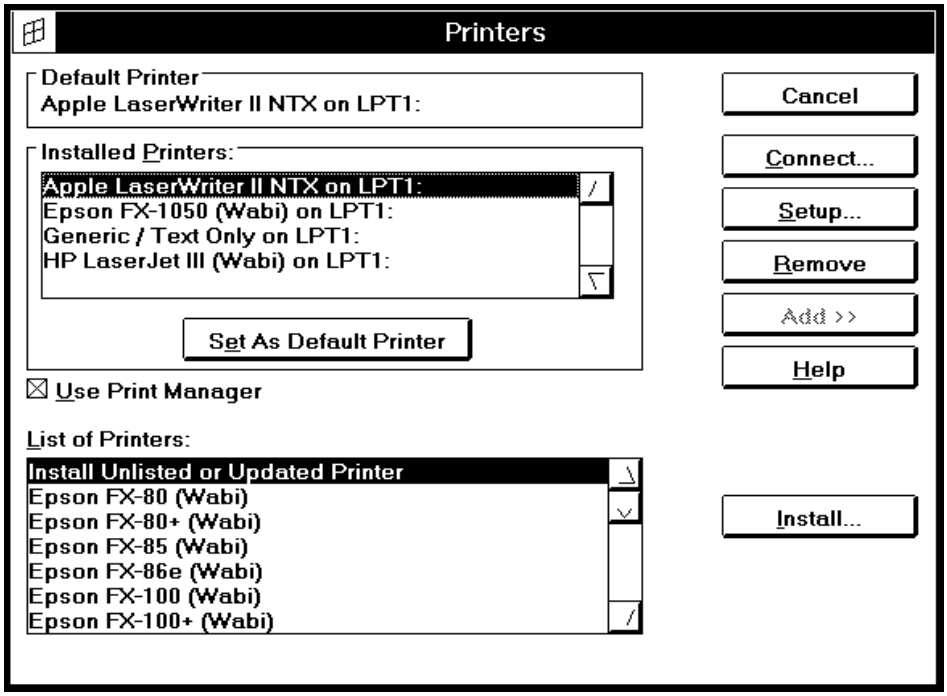

Figure 5-3 Printers Dialog Box Showing Wabi Printer Descriptions

Epson or LaserJet III System Default Printer

If your system default printer is an HP LaserJet III or Epson printer, before you print the first time, you should use Control Panel to assign the `HP LaserJet III (Wabi)` or `Epson FX-1050 (Wabi)` printer as your Wabi default printer. The Wabi program is set up to print to PostScript printers by default.

Using Text-Only Printers

You can print to text-only printers (such as dot-matrix printers) using the Generic/Text Only driver supplied with Microsoft Windows. You can also use this driver to print plain text (not graphics) to most printers. If your

printer is not supported in the Wabi environment, you can assign the Generic/Text Only driver to it and print draft-quality documents without graphics.

Note that if your application lets you save a document as an ASCII text file, you probably can print a text file without the generic printer driver. PostScript printers can print text-only documents if they are configured in the operating system to accept simple text input.

Changing the Wabi Default Printer

You set your Wabi default printer the same way you set your Microsoft Windows default printer, using the Control Panel. The Set as Default Printer button in the Printers dialog box sets the selected printer as the default printer.

See "Defining the Wabi Default Printer" on page 80 for the procedure.

Your Wabi default printer should connect to the UNIX printer you use most frequently. For example, if most of your printing is done on an Apple LaserWriter II NTX printer named "speedy" located near your office, attach the Apple LaserWriter II NTX printer driver to a port such as LPT1, and then set this printer as your default. Then use Configuration Manager to connect "Apple LaserWriter II NTX on LPT1" to the "speedy" printer. When you print within an application, the application sends the job to LPT1, and the Wabi program redirects the print job to "speedy."

Connecting the Default Printer in Linux to the Wabi Default Printer

You may find it convenient to use the same default printer for both your Linux and Wabi print jobs. The Wabi program is set up this way initially. If you have changed your print setup, do the following to assign both defaults to the same physical printer:

- Assign a system default printer using your operating system's print management methods (UNIX commands or utilities).
- Use Configuration Manager to connect LPT1 to `<DefaultPrinter>`.
- Use Control Panel to connect a printer to LPT1 and set the printer as your Wabi default printer.

Printing to a File

You can set up a Wabi printer so that all print requests that are sent to the printer go to a file on disk instead of being printed. To do this, you can connect the Wabi printer to the FILE "port" instead of an LPT port. Use the Control Panel to do this.

You will be prompted for a file name whenever you print to this printer from an application.

Some applications allow you to print a single print job to a file using a Print Setup option within the application's menus. If your application has this option and you only occasionally print to a file, it may not be necessary to set up a printer in this way.

Printing Directly to a Serial Printer

Within the Linux environment, you can configure a serial printer so that you can send print requests through the UNIX print system. You can print from the Wabi environment to a serial printer configured in the UNIX print system, just as with any other printer configured in the operating system — through a Wabi LPT port connected to the UNIX printer.

See "Connecting a COM Port to a Serial Device Driver" on page 91 for the steps required to connect a COM port to a serial device on your system.

However, if you have connected a serial printer to a serial port on your Linux-based computer, you can also print directly to the printer through the Wabi program. To do this, first use Configuration Manager to make sure a Wabi COM port is connected to the serial device that controls the serial port. Then use the Control Panel's Ports dialog boxes to connect an appropriate printer driver to the COM port.

The printer's documentation should tell you what to use for COM port settings such as baud rate, flow control, stop bits, etc. You should configure the port through the Control Panel's Ports dialog boxes.

Printing directly to a serial port generally is not recommended because it bypasses the print spooling system of Linux. This means you cannot use your usual print control commands or utilities to cancel or pause the print request. Also, printing directly to a printer is no faster than printing through the operating system's print system, and you must wait for the print job to finish before continuing to work in the Wabi program.

Instructions for Tasks Related to Printing

This section provides detailed, step-by-step instructions for performing a variety of tasks related to setting up the Wabi program for printing.

Note – For information about tasks related to a specific printer driver, refer to the on-line Help provided in the printer driver's Setup dialog box.

▼ Installing Printer Drivers for PostScript, Epson, or HP LaserJet III Printers

1. **Open the Control Panel.**
2. **Open the Printers icon.**
   The Printers dialog box opens.
3. **Choose the Add button.**
   The dialog box expands to include the List of Printers and an Install button.
4. **Select a printer driver appearing in the List of Printers.**
   You must choose either a PostScript printer model, or an HP LaserJet III or Epson model that includes Wabi in the name. The Wabi HP LaserJet III and Epson drivers are at the top of the list of printers, and are not listed alphabetically with the Windows printer drivers.
5. **Choose Install.**
   If you chose a Wabi HP LaserJet III or Wabi Epson driver, the printer is displayed in the list of Installed Printers immediately, and you can close the dialog box.

   If you chose a PostScript driver, such as TI microLaser PS17, the Install Driver dialog box tells you to insert the diskette containing a file needed for the printer.

Refer to page 74 for information about using other PostScript, Epson, and HP LaserJet printers.

6. **Insert the requested diskette and choose OK.**
   If your Microsoft Windows files are on a network drive, use the Browse button to locate the requested file, and choose OK.

   When installation is complete, the printer is displayed in the list of Installed Printers.

7. **Choose Close to exit the dialog box.**

▼ Defining the Wabi Default Printer

"Changing the Wabi Default Printer" on page 77 discusses the default printer.

1. **Open the Control Panel.**

2. **Open the Printers icon.**
   Alternatively, open the Settings menu and choose Printers or press Alt+s, p.

   The Printers dialog box opens.

3. **Select a driver/port combination in the Installed Printers list.**
   The item is highlighted.

4. **Choose the Set As Default Printer button.**
   The selected driver/port combination is assigned as the default, and is displayed in the Default Printer panel.

5. **Choose Close to save your selection and exit the dialog box.**
   Alternatively, choose Cancel to close the dialog box without making changes.

▼ Connecting a Wabi Printer Port to a UNIX Printer

1. **Open the Control Panel.**

2. **Open the Wabi Config icon.**
   Configuration Manager opens.

3. **Choose the Printers tab.**
   Alternatively, press Alt+p.

4. **Select the Printer Port you want to connect.**
   LPT1 through LPT8 are available.

5. **Select the Native Printer Name.**
   This is the name of the UNIX printer you want to assign to the port.

   Select `<DefaultPrinter>` if you want to connect to your operating system's default printer.

   Note – You must designate a default printer in Linux before you can use `<DefaultPrinter>`.

See "Configuration Manager's Printers Tab Sheet" on page 72 for information about this sheet.

6. **Select or enter a Native Print Command.**
   If you do not want to use the default command provided, you can enter one of your own by selecting the box and typing into it. If you want to return to the default command, select the last command in the list.

7. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

5

Reference Material for Printing

This section provides reference material for tasks related to printing.

Troubleshooting Problems With Printing

Table 5-1 suggests solutions to problems you might experience when working with printers.

Table 5-1 Printing Problems and Solutions

Symptom	Possible Cause	Solution
Can't print	Invalid Linux printer name or print command.	Make sure you can print to the same printer outside Wabi, using a UNIX print command such as `lp` or `lpr`. If you can print from a Linux command line, try resetting the print command to the default value by selecting the last command in the Native Print Command list on the Printers tab sheet. If you cannot print using the default, the problem is probably outside Wabi.
	Printer not configured correctly in Linux.	If the printer is not configured correctly, you cannot print outside Wabi with a UNIX print command. If this is the case, see your system administrator or your Linux system documentation for help in configuring the printer.
	Printer port connected to wrong printer.	Check the Printers tab sheet in Configuration Manager to make sure the port is connected to the UNIX printer you want to print on. See page 80 for more information.
Can't print large graphics files.	Out of space in `/tmp`.	The `/tmp` directory could become filled with temporary printing files if it does not have enough free space, so you may have to increase the space allotted `/tmp`. Try this command to see how much space `/tmp` has available: **`df /tmp`**

Table 5-1 Printing Problems and Solutions *(Continued)*

Symptom	Possible Cause	Solution
Desired Windows printer driver not listed in List of Printers.	Printer not officially supported.	If the printer is PostScript, you should be able to use one of the listed printer drivers. The printer's documentation may list other drivers you can use, or tell you what printer is emulated. If it doesn't, contact the printer vendor, who might suggest other drivers to use. You might also contact Adobe Systems, Inc. (the developer of PostScript) for advice. If the printer is *not* PostScript, Epson, HP LaserJet III, or a text-only printer, it is not supported by Wabi.
Desired UNIX printer not listed in the Native Printer Name list.	Printer not configured in Linux.	See your system administrator or your Linux system documentation for help in setting up a printer in Linux.

5

Using Wabi COM Ports 6

This chapter discusses working with Wabi COM ports, or serial ports. A serial port provides a way to connect your computer to an external device, such as a printer or a modem.

If you are not familiar with Wabi COM ports and would like to learn more about them, read the next section, "About Wabi COM Ports."

If you want to go directly to instructions for specific tasks related to ports, use the following table to locate the instructions you need.

6

About Wabi COM Ports

A COM port is a gateway through which you access the world beyond the Wabi program. For example, you can use a port to connect the Wabi program to an information service located in a distant city, or to a local serial printer. Wabi COM ports connect to a serial device in Linux. A serial device is an operating system resource that enables your computer to interact with physically-connected devices such as modems and serial printers. There are four Wabi COM ports available: COM1, COM2, COM3, and COM4. (Your computer probably has fewer than four COM ports installed, however.)

Note – LPT ports provide a way for you to connect to a system printer. Chapter 5, "Printing," discusses the use of LPT ports and explains how to connect them to printers in your operating system.

COM Port Configuration

Before you can use a COM port, you must be able to access serial devices from Linux. Your operating system documentation contains instructions for accessing devices. Once you have access to a serial device from Linux, you can configure a Wabi COM port to access the device.

Note – If a COM port is being used by a Linux program, the port is not available for use by the Wabi program. This could occur if your mouse connects through COM1 or if you connect your computer to a remote system using a UNIX program such as `minicom`.

Configuring a COM port is a two-part process:

- Specify COM port settings through the Control Panel
- Connect the COM port to a Linux serial device through Configuration Manager

COM Port Settings in Control Panel

You'll find the default COM port settings appropriate for most serial communications situations. When using a COM port, try the default settings first. If these settings do not work, change them as necessary to establish and maintain communication. The default settings are:

Baud Rate: 9600
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: Xon/Xoff

You might have to change a COM port setting if you connect to an information service through a modem. The baud rate setting of the COM port must match the baud rate (speed) at which the service operates. For example, this might require you to change the baud rate from 9600 baud to 2400 baud.

Note that many applications automatically adjust COM port settings by determining the settings required and overriding the current COM port settings.

For the steps required to make or change port settings, see "Changing COM Port Settings" on page 91.

You change COM port settings through the Control Panel in the Settings for COM*x* dialog box, shown in Figure 6-1. You access this dialog box by opening the Ports icon and selecting a COM port in the Ports dialog box.

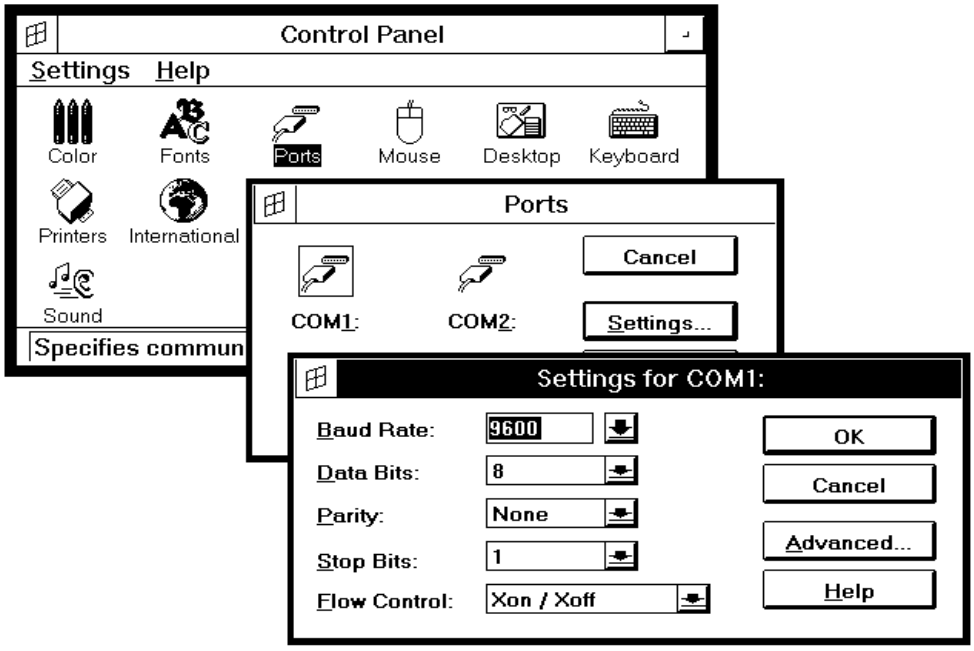

Figure 6-1 Control Panel's Port Settings

You change COM port settings in the Wabi environment the same way you would in the Microsoft Windows environment. The Settings for COM*x* dialog box works as it does in Microsoft Windows, with the following exceptions:

- Hardware flow control is not supported. You should select either None or Xon/Xoff flow control.
- The Advanced Settings, which you open when you choose the Advanced button, have no meaning in the Wabi environment. The Base I/O Port Address and Interrupt Request Line (IRQ) are controlled by how the serial device is configured in Linux.

COM Ports Tab Sheet in Configuration Manager

To make a COM port connection, see "Connecting a COM Port to a Serial Device Driver" on page 91.

The serial communications ports COM1 through COM4 connect to serial device drivers located in Linux. You decide which port to connect to which operating system device.

Use the COM Ports tab sheet, shown in Figure 6-2, to make or change a COM port connection.

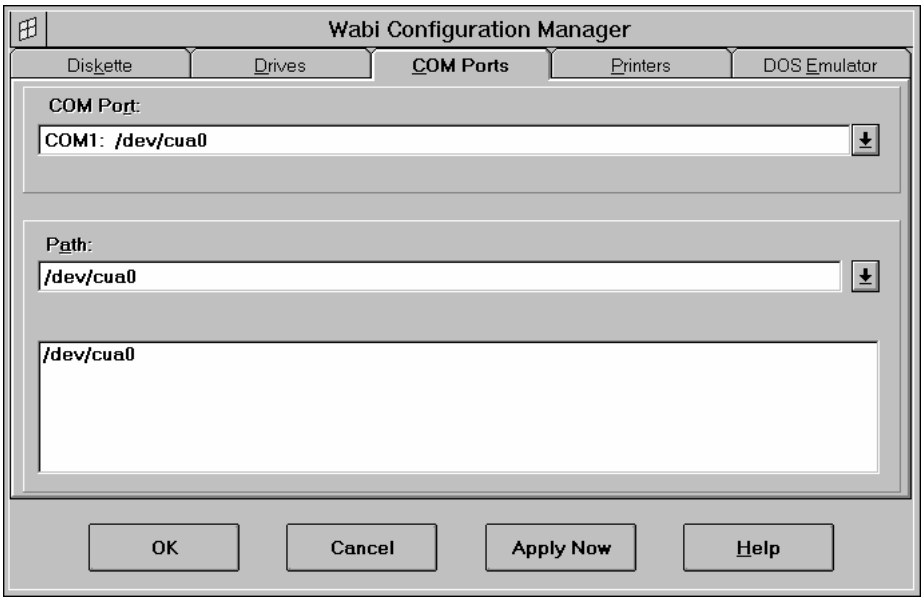

Figure 6-2 COM Ports Tab Sheet

The COM Ports tab sheet lists default paths for device drivers for COM1 and COM2 that are appropriate for your operating system. If your system does not use the default device drivers, you can edit the Path box to specify the correct path. If your system has more than two serial ports, you can also use the tab sheet to specify a path for COM3 and COM4.

Note – You cannot assign the same device driver to more than one COM port. For example, you cannot assign `/dev/cua0` to both COM1 and COM2.

If you are not certain of the path to the correct serial device drivers, you can use the file browsing feature of the Path box to locate them, as explained in “Path Box and File Browser” on page 37.

COM Ports and Printing

See “Printing Directly to a Serial Printer” on page 78 for more information about printing to a serial printer.

The Wabi program allows you to print to a COM port as well as to an LPT port. When you print to a COM port, you bypass your Linux system’s print facility. This allows you to access a printer directly, rather than through the operating system’s print spooler. Your printer must be physically connected to your workstation’s serial communications port.

Instructions for Tasks Related to COM Ports

This section provides detailed, step-by-step instructions for performing a variety of tasks related to serial ports.

▼ Changing COM Port Settings

1. **Open the Control Panel.**
2. **Open the Ports icon.**
   The Ports dialog opens.
3. **Select a COM port and choose Settings.**
   The Settings for COM*x*: dialog opens.

See Figure 6-1 on page 88 for a picture of the dialog box, and a list of the default settings.

4. **Open the drop-down list of each setting you want to change and select an item from the list.**
5. **Choose OK to save your choices.**
   The settings you've specified apply to the selected port.

   Alternatively, choose Cancel to exit the dialog box without changing settings.

▼ Connecting a COM Port to a Serial Device Driver

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   Configuration Manager opens.
3. **Choose the COM Ports tab.**
4. **Select a COM port.**
5. **Enter the path to a device driver in the Path box.**
   If you do not know the path, you can type a partial path and press Enter to begin browsing for the file. Double-click on directories to see their content. The current path appears in the Path box. Browse until the Path box displays the device driver you want to assign to the COM port.

6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Resetting a COM Port Device Assignment to the Default

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   Configuration Manager opens.
3. **Choose the COM Ports tab.**
4. **Select a COM port.**
5. **Open the Path list and select the last item in the list.**
   The last item in the list is the default value for your operating system.
6. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

Reference Material for Tasks Related to COM Ports

This section provides reference material for various tasks related to configuring and using Wabi COM ports.

Troubleshooting Problems With COM Ports

You may encounter problems when attempting to use a COM port. Table 6-1 suggests solutions to problems you might experience when working with COM ports.

Table 6-1 COM Port Problems and Solutions

Symptom	Probable Cause	Solution
Can't assign COM1, device busy	Serial port is being used by another device, such as a mouse or terminal, or by a UNIX `minicom` connection.	Try using a different COM port, if you have one that is not in use.
Can't access COM2	Serial port not configured at operating system level.	See your operating system documentation for information about configuring serial ports.
	Insufficient permissions on serial device file.	Use the command `chmod 666` *device* to set the permissions so that all users have read and write permission to the device.
Can't connect COM port to serial device	Inadequate permissions to device file or directory.	You must have read and write access to your system's device files and directories. Change permissions in the operating system using the `chmod` command.

6

Wabi International 7

This chapter discusses various issues for using Wabi internationally.

The Wabi program can be adapted for international use at several levels in the Linux environment, and in the Microsoft Windows environment.

If you want to learn more about how the Wabi program uses international settings, read “About Using Wabi Internationally” on page 96. If you want to learn more about how Wabi uses the Control Panel’s international settings, read the section, “Control Panel’s International Settings” on page 97.

If you want instructions for specific tasks related to international settings, use the following table to locate the instructions you need.

7

About Using Wabi Internationally

Because the Wabi environment consists of programs, libraries, and files from the Linux world and the Microsoft Windows world, it is affected on several levels by the international settings of both those environments. In Linux, you can set environment variables. In Microsoft Windows, you can install localized Windows versions, and change International options in Control Panel.

The Wabi program is only available in English. This means that even if you install a localized version of Microsoft Windows, the Wabi configuration dialogs in the Control Panel, Wabi error messages, and online help from Wabi will always be in English.

Environment Variables

On the Linux side, your Wabi environment can be localized through environment variables: `LANG`, `WABI_KEYB`, and `WABI_CODEPAGE`. The `LANG` variable affects your entire X Window desktop, while the `WABI_KEYB` and `WABI_CODEPAGE` variables affect only the Wabi program.

The `LANG` *Variable*

If your Linux system contains international language libraries, you can use the environment variable `LANG` to some international setting that are used in Wabi, as described below.

The procedure for setting these variables is on page 100.

The `WABI_KEYB` *Variable*

Table 7-1 on page 102 lists the locales you can use to set the `LANG` and `WABI_KEYB` variables.

The `LANG` environment variable also sets the keyboard to the locale you specify. The Wabi program supports the `WABI_KEYB` variable to let you specify a keyboard that is different from that specified by the `LANG` variable. The `WABI_KEYB` variable overrides the keyboard specified by the `LANG` variable, but only for the Wabi environment and applications running within it.

The `LANG` and `WABI_KEYB` variables use a two-letter or four-letter abbreviation to identify the locale. Table 7-1 on page 102 lists the locale abbreviations.

The WABI_CODEPAGE *Variable*

The procedure for setting this variable is on page 101.

Table 7-2 on page 103 lists the code pages and the countries in which they are commonly used.

The WABI_CODEPAGE variable lets you specify which code page Wabi should use for OEM character translation. Microsoft Windows uses the code page set in DOS. Since DOS is not used in the Wabi environment, the Wabi program uses 437 by default. If you want to use a different code page, specify the code page with this environment variable. Possible values are: 437, 850, 860, 861, 863, and 865.

Localized Microsoft Windows Versions

Most of the text you see when you run the Wabi program is provided by Microsoft Windows; the amount of user interface text provided by Wabi software is quite small by comparison. You can install one of several different language versions of Microsoft Windows into your Wabi environment, and this is what determines the language of most of the user interface.

Before you install a localized version of Microsoft Windows, you must first set your LANG variable in your Linux environment to the language of the Windows version you want to install. Do this before starting the Wabi program.

Control Panel's International Settings

Applications running in the Wabi program use the international options set in your win.ini file. You can customize these international conventions to your preferences using the Microsoft Windows Control Panel's International dialog box. Some applications have their own menus or commands for setting some formats. An application's settings take precedence over the Control Panel settings.

You use the International dialog box shown in Figure 7-1 to change international settings.

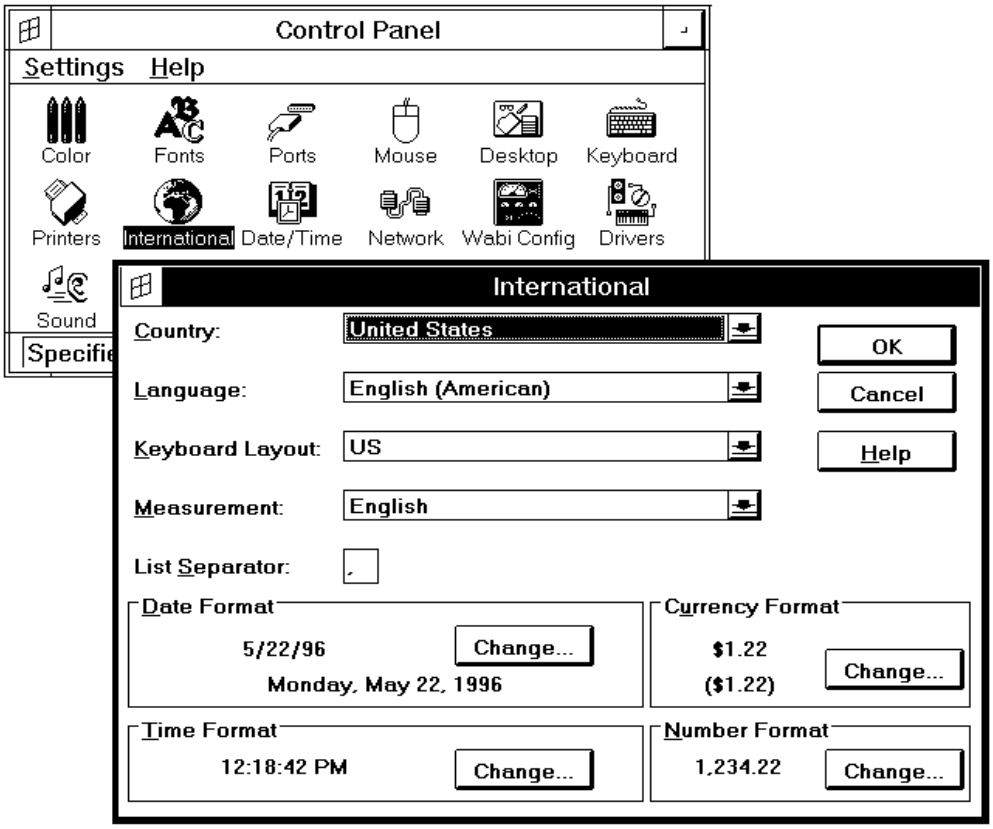

Figure 7-1 Control Panel's International Dialog Box

The International options are used by applications, not by the Wabi program itself. The International dialog box works as it does in the Microsoft Windows environment, except for the Keyboard Layout setting, which Wabi ignores in favor of the `WABI_KEYB` variable. Briefly, the International settings are:

- *Country* — sets the Date, Time, Currency, and Number Formats to the values normally used in the selected country.
- *Language* — used by applications to determine how to sort characters.
- *Keyboard Layout* — Microsoft Windows uses this setting to determine how to interpret your keystrokes on keyboards designed for various languages. In the Wabi environment, the `WABI_KEYB` variable performs this function, so this setting has no affect.
- *Measurement* — specifies English or metric measurement.
- *List Separator* — specifies the character used between list items.
- *Date* — the format used in applications using these formats.
  Time
  Currency
  Number

7

Instructions for Tasks Related to International Settings

This section provides detailed, step-by-step instructions for performing a variety of tasks related to international settings for your Wabi environment.

▼ Setting the LANG Environment Variable

1. **At the operating system prompt, enter one of the following commands before starting your X Window desktop:**

   In the Bash, Bourne or Korn shell:

   LANG=*locale***;export LANG**

   In the C shell:

   setenv LANG *locale*

   For example, to specify French as the locale/keyboard type, enter one of the following commands:

   In the Bash, Bourne or Korn shell:

   LANG=fr;export LANG

   In the C shell:

   setenv LANG fr

2. **Start your X Window desktop.**

Table 7-1 on page 102 lists the locales you can use to set the LANG and WABI_KEYB variables.

▼ Setting the WABI_KEYB Environment Variable

1. **At the operating system prompt, enter one of the following commands before starting the Wabi program:**

   In the Bash, Bourne or Korn shell:

   WABI_KEYB=*locale***;export WABI_KEYB**

   In the C shell:

   setenv WABI_KEYB *locale*

   For example, to specify French as the locale for the keyboard in the Wabi program, enter one of the following commands:

In the Bash, Bourne or Korn shell:

```
WABI_KEYB=fr;export WABI_KEYB
```

In the C shell:

```
setenv WABI_KEYB fr
```

Or, to set the environment variable statements required to establish French international settings with an English-language (U.S.) keyboard, enter the following at the command line:

In the Bash, Bourne or Korn shell:

```
LANG=fr;export LANG
WABI_KEYB=C;export WABI_KEYB
```

In the C shell:

```
setenv LANG fr
setenv WABI_KEYB C
```

2. **Start the Wabi program.**

▼ Setting the WABI_CODEPAGE Environment Variable

1. **At the operating system prompt, enter one of the following commands before starting the Wabi programs:**

In the Bash, Bourne or Korn shell:

```
WABI_CODEPAGE=nnn;export WABI_CODEPAGE
```

In the C shell:

```
setenv WABI_CODEPAGE nnn
```

Table 7-2 on page 103 lists the code pages you can use.

For example, to specify the 850 code page, enter one of the following commands:

In the Bash, Bourne or Korn shell:

```
WABI_CODEPAGE=850;export WABI_CODEPAGE
```

In the C shell:

```
setenv WABI_CODEPAGE 850
```

2. **Start the Wabi program.**

▼ Changing International Settings

1. **Open the Control Panel.**
2. **Open the International icon.**
   The International dialog box opens.
3. **Change the settings you want.**
4. **Choose OK.**
   The International dialog box closes.

   Alternatively, choose Cancel to remove any changes you made in the dialog.

Read "Control Panel's International Settings" on page 97 for more information about International settings.

Reference Material for International Settings

This section provides reference material for tasks related to international settings.

Locales for LANG *and* WABI_KEYB *Variables*

Table 7-1 lists the locale names available for use with the LANG and WABI_KEYB variables and the languages and regions these variables represent. It also includes the equivalent DOS keyboard variables.

Table 7-1 Locales Used for Environment Variables

Language – Country	Locale	Equivalent DOS Variable
English – United States	en_US or C	KEYB_us
English – United Kingdom	en_UK	KEYB_uk
Danish – Denmark	da	KEYB_dk
Dutch – Netherlands	nl	KEYB_nl
Finnish – Finland	fi	KEYB_su
French – Belgium	fr_BE	KEYB_be
French – Canada	fr_CA	KEYB_cf
French – France	fr	KEYB_fr

Table 7-1 Locales Used for Environment Variables *(Continued)*

Language – Country	Locale	Equivalent DOS Variable
French – Switzerland	fr_CH	KEYB_sf
Spanish - Latin America	es_LA	KEYB_la
Spanish – Spain	es	KEYB_sp
German – Germany	de	KEYB_gr
German – Switzerland	de_CH	KEYB_sg
Italian – Italy	it	KEYB_it
Norwegian – Norway	no	KEYB_no
Portuguese – Portugal	pt	KEYB_po
Swedish – Sweden	sv	KEYB_sv

Code Pages for the WABI_CODEPAGE *Environment Variable*

Table 7-2 lists the valid code pages you can use with the WABI_CODEPAGE variable to change the OEM character translation table used in the Wabi environment. It also lists some of the countries in which the code pages are commonly used.

"Setting the WABI_CODEPAGE Environment Variable" on page 101 tells how to set the variable.

Table 7-2 Code Pages

Code Page	Language/Country
437	English (U.S., U.K., International)
850	Western Europe (Belgian, Dutch, Finnish, French, German, Italian, Norwegian, Spanish, Swedish)
852	Croatian, Slovenian, Czech, Slovak, Hungarian, Polish
860	Portuguese
861	Icelandic
863	Canadian French
865	Danish

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On the Network 8

The Wabi program gives Microsoft Windows applications access to your computer's network capabilities and provides some PC network interface support. This chapter explains Wabi network support.

About Wabi Networking

The Wabi program provides a networked environment in ways that combine UNIX networking and PC networking. A computer running Linux is very likely connected to a TCP/IP network, and probably uses distributed file system software, which allows the computer to access directories on remote computers as if those directories were on a local hard drive. A personal computer running DOS and Microsoft Windows is often connected to a PC network through one of several PC network products using one of several networking interfaces. The Wabi program uses the TCP/IP network and a distributed file system to provide some of the services of a PC network, such as shared file systems and devices. The Wabi program also supports the Windows Sockets networking interface to allow certified applications, such as Lotus Notes, to communicate through the network directly.

Although IPX Windows applications are not supported by Wabi, users who are running Wabi on the Caldera Network Desktop can access all NetWare volumes from within Wabi using the Caldera NetWare client. The Caldera *Getting Started Guide* contains additional information about the Caldera NetWare client.

The Invisible UNIX Network

The Wabi program makes abundant use of your Linux system's TCP/IP network and distributed file system capabilities, but this is mostly transparent to the applications running in Wabi. The printers and drives that you connect through Configuration Manager are often residing on the network. To an application, the printer seems locally connected to a port on a PC, but in reality, it may be in another wing of the building, connected to a print server on your network. The Wabi program can make any drive, local or remote in reality, appear to an application as either local or remote. You must determine which type of drive an application needs and set the drive accordingly.

See page 59 and page 60 for the steps to set up drives as network drives or local drives.

You can connect a Wabi drive to any file system that can be accessed through your Linux operating system. For example, if you have a remote filesystem mounted via NFS, you can assign that directory to a Wabi drive letter. Or, if you can access a NetWare file system from your operating system through the Caldera NetWare client, you can access it through a Wabi drive as well.

Windows Sockets Networking

Windows Sockets is a network interface allowing Microsoft Windows applications to exchange data over a network. Windows Sockets, or Winsock, is based on the sockets interface, a network interface used by most UNIX operating systems, and is tailored for the Microsoft Windows environment. In the Wabi environment, Winsock is internal to the Wabi program, so you won't see a `winsock.dll` in your `windows` directory.

Applications can make Winsock calls, and Wabi carries them out using TCP/IP. The Wabi program's Winsock capability is always available to applications, and no configuration is necessary. Note that the Wabi program runs only the client version of applications that use Winsock.

The Wabi program is not guaranteed to support every application that uses the Winsock network interface. Only certified applications, such as Lotus Notes, are supported for Winsock.

Networking for E-Mail Applications

Wabi-certified electronic mail applications do not use a PC network interface to exchange messages. When Microsoft Mail and Lotus cc:Mail clients run in Microsoft Windows, they use a distributed file system provided by PC network software. When they run in the Wabi environment, they use the distributed file system provided by your operating system. Therefore, the Configuration Manager does not present any network options that affect electronic mail programs.

Network-Aware Applications

Some applications that run in the Wabi program, while not actually communicating over the network, are "network-aware." Such applications take steps to prevent problems caused by multiple users having access to the same files: locking files when open, creating temporary files for each user, storing times in Greenwich Time for accurate time stamps across time zones, and so on. Network-aware applications may need to know if they are using a local or network drive. Chapter 4, "Setting Up Drives," discusses network drives.

Novell NetWare File Systems

The Wabi program does not support the Novell NetWare API. This means you cannot run a Windows-based NetWare client to use NetWare's file and print services directly from the Wabi environment. The Microsoft Windows NetWare client requires DOS-based drivers in order to communicate with the NetWare server.

However, if you are running Wabi on the Caldera Network Desktop, NetWare volumes are accessible from the Linux filesystem automatically under the `/NetWare` directory. From this directory, NetWare-based files and directories can be mapped to a Wabi drive letter from the Wabi Configuration Tool dialog.

If your NetWare server includes the NFS add-on NLM, you may also be able to access NetWare filesystems through Linux systems that do not have the Caldera NetWare client installed. The Wabi Configuration Tool dialog is used in this case also.

Installing Microsoft Windows Applications 9

This chapter discusses using the Wabi program to install Microsoft Windows application programs. You cannot install DOS-based applications using the procedures described here. Chapter 11, “Using a DOS Emulator in the Wabi Environment,” discusses DOS-based applications.

If you are not familiar with the installation of software under the Wabi program and would like to learn more about it, read the next section, “About Application Installation.”

If you want instructions for specific tasks related to installing applications, use the following table to locate the instructions you need.

9

About Application Installation

Installing an application requires you to place the application in a directory on your system or on a network file server by using the application's `install` or `setup` program through the Microsoft Windows Program Manager.

Before you install an application, consider these important points:

- You are responsible for adhering to the terms of the software license of each application you use under the Wabi program.
- You should use the Run command in the File menu of Program Manager to install applications (except Microsoft Windows itself).
- Before you begin installing an application, be sure to read the *Wabi Release Notes* or supplementary guide you received with your version of the Wabi program. It may contain important information about installing particular applications.
- Some application installation windows fill the screen, preventing you from using other windows on your desktop. For this reason, you should not plan to use your system for other work while you install an application. See "Troubleshooting General Application Installation Problems" on page 120 for a possible workaround.
- In general, you should not install applications in drive C, even if the application provides drive C as the default location for installation. Drive C is connected to `$HOME/wabi`, which contains Wabi program files that should be kept separate from application files. You should use drive C only for files of which users must have their own copy, and for applications that must access a simulated hard drive for their copy protection schemes to work.

"Your Personal Wabi Directory" on page 9 discusses the $HOME/wabi directory.

You can install an application in any other location you like. The only limitations are that you must have adequate space in the directory in which you install the application, and you must have permission to write to the directory. If you intend to store the files you create with the application in the same directory as the application, make sure the extra space required for these files is available in the directory.

Installing applications on drives other than C gives you the freedom to move the application to other file systems. If you remap the drive to the new location, the application's setup information, such as the command to run it, will remain valid. For example, if you map drive F to `/home/me/myapps` and install Microsoft Office in `F:\msoffice`, you could later move `msoffice` to `/files/msapps/msoffice` and remap F to `/files/msapps`. The command path to Microsoft Word, for example, would be `F:\msoffice\winword\winword.exe` for both locations.

- Many installation programs tell you to reboot your computer after installing the application. This is not necessary under the Wabi program. You need only exit and restart the Wabi program.
- The Wabi program provides some integration with your X Window desktop.

Caution – The Wabi program does not support Adobe Type Manager (ATM) fonts. If your application includes a disk containing Adobe Type Manager or ATM fonts, do not install this disk.

The Run Command

You install applications using the Run command. You'll find this command in Program Manager's File menu. To install an application, open the File menu and choose Run. The Run dialog box opens, as shown in Figure 9-1.

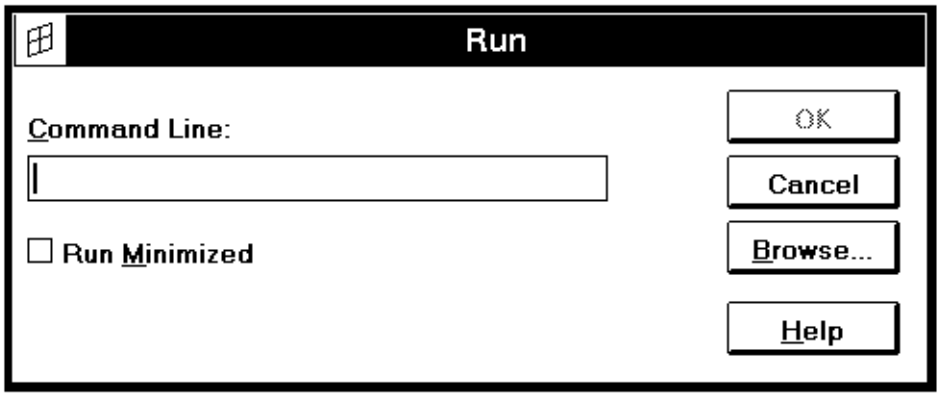

Figure 9-1 Run Dialog Box

The Command Line entry field in the Run dialog box is where you tell the Wabi program the location of the application files, and the name of the application installation program.

The location includes the drive letter, which depends on whether you are installing from diskette, the network, or CD-ROM. It may also include a directory path on the diskette, network, or CD-ROM.

The name of the application's installation program depends on the application you are installing. Many applications use `setup` or `install` as the name of the program that starts the installation process. If the application includes both `setup` and `install` programs, `install` is likely used for DOS systems, and `setup` for Microsoft Windows systems. See the application's documentation for the command to begin installation.

Application Installation From Diskettes

If you are installing an application from diskettes, the drive letter will be A or B, depending on the diskette drive you are using. If there is one diskette drive, it is usually A.

See“Installing a Windows Application From Diskette” on page 116 for step-by-step procedures.

The command that you use to install a typical application from diskette is often:

```
A:\SETUP
```

When you type this command in the Run dialog box and choose OK, the Wabi program passes control to the application’s installation program. What you see next depends on the installation program. Follow the instructions presented by the installation program, inserting program disks as required throughout the installation process.

Application Installation From CD-ROM

If you are installing an application from CD-ROM, you must first make sure the CD-ROM drive is accessible from the operating system. See “CD-ROM Drives” on page 53 for information about using CD-ROM drives in the Wabi program.

When you have assigned a Wabi drive letter to the CD-ROM directory, you can install the application using the Run command in Program Manager, as described in “The Run Command” on page 112.

Application Installation on a Network Server

Because the Wabi program runs in a networked UNIX environment with a distributed file system, it is easy to share applications over the network. You do not need any additional software for file sharing as you would on a PC because your operating system provides that function. You simply connect a Wabi drive to a directory on the network server where you want to install the application, and specify this drive and directory when prompted for the installation location.

Most Wabi-certified applications can be used in both standalone and network environments and provide a way to install to a network file server. The method used for a network installation varies from application

to application. Some installation programs require a switch on the command line, which instructs the installation program to place the files on a network server so that users can then install the application from that location to their own workstations. Other application installation programs offer a server installation option you can select in a dialog box.

Some applications let users run the application from the network server without installing all the application files to their workstations. In this case, the installation program installs on the workstation the minimum files needed to run the application.

Before you install an application to a shared network location:

- Refer to the application's manuals for specific information about installing on a network. Some applications include on the installation diskettes a Readme file describing network installation.
- Connect a Wabi drive to the network directory, and make sure the Network option is selected on the drive.
- If users will be using the application in a workgroup arrangement (for example, working on shared reports, spreadsheets, and so on), you should probably use file sharing. Look through the application's documentation to see if you should *not* use file sharing. The DOS program `SHARE.EXE` enables file sharing in the Microsoft Windows environment, so look for a discussion about using `SHARE.EXE`. If there are no warnings against using `SHARE.EXE`, select the Shared option on the Wabi drive where the shared files are stored.
- Make sure that everyone allowed to install the application has a license to use it. For most applications, this requirement can be fulfilled by purchasing a single-user copy for each user, or by purchasing a "license pack" for multiple users.

Caution – Some Wabi-certified applications are created for single-user, single-tasking, nonprotected environments, and do not function well in a network environment. In addition, sharing may be prohibited by the application's software

license agreement. You are responsible for adhering to the terms of the software license of each application you use under the Wabi program.

Application Installation From a Network Server Through a Wabi Drive

Once an application has been installed on a network server, users can install application files to their computers through a Wabi drive.

Note – You are responsible for adhering to the terms of the application's software license. Each user who installs an application, whether from a drive or from diskette, must be licensed to use the software.

If you want to install an application from a network server, see "Installing an Application to a Workstation From a Network Server" on page 119.

The method for installing an application from a Wabi drive is the same as installing from diskette — you use the Run command from the File menu in Program Manager. However, the drive you specify is a Wabi drive through which you access the directory where the application is located.

You can use the preconfigured drive R and specify a complete path name to the directory. You can also use Configuration Manager to connect a different Wabi drive letter to the directory containing the files. In either case, you enter in the Run dialog box (shown in Figure 9-1) the Wabi drive letter and the path to the application files.

For example, if the application files are located in directory path `/usr/apps/install/hg20`, you could enter the following in the entry field of the Run dialog box:

```
R:\usr\apps\install\hg20\setup
```

You could also assign drive letter F to `/usr/apps/install/hg20` and enter:

```
F:\setup
```

The type of slash character you use depends on whether a UNIX or a DOS path name is involved. The backslash (\) is used in DOS path names. The forward slash (/) is used in UNIX path names. The Wabi program accepts both types of slash characters, but you should use one type within a command line.

Instructions for Tasks Related to Installing Applications

This section provides detailed, step-by-step instructions for performing a variety of tasks related to the installation of Microsoft Windows applications.

▼ Installing a Windows Application From Diskette

1. **Determine the directory in which you want to install the application.**
   If necessary, assign a Wabi drive to the directory.

   Note – You should install applications on a drive other than the C drive.

See "About Application Installation" on page 110 for more details about installing applications.

2. **In Program Manager, open the File menu and choose Run.**
   The Run dialog box opens.

3. **In the Command Line entry field, enter the diskette drive letter and the name of the installation program.**
   For example, to install Microsoft Word for Windows, enter `A:\SETUP`.

4. **Choose OK.**
   An application-specific dialog box opens providing additional instructions.

5. **When prompted for a location in which to install the application, indicate an assigned Wabi drive (and path name, if necessary).**
   Most applications provide a default path name on the C drive, so you should not accept the default. Replace it with the drive and directory name you decided on in Step 1. For example, if you connected drive D to `$HOME/winapps`, and want to install

the application in `$HOME/winapps/mailapps`, enter `D:\mailapps`. The application is placed in your `$HOME/winapps/mailapps` directory.

6. **Follow the instructions in the installation dialog box to complete installation.**

▼ Installing a Windows Application From CD-ROM

1. **Determine the directory in which you want to install the application.**
   If necessary, assign a Wabi drive to the directory.

   Note – You should install applications on a drive other than the C drive to separate Wabi files from application files.

See "Accessing a CD-ROM Drive" on page 60 for instructions on assigning a Wabi drive to the CD-ROM.

2. **Open Configuration Manager and assign a Wabi drive to the CD-ROM directory.**
3. **In Program Manager, open the File menu and choose Run.**
   The Run dialog box opens.
4. **In the Command Line entry field, type the CD-ROM drive letter and the name of the installation program.**
   For example, if you connected drive M to the CD-ROM directory, and the installation program is `SETUP`, type **`M:\setup`**.
5. **Choose OK.**
   An application-specific dialog box opens providing additional instructions.
6. **When prompted for a location in which to install the application, indicate an assigned Wabi drive (and path name, if necessary).**
   Most applications provide a default path name on the C drive, so you should not accept the default. Replace it with the drive and directory name you decided on in Step 1. For example, if you connected drive D to `$HOME/winapps`, and want to install

the application in `$HOME/winapps/mailapps`, enter `D:\mailapps`. The application is placed in your `$HOME/winapps/mailapps` directory.

7. **Follow the instructions in the installation dialog box to complete installation.**

▼ Installing an Application on a Network Server

See "Application Installation on a Network Server" on page 113 for more details about installing applications on servers.

1. **Refer to the application's documentation for specific information about installing on a network.**
   Some applications include on the installation diskettes a ReadMe file describing network installation.
2. **Start the Wabi program on your computer.**
3. **Connect a Wabi drive to the server directory where you want to install the application.**
4. **Select the Network option for the drive.**
5. **Select the Shared option for the drive if users will be working on shared files stored on this drive.**
6. **Choose the Run command from the File menu in Program Manager.**
7. **In the Run dialog box, enter the command needed to install the application onto a network server.**
   Refer to the application's documentation for the command you need to run, along with any necessary switches. Enter the drive letter plus the full directory path to the command. If the path is long, or you're not sure what it is, choose the Browse button and search for the directory and command on the server.
8. **Choose OK in the Run dialog box.**
   The installation or workstation setup program starts.
9. **Follow the program's instructions to place the application files on a network server.**

▼ Installing an Application to a Workstation From a Network Server

See "Application Installation From a Network Server Through a Wabi Drive" on page 115 for more details about installing applications from servers.

1. **Make sure the network server directory where the application is installed is accessible to your operating system.**
2. **Start the Wabi program on your computer.**
3. **Choose the Run command from the File menu in Program Manager.**
4. **In the Run dialog box, enter the command needed to install the application from the network.**
   Refer to the application's documentation for the command you need to run, along with any necessary switches. Enter the drive letter plus the full directory path to the command. If the path is long, or you're not sure what it is, choose the Browse button and search for the directory and command on the server.
5. **Choose OK in the Run dialog box.**
   The installation or workstation setup program starts.
6. **Follow the program's instructions to set up your computer to run the application.**

9

Reference Material for Tasks Related to Installing Applications

This section provides reference material for tasks related to installing Windows-based applications and the Microsoft Windows software.

Troubleshooting General Application Installation Problems

Table 9-1 suggests solutions to common problems you might experience during application installation.

Table 9-1 Windows Application Installation Problems and Solutions

Symptom	Possible Cause	Solution
Application will not fully install.	Not certified to run in Wabi program.	Only certified applications are sure to install correctly. Uncertified applications may use nonstandard installation procedures or data compression methods that Wabi has not been designed to translate.
Application does not install correctly.	Special installation procedures required.	See the Release Notes or supplementary manual you may have received with the Wabi program.
Application installation fails with error "ACMSETUP Caused a General Protection Fault in Module MMSETUP.DLL."	Some Microsoft applications' setup programs alter the `system.ini` file incorrectly.	With a DOS or UNIX text editor, edit `$HOME/wabi/windows/system.ini` and insert a blank line before each section title. Section titles are enclosed in square brackets. (Note that UNIX editors display blank lines in DOS text files as ^M. You do not need to remove them.) Save the file, restart the Wabi program, and reinstall the application.

Table 9-1 Windows Application Installation Problems and Solutions

Symptom	Possible Cause	Solution
Application installation program covers the screen, blocking other application windows.	Application was not designed for the X Window desktop.	Some applications do not let you change this, but you can try the following: • Try reducing the size of the window by restoring it. To restore, click on the Wabi logo in the upper left corner of the window (if it's visible) and choose Restore in the pull-down menu, or press Alt+Spacebar, R. This does not work for all installation programs. • If your keyboard has a key or key combination that raises windows, such as a Front key, try pressing it once to make the installation window go to the back so you can see other windows. It may take Wabi several seconds to respond to key strokes if the application installation is loading your computer heavily. This technique does not work with all installation programs.

Table 9-1 Windows Application Installation Problems and Solutions

Symptom	Possible Cause	Solution
Application installs very slowly	Application uses nonstandard compression routines. Most files must be decompressed at installation. If an application uses standard Windows routines, it installs quickly because Wabi translates to UNIX routines to decompress. If an application does not use standard routines, Wabi must execute the decompression one instruction at a time.	If you find an application installation intolerably slow, try some of these ideas: • Obtain the application on CD-ROM if possible. CD-ROM files are not compressed, so Wabi does not have to decompress, making installation faster. • Check the application documentation for an installation option to do a partial installation to decompress the files. If there is, do the partial installation, and store the decompressed files in a network directory where other users can use them to do the second half of the installation. • Investigate the possibility of all the users on the network referencing a single copy of the application, so you only have to install the application once. CAUTION: If you share a single copy, remember you *must* have a license for every user of the application. You are responsible for adhering to the terms of the software license of each application you run in the Wabi program.

Using Microsoft Windows Applications 10

This chapter discusses starting and using Microsoft Windows applications in the Wabi environment.

If you are not familiar with starting applications under the Wabi program and would like to learn more about it, read the next section, “About Starting Applications.” If you want instructions for specific tasks related to starting applications, use the following table to locate the instructions you need.

10

About Starting Applications

Generally, you can use Microsoft Windows applications in the Wabi environment the same as in the Microsoft Windows environment.

You can start applications several different ways:

- From within Program Manager, by opening an icon or using the Run command
- Using Microsoft Windows File Manager, by using the Run command or by opening an executable file
- From a command line window in Linux, using the `wabi` command along with some parameters

Application Startup From an Icon in Program Manager

When you install a Microsoft Windows application, the Wabi program creates an item representing the application. This item, represented by an icon, is stored in a group. Usually, the application's install program creates its own group.

See "Starting an Application From an Icon" on page 128 for specifics on getting an application to run.

Running an installed application using an icon is straightforward. Open the icon representing the application and the application starts. Once the application starts, a window opens revealing the initial application screen.

You can minimize any application, including the Program Manager. The icons of minimized applications are automatically placed in the upper-left corner of your desktop. You can restore a minimized application by opening its icon. You can also restore a minimized application by single-clicking its icon and selecting Restore from the window control box.

Application Startup With the Run Command in Program Manager

When the Wabi program is already running Program Manager, you can start an application using the Run option from the File menu. The command you enter is the same command you would use to run the application on a PC, except that the drive letter indicates a path on your Linux system.

Application Startup in Microsoft Windows File Manager

You can use Microsoft Windows File Manager to start applications just as in the Microsoft Windows environment: open a program file or a document file associated with an application. In the Wabi environment, however, you cannot open files with .COM, .PIF, or .BAT extensions because they are not Windows executables. Only Windows executables with .EXE extensions will run in the Wabi environment.

Application Startup at the Command Line

See "Starting an Application From a Linux Command Line" on page 128 for the command format.

You can run an application directly with the `wabi` command by specifying the application startup command as an argument to the `wabi` command. Depending on how you specify the application startup command, you can make the Wabi desktop (the Microsoft Windows Program Manager and Wabi Tools) visible or transparent. If you want to see the Wabi desktop, simply add the application startup command to the `wabi` command.

You can use the `-s` switch plus the application startup command to make the Wabi user interface transparent, so all you see is your application. This is the recommended format to use when including an application in a desktop icon or menu item. Note that you can access Program Manager or programs such as Control Panel by starting them just as you would an application. For example, the command line below starts Control Panel:

```
wabi -s c:/windows/control.exe
```

Application Startup With an Open File

With any of the application startup methods, you can specify a file name to open with the application, if the application startup command allows it (as most do). Just include the file's full name as an argument to the startup command. If the directory containing the file is not on your path in your `autoexec.bat` file, you must include the full path to the file.

The `wabi` command supports additional switches allowing you to display Wabi on a remote system, and to display Wabi with smaller or larger system fonts. These switches, which are described in Chapter 2,

"Installing and Starting Wabi," must be specified before an application startup command. The application startup command and optional file name must be the last arguments on the `wabi` command line.

Using Microsoft Windows Applications in an X Window Desktop

The Wabi program is an X Window application, but in some ways it behaves like a Microsoft Windows application. Window focus, and cut, copy, and paste methods are areas where Wabi behaves like Microsoft Windows rather than an X application.

Window Focus and Raising

Window managers on X Window desktops often let you choose your window focus policy. You can configure your X Window desktop so that you must click on a window to activate it, or so that you can move your mouse into a window to activate it. In addition, you can also specify whether you want a window to be raised to the top when activated. Different Linux systems have their own terminology for these desktop properties and their own utilities for changing them.

In Microsoft Windows, you must click in a window before you can type into it. When you do, the window automatically rises to the top, overlaying other windows. Wabi's behavior matches that of Microsoft Windows.

Wabi windows use the click-to-focus mode even if you set your X Window desktop to use the follow-mouse mode. because it is the only mode Microsoft Windows applications can use. It may be less confusing for you to configure your X Window System desktop to use the click-to-focus mode so that all your windows behave the same way.

Cut, Copy, and Paste

You can cut, copy, and paste text and graphics between applications running in the Wabi environment just as you do in the Microsoft Windows environment. Generally, applications use menu commands (e.g., Edit, Cut) or accelerator keys (e.g., Ctrl+X) to cut, copy, and paste. You should use the same methods when using the applications in the Wabi environment.

See page 131 for the copying and pasting procedures.

You can also copy and paste text between Windows applications running in Wabi and X applications running on your X desktop. You should follow each application's normal methods to cut, copy, and paste. For example, some Linux desktops support the use of keyboard keys and menu commands to cut, copy, and paste. You can use the special keys or commands in the X applications to copy text and then paste it into a Windows application in Wabi using that application's pasting method. You cannot use the UNIX desktop special keys to paste into the Windows application.

Note – You cannot copy and paste graphics from Windows applications to X applications and vice versa because they use incompatible graphics formats.

X Window Managers

In the X Window System, *virtual* window managers create several logical views of your desktop, and let you designate specific windows to "stick" so that they appear in all logical views. Other windows stay in the logical screen in which you place them. When you run the Wabi program with some virtual window managers, conflicts can occur between the Wabi window manager and the virtual window managers.

The `fvwm` window manager that is installed by default in the Caldera Network Desktop and many other Linux systems is known to have these conflicts. Two other window managers that have the conflicts are `olvwm` (Open Look Virtual Window Manager) and `tvwm` (Tom's Virtual Window Manager). You can use Wabi with `fvwm`, `olvwm` or `tvwm`, but Wabi windows will always follow you to the current view rather than remaining on the logical screen where you've placed them.

10

Instructions for Tasks Related to Using Applications

This section provides detailed, step-by-step instructions for performing a variety of tasks related to using Microsoft Windows applications.

▼ Starting an Application From an Icon

1. **Install the application.**
2. **In Program Manager, locate the icon representing the application.**
3. **Open the application icon.**
   The Wabi program loads the application. When the application is loaded, a window opens, displaying the application.

▼ Starting an Application From a Run Command

1. **Install the application.**
2. **In Program Manager, open the File menu and choose Run.**
   The Run dialog box opens.
3. **In the Command Line entry field, type the full path name of the application's startup command.**
   Alternatively, choose the Browse button to search your directories for the executable file. When you find the executable, select it. The file name is displayed in the Command Line entry field.
4. **Choose OK to run the command you typed.**
   The Wabi program loads the application. When the application is loaded, a window opens displaying the application.

▼ Starting an Application From a Linux Command Line

This method starts your application when the Wabi program starts, with Program Manager and Wabi tools available to you.

If you want to open a data file when starting an application, see "Opening a File When Starting an Application" on page 130.

- **At the system prompt, enter `wabi` followed by the path name of an installed application executable.**
  You can use either a DOS path enclosed in quotes, or a UNIX path. If the directory containing the application program is not in the path in your `$HOME/wabi/autoexec.bat`, you must include a full path name.

  For example, suppose you have installed Microsoft Excel in your `$HOME/excel` directory. The Wabi drive H is connected to your home directory. To start the Excel program, you could enter any of the following:

  ```
  wabi 'h:\excel\excel.exe'
  wabi $HOME/excel/excel.exe
  wabi h:/excel/excel.exe
  ```

  or if `H:\EXCEL` is in the PATH statement of your `autoexec.bat`,

  ```
  wabi excel.exe
  ```

  Note – The application startup command and optional file name must be the last arguments on the `wabi` command line.

▼ Running an Application Transparently

This method starts your application when the Wabi program starts, without starting Program Manager.

Read "Application Startup at the Command Line" on page 125 for reasons you might want to do this.

- **At the system prompt, enter the Wabi startup command followed by `-s` and the application startup command.**
  You can use either a DOS path enclosed in quotes, or a UNIX path. If the directory containing the application program is not in the path in your `$HOME/wabi/autoexec.bat` file, you must include a full path name.

For example, suppose you have installed Microsoft Excel in your `$HOME/excel` directory. The Wabi drive H is connected to your home directory. To start the Excel program, you could enter any of the following commands:

```
wabi -s 'h:\excel\excel.exe'
wabi -s $HOME/excel/excel.exe
wabi -s h:/excel/excel.exe
```

or if `H:\EXCEL` is in the PATH statement of your `autoexec.bat`,

```
wabi -s excel.exe
```

▼ Opening a File When Starting an Application

- **With any of the startup methods, add the name of the file as an argument to the application startup command.**
  You should always use a complete path for the file name.

  If you are starting the application from within Program Manager, add the file name in DOS format, including drive letter, to the command you enter in the Command Line field of the Run dialog box. For example, the Windows Install program item uses the command:

  ```
  write w:\wbin\win_inst.exe
  ```

  If you are starting the application from a command line, and use a DOS path for the file to open, include the drive letter and file name within the quotes along with the startup command. If you use a UNIX path, you can use the drive letter or a full UNIX path, but be sure to use accurate capitalization. If you want, you can use a UNIX path for the command, and enclose a DOS path and drive in quotes for the file name.

  For example, to start the Excel program and open your file `sched.xls` in your `h:\excel\files` directory, you could enter any of the following commands:

  ```
  wabi -s 'h:\excel\excel.exe
  h:\excel\files\sched.xls'
  wabi -s h:/excel/excel.exe
  h://excel//files//sched.xls
  ```

```
wabi -s h:/excel/excel.exe
'h:\excel\files\sched.xls'
wabi -s h:/excel/excel.exe
h:\\excel\\files\\sched.xls
```

When the Excel window opens, it displays the `sched.xls` file.

Note – The application startup command and optional file name *must* be the last arguments on the `wabi` command line.

▼ Copying and Pasting From Windows Applications to X Applications

1. **Click in the X application window to set the insertion point for pasting.**

2. **Copy the text in the Windows application using the application's normal copying method.**
   For example, select the text and press Ctrl+C or choose the Copy command from the Edit menu.

3. **Click the title bar of the X application window to make it the active window.**
   In some X applications, if you click in the work area of the window, the copied text is lost because Wabi interprets this as a new text selection and erases the contents of the clipboard.

4. **Paste the text into the X application window using the application's normal pasting method.**
   For example, press both buttons of your two-button mouse (or the middle button of your three-button mouse) to paste text into the X application window.

   The text is pasted at the insertion point you set in the first step.

▼ Copying and Pasting From X Applications to Windows Applications

1. **Copy the text in the X application using the application's copying method.**
   For example, click the left mouse button and drag the mouse pointer to select a block of text.
2. **Click the title bar of the Windows application to make it the active window.**
3. **Click in the work area of the Windows application to set the insertion point.**
4. **Paste the text using the application's paste method.**
   For example, press Ctrl+V or choose the Paste command from the Edit menu. The text is pasted at the insertion point.

Reference Material for Tasks Related to Using Applications

This section provides reference material for general tasks related to starting and using Microsoft Windows applications. See the *Wabi Release Notes* for information about specific applications.

Table 10-1 Windows Application Problems and Solutions

Symptom	Possible Cause	Solution
Application does not start.	Incorrect executable name or directory path.	Make sure you have entered the correct path name. See page 128.
Application not fully functional.	Application function not compatible with Wabi or X Window System.	See the Release Notes or supplementary manual you may have received with the Wabi program for information about the application.
"Not enough memory" or "Out of memory" message from application.	Application encountered an unrecoverable error.	This error message is often generated when applications cannot perform some function for an unknown reason. Memory shortage is seldom the actual cause. Contact Wabi support.

Using a DOS Emulator in the Wabi Environment 11

Although the Wabi program is intended primarily for running Microsoft Windows application programs, you can also use it to run DOS applications if you have a DOS emulator installed on your system. This chapter discusses using the Wabi program to install and run DOS applications after you have a DOS emulator installed.

If you are not familiar with the installation and use of DOS emulators and applications under the Wabi program and would like to learn more about it, read the next section, "About DOS Applications."

If you want instructions for specific tasks related to DOS application installation or use, use the table below to locate the instructions you need.

11

About DOS Applications

The Wabi program cannot run DOS-based applications by itself, but it does provide a method for running them that is similar to the method used for running Microsoft Windows applications. However, you must have a DOS emulator installed on your system before you can run DOS applications through the Wabi program. A DOS emulator is a program that simulates a DOS environment while running in another operating system.

The Wabi program lets you group your DOS applications as you do your Microsoft Windows applications, and start them by opening an icon. You do not have to create a program information file (PIF) to run a DOS application through the Wabi program. Once you have a DOS emulator installed and connected to Wabi, installing and using DOS-based applications is as easy as installing and using Microsoft Windows applications.

DOS Emulation in Linux

Almost all Linux distributions, including the Caldera Network Desktop, include the DOSEMU package. This component is not a DOS emulator by itself, but rather emulates an Intel x86 computer so that a copy of DOS can be loaded onto your Linux computer for emulation. Linux distributions do not include a copy of DOS, because of the license needed to use DOS.

To use the DOS emulator in Linux, make certain that the DOSEMU package is installed. This is done by the default installation on the Caldera Network Desktop. Then install a licensed copy of DOS and configure the DOS emulator file, `/etc/dosemu.conf` (or a similar file on your distribution of Linux).

Once DOS is installed and configured, you can have icons on the Caldera Desktop interface that launch DOS applications. Wabi allows you to launch these same programs from within a Windows program group in the Wabi environment.

Preparation for Using DOS Applications

To use DOS applications with the Wabi program, you must prepare your Wabi environment to be able to use DOS applications. The tasks are divided here into tasks you do one time only, and tasks you do once for each DOS application you want to use through the Wabi program. Instructions for the tasks are included later in the chapter. See the margin notes for references to related information.

One-Time Tasks

For information on installing a DOS emulator, read "DOS Emulator Installation" on page 135.

To set up the Wabi program for installing and running DOS applications, you must:

- Install a DOS emulator if you do not have one already installed. (See above.)
- Specify the DOS emulator startup command through the DOS Emulator tab sheet in Configuration Manager.

Tasks Done Once for Each DOS Application

To install a DOS application after you've set up for using DOS applications:

- Start the DOS emulator.
- Install the DOS application from the DOS session, following the DOS application's instructions.
- Create a program item and, optionally, a program group.

After you have done these tasks, you do not have to start the DOS emulator before starting a DOS application. The Wabi program does it for you.

DOS Emulator Installation

You do not use the Wabi program to install a DOS emulator. You should install the emulator using the instructions provided with it. Make note of the path and command needed to start it, along with any parameters to the command that you might want to use.

Before you use the emulator with the Wabi program, make sure it is correctly installed, and you are able to run it by entering a command in the operating system.

Caution – Drive mappings (for emulated hard drives, or virtual drives) that you use in the DOS emulator must match the drive mappings you use in the Wabi program (except for drive C, and possibly D, which are likely to be permanently assigned by the DOS emulator). If the drive letters do not connect to the same file system or directory on the host computer, the emulator may not work correctly. See Chapter 4, "Setting Up Drives," for more about drive mappings.

As the caution specifies, you must coordinate the drive mappings that you assign in the Wabi program with the drive mappings you assign in your DOS emulator. For example, if you have assigned Wabi drive G to the native operating system directory, `/home/blue/green`, the DOS emulator drive G must also be assigned to `/home/blue/green`. If drive G is not mapped identically in both programs, an error will occur if an application running under the DOS emulator tries to access drive G through the Wabi program.

Before you run a DOS application through the DOS emulator under the Wabi program, check all drive mappings in both the DOS emulator and Wabi to be sure they are consistent.

The DOS Emulator's Drive C

The DOS emulator's drive C cannot be mapped to a Wabi drive because it is likely a special file that the Wabi program cannot access. You should store any files you want to use in both the Wabi program and the DOS emulator in your home directory. Make sure both programs connect the same drive (H, for instance) to your home directory. If you want to use the Wabi program and your DOS emulator to run applications installed in your DOS emulator's drive C, you should:

- Start the DOS emulator.
- Map a DOS emulator drive to your home directory if you don't already have one.

- Copy the application directories and files from drive C to the drive connected to your home directory.
- Start the application from the drive connected to your home directory to make sure the application runs correctly.
- When you are sure the application runs correctly, delete the application files from drive C.

Then, both programs can access the files through the same drive letter.

DOS Emulator Command

For instructions on connecting a DOS emulator, read "Entering a DOS Emulator Startup Command" on page 145.

The Wabi program must know the command used to start your DOS emulator from a Linux command line. You provide this information in Configuration Manager's DOS Emulator tab sheet, shown in Figure 11-1. The command should include your DOS emulator's path name, startup command, and startup parameters. Once your DOS emulator is functional under the Wabi program, you can use it to install and run a DOS application.

Figure 11-1 DOS Emulator Tab Sheet

In the DOS emulator command, you should include three placeholders for parameters that enable the Wabi program to start a DOS application running under the DOS emulator:

- `%d` – This placeholder is used with the `-display` switch of the emulator command. (The `-display` switch works with most X-based DOS emulators.) Including `%d` with the `-display` switch makes the DOS session appear on the same display screen as the Wabi window. The Wabi program replaces `%d` with a display name. If you start the Wabi program with the `-display` switch, the same remote host display name is substituted for `%d` in the DOS emulator command. If you do not start the Wabi program with the `-display` switch, `%d` is replaced by the name specified by the `DISPLAY` variable in your Linux environment.

See "Displaying the Wabi Program on a Remote System" on page 24 for instructions for setting the `DISPLAY` variable.

- `%f` – This placeholder is used as a parameter for a DOS emulator switch that starts a DOS program. Including `%f` with a switch in the command line allows you to start a DOS application through the Wabi program using the Run menu item or by double-clicking the program's icon. The switch you use with `%f` is specific to the emulator. It is likely to be `-c` or `-s`. The Wabi program replaces `%f` with the name of an executable DOS program. The Wabi program uses the name of the executable file that you supply when you create a program item for the application, or when you run the application through the Run item in Windows Program Manager's File menu.

- `%c` – This placeholder is used to specify more parameters to the DOS emulator switch that starts a DOS program. Including `%c` allows you to specify an argument such as a file name or some other parameter used in the DOS command line to start the DOS application. You should use `%c` only if you use the `%f` placeholder. The Wabi program replaces `%c` with the remainder of the DOS command line that follows the `.EXE` command.

For example, suppose you want to run a DOS application called CLEANUP.EXE on a file called PRICE.LST, and you want to send the display to the same system where you are displaying the Wabi program. The DOS command line you normally use to run this program on PRICE.LST looks like this:

```
CLEANUP.EXE PRICE.LST /X /Y
```

Your DOS emulator command must include the %f and %c placeholders so the Wabi program can pass the DOS command line as arguments to the UNIX command that starts the DOS emulator. Wabi uses the CLEANUP.EXE file name in the %f placeholder, and the PRICE.LST file name and /X and /Y parameters in the %c placeholder.

In the example below, the -c switch instructs the emulator to execute the command that follows (CLEANUP.EXE PRICE.LST /X /Y, for example). If your DOS emulator is called myemulator, the DOS emulator command might look like this:

```
/usr/myemulator -display %d -c %f %c
```

The -c switch is just an example; your emulator may require a different switch for passing commands. See the emulator's documentation for information about command-line switches.

Note – If you do not include the complete path name to the emulator's executable file, you must have the DOS emulator directory in your UNIX search path. The default emulator command that the Wabi program provides assumes your path includes the emulator directory.

DOS Sessions

After making your DOS emulator connection, you can run DOS sessions as you would in the Microsoft Windows environment on a PC. The Main group includes an MS-DOS Prompt icon. When you open the icon in the Wabi environment, the DOS emulator starts.

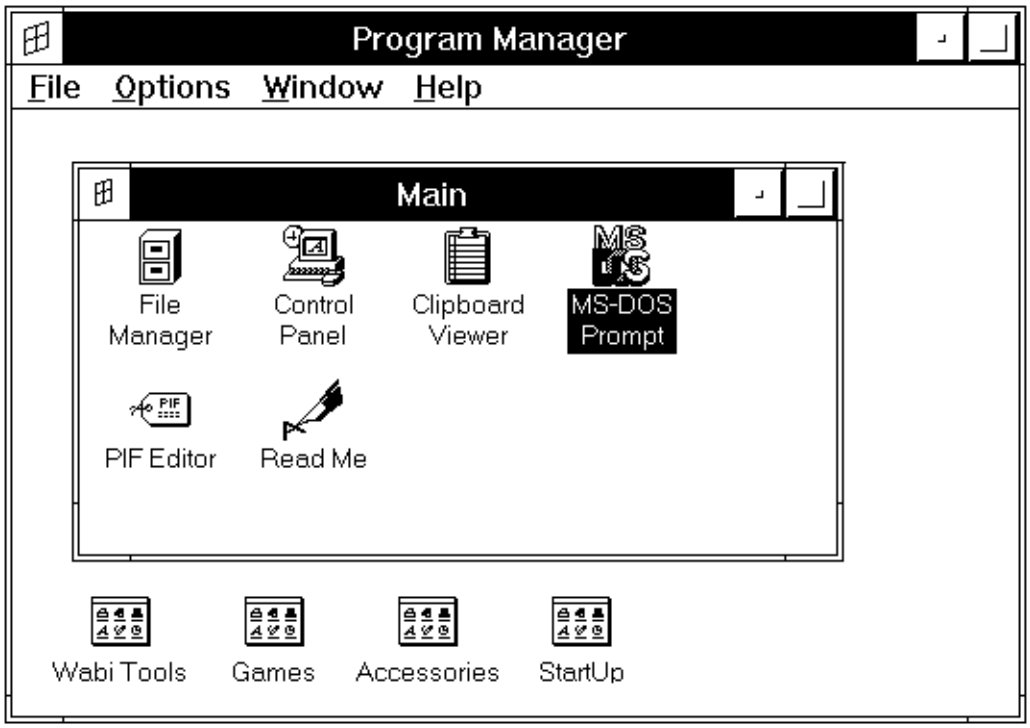

Figure 11-2 MS-DOS Prompt Icon in the Main Group

The DOS emulator starts in its own window, so you still have access to the Wabi window, your Windows applications, and your UNIX desktop applications.

DOS Application Installation

After you install the DOS emulator, you can install DOS applications using the DOS emulator. You can start the emulator from the operating system, or open the MS-DOS Prompt icon in the Main group. Once you are running a DOS session, proceed to install the DOS application as indicated in the application's installation instructions.

Caution – You should not install any applications in the Wabi drive C or the DOS emulator's drive C. You should connect drives for both programs to the same directories in your Linux file system, and install applications in those drives. If you want the Wabi program to access files already stored in your DOS emulator's drive C, read "The DOS Emulator's Drive C" on page 136.

Create a Program Group and Item for a DOS Application

After the application is installed, you should create a program group and item for the application so you can start it within the Wabi program by opening an icon. Microsoft Windows applications create their own program groups and items when you install them, but DOS applications do not because they are not designed to run in a window environment.

You can create program groups and items for DOS applications the same way you create them for Microsoft Windows applications, using the New option in Program Manager's File menu.

When you choose New in the File menu, the New Program Object dialog box opens as shown in Figure 11-3.

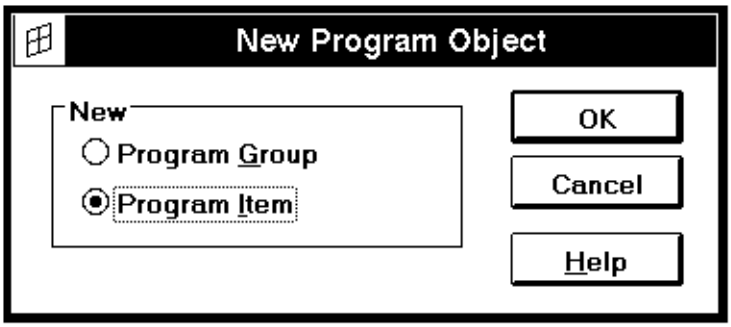

Figure 11-3 New Program Object Dialog Box

See “Creating a DOS Program Group” on page 146 for the steps required.

For the steps to make a program item for a DOS application, see “Creating a DOS Program Item” on page 146.

You use this dialog box to create groups and items. To create a group, select Program Group and enter a Description in the Program Group Properties dialog box that opens.

To create a program item that represents a DOS application, you choose the Program Item button in the New Program Object dialog box. When you do, the Program Item Properties dialog box shown in Figure 11-4 opens.

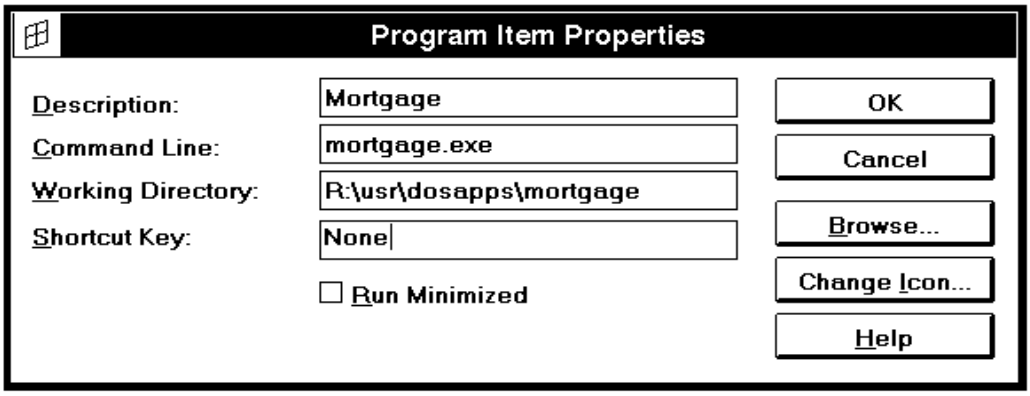

Figure 11-4 Program Item Properties Dialog Box

Note that for a DOS application, the command you enter in the Command Line entry field is the same command you would use to start the application in DOS. It must be in DOS format and include the Wabi drive location, and may include parameters or switches. Do not include the DOS emulator command. When you start the application from the icon, the Wabi program detects that the application requires DOS, starts your DOS emulator, and passes the command you enter here.

Microsoft Windows applications generally have icons associated with the executable files, but DOS executables do not. When you create a program item for a DOS application, the Program Manager uses a generic icon indicating that the program is a DOS program. However, you can use a

different icon if you like. The Change Icon button opens a dialog box that lets you select a different icon image to represent the application when it is minimized or displayed in a group window.

Note – DOS applications used with a DOS emulator through the Wabi program do not use a Program Information File (PIF).

To Run a DOS Application

To run an installed DOS-based application, you must have a DOS emulator configured to run with the Wabi program. See "DOS Emulator Command" on page 137 for more about setting up and using a DOS emulator.

You can use the Wabi program to start DOS applications the same way as Microsoft Windows applications — either through Program Manager's Run command on the File menu or by opening an icon.

An Application's Startup Command

See "Starting a DOS Application" on page 147 for the steps required.

You can run a DOS application with the File menu's Run command in Program Manager by entering in the Run dialog box the command to run the application. This is the same command you would use to run the application on a PC running DOS, except that the drive letter indicates a path in your Linux file system.

To run a DOS application, open the File menu and choose Run. The Run dialog box opens, as shown in Figure 11-5.

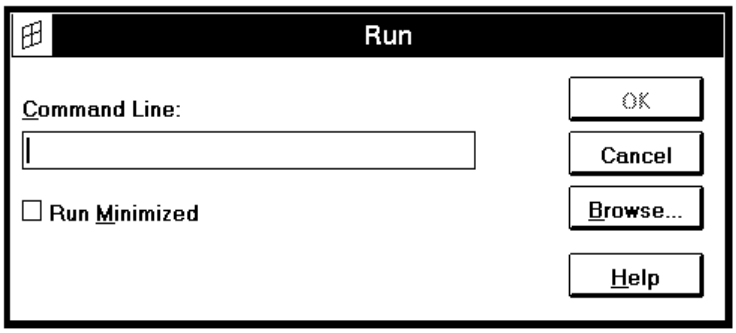

Figure 11-5 Run Dialog Box

The Command Line entry field in the Run dialog box is where you tell the Wabi program the location and name of the application's startup command.

When you choose OK, the Wabi program detects that the application requires DOS, starts your DOS emulator, and loads and runs the DOS application.

A DOS Application's Icon

See "Create a Program Group and Item for a DOS Application" on page 141 if you want to create an icon for a DOS application.

The simplest way to use a DOS application under the Wabi program is by double-clicking an icon representing the application. When you open the icon, the Wabi program detects that the application is a DOS application, starts your DOS emulator program, and the DOS emulator runs the DOS application.

Instructions for Tasks Related to DOS Applications

This section provides detailed, step-by-step instructions for performing a variety of tasks related to the installation and use of DOS-based applications.

▼ Entering a DOS Emulator Startup Command

1. **Open the Control Panel.**
2. **Open the Wabi Config icon.**
   Configuration Manager opens.
3. **Choose the DOS Emulator tab.**
   Alternatively, press Alt+e.
4. **Enter a path name, startup command, and optional placeholder parameters for your DOS emulator.**
   This is the command you would use to start the emulator in your native operating system. If you do not include the complete path name to the executable file, you must have the DOS emulator directory in your path in the Linux environment. Note that the default emulator command the Wabi program provides assumes your path includes the DOS emulator directory.

Read “DOS Emulator Command” on page 137 for more information about the startup command and placeholders in the command.

5. **Choose OK to validate and save your changes, and exit Configuration Manager.**
   If you want to make changes to other tab sheets before exiting, choose Apply Now to validate and save your changes but keep Configuration Manager open.

   Alternatively, choose Cancel to quit Configuration Manager without making changes.

▼ Starting a DOS Emulator in the Wabi Environment

1. **Open Program Manager.**
2. **Open the Main group.**

3. **Open the MS-DOS Prompt icon.**
   The Wabi program runs the DOS emulator configured in your Wabi environment.

▼ Installing a DOS Application

Read "DOS Emulator Command" on page 137 for more about setting up and using a DOS emulator program.

1. **Configure a DOS emulator for use with the Wabi program, as explained in "Entering a DOS Emulator Startup Command" on page 145.**
2. **Start the DOS emulator, and install the DOS application as described in the application's documentation.**

▼ Creating a DOS Program Group

1. **Open Program Manager.**
2. **Open the File menu and choose New.**
   The New Program Object dialog box opens.
3. **Select Program Group and choose OK.**
   The Program Group Properties dialog box opens.
4. **Enter a description.**
   This text will appear below the group icon. You should enter something that indicates this group is for DOS applications.
5. **Enter a group file name.**
   Make this entry only if you want the group file name to be different from the identifier entry.
6. **Choose OK.**
   A group window with the name you specified opens. You can now create icons for DOS applications in this group.

▼ Creating a DOS Program Item

1. **Open Program Manager.**
2. **Select or create a group in which you want to place a DOS application.**

3. **Open the File menu and choose New.**
   The New Program Object dialog box opens.

4. **Select Program Item and choose OK.**
   The Program Item Properties dialog box opens.

5. **Enter the appropriate information in the Program Item Properties dialog box.**
   The text you enter in the Description field appears under the icon.

Figure 11-4 on page 142 shows this dialog box, along with information about completing it.

6. **Choose OK.**
   An icon representing the DOS application appears in the group selected in Step 2.

▼ Starting a DOS Application

- **Open the icon representing the DOS application.**
  The DOS emulator starts and loads the DOS application.

  or

- **In Program Manager, open the File menu and select Run, then enter the path and DOS command to run the DOS application.**

11

Reference Material for Tasks Related to Using DOS Applications

This section provides reference material for tasks related to installing and running DOS-based applications.

Troubleshooting DOS Application Problems

Table 11-1 suggests solutions to problems you might experience during DOS application installation and use.

Table 11-1 DOS Application Problems and Solutions

Symptom	Possible Cause	Solution
DOS emulator will not start.	DOS emulator not installed on system.	You must install the DOS emulator onto your Linux system before you can use it through the Wabi program. On Linux, this is usually the DOSEMU package with a licensed copy of DOS.
	The Wabi program cannot locate the DOS emulator program.	Specify a full path name in the startup command, even if the emulator's directory is on your Linux path. See page 137 for more information.
	Improperly configured startup command string.	Make sure you can start the emulator from a Linux command line first. Use this Linux command as the basis for your startup command string, with placeholders inserted if necessary. See page 137 for more information.
Installed DOS program does not appear in any group.	No icon created for this application.	You must create a program item for a DOS application. See page 144 for more information.
DOS application won't install or run.	DOS emulator not installed, or not configured correctly.	See the DOS emulator documentation to make sure you have installed and configured the emulator correctly. See page 137 for information about connecting it to the Wabi program.

Table 11-1 DOS Application Problems and Solutions *(Continued)*

Symptom	Possible Cause	Solution
Can't start DOS application by opening its icon.	Missing placeholders in DOS emulator startup command or DOS emulator not in Linux path.	Make sure you have inserted the correct placeholders in the DOS emulator connection. Use a full path in the emulator command if the directory is not in your Linux path. See page 137.
	The path specified in the Command Line or the Working Directory may no longer be valid.	If the DOS application files have been moved, or if you have changed the Wabi drive connection to the directory, the Program Item Properties must be changed. See page 142 for information about the Program Item Properties dialog box.
Application not fully functional.	Application function incompatible with DOS emulator or X Window system.	See documentation for the DOS emulator for known problems. Also see any supplemental documentation included with your Wabi software.

11

Wabi File Layout A

This appendix discusses the structure and file layout of the Wabi software. This hierarchy of directories and files provides the Wabi program with the resources it needs to run your applications. There are two main areas in this file layout:

- **The Wabi system directory** – This area is created when you install the Wabi software from the distribution media. The directories within this directory contain UNIX executable and binary files, many of which are copied into other directories. The Wabi system directory is `/opt/wabi`. This appendix describes the file layout at the level of the Wabi system directory and below.
- **The** `$HOME/wabi` **user directory** – This area is created within your home directory the first time you start the Wabi program. (However, if you set the `WABIDIR` variable, your `wabi` user directory may be located elsewhere.) The directory is expanded and modified as you install applications. The directories located within this directory contain resource, program, and initialization files. Symbolic links in this directory point to other locations.

In addition to these directories, the Wabi program uses initialization (`.ini`) files to provide application compatibility and to control program configuration. Initialization files are located in the

$HOME/wabi/windows directory. By changing settings in these files, you can change various Wabi configuration items. Initialization files are discussed in "Initialization Files" on page 154.

Wabi System Directories and Files

A system of directories and files is created during the first phase of installation. These directories and files contain UNIX binary programs and other executable files. Table A-1 lists the directories created during the installation process on all operating systems. Do not alter these directories or files within them in any way unless you are following a procedure documented in this manual.

Table A-1 Wabi System Directories and Files

Name of Directory	Directory Contents
bin	The Wabi program's UNIX executable files and scripts, such as wabi (the Wabi startup script), wabiprog (the main Wabi executable), and wabifs (the Wabi font server).
doc	README files, copyright notices, and the HTML and Postscript versions of this User's Guide.
icons	Various graphical components used during Wabi execution.
lib	Internal Wabi scripts and image files.
man	Text pages displayed when you enter the man wabi command.
printers	Drivers, initialization files, and help files for HP LaserJet III and Epson printers.
wbin	Wabi utility programs, executable files, libraries, and initialization files.

$HOME/wabi *Directories and Files*

The first time you start the Wabi program, it creates a system of directories and files within a `wabi` subdirectory in your home directory. Table A-2 lists the directories and files created the first time you start the Wabi program.

Table A-2 `$HOME/wabi` Directories and Files

Name of File or Directory	Function
`autoexec.bat`	This file is required to complete the installation of application programs that modify it automatically. This file may contain PATH statements that Wabi uses to locate installed applications, and SET statements for setting environment variables used by applications. PATH and SET commands are the *only* commands that Wabi uses in your `autoexec.bat` file. If you add other commands, Wabi ignores them.
`config.sys`	This file is required to complete the installation of application programs that modify it automatically. The Wabi program ignores all statements in this file.
`fc`	This directory contains font information for your display.
`tmp`	This directory is required by some application programs. The directory contains no Wabi files, and may contain nothing at all, but you should not delete it.
`wabihome`	This file is a link to the Wabi system directory.
`windows`	This directory contains Microsoft Windows files and Wabi program resource and initialization files. The directory also contains links to various executable files residing in the Wabi system directory. Several `.ini` files are also stored in this directory; they are described in "Initialization Files" on page 154. The directory may also contain initialization files installed by applications.
`windows/system`	This directory contains font files and dynamic link libraries (`.dll`) installed with Microsoft Windows, and utilities and files related to installed printer drivers. Some files are links to files in the Wabi system directory. The directory may also contain font files and dynamic link libraries installed by applications.

A

Initialization Files

Initialization (`.ini`) files are contained within the `$HOME/wabi/windows` directory. These files are used to control certain configuration items for the Wabi program and Microsoft Windows programs. Some of these files are updated automatically by the applications you install. When you install applications, the installation programs may add `.ini` files for the applications to this directory. Table A-3 lists initialization files and the functions each provides.

Table A-3 Initialization Files

Name of File	Function of File
`win.ini`	This file provides compatibility with Windows applications (many applications modify it automatically at the time of installation). This file also stores the window color settings you make from Control Panel. You should not edit this file unless instructed to do so.
`system.ini`	This file provides compatibility with Windows applications.
`wabi.ini`	This file is used to store Wabi-specific settings that you make through Configuration Manager. This file also stores default system settings for various operating system platforms. In general, you should not edit this file. Make all changes through Configuration Manager.
`progman.ini`	This file is used by Program Manager. It maintains lists of groups and their contents and other miscellaneous settings. Do not edit this file.
`control.ini`	This file is used by Control Panel to store your Wabi environment settings.

Color From Windows to Wabi B

The subject of color handling in Microsoft Windows and the X Window System is a complicated one. This appendix gives a brief overview of the major features, and some specific information on how to influence color behavior when using the Wabi program.

A good source of detailed information about X Window color handling is the *Xlib Programming Manual* published by O'Reilly & Associates, Inc.

Color Palettes and Maps

Many popular color display devices are able to generate thousands or even millions of different colors, but can display only 256 or fewer colors at one time. Because of this, the colors available for display at a given time must be defined and listed, or *allocated*, in a place where the window system can look them up. Colors are identified by *RGB* values, which are numbers that indicate the amounts of red, green, and blue light needed to produce the color. Microsoft Windows and X Windows both use a table of RGB values stored in memory to determine what colors are available for use. Microsoft Windows calls its table of colors a *color palette*, and X Windows calls it a *colormap*. Each entry in the table is called a *color cell*, and specifies the RGB values for a particular color. Each pixel on a display is assigned a number corresponding to a color cell, and the RGB value stored in the color cell determines the color displayed by the pixel.

Microsoft Windows and X Windows each use a color table that is hardware-dependent, so the color tables vary from one display type to another. Both window systems also let applications provide their own color tables, and here is where color handling in the two systems differs markedly.

Microsoft Windows Color Allocation

Microsoft Windows tries to match the colors in an application's color palette, called the *logical palette*, to colors already allocated in the default palette. Windows uses one of two methods for handling this. The method chosen depends on the particular display type.

For some displays, Microsoft Windows uses a single color palette, one that cannot be changed. If an application requests a color that is not in the palette, Windows either uses the closest color it can find in the palette, or approximates the color by making a pattern composed of pixels of different colors. For example, a light yellow might be approximated using a checkerboard pattern of bright yellow and white. This is called *dithering*. Usually, if the color is for a line, Windows uses the closest color. If the color is for filling a shape, Windows dithers the color.

For other displays, Microsoft Windows uses a palette manager, which can change colors in the default palette. If an application requests a color that is not in the palette, and an unallocated color cell exists, the color is added to the palette. If there are no more unallocated color cells, Windows either matches the logical palette color to the closest color it can find in the default palette, or dithers it.

Because all windows running in Microsoft Windows use the default palette, Windows allocates colors for the active window first, to make sure its colors are correct. The inactive windows could potentially show some colors that are not exactly what the application requested. However, for the most part, colors in inactive windows are close to what is intended.

X Windows Color Allocation

X Windows color handling is more complex, and varies with the display type and the capabilities of the X server, a program that controls all aspects of the display for X applications. It usually supports several color handling methods, called *visuals.*

The X server has a default visual, the method used to handle color when an X application does not request a specific visual. The Wabi program uses the X server's default visual whenever possible.

On the most common types of color display, 8-bit or 8-plane, the usual default is a visual called *PseudoColor*, which is therefore the visual that the Wabi program uses most often.

Eight-plane displays generally have one hardware colormap, into which the X server loads a default colormap when it first starts up. The default X colormap is changeable, so X applications can change individual color cells in the default colormap to allocate colors they need.

X applications can also provide their own colormaps, called *virtual colormaps*, which are loaded into the hardware colormap. The X server can maintain more than one virtual colormap at the same time, but only one can be used in the hardware colormap at any given instant. This means that if the active application swaps in its own colormap, the windows of all other (inactive) applications must use this same colormap. As a consequence, the color cells assigned to pixels might now contain colors completely different from those intended, resulting in undesirable color schemes for the inactive windows.

As you change focus from one window to another, colors flash as each application's colormap is loaded and used by all running applications.

To minimize color flashing, only color-intensive X applications use virtual colormaps. The Wabi program is a color-intensive X application by virtue of the many color-intensive Windows applications it runs, so color flashing can be a problem. You can alleviate color flashing by controlling certain aspects of the Wabi colormap.

B

The Wabi Colormap

When the Wabi program uses PseudoColor visuals, it creates a virtual colormap but tries to retain many of the colors already allocated in the default colormap. This reduces the number of colors that might be changed for other X applications that are running.

When the Wabi program starts, it uses the current default colormap as the starting point for creating a virtual colormap. First, the Wabi program changes some of the color cells in the default colormap to provide a range of colors needed for the Windows applications you may subsequently run. It allocates 49 colors — seven shades of each of the seven solid colors (red, green, blue, cyan, magenta, yellow, and gray). In addition, it allocates 15 more colors — five shades of each of the primary colors (red, green, and blue). Some of these additional reds, greens, and blues may be duplicates of the 49 shades of solid colors, so the total number of colors allocated may be something less than 64 colors. On an eight-plane display (which has 256 colors in its colormap), this leaves the majority of colors in the default colormap unchanged. Wabi then copies the changed default map into its own virtual colormap. Finally, the Wabi program frees half of the color cells it allocated in the default colormap so that they can be allocated by other X applications.

Wabi Color Variables

"Where to Set Color Variables" on page 162 explains where to set the variables in `win.ini`.

The Wabi program provides variables that influence how the Wabi colormap is created and how Wabi affects the default X colormap. One variable, `Technicolor`, affects Wabi on all display types. The other variables depend on `Technicolor` being set to 0, and apply only when Wabi is using the 8-bit PseudoColor visual. You set the variables in your `win.ini` file.

`Technicolor` *Variable*

The `Technicolor` variable allows you to make a trade-off between color flashing, or "technicolor," and flexibility in allocating and changing colors in Microsoft Windows applications running in the Wabi program. If you want applications running in the Wabi program to be able to allocate all the colors they want, you can set `Technicolor=1`, and put up with color flashing in inactive X windows. If it does not matter if

applications in Wabi get the exact colors they want, you can set `Technicolor=0`, and color flashing is minimized as Wabi tries to share colors with other X applications.

The default value is 0 (color flashing off), unless there is more than one hardware colormap for the display screen. If there is more than one hardware colormap, it is assumed one will be available for Wabi, and the value defaults to 1. This may sometimes cause color flashing on 24-bit displays using 8-bit PseudoColor.

When `Technicolor=0`, Wabi allocates colors from the default X colormap and then copies them to the Wabi colormap, as described in "The Wabi Colormap" on page 158, in an attempt to share as many colors as possible.

When `Technicolor=1`, Wabi uses a standard X colormap as its colormap. This often causes color flashing on 8-bit displays and 24-bit displays when you switch between Wabi windows and other X windows.

If your X server has more than one hardware colormap, but the colormaps are normally already in use by other X applications when you start Wabi, you can set `Technicolor` to 0 to alleviate color flashing.

If your X server has one colormap, as is the case with most 8-bit displays, you may set `Technicolor` to 1 to give Wabi, and the Windows applications running under it, the most flexibility in allocating and changing color. If you need the color flexibility and find that color flashing is annoying, try maximizing the Wabi window when you use the Windows application. This prevents the mouse pointer from drifting into other X application windows and causing their colormaps to be swapped in.

Other Color Variables

The other Wabi color variables affect Wabi only when it uses 8-bit PseudoColor visuals (on 8-bit and 24-bit displays) and `Technicolor` is set to 0. You can see if Wabi is using 8-bit PseudoColor by running the X program `xwininfo`, which should be present on most Linux systems with X windows.

In a Linux command line window, type the following command:

```
xwininfo
```

and then select the Wabi window when prompted.

Look for the following lines:

```
Depth:8
Visual Class: PseudoColor
```

If you see these lines, you can use the variables in Table B-1 on page 161.

If `xwininfo` is not available, use the `xdpyinfo` command. This displays information about your X server, including the visuals that are available.

In a Linux command line window, type the following command:

```
xdpyinfo | grep class
```

If you see the class PseudoColor, you can use the variables in Table B-1 on page 161.

Variable for a 24-Bit Display

The Wabi program does not support 24-bit TrueColor displays directly. However, some X servers that run on 24-bit displays can simulate an 8-bit PseudoColor device. The Wabi program uses an 8-bit PseudoColor visual on 24-bit displays that support PseudoColor, so all the variables described above apply to such 24-bit displays as well as 8-bit displays.

An additional variable, `UseRootWindow`, may be useful if you find Wabi has problems drawing to your 24-bit display. `UseRootWindow=`*`n`* tells whether or not Wabi can draw to and read from the root window (the "background" window of the desktop). The default value is 1 (yes), unless the Wabi colormap and the default colormap are of different sizes, in which case the default is
0 (no).

Most users will never need to set `UseRootWindow`, and should not set it because it may cause problems, especially on 8-bit displays. You should only consider using it if you are using a 24-bit display and Wabi appears to be having problems drawing to the screen (windows and icons do not look right, for example).

If you are experiencing such problems, experiment with `UseRootWindow` to see if it alleviates them. If this does nothing, or makes the drawing worse, remove the variable entirely.

Table B-1 Variables for 8-Bit PseudoColor Visuals

Variable	Description
`PercentFree=`*n*	When `Technicolor=0`, `PercentFree` specifies how much of the default X colormap Wabi should free up after allocating its colors. The range of acceptable values is 0 through 100, with a default of 50, which means Wabi frees 50% of the color cells. Setting `PercentFree` higher could reduce color flashing as you activate and deactivate the Wabi window, because the other X windows use most of the colors that were in effect when they started. However, setting `PercentFree` to 100 means Wabi frees all the color cells it allocated, which leaves the same number of free color cells as there were before Wabi started. This may cause flashing as the default X colormap and the Wabi colormap are swapped in and out. Setting `PercentFree` lower reduces the chance that other X applications will find insufficient free color entries available. If an X application does not find enough free color cells, it may display incorrect colors, return an error message, or detect that the default X colormap is too full and swap in its own virtual colormap. This causes more color flashing when you move the mouse out of the X application's window.
SolidColorCount=*n*	When `Technicolor=0`, this variable defines how many shades of each of the seven colors (red, green, blue, cyan, magenta, yellow, and gray) are allocated. A total of 7 shades x `SolidColorCount` colors are allocated. The range of acceptable values is 1 through 16, with a default of 7. Set this variable higher to let Wabi allocate more colors so that applications running under Wabi don't find it necessary to allocate new colors. Set this variable lower if most colors have already been defined by X applications before Wabi starts, or if you will be manually defining all your colors anyway (through a "paint" program, for example).

Table B-1 Variables for 8-Bit PseudoColor Visuals *(Continued)*

Variable	Description
RedCubeCount=*n* GreenCubeCount=*n* BlueCubeCount=*n*	When `Technicolor=0`, these three variables define the dimensions of the red, green, and blue components of the color cube. The color cube comprises the additional reds, greens, and blues that Wabi adds to its colormap. These variables allow you to alter the number of reds, greens, and blues, respectively, that will be used in the Wabi colormap. The range is 4 through 9, with a default of 5. You can adjust these variables if you find that Windows applications you run need more colors of a particular shade. These variables usually do not affect color flashing.

Where to Set Color Variables

To set Wabi color variables, edit your `$HOME/wabi/windows/win.ini` file and add them. None of the variables appear in `win.ini` as shipped in the Wabi program.

If you want the variables to affect your running of Wabi on any display you use, set the variables in the `[ColorMap]` section in `win.ini`. For example, if all displays you use are 8-bit, set the variables in the `[ColorMap]` section.

If you run Wabi on more than one display and you want the variables to affect Wabi only on a particular display, create a section whose title is the display name and set the variables in that section. For example, to apply the variables to Wabi only when you display it on the display jethro:0.0, create a section called `[jethro:0.0]`.

The Wabi program reads the `[ColorMap]` section first, and then the `[`*host*`:0.0]` sections, so that variables set in `[`*host*`:0.0]` sections supercede variables set in the `[ColorMap]` section for the specified displays. If you set the same variables in both sections, the `[`*host*`:0.0]` variables are used for those displays. This may be helpful if you use multiple displays and one of them is 24-bit, for example. You could set variables specific to the 24-bit display by creating a `[`*host*`:0.0]` section, and set variables for all 8-bit displays in the `[ColorMap]` section.

Fonts From Windows to Wabi C

This appendix describes some aspects of font handling in Microsoft Windows and in the Wabi program, so you can better understand how the Wabi program implements fonts used by your applications. It does not fully describe either system's font handling.

The Caldera Network Desktop includes a complete X-based font server that supports TrueType, Type 1 Postscript and SPEEDO fonts for X applications. The Caldera Font Server is not used in any way by the Wabi program. Wabi includes a separate font server that is described here.

Why Does Wabi Convert Fonts?

Fonts used in Microsoft Windows applications are described in font resource files, usually stored in `C:\WINDOWS\SYSTEM` with file name extensions such as `.FON` and `.TTF`. These files contain either the actual images of fonts and detailed numeric information about them, or precise information about how to create the font images.

The X Window System cannot use the Microsoft Windows font images or font information directly because it expects font information in a different form. The Wabi program must convert the font information so that the X server can use it to display the desired fonts.

On X Window systems using the X11R6 protocol, the Wabi program uses the Wabi font server, which speeds up the conversion process so that the X server can display the fonts faster.

C

Font Display Types

Three font display types are relevant to applications running in Microsoft Windows and the Wabi program: bitmap fonts, outline fonts, and vector fonts.

Bitmap fonts are stored as graphic images of characters, with each point size of a typeface stored as a separate font. Generally, in Microsoft Windows, the fonts used in dialog boxes and in an application's screen displays are bitmap fonts. Bitmap fonts can be *scaled* (displayed in smaller and larger point sizes) but a scaled bitmap font may display with poor resolution.

A bitmap font displayed on the screen is not the same font used by a printer. Most WYSIWYG ("what you see is what you get") applications running in the Microsoft Windows or Wabi environment only use bitmap fonts that can be matched to a printer font on the printer you are currently set up to use. The font used by the printer, while not the same as the bitmap font shown on the screen, usually looks nearly identical. For example, if you use the font Courier 10 in your document, you see a bitmap Courier 10 on the display. When you print your document, you see the printer's version of Courier 10.

Outline fonts are produced from stored information about the shape, or outline, of the font. Outline fonts scale better because the information about the shape is independent of the size. In both Microsoft Windows and X Window environments, different font sizes are created by calculating the new size and reproducing the exact shape of a character in the new size. TrueType™ fonts and many X Window fonts, including those used by Adobe PostScript, are outline fonts.

Outline fonts can be used both on the screen and on the printer. If you are using a printer that can handle outline fonts in either Microsoft Windows or Wabi environments, the outline information is passed to the printer and the printer creates the raster images. If you are using a printer that cannot handle outline fonts, Microsoft Windows or Wabi creates the raster images and sends them to the printer. In either case, the fonts are the same printed and on the screen.

Vector fonts (or plotter fonts) are stored as lists of vectors to be drawn in sequence to generate each character. Although they are easily scalable, their appearance is poor compared to outline fonts.

Wabi Font Processing

Each time you start the Wabi program, it creates a list of available fonts from the `[fonts]` section of `win.ini`, which includes bitmap fonts shipped with the Wabi program, TrueType, bitmap, and vector fonts installed with Microsoft Windows, and any fonts installed with your applications.

The list of fonts is made available to applications, just as in Microsoft Windows, so the applications can display a list of fonts to the user.

When you select a font name, the Wabi program finds the font information and determines how to display it. The method for displaying the font varies depending on whether the font is a TrueType, bitmap, or vector font, and whether the Wabi font server is running.

Vector fonts are the easiest to display. For each character to be displayed, the Wabi program simply draws the list of vectors, or lines, that make up the character. Because line drawing is fast, Wabi is able to draw these characters itself, without help from the X server. Bitmap and TrueType fonts, however, are more complicated to produce.

If the font server is running and Wabi is asked to display characters using a bitmap or TrueType font, Wabi simply passes the font information to the Wabi font server. Wabi passes the text to be displayed to the X server. The X server obtains any necessary font images or information from the Wabi font server and displays the text.

If the font server is not running and the font requested is TrueType, Wabi creates bitmap images of the TrueType font. The Wabi program can then draw characters by painting these bitmaps onto the screen, using the X server's normal functions.

If the font server is not running, and the requested font is a Microsoft Windows bitmap font, the font's raster images, or bitmaps, are already created, so the Wabi program uses them to draw the characters on the screen.

The Wabi Font Server

The Wabi font server uses the X Font Service Protocol, a method introduced in the X11R5 release of the X Window System for separating font handling from the X server's other duties.

If the X server is the X11R5 or X11R6 release and supports the Font Service Protocol, Wabi starts its font server, `wabifs`, when you start the Wabi program. When Wabi selects a font in the available fonts list, it passes the font information to `wabifs`, which takes over font processing for the request and interacts with the X server.

If the X server is the X11R4 release or does not support the Font Service Protocol, Wabi creates bitmap images of the fonts on the X server, which then displays them.

When the Wabi font server is running, you see two UNIX processes rather than one. The main process is called `wabiprog`, and the font server process is called `wabifs`. The processes work together closely.

With the Wabi font server running, the Wabi program can send text rather than bitmapped images to the X server no matter what font you are using. Even if you are using a TrueType font that your X server does not know about, Wabi can act as though the X server knows about the font. The Wabi program passes the Windows font data to the Wabi font server, which converts the font information to a form the X server can use. The font server passes the converted font information to the X server, which then displays the characters on the screen in the specified font.

Font processing is most efficient when the Wabi font server is running. There is no performance difference between TrueType and Microsoft Windows bitmap fonts. If the font server is not running, all fonts take longer to display because the Wabi program must create the font images and pass them to the X server.

If you have a problem with fonts and cannot tell where the problem lies, you can take a step in isolating it by starting Wabi without the font server to see if the symptoms change. See "Starting Wabi With or Without the Font Server" on page 25 for instructions.

UNIX and DOS File Systems D

This appendix describes some utilities to help you use DOS files in a Linux system and vice versa.

Files Created With Applications

The files you create with an application running in the Wabi environment are the same as files created with the same application running in the DOS environment with Microsoft Windows. If you run an application in both environments, you can create a file with an application in one environment, and edit the same file in the other environment.

Text Files

Simple ASCII text files can be used in both the UNIX and DOS worlds, but there are a few slight differences in file format. For example, the Linux operating system interprets the DOS end-of-line character as a ^M (Ctrl-M), so if you view a DOS ASCII file in a Linux text editor, it may have a ^M at the end of each line.

D

Text File Conversion Between UNIX and DOS Systems

Some Linux distributions include two UNIX text file conversion utilities. You can use these utilities to convert simple ASCII text files created with tools such as a text editor, vi, or the Microsoft Windows Notepad, back and forth between UNIX and DOS formats. This allows you to view and print ASCII text files in either environment. The utilities are:

- `unix2dos` – Converts text files created with UNIX-based tools, such as vi or a text editor, to a common DOS format.
- `dos2unix` – Converts text files created with DOS-based tools, such as the Microsoft Windows Notepad, to a common UNIX format.

You run these utilities from a Linux command line window.

▼ Converting a DOS Text File to a UNIX Text File

The `dos2unix` command takes the following form, where *originalfile* is the DOS file and *newfile* is the UNIX file:

`dos2unix` *`originalfile newfile`*

The original DOS text file is converted from DOS format to UNIX format. The converted file is given the name represented by *newfile*. (The original file still exists.) If the original file and the new file are the same, `dos2unix` will rewrite the original file after converting it.

▼ Converting a UNIX Text File to a DOS Text File

To convert a text file from UNIX format to DOS format, enter:

`unix2dos` *`originalfile newfile`*

The original UNIX text file is converted from UNIX format to DOS format. The converted file is given the name represented by *newfile*. (The original file still exists.) If the original file and the new file are the same, `unix2dos` will rewrite the original file after converting it.

File Names in UNIX and DOS

The DOS operating system limits file names to a format using 8 characters, a period, and up to 3 characters in a file name extension (commonly known as the 8.3 convention). Also, DOS recognizes only a single case so it doesn't matter whether you type a name in uppercase or lowercase. The UNIX filesystem used in the Linux operating system accepts file names up to 128 characters (or more) and distinguishes between uppercase and lowercase. The only Linux file name that matches the DOS file name format is all lowercase and no more than 8 characters plus 3 extension characters.

A file created in the Linux system and named with a long descriptive file name such as `QuarterlyReport.doc` cannot be handled by DOS. The Wabi program must map Linux file names that use uppercase or are longer than the DOS 8.3 naming convention to names acceptable in both DOS and Linux environments because Microsoft Windows applications expect the DOS file name format.

The Wabi program creates names that may be hard to recognize because they may include tildes (~), and may sometimes not include the DOS file name extension. For example, if you have files named `ORANGE.TXT`, `Red.doc`, and `GREENERY.ZIP` in the directory `$HOME/ColorFiles`, they might be mapped to names like `orang~5z`, `red~~~s2.doc`, and `green~26`. Note that these names follow the 8.3 convention, but not the all-lowercase convention.

This mapping may sometimes cause a problem if the file extension is omitted. For example, if an application you run in the Wabi program looks for files with a particular file extension, it may not be able to find them. If you run into such a problem, you run the `wabimakelower` utility to map mixed-case file names to lowercase names, as described in the next section.

▼ Mapping File Names to Lowercase

If you find the Wabi program's mapping of file names using uppercase to be a problem, you can run the `wabimakelower` program to create symbolic links to file names that include UNIX uppercase characters.

This program only works on file names that fit the DOS 8.3 convention but include uppercase characters. To run the program, enter the following command:

wabimakelower *directory*

where *directory* is a directory containing files whose names you want to map.

For the files named `ORANGE.EXE`, `Red.doc`, and `GREENERY.ZIP` in the directory `$HOME/ColorFiles`, use the command:

```
wabimakelower $HOME/ColorFiles
```

The program creates symbolic links `orange.exe`, `red.doc`, and `greenery.zip`, with the original files as their targets. This enables you to see recognizable file names in your applications and when browsing directories in the Wabi program.

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Colophon

This manual was produced from original FrameMaker files provided to Caldera, Inc. by SunSoft. It was edited on a Pentium 90 with 32 MB of RAM using FrameMaker 4 for Windows, running on Wabi 2.2 beta, running on the Caldera Network Desktop 1.0. Proofs were printed from Frame on a Hewlett-Packard LaserJet 4si through Linux print services. Body text is TimesNewRoman.

The Frame files and accompanying graphics were transmitted by FTP to the printer for film output.