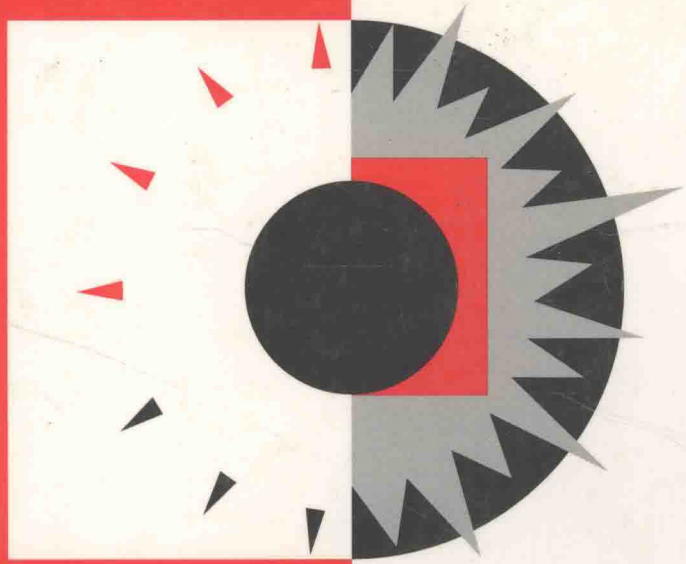
INTERACTIVE™ UNIX®

OPERATING SYSTEM

A Guide for System Administrators

Marty C. Stewart



Unique CUI Interface
Adding and Deleting Users
Kernel Customization
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Network Management

SunSoft
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Dedicated to Karin Ellison.

— *Marty C. Stewart*

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Thanks to the SunSoft Los Angeles Support Center for gathering all the commonly asked questions by INTERACTIVE UNIX users. The solutions to these questions are provided in this book.

Preface

The job of a system administrator can be a tough one. A good administrator tries to devise backup plans and procedures to keep the systems running smoothly. However, crises are a part of the job. The system administrator must be ready to work on a down system at any time. Mission-critical machines are required to be up and running 24 hours a day. Between crises, the system administrator performs these and other routine tasks:

Installing new systems
Configuring kernels
Adding and deleting user accounts
Configuring printers and keeping the queue moving
Backing up the system
Restoring files for users
Restoring the system after a crash
Monitoring system activity
Tweaking system parameters to improve system performance
Installing applications
Monitoring and freeing up disk space
Helping users
Setting up and maintaining a network
Adding new systems to the network
Ensuring the system's security
Testing changes to the system
Automating, automating, automating!

The INTERACTIVE UNIX Operating System, with its instructive character user interface, not only eases the performance of these tasks, but also helps ensure consistency and accuracy. System administrators, experienced or not, will discover this book to be a useful reference guide.

How This Book Is Organized

This book describes the menus and processes offered by the INTERTACTIVE UNIX Operating System. Chapter 1, "The Installation," describes your hardware needs and installing the operating system. Chapter 2, "Using *kconfig*," gives you a detailed description of kconfig and working with kernels. Chapter 3, "Working with Device Drivers" talks about the different types device drivers supported and how you configure

them into your system. Chapter 4, "Working with File Systems," shows you the different types of file systems you can have under INTERACTIVE UNIX. Chapter 5, "System Administrator's Job," describes the functions of sysadm and working as the superuser. Chapter 6, "Backing Up the System," talks about creating backups and restoring files when needed. Chapter 7, "Configuring Printers," helps you configure and manage printers under INTERACTIVE UNIX.

Chapter 8, "User and Group Accounts,"covers the setting up and managing of your user accounts, while Chapter 9, "Configuring Modems," helps you configure a modem for the system. Chapters 10 and 11, "Basic Networking," and "Advanced Networking,"describe basic and advanced networking. Chapter 12, "Electronic Mail," gives you a detailed description on setting up and running electronic mail. The last chapter, Chapter 13, "The INTERACTIVE UNIX Editor," shows you how to use INTERACTIVE UNIX's own unique screen editor, Ten/Plus.

Typographical Conventions in This Book

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

Table PR-1 Typographic Conventions

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

Code samples are included in boxes and may display the following:

%	UNIX C shell prompt	system%
ok	OpenBoot command prompt	ok
$	UNIX Bourne and Korn shell prompt	system$
#	Superuser prompt, all UNIX shells	system#

Contents

The Installation 1

Hardware Requirements

The INTERACTIVE™ UNIX® Operating System is a multiuser, multitasking system based on AT&T UNIX System V, Release 3.2. It is the first UNIX System V, Release 3.2 on the 386® platform. With an installed base of over 150,000 users, the INTERACTIVE UNIX System is one of the most reliable UNIX System V, Release 3.2 operating systems in the PC market.

Before installing the INTERACTIVE UNIX System, make sure that your hardware is set up correctly. MS-DOS runs on just about any personal computer; UNIX is more sensitive to the hardware. Having been in the market for over seven years has given INTERACTIVE UNIX System a large base of supported hardware and peripherals. With the inexpensive and powerful PCs that a user can buy today, it makes sense to use an operating system that can work with a wide selection of currently available hardware.

Discussing the different types of available hardware out there and the issues you can have with the hardware is a book in itself. I have touched on the different architectures and have covered some of the more common problems users run into. For an in-depth look at hardware, see Ron Ledesma's book, *PC Hardware Configuration Guide for DOS and Solaris*, SunSoft Press, A Prentice Hall Title, ISBN 0-13-124678-X. It's available at technical bookstores or direct from both SunSoft, Inc. and Prentice Hall.

Bus Architecture

The INTERACTIVE UNIX System can generally run on any basic Intel 386®, 486™, or Pentium® computer. Three main types of I/O buses are supported by the INTERACTIVE UNIX System:

ISA (Industry Standard Architecture)

EISA (Extended Industry Standard Architecture)

MCA (Micro Channel Architecture)

The bus architecture that you choose should depend on what you are planning to do with the system and the resources that you need. Each bus architecture has advantages and disadvantages to be weighed when you make your purchasing decision. Consider the

cost of the machine, applications you plan to run, minimum acceptable level of performance, estimated number of users, and whether the computer will be running as an X server or client or as a networking server.

In addition to the ISA, MCA, or EISA primary system buses, two types of local buses can coexist with the traditional standard buses: Video Electronics Standards Association (VESA) VL-Bus allows high-speed peripheral devices to interface to the local bus of a host CPU. Your motherboard can have a combination of ISA, EISA, and VL-Bus. For example, a system can have 6 ISA slots and 2 VL-Bus slots. A system configured with a VL-Bus attached can achieve good performance when compared to some of the more powerful bus architectures (EISA or MCA).

The other local bus is a Peripheral Component Interconnect (PCI) local bus, developed by Intel. It upgrades a system from a 32-bit data path to a 64-bit data path. The PCI bus is gaining popularity today because it offers excellent performance and supports five adapters. It is also a very low-cost addition to your system. A system with dual buses (such as ISA and PCI) doesn't cost much more than a system with a single bus (e.g., ISA).

Today, you can get different combinations of buses on your system:

ISA	EISA	MCA
ISA + PCI	EISA + VL-BUS	MCA + PCI
ISA + VL-bus	EISA + PCI	
ISA + EISA + VL-bus		

Connecting devices to the PCI or VESA local bus can dramatically increase the speed of the I/O (Input/Output) bound peripherals. The local bus is defined as the set of addresses, data, and control signals that are *directly* connected to the CPU. In simple systems, the local bus may also be the system bus. In a more complex system, the system bus may be a buffered version of the local bus. In a cached system, the system bus may interface indirectly to the CPU through a cache controller.

PC bus architectures are:

ISA, EISA, MCA

Local bus architectures are:

PCI, VESA-LB

Figure 1-1 illustrates one possible bus architecture combination. The VESA or PCI board is slotted between the CPU and the ISA/EISA/MCA bus. Adapters hang off the ISA bus. The SCSI bus is connected to one of the adapters (Adapter *n*). Hanging from the SCSI bus is a disk and a tape drive. The monitor is driven from another adapter, Adapter 1.

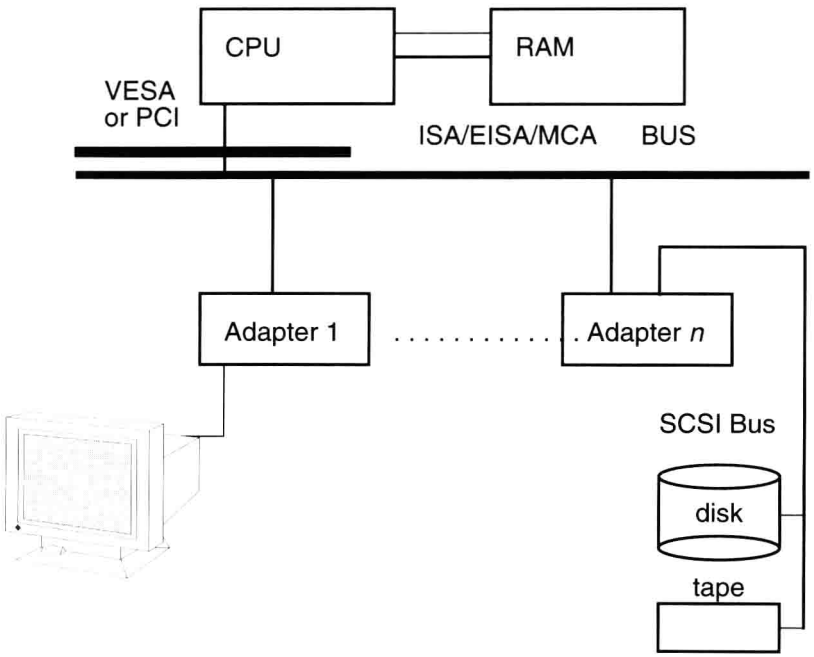

Figure 1-1 Bus Architecture Diagram

Memory Usage

INTERACTIVE UNIX System Version 4.1 requires at least 6 megabytes (Mbytes) of memory and at least 60 Mbytes of fast hard-disk space. The INTERACTIVE UNIX package that you have—Base, Graphical, or Network Solution—determines how much disk space and memory is required to run your system. Table 1.1 summarizes the different packages and their specific hardware requirements.

Table 1-1 INTERACTIVE UNIX Hardware Requirements

Base Solution	Graphical Solution	Network Solution
386 SX or higher processor	25 MHz 386 DX or higher processor Numeric coprocessor recommended	33 MHz 386 DX or higher processor Numeric coprocessor recommended
ISA, EISA, MCA, VESA local bus	ISA, EISA, MCA, VESA local bus	ISA, EISA, MCA, VESA local bus
6 Mbytes memory or higher Plus 1 Mbyte per user	6 Mbytes memory or higher Plus 1 Mbyte per user	8 Mbytes memory or higher Plus 1 Mbyte per user
60-Mbyte hard drive or higher Plus 20 Mbytes per user	80-Mbyte hard drive or higher Plus 20 Mbytes per user	100-Mbyte hard drive or higher Plus 20 Mbytes per user
MDA, Hercules™, EGA, VGA, SVGA, 8514/A and other high resolution video cards	MDA, Hercules, EGA, VGA, SVGA, 8514/A and other high resolution video cards	MDA, Hercules, EGA, VGA, SVGA, 8514/A and other high resolution video cards
1.44-Mbyte, 3.5-inch floppy drive, optional 150-Mbyte, .25-inch tape, optional multiport card	1.44-Mbyte, 3.5-inch floppy drive, optional 150-Mbyte, .25-inch tape, mouse or trackball, optional network controller, optional multiport card	1.44-Mbyte, 3.5-inch floppy drive, optional 150-Mbyte, .25-inch tape, network controller, optional multiport card

Most of the time, tasks should be running in core or NVRAM (nonvolatile random access memory). However, if a task is very large or if you have several tasks needing memory at one time, a fast hard drive is good to have. INTERACTIVE UNIX System uses the disk to temporarily store tasks while the system memory is assigned to a particular task (or tasks) at hand. This process of tasks swapping in and out of memory to disk is called "paging." If your system is paging often, then you probably need to get more memory. Paging slows the system down. The cost of lower user productivity is higher than the cost of memory. Besides, memory is relatively inexpensive these days compared to five years ago.

An MS-DOS system can run comfortably on a 20-Mbyte hard drive. A larger disk is required for a UNIX operating system, because a fully configured system contains over 400 system and user commands. You can get by with a smaller disk, around 40 Mbytes, if you do not install all the optional subsets. For example, you may not want to install the INTERACTIVE Software Development System if you are not using the computer for development work.

When a system crashes, an image or snapshot is taken of the memory contents at the time of the crash. This image is stored in the swap area. The swap area is normally used by the system to store data that is swapped out. Be careful, though. If you are running a machine with 32 Mbytes of RAM, you should at least have 32 Mbytes of swap. A system running 32 Mbytes of RAM but only 24 Mbytes of swap will cause some of your disk to be overwritten by the rest of the crash image. A good rule of thumb is to always have at least as much swap space as system memory.

MS-DOS can run on a system with 1 Mbyte RAM. Version 4.1 requires at least 6 Mbytes RAM, because the kernel resides in memory the entire time the system is running. The kernel performs the system management aspects of the user programs and controls access to the hardware. It is a good idea to have at least 8 Mbytes of memory if you are planning to run medium to heavy applications or if you have a high number of users.

Mass Storage Controllers

The two types of disk interfaces that are typically found in most 386- and 486-based computers are SCSI (Small Computer System Interface) host bus interfaces and IDE controllers. The SCSI host bus adapter (HBA) is the better choice today. Its primary objective is to allow host computers to support a wide range of SCSI devices. Different disk drives, tape drives, printers, optical media drives, and other devices can be added on the SCSI bus without modifications to the generic hardware or software. SCSI host bus adapters are more flexible than IDE controllers. However, the IDE disk drive is reliable and a lower-cost alternative to a SCSI disk drive. It can support up to four fixed disks.

It is important to have an IDE controller or SCSI host adapter that is supported by INTERACTIVE UNIX System. Refer to the "INTERACTIVE UNIX System Hardware Compatibility Guide" for the current full list of supported controllers. Each copy of INTERACTIVE UNIX comes with a hardware compatibility guide. You can also obtain the latest guide by calling SunSoft Teleservices or Support and requesting a copy.

If your fixed disk controller is not supported by one of the INTERACTIVE UNIX System 4.1 drivers, the system will prompt you for the use of a third-party driver diskette or an INTERACTIVE UNIX System boot-loadable driver update during the installation. The third-party driver diskette must be installed with `installpkg`. You must also configure the drive into a new kernel, rebuild the kernel, and install it before you reboot the system from the hard drive. If you do not have an INTERACTIVE UNIX System-supported controller or one that comes with a driver for INTERACTIVE UNIX System, you will not be able to install the software.

Some systems today have a feature called disk mirroring. Disk mirroring is supported by the hardware, that is, DPT SCSI controllers support disk RAID levels 0–5. (RAID stands for Redundant Array of Inexpensive Disks.) Basically, disk mirroring means that the data on one disk is copied to another disk as a safety precaution against data loss. At this time,