

Using
SCO[®] Merge[™]



Using SCO[®] Merge[™]

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Chapter 1

Introduction

This guide is for anyone who uses SCO® Merge™. It complements your UNIX® and DOS documentation. It is not meant to be a complete user's guide for either DOS or the UNIX system. For complete information on using either operating system, including comprehensive descriptions of commands, refer to your operating system documentation.

This section describes briefly the topics covered in the chapters of this guide. You do not have to read the entire guide to begin using SCO Merge. We suggest that you select a learning path suited to your needs and experience.

The rest of this book explains how to use the many features of Merge. It assumes that your system administrator has installed Merge according to the instructions in the *SCO Merge Release and Installation Notes*.

Once Merge is installed on your SCO UNIX System V/386 Release 3.2 Operating System Version 4.2.0 system, if you can log on (either at the console or from a remote terminal), you can use SCO Merge. There are no other prerequisites for using SCO Merge.

Organization of this guide

This guide explains how to use the various features of Merge on your SCO UNIX system. This guide is organized into the following chapters:

Chapter 1, "Introduction," provides an overview of the contents of this guide and gives a list of the notational conventions used throughout.

Chapter 2, "Getting started with DOS," shows you how to use SCO Merge to start and stop a DOS session and use basic DOS commands.

Chapter 3, “Finding your way around with DOS,” describes how SCO Merge makes both DOS and UNIX filesystems available to you.

Chapter 4, “Working with DOS files,” explains how to work with DOS and UNIX files in the SCO Merge environment.

Chapter 5, “Configuring the DOS work environment,” shows you how to use the various SCO Merge tools to create and configure DOS environments on your UNIX system.

Chapter 6, “Using DOS with the UNIX system,” shows you how to effectively use the DOS and UNIX system together. For example, this chapter shows you how to run UNIX commands from the DOS command line, and how to run DOS commands from the UNIX command line.

Chapter 7, “Using Windows with SCO Merge,” explains how to install and configure Microsoft® Windows™ and Windows applications with SCO Merge.

Other SCO Merge documentation

Other documents that are helpful in operating SCO Merge include:

- *Administering SCO Merge*
- *SCO Merge Release and Installation Notes*

Installing SCO Merge

This guide assumes that your system administrator has already installed Merge according to the instructions in the *Release and Installation Notes*.

In addition to installation information, you should be sure to read the *SCO Merge Release and Installation Notes* for up-to-date information on supported hardware and software as well as information on product changes since this guide was printed.

Conventions used in this guide

This guide uses the following notational conventions:

- | | |
|-------------|--|
| bold | Commands, command options, and daemons appear in bold. UNIX commands are case sensitive and will always be presented exactly as they must be entered. DOS commands are not case sensitive. Unless the command in question appears within a file (for example within <i>config.sys</i>), DOS commands will always be presented in lower case bold. |
|-------------|--|

BOLD CAPS	Parameters and variables and DOS commands contained in files appear in uppercase bold. For example: ... SCO Merge does <i>not</i> interpret FCBS commands in any of your system's <i>config.sys</i> ...
SMALL CAPITALS	Acronyms are shown in SMALL CAPITALS. For example: ... the name UUCP is an acronym for UNIX to UNIX Copy ...
<i>italics</i>	Files and directories appear in italics. Italics are also used for emphasis. DOS filenames will always appear in lower case even though DOS filenames are not case sensitive. Additionally, the DOS Drive name (for example, A:) will be treated as a filename when used as an indicator of a file location and it will always be in uppercase.
<i>bold italics</i>	Variables that you supply are in bold italics. For example, in the command <i>path:pathname</i> , you replace the variable "pathname" with an actual pathname when you type the command.
< >	Special keys that you press are in angle brackets, < >. For example, <Ctrl>x means to hold down the Control key and press the x key simultaneously, then release them.
Courier	System responses, programming, and screen examples appear in Courier style font.

Chapter 2

Getting started with DOS

In all important respects, using SCO Merge is just like using DOS on a stand-alone personal computer. With SCO Merge, you can:

- use all common DOS commands
- install and run off-the-shelf DOS applications
- use your computer hardware (diskette drives and printers, for example) in standard DOS ways

In addition, with SCO Merge, you can:

- run Microsoft Windows 3.0 and 3.1. Windows 3.1 runs in the “standard” or 80286 “protected” mode. For more information on how to install, configure and run Windows see Chapter 7 (page 81).
- run several DOS applications in separate DOS environments simultaneously and switch between any of the DOS and UNIX windows
- take advantage of the security capabilities of the UNIX system, including password protection for the whole system and protection for specified DOS directories, data files, and programs
- access UNIX data files and programs, including files within a network environment

This is possible because Merge creates a *virtual personal computer* (also called a *virtual PC* or *virtual machine*) for you whenever you run DOS. Because Merge virtual computers use the virtual 8086 mode of your 80386 or 80486 processor, you can run DOS commands and applications under Merge only if they are compatible with the Intel 8086 processor, except for Windows 3.1, which is supported in the “standard” or 80286 “protected” mode. Merge does not support DOS applications that require the protected mode available on 80286, 80386, and 80486 processors.

Beginning a DOS session

You can enter the DOS environment from UNIX in two ways.

1. If you are running a standard UNIX session, enter the DOS environment by typing:
dos
2. If you are running X windows you can type **dos** in the Xterm window.

If you use either method a DOS session starts with the standard DOS prompt displayed:

C:\

The C: prompt that you see after invoking DOS tells you that you are using DOS drive C: (the fixed disk). You can now use your computer as you would use a standard computer running DOS.

If you start a DOS session or application from an X window and the screen colors are strange or the text unclear, see "Controlling the DOS window" (page 49) for more information.

Ending a DOS session

To end a DOS session, at your DOS prompt type:

quit

If you started DOS by entering the command:

dos program name

simply exit the program. You will be returned either to your UNIX prompt, or (if you are running X) your Xterm window.

Using DOS commands and applications

With some exceptions — see "DOS commands with special behavior" (page 9) and "Inapplicable DOS commands" (page 65) — all common DOS commands work as they do on a conventional, stand-alone DOS computer.

You can use DOS commands for routine operations like copying files or listing the names of files on the fixed disk or a diskette. There are also DOS commands for more specialized purposes such as creating text files and creating and executing BASIC programs. These DOS commands are all supplied with SCO Merge and are described in your DOS documentation. You can also install and use off-the-shelf DOS applications in the DOS environment. *Administering SCO Merge* as well as "Configuring the DOS work environment" (page

29) and "Installing Windows applications" (page 98) provide more information about installing and configuring DOS applications for use on your SCO Merge system.

In the DOS environment, you specify directories and give options to commands in the usual DOS way. For example, if you are using the C: drive, the following command displays the contents of the directory `\usr\dbin` in wide format, with five files listed per line:

```
dir /w \usr\dbin
```

If you are a UNIX user who has not used DOS, you may be unfamiliar with the use of the slash (/) to turn on options and the backslash (\) as the path separator. This is the normal DOS syntax. For further information on this syntax, refer to your DOS documentation.

Changing the default drive: When you enter the DOS environment, your default drive is drive C: (the fixed disk) and your prompt is C:.. To change your default drive to drive A: (the first diskette drive), be sure you have a valid, formatted DOS diskette in the drive, and type:

```
a:
```

Your prompt changes to A: and you can execute commands from the diskette drive.

If your system has a second diskette drive, you can use it with DOS by referring to it as drive B:. The diskette drives are available to only one user at a time. If one user is accessing a diskette drive and a second user attempts to use it at the same time, the second user sees a message stating that the drive is unavailable.

Changing directories: Use the DOS `cd` or `chdir` command to change your current working directory. For example, to change to `C:\usr\dbin`, at the C: prompt, type:

```
cd \usr\dbin
```

Piping and redirecting with DOS: Pipes and redirection function under SCO Merge as under standard DOS. For example the following commands work exactly as they would under standard DOS:

```
dir | sort > contents  
dir a: >> contents
```

All common DOS commands work as you would expect, including `copy`, for copying files `comp`, for comparing files `type`, for displaying the contents of files `ren`, for renaming files and `del`, for deleting files.

The more specialized DOS tools for editing files, programming, and configuring the DOS environment also work in the Merge environment. These tools include:

- the **edlin** and **edit** editors
- the **QBASIC** interpreter
- batch files, including all standard batch commands
- the **debug** utility
- *config.sys* and *autoexec.bat* files

Using off-the-shelf DOS applications

You can use most off-the-shelf DOS application programs just as you would use them on a stand-alone DOS personal computer. You can also use any custom DOS applications that you might have developed.

To use an application from drive A:, follow the application manufacturer's instructions. Typically, you insert the application diskette into drive A:, change your current drive to drive A:, and invoke the application by name from your A: prompt. For example, to run WordPerfect® from your A: drive, first type:

a:

and then, from the A: prompt, type:

wp

To run an application from drive C:, you must first install the application on the fixed disk. (In most cases, DOS applications are installed by following the application manufacturer's instructions.) For further pointers on installing DOS applications, see *Administering SCO Merge*.

Once installed, applications are executed according to the manufacturer's instructions. For example, if WordPerfect is installed on your fixed disk and it is in your search path, you can start it by typing:

wp

Booting applications from drive A:

A few personal computer applications (such as some versions of the Microsoft® Flight Simulator®) must be booted from drive A: because they do not run under DOS. They actually boot their own operating systems. To use these applications on a conventional personal computer, you insert the bootable application diskette into drive A: and power the computer on or press (Ctrl)(Alt)(Del).

To run these applications under SCO Merge, you use the **dosboot** command. To use **dosboot**, you must be using the UNIX shell and not the DOS environment. If you are currently in the DOS environment, type **quit**. You should be at a UNIX prompt.

Only two steps are required to use **dosboot**:

1. Insert your bootable application diskette into drive A:
2. Type:

dosboot

When you use **dosboot**, your application runs independently of any other UNIX or DOS activity. This means that files on drive C: are not available, and you cannot type **quit** as you usually do to leave the DOS environment.

To end a **dosboot** session, press (Ctrl)(Alt)(Del). Your UNIX system prompt then returns.

NOTE You can also use the kill DOS control code described in “Stopping DOS programs” (page 11) if your application is hung and does not respond to (Ctrl)(Alt)(Del).

File permission errors

Sometimes the message DOS returns is affected by file permission modes. For example, when a DOS command you issue encounters a file for which you do not have read access, DOS may display a message that implies the file does not exist, even though the file does exist. Similarly, if you try to create a file in a directory for which you do not have write access, DOS may display an error message such as File creation error that does not clearly indicate the nature of the problem.

DOS commands with special behavior

Nearly all standard DOS commands operate in the Merge environment just as they do on a conventional stand-alone DOS computer. Some DOS commands, however, are either not usable in the Merge environment or operate differently than they do on a stand-alone DOS computer.

In particular, some of them will operate correctly only on a “real” DOS filesystem. Merge emulates DOS filesystems while preserving the underlying UNIX structure, which is completely different.

The following restrictions apply:

- You cannot use the DOS **fdisk** command under Merge. Instead of running **fdisk** under Merge, use equivalent UNIX utilities or shut down the UNIX system, boot standard DOS, and use **fdisk** under standard DOS.
- You cannot use **ship** or any other DOS command for parking the fixed disk head on the Merge system.
- You cannot use the following commands on the shared UNIX filesystem: **chkdsk**, **format**, **sys**, **mirror**, or **unformat**. Do not use them on Drives C:, D: or J:.

You *can* use these commands on a real DOS filesystem, such as the diskette drive, or a physical DOS partition. You can also use them on virtual floppies and virtual DOS partitions, because, though these are portions of the shared UNIX filesystem, they are formatted as real DOS filesystems.

format may work somewhat differently under Merge and standard DOS. A filesystem which you **format** under Merge may work properly under Merge but not work properly if used under standard DOS. It is safest to use standard DOS to **format** any disk or partition from which you intend to boot DOS. They will then work properly under either DOS or Merge.

Since virtual floppies or virtual partitions will be used only under Merge, they should be **formatted** or **unformatted** under Merge.

- Similarly, you cannot use **undelete** on any file which is part of the shared UNIX filesystem. But you *can* use it on any file which is part of a real DOS filesystem. Use **undelete** on real or virtual floppies or on real or virtual DOS partitions.
- You *can* use the DOS **time** and **date** commands to display or change the time and date that apply to the DOS environment, but when you leave the DOS environment, time and date are determined by the UNIX system clock. When you reenter DOS, the DOS clock is always initially synchronized with the UNIX system clock.

If you issue a DOS command that does not work in the Merge environment, DOS displays an error message but does not harm your computer in any way or destroy any data.

Stopping DOS programs

There are several ways to stop DOS programs that you start in a DOS environment. Most DOS applications include a specific procedure for stopping their execution. Whenever possible, you should stop a DOS program using the procedure designed for that program. Sometimes, however, you might want to stop a DOS utility that provides no specific method for termination, or else a DOS application might get locked into a state where the prescribed termination procedure does not work. If you run into one of those conditions, follow one of these procedures:

1. Use the DOS break character `<Ctrl><C>` or `<Ctrl><Break>` just as you would in standard DOS. These functions stop DOS commands like `dir`, `type`, or `tree`, and some applications. When you press `<Ctrl><C>`, your DOS prompt returns and you can resume DOS work immediately.
2. If `<Ctrl><Break>` does not work, press `<Ctrl><Alt><Del>`. That is, press `<Ctrl>` and `<Alt>` at the same time; then, while still holding `<Ctrl>` and `<Alt>`, press `<Del>`. This is the key sequence used to reboot DOS on a standard DOS computer. Under SCO Merge, `<Ctrl><Alt><Del>` causes the DOS program as well as the current DOS environment to abort. You must reinvoke DOS before you can resume DOS work.

WARNING When you press `<Ctrl><Alt><Del>`, you could lose data if your DOS program is working on open files, just as you would on any standard DOS system.

3. If neither the `<Break>` character nor `<Ctrl><Alt><Del>` properly terminates your DOS process, use the kill DOS control code appropriate for your terminal.

DOS Window or Console	PC Scancode Terminal	ASCII Terminal
<code><Ctrl><Esc></code> <code><Ctrl><K></code>	<code><Ctrl><Esc></code> <code><Ctrl><K></code>	<code><Esc></code> <code><Ctrl><K></code>

Chapter 3

Finding your way around with DOS

With SCO Merge, the entire UNIX filesystem is available to you. DOS treats it as a DOS fixed disk, usually referenced as Drive C:.

When you boot DOS on a conventional stand-alone personal computer, your working directory is the *root* of the filesystem tree. You own all files in the filesystem and can access them easily with `cd` (change directory) commands. You can also modify any file as you please.

On SCO systems, each user has a home directory, that is, a directory containing the files and subdirectories created and owned by that user. When you log in to the UNIX environment on your SCO system and then immediately enter the DOS environment, your working directory is your home directory. (If you change directories before entering the DOS environment, however, your working DOS directory is the same as your UNIX directory at the time you type `dos`.) You can access your own files and subdirectories like you can on a conventional DOS computer, but you cannot access those belonging to other users without their permission.

NOTE Due to differences in the way DOS and UNIX systems do file allocation, some DOS commands (such as `mirror(CMD)`) do not work on shared filesystems. For more information on DOS commands that do not work on shared filesystems, see “Inapplicable DOS commands” (page 65).

The DOS search path

When you run a DOS program by typing a path name, DOS looks in the directory you specify for the program. If the program is there, DOS runs it. If the program is not there, the operation fails. For example, if you enter the following command:

```
C:\usr\ldbin\wp5\wp
```

DOS looks in the directory `\usr\ldbin\wp5` on drive C: for the program `wp` and runs it only if it is there.

If you type only the name of the program (for example, `wp`) without specifying its path, DOS looks first in your current working directory for the program. If the program is there, DOS runs it. If the program is not there, DOS searches through the directories in your search path to find the program.

The DOS search path in SCO Merge works like the search path on a conventional DOS system, with one difference: when you enter the DOS environment, your search path is automatically set to be `\usr\sbin` and `\usr\ldbin`, the directories where standard DOS commands and applications are stored. You can, if necessary, override the default DOS search path by using the **PATH** command as you would on a conventional DOS system. Note that the path is often set in *autoexec.bat*. For more information on the *autoexec.bat* file, see “Using *autoexec.bat* and *config.sys* files” (page 31).

Naming DOS files and directories

When you create files or directories during a DOS session or using a DOS application, your names must conform to standard DOS rules for length and character set.

You can type the name with either uppercase or lowercase alphabetic characters. When you create a file on a DOS medium (a diskette in drive A:, for example), DOS converts all alphabetic characters to uppercase as expected. When you use DOS to create a file in the shared UNIX filesystem (DOS drive C:), however, SCO Merge converts all alphabetic characters to lowercase. Using lowercase for filenames is conventional under the UNIX system. Requiring names to be consistently lowercase also prevents you from creating names that are identical except for case, which DOS cannot differentiate.

Thus, any file you create with SCO Merge in the shared UNIX filesystem can be accessed by either DOS or the UNIX system.

Differences between DOS and UNIX filenames

DOS and UNIX rules for naming files and directories differ with respect to case, size, and character set.

UNIX is case-sensitive while DOS is not. Alphabetic characters in UNIX file and directory names are usually lowercase, but they can be any combination of upper- and lowercase. Whatever combination you enter is preserved. DOS, on the other hand, interprets all alphabetic characters in file- and directory names as uppercase, whether you enter them in uppercase or lowercase. To the UNIX system, "chapter1" and "CHAPTER1" name two different files; DOS cannot distinguish between the two forms, seeing them instead as the same name.

DOS limits file and directory names to eight characters plus an optional extension of up to three characters. Traditionally, the UNIX system allows names up to 14 characters, although some newer systems (including SCO UNIX Operating System Version 4.2.0) allow more. Although the UNIX system does not provide for filename extensions in the same sense as DOS, a UNIX name can contain a period anywhere in the name. Thus, while the UNIX system accepts any legal DOS name, DOS does not allow such perfectly good UNIX names as *messagetoall* or *chapter.seven*.

DOS and the UNIX system accept both alphabetic and nonalphabetic characters in file and directory names, but the UNIX system accepts more nonalphabetic characters than DOS. For example, control characters and spaces are valid characters in UNIX names but not in DOS names. (Note that UNIX names containing spaces must be enclosed in quotes.)

3

Accessing files with illegal DOS names

You can use DOS to access any file or directory in the shared UNIX filesystem, whether it was created with DOS or under the UNIX system. However, you must use a special mapped name for UNIX files or directories with names that do not conform to DOS rules. These names include:

- names longer than DOS allows
- names with more than three characters following a period
- names with nonalphabetic characters that DOS does not recognize
- names with uppercase alphabetic characters

When any DOS utility or application accesses a UNIX file or directory name that does not conform to DOS rules, SCO Merge translates, or maps, the name to a legal DOS name by appending a unique index consisting of an apostrophe followed by one to three characters. If necessary, the UNIX filename is truncated before appending the index. For example, a file called *messagetoall*

might be mapped to the name *mess'baq*. You can determine the mapped name by issuing the DOS **dir** command.

Use the mapped names shown in the directory listing whenever you need to refer to UNIX files in a DOS command.

Examples of mapped filenames

The following table illustrates the operation of SCO Merge filename-mapping on various types of UNIX filenames. The UNIX file name is shown in the left column. A typical mapped name is shown in the right column.

UNIX name	Mapped name
Mail	MAIL\FPE
messagetoall	MESS'BAQ
message.tobob	MESS'BBF.TOB
+.toomuch	_'PS.TOO
=.ok	_'PP.OK
MiXcAsE.xtn	MIXCA'5U.XTN
okbase.:=+	OKBAS'QW.---
a.b.c	A_B'SV.C

This table illustrates the filename-mapping system:

- Characters that are not legal DOS characters (like "+", ":", and "=") are all mapped to an underscore (_).
- Up to three characters following the rightmost period in the UNIX name are preserved in the mapped name as a DOS filename extension.
- Both lowercase and uppercase letters in the UNIX name are presented as uppercase in the mapped name.
- The index following the apostrophe can consist of either letters or numbers and can be of varied length in different names.

Note that you need to use mapped filenames only when you use files created under the UNIX system with names that are not legal DOS names.

Displaying UNIX-style directory listings

Although you always use a UNIX file's mapped name with DOS commands, you sometimes want to know the original UNIX file- or directory name. The SCO Merge **udir** command displays the contents of a UNIX directory in a format that combines the UNIX command **ls -l** and the DOS **dir** command. The first two fields show both the UNIX name and its corresponding mapped DOS name.

The **udir -a** option displays “hidden” UNIX files. These are UNIX files with names that start with a period, which are normally not displayed in a directory listing.

Using DOS drives

Drive letters are used under SCO Merge DOS the same way they are under DOS. However, SCO Merge imposes certain additional conventions and limitations. Certain drive names should always be associated with certain devices.

Drive letters A: and B: should be used only with devices that are functionally equivalent to floppy disks. This includes physical floppies and virtual floppies.

Drive letters C: and beyond are used for devices which SCO Merge treats as hard disk drives. These can include:

- The UNIX partition used to hold the hard disk filesystem shared by the DOS and UNIX systems.
- Virtual DOS partitions, which are portions of the shared filesystem set aside to emulate DOS disks.
- Physical DOS partitions on the same disk where the shared filesystem resides.
- Actual DOS-formatted hard disks which are separate from the hard disk used to hold the filesystem shared by the DOS and UNIX systems.

Drives C:, D: and J: are used to access the partition shared by DOS and the UNIX system.

Drive E: is the default designation for a physical DOS partition on the main disk (the same disk that holds the partition shared by the DOS and UNIX systems). The DOS partition is a special section of the fixed disk reserved for DOS files. If no physical DOS partition is present, *E:* can refer to a virtual DOS partition. See “Using physical DOS partitions” (page 59) for more about physical DOS partitions.

Drive letters E: through I: can be used to refer to either physical or virtual DOS partitions. No letters beyond *I:* should be used for virtual partitions.

SCO Merge automatically allocates room for drives up to and including *N:*. If you need more, you must specify that with the **lastdrive** command in the *config.sys* files used in DOS image construction. (See *Administering SCO Merge* in the for details.)

Drive letters K: through lastdrive can be used for other DOS devices, like CD ROM drives. The drivers for these devices are loaded in the *config.sys* file. Starting with K:, SCO Merge automatically assigns the next available drive letter to each such device.

Another purpose for high drive letters is for use with the **subst** command. **subst** is often used to equate a long pathname string to a DOS drive string. For example:

subst M: D:\clients\reports\monthly\june

Having a series of assignments like the one above can save you a lot of key-strokes when doing operations that require hopping back and forth between directories.

For most purposes, DOS drives C: and D: are the most convenient drives to use when you install and run DOS commands and applications.

The following table illustrates these drive letter conventions under SCO Merge and the sections which follow provide details.

Drive Letter	Used for
A:	Floppy disk (real or virtual)
B:	Floppy disk (real or virtual)
C:	Accesses the shared filesystem, starting at <i>root</i> .
D:	Accesses the shared filesystem, starting at user's <i>HOME</i> directory.
E:	Default designation for the physical DOS partition on the SCO Merge fixed disk. Can also be used for virtual DOS partition.
F:	Available for virtual or physical DOS partition.
G:	Available for virtual or physical DOS partition.
H:	Available for virtual or physical DOS partition.
I:	Available for virtual or physical DOS partition.
J:	Accesses the shared UNIX filesystem starting at <i>\usr\ldbin</i> .
K: to lastdrive	Available for other DOS devices.

Drive D:

Your own files and directories on the SCO Merge fixed disk are accessible on drive D: just as they are on drive C:. On drive D:, however, your UNIX *\$HOME* directory is the *root* of the DOS filesystem. That is, if you are logged in as the user *Hegel*, the directory D:\ contains the same files as C:\usr\Hegel. Because your home directory is the *root* of the filesystem on drive D:, you

cannot move upward. This means you can only use drive *D:* to access files in your home directory or the subdirectories beneath it. It also means drive *D:* is unique for each user.

Drive *D:* is useful for installing and running some DOS applications that modify or create files in the *root* directory. When you install such applications on drive *D:*, they modify or create files in your home directory rather than altering the systemwide *root* directory (*C:*). See *Administering SCO Merge* and *Configuring the DOS work environment* (page 29) for further information on installing and configuring DOS applications under SCO Merge.

Drive E:

Drive *E:* gives you access to the physical DOS partition, if available. This is a special section of the fixed disk that is reserved exclusively for DOS work. Drive *E:* is usable only if you or the system administrator has created and formatted the DOS partition. UNIX files cannot be created on drive *E:* in the same way as they can on the *C:*, *D:*, and *J:* drives. The UNIX system does not have direct access to DOS files created on drive *E:*. Although drive *E:* does not share the same files as drives *C:*, *D:*, and *J:*, you use it like a standard DOS disk drive.

Drive *E:* may or may not contain DOS files when you first install SCO Merge. As you use your system, however, you can add DOS programs, files, and directories to the *E:* drive.

Drive *E:* is the same for all users. By default, drive *E:* is a public resource. DOS files and directories created on drive *E:* are not owned by specific users or protected by UNIX file protection mechanisms. This means that all users can create files on drive *E:*, and all users have the power to remove or change any file.

Write access to drive *E:* is available on a first-come, first-served basis. As long as nobody is writing a file on drive *E:*, all SCO Merge users can read any file on drive *E:*. When someone writes to a file on drive *E:*, no other users can *read* or *write* to drive *E:* until the DOS process that is writing on drive *E:* exits.

If your computer has multiple DOS partitions on several fixed disks, SCO Merge checks them all. Drive *E:* always accesses the *first* primary partition DOS finds, which is usually on the first disk. For further information on the physical DOS partition, see *Administering SCO Merge*.

Drive J:

Drive *J:* contains the same files as *C:\usr\ldbin*. Because *\usr\ldbin* is the *root* of the filesystem on drive *J:*, you can use the *J:* drive to install public applications that must be installed in the *root* directory.

That is, Drive J: is mated to the DOS applications directory, `C:\usr\ldbin` with the DOS `subst` command. When you change to drive J: the *root* of the DOS filesystem is `\usr\ldbin`.

Virtual DOS floppies and virtual DOS partitions

Your SCO Merge system may have one or more virtual floppy drives or virtual DOS partitions. These are files within the shared filesystem that are formatted as DOS volumes. A virtual floppy is a UNIX file which emulates the function of a DOS floppy disk. You can store files there and even boot from it. A virtual DOS partition is a UNIX file which emulates the function of a DOS partition on the hard disk.

These virtual drives are not useful in the UNIX environment, but you can use them with DOS as you would use physical DOS diskette drives or physical DOS partitions. *Administering SCO Merge* describes how you create and administer virtual floppies and partitions.

By default, virtual floppies and partitions are not automatically accessible when you enter the DOS environment. You must use the `dos +a` option to attach any virtual floppies or partitions you want to use during a particular DOS session. See "Using virtual partitions and virtual floppy disks" (page 58) for instructions.

Virtual floppies and partitions have the same access restrictions as the physical DOS partition (drive E:). Multiple DOS processes can read the same virtual floppy or partition at the same time, but when a process writes to the virtual device, no other process can *read or write* to the device until the writing process exits.

You can also use the `dosopt` or `dosadmin` commands as described in "Configuring the DOS work environment" (page 29) to configure DOS applications or the DOS environment to attach specific virtual floppies or partitions automatically. In addition, for more information about attaching devices while using X, see "X window configuration options" (page 47).

Reassigning Merge drives

Unless you intend to change standard SCO Merge functionality, do not use the DOS `assign`, `join`, or `subst` commands to redefine drives C:, D:, E: or J: so they refer to other drives or directories. You can, however, use these commands to make other DOS drives refer to the standard SCO Merge drives without affecting Merge functionality.

For example, the following command defines DOS drive M: so that it refers to the subdirectory *\reports\monthly* within your home directory (*D:*):

subst *M: D:\reports\monthly*

For more information on these three commands, see your DOS documentation or the **assign**(CMD), **join**(CMD), or **subst**(CMD) manual pages.

Chapter 4

Working with DOS files

DOS and the UNIX systems use different file naming conventions. See “Naming DOS files and directories” (page 14) for an explanation of the differences, along with instructions for working with both types of filenames at the same time.

DOS and the UNIX systems also store text files in different formats. The UNIX system stores text lines as a sequence of characters terminated by a line-feed character. DOS, on the other hand, terminates text lines with a carriage-return character followed by a line-feed character. A file created in one format can appear corrupted when accessed by the other.

Converting DOS and UNIX files

When you use DOS on your SCO system, you can use any file that was created with DOS because these files are stored in DOS format even when they are created on the shared UNIX filesystem. To use a text file in UNIX format with DOS programs, however, you must convert the file to DOS text format using either the SCO Merge **unix2dos**, or the UNIX **xtod(C)** command. For example, if you are running SCO Merge, convert the file *letter* in UNIX format to the file *ltr.dos* in DOS format by typing:

```
unix2dos letter ltr.dos
```

You can also convert the file and copy it from one drive to another in one step, as the following example illustrates:

```
unix2dos C:bdgtmemo A:budget
```

When you create text files with DOS that you want to use later with UNIX utilities, you can convert them to UNIX text format with either the SCO Merge command **dos2unix** or the UNIX command **dtoxC**.

For example:

```
dos2unix memo memo.unx
```

You can use the SCO Merge commands, **unix2dos** and **dos2unix**, both in the DOS environment and from the UNIX shell. When you enter the **unix2dos** or **dos2unix** command in the DOS environment, you use DOS filenames, including mapped names when appropriate. When you use these commands from the UNIX shell, use UNIX (unmapped) names. The following example converts the file *message.tobob* (which would have a mapped name in the DOS environment) from UNIX format to DOS format and names the DOS file it creates with a legal DOS name:

```
unix2dos message.tobob message.bob
```

You can combine these commands with other DOS or UNIX commands through pipes and redirection. For example, the following command converts the file *names* from DOS format to UNIX format, sorts the text, and appends the sorted text to the UNIX file *newnames*:

```
dos2unix names | sort >> newnames
```

Do not specify the same name for the source file and the target file or try to redirect your output back into the source file. The following examples are incorrect:

```
dos2unix names names          incorrect
dos2unix names > names        incorrect
```

When you omit the target filename, **unix2dos** and **dos2unix** display the text file conversions but do not save them.

When you do not know the format of a text file, you can use the **unix2dos** or **dos2unix** command to convert to the format you need, just to be sure. The commands do not change anything when the file is already in the target format.

NOTE Use **unix2dos**, **dos2unix**, **xtod(C)** and **dtox(C)** only on ASCII text files. These commands do not convert programs, database files, or special-format files created by some word processors.

Accessing other users' files

SCO Merge users have limited access to files owned by other users. Whether or not you can inspect or modify other users' files depends on how UNIX permission modes are set on your computer. All DOS and UNIX files and directories you create or access in the shared UNIX filesystem are protected by these permission assignments.

SCO Merge, unlike a conventional DOS system, is designed to accommodate multiple users. It therefore provides tools for preventing inspection, alteration, or execution of files by unauthorized users. In general, you cannot modify or delete a file or directory that belongs to someone else.

With SCO Merge, you can restrict access to your files so that unauthorized users cannot see the contents of your directories or read your files. On the other hand, you can also grant other users permission to modify or delete your files and directories if you so choose.

The following default permissions are typical:

- Users can inspect the contents of any directory with the **dir** command.
- Users can read the contents of any file (with the **type** command, for example). Users can also copy any file to their own directories.
- Users can run programs contained in any directory.
- Users cannot modify or delete files or directories belonging to other users.

DOS applications and file permissions

Remember that most DOS applications are designed for a single-user environment. When used with SCO Merge in a multiuser environment, most DOS applications do not protect your files from being simultaneously updated by you and another user with write permission.

You should consider carefully which combination of file and directory permissions give you the most appropriate protection. For example, to prevent a file from being simultaneously updated by someone else while you are working on it, you could temporarily remove execute permission for the directory containing that file for all other users. This would prevent anyone from even looking at the file until you were done. Alternatively, you could remove everyone else's write permission for the file. This would allow others to look at a file you are working on, but not to update it. Note that these measures do not protect a file if another user has opened the file and is using it at the time you change permission modes.

Newer DOS programs that use locking calls can prevent these problems without any special user action.

Printing from the DOS window

All standard DOS print functions work in SCO Merge. These functions include the print screen (<Prt Scr>) key, the **print** command, the **copy** command, and printing operations performed by DOS applications.

By default, SCO Merge sends DOS printer output via the UNIX print spooler to a printer named **doslp**. (Your system administrator must set this printer up before it can be used.) The following describes printing procedures you can use with the default SCO Merge configuration.

Printing from DOS applications

SCO Merge stores printing sent by DOS applications to any of the DOS parallel ports (*lpt1*, *lpt2* or *lpt3*) in a temporary file. It is printed when either of two conditions occurs:

- You exit the application and return to your DOS prompt
- More than 15 seconds have elapsed since the application sent a character to be printed.

Printing with the DOS copy command

You can print by using the DOS **copy** command exactly as you would under standard DOS:

```
copy filename prn
copy filename lpt1
copy filename lpt2
copy filename lpt3
```

Printing with the DOS print command

To print a file using the DOS **print** command, type the command in the form:

```
print filename
```

You cannot use **print** options (such as */t*, */c*, and */p*) when you use the UNIX print spooler.

Printing with the Prt Scr key

Press the <Shift> and print screen (<Prt Scr>) keys at the same time to print the current screen contents just as you would under standard DOS.

To use the (Prt Scr) key to save and print your screen contents as the screen is updated:

1. Press (Ctrl)(Shift)(Prt Scr) once to start saving your screen contents. You can then continue to perform operations that change the appearance of your screen. SCO Merge saves all changes in a temporary file until you are ready to print.
2. Press (Ctrl)(Shift)(Prt Scr) a second time to stop the accumulation of screen contents and start printing.

The “printer not ready” message

Printing from some DOS applications may fail and produce an error message similar to the following:

Printer not ready.

To print from these applications, attach the printer directly to the DOS process using the following steps:

1. If the printer is currently used to print spooled UNIX print jobs, the system administrator must use the **disable** command to disable the printer.
2. Use the **+a** option to attach the printer you want to use. For more information on the **+a** option, see “Using the dos + or - options on the UNIX command line” (page 33) or the **dos(ADM)** manual page. SCO Merge uses the device names *lp0*, *lp1*, and *lp2* to identify the first, second, and third parallel printer ports. Use the name that corresponds to the port to which your printer is attached. For example, if your printer is attached to */dev/lp0*, you can start the DOS environment with the command:

dos +alp0

Consult the manuals for your computer and the SCO Merge */etc/dosdev* file if you are uncertain how to identify your printer port.

3. You can now start the application and send data to the printer.
4. When you are finished using the printer that is directly attached to DOS, the system administrator can reenale it for UNIX printing by using the **enable** command. UNIX printing cannot be enabled if the DOS process using the directly attached printer is still running.

Chapter 5

Configuring the DOS work environment

Because SCO Merge is a fully configurable environment, you may run many different kinds of DOS sessions. You may configure SCO Merge to run in VGA mode with one program and in CGA mode for another. You might run one program with minimal memory to conserve resources and allocate 5 megabytes of EMS memory to another. You might attach a local dot-matrix printer when you use your database program, while you attach a network laser printer for desktop publishing.

Many users set things up so that the devices they need are automatically attached whenever a particular DOS program is run. For example, if you use applications requiring large amounts of memory, you can clear nearly all of DOS conventional (low) memory for their use.

This chapter tells you how to modify default DOS characteristics to suit your needs. The SCO Merge system administrator can use the procedures described here and in *Administering SCO Merge* to define systemwide default DOS characteristics. Microsoft Windows installation and configuration information can be found in Chapter 7 (page 81).

SCO Merge makes this flexibility possible because every time you start DOS you are creating a *virtual personal computer* (also called a *virtual PC* or *virtual machine*). A virtual PC has all the important characteristics of a real stand-alone, single-user computer based on the Intel 8086 processor. Instead of existing as physical hardware, however, a virtual PC is a simulation of personal computer hardware. The simulation uses the virtual 8086 mode of your Intel 80386 or 80486 processor and configures resources such as memory so that DOS can use these resources the same way it uses a real personal computer.

Each DOS environment under SCO Merge runs in its own separate, protected, virtual machine, which cannot harm the operation of other DOS environments or the UNIX system. In particular:

- DOS programs cannot disable system interrupts. They can only disable their own “virtual” interrupts, which affect only that one DOS environment and not any other DOS environment or the UNIX environment.
- Errant DOS processes cannot damage UNIX processes or other DOS processes because each DOS environment is assigned a specific segment of memory and cannot write outside it.
- DOS programs can only affect I/O devices that are assigned to them, and not those assigned to the UNIX system or other DOS programs.

You can customize each virtual PC in much the same way you can customize a conventional stand-alone personal computer. When you use SCO Merge, however, you do not open your computer and install adapter cards containing memory chips or a *com* port. Instead, you use simple command options that tell SCO Merge to use and configure these resources—provided they are already physically present—so they become part of your virtual personal computer. Because each virtual PC is independent of all others, you can customize each one as appropriate for the applications running in it.

Using DOS and SCO Merge configuration tools

When running under SCO Merge, you can customize many DOS characteristics to suit your needs. Each characteristic has a default value that you can use or change. Among the characteristics you can control are:

- Amount of memory allocated for DOS.
- Which *autoexec.bat* and *config.sys* files are interpreted when you start DOS.
- Which hardware devices DOS is allowed to access.
- The initial working drive when you start DOS.

These characteristics apply to any DOS environment that any user starts from the UNIX shell.

SCO Merge allows you to configure your DOS environments in four basic ways. You can configure your DOS environment:

- using standard DOS configuration files (*autoexec.bat* and *config.sys*)
- using the command **dos +** or **- option** from the UNIX command line .
- using **dosadmin** or **dosopt** from either the UNIX or DOS command line.
- using the X based configuration tools DOS Menu and **xdosopt**. **xdosopt** starts the DOS Options dialog box

This first part of this chapter explains the various configuration tools provided with SCO Merge to configure your DOS environment. The second part describes how to use peripheral hardware with SCO Merge.

Using *autoexec.bat* and *config.sys* files

DOS interprets the commands in two special files automatically every time you enter the DOS environment. These files are *autoexec.bat* and *config.sys*.

You can use *autoexec.bat* to customize your DOS environment or to run commands you want executed every time you use DOS. For example, if you run a program called **graphs** every time you start DOS, you could include the command to run the program in your *autoexec.bat* file.

The *config.sys* file (if it exists) contains information about your computer's configuration that the system needs to know every time you run DOS. Some DOS applications, for example, require device drivers that are identified in *config.sys*.

Because different users may want to include different commands in their *autoexec.bat* or *config.sys* files, SCO Merge provides for both:

- System default *autoexec.bat* and *config.sys* files, which affect all users unless they explicitly specify otherwise.
- Personal *autoexec.bat* and *config.sys* files, which individual users can create to customize their own personal DOS environments.

If you create a personal *autoexec.bat* file in your home directory, SCO Merge executes it whenever you enter the DOS environment or start a DOS process. SCO Merge executes your home directory *autoexec.bat* file after executing the root directory *autoexec.bat*.

In general, SCO Merge interprets *config.sys* commands just as conventional DOS personal computer does. There are some exceptions. Notably:

BUFFERS SCO Merge does *not* interpret **BUFFERS** commands in any of your system's *config.sys* files at DOS run time. The **BUFFERS** value is defined by your system administrator in the default DOS configuration at the time they Merge is installed and cannot be changed unless you make new DOS images. The **BUFFERS** value used in the factory default DOS images is 15, the standard DOS default value for 640K of RAM. See *Administering SCO Merge* for further information on changing **BUFFERS** and making new DOS images. The **BUFFERS** value is effective only when you use an actual DOS file system. It is not used when you access the shared UNIX filesystem.

COUNTRY	Works just as it does on a conventional DOS personal computer, except that the third parameter (drive and pathname of your country information file) is not supported. SCO Merge always looks for the country information file in the <i>root</i> of your current drive.
DOS	determines the area of memory into which DOS will be loaded and specifies whether the upper memory area can be used for drivers and TSRs. (Terminate and Stay Resident) The DOS command is already defined in your DOS images at the time they are created. The value used in the factory default DOS images is <code>DOS=HIGH,UMB</code> , which loads DOS into the High Memory Area and allows the Upper Memory Blocks to be used. This provides the maximum RAM for DOS programs. It should not be changed. See <i>Administering SCO Merge</i> for further information on making new DOS images.
DRIVPARM	Works just as it does on a conventional DOS personal computer. It is effective only when you access actual DOS filesystems.
FCBS	Sets the number of File Control Blocks that DOS can open concurrently. SCO Merge does <i>not</i> interpret FCBS commands in any of your system's <i>config.sys</i> files at DOS run time. The FCBS value is defined in the DOS images at the time they are created and cannot be changed unless you make new DOS images. The FCBS value used in the factory default DOS images is the same as the standard DOS default value: 4. See <i>Administering SCO Merge</i> for further information on changing FCBS and making new DOS images. The FCBS command is effective only when you use an actual DOS file system. It is not used on any portion of the shared UNIX file system.
FILES	Sets the maximum number of files that DOS can open concurrently. If there is more than one FILES command in the <i>config.sys</i> files that SCO Merge interprets when DOS starts, the <i>highest</i> value is used. The FILES command is effective only when you use an actual DOS file system. The limit for a UNIX file system is set separately and is not affected by the FILES command. A DOS process can open a maximum of 123 files simultaneously in the shared UNIX file system.
STACKS	Sets the amount of RAM to be set aside for the processing of hardware interrupts. SCO Merge does <i>not</i> interpret the STACKS variables in any of your system's <i>config.sys</i> files at DOS run time. The STACKS value is defined in the DOS images at the time they are created and cannot be changed unless you make new DOS images. The STACKS value used in the factory default DOS images is the same as the standard DOS default value: 9,128 (nine stacks with 128 bytes each). See <i>Administering SCO Merge</i>

for further information on changing STACKS and making new DOS images.

SWITCHES Specifies the use of a conventional keyboard even though an enhanced keyboard is installed. SCO Merge does *not* interpret the **SWITCHES** values in any of your system's *config.sys* files at DOS run time. The **SWITCHES** value must be defined in your DOS images. The factory default DOS images do not contain a **SWITCHES** value. This means that your enhanced keyboard will function in its enhanced mode.

The **SWITCHES** value cannot be changed unless you make new DOS images. If you are using an enhanced keyboard and you wish it to behave as a conventional keyboard, you must make a new DOS image. See *Administering SCO Merge* for further information on making new DOS images.

Using the *dos + or - options* on the UNIX command line

Whenever you want to change a default DOS characteristic for a single execution of the DOS environment or a DOS application, use command-line options. The syntax for specifying options on the **dos** command line is:

dos options [command [arguments]]

For example, to create a DOS environment with 3 Mbytes of memory, type:

dos +m3

Similarly, to run WordStar with 2 Mbytes of expanded memory to create a file called **report**, type:

dos +aems2 ws report

See "Configuring memory" (page 52) for more information on allocating expanded memory.

Options consist of a single alphabetic character (**m** in the previous examples) preceded by either a plus or minus sign (+ or -). The plus sign generally turns the characteristic controlled by that option "on", the minus sign turns it "off." The **+t** option, for example, means "turn on automatic translation of DOS switch characters and path separators," while **-t** means "turn it off."

Some options require or are allowed to take parameters. The number "2" in the command **dos +m2**, for example, is a parameter to the **+m** option that specifies the number of Mbytes of memory to allocate.

Options that do not take parameters can be grouped together following a single plus or minus:

dos +bc -tx compute

Options that can take parameters must be specified separately:

dos +e/usr/hegel/config.sys +l/usr/hegel

The order of options is immaterial. The following two examples are both valid and both have the same effect:

dos -e -s

dos -s -e

DOS options that you specify on the **dos** command line override DOS defaults and also override any DOS options that are installed in an application or options file. For more information on using the **dos** command, see the **dos(C)** manual page.

Using dosadmin, dosopt, and the X window configuration tools

SCO Merge provides three ways to change the default configuration of your DOS environment:

- The **dosadmin** menu system, which provides convenient ways to change default values for the DOS characteristics that most often need changing
- The **dosopt** command, which is less convenient but more flexible than **dosadmin**
- **xdosopt** (which brings up the the DOS Options dialog box) and the DOS menu system, which allow you to configure your X based DOS environment.

You can override DOS defaults by installing DOS options in personal options files, in DOS commands, and in DOS applications. You should install DOS options to override system defaults whenever you want to override a default value more permanently than you can by using DOS options on the **dos** command line. Installed options remain effective until you change or override them. Command-line options are effective only for one execution of a DOS environment or application.

You can install DOS options in either of two personal options files *dosenv.def* or *.dosstart*, which you establish in your home directory. *dosenv.def* does not exist until you create it either with **dosadmin** or **dosopt**. *.dosstart* does not exist until you create it by clicking on the apply button in **xdosopt**'s DOS Options dialog box.

Your *dosenv.def* and *.dosstart* files control the characteristics of DOS environments.

The values defined in your home directory are effective only for your own DOS applications and programs. Values defined in your directory files override default values defined by your system administrator in the options files in */etc*. Your home directory options files are fully specified. That is, values for every configurable DOS characteristic are defined.

CAUTION These files use a priority system. If the user has no *\$HOME/dosenv.def* file, the values for the user's session are taken from the system-wide */etc/dosenv.def*. If that user then creates *\$HOME/dosenv.def* with **dosadmin**, the values for that user's session are taken from *\$HOME/dosenv.def*.

If that same user then creates a *\$HOME/.dosstart* file via **xdosopt**, the values in *\$HOME/.dosstart* take precedence over those in *\$HOME/dosenv.def*. At this point any new values the user entered in *\$HOME/dosenv.def* via **dosadmin** would not be honored. They would be constantly overridden by older values in *\$HOME/.dosstart*, entered via **xdosopt**. If you are running under X windows we recommend that you use **xdosopt** exclusively.

To transition from **dosadmin** to **xdosopt**, simply bring up the DOS Options Dialog Box and click on Defaults. This copies the values from *\$HOME/dosenv.def* and incorporates them into *\$HOME/.dosstart*.

You can also configure specific DOS applications (for example, WordPerfect®) so they use your preferred values when you run them from the UNIX shell. When you install specific DOS options directly in executable DOS command and application files, the options override DOS defaults and options installed in options files. They can be superseded only by using **dos** command options on the UNIX command line. You do not need to fully specify all DOS characteristics when you install options in a command or application. Unspecified characteristics take their values from the home directory *dosenv.def* or *.dosstart*, if they exist, or from */etc/dosenv.def* if they do not.

Using *dosadmin* to install and remove DOS options

The **dosadmin** menu system provides an easy way to change the values of three important DOS characteristics: memory, DOS startup files, and DOS device files. The following sections tell you more about these characteristics and how to modify them using **dosadmin**.

Characteristics you can tailor using dosadmin

You can use **dosadmin** to install DOS options that affect memory, DOS startup files, and DOS device files. Depending on how you use **dosadmin**, you can tailor these characteristics for:

- The DOS environment and all DOS commands and applications run from the UNIX shell.
- Specific DOS commands and applications.

Startup memory

The SCO Merge factory default for DOS memory is 1 Mbyte.

This total memory must be shared, however, by DOS, the application, all the device drivers in use, and any terminate-and-stay-resident (TSR) programs you have loaded. SCO Merge uses about 50K bytes for its own driver. For further information, see “Configuring memory” (page 52), later in this chapter.

SCO Merge runs more efficiently if you allocate only as much memory as you need. For example, if you normally need only 1 Mbyte of memory while in the DOS environment, you can install the 1 Mbyte value as your preferred memory value.

DOS startup file

On a conventional DOS computer, if you have a file called *autoexec.bat* in the *root* directory of your system disk, the commands in that file are executed automatically whenever you boot the computer. When you use SCO Merge, you do not boot DOS the same way you would on a stand-alone personal computer. SCO Merge, however, can execute an *autoexec.bat* file when you use the DOS environment or run a DOS program, just as though you had booted DOS on a conventional personal computer.

The SCO Merge factory default is to execute *two autoexec.bat* files in succession when you start DOS by typing **dos** or when you run DOS programs from the UNIX shell. These two files are the *root* directory *autoexec.bat* and your home directory *autoexec.bat*.

Using **dosadmin**, you can specify a single DOS batch file that is to be executed instead of the default files when you start the DOS environment or a DOS program, or specify that *no* batch file is to be executed.

The file you specify can have any legal DOS or UNIX filename, and you can specify it either by full UNIX pathname, for example:

/usr/hegel/dbin/appl.bat

or by DOS drive and full DOS pathname, for example:

C:\usr\hegel\dbin\appl.bat

DOS device file

On a conventional DOS computer, the file *config.sys* is interpreted automatically when you boot DOS. SCO Merge by default treats *config.sys* files similarly to *autoexec.bat* files: it interprets the *root* directory *config.sys* file and your home directory *config.sys* file in succession whenever you run the DOS environment or a DOS application.

Using **dosadmin**, you can specify *one or more* configuration files that are to be interpreted instead of the defaults, or you can specify that *no* configuration file is to be interpreted. The files you specify can have any legal UNIX filename. You can specify files either by full UNIX path, for example:

/usr/hegel/dbin/config.sys

or by DOS drive and full DOS pathname, for example:

C:\usr\hegel\dbin\config.sys

To specify multiple files, list them in the order they are to be interpreted, separated by a space, a comma, or both. For example:

D:\config.sys, D:\special.sys

Using dosadmin to tailor DOS

NOTE When you use **dosadmin** to tailor DOS, SCO Merge maintains a record of your configuration in the file *dosenv.def*. This file is stored in your home directory if you are a normal system user or in */etc* if you are the system administrator logged in as *root*. You do not need to be concerned with the contents of this file, but be sure you do not accidentally delete it.

To use **dosadmin** to tailor DOS, follow these procedures:

- Select the appropriate Configuration menu.
- Identify the DOS application you are tailoring, if you are tailoring a specific application.
- Fill in the fields for memory, startup file, and device file.

The following paragraphs describe these steps in more detail.

Selecting the configuration menu

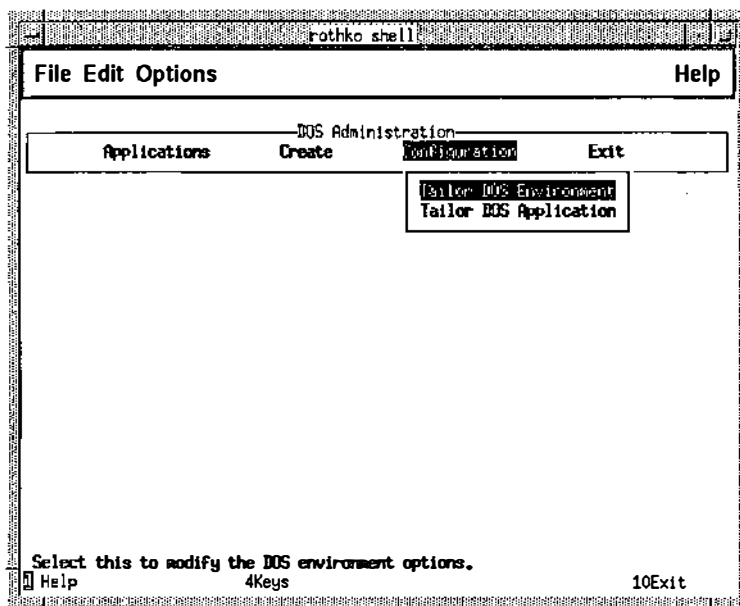
Follow these steps to select the appropriate Configuration menu:

1. Type:

dosadmin

(You can type the **dosadmin** command either at the UNIX shell prompt or in the DOS environment.) The main DOS Administration menu is displayed.

2. Press the left or right arrow key (← or →) to move the highlighted field at the top of the screen to "Configuration." Your display looks like this:



The Configuration menu offers two selections:

- Tailor DOS Environment
- Tailor DOS Application

Use the up or down arrow key (↑ or ↓) to highlight the appropriate field and press (Enter). Follow these guidelines to make your selection:

- **Tailor DOS Environment:** Use this selection when you want to modify the characteristics of the DOS environment (that is, the DOS characteristics that apply when you type **dos** and the characteristics of DOS commands and applications when they are run from the UNIX shell).

If you are logged in as *root*, the characteristics you specify *replace* existing DOS defaults for all users. If you are not logged in as *root*, the characteristics you specify *override* existing DOS defaults.

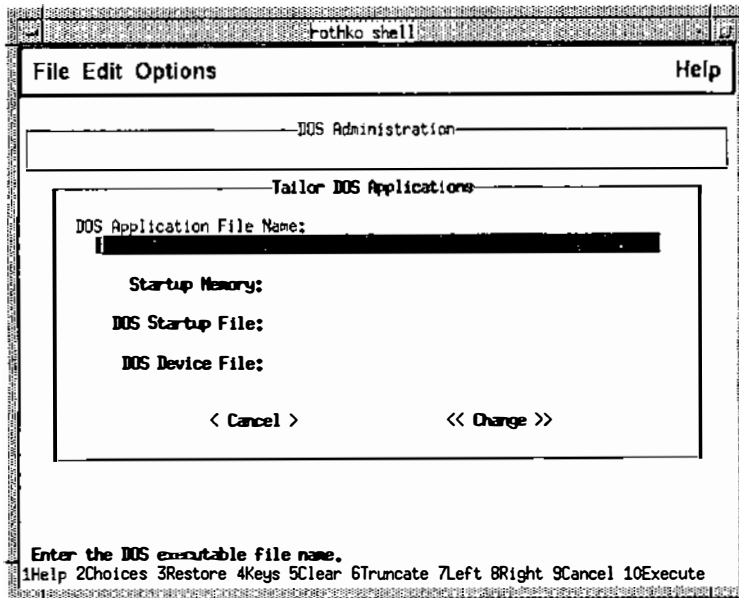
You can override characteristics specified with this menu by using DOS command-line options when you use the **dos** command as described in "Using the dos + or - options on the UNIX command line" (page 33).

- **Tailor DOS Application:** Use this selection when you want to modify the characteristics of a specific DOS command or application when it is run from the UNIX shell. If you are logged in as *root*, you can tailor any command or application, although normally you use this menu as *root* in order to tailor publicly accessible applications in directories such as */usr/ldbin*. You can tailor only commands and applications for which you have write permission.

If you have selected the Tailor DOS Application menu, you must identify the command or application you want to tailor as described in the next section. If you have selected the Tailor DOS Environment menu, skip ahead to "Filling in the configuration menu" (page 40).

Selecting the DOS command or application

If you have selected the Tailor DOS Application menu, your display resembles this:



You must now fill in the "DOS application file name" field to identify the command or application you want to tailor.

Type in the name of a DOS executable file. You can name the file by full UNIX path or by DOS drive and full DOS path, for example the command:

`/usr/ldbin/lotus.com`

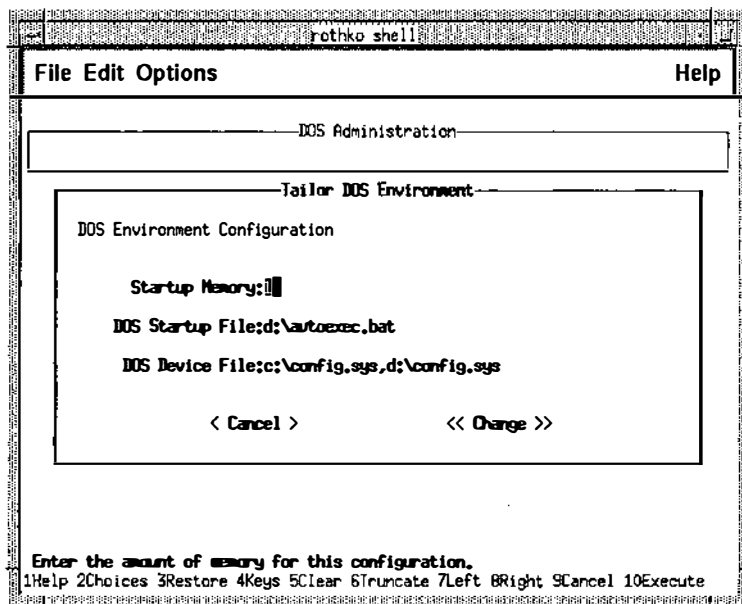
or

`C:\usr\ldbin\lotus.com`

Continue with the steps described in the next section.

Filling in the configuration menu

The Tailor DOS Environment and Tailor DOS Application menus are similar. They both have fields named "Startup Memory," "DOS Startup File," and "DOS Device File." The display resembles this:



The values shown for "Startup Memory," "DOS Startup File," and DOS Device File are the current values that apply to the DOS environment, application, or applications you are configuring. The actual values shown on your display may differ from those in this illustration.

To change any of the displayed values, press the <Tab> key until the field you want to change is highlighted. Then type in the value you want. If you make a mistake, press the <Bksp> key (←) and retype your entry or press the <F5> key to clear the field. Then retype your entry.

When the "DOS Startup File" or "DOS Device File" field is highlighted, you can use the (F5) key to clear the field, which results in no startup file or device file being interpreted when you start the DOS environment.

Follow these guidelines as you fill in each field:

Startup Memory The value displayed here is the amount of memory (in Mbytes) reserved for this application when you run it from the UNIX system shell.

NOTE Because SCO Merge takes up some space, there is actually somewhat less memory available than the displayed value. For more information, see "Configuring memory" (page 52)

Specifying too little memory may cause your DOS environment or application to fail.

DOS Startup File If this field is filled in *only* with *D:\autoexec.bat*, it means *both* the *root* directory *autoexec.bat* and personal, home-directory *autoexec.bat* files are executed.

NOTE If you are logged in as *root* when you use DOS, only the *autoexec.bat* file in the *root* directory is executed.

Note that the home directory *autoexec.bat* is executed second, so settings in that file override settings in the *root* directory *autoexec.bat*. If you want only one *autoexec.bat* file to be interpreted, identify it using DOS drive C: or a UNIX-style pathname. For example, filling in this field with *C:\usr\hegel\autoexec.bat* causes only Hegel's home-directory *autoexec.bat* to be executed. Filling in *autoexec.bat* causes only the *root* directory *autoexec.bat* to be executed.

You are not restricted to files named *autoexec.bat* for this field. You can identify any single DOS file, in any directory in the filesystem shared by DOS and the UNIX system, provided that it contains legal DOS batch commands.

For example, if you want your application to run the file *c:\usr\pat\lotus\appl.bat* every time you invoke it, type the following in this field:

c:\usr\pat\lotus\appl.bat

If you do not want any file to run automatically when you use this application, erase the field by pressing the (F5) key.

DOS Device File

This field identifies the device configuration files that you want DOS to interpret when you run your application from the UNIX shell. It normally shows both `C:\config.sys` and `D:\config.sys`. When these two filenames are displayed, DOS interprets both the *root* directory `config.sys` and a home-directory `config.sys`. If you are logged in as *root* when you use DOS, however, only one `config.sys` file is executed—the one in the *root* directory. (Note that home directory `config.sys` files do not exist until you create them.)

You can change or delete the files displayed in this field. For most purposes, however, it is preferable to let DOS interpret the default `config.sys` files.

You are not restricted to files named `config.sys` for this field. You can identify one or more DOS files, in any directories in the shared filesystem, that contain legal DOS `config.sys` commands.

When you have filled in the configuration menu, check your entries for accuracy. If you choose to cancel the tailoring operation, press the `<Tab>` key until the "`<Cancel>`" field is highlighted and press `<Enter>`.

When you have entered the values you want, press the `<Tab>` key until the "`<<Change>>`" field is highlighted and press `<Enter>` to save the new values you have specified.

The top-level DOS Administration menu reappears. Press the left or right arrow key until "Exit" is highlighted, and press `<Enter>`. Your UNIX or DOS system prompt returns.

Using dosopt to install and remove DOS options

You use the **dosopt** command (like you use the **dosadmin** menu system) to assign DOS characteristics such as memory, startup file, and device configuration file to applications or to your environment. The **dosopt** command is more flexible than **dosadmin**. You can use it to assign many characteristics besides memory, startup file, and configuration file. You can also use **dosopt** where you cannot use **dosadmin**—inside UNIX shell scripts, for example.

As with **dosadmin**, you can use the **dosopt** command to install DOS options that determine:

- Characteristics of DOS environments and applications run from the UNIX shell for all users.

- Characteristics of specific DOS applications run from the UNIX shell.

The syntax for **dosopt** is:

dosopt + or - options options_file

or

dosopt + or - options application

As described earlier in "Using the dos + or - options on the UNIX command line" (page 33), *options* are key letters preceded by a plus or minus (+ or -) sign that identify the values of specific DOS characteristics.

options files are files that hold records of DOS options you have installed. In the command:

application is the name of a specific DOS application in which you want to install DOS options. For example, to start WordPerfect with 4 Mbytes of standard (or extended) memory, type the command:

dosopt +m4 wp

The names of the options files and the DOS processes they affect are:

- */etc/dosenv.def*: This file defines system default characteristics for DOS environments and DOS applications started from the UNIX prompt by all users. DOS options defined in this file can be overridden by using DOS options on the **dos** command line or by installing DOS options in home directory *dosenv.def* files.
- *\$HOME/dosenv.def*: Your home directory *dosenv.def* file overrides *all* values defined in */etc/dosenv.def* and defines characteristics of DOS environments and DOS applications started from the UNIX prompt. DOS options defined in *\$HOME/dosenv.def* can be overridden by using **dos** command-line options.
- **A specific DOS application**: Although not an options file in the same sense as the files listed above, any DOS executable file can hold a record of DOS options that apply to that file when you run it from the UNIX shell. Options installed in DOS commands and applications override */etc/dosenv.def* and *\$HOME/dosenv.def*. You can override options installed in commands and applications by using **dos** command-line options.

Only the system administrator, logged in as *root*, can change options in */etc/dosenv.def*, and only with **dosopt**. The file cannot be edited directly with **edlin**, **vi** or any ordinary text editor.

All users can create *dosenv.def* files in their home directories and install options in them. Anyone who has write permission for a command or application can install options in the executable file.

Creating a home directory options file

The system default options file */etc/dosenv.def* is created automatically when you install SCO Merge. Home directory *dosenv.def* files, however, do not exist until you create them. There are two ways to create this home directory file:

- Use the **dosadmin** menu system as described in “Using dosadmin to install and remove DOS options” (page 35) to modify the characteristics of the DOS environment or DOS applications. If you are logged in as a user who has a home directory, **dosadmin** automatically creates *\$HOME/dosenv.def* the first time you use the “Tailor DOS environment” menu to tailor the DOS environment.
- Copy */etc/dosenv.def* to your home directory and make sure it is writable. If you are working in your home directory, you can use the following commands:

```
cp /etc/dosenv.def dosenv.def
chmod u+w dosenv.def
```

Installing DOS options

Following are a few examples of **dosopt** commands to illustrate how you install options in options files and in applications. For more information on the meaning of specific options, see *Administering SCO Merge* or the **dos(C)** manual page. All of the following examples assume that you already have a *\$HOME/dosenv.def* file, created by one of the methods above.

If you are working in your home directory, the command:

```
dosopt +m2 dosenv.def
```

overrides the default values for memory (**+m**) so that you get 2 Mbytes of memory. If the system administrator enters the following similar command:

```
dosopt +m2 /etc/dosenv.def
```

these values become the defaults for all users who run DOS environments.

Preceding a DOS option with a minus sign (**-**) generally turns off that function. For example, to prevent *autoexec.bat* from running, type:

```
dosopt -p dosenv.def
```

You can change values at different times without affecting values you specified previously:

```
dosopt -p dosenv.def  
dosopt +t dosenv.def
```

In this example, *autoexec.bat* is disabled and automatic path separator translation is turned on in two separate commands. The *autoexec.bat* file remains

disabled unless it is later explicitly enabled with the **+p** option. If you are working in your home directory, the command:

```
dosopt -s dosenv.def
```

changes the default to disable the DOS printer timeout.

The command:

```
dosopt +b /usr/hegel/dbin/cl
```

identifies the **cl** program as stream-oriented.

Note that DOS applications that you can run from the UNIX shell normally have two names: a DOS filename with an extension (*.exe*, *.com*, or *.bat*) and a UNIX filename without an extension, which is linked to the DOS name. For example, the file *cl.exe* would be linked to **cl**. When you use **dosopt** to install an option in an application, you can use either name. That is, the following two commands have the same effect since *cl.exe* and *cl* are two names for the same file:

```
dosopt +b cl  
dosopt +b cl.exe
```

Displaying installed options

You can display the dos options currently in effect by typing:

```
dosopt +v
```

This command displays the contents of your home directory *dosenv.def* file, if you have one. Otherwise it displays the contents of */etc/dosenv.def*. The display is similar to the following:

```
File: /usr/hegel/dosenv.def  
+ae:=/dev/dsk/0s1 +amouse -b +dc +e +l +m3 +p +s15 +t
```

NOTE If you have used **xdosopt** to install a *.dosstart* file, this command will display incorrect values. To display the correct values you must use the command

```
dosopt +v .dosstart
```

To display the options installed in a specific options file, use the command:

```
dosopt +v file
```

For example, to display the current system default DOS options, issue the command:

```
dosopt +v /etc/dosenv.def
```

Removing installed options

To remove an option installed in a command or application, use the **dosopt +z** option. For example, if you have assigned 2 Mbytes of memory to Windows 3.1 using the command:

```
dosopt +m3 win.com
```

you can use the **+z** option to remove the installed memory value and allow the memory value from **\$HOME/dosenv.def** (if it exists) or **/etc/dosenv.def** to be effective. The command is:

```
dosopt +zm win.com
```

When you use **+z** to remove previously installed **+a** ("attach device") options, you can remove individual **+adevice** options or you can remove *all* **+a** options with a single **dosopt** command. For example, assume you have used the following **dosopt** commands to specify attachment of both *com1* and *com2* for the application named *appl*:

```
dosopt +acom1 appl
```

```
dosopt +acom2 appl
```

To remove the **+acom2** instruction but keep the **+acom1** instruction, type:

```
dosopt +zacom2 appl
```

To remove all **+a** options from the file **APPL** at once, type:

```
dosopt +za appl
```

To remove *all* installed options in a DOS command or application, use an uppercase **"Z"**:

```
dosopt +Z appl
```

This command removes all installed options from **appl** and allows the option values in **\$HOME/dosenv.def** (if it exists) or **/etc/dosenv.def** to be effective.

The **+z** and **+Z** options cannot be used on the options files **\$HOME/dosenv.def** or **/etc/dosenv.def**.

Restoring DOS options files

If for any reason you want to restore the original contents in your system default DOS options file (**/etc/dosenv.def**), you can copy the corresponding file from the directory **/usr/merge**. **/usr/merge/dosenv.def** is a permanent copy of **/etc/dosenv.def** in the form that exists when you install SCO Merge.

X window configuration options

From your X environment, you can access the DOS Options dialog box and the DOS menu.

Using the DOS options dialog box

The DOS options dialog box is started by typing the command, **xdosopt** at your Xterm UNIX prompt. This is a menu you can use to start a DOS environment or a particular DOS program with a specific hardware arrangement. The DOS Options dialog box is available for your DOS sessions, your Windows sessions, or any DOS application or program installed on your system.

The DOS Options dialog box allows you to configure your DOS processes with most of the devices you will need. You have your choice of video standards (VGA, CGA, MDA or Hercules). You can associate any available DOS partition with any of the listed drive letters (E:, F:, G:, H:, and I:). You can associate your DOS printer ports with the UNIX spooler or with direct attached parallel printers.

You can also allocate extra memory to your DOS process. Memory can be added in the form of expanded memory (EMS) or “standard” memory. Standard memory means the sum of 1 Mbyte of conventional DOS memory plus as many additional Mbytes of extended memory you care to assign. Standard memory is limited to 15 Mbytes total.

To access the DOS Options menu, at any Xterm UNIX prompt type:

xdosopt

When the DOS Options dialog box appears, click on the appropriate buttons to attach the hardware you want. Click Apply to configure future application sections or Start to start the application without saving it. Your DOS session or program starts with the particular hardware setup you have specified. When you exit that session or program, those devices are detached.

It is also possible to attach devices that are not actually available. If you do, restart your process with appropriate hardware. For instance, suppose you attach *com1* to your DOS session and that port is already in use: When your process starts you see a message like this:

```
INTFDEV_FAIL:DOS:error:could not initialize '/dev/vcom1/dev/ttyla.'
```

1. Acknowledge by clicking on OK. This is followed by a second error message:

```
VM_DIED:DOS:ERROR: The VM86 process died.
```

2. Once again, acknowledge by clicking OK.
3. Bring up the DOS Options dialog box again by entering **xdosopt**.
4. Select another *com* port and click on Start.

Using the apply button

The DOS Options dialog box also offers a button marked Apply. This allows you to save your hardware choices and use them for all future DOS sessions or all future invocations of that particular program. Use the Apply button with restraint. Remember that any memory or hardware you attach is temporarily unavailable to other users or other programs you might run. Use Apply to save only the minimum configuration you need to run DOS or Windows.

This is especially important for *com* ports. Any time you attach a *com* port to your session it is unavailable to other users. Attach *com* ports only when you actually plan to use them.

In addition to the DOS Options dialog box the entire range of devices can be accessed through **dosadmin** or **dosopt** and the **dos +a** or **win +a** commands. For more information on attaching devices with the **dos +a** or **win +a** commands, see "Using the dos + or - options on the UNIX command line" (page 33) or the **dos(C)** manual pages. For more information on **dosadmin** and **dosopt**, see "Using dosadmin, dosopt, and the X window configuration tools" (page 34). Also see *Administering SCO Merge* for more information on the attaching and configuring devices to DOS.

Controlling the DOS window

You can control the the DOS window with the DOS menu.

There are two ways to invoke the DOS menu. To invoke the DOS menu with the mouse, move the cursor into the DOS window and press and hold the right mouse button. The DOS menu appears. Keep holding the button down and move the mouse cursor to the desired option on the menu, and then release the button. The option is selected and the DOS menu goes away.

You can also invoke the DOS menu by pressing a special key sequence. By default it is `<Alt><D>`, but it can be redefined. The key sequence works only when the DOS window is already selected. To select one of the options on the menu, click on it with either the left or right mouse button. To close the DOS menu without selecting any option, simply click on the mouse outside of the DOS menu.

The options on the DOS menu are as follows:

Zoom	Zooming a window means causing it to expand so it fills your whole screen. When you want to run a DOS EGA/VGA graphics program, you must zoom the window it is in; you cannot run such a program in a normal window. You can also zoom any other window if you want it to take over the screen. To unzoom (that is, return a zoomed window to its default size), press the DOS menu key sequence (<code><Alt><D></code> by default).
Focus [Unfocus]	Selecting the Focus option allows your mouse input to be passed to any DOS program that is running in the DOS window and capable of using mouse input. During this time the mouse is devoted to DOS and cannot be used to move the DOS window or for any other X pointer task. Selecting the Unfocus option returns the mouse to X pointer status and allows you to use the mouse in other X windows. Only one of these options (Focus or Unfocus) appears on the DOS Menu at a time. When the mouse is already focused in the DOS window, it cannot be used to bring up the DOS Menu. You must use the DOS Menu key sequence.
Refresh	Selecting the Refresh option redraws the DOS window.
DOS Colors [X Colors]	Selecting the DOS Colors option sets the colors for your DOS window to the sixteen standard text colors.

Select the X Colors option sets it back to the colors chosen through the **Color** utility. Only one of these options appears on the menu at a time.

Autofreeze

Selecting the Autofreeze option cause your DOS session to be suspended as soon as you move your X pointer outside the DOS window. "Freezing" saves processor cycles for other work. You may also find it useful when you are monitoring activity in the DOS window and do not wish to miss any changes. You can set a DOS process in motion and then do other work. Your DOS process resumes its activity only when you once again move the X pointer inside the DOS window.

Quit

Selecting the Quit option closes your DOS session.

NOTE Autofreeze and Focus are mutually exclusive. The Autofreeze option is used only when your mouse is functioning as the X windows pointing device. It cannot be used when Focus is on. The Focus option controls shifting the mouse back and forth from X pointer status to DOS pointer status.

Some applications run in graphics mode only part of the time. When using such an application, you only need to zoom it when it enters graphics mode. For example, a spreadsheet can work as a text application but it can also draw graphs. In a case like this, you could perform text entry in a regular DOS window without worrying about zooming. If your application enters graphics mode, however, a message displays reminding you to zoom, and the DOS window **running** your program becomes unusable until you have done so. You can return to the normal DOS window after you are finished using graphics mode by pressing the DOS menu key sequence (usually **<Alt>(D)<>**).

Note that you can unzoom at any time, even if you are still in EGA/VGA graphics mode, in order to use other clients. However, when you unzoom while your application is in EGA/VGA graphics mode, the application in the window is suspended until you zoom it again.

When the DOS program you are **running** requires a mouse, use the DOS menu key sequence; then select the Focus option from the DOS menu to focus your mouse in the DOS window. This means that your mouse input goes to the DOS program instead of to the server. The Unfocus option reverses this, so that your mouse input goes to the server. If you select the Zoom option, your mouse is automatically focused for you while you are zoomed.

Changing colors

By default, SCO Merge uses the current UNIX color palette to display the colors in the DOS window. For many DOS programs this is sufficient. For DOS programs that depend heavily on color, the results can be peculiar. When the colors SCO Merge expects to use are not available, you may find that objects in their DOS windows are displayed in unexpected colors.

The colors you see in your DOS program depend upon a number of factors: your hardware setup, the colors chosen for your X Windows session, and the color requirements of the DOS program you are running. DOS programs run in X windows may produce distorted colors or unreadable screens when run on 16-color servers.

The DOS Colors option on the DOS menu allows you to have your DOS windows displayed in true DOS colors. This can have an unexpected impact on the appearance of your UNIX windows. Some DOS applications let you select colors specifically for that application.

See *Administering SCO Merge* for more about controlling colors in the DOS window.

Using peripheral hardware with SCO Merge

This section describes some of the hardware you can attach using the `dos ±` command. Most of the hardware can also be attached using the SCO Merge configuration tools mentioned above. For more information on how to use those tools to attach peripheral devices, see “Using dosadmin, dosopt, and the X window configuration tools” (page 34).

Using the DOS Device Information window

Because you may run different DOS sessions with many different configurations, SCO Merge provides the Device Information window. The Device Information window gives you instant access to configuration information any time you are in a DOS window in text mode. It works from the DOS command line or from within any DOS application. It “pops up” when you hit a hot-key sequence, like a TSR program in the standard DOS environment.

To open the Device Information window, press `(Ctrl)(Esc)`, then `(Ctrl)(I)`. While the Device Information window is displayed, your DOS process is suspended. Any other processes, (DOS or UNIX) which may be running in the background continue to run. When you have obtained the information you need, press `(Space)` and you pop back into your DOS session, which picks up exactly where you left it.

The default color scheme depends on your system setup. It is usually white on black or yellow on red. If you find this hard to read or prefer another arrangement, it is configurable.

You can reset the colors of the Device Information window by setting the UNIX environment variable, `DOSCONFIG`. The following two commands show how this is done from the Bourne shell:

```
DOSCONFIG=menucolor.white.blue
export DOSCONFIG
```

The `menucolor` option allows you to specify two parameters, separated by dots. The first parameter is the foreground color; the second is the background color. The code above gives you white characters on a blue field. Sixteen colors are available for each. See *Administering SCO Merge* for a list.

Configuring memory

SCO Merge provides you with a virtual personal computer which emulates the functions of a standard 8086 processor in nearly every way. The one significant exception is added functionality to support Windows 3.1 Standard Mode (80286).

DOS 5.0 provides tools for maximizing the amount of conventional DOS memory available for your programs. These tools cannot be used on an 8086 computer, but you can use them under SCO Merge. You can load device drivers and TSRs (Terminate and Stay Resident programs) into the upper memory blocks (UMBs) and you can load DOS itself into the high memory Area (HMA).

Most of this has already been done for you. By default, when SCO Merge comes up it loads a special extended memory manager, *mrngxms.sys*, which provides access to the upper memory blocks. It also loads DOS into the high memory area.

The commands for doing this are built into the DOS images and cannot be changed without making new images. Since this provides an optimum amount of RAM for your programs, you will probably never need to change it. With DOS and all device drivers and TSRs loaded high, SCO Merge provides about 610K of conventional DOS memory for programs.

The following commands are built into the DOS images:

```
DEVICE=MRGXMS.SYS
DOS=HIGH,UMB
```

mrngxms.sys is the only extended memory Manager that can be used with SCO Merge. Do not use *himem.sys*, *xms.sys*, or any other DOS extended memory manager produced by other vendors.

As in standard DOS, once the Upper Memory Blocks have been enabled, you can free up DOS conventional memory by loading your device drivers and TSRs there. Refer to your DOS manuals for more about DOS memory management.

To load device drivers and TSRs in the Upper Memory Blocks, use commands such as the following in any *config.sys* file which will be interpreted when SCO Merge starts:

```
DEVICEHIGH=DEVICE1.SYS
DEVICEHIGH=DEVICE2.SYS
INSTALL=TSR1.EXE
INSTALL=TSR2.EXE
```

To load TSRs into the Upper Memory Blocks, you can also use commands such as the following in any *autoexec.bat* file which will be interpreted when SCO Merge starts:

```
LOADHIGH TSR1.EXE
LOADHIGH TSR2.EXE
```

Using expanded memory (EMS)

SCO Merge supports the Lotus/Intel/Microsoft Expanded Memory Specification (EMS), so you can run any DOS applications that use expanded memory and conform to this specification.¹ SCO Merge expanded memory is available in the following sizes: 512 Kbytes, and 1, 2, 3, 4, 5, 6, and 8 Mbytes. The default amount of expanded memory is one Mbyte, but you can easily request any of the allowable values. (You should not request more memory than you need, however, because it wastes system resources.)

Your computer does not need to have actual physical memory in the amount you request when you use expanded memory, and you do not need an EMS memory card to use expanded memory with SCO Merge. SCO Merge simulates expanded memory by using standard UNIX system virtual memory. Provided you have at least the minimum amount of memory required to run SCO Merge, you can use any of the expanded memory values that SCO Merge supports.

To use expanded memory, you must request that a certain amount of it be allocated to a particular DOS process.

1. *The Lotus/Intel/Microsoft Expanded Memory Specification*, Version 4.0, Lotus Development Corporation, Intel Corporation, and Microsoft Corporation.

To request the standard one Mbyte of expanded memory, use the **+aems** option from the UNIX command line. For example:

```
dos +aems
dos +aems 123
```

The first example starts a DOS environment with one Mbyte of expanded memory. The second example starts Lotus 1-2-3 with one Mbyte of expanded memory.

To request a different amount of expanded memory, use one of the following **+a** options:

DOS Option	Memory
+aems512	512 Kbytes
+aems	1 Mbyte
+aems1	1 Mbyte
+aems2	2 Mbytes
+aems3	3 Mbytes
+aems4	4 Mbytes
+aems5	5 Mbytes
+aems6	6 Mbytes
+aems8	8 Mbytes

For example, to request four Mbytes, type:

```
dos +aems4
```

Note that **+aems1** has the same effect as **+aems**.

When expanded memory was introduced, it was available only as an adapter board. The card was a separate device which had to be attached to the computer like other peripherals. Even though SCO Merge emulates EMS in a completely different manner, the process by which you make it available to your program reflects its origin. EMS memory is “attached” with the **+a** option. Compare this with the method used to grant access to extended memory, described in “Using extended (or standard) memory (XMS)” (this page).

Using extended (or standard) memory (XMS)

Extended memory is made available to your programs by procedures that are similar to EMS but have some essential differences.

Extended memory is not treated as hardware, so you do not use the “attach devices to DOS” option. It is described here merely for your convenience, so that you can see clearly the differences and similarities between adding expanded memory and standard or extended memory.

The **dos** command has a **+m** option, which means "set memory size." You can allocate memory beyond 1 Mbyte to Windows 3.1.

Note that this additional memory can be utilized *only* by Windows 3.1. Windows can then allocate this memory to its applications.

When you provide memory in this way, Windows 3.1 manages the memory for you. You do not need to be concerned about whether it is "conventional" or "upper memory block" or "extended" memory. For this reason it is referred to simply as "standard" memory.

To allocate standard memory to Windows 3.1, start your process through the **dos** command with the **+m** option. The command:

dos +m4 win

requests four Mbytes and runs Windows.

For more on the **+m** option, see, "Configuring memory" (page 52), *Administering SCO Merge*, and the **dos(C)** manual page.

Using display adapters and serial terminals

SCO Merge automatically senses the type of display adapter you use in the system console and properly displays DOS processes. SCO Merge is compatible with VGA, CGA, Hercules, and monochrome display adapters. When you use a serial terminal, SCO Merge displays DOS processes as though they are running on a monochrome console. You can use the **dos +a** command to explicitly specify a particular display type, but this is normally unnecessary. For further information on display devices, refer to *Administering SCO Merge*.

Using a mouse

You should not modify any *config.sys* files to identify a mouse driver as you would on a conventional personal computer running standard DOS. SCO Merge uses a special mouse driver that is identified in the system default *config.sys* file.

SCO Merge causes DOS to view any properly configured mouse as though it were a Microsoft Bus Mouse. If you install DOS applications that need to know about the specific mouse you use, always refer to it as a Microsoft Bus Mouse.

If you have a bootable DOS partition on the fixed disk and you sometimes boot DOS from it, you may have to switch from one mouse driver to another. For more information on switching mouse drivers, see "Switching mouse drivers" (page 97).

Using a modem

You can use either an external modem (one attached to a serial port) or an internal modem (one that requires an internally installed card) with SCO Merge. If you have a choice, consider that external modems are easier to troubleshoot should problems arise.

Install either kind of modem by following the manufacturer's instructions for connecting it to a serial port. Note that an internal modem generally replaces *com1* or *com2*. To use the modem, attach the appropriate *com* port to your DOS process by using the **+a** option when you start DOS. For example:

```
dos +acom1
```

For further information, see "Using com ports".

Using com ports

DOS can use the *com1* and *com2* serial ports (equivalent to the UNIX devices */dev/tty1a* and */dev/tty2a*). The *com3* and *com4* ports are not supported. Only one DOS process at a time can use each *com* port. To use a *com* port, you must explicitly request access to it.

SCO Merge can attach *com* ports in two different ways: indirectly or directly. You do not need to understand the technical distinction between these two forms. However, you must choose one form or the other when you start DOS. Consider these trade-offs as you make your choice:

- Indirect attachment is more reliable when the system is heavily loaded, but it may be slower than direct attachment. Try this form of attachment first if you are uncertain which to use.
- Direct attachment is faster but less reliable than indirect attachment when the system is heavily loaded.

To indirectly attach a *com* port from the UNIX command line, use the **dos** command with the **+acom1** or **+acom2** option. For example:

```
dos +acom1  
dos +acom2 xtalk
```

The first example starts a DOS environment and requests access to *com1*. The second example starts the *xtalk* (Crosstalk) application and requests access to *com2*. In both examples, if the requested *com* port is not available, SCO Merge does not start DOS and instead displays an error message.

To directly attach *com1* or *com2*, use the **+adcom1** or **+adcom2** option. For example, to start a DOS environment and directly attach *com1*, type:

```
dos +adcom1
```

To start **xtalk** and directly attach *com2*, type:

```
dos +adcom2 xtalk
```

Direct attachment is not available through the DOS Options dialog box.

Transferring files through com ports

You can use both directly and indirectly attached *com* ports to transfer files between computers. However, the reliability of the transfer depends on many factors including line quality, transfer speed, and system load. If you use *com* ports to transfer files at speeds greater than 4800 baud, use an error-correcting protocol to perform the transfer. Error-correcting protocols help ensure the integrity of data during transfer.

Using the game port

To use the game port, use the **+agame** option. For example:

```
dos +agame
```

Only one DOS process at a time can use the game port.

For further information on installing and configuring hardware devices, refer to *Administering SCO Merge* or consult your system administrator or SCO Merge distributor.

Using CD ROM devices

CD ROM devices are supported as mounted file systems only. They must be attached through the SCSI bus and the file tree they must be mounted with the **lower** option, which converts all filenames to lower case. This allows DOS to map the filenames correctly. One suitable mount command is shown in the example below:

```
/etc/mount -r -f HS,lower /dev/cdrom /mnt
```

Another option that might be useful is **showhidden**, which makes hidden files show up in directory listings.

Using custom devices

You can install and use hardware devices other than those described in the preceding sections. Your system administrator can define an easy-to-type device name for any device that exists on your computer. You can use any defined device name with the **+a** option. For example, if your system administrator has defined the device name **widget**, you can use the device with this name by typing the command **dos +awidget**.

For further information on installing and configuring hardware devices, refer to *Administering SCO Merge* or consult your system administrator or SCO Merge distributor.

Using virtual partitions and virtual floppy disks

Virtual DOS partitions and virtual floppy disks are UNIX files that contain actual DOS filesystems. By default, these virtual devices do not exist. *Administering SCO Merge* describes how to create and administer these devices and discusses their characteristics.

Virtual partitions and floppy disks are typically not of interest to most SCO Merge users. If your computer does not have a physical DOS partition, however, you may find a virtual partition to be useful. Refer to *Administering SCO Merge* for further information on creating these virtual devices and on their characteristics.

To use a virtual partition or floppy disk, attach it to your DOS process using the **+a** option:

+a*drive_letter:=unix_file_name*

You should normally use drive letters *A:* or *B:* to access a virtual floppy. Use drive letters *E:*, *F:*, *G:*, *H:* or *I:* to access virtual partitions.

NOTE You may want to avoid using drive *E:* since it is assigned to the primary DOS partition by default. If you assign drive *E:* to a virtual floppy or virtual partition, you will no longer have an attachment to the primary DOS partition (unless you specifically assign another letter to it).

The full pathname of the UNIX file that contains the virtual partition or floppy drive is *unix_file_name*. For example, the following command starts a DOS environment and attaches the virtual partition */usr/marx/vdisk* as DOS drive *F:*:

dos +af:=/usr/marx/vdisk

You can then access any DOS files contained within */usr/marx/vdisk* via DOS drive *F:*. You can change your current drive to drive *F:* with the command:

f:

You can list the files on drive *F:* with the command:

dir F:

To start a DOS environment and attach a virtual floppy named */usr/hegel/vflop*, use a command such as:

dos +ab:=/usr/hegel/vflop

When you issue this command, the virtual floppy is accessible as DOS drive *B:*, just as if it were a physical diskette drive. Note that if there is a physical drive *B:*, you will no longer have access to it.

Virtual partitions and floppy drives have the following limitations:

- While multiple users can simultaneously attach and read a virtual partition or floppy drive, only one user at a time can write to a virtual partition or floppy drive.
- When one user is writing to a virtual partition or floppy drive, all other users are prevented from reading and writing to that device until the DOS session on the device is terminated.

See *Administering SCO Merge* for more information on attaching virtual partitions and floppy disks, including instructions on attaching them “exclusive” so they cannot be written by other users.

Using physical DOS partitions

A physical DOS partition is a portion of the fixed disk formatted as a DOS file-system and reserved exclusively for DOS files. SCO Merge may have just one physical DOS partition (called the primary DOS partition); it may have both a primary and an extended DOS partition; or it may have no physical DOS partitions.

If your SCO system has a primary DOS partition, it is automatically available as DOS drive E: whenever you run DOS. If your computer has an extended DOS partition, you must attach each logical drive you want to use to an available SCO Merge drive letter.

Be careful not to attach any logical drive twice. It is easy to do this unintentionally with `xdosopt`'s DOS Options dialog box. If you do inadvertently assign two different drive letters to the same segment of the fixed disk, SCO Merge responds by protecting your files from corruption. All files on the partition are made read-only.

To attach a logical drive within the extended DOS partition, you can use any of the SCO Merge configuration tools mentioned earlier in this chapter (see “Using `dosadmin`, `dosopt`, and the X window configuration tools”) or the `dos +a` command.

From the UNIX command line, use the `dos` command with the `+a` option:

`dos +aSCO Merge_drive_letter:=dos_logical_drive_letter`

SCO Merge_drive_letter can be E:, F:, G:, H: or I:. *dos_logical_drive_letter* can be any of the logical drives available on your DOS partition.

NOTE You may want to avoid using drive *E:* since it is assigned to the primary DOS partition by default. However, you can use drive *E:* if you wish. If you assign drive *E:* to a logical drive in the extended partition, you will no longer have an attachment to the primary DOS partition unless you specifically assign another letter to it.

For example, the following command attaches your system's logical DOS drive *D:* to the SCO Merge *F:* drive:

```
dos +af:=dosd
```

Refer to the file */etc/dosdev* for a list of available logical drives.

Multiple DOS processes can *read* files on a DOS partition at the same time, but only one process at a time can *write* to the primary DOS partition or to a logical drive within the extended DOS partition. As soon as one process writes to a DOS partition, no other process can read or write to the partition until the DOS session writing the first process is terminated.

Refer to the *Administering SCO Merge* for further information on using and administering physical DOS partitions.

Chapter 6

Using DOS with the UNIX system

With SCO Merge, you can also perform tasks that would be impossible using either a UNIX or DOS system separately. For example, you can create a UNIX shell script that, with a single command, loads a DOS word processor like WordPerfect® so you can create a report, and then sends that report to other users via the UNIX **mail** utility.

The examples in this chapter assume you are using the standard UNIX Bourne shell. If you use a shell other than the Bourne shell, you may have to modify some of the examples.

Running DOS programs from the UNIX system

To run an off-the-shelf application that is installed on your fixed disk, start it from your UNIX prompt just as you would at a DOS prompt.

Most standard DOS commands have already been set up so that they are executable from the UNIX prompt. However, you will have to perform this setup yourself on any DOS application you install. See *Administering SCO Merge* for instructions.

When you run a program under SCO Merge, the system must be able to find the program you specify. This rule applies whether you use the DOS environment or the UNIX shell, and whether the program you specify is a DOS or a UNIX program.

Your default UNIX and DOS search paths include */usr/dbin* and */usr/ldbin*, the directories where standard DOS commands and applications are stored. You can therefore run all standard DOS commands and utilities while working in any directory without typing their full paths on your command line or using the DOS **path** command. If you add DOS applications however, you must add

that application's directory to your DOS search path before it will run without typing the full path name.

If you are familiar with DOS search rules, you should be aware that UNIX and DOS rules for search paths differ in one respect: DOS always looks for any program you execute in your current working directory first, before it checks the rest of your search path. The UNIX system, on the other hand, does not look in the current directory unless it is explicitly specified in the search path.

Using DOS commands

All common DOS commands work as you expect when you use the UNIX shell. Use these commands just as you would use them in the DOS environment. For example:

```
dir  
fc memo memo.old
```

If you choose, you can intermix DOS and UNIX commands:

ls	The UNIX command for a directory listing
del report	The DOS command for deleting a file
cp plan newplan	The UNIX command for copying a file
comp plan newplan	The DOS command for comparing files

At the UNIX prompt, pipes and redirection work as they do on a conventional DOS system. For example:

```
dir | sort > contents
```

When you run DOS programs from the UNIX shell, you must use UNIX syntax. For example, use the slash (/) in path names (*/usr/dbin*, for example) and the hyphen (-) to indicate command options (**dir -w**, for example). If you are a UNIX user, this syntax should be familiar to you. If you are accustomed to DOS, however, you need to know when the UNIX shell interprets your commands differently from standard DOS. When you use DOS from the UNIX shell, observe the following rules:

- Use the UNIX path separator "/" and switch character "-" instead of the standard DOS path separator "\" and switch character "/". For example, in the DOS environment you would type:

```
dir \usr\dbin /w
```

At the UNIX shell you would instead type:

```
dir /usr/dbin -w
```

- When working from the UNIX shell, use lowercase letters for DOS commands and filenames just as you do for most UNIX commands and filenames.

For example, type:

```
dir /usr/dbin
```

Do not type:

```
dir /USR/DBIN (this is incorrect)
```

- When you use the UNIX shell, the following characters are interpreted according to the rules of UNIX syntax, rather than the rules of DOS syntax:

```
< > * ? | & $ ; \ " ` ' ^ ( ) [ ] #
```

You can therefore use them as necessary with DOS commands just as you would use them with UNIX commands. If you are used to using any of these metacharacters on a conventional DOS system (or in the SCO Merge environment), however, you should be aware that the UNIX system treats them differently than DOS does. For example, if you issue the DOS command:

```
copy *.com A:
```

in the DOS environment, DOS copies all files ending with **.com** in your current directory on drive C: to your current directory on drive A:. The equivalent command from the UNIX shell is:

```
dos copy *.com A:
```

NOTE The command must start with **dos** to avoid a conflict with the UNIX **copy** command.

This command works differently than it does in the DOS environment because the UNIX shell translates the asterisk (*) before the DOS **copy** program receives the command. By the time the command is passed to DOS, it has been translated into something like the following:

```
dos copy file1.com file2.com file3.com a:
```

An error message results since DOS **copy** accepts only one source filename. Similar errors can occur with other UNIX shell metacharacters.

You can prevent the UNIX shell from interpreting shell metacharacters by using the standard UNIX shell escape character, the backslash (\). For example:

```
dos copy \*.com A:
```

The backslash prevents the UNIX shell from interpreting the metacharacter **"*"**, and the command is passed to DOS and interpreted correctly.

You can also use both the single quote (') and double quote (") symbols to prevent the UNIX shell from interpreting metacharacters. The quotes in the command:

```
dos copy '*.com' A:
```

tell the UNIX shell not to interpret the metacharacter asterisk (*), and the command is passed to DOS in the desired form. Single quotes work equally well.

Some DOS commands require the quote symbol as part of their command syntax. The quote must be passed literally to DOS rather than being used by the UNIX shell to prevent interpretation of other metacharacters. The DOS **find** command, for example, uses quotes to surround a character string that is being searched for. A typical use of this command in the DOS environment would be:

```
find "October" memo
```

(This command displays all lines in the file **memo** containing the word "October.") If you issue the command from the UNIX shell in this form, the UNIX shell strips away the quotes and passes the command in an illegal form to DOS. To avoid this unwanted behavior, type:

```
dos find \"October\" memo
```

Again, note that the command starts with **dos** to avoid a conflict with the UNIX **find** command. You can sometimes avoid unwanted interpretation of metacharacters by including DOS drive designations when you run a command. To accomplish the copying operation described above, for example, you can type:

```
dos copy C:*.com A:
```

Provided you do not have a file in your current directory that matches the character string "c:*.com" (including the "c:"), this command works as expected. When you issue this command, the UNIX shell first looks for files matching the character string "c:*.com" in order to carry out the proper substitution for the metacharacter asterisk (*). Because the shell cannot find matching files, interpretation of the metacharacter does not occur. The string "c:*.com" is passed literally to DOS, which interprets the drive designation and metacharacter as expected.

Avoiding program name conflicts

There are a few UNIX programs with the same names as DOS programs. The UNIX and DOS operating systems both include **copy**, **sort**, and **find** commands, for example. The **copy** and **sort** commands operate somewhat differently in the two operating systems, and **find** has an entirely different purpose in DOS from that in UNIX. You might encounter other program names shared by UNIX and DOS. These duplicated program names create no problem when you are working inside the DOS window, where all commands are assumed to be DOS commands.

From the UNIX shell, because you can issue both DOS commands and UNIX commands, you might not be sure which version of **copy**, **sort**, or **find** is executed.

By default, UNIX commands are executed instead of DOS commands because the directories containing UNIX commands are listed first in the default search path.

There are three ways you can ensure that the DOS versions of these commands are executed:

1. Explicitly specify the path of the command when you run it, for example:

```
/usr/dbin/copy names newnames
/usr/dbin/sort < names
```

Since */usr/dbin* contains the standard DOS commands, you know that the DOS versions of **copy** and **sort** are run.

2. Start your UNIX command line with **dos**, which guarantees that the command is interpreted as a DOS command:

```
dos copy names newnames
dos sort < names
```

3. Change your path to place the directories containing DOS commands at the beginning of the path. (This procedure has no effect on commands built into the UNIX shell, such as **type**. These built-in commands are interpreted and executed without searching the path.)

Inapplicable DOS commands

Several DOS commands have no known use from the UNIX shell. The UNIX system provides the same functions as some of these DOS commands, in many cases with commands having the same names. Other DOS commands (**cd**, for example) are not useful from the UNIX shell because they affect a transient DOS environment that lasts only as long as the command itself. The following DOS commands are not enabled for use from the UNIX shell:

append	cls	graphics	nlsfunc	set
assign	ctty	join	prompt	share
bread	fastopen	keyb	path	subst
cd (chdir)	fdise	mkdir	recover	verify
chcp	grftabl	mode	rmdir	

All DOS batch commands except **"for"**

The following additional restrictions apply to DOS commands:

- You cannot use **chkdsk**, **format**, **mirror**, **sys**, **undelete** or **unformat** on the shared UNIX file system. You can, however, use these commands on an actual DOS file system (such as a diskette drive or a DOS partition) as you would on any conventional DOS system.

- The DOS **time** and **date** commands can be used from the UNIX shell to display the time or date, but cannot be used to alter the SCO Merge system clock. Note that the UNIX system also includes **time** and **date** commands, so if you use DOS **time** or **date**, see “Avoiding program name conflicts” (page 64).

Multitasking and background execution

Because UNIX is a multitasking system, you can run more than one program at a time. UNIX users commonly run noninteractive programs (such as compilers) in the background while simultaneously running an interactive program (such as a text editor) in the foreground. When a program is running in the background, your console or terminal is available for other tasks; you do not need to wait for the background program to complete before beginning another task.

To start a program in the background, type an ampersand (&) at the end of the command line.

You can run some DOS programs (including batch files) as well as UNIX programs in the background by invoking them from the UNIX shell prompt and including an ampersand at the end of the command line. For example, if the Microsoft C compiler is installed on your system, you can use it to compile and link a file named *hist.c* in the background by typing the command:

```
cl hist.c &
```

Just as with the UNIX **cc** command, your UNIX prompt returns as soon as you issue the **cl** command, and you can continue using other UNIX or DOS programs while the DOS **cl** program compiles and links *hist.c* in the background.

NOTE You can successfully run only noninteractive programs in the background. Most DOS programs are interactive, so you cannot run most DOS programs in the background. Refer to the description of the **dos ±b** option in *Administering SCO Merge* or to the **dos(C)** manual page for further information on installing and using noninteractive DOS programs.

In SCO Merge, you can use the standard DOS pipe and redirection mechanisms with DOS programs and files just as you would on a conventional DOS computer. SCO Merge gives you the additional power of piping and redirecting between DOS and UNIX programs.

Using DOS drives

You can use DOS drives from the UNIX shell to access DOS files and programs stored outside the shared UNIX filesystem. Files on a diskette drive that is accessible to DOS but not mounted as part of the UNIX filesystem, for example, are not part of the shared UNIX filesystem. DOS partitions are also not

part of the shared UNIX filesystem. See *Administering SCO Merge* for further information on DOS partitions.

Follow these rules to use DOS files that are not part of the shared UNIX filesystem:

1. If you want to run a command on a DOS drive, precede the command with the command **dos** and specify the drive name as you would when using standard DOS:

dos a:cards

2. If the drive name is a parameter to a command, use the drive designation just as you would when using standard DOS:

dir A:

dir A:memos/july

These rules apply to any DOS filesystems, including physical DOS partitions, virtual DOS partitions, and virtual floppies. The following examples illustrate these principles:

1. To run a program called **tricks** stored on the primary physical DOS partition:

dos e:tricks

2. To use a DOS program called **showdata** stored on the virtual floppy **/usr/paul/vflop** to display information about the file **messages** in your home directory (drive D:) using the **dos +a** command:

dos +ab:=/usr/paul/vflop b:showdata d:messages

See "Using the dos + or - options on the UNIX command line" (page 33), the **dos(C)** manual page, and *Administering SCO Merge* for more information on the **+a** option.

3. To display the contents of the virtual partition **/usr/sam/vpart** using the **dos +a** option:

dos +af:=/usr/hegel/vpart dirF:

Stopping DOS programs

There are several ways to stop a DOS program that you started from the UNIX shell. To stop a DOS application, you should generally follow the application manufacturer's instructions. If these instructions do not stop the application, or if you are running a DOS program for which no specific procedures are provided, use one of the following procedures. You may need to try more than one of them.

- Send the UNIX interrupt signal by pressing the key. An interrupt aborts only stream-oriented programs **running** in the foreground.
- Use the DOS break character by pressing <Ctrl><C> or <Ctrl><Break>.
- Press <Ctrl><Alt>.
- Use the **KILL** DOS terminal control code described in “Stopping DOS programs” (page 11).
- If the DOS process is **running** in the background (and you see the UNIX prompt), use the UNIX **ps** command to determine the process ID (PID) and issue the UNIX **kill** command in the form:

kill *pid*

Here, *pid* is the process ID of the DOS process you want to kill.

Printing from the UNIX shell

When you do your work at the UNIX shell, you have the option of printing either DOS or UNIX files with either DOS or UNIX print commands.

Using UNIX print commands

By default, SCO Merge sends all printer output from both DOS print functions and UNIX print functions to the UNIX print spooler. Using UNIX print commands is therefore usually more efficient than using DOS print commands. When you run a DOS print command at the UNIX shell, it indirectly invokes a UNIX print command, that could run directly from the UNIX shell yourself. If you are familiar with UNIX print commands, we recommend that you use them to print both DOS and UNIX files when you use the UNIX shell.

Using DOS print commands

If you prefer to use DOS print functions, you can use most of them just as though you were running UNIX printing routines. Following are the general rules for using DOS print functions from the UNIX shell.

- The DOS **print** command works in the standard way from the UNIX shell. To print, issue the print command with the name of the file you want to print:

dos print *filename*

You cannot use **print** options (such as */t*, */c*, and */p*) when you use UNIX spooling.

- You can use the DOS **copy** command to copy a file to the DOS print device *prn*, *lpt1*, *lpt2* or *lpt2*:

dos copy *filename* *lpt1*

- Printing done by DOS applications works just as it does in the DOS environment. SCO Merge stores the printer output in a temporary file and sends it to the UNIX print spooler when either of the following occurs:
 - You exit the application and return to your UNIX prompt.
 - More than 15 seconds have elapsed since the application has sent a character to be printed.
- You cannot use the DOS (Prt Scr) and (Ctrl)(Prt Scr) functions from the UNIX shell.
- If you want to print a file that is not in the shared UNIX filesystem, you must use a DOS print or copy command. For example, to print files from DOS drive A:, you would use a command such as:

```
dos copy A:status lpt1
```

Running UNIX programs from DOS

The SCO Merge **on** utilities allow you to run UNIX programs from the DOS environment and view the output as though the programs were actually running under DOS. You can also view status information concerning UNIX programs and control their execution and output from the DOS environment.

The **on** utilities can only be used to execute *noninteractive* UNIX commands — those that do not initiate a conversation with the user. You must be at a UNIX prompt if you want to run interactive UNIX programs such as the **vi** text editor.

With the **on** utilities you can:

- Execute UNIX commands without switching to a UNIX window or screen or exiting the DOS environment.
- Extend the functionality of the DOS environment by executing UNIX commands on DOS files as if they were DOS commands.
- Run UNIX programs in the background and view their output at a later time.

The **on** utilities include three commands that run under DOS: **on**, **jobs**, and **kill**.

Specifying the machine and UNIX command

UNIX commands can contain all options and arguments exactly as they would be typed at a UNIX prompt. For example, from your DOS prompt:

```
on unix pr -o10 -w65 -l54 -d /tmp/longfilename1
```

Specify UNIX filenames with their full UNIX names, not with their mapped DOS names.

The **on** command runs the specified UNIX process in the current directory of your current drive, provided it is a drive (such as C:, D:, or J:) that accesses the shared UNIX filesystem. For example, if your current working drive is drive C: and you type:

```
on unix rm temp
```

on removes the file *temp* in your current working directory on drive C:. If your current working drive is drive A: and you type:

```
on unix rm temp
```

on removes the *same* file as in the previous example — the file *temp* in your current working directory on drive C:. If your current drive is not one of these drives, **on** fails and displays an error message.

The **on** command cannot execute multiple UNIX commands separated by semicolons unless the commands are surrounded by parentheses. For example:

```
on unix (ls ; cat names)
```

The **on** command automatically converts the text output of the UNIX command from UNIX format to DOS format. That is, the SCO Merge **unix2dos** utility is built in.

If **on** cannot execute the requested UNIX command, either because it cannot find a requested file or because you do not have execute permission for a requested file, then **on** returns the following error message:

```
unixcommand: access denied or file not found
```

where *unixcommand* is the name of the command that **on** attempted to run.

Using UNIX command names directly

The second major form of the **on** command allows you to run UNIX commands without typing **on unix** for every command. When you want to avoid typing **on unix**, copy or link the **on** program to the names of the UNIX commands you want to run directly from the DOS prompt.

The executable DOS file that contains the **on** command is `\usr\dbin\on.exe`. To make a UNIX command executable directly from the DOS prompt, copy or link *on.exe* to a file with the name of the UNIX command you want to run. Include

the filename extension *.exe* in the renamed copy of *on.exe*. Assume, for example, that you have a UNIX program called **getname** that displays a user's full name when given either a first or last name. To make **getname** executable under DOS, copy *on.exe* with the command:

```
copy \usr\dbin\on.exe getname.exe
```

You could then type:

```
getname joe
```

from the DOS prompt, and Joe's full name is printed in your DOS window.

All options and arguments are entered following the renamed copy of **on** exactly as they would be at the UNIX prompt. This feature allows you to make copies of **on** with the names of UNIX utilities and use them as if they were DOS utilities.

Observe the following precautions and restrictions:

- The filenames of your UNIX commands must have the extension *.exe*, just like *on.exe* does.
- As with any DOS command in the DOS environment, the copies of *on.exe* must be in your DOS search path or your current directory.
- The UNIX command that *on.exe* is renamed to resemble must contain only lowercase letters in its name. (Other commands can still be run by preceding the command with **on unix**.)
- The name of the UNIX command cannot violate any of the DOS naming conventions. For example, you could not create an **on** version of a UNIX shell script named **mycalendar** because its name contains ten letters. (You can still run **mycalendar** by using the command **on unix mycalendar**, however.)
- Do not try to make copies of *on.exe* with the names of UNIX programs called **jobs** or **kill**. The **on** utilities interpret **jobs** and **kill** as built-in commands. Whenever you run these commands directly from your DOS prompt, SCO Merge runs the **on** utilities versions. If UNIX versions of these commands exist and you want to execute them from the DOS prompt, use the first form of the **on** command, like this:

```
on unix jobs
on unix kill pid
```

- Do not make copies of **on.exe** with the names of DOS internal commands. The DOS shell interprets DOS internal commands, such as **type**, as soon as they are entered. You therefore cannot run **on** utilities versions of these commands directly from the DOS prompt. To run a UNIX command with the same name as a DOS internal command, use the first form of the **on** command, like this:

on unix type cat

Linking on in the shared UNIX filesystem

The **on** command is stored in `\usr\dbin\on.exe` in the shared UNIX filesystem. Rather than using up disk space by making copies, you should, whenever possible, use the UNIX **ln** command to create links to the **on** program. The advantage of using the UNIX **ln** command instead of the DOS **copy** command is that **ln** allows a single file to have more than one name without taking up extra disk space.

When SCO Merge is installed, several UNIX programs are already linked to `\usr\dbin\on.exe`. These programs are:

cat	df	egrep	lp	spell
chmod	diff	fgrep	ls	tail
cmp	dosopt	grep	mv	wc
cp	du	ln	pr	

Like *on.exe*, these links are in the directory `\usr\dbin`. Because these links exist, you can use any of these commands in the DOS environment just as though they were DOS commands.

Search path and other environment considerations

All forms of the **on** command use both DOS and UNIX search paths. If you use the form **on unix unixcommand**, DOS must be able to find the file *on.exe*. *on.exe* is in `\usr\dbin`, which is in the default DOS search path. If you use the form *linked_unix_command* or *copied_unix_command*, DOS must be able to find the file that is linked to or a copy of *on.exe*. With any form of the **on** command, the UNIX system must be able to find the UNIX command named in the **on** command line.

SCO Merge executes UNIX commands that you run with **on** under the standard Bourne shell, **sh**. Any UNIX environment variables exported by the shell that started your DOS environment are available to UNIX programs executed with **on**.

Breaking out of on

Unless **on** is **running** as a detached task, as described in the next section, you can interrupt it by pressing **<Ctrl><C>** or **<Ctrl><Break>**. The following prompt is displayed:

a - abort, c - continue, d - detach:

Entering **a** kills the job, clears the job from the job table, and returns you to a DOS prompt. Entering **c** allows the process to continue as before in the DOS foreground. Entering **d** detaches the UNIX process from your terminal, returns your DOS prompt, and continues to run the specified UNIX program in the background under the UNIX system. The next section describes the job table and detached tasks.

Running on jobs in the background

The **on** utilities allow you to:

- Start one or more UNIX commands from your DOS prompt and run them in the background.
- Detach an **on** command that is currently **running** in the foreground so that it continues to run in the background. Your DOS prompt returns and you can issue other commands while your **on** program continues.
- View a table showing the status of all currently executing and completed **on** commands.
- View the output of detached commands, including commands that have finished executing, at any time.

The following sections describe the features for controlling jobs executed with **on**.

Using the job table

SCO Merge maintains a job table that keeps track of detached UNIX processes initiated by **on** — that is, processes that are placed in the background of the UNIX environment. The job table shows the status of up to ten detached **on** commands. Each DOS environment has its own job table.

The job table holds one entry per **on** command. Each UNIX command, however, may create several subordinate processes. For example, a single **spell** command takes only one space in the DOS job table, but appears in a UNIX **ps** (process status) list as four or five processes.

Two ways to detach tasks

You can detach UNIX tasks initiated with **on** so they run in the UNIX background in either of two ways:

1. Add an ampersand (&) to the end of the **on** command. For example:

NOTE This example and all subsequent examples of standard UNIX commands in this chapter use the second **on** command form. That is, the words **on unix** are not explicitly included in the command since the names of these UNIX commands are linked to `\usr\dbin\on.exe`. All of these examples work equally well if you include **on unix** at the beginning of each command.

spell memo &

Note that the ampersand must be preceded by a space. The following command is incorrect:

spell memo& (incorrect)

2. Initiate an **on** command and later interrupt it with `<Ctrl><C>` or `<Ctrl><Break>`. For example:

spell memo
`<Ctrl><C>`

The following prompt is displayed:

a - abort, c - continue, d - detach

When you enter **d**, the task is placed in the background under the UNIX system.

In either case, **on** responds with a message in the form:

[jobnumber] pid

where *jobnumber* is the job number of the task in the DOS job table, and *pid* is the UNIX process ID number returned by the UNIX system. Your DOS prompt then returns and you can issue additional commands (including **on** commands) while your detached process continues executing in the background. Any output produced by a detached **on** task (for example, the spelling errors found by the **spell** command shown previously) is by default stored in a temporary file. You can see the contents of this temporary file by reattaching the task as described in "Reattaching to detached tasks" (page 76). You can also use pipes and redirection to send the output of detached tasks to any file or program you choose. See "Using pipes and redirection" (page 77).

Keeping track of detached tasks

You can use the **jobs** command to perform any of the following tasks:

- Display job table information.
- Clear the job table of entries for completed jobs.
- Reattach to detached jobs.

Invoking **jobs** with no arguments displays the current job table in the following format:

JOB	STATE	EXIT STATUS	COMMAND
[1]	Running		<i>unixcommand1</i>
[2]	Done	exit (0)	<i>unixcommand2</i>

If the job table is currently clear, invoking **jobs** returns you to the DOS prompt. The job table is clear when no detached jobs have yet been run or when you have cleared the job table of all entries.

The "JOB" column shows the job ID number that **on** assigned to each process when the process was detached.

The "STATE" column indicates whether the process is running or done.

The "EXIT STATUS" column shows one of the following values:

exit(<i>nn</i>)	The job terminated with an exit status of <i>nn</i> . An exit status of 0 usually means the process terminated normally. Any other value may indicate an abnormal termination of the process.
unknown	The job terminated, but on was unable to determine its exit status. This condition does not normally occur.
signal(<i>nn</i>)	A signal was received that killed the process. In this case, <i>nn</i> indicates the signal received.
coredump(<i>nn</i>)	The signal received caused a core dump to occur. This is a special case of signal .
err3(<i>nn</i>)	An error in the functioning of on or SCO Merge has occurred.

The "COMMAND" column shows the UNIX command that was requested.

Completed processes remain in the job table until you clear them by entering **jobs** with a single hyphen as an argument. When you enter:

jobs -

these events occur:

- The current status of the job table is displayed, including all currently "Done" entries.

- The “Done” entries are cleared from the job table.
- Any temporary files in the `\TMP` directory that were associated with the “Done” jobs are removed.

Once jobs are cleared from the job table, they can no longer be reattached. Output from any task being saved in temporary files for reattachment and review is discarded.

Reattaching to detached tasks

Reattaching to a detached task allows you to:

- View all previous output of a currently **running** program and continue to view new output as the program sends it to your screen.
- View the output of a program that has finished **running**.

To reattach either to a currently **running** job or to a completed job, use the **jobs** command in the form:

jobs %jobnumber

where *jobnumber* is the job number of the detached task.

For example, suppose you start the UNIX **spell** program as a detached task by typing:

spell memo &

When you type this command, **on** displays a job number and process ID similar to:

[1] 4376

To reattach to your **spell** job, type the command:

jobs %1

If you decide to reattach to the detached job and do not know the job number, type the **jobs** command to find out. A display similar to this is printed:

JOB	STATE	EXIT STATUS	COMMAND
[1]	Running		spell memo
[2]	Done	exit(0)	who

Using the percent sign without a number reattaches you to the lowest numbered task in the job table:

jobs %

When you reattach to a currently **running** job (that is, one that appears as “Running” in the job table), you see all the output produced by the job up to the time you reattach to it. The job then continues to run, and you see any additional output as it is printed. If you wish, you can detach the task again at any time while it is **running**. Each time you reattach it, you see *all* output printed up to the time you reattach.

When you reattach to a completed job (one that appears as “Done” in the job table), you see all output printed by the job. The temporary file storing the output is removed and the job table entry for that job is cleared. The temporary file is also removed and the job table entry cleared if the job completes while it is attached.

Stopping detached jobs

You can halt detached jobs and clear them from the job table by reattaching, pressing <Ctrl><C> or <Ctrl><Break>, then responding a (for “abort”) to the resulting prompt.

You can also stop a UNIX process by using the **on** utilities **kill** command, which runs under DOS, in this form:

```
kill [-signal] %jobnumber [...]
```

where *jobnumber* is the task number of the job in the job table and *signal* is the UNIX signal to be sent to the process.

The **on** utilities **kill** command works exactly like the UNIX **kill** command except that it accepts *%jobnumber* instead of the process ID number argument. See the descriptions of **kill** and **signal** in your UNIX documentation for more information. The default signal sent is 15. A signal of 9 may be used for a sure kill. Note, however, that entering **kill -9** is bad practice unless other **kill** commands have failed, because the UNIX program has no chance to perform cleanup operations before exiting.

Using pipes and redirection

With the **on** command, you can use either DOS or UNIX pipes or redirection, or even combine the DOS and UNIX versions of these mechanisms in a single command. You can accomplish nearly all useful operations using the DOS mechanisms. You can use DOS pipes (|) with UNIX programs that you invoke using **on** just like you use them with DOS programs and you can redirect the output of **on**-initiated commands to specified files or directories where you have write permission. You can also use the DOS input redirection mechanism (<) to redirect standard input from a file or from the DOS keyboard to an **on** command.

Input redirection from a file can be useful when you want to run a UNIX command that operates on a file contained on a DOS device, such as drive A:. For more information on using DOS pipes and redirection utilities, see your DOS documentation.

Using pipes and redirection in detached tasks

A detached **on** command that includes DOS pipes or redirection may not produce the results you want. This can happen because the DOS command processor, *command.com*, interprets the pipe and redirection symbols (<, >, and |), while **on** interprets other parts of the command line, including the ampersand (&).

For example, if you want to redirect the output of the UNIX **spell** command into a file called *typos*, you might incorrectly issue the following command:

```
spell memo > typos &           (incorrect)
```

This command, however, does not put the list of spelling errors in the file *typos*. Instead, it puts the job number and process ID of the **spell** command (which **on** returns to the DOS environment) in *typos*.

To save output produced by **spell** you can do either of the following:

- Issue the command in the form:

```
spell memo &
```

and then redirect the output when you reattach, as described previously in “Reattaching to detached tasks” (page 76).

- Use UNIX output redirection rather than DOS output redirection when you issue the **spell** command. You can also use quotes to prevent the pipe and redirection symbols from being interpreted by DOS. For example:

```
spell "memo > typos" &
```

This command, however, leaves the contents of the file *typos* in UNIX text format.

The **on** utilities use the special characters “{” to mean UNIX input redirection, “}” to mean UNIX output redirection, and “!” to mean a UNIX pipe. When you use these characters in an **on** command, the UNIX system does the redirection or piping operation, and the results are often easier to understand. To use UNIX output redirection in the **spell** example illustrated above, type:

```
spell memo } typos &
```

This example displays a job number and process ID when you issue the command. Your DOS prompt returns, as expected, and the task runs in the background. When the **spell** program completes, the results are in the file *typos*.

When you use UNIX redirection as illustrated in the previous example, the output of the **on** command is not returned to the DOS environment and is not converted into DOS text format. You can use the SCO Merge **unix2dos** command to convert the file to DOS text format.

The following example shows how UNIX pipes and redirection can be useful. It shows both incorrect and correct ways of creating a file called *names* containing a sorted list of users currently logged into the SCO Merge system.

```
on unix who | on unix sort > names &      (incorrect)
on unix who | sort | unix2dos > names &    (correct)
```

If you issue the first command, it is not detached until the **who** program finishes, and the file *names* contains a job number and process ID rather than a sorted **who** list. This is probably not the result you want. The second command uses a UNIX pipe to send the list output by the **who** program directly to the UNIX **sort** program, without returning to DOS or using a second **on** command. Because the output is not returned to the DOS environment, it remains in UNIX text format rather than being converted to DOS text format. The **unix2dos** program is therefore used to convert the list to DOS format, following which UNIX output redirection (**|**) puts the list into the file *names*.

To be properly interpreted by **on**, the special redirection and pipe characters (**|**, **|>**, and **!**) require spaces surrounding them. The following examples, which omit the required spaces, are incorrect:

```
spell memos}typos &      (incorrect)
on unix who!sort!unix2dos}names &    (incorrect)
```


Chapter 7

Using Microsoft Windows with SCO Merge

Using Microsoft Windows under SCO Merge involves first installing and configuring Windows 3.0 or 3.1 on your system, and then installing any applications you want to use with Windows.

When you install Windows 3.1 you have several options. You can install Windows 3.1 as part of the UNIX filesystem or on a “real” (as opposed to virtual) DOS partition. In either case, you must also decide if you want to install a personal or network version of Windows, and if you intend to run Windows as an X client. For general installation information, see “Installing Windows 3.1” (page 83). Once you have decided which installation meets your needs complete the appropriate procedure.

- If you intend to install a **personal copy** of Windows 3.1, consult your Windows documentation and see “Installing a personal copy of Windows 3.1” (page 84).
- If you intend to install the **network version** of Windows 3.1, consult your Windows documentation and follow the procedures in “Installing the network version of Windows 3.1” (page 86).
- If you intend to install Windows 3.1 on a **real (as opposed to virtual) DOS partition** you should be familiar with the information found in “Installing Windows on a DOS partition” (page 91) before installing.
- After installing Windows, if you intend to run Windows under X you should read “Running Windows 3.1 under X” (page 99) for more information.

CAUTION If Windows was previously installed on a DOS partition on the C: drive or any drive other than E: before installing SCO Merge, you will probably need to reinstall it. Drive information is embedded Windows' group identification files, which are semi-binary in format. The only tool you have to change those files is the Windows **setup** command.

SCO Merge supports both Windows 3.0 and 3.1 although they are supported differently. The differences between these two programs are significant and affect the kind of services available.

- Windows 3.0 is only supported in the real mode, and can be used in an X environment in full screen mode. For more information on Windows 3.0 support, see "Windows 3.0 support" (this page).
- Windows 3.1 is supported in real an "standard mode, and a special X driver is supplied that enables you to use Windows as an X client. For more information on Windows 3.1 support, see "Windows 3.1 support" (page 83).

Windows 3.0 support

Windows 3.0 is supported in the 8086-compatible "real mode." Windows 3.0 and Windows applications that run under it operate only in full screen VGA mode. If you run Windows 3.0 in an X window, that window must be zoomed to full screen size.

Windows 3.0 runs under SCO Merge just as it would run on an 8086 processor. It offers access to no more than 1 Mbyte of RAM. "Allocating memory for DOS" in *Administering SCO Merge* discusses how DOS programs use memory.

If you want to provide Windows 3.0 with memory beyond the standard 1-Mbyte limit, you must attach expanded memory (as opposed to extended memory). From the command line this is done with the **dos +a** command. Or, you can use **dosadmin**, **dosopt** or (under X), the DOS Options dialog box to configure all Windows sessions to start with additional expanded memory. For more information on these configuration tools, see "Using dosadmin, dosopt, and the X window configuration tools" (page 34) or "Using the dos + or - options on the UNIX command line" (page 33) or the **dos(C)** manual page. For more information on attaching expanded memory see "Using expanded memory (EMS)" (page 53).

Many current Windows applications require the "standard" or "protected" mode of the Intel 80286 processor, and thus do not run under Windows 3.0 with SCO Merge. Nevertheless, there are a few Windows applications that run *only* under Windows 3.0. Version 3.0 may still be valuable to you if you have a favorite application which is among those few.

Windows 3.1 support

Windows 3.1 is supported in a very different manner. Special modifications have been made to SCO Merge to support standard mode operation, access to extended memory, and X client operation.

Version 3.1 of Windows runs under SCO Merge on an emulated 80286 processor; in the 286 standard mode. It multitasks Windows applications and can give them access to up to 15 Mbytes of RAM. It operates as a true X client, running properly within a zoomed or an unzoomed X window.

This standard mode operation requires at least 2 Mbytes of RAM. To provide extra memory to Windows 3.1, you normally attach memory as extended memory (as opposed to expanded memory). From the command line, this is done with the `dos +m` command. SCO Xsight users can also use `xdosopt` and the DOS Options dialog box. See "Configuring memory" (page 52) and the section called "Allocating memory to DOS" in *Administering SCO Merge* for more information on how programs access that memory.

Assuming you have set both of them up properly, you can even run Windows 3.0 and Windows 3.1 at the same time. Remember that Version 3.0 must be set up to run in full screen VGA mode only and needs EMS memory for full performance. Version 3.1 operates in either full screen VGA or as an X client and can run with up to 15 Mbytes of RAM.

The sections that follow describe setting up and running Version 3.1.

Installing Windows 3.1

Installing Windows 3.1 under SCO Merge is very similar to installing Windows 3.1 on native DOS. This section describes the steps you need to perform. If you have never installed Windows before, you should review the installation description in your Windows documentation.

Since Windows 3.1 can operate as an X client, users who run SCO Xsight may also wish to install it under X. The following installation instructions can be used by any SCO Merge user. Those who do not operate under X should ignore references to it. Further information on X usage can be found in "Running Windows 3.1 under X" (page 99).

Windows is installed by a DOS program called **setup**. **setup** copies itself to your Windows directory along with the rest of the Windows files. The first time you run **setup**, you invoke it from a diskette, usually from drive A:. After that it is available from your Windows directory.

setup is used not only to install, but also to reconfigure Windows. It runs in two modes, text mode and graphics mode. The text version runs from the DOS command line. The graphics version operates from inside the Windows environment, accessed through the Windows Setup icon in the Main group.

setup is intelligent enough to sense whether it is being run from a diskette (to install) or from the Windows directory (to reconfigure) and to do the appropriate thing.

Installing a personal copy of Windows 3.1

1. From your UNIX prompt, start an appropriate DOS environment by typing:

winsetup

2. When you get your DOS prompt, insert the first disk of the Windows 3.1 package in drive A:, and enter:

a:setup

(You can also install Windows 3.1 from drive B:). If you are running under X and the text is not readable, press <Alt><D> to bring up the DOS menu. Select the DOS Colors option.

3. **setup** checks your environment and prints a warning about the use of the **subst** in your DOS session. When prompted, press <C> to continue.
4. **setup** checks for previous versions of Windows on your hard drive. This may take a few minutes. If it takes more than three minutes, see "Slow installations" (page 96) for more information.
5. After displaying a welcoming screen, Windows prompts you to choose between the Express Setup and the Custom Setup. For proper operation in an SCO Merge environment, use the Custom Setup.
6. **setup** displays a suggested drive and directory name to be used in installation. Generally, this is C:\windows. If Windows has been installed previously, the suggested directory is the same as the installed copy. For correct operation, install Windows on your D: drive. Change the displayed drive and directory to the D: drive and a directory name of your choice (for example, *win31* or *windows*).

NOTE If you are installing Windows on a DOS partition and you intend to boot DOS before using Windows, make sure you are familiar with the information found in "Installing Windows on a DOS partition" (page 91) and skip to step 11.

7. **setup** displays the current hardware configuration (type of video, mouse, etc.). Use the arrow keys to select the Mouse option, and press <Enter> to see the list.

8. When you find the following line:

Other (Requires disk provided by hardware manufacturer)

Press (Enter).

9. **setup** prompts for the display driver disk to be inserted into drive A:. Do not insert a diskette. The files **setup** requires have already been installed. Change the directory listed from A: to C:\usr\lib\merge\windows and press (Enter).
10. Press (Enter) to select the DOS Merge Mouse.
11. Verify that the rest of the displayed hardware is correct. If any other part of the displayed configuration is incorrect, use the arrow keys to move the cursor to that field and make any correction needed. On some systems, for instance, **setup** may mistake your 101-key keyboard for another keyboard. When the display is correct, move the cursor to the option:

No changes: The above list matches my computer

and press (Enter).

12. **setup** installs Windows files prompts for additional diskettes, sets up your directory, and starts Windows.

At this point if you are running SCO Xsight, you must zoom to full screen before you can continue with your installation. To zoom, invoke the DOS Menu by pressing (Alt)(D) click on Zoom.

13. **setup** prompts you to enter your name and the name of your company.
14. **setup** displays a screen with three installation options with a check mark in some of the boxes. The options are:

Setup only the Windows Components you select

Setup Printers

Setup applications installed on your hard disk

Delete the check marks next to any of these options you wish to bypass.

Although all of these options work under SCO Merge, you can install faster by deleting the check marks for the first and third option. If you don't want to install a printer, you should also delete the check mark next to the second option. (In the case of limited disk space, you might want to use the first option.)

15. You may get an error message about problems updating your system files. If so, select the Cancel option to continue the installation.
16. **setup** may display a request to modify your *autoexec.bat* and *config.sys* files. Do *not* let these files be modified. Pick the option that says you will make modifications later.
17. **setup** asks if you would like to make a copy of the changes it would have made to *autoexec.bat* and *config.sys*. Click on Don't Save.

18. If you selected the Set Up Printers option, **setup** now displays a list of printers. Install the appropriate printers, making sure you pick *lpt1.DOS* for the port.
19. **setup** creates your Windows desktop and offers to run a tutorial. Click on the Skip Tutorial button so that you can finish the installation. (You can run the tutorial at a later time.)
20. **setup** may ask whether you want to stay in Windows or return to DOS. Click on the DOS button.
21. You must now add the Windows path to your DOS **PATH** environment variable. You should do this in your local startup file, *D:\autoexec.bat*. If you have a local *autoexec.bat* file in the *root* of your *D:* drive, update the **PATH** entry to include the Windows path. If no *autoexec.bat* file exists on your *D:* drive, create one with a DOS editor and add the Windows path. Your SCO Merge DOS **PATH** combines the path entry in the system startup file (*C:\autoexec.bat*) plus the **PATH** entry in your local startup file (*D:\autoexec.bat*).
22. After installation is complete, you can exit the DOS session by entering **quit** at the DOS prompt. To test your installation, enter **win** at your UNIX prompt.

Installing the network version of Windows 3.1

With a network installation, a single binary copy of Windows can be executed by multiple users, saving disk space. Of course, you need the appropriate license agreement.

The network installation of Windows is a two step process. First, the administrator installs the Windows files into a shared directory by running **setup /a**. Then each user accesses the files in this shared directory to create a personal copy of Windows in a personal directory using **setup /n**. Only a few configuration files are actually copied to each user's personal Windows directory. The majority of the Windows files remain in the shared directory. Therefore each user must have **PATH** access to two Windows directories, the user's own personal Windows directory and the shared Windows directory.

Part 1 (for the system administrator)

1. To install the network version, log into your system as *root*. Start an appropriate DOS environment by typing:

winsetup

2. When you get your DOS prompt, insert the first disk of the Windows 3.1 package in drive A: and enter:

a:setup /a

(You can also install Windows 3.1 from drive B:). If you are running under X and the text is not readable, press (Alt)(D) to bring up the DOS menu. Select the DOS Colors option.

3. **setup** prompts you to enter a group and company name.
4. **setup** prompts for the desired Windows directory. You should install on drive J: (for example, J:\windows). This places the Windows files in their own directory within the public-access area of the shared UNIX file system. Remember that under SCO Merge, J:\windows and C:\usr\ldbin\windows are the same directory.
5. **setup** prompts for the Windows diskettes and copies the contents into the shared directory.
6. When installation is complete, **setup** exits.
7. Copy the SCO Merge Windows X driver files into J:\windows. These are the files that allow SCO Merge to run as an X client. SCO Merge includes a command called **winxcopy** to do this copying. It is automatically available in C:\usr\ldbin which should be in your path. Unless you have changed your **PATH** statement, you can run this command from any drive or directory. Just be sure you specify as an argument the proper drive and directory where the public-access copy of Windows is installed. If you installed Windows in J:\windows the command is the following:

winxcopy J:\windows

8. The network installation is now complete, and you can exit your DOS session by typing **quit** at the DOS prompt.
9. Read "Setting permissions in \usr\ldbin" (this page), decide on one of the recommended policies, for your installation and apply it at this point.

Setting permissions in \usr\ldbin

It is standard UNIX practice to set the permissions on directories where important system files are stored to read-only. This prevents users from accidentally damaging valuable resources. **/usr/ldbin** and its subdirectories, where DOS program files are stored, are usually maintained in this state.

However, the shared network copy of Windows is usually installed in **/usr/ldbin/windows**. Valid SCO Merge names for this directory are **C:\usr\ldbin\windows** and **J:\windows**. This directory would ordinarily have its permissions set to read-only, but this will cause problems with network user installation.

When network users install Windows, they need write permission to this directory or their installation fails. Even though each user runs a personal copy of Windows, stored in that user's own directory, the Windows files must be written to the shared Windows directory. The read-only status prevents files from being written and the user's installation attempt aborts with a message like this:

```
Cannot write file filename to  
C:\usr\ldbin\windows\ filename
```

To correct the problem, the system administrator has three choices:

- Change the directory permissions permanently, using the following procedure.
 1. Change the permission on the directory `/usr/ldbin/windows` by issuing the following command at the UNIX prompt:

```
chmod 777 /usr/ldbin/windows
```
 2. Change the permissions on all the files in this directory to "644".

NOTE You cannot change them by issuing the command:

```
chmod 644 *
```

This is because there are too many files for the command to change at once. Use the **chmod** command to change the file permissions in chunks.

This allows users access for installation but it also opens up the possibility that someone may accidentally erase a needed file. Frequent backups should be made if this option is chosen.

- Change the directory permissions temporarily. Notify all users that part of their installation routine is to advise the system administrator. The system administrator sets directory permissions to read-write temporarily and sets them back to read-only when the installation is done.
- Take over the installation of shared Windows applications as a system administration chore.

Each system administrator must decide which policy works best for his or her installation.

A few Windows applications may need permanent access to `/usr/ldbin/windows` in order to update their configuration files. Here again, the system administrator must make an individual determination about procedure.

Part 2 (for the user)

Users who want to run this shared copy of Windows must copy a few files to their own personal Windows directory. Each such user must perform the following steps:

1. Log into your system as yourself and start an appropriate DOS environment by typing:

winsetup

2. When you get your DOS prompt, Move to the drive and directory where the public-access copy of Windows is installed by entering:

J:
cd windows

3. Enter:

setup /n

If you are running under X and the text is not readable, press <Alt><D> to bring up the DOS menu. Select the DOS Colors option.

4. **setup** checks your environment and prints a warning about the use of **subst** in your DOS session. Press <C> to continue.
5. **setup** checks for previous versions of Windows on your hard drive. This may take a few minutes. If it takes more than 3 minutes, see "Slow installations" (page 96) for more information.
6. After displaying a welcoming screen, Windows prompts you to choose between the Express Setup and the Custom Setup. For proper operation in an SCO Merge environment, we recommend the Custom Setup.
7. **setup** then displays a suggested drive and directory name to be used in installation. Generally, this is *C:\windows*. If Windows has been installed previously, the suggested directory is the same as the installed copy. For correct operation, SCO Merge requires that Windows be installed on your *D:* drive. Change the displayed drive and directory to the *D:* drive and a directory name of your choice (for example, *win31* or *windows*).
8. **setup** displays the current hardware configuration (type of video, mouse, etc.). Use the arrow keys to select the Mouse option, and press <Enter> to see the list.
9. When you find the following line:
 Other (Requires disk provided by hardware manufacturer)
 Press <Enter>.
10. **setup** prompts for the display driver disk to be inserted into drive A:. Do not insert a diskette. The files **setup** requires have already been installed. Change the directory listed from *A:* to *C:\usr\lib\merge\windows* and press <Enter>.

11. Press <Enter> to select the DOS Merge Mouse.
12. Verify that the rest of the displayed hardware is correct. If any other part of the displayed configuration is incorrect, use the arrow keys to move the cursor to that field and make any correction needed. On some systems, for instance, **setup** may mistake your 101-key keyboard for another keyboard. When the display is correct, move the cursor to the option:

No changes: The above list matches my computer

and press <Enter>.

13. **setup** sets up your directory and starts Windows. At this point if you are running SCO Xsight, you must zoom to full screen before you can continue with your installation. To zoom, invoke the DOS Menu by pressing <Alt><D> click on Zoom.
14. **setup** may prompt you to enter your name and/or the name of your company.
15. **setup** displays a screen with three installation options with a check mark in some of the boxes. The options are:

Setup only the Windows Components you select

Setup Printers

Setup applications installed on your hard disk

Delete the check marks next to any of these options you wish to bypass.

Although all of these options work under SCO Merge, you can install faster by deleting the check marks for the first and third option. If you don't want to install a printer, you should also delete the check mark next to the second option. (In the case of limited disk space, you might want to use the first option.)

16. You may get an error message about problems updating your system files. If so, select Cancel to continue the installation.
17. **setup** may display a request to modify your *autoexec.bat* and *config.sys* files. Do *not* let these files be modified. Pick the option that says you will make modifications later.
18. **setup** asks if you would like to make a copy of the changes it would have made to *autoexec.bat* and *config.sys*. Click on Don't Save.
19. If you selected the Set Up Printers option, **setup** now displays a list of printers. Install the appropriate printers, making sure you pick *lpt1.DOS* for the port.
20. **setup** creates your Windows desktop and offers to run a tutorial. Click on the Skip Tutorial button so that you can finish the installation. (You can run the tutorial at a later time.)

21. **setup** may ask whether you want to stay in Windows or return to DOS. Click on the DOS button.
22. You must now add the Windows path to your DOS **PATH** environment variable. You need to add both the shared Windows directory and your personal Windows directory. You should do this in your local startup file, *D:\autoexec.bat*. If you have a local *autoexec.bat* file in the root of your *D:* drive, update the **PATH** entry to include the Windows paths. If no *autoexec.bat* file exists on your *D:* drive, create one with a DOS editor and add the Windows path. Make sure you list the local (*D:*) Windows directory first. If you installed Windows in *D:\win31* the path statement would look like the following:

```
PATH=D:\WIN31;J:\WINDOWS
```

Your SCO Merge DOS **PATH** combines the path entry in the system startup file (*C:\autoexec.bat*) plus the **PATH** entry in your local startup file (*D:\autoexec.bat*).
23. After installation is complete, you can exit the DOS session by typing **quit** at the DOS prompt
24. You can now start Windows from your UNIX prompt by typing **win**.

Installing Windows on a DOS partition

Installing Windows on a DOS partition on your fixed disk can create several problems if you intend to run Windows under both DOS and SCO Merge. For the purpose of the following discussion, let us assume that there are two ways to start DOS. You can start DOS using SCO Merge, or you can boot DOS directly from a primary DOS partition.

NOTE If you have installed the network version of Windows 3.1 on a real (not virtual) DOS partition and then setup a user account on the UNIX file-system using SCO Merge, you cannot use Windows from you UNIX user account. as it is not accessible from the DOS partition. To use the networked version of Windows under DOS, you must set up a network user directory on a DOS partition.

When you start DOS from UNIX, either from an Xterm window or from the UNIX command line, the primary physical DOS partition is automatically made available to your DOS session as drive *E:*. When you boot DOS directly from the DOS partition, that same section of disk is recognized as drive *C:*. All SCO Merge drives (for example *D:* and *J:*) are not accessible. This can cause problems for any DOS program that stores drive and directory information it needs for operation. The basis of the problem is a drive letter mismatch.

When you install Windows or configure applications to run under Windows, Windows stores drive and directory information in its various initialization files, (for example, *progmam.ini*).

For example, if you have installed a personal version of Windows on a primary DOS partition, it could be in a single directory called *\windows*, located immediately below the *root* of the C: drive.

If, on the other hand, you have installed Windows under SCO Merge, that drive is labeled E:. The location of items like Windows' program groups is recorded in *progmam.ini*. The lines look like this in the case of SCO Merge installation:

```
Group1=E:\windows\games0.grp
Group2=E:\windows\games1.grp
```

NOTE If you have installed a network version of windows, and you have established a user account on the real (not virtual) DOS partition, your *progmam.ini* file is located in your user directory.

Similarly, if you configure a DOS application program to run under Windows, and you perform that configuration process under SCO Merge, the program's startup information is recorded in a line like this:

```
E:\windows\dosapp.pif=1 8 12 648 328 22 0 1 ...
```

In all the cases above, drive letter E: is part of the string that represents the item's location.

If you now boot DOS, from the DOS partition, that same disk is labeled C:. The items above must be accessed through strings that contain the drive letter C. For example, to run on drive C: the same lines must look like this:

```
C:\windows\games0.grp
C:\windows\games1.grp
C:\windows\dosapp.pif= 1 8 12 648 328 22 0 1 ...
```

The items themselves have not moved, but they must now be accessed through a different drive letter. Windows examines its initialization files for the things it needs to load properly and searches for them on the specified drive. Since the drive is now labeled C:, the path does not properly reflect the location of the file. The result is a failure to load.

No matter which way you install Windows, under SCO Merge or under DOS booted directly from the DOS partition, if you then boot DOS in the other manner and invoke Windows, Windows fails.

The solution is simple. Install the items under a single drive letter and always access them under that same letter. This can be done by "renaming" the drive through a DOS **subst** command. This is simple to do under DOS but somewhat more difficult under SCO Merge, so the **subst** should always be applied when booting directly from the DOS partition.

There are two ways to do it. You can install the programs under SCO Merge and then rename the drive when you run them from the DOS partition. Or, you can boot from the DOS partition, rename the drive, perform the installation, and then run programs under SCO Merge.

Installing Windows on a DOS partition using SCO Merge

Install either the network or personal version of Windows under SCO Merge as described in "Installing a personal copy of Windows 3.1" (page 84) or "Installing the network version of Windows 3.1" (page 86). However, instead of installing Windows on either *J:\windows* or *D:* have **setup** place the files in *E:\windows*. This will not effect the operation of Windows under SCO Merge.

NOTE If you install the network version of Windows and you intend to use Windows under DOS, (as opposed to solely under SCO Merge) you must also establish a user directory on the DOS partition.

However if you boot DOS directly from the DOS partition, you must do the following in order to run Windows:

1. Make sure that *himem.sys* and *smartdrv.exe* are in the *root* directory. If they are not, find them and copy them there. (If they are not in the *root* directory, try looking in the Windows directory.)
2. Using an ASCII editor, place the following lines in the *autoexec.bat* file in the *root* directory on the DOS partition so that it is invoked every time you boot from the partition.

```
SUBST E: C:\
E:\SMARTDRV
```

NOTE Make sure that the **smartdrv** command always comes after the **subst** command.

3. Use the same ASCII editor to open *config.sys* file look for lines like the following:

```
DEVICE=E:\HIMEM.SYS
```

4. Remove the drive specification from this line so that it looks like this:

```
DEVICE=HIMEM.SYS
```

NOTE The *config.sys* file is read before the **subst** command in *autoexec.bat* can be carried out. Moving *himem.sys* to the *root* and removing the drive specification from the *config.sys* entry assures that it will be found at bootup time, no matter which drive letter is in force. Do the same with any other drivers that you want *config.sys* to load.

For more configuration information on either **smartdrv** or *himem.sys*, see your Windows 3.1 documentation.

5. If you installed the DOS Merge mouse driver, you must change your Windows mouse driver to match your actual hardware. To do so, complete the procedure found in "Switching mouse drivers" (page 97).
6. Reboot from the DOS partition and test your installation. If the **subst** command fails to execute, enter it and the **smartdrv** command at the DOS command line.

Installing Windows on a DOS partition using DOS

Some Windows applications install more easily under DOS than they do under SCO Merge. If you run into such an application, you may wish to switch the process around. Install either the network or personal version of Windows as described in "Installing a personal copy of Windows 3.1" (page 84) or "Installing the network version of Windows 3.1" (page 86). However, instead of installing Windows on either *J:\windows* or *D:* have **setup** place the files in *E:\windows*. This will not effect the operation of Windows under SCO Merge.

NOTE If you install the network version of Windows and you intend to use Windows under DOS, (as opposed to solely under SCO Merge) you must also establish a user directory on the DOS partition.

1. Boot DOS from the DOS partition.
2. Be sure you have the DOS command *subst.exe* available on that drive and in the path that will actually be searched when *autoexec.bat* is run. One simple way to assure this is to copy *subst.exe* to the *root* directory of the DOS partition.
3. Enter the DOS **subst** command from the DOS command line.
`subst E: C:\`
4. Move to the E: drive by typing the following command:
`e:`
Notice that your prompt now reads E:
5. Place the first Windows **setup** disk in drive A: and enter:
`a:setup`
6. Continue with the steps as outlined earlier under "Installing a Personal Copy of Windows 3.1." **setup** complains about the use of a **subst** command, but the installation works correctly.
7. When **setup** prompts for the drive and directory in which to install Windows, be sure it is *E:\windows*.
8. Conclude the Windows setup procedure as described in one of the preceding sections.
9. Most people who run Windows use both *himem.sys* and *smartdrv.exe* when they run Windows. The following steps assume you want both.
10. Make sure that *himem.sys* and *smartdrv.exe* are in the *root* directory. If they are not, find them and copy them there. Be sure you use the updated Windows versions (usually found in your Windows directory) rather than the DOS versions (usually found in your DOS directory).

11. Place the following lines in the *autoexec.bat* file on the DOS partition so that they are invoked every time you boot from the partition. Be sure they are at the top of the file before your **PATH** statement or any other commands. If you place it anywhere else, other commands may fail with an "Invalid path" message.

```
SUBST E: C:\
E:\SMARTDRV
```

Make sure that the **smartdrv** command always comes after the **subst** command.

12. Open the *config.sys* file with an ASCII editor and look for a line like this:

```
DEVICE=E:\HIMEM.SYS
```

If you find this line, remove the drive specification so that it looks like the following.

```
DEVICE=HIMEM.SYS
```

If there is no mention of *himem.sys*, add the following:

```
DEVICE=HIMEM.SYS
```

The *config.sys* file is read before the **subst** command in *autoexec.bat* can be carried out. Moving *himem.sys* to the *root* and removing the drive specification from its *config.sys* entry assures that it will be found at bootup time, no matter which drive letter is in force. Do the same with any other drivers that you want *config.sys* to load.

NOTE For more configuration information on either **smartdrv** or *himem.sys*, see your Windows 3.1 documentation.

13. If you installed the DOS Merge mouse driver, you must change your Windows mouse driver to match your actual hardware. To do so, complete the procedure found in "Switching mouse drivers" (page 97).
14. Reboot from the DOS partition, run Windows, and test your installation.
15. Reboot UNIX, run Windows, and test your installation. You may have to switch mouse drivers again. If you do, we recommend that you do so under SCO Merge, following the procedure found in "Switching mouse drivers" (page 97).

Windows is now installed to run properly, either under SCO Merge or under DOS booted directly from the partition.

This technique may be useful for *any* DOS program you find difficult to install under SCO Merge.

Slow installations

Sometimes installing Windows under SCO Merge seems to take an inordinate amount of time. Occasionally **setup** may report that it is searching for other installed copies of Windows and then hang. If you encounter this phenomenon, there is a quick solution.

As part of its setup routine, Windows checks carefully for previously installed versions. **setup** checks every directory on every drive, looking for another copy of *win.com*. If your available DOS drives include large UNIX file systems, especially those with NFS mounted subtrees, this checking can go on for a very long time.

The quick fix is to abort the slow installation and start over after completing the following steps.

1. Start DOS.
2. Create the directory where you want Windows to be installed. We recommend *D:\windows*. Use the following command:

```
mkdir D:\windows
```

3. Copy any simple text file to the name *win.com*. The following example uses *config.sys*:

```
copy C:\config.sys D:\windows\win.com
```

4. Quit DOS.
5. Start a new DOS environment by typing:

```
winsetup
```

Follow one of the procedures described in “Installing Windows 3.1” (page 83).

When **setup** prompts for a drive and directory in which to install Windows, give it the drive and directory where the counterfeit *win.com* resides. **setup** looks there first, finds what it wants, and discontinues the search. **setup** overwrites the imitation with the real *win.com* and the rest of the installation proceeds normally.

Configuring your Windows session

Assuming that Windows 3.1 has been installed as described earlier and that your PATH has been properly updated, run Windows from your UNIX prompt with:

win

By default, this starts a 3 Mbyte DOS session and then runs Windows.

You can configure your Windows session just as you can configure your DOS session. For example, you can change the default amount of memory allocated to Windows or the number of attached DOS drives.

These configurations can be accomplished in a several ways:

NOTE For these examples to work, the Windows directory must be in your search path.

- You can override the default settings on the command line. For example, to start a Windows session with 5 Mbytes of memory, enter:

win +m5

For more information on the **win** command, see the **dos(C)** manual page.

- You can also use the **dosopt** command to configure your Windows environment. To display your current Windows environment, execute the following:

dosopt +v win

To change the default memory assignment to 4 Mbytes, enter:

dosopt +m4 win

For more information on **dosopt**, see "Using dosadmin, dosopt, and the X window configuration tools" (page 34). For a discussion of how Windows uses that memory, see "Allocating memory for DOS" in *Administering SCO Merge*.

- From the Xterm window, you can use the **xdosopt** command to call up the DOS Options dialog box to reconfigure your Windows environment. For more information about the DOS Options dialog box see "X window configuration options" (page 47). For more information on how to use the DOS Options dialog box to configure window environments, see "Using the DOS Options dialog box to set up a Windows environment" (page 103).

Switching mouse drivers

As part of your Windows installation, you should have installed the enhanced mouse driver.

Even when using the DOS Merge enhanced mouse driver, SCO Merge always sees the mouse as a bus-connected, two-button, Microsoft-compatible mouse. If your real hardware is different, SCO Merge uses the hardware's input, emulates the workings of a Microsoft bus mouse, and passes that input along to your programs. To run under SCO Merge, all your DOS software must be configured to expect input either from the enhanced mouse driver or from a Microsoft bus mouse. This includes Windows.

If you install Windows (or any DOS program) to run under DOS on a DOS partition, you must configure it to take input from whatever hardware you actually have. When you then run the software under SCO Merge you must reconfigure it to accept the emulated mouse input passed to it by SCO Merge. Thus, this procedure applies only if you have done both of the following:

- installed a personal copy of Windows on a DOS partition
- booted DOS on that partition and reconfigured your mouse as something other than the Microsoft Mouse.

To reconfigure your mouse for use with SCO Merge you must complete the following steps:

1. After booting the UNIX system, from a UNIX prompt start an appropriate DOS environment by typing:
winsetup
2. Change to the Windows directory on the DOS partition where you installed your personal copy of Windows.
3. Run the DOS text-based version of **setup**. If you are running under X and the text is not readable, press <Alt><D> to bring up the DOS menu. Select the DOS Colors option (not supported on all servers). If the DOS Colors option is grayed out, zoom the window.
4. Change your mouse option to "Microsoft Mouse." **setup** may ask you for your Windows disks if this is the first installation. After that "Microsoft Mouse" is available in the list of options.
5. Exit **setup**.

You can now run Windows under SCO Merge. You must switch back to the driver appropriate to your real hardware the next time you run Windows from the DOS partition.

Installing Windows applications

To install a Windows application, log into your UNIX system as yourself, start a Windows session, and follow the normal installation procedures for the application. Since many applications assume the *root* directory of C: for their default installation directory, you may have to specify an alternate drive and directory. We recommend your personal directory, *D:*. If the application does

not allow you to specify a subdirectory, then simply specify the *D:* drive. Under SCO Merge, *D:* is automatically substituted to your home directory with the DOS **subst** command.

Some applications need more memory than others. Refer to your Windows and Windows application documentation for more information about installing specific Windows applications.

Do *not* allow an application's installation routine to alter your personal *autoexec.bat* and *config.sys* files. Perform those alterations yourself. Back up both of these files before any installation, just in case the installation routine makes changes without your permission.

When you are logged in as a normal user, you do not have the required permissions to alter the *root autoexec.bat* and *config.sys* files. If your installation routine tries to write to these files, it fails. Nevertheless, it is always safest (and quicker) to reject its offer to make these changes.

After successfully installing a Windows application, you may execute that application from the Windows desktop or directly from the UNIX command prompt, with a command like this:

```
win winapp
```

Running Windows 3.1 under X

From the Xterm window you can run Windows by typing **win** at the UNIX command line. Remember that you must have Windows properly installed and you must have the Windows directory in your path. For more information on setting up Windows, see "Installing Windows 3.1" (page 83).

Display considerations

Since Windows is initially installed as a VGA program, X prompts you to "Zoom" every time you run it under X. However, SCO Merge provides a special Windows display driver that allows users to run Windows 3.1 under X more easily. With this driver installed, users can run Windows under X like any other X application. You can iconify your Windows session, raise it, lower it, or move it around your X session screen.

The Windows X driver is provided as a standard Windows display driver. It is installed using the standard Windows procedure, as if you were attaching a new display adapter. This involves running **setup** to tell Windows where to find the driver for the new "display card" that has been "installed." **setup** runs in two modes. The graphics mode operates from within the Windows environment and is accessed through an icon in the Main group. The text mode operates from the DOS command line. You can use either of the two. The following sections describe using both modes.

Installing the Windows X driver from Windows

While in Windows, go to the Main group window and double-click on the Windows Setup icon.

1. Pull down Options and select Change System Settings.
2. Click on Display and then select Other display (Requires disk from OEM)
3. **setup** prompts for the OEM disk to be inserted into drive A:. Do not insert a diskette. The files **setup** requires have already been installed. All you need to do is tell **setup** where to find them. Change the directory listed from A: to C:\usr\lib\merge\windows and press (Enter).
4. **setup** displays the following options
DOS Merge Windows X
DOS Merge Windows X (Large Fonts)

If you are running X on a high resolution display (1024x768), choose the Large Fonts options. This option does not affect the size of your windows. It merely makes text easier to read. On any other display, choose the first option.

5. When the driver has been loaded you can restart Windows. Your screen automatically unzooms and Windows starts under X.

Installing the Windows X driver from DOS

1. From your Xterm window, start the appropriate DOS session by typing the command, **winsetup**.
2. Change your current directory to the directory where Windows is installed and enter:

setup

If the text is not readable, press (Alt)(D) to bring up the DOS menu. Select the DOS Colors option (not supported on all servers). If the DOS Colors option is grayed out, zoom the window.

3. **setup** displays your current hardware configuration. Use the arrow keys to select the Display option and press (Enter) to see the list.
4. Select the option Other (Requires disk provided by hardware manufacturer) at the bottom of the list.
5. **setup** prompts for the display driver disk to be inserted into drive A:. Do not insert a diskette. The files **setup** requires have already been installed. All you need to do is tell **setup** where to find them. Change the directory listed from A: to C:\usr\lib\merge\windows and press (Enter).

6. **setup** displays the following options:

DOS Merge Windows X

DOS Merge Windows X (Large Fonts)

If you are running X on a high resolution display (1024x768), choose the Large Fonts options. This option does not affect the size of your windows. It merely makes text easier to read. On any other display, choose the first option.

7. **setup** loads the driver and exits. You can now exit your DOS session by entering **quit**.

You can now run Windows under X by typing **win** from a xterm UNIX prompt.

Switching between VGA and X

The standard VGA driver provided with SCO Merge has two advantages. First, it creates the appearance of a regular DOS driver and some VGA graphics programs look best that way. Second, it allows some display-intensive programs to run faster. It also has a major disadvantage; it runs only in full screen mode (640x480).

The Windows X driver runs at a much higher resolution. It is also much more flexible. It allows you to iconify your Windows session and use your X session to much better advantage.

Therefore, depending on what you actually do from day to day, you may choose to use only the VGA driver or only the Windows X driver. You may also choose to switch back and forth. Switching display drivers involves running **setup** as described earlier. However, once you have installed the X driver the first time, you no longer have to pick Other and give a directory name. The DOS Merge Windows X driver is displayed as an option on the list of available display drivers.

Using the Windows version of **setup** is convenient because you can switch back and forth between the VGA and the X driver from within Windows itself.

The DOS (or text-based) version of **setup** allows you to quickly change options and drivers without having to start Windows itself. It can be useful in situations where it might be hard to start Windows. One prime example is the situation where you lock yourself out of Windows by starting it with the wrong display driver selected.

The Windows X display driver is specific to the X Window System. It does not work properly outside the X environment. If you configure Windows to use this driver, Windows produces a display only if started in the X environment. You can start it from the xterm UNIX command line, and it displays properly.

However, if you start Windows outside the X environment, it fails. Depending on your setup, you may get only a blank screen, the Windows logo and then a blank screen, or a return to the DOS command line with no explanatory message. You cannot navigate the Windows desktop to run Windows' own internal **setup** program. These symptoms are the same for the use of any unsupported display driver (EGA and XGA cards, for instance).

To correct this, switch to your X session and enter **winsetup** to start an appropriate DOS environment (if you are not already there). From the DOS command line, switch to the directory where Windows is installed and run the DOS-based version of **setup**.

Size of Windows under X

The SCO Merge Windows X driver automatically sets the size of the X window in which your Windows session runs. This size is based on the resolution of your server. Your Windows window is about 80 percent of your display size. On a server with a resolution of 800x600 this yields a window that is about 640x480. On a server with a resolution of 1024x768, it yields a window that is about 800x600.

You can always specify exact values for screen size and for other characteristics of your X window by setting specific X resources. Refer to the section titled "X System Resources" in *Administering SCO Merge*.

On a server with 640x480 resolution, the standard window size can occasionally result in problems. 80 percent of server resolution yields a DOS screen that is 512x384 pixels. Most DOS applications work fine this way, but a few assume that the screen size is a standard minimum of 640x480 pixels. These programs may yield peculiar results (clipping text, strange displays, etc.). If this presents a problem, you can set your DOS window size to 640x480 through the standard X resources described above. The X window loses a few pixels of its border, but this does no harm.

Windows performance under X

The performance of Windows under X is around 70 percent of the performance of Windows in a zoomed VGA screen. However, you can approach and even better the performance of a zoomed VGA screen if you use an accelerator video card that is supported by your X server.

Mouse tracking under X

When you run Windows under X, you *must* have your Windows mouse tracking speed set to the slowest possible value. The Windows X driver does this for you automatically when you first install it. However, if you use the Windows Control Panel to change your mouse tracking speed to anything else, your mouse does not function correctly in a Windows window. If this

happens, you must use appropriate keyboard input to access the Windows Control Panel and run **setup**. Set the mouse tracking back to slow.

Alternatively, you can exit Windows, use the DOS version of **setup** to change your display to VGA, start Windows in VGA mode, and use the mouse to reset the mouse tracking. You can then use **setup** again to change your display driver back to X.

Colors under X

The number of colors available in your Windows environment depends on the number of colors available on your X server. On a 16-color server, Windows has a very limited range of colors. On a 256-color server, you have a much more extensive range of colors. On a 2-color server, Windows runs in black and white.

Windows builds its icons during the installation of its display driver. If you change your color settings or if you change your colormap with the **Color** utility, you must rebuild your Windows icons. To force Windows into rebuilding its icons, use **setup** to change your display driver to VGA and then back to Windows X.

Using the DOS Options dialog box to set up a Windows environment

From an X session, you can use **xdosopt** and the DOS Options dialog box to reconfigure your Windows environment. To access this menu, at any xterm UNIX prompt enter the command:

xdosopt

When the DOS Options dialog box appears, make the appropriate changes. Click on "Start." Your Windows session comes up with the items you have selected available.

If you want to save a configuration for future Windows sessions just click on "Apply". At your UNIX prompt, enter **win** to start your session. For more information on the DOS options dialog box, see "X window configuration options" (page 47).

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