

Table of Contents

	Page
Preface	xv
UNIX Versions Discussed	xviii
Audience	xix
Organization	xx
Conventions Used in this Handbook	xxii
Acknowledgments	xxiii
Chapter 1 Introduction to System Administration	1
The System Administrator's Job	1
Becoming Superuser	5
Communicating with Users	7
Interactive Communication with Users	7
Sending a Message to All Users	8
The Message of the Day	9
System V Local System News	9
Sending Mail to a Group of Users	10
Essential Administrative Tools	12
Menu Interfaces for System Administration	17
Chapter 2 The UNIX Way	20
Files	21
File Ownership	22
File Protection	25
How to Recognize a File Access Problem	32
Mapping Files to Disks	34
File Types	35
Processes	40

Process Types	40
Process Attributes	42
The Life Cycle of a Process	43
SUID and SGID File Access and Process Execution	44
The Relationship Between Commands and Files	46
Devices	47
Fixed Disk Special Files	49
Special Files for Other Devices	51
The UNIX Filesystem Layout	52
The /usr Directory	55
System V.4 Filesystem Organization	57
Chapter 3 Startup and Shutdown	59
The UNIX Boot Process	60
Single-User Mode	62
System V Run-levels	63
Starting a Boot	65
Filesystem Checking	66
UNIX Initialization Scripts	67
BSD Initialization Files	68
System V Initialization Files	76
Shutting Down a UNIX System	85
Shutdown and Automatic Reboot	88
Rebooting from Single-user Mode	89
Shutdown and Halt	89
Guaranteeing Disk Accuracy	90
Disabling Logins Under BSD	91
Aborting a Shutdown	91
Fake Shutdowns (BSD and AIX 3.1)	92
When the System Crashes	92
When the System Won't Boot	94
Chapter 4 User Accounts	96
Adding New Users	97
Defining a New User Account	98
Assigning User Passwords	101
Setting Password Restrictions	105

Creating a Home Directory	110
Initialization Files	110
Setting File Ownership	117
Adding the User to Other System Facilities	117
Adding the User to Secondary Groups	117
Additional Tasks	118
Testing the New Account	118
Automating the Account Creation Process	119
Captive Accounts	124
Removing a User Account	125
UNIX Groups	126
The /etc/group File	128
Standard UNIX Users and Groups	131
Chapter 5 Security	134
UNIX Lines of Defense	136
Preventing Security Problems	141
Password File Issues	141
Using Groups Effectively	145
The SUID and SGID Access Modes	147
Search Path Issues	151
Encryption	151
Dialup Passwords	153
AIX 3.1 Access Control Lists	156
Detecting Problems	161
Monitoring the Filesystem	161
Tools for Detective Work	167
Chapter 6 Automating Routine Tasks	176
Using Scripts Effectively	177
Example: Password File Security	177
Example: Monitoring Disk Usage	179
Periodic Program Execution: The cron Facility	184
Execution Scheduling	184
Adding Crontab Entries	187
Using cron to Automate System Administration	189
cron Security Issues	191

Chapter 7 Managing System Resources	193
Monitoring System Load	193
Controlling Execution Priorities	197
Destroying Processes	200
Introducing the System V.4 Process Scheduler	201
UNIX Batch Processing Facilities	204
Process Resource Limits	205
Managing Memory	207
Monitoring Memory Use and Paging Activity	209
Managing Paging Space	214
Managing Disk Usage with Disk Quotas (BSD and V.4)	221
Preparing Filesystems for Quotas	222
Setting Users' Quota Limits	223
Enabling Quota Checking	223
Chapter 8 Filesystems and Disks	225
Mounting and Dismounting Filesystems	226
The mount and umount Commands	229
The Filesystem Configuration File	229
Automatic Filesystem Mounting	234
Managing Disk Space Usage	235
df: Display Filesystem Statistics	235
du: Report on Disk Usage	236
quot: Report Usage by User (BSD, XENIX, and V.4)	237
Handling Disk Shortage Problems	237
Using fsck to Validate a Filesystem	242
After fsck	246
From Disks to Filesystems	246
Disk Partitions	246
Filesystems	249
Adding Disks	251
Adding a Hard Disk (XENIX and Interactive UNIX)	252
Adding Disks to Multiuser Systems (BSD and System V)	254
Remaking an Existing Filesystem	257
Striped Disks	258
Floppy Disks	259
Floppy Disk Special Files	260
Disks and Filesystems Under AIX 3.1	261
Disks	261

Volume Groups	262
Logical Volumes	263
Filesystems	266
Adding a Disk Under AIX 3.1	267
Reorganizing the Default root Volume Group Structure	268
System V.4 Additional Device Management Features	270
The Device Database	270
Device Groups	272
Chapter 9 Backup and Restore	273
Backing Up the Filesystem	274
Is tar Enough?	275
Planning a Backup Schedule	276
Backup Under System V.3	279
Backup Under BSD	280
The V.4 Backup Service	284
Other Backup Considerations	287
Restoring Files from Backup	289
Restore Under System V.3	289
Restore Under BSD, AIX 3.1, XENIX, and V.4	290
restore's Interactive Mode	293
The V.4 Restore Service	294
Storing Backup Media	295
Tape Special Files	296
Chapter 10 Terminals and Modems	298
Terminal-Related Special Files	298
Specifying Terminal Characteristics	300
termcap and terminfo	300
The tset Command	302
The stty Command	305
Adding a New Device	307
Making the Physical Connection	307
Gather the Necessary Data	315
Terminal Line Configuration Files	316
Starting the Terminal Line	325

Troubleshooting Terminal Problems	326
Configuring a Dialin/Dialout Modem	327
Chapter 11 Printers and the Spooling Subsystem	329
The BSD Spooling System	330
The printcap File	331
Spooling Directories	332
The Spooling Daemon	333
Managing Queues	334
Adding a New Printer	336
Remote Printing	337
System V Printing	338
Device Classes	338
Setting the System Default Destination	339
Obtaining Destination Status Information	339
Manipulating Individual Print Requests	340
Controlling Print Queues	341
Starting and Stopping the Print Service	342
Managing Printers and Destination Classes	342
Adding a New Printer	345
Enhancements to the System V Printing System	346
The AIX 3.1 Queueing System	352
The /etc/qconfig File	353
Controlling Queues and Print Jobs	356
Adding a New Printer	359
Configuring Remote Printing	359
Using the Queueing System as a Batch Service	360
Troubleshooting Printers	361
Chapter 12 TCP/IP Network Management	363
About TCP/IP Networking	363
Hostnames	365
Network Addresses	365
The Host Table /etc/hosts	367
Network Daemons	368
Monitoring the Network	370
Adding a New Host	372

Network Security	373
Host Level Equivalence	373
Account Equivalence	374
NFS and NIS	375
About NFS	376
Mounting Remote Directories	377
NIS	381
TCP/IP Networking and AIX 3.1	382
Chapter 13 Accounting	384
Standard Accounting Files	385
BSD Accounting	386
Enabling and Disabling Accounting	387
Merging Accounting Records into the Summary Files	387
Administrative Accounting Options	388
After a Crash	389
Image-Based Resource Use Reporting: sa	390
Connect Time Reporting: ac	392
System V Accounting	393
Setting Up Accounting	394
Accounting Reports	396
Accounting Under XENIX	398
Accounting Under AIX 3.1	398
Bourne Shell Programming Appendix	400
Basic Syntax	400
The dot Command	401
Return Codes and the exit Command	401
Argument Symbols and Other \$ Abbreviations	402
Parameter Substitution	403
The if Statement	404
The test Command, aka [.....	406
Other Control Structures	408
The while and until Commands	408
The case Command	409
The for Command	410
The Null Command	411

Getting Input: The read Command	411
Other Useful Commands	412
set	412
expr	412
eval	413
Functions	413
Bibliography	415
Index	417

