

The XENIX™  
Operating System

Reference  
for the Apple Lisa 2™

**The Santa Cruz Operation, Inc.**

Information in this document is subject to change without notice and does not represent a commitment on the part of The Santa Cruz Operation, Inc. and Microsoft Corporation. The software described in this document is furnished under a license agreement or nondisclosure agreement. The software may be used or copied only in accordance with the terms of the agreement.

©The Santa Cruz Operation, Inc., 1984

©Microsoft Corporation, 1983

**The Santa Cruz Operation, Inc.**  
500 Chestnut Street  
P.O. Box 1900  
Santa Cruz, California 95061  
(408) 425-7222 · TWX: 910-598-4510 SCO SACZ

UNIX is a trademark of Bell Laboratories  
XENIX is a trademark of Microsoft Corporation  
Apple, Lisa 2, and ProFile are trademarks of Apple Computer Inc.

Release: 68-5-24-84-1.0/1.0

# Preface

---

The complete XENIX Reference Manual is actually divided into six parts and distributed as individual reference sections in the various volumes of the XENIX Operating System, Text Processing, and Development Systems. The following table lists the name, content, and location of each reference section.

<b>Section</b>	<b>Description</b>	<b>Volume</b>
<b>C</b>	Commands — used with the XENIX Operating System.	XENIX Reference
<b>CT</b>	Text Processing Commands — used with the Text Processing System.	Text Processing Guide
<b>CP</b>	Programming Commands — used with the Development System.	Programmer's Guide
<b>M</b>	Miscellaneous — information used for access to devices, system maintenance, and communications.	XENIX Reference
<b>S</b>	System Calls and Library Routines — available for C and assembly language programming.	Programmer's Reference
<b>F</b>	File Formats — description of various system files not defined in section M.	Programmer's Reference

In text, a given command, routine, or file is referred to by name and section. For example, the programming command "cc", which is described in the Programming Commands (CP) section, is listed as cc(CP) in the text.

The alphabetized table of contents given on the following pages is a complete listing of all XENIX commands, system calls, library routines, and file formats. If you want to locate information about a specific item look in the indicated reference section.



# Alphabetized List

Commands, Systems Calls, Library Routines, and File Formats

---

<b>a.out</b>	<b>a.out(F)</b>	<b>cal</b>	<b>cal(C)</b>
<b>a64l</b>	<b>a64l(S)</b>	<b>calendar</b>	<b>calendar(C)</b>
<b>abort</b>	<b>abort(S)</b>	<b>calloc</b>	<b>malloc(S)</b>
<b>abs</b>	<b>abs(S)</b>	<b>cat</b>	<b>cat(C)</b>
<b>access</b>	<b>access(S)</b>	<b>cb</b>	<b>cb(CP)</b>
<b>acct</b>	<b>acct(F)</b>	<b>cc</b>	<b>cc(CP)</b>
<b>acct</b>	<b>acct(S)</b>	<b>cd</b>	<b>cd(C)</b>
<b>acctcom</b>	<b>acctcom(C)</b>	<b>cdc</b>	<b>cdc(CP)</b>
<b>accton</b>	<b>accton(C)</b>	<b>ceil</b>	<b>floor(S)</b>
<b>acos</b>	<b>trig(S)</b>	<b>chdir</b>	<b>chdir(S)</b>
<b>adb</b>	<b>adb(CP)</b>	<b>checklist</b>	<b>checklist(F)</b>
<b>admin</b>	<b>admin(CP)</b>	<b>chgrp</b>	<b>chgrp(C)</b>
<b>alarm</b>	<b>alarm(S)</b>	<b>chmod</b>	<b>chmod(C)</b>
<b>aliases</b>	<b>aliases(M)</b>	<b>chmod</b>	<b>chmod(S)</b>
<b>aliases.hash</b>	<b>aliases(M)</b>	<b>chown</b>	<b>chown(C)</b>
<b>aliashash</b>	<b>aliashash(M)</b>	<b>chown</b>	<b>chown(S)</b>
<b>ar</b>	<b>ar(CP)</b>	<b>chroot</b>	<b>chroot(C)</b>
<b>ar</b>	<b>ar(F)</b>	<b>chroot</b>	<b>chroot(S)</b>
<b>as</b>	<b>as(CP)</b>	<b>chsize</b>	<b>chsize(S)</b>
<b>ascii</b>	<b>ascii(M)</b>	<b>clearerr</b>	<b>ferror(S)</b>
<b>asctime</b>	<b>ctime(S)</b>	<b>close</b>	<b>close(S)</b>
<b>asin</b>	<b>trig(S)</b>	<b>cmp</b>	<b>cmp(C)</b>
<b>asktime</b>	<b>asktime(C)</b>	<b>col</b>	<b>col(CT)</b>
<b>assert</b>	<b>assert(S)</b>	<b>comb</b>	<b>comb(CP)</b>
<b>assign</b>	<b>assign(C)</b>	<b>comm</b>	<b>comm(C)</b>
<b>at</b>	<b>at(C)</b>	<b>config</b>	<b>config(CP)</b>
<b>atan</b>	<b>trig(S)</b>	<b>console</b>	<b>console(F)</b>
<b>atan2</b>	<b>trig(S)</b>	<b>copy</b>	<b>copy(C)</b>
<b>atof</b>	<b>atof(S)</b>	<b>core</b>	<b>core(F)</b>
<b>atoi</b>	<b>atof(S)</b>	<b>cos</b>	<b>trig(S)</b>
<b>atol</b>	<b>atof(S)</b>	<b>cosh</b>	<b>sinh(S)</b>
<b>atq</b>	<b>at(C)</b>	<b>cp</b>	<b>cp(C)</b>
<b>atrm</b>	<b>at(C)</b>	<b>cpio</b>	<b>cpio(C)</b>
<b>awk</b>	<b>awk(C)</b>	<b>cpio</b>	<b>cpio(F)</b>
<b>banner</b>	<b>banner(C)</b>	<b>creat</b>	<b>creat(S)</b>
<b>basename</b>	<b>basename(C)</b>	<b>creatsem</b>	<b>creatsem(S)</b>
<b>bc</b>	<b>bc(C)</b>	<b>cref</b>	<b>cref(CP)</b>
<b>bdiff</b>	<b>bdiff(C)</b>	<b>cron</b>	<b>cron(C)</b>
<b>bfs</b>	<b>bfs(C)</b>	<b>crypt</b>	<b>crypt(C)</b>
<b>brk</b>	<b>sbrk(S)</b>	<b>crypt</b>	<b>crypt(S)</b>
<b>bsearch</b>	<b>bsearch(S)</b>	<b>csh</b>	<b>csh(C)</b>
<b>cabs</b>	<b>hypot(S)</b>	<b>csplit</b>	<b>csplit(C)</b>

ctags	ctags(CP)	environ	environ(M)
ctermid	ctermid(S)	eqn	eqn(CT)
ctime	ctime(S)	eqncheck	eqn(CT)
cu	cu(C)	errno	perror(S)
curses	curses(S)	ex	ex(C)
cuserid	cuserid(S)	execl	exec(S)
cut	cut(CT)	execle	exec(S)
cw	cw(CT)	execlp	exec(S)
cwcheck	cw(CT)	execv	exec(S)
daemon.mn	daemon.mn(M)	execve	exec(S)
date	date(C)	execvp	exec(S)
dbmunit	dbm(S)	exit	exit(S)
dc	dc(C)	exp	exp(S)
dd	dd(C)	explain	explain(CT)
deassign	assign(C)	expr	expr(C)
default	default(M)	fabs	floor(S)
defopen	defopen(S)	faliases	aliases(M)
defread	defopen(S)	false	false(C)
delete	dbm(S)	fclose	fclose(S)
delta	delta(CP)	fcntl	fcntl(S)
deroff	deroff(CT)	fcvt	ecvt(S)
devnm	devnm(C)	fd	fd(M)
df	df(C)	fdopen	fopen(S)
diction	diction(CT)	feof	ferror(S)
diff	diff(C)	ferror	ferror(S)
diff3	diff3(C)	fetch	dbm(S)
diffmk	diffmk(CT)	fflush	fclose(S)
dir	dir(F)	fgetc	getc(S)
dircmp	dircmp(C)	fgets	gets(S)
dirname	dirname(C)	fgrep	grep(C)
disable	disable(C)	file system	file system(F)
dtype	dtype(C)	file	file(C)
du	du(C)	fileno	ferror(S)
dump	dump(C)	find	find(C)
dump	dump(F)	finger	finger(C)
dumpdir	dumpdir(C)	firstkey	dbm(S)
dup	dup(S)	floor	floor(S)
dup2	dup(S)	fmod	floor(S)
echo	echo(C)	fopen	fopen(S)
ecvt	ecvt(S)	fork	fork(S)
ed	ed(C)	fprintf	printf(S)
egrep	grep(C)	fputc	putc(S)
enable	enable(C)	fputs	puts(S)
encrypt	crypt(S)	fread	fread(S)
endgrent	getgrent(S)	free	malloc(S)
endpwent	getpwent(S)	freopen	fopen(S)
env	env(C)	frexp	frexp(S)

<b>fscanf</b>	<b>scanf(S)</b>	<b>hypot</b>	<b>hypot(S)</b>
<b>fsck</b>	<b>fsck(C)</b>	<b>id</b>	<b>id(C)</b>
<b>fseek</b>	<b>fseek(S)</b>	<b>init</b>	<b>init(M)</b>
<b>fstat</b>	<b>stat(S)</b>	<b>inode</b>	<b>inode(F)</b>
<b>ftell</b>	<b>fseek(S)</b>	<b>intro</b>	<b>intro(C)</b>
<b>ftime</b>	<b>time(S)</b>	<b>intro</b>	<b>intro(CP)</b>
<b>fwrite</b>	<b>fread(S)</b>	<b>intro</b>	<b>inuro(CT)</b>
<b>fxlist</b>	<b>xlist(S)</b>	<b>intro</b>	<b>intro(F)</b>
<b>gamma</b>	<b>gamma(S)</b>	<b>intro</b>	<b>intro(M)</b>
<b>gcvt</b>	<b>ecvt(S)</b>	<b>intro</b>	<b>intro(S)</b>
<b>get</b>	<b>get(CP)</b>	<b>ioctl</b>	<b>ioctl(S)</b>
<b>getc</b>	<b>getc(S)</b>	<b>isalnum</b>	<b>ctype(S)</b>
<b>getchar</b>	<b>getc(S)</b>	<b>isalpha</b>	<b>ctype(S)</b>
<b>getcwd</b>	<b>getcwd(S)</b>	<b>isascii</b>	<b>ctype(S)</b>
<b>getegid</b>	<b>getuid(S)</b>	<b>isatty</b>	<b>ttyname(S)</b>
<b>getenv</b>	<b>getenv(S)</b>	<b>isctrl</b>	<b>ctype(S)</b>
<b>geteuid</b>	<b>getuid(S)</b>	<b>isdigit</b>	<b>ctype(S)</b>
<b>getgid</b>	<b>getuid(S)</b>	<b>isgraph</b>	<b>ctype(S)</b>
<b>getgrent</b>	<b>getgrent(S)</b>	<b>islower</b>	<b>ctype(S)</b>
<b>getgrgid</b>	<b>getgrent(S)</b>	<b>isprint</b>	<b>ctype(S)</b>
<b>getgrnam</b>	<b>getgrent(S)</b>	<b>ispunct</b>	<b>ctype(S)</b>
<b>getlogin</b>	<b>getlogin(S)</b>	<b>isspace</b>	<b>ctype(S)</b>
<b>getopt</b>	<b>getopt(C)</b>	<b>isupper</b>	<b>ctype(S)</b>
<b>getopt</b>	<b>getopt(S)</b>	<b>isxdigit</b>	<b>ctype(S)</b>
<b>getpass</b>	<b>getpass(S)</b>	<b>j0</b>	<b>bessel(S)</b>
<b>getpgrp</b>	<b>getpid(S)</b>	<b>j1</b>	<b>bessel(S)</b>
<b>getpid</b>	<b>getpid(S)</b>	<b>jn</b>	<b>bessel(S)</b>
<b>getppid</b>	<b>getpid(S)</b>	<b>join</b>	<b>join(C)</b>
<b>getpw</b>	<b>getpw(S)</b>	<b>kill</b>	<b>kill(C)</b>
<b>getpwent</b>	<b>getpwent(S)</b>	<b>kill</b>	<b>kill(S)</b>
<b>getpwnam</b>	<b>getpwent(S)</b>	<b>kmem</b>	<b>mem(M)</b>
<b>getpwuid</b>	<b>getpwent(S)</b>	<b>l</b>	<b>l(C)</b>
<b>gets</b>	<b>gets(CP)</b>	<b>l3tol</b>	<b>l3tol(S)</b>
<b>gets</b>	<b>gets(S)</b>	<b>l64a</b>	<b>a64l(S)</b>
<b>getty</b>	<b>getty(M)</b>	<b>lc</b>	<b>lc(C)</b>
<b>getuid</b>	<b>getuid(S)</b>	<b>ld</b>	<b>ld(CP)</b>
<b>getw</b>	<b>getc(S)</b>	<b>ld</b>	<b>ld(M)</b>
<b>gmtime</b>	<b>ctime(S)</b>	<b>ldexp</b>	<b>frexp(S)</b>
<b>grep</b>	<b>grep(C)</b>	<b>lex</b>	<b>lex(CP)</b>
<b>group</b>	<b>group(M)</b>	<b>line</b>	<b>line(C)</b>
<b>grpcheck</b>	<b>grpcheck(C)</b>	<b>link</b>	<b>link(S)</b>
<b>gsignal</b>	<b>ssignal(S)</b>	<b>lint</b>	<b>lint(CP)</b>
<b>haltsys</b>	<b>haltsys(C)</b>	<b>lisa</b>	<b>lisa(M)</b>
<b>hdr</b>	<b>hdr(CP)</b>	<b>ln</b>	<b>ln(C)</b>
<b>head</b>	<b>head(C)</b>	<b>localtime</b>	<b>ctime(S)</b>
<b>help</b>	<b>help(CP)</b>	<b>lock</b>	<b>lock(S)</b>
<b>hyphen</b>	<b>hyphen(CT)</b>	<b>locking</b>	<b>locking(S)</b>

log	exp(S)	neqn	eqn(CT)
log10	exp(S)	neqn	neqn(CT)
login	login(M)	netutil	netutil(C)
logname	logname(C)	newgrp	newgrp(C)
logname	logname(S)	nextkey	dbm(S)
longjmp	setjmp(S)	nice	nice(C)
look	look(C)	nice	nice(S)
lorder	lorder(CP)	nl	nl(C)
lp	lp(M)	nlist	nlist(S)
lpr	lpr(C)	nm	nm(CP)
ls	ls(C)	nohup	nohup(C)
lsearch	lsearch(S)	nroff	nroff(CT)
lseek	lseek(S)	null	null(M)
lto3	l3tol(S)	od	od(C)
m4	m4(CP)	open	open(S)
machine	machine(M)	opensem	opensem(S)
mail	mail(C)	pack	pack(C)
make	make(CP)	passwd	passwd(C)
makekey	makekey(M)	passwd	passwd(M)
aliases	aliases(M)	paste	paste(CT)
malloc	malloc(S)	pause	pause(S)
master	master(F)	pcat	pack(C)
mem	mem(M)	pclose	popen(S)
mesg	mesg(C)	perror	perror(S)
messages	messages(M)	pf	pf(M)
micnet	micnet(M)	pipe	pipe(S)
mkdir	mkdir(C)	popen	popen(S)
mkfs	mkfs(C)	pow	exp(S)
mknod	mknod(C)	pr	pr(C)
mknod	mknod(S)	prep	prep(CT)
mkstr	mkstr(CP)	printf	printf(S)
mktemp	mktemp(S)	prof	prof(CP)
mkuser	mkuser(C)	profil	profil(S)
mm	mm(CT)	profile	profile(M)
mmcheck	mmcheck(CT)	prs	prs(CP)
mmt	mmu(CT)	ps	ps(C)
mnttab	mntab(F)	pstat	pstat(C)
modf	frexp(S)	ptrace	ptrace(S)
monitor	monitor(S)	ptx	ptx(CT)
more	more(C)	putc	putc(S)
mount	mount(C)	putchar	putc(S)
mount	mount(S)	putpwent	putpwent(S)
mouse	mouse(M)	puts	puts(S)
mv	mv(C)	putw	putc(S)
nap	nap(S)	pwadmin	pwadmin(C)
nbwaitsem	waitsem(S)	pwcheck	pwcheck(C)
ncheck	ncheck(C)	pwd	pwd(C)

qsort	qsort(S)	signal	signal(S)
quot	quot(C)	sigsem	sigsem(S)
rand	rand(S)	sin	trig(S)
random	random(C)	sinh	sinh(S)
ranlib	ranlib(CP)	size	size(CP)
ratfor	ratfor(CP)	sleep	sleep(C)
rcp	rcp(C)	sleep	sleep(S)
rdchk	rdchk(S)	soelim	soelim(CT)
read	read(S)	sort	sort(C)
realloc	malloc(S)	spell	spell(CT)
regcmp	regcmp(CP)	spellin	spell(CT)
regcmp	regex(S)	spellout	spell(CT)
regex	regex(S)	spline	spline(CP)
remote	remote(C)	split	split(C)
restor	restor(C)	sprintf	printf(S)
rewind	fseek(S)	sqrt	exp(S)
rm	rm(C)	srand	rand(S)
rmdel	rmdel(CP)	scanf	scanf(S)
rmdir	rmdir(C)	signal	signal(S)
rmuser	rmuser(C)	stat	stat(S)
rsh	rsh(C)	stdio	stdio(S)
sact	sact(CP)	stime	stime(S)
sbrk	sbrk(S)	store	dbm(S)
scanf	scanf(S)	strcat	string(S)
sccsdiff	sccsdiff(CP)	strchr	string(S)
sccsfile	sccsfile(F)	strcmp	string(S)
sddate	sddate(C)	strcpy	string(S)
sdenter	sdenter(S)	strespn	string(S)
sdget	sdget(S)	strdup	string(S)
sdgetv	sdgetv(S)	strings	strings(CP)
sdiff	sdiff(C)	strip	strip(CP)
sdleave	sdenter(S)	strlen	string(S)
sdwaitv	sdgetv(S)	strncat	string(S)
sed	sed(C)	strncmp	string(S)
setbuf	setbuf(S)	strncpy	string(S)
setgid	setuid(S)	strpbrk	string(S)
setgrent	getgrent(S)	strrchr	string(S)
setjmp	setjmp(S)	strspn	string(S)
setkey	crypt(S)	strtok	string(S)
setmnt	setmnt(C)	stty	stty(C)
setpgrp	setpgrp(S)	style	style(CT)
setpwent	getpwent(S)	su	su(C)
settime	settime(C)	sum	sum(C)
setuid	setuid(S)	swab	swab(S)
sh	sh(C)	sync	sync(C)
shutdn	shutdn(S)	sync	sync(S)
shutdown	shutdown(C)	sys_errlist	perror(S)

sys_nerr	_____	perror(S)	uname	_____	uname(S)
sysadmin	_____	sysadmin(C)	unget	_____	unget(CP)
system	_____	system(S)	ungetc	_____	ungetc(S)
systemid	_____	systemid(M)	uniq	_____	uniq(C)
tail	_____	tail(C)	units	_____	units(C)
tan	_____	trig(S)	unlink	_____	unlink(S)
tanh	_____	sinh(S)	unpack	_____	pack(C)
tar	_____	tar(C)	ustat	_____	ustat(S)
tbl	_____	tbl(CT)	utime	_____	utime(S)
tee	_____	tee(C)	utmp	_____	utmp(M)
termcap	_____	termcap(M)	uucp	_____	uucp(C)
terminals	_____	terminals(M)	uulog	_____	uulog(C)
test	_____	test(C)	uunow	_____	uunow(C)
tgetent	_____	termcap(S)	uusend	_____	uusend(C)
tgetflag	_____	termcap(S)	uux	_____	uux(C)
tgetnum	_____	termcap(S)	val	_____	val(CP)
tgetstr	_____	termcap(S)	vi	_____	vi(C)
tgoto	_____	termcap(S)	vsh	_____	vsh(C)
time	_____	time(CP)	wait	_____	wait(C)
time	_____	time(S)	wait	_____	wait(S)
times	_____	times(S)	waitsem	_____	waitsem(S)
tmpfile	_____	tmpfile(S)	wall	_____	wall(C)
tmpnam	_____	tmpnam(S)	wc	_____	wc(C)
toascii	_____	conv(S)	what	_____	what(C)
tolower	_____	conv(S)	who	_____	who(C)
top	_____	top(M)	whodo	_____	whodo(C)
top.next	_____	top(M)	write	_____	write(C)
touch	_____	touch(C)	write	_____	write(S)
toupper	_____	conv(S)	wtmp	_____	wtmp(M)
tputs	_____	termcap(S)	xargs	_____	xargs(C)
tr	_____	tr(C)	xlist	_____	xlist(S)
troff	_____	troff(CT)	xref	_____	xref(CP)
true	_____	true(C)	xstr	_____	xstr(CP)
tset	_____	tset(C)	x.out	_____	x.out(F)
tsort	_____	tsort(CP)	y0	_____	bessel(S)
tty	_____	tty(C)	y1	_____	bessel(S)
tty	_____	tty(M)	yacc	_____	yacc(CP)
ttyname	_____	ttyname(S)	yes	_____	yes(C)
ttys	_____	ttys(M)	yn	_____	bessel(S)
types	_____	types(F)			
tzset	_____	ctime(S)			
ulimit	_____	ulimit(S)			
umask	_____	umask(C)			
umask	_____	umask(S)			
umount	_____	umount(C)			
umount	_____	umount(S)			
uname	_____	uname(C)			

## CONTENTS

---

### *Commands (C)*

intro	Introduces XENIX commands.
acctcom	Turns on accounting
accton	Searches for and prints process accounting files
asktime	Prompts for the correct time of day
assign, deassign	Assigns and deassigns devices
at, atq, atrm	Executes commands at a later time
awk	Invokes a pattern processing editor
banner	Prints large letters
basename	Delivers filename part of pathname
bc	Invokes a calculator
bdiff	Compares files too large for diff
bfs	Scans big files
cal	Prints a calendar
calendar	Invokes a reminder service
cat	Concatenates and prints files
cd	Changes working directory
chgrp	Changes group ID
chmod	Changes the mode of the named file
chown	Changes owner ID
chroot	Changes root directory for command
cmchk	Reports hard disk block size
cmp	Compares two files
comm	Selects or rejects lines common to two sorted files
copy	Copies groups of files
cp	Copies files
cpio	Copies file archives in and out
cron	Executes commands at specified times
crypt	Encodes and decodes files
csh	Invokes a shell command interpreter with C-like syntax
csplit	Splits files according to context
cu	Calls another XENIX system
date	Prints and sets the date
dc	Invokes an arbitrary precision calculator
dd	Converts and copies a file
devnm	Identifies device name
df	Reports the number of free disk blocks
diff	Compares two text files
diff3	Compares three files
dircmp	Compares directories
dirname	Delivers directory part of pathname
disable	Turns off terminals
dtype	Determines disk type
du	Summarizes disk usage
dump	Performs incremental file system backup
dumpdir	Prints the names of files on a backup archive

echo	Echoes arguments
ed	Invokes a text editor
eject	Ejects Lisa II micro floppydisk
enable	Turns on terminals
env	Sets environment for command execution
ex	Invokes a text editor
expr	Evaluates arguments as an expression
false	Returns with a non-zero exit value
file	Finds files
find	Finds pathname-- list expression
finger	Finds information about users
format	Formats floppy disks
fsck	Checks and repairs file systems
gettop	Parser command options
grep, egrep, fgrep	Searches a file for a pattern
grpcheck	Checks group file
haltsys	Closes out the file systems and halts the CPU
hd	Displays files in a hexadecimal format
head	Prints the first few lines of a stream
id	Prints user group ID and names
join	Joins two relations
kill	Terminates a process
l	Lists information about contents of directory
lc	Lists directory contents in columns
line	Reads one line
logname	Gets login name
look	Finds lines in a sorted list
ln	Makes a link to a file
lpr	Sends files to the lineprinter queue for printing
ls	Gives information about contents of directories
mail	Sends, reads or disposes of mail
mesg	Permits or denies message sent to terminal
mkdir	Makes a directory
mkfs	Constructs a file system
mknod	Builds special files
mkuser	Adds a login ID to the system
more	Views a file one screenful at a time
mount	Mounts a file structure
mv	Moves or renames file or directories
ncheck	Generates names from inode numbers
netutil	Administers the XENIX network
newgrp	Logs user into a new group
nice	Runs a command at a different priority
nl	Adds line members to a file
nohup	Runs a command immune to hangups and quits
od	Displays files in octal format
pack, pcat, unpack	Compresses and expands files
passwd	Changes login password
pr	Prints files on the standard output
ps	Reports process status
pstat	Reports system information
pwadmin	Performs password aging administration

<b>pwcheck</b>	Checks password file
<b>pwd</b>	Prints working directory
<b>quot</b>	Summarizes file system ownership
<b>random</b>	Generates a random number
<b>rcp</b>	Copies files across XENIX systems
<b>remote</b>	Executes a command on a remote XENIX system
<b>restor</b>	Invokes incremental file system restorer
<b>rm, rmdir</b>	Removes files or directories
<b>rmuser</b>	Removes a user from the system
<b>rsh</b>	Invokes a restricted shell (command interpreter)
<b>sddate</b>	Prints and sets backup dates
<b>sdiff</b>	Compares files side-by-side
<b>sed</b>	Invokes the stream editor
<b>setmnt</b>	Establishes/etc/mnttab table
<b>settime</b>	Changes the access and modification dates of files
<b>sh</b>	The shell command interpreter
<b>shutdown</b>	Terminates all processing
<b>sleep</b>	Suspends execution for an interval
<b>sort</b>	Sorts and merges files
<b>split</b>	Splits a file into pieces
<b>stty</b>	Sets the options for a terminal
<b>su</b>	Makes the user super-user or another user
<b>sum</b>	Calculates checksum and counts the blocks in a file
<b>sync</b>	Updates the super-block
<b>sysadmin</b>	Performs file system backups and restores files
<b>tail</b>	Delivers the last part of a file
<b>tar</b>	Archives files
<b>tee</b>	Creates a tee in a pipe
<b>test</b>	Tests conditions
<b>touch</b>	Updates access and modification times of a file
<b>tr</b>	Translates characters
<b>true</b>	Returns with a zero exit value
<b>tset</b>	Sets terminal modes
<b>tty</b>	Gets the terminal's name
<b>umask</b>	Sets file-creation mode mask
<b>umount</b>	Dismounts a file structure
<b>uname</b>	Prints the current XENIX name
<b>uniq</b>	Reports repeated lines in a file
<b>units</b>	Converts units
<b>uucp</b>	Copies files from XENIX to XENIX
<b>uunow</b>	Initiate a uucp sequence now
<b>uuse</b>	Send a file to a remote host
<b>uux</b>	Executes command on remote XENIX
<b>vi</b>	Invokes a screen oriented text editor
<b>vsh</b>	Menu driven visual shell
<b>wait</b>	Awaits completion of background processes
<b>wall</b>	Writes to all users
<b>wc</b>	Counts lines, words, and characters
<b>what</b>	Identifies files
<b>who</b>	Lists who is on the system

**who do**  
**write**  
**xargs**  
**yes**

**Determines who is doing what**  
**Writes to another user**  
**Constructs and executes commands**  
**Prints strings repeatedly**

# Index

---

Accounting files, printing	acctcom
Accounting, starting	accton
Archives, creating and restoring	tar
at command	at
atrm command	at
Backup, creating	dump
Backup, creating and restoring	sysadmin
Backup, dates	sddate
Backup, listing	dumpdir
Backup, restoring	restor
Calculator	bc
Calculator	dc
Calendar, display	cal
Character translation	tr
Commands, constructing and executing	xargs
Commands, execution on a remote system	remote
Commands, execution priority	nice
Commands, execution without hangups and quits	nohup
Commands, intersystem execution	uux
Commands, options	getopt
Commands, scheduled execution	at
Commands, scheduled execution	cron
Communication, calling other systems	cu
Communication, copying files across systems	rcp
Conversions, units	units
Date, setting	date
deassign command	assign
Devices, exclusive control	assign
Devices, names	devnm
Directory, comparing	dircmp
Directory, creating	mkdir
Directory, listing	ls
Directory, listing columns	lc
Directory, listing information	l
Directory, removing	rmdir
Directory, renaming	mv
Disk type	dtype
Displaying, command arguments	echo
Displaying, first lines of a file	head
Displaying, last lines of a file	tail
Displaying, line numbers	nl
egrep command	grep
Environment, setting	env
Expressions, evaluating	expr
fgrep command	grep
File system, backup	dump

File system, backups	sysadmin
File system, checking and repairing	fsck
File system, constructing	mkfs
File system, mount table	setmnt
File system, mounting	mount
File system, names from inode numbers	ncheck
File system, ownership	quot
File system, unmounting	umount
File, access and modification dates	settime
File, access and modification times	touch
File, access permissions	chmod
File, building special files	mknod
File, checksum and blocks	sum
File, comparing	cmp
File, comparing	bdiff
File, comparing side-by-side	sdiff
File, comparing text	diff
File, comparing text	diff3
File, compressing and expanding	pack
File, concatenating and displaying	cat
File, converting and copying	dd
File, copying	cp
File, copying archives	cpio
File, copying groups	copy
File, counting lines, words and characters	wc
File, creation mode mask	umask
File, displaying	pr
File, displaying repeated lines	uniq
File, encryption	crypt
File, group ID	chgrp
File, hexadecimal display	hd
File, identifying	what
File, intersystem copy	unccp
File, linking	ln
File, locating	find
File, moving and renaming	mv
File, octal display	od
File, owner ID	chown
File, printing	lpr
File, removing	rm
File, scanning	bfs
File, selecting common lines	comm
File, sorting	sort
File, splitting by context	csplit
File, splitting by lines	split
File, type	file
File, viewing	more
Group file	grpcheck

Group, switching _____	newgrp
IDs, user and group _____	id
initiate a uucp connection now _____	uucw
Large letters _____	banner
Line, reading from input _____	line
Lines, finding in a sorted list _____	look
Login, name _____	logname
Mail _____	mail
Micnet, creating and operating _____	netutil
Password, aging _____	pwdmin
Password, changing _____	passwd
Password, file check _____	pwcheck
Pathname, directory name _____	dirname
Pathnames, filename _____	basename
Pattern, searching _____	grep
Pattern, searching and processing _____	awk
pcat command _____	pack
Pipe, creating a tee _____	tee
Process, status _____	ps
Process, temporary suspension _____	sleep
Process, terminating _____	kill
Process, waiting for background process _____	wait
Random number _____	random
Relations, joining _____	join
Reminder service _____	calendar
Return value, nonzero _____	false
Return value, repeated string _____	yes
Return value, zero _____	true
Root directory _____	chroot
Send a file to a remote host _____	uucsend
Shell _____	csh
Shell _____	sh
Shell, restricted _____	rsh
Shell, visual _____	vsh
System, current name _____	uname
System, disk usage _____	du
System, free disk blocks _____	df
System, information _____	psstat
System, stopping _____	haltsys
System, stopping _____	shutdown
System, super-block _____	sync
Terminal, disable login _____	disable
Terminal, enabling logins _____	enable
Terminal, enabling messages _____	msg
Terminal, name _____	tty
Terminal, setting modes _____	stty
Terminal, setting modes _____	tset
Terminal, writing to all _____	wall

Testing conditions	test
Text editor, line	ed
Text editor, line	ex
Text editor, screen	vi
Text editor, stream	sed
Time of day	asktime
unpack command	pack
User, adding to the system	mkuser
User, listing	who
User, listing action	whodo
User, removing from the system	rmuser
User, switching	su
User, writing to the terminal	write
Users, information	finger
uulog command	uucp
Working directory	cd
Working directory	pwd

**Name**

**intro** - Introduces XENIX commands.

**Description**

This section describes use of the individual commands available in the XENIX Timesharing System. Each individual command is labeled with either a C, a CP, or a CT for easy reference from other volumes. The letter "C" stands for "command". The letters "P" and "T" stand for commands that come with the optional XENIX Programming System and the XENIX Text Processing System, respectively. For example, the reference *date(C)* indicates a reference to a discussion of the *date* command in the C section; the reference *cc(CP)* indicates a reference to a discussion of the *cc* command in the XENIX Programmer's System; and the reference *spell(CT)* indicates a reference to a discussion of the *spell* command in the XENIX Text Processing System. The Text Processing and Programmer's Systems are optional supplemental packages to the standard Timesharing System.

The "M" Miscellaneous section contains miscellaneous information including a great deal of system maintenance information. Other reference sections include the "S" System Services section and the "F" File Format section. Both these sections come as part of the Programmer's Reference with the optional Software Development System.

**Syntax**

Unless otherwise noted, commands described in this section accept options and other arguments according to the following syntax:

*name* [*option(s)*] [*cmdarg(s)*]

where:

*name* Is the name of an executable file.

*option* - *noargletter(s)* or,  
- *argletter<>optarg*  
where <> is optional whitespace.

*noargletter* Is a single letter representing an option without an argument.

*argletter* Is a single letter representing an option requiring an argument.

## INTRO(C)

## INTRO(C)

*optarg* Is an argument (character string) satisfying preceding *argletter*.

*cmdarg* Is a pathname (or other command argument) *not* beginning with - . - by itself indicates the standard input.

### See Also

`getopt(C)`, `getopt(S)`

### Diagnostics

Upon termination, each command returns 2 bytes of status, one supplied by the system and giving the cause for termination, and (in the case of "normal" termination) one supplied by the program (see `wait(S)` and `exit(S)`). The former byte is 0 for normal termination; the latter is customarily 0 for successful execution and nonzero to indicate troubles such as erroneous parameters, bad or inaccessible data. It is called variously "exit code", "exit status", or "return code", and is described only where special conventions are involved.

### Notes

Not all commands adhere to the syntax described here.

**Name**

acctcom - Searches for and prints process accounting files.

**Syntax**

acctcom [[options][file]] . . .

**Description**

*Acctcom* reads *file*, the standard input, or */usr/adm/pacct*, in the form described by *acct*(F) and writes selected records to the standard output. Each record represents the execution of one process. The output shows the COMMAND NAME, USER, TTYNAME, START TIME, END TIME, REAL (SEC), CPU (SEC), MEAN SIZE (K), and optionally, F (the *fork/exec* flag: 1 for *fork* without *exec*) and STAT (the system exit status).

The command name is prepended with a # if it was executed with super-user privileges. If a process is not associated with a known terminal, a ? is printed in the TTYNAME field.

If no *files* are specified, and if the standard input is associated with a terminal or */dev/null* (as is the case when using *&* in the shell), */usr/adm/pacct* is read, otherwise the standard input is read.

If any *file* arguments are given, they are read in their respective order. Each file is normally read forward, i.e., in chronological order by process completion time. The file */usr/adm/pacct* is usually the current file to be examined; a busy system may need several files, in which case all but the current file will be found in */usr/adm/pacct?*. The *options* are:

- b Reads backwards, showing latest commands first.
- f Prints the *fork/exec* flag and system exit status columns in the output.
- h Instead of mean memory size, shows the fraction of total available CPU time consumed by the process during its execution. This "hog factor" is computed as:  
  
(total CPU time)/(elapsed time).
- i Prints columns containing the I/O counts in the output.
- k Instead of memory size, shows total kcore-minutes.
- m Shows mean core size (the default).

- r Shows CPU factor (user time/(system-time + user-time).)
- t Shows separate system and user CPU times.
- v Excludes column headings from the output.
- l *line* Shows only processes belonging to terminal */dev/line*.
- u *user* Shows only processes belonging to *user* that may be specified by a user ID, a login name that is then converted to a user ID, a # which designates only those processes executed with super-user privileges, or ? which designates only those processes associated with unknown user IDs.
- g *group* Shows only processes belonging to *group*. The *group* may be designated by either the group ID or group name.
- d *mm/dd* Any *time* arguments following this flag are assumed to occur on the given month and day, rather than during the last 24 hours. This is needed for looking at old files.
- s *time* Shows only those processes that existed on or after *time*, given in the form *hr:min:sec*. The *:sec* or *:min:sec* may be omitted.
- e *time* Shows only those processes that existed on or before *time*. Using the same *time* for both -s and -e shows the processes that existed at *time*.
- n *pattern* Shows only commands matching *pattern* that may be a regular expression as in *ed*(C) except that + means one or more occurrences.
- H *factor* Shows only processes that exceed *factor*, where *factor* is the "hog factor" as explained in option -h above.

**-I** *number*

Shows driver processes transferring more characters than the cutoff *number*.

**-O** *time*

Shows only those processes with operating system CPU time that exceeds *time*.

**-C** *time*

Shows only those processes that exceed *time* (the total CPU time).

Multiple options have the effect of a logical AND.

**Files**

/etc/passwd

/usr/adm/pacct

/etc/group

**See Also**

accton(C), ps(C), su(C), acct(S), acct(F), utmp(M)

**Notes**

*Acctcom* only reports on processes that have terminated; use *ps*(C) for active processes.

**Name**

accton - Turns on accounting.

**Syntax**

accton [file]

**Description**

*Accton* turns on and off process accounting. If no *file* is given, then accounting is turned off. If *file* is given, it must be the name of an existing file, to which the kernel appends process accounting records. (see *acct(S)* and *acct(F)*).

**Files**

/etc/passwd	Used for login name to user ID conversions
/usr/lib/acct	Holds many accounting commands
/usr/adm/pacct	Current process accounting file
/usr/adm/wtmp	Login/logout history file

**See Also**

acctcom(C), acct(S), acct(F), utmp(M)

**Name**

asktime - Prompts for the correct time of day.

**Syntax**

/etc/asktime

**Description**

This command prompts for the time of day. You must enter a legal time according to the proper format as defined below:

*mmddhhmm*[*yy*]

Here the first *mm* is the month number; *dd* is the day number in the month; *hh* is the hour number (24-hour system); the second *mm* is the minute number; *yy* is the last 2 digits of the year number and is optional. The current year is the default if no year is mentioned.

**Examples**

This example sets the new time, date, and year to "9:23 January 1, 1983".

```
I think it's Wed Nov 3 14:36:23 PST 1982
Enter time (mmddhhmm[yy]): 0101092383
```

**Diagnostics**

If you enter an illegal time, *asktime* prompts with:

Try again:

**Notes**

*Asktime* is normally performed automatically by the system startup file */etc/rc* immediately after the system is booted; however, it may be executed at any time. The command is privileged, and can only be executed by the super-user.

**Name**

assign, deassign -- Assigns and deassigns devices.

**Syntax**

assign [ -u || -v || -d || device ] ...

deassign [ -u || -v || device ] ...

**Description**

*Assign* attempts to assign *device* to the current user. The *device* argument must be an assignable device that is not currently assigned. An *assign* command without an argument prints a list of assignable devices along with the name of the user to whom they are assigned.

*Deassign* is used to "deassign" devices. Without any arguments, *deassign* will deassign all devices assigned to the user. When arguments are given, an attempt is made to deassign each *device* given as an argument.

Available options include:

- d Performs the action of *deassign*. The -d option may be embedded in *device* names to assign some devices and deassign others.
- v Gives verbose output.
- u Suppresses assignment or deassignment, but performs error checking.

The *assign* command will not assign any assignable devices if it cannot assign all of them. *Deassign* gives no diagnostic if the *device* cannot be deassigned. Devices may be automatically deassigned at logout, but this is not guaranteed. *Device* names may be just the beginning of the device required. For example,

```
assign fd
```

should be used to assign all floppy disk devices. Raw versions of *device* will also be assigned, e.g., the raw floppy disk devices */dev/rfd?* would be assigned in the above example. Note that in many installations the assignable devices such as floppy disks have general read and write access, so the *assign* command may not be necessary. This is particularly true on one-user systems. Devices supposed to be assignable with this command should be owned by the user *asg*. The directory */dev* should be owned by *bin* and have mode 755. The *assign* command (after checking for use by someone else) will then make the device owned by whoever invokes the command, without changing the access permissions. This allows

the system administrator to set up individual devices that are freely available, assignable (owned by *asg*), or nonassignable and restricted (not owned by *asg* and with some restricted mode). Note also that the first time *assign* is invoked it builds the assignable devices table */etc/atab*. This table is used in subsequent invocations to save repeated searches of the */dev* directory. If one of the devices in */dev* is changed to be assignable (i.e., owned by *asg*), then */etc/atab* should be removed (by the super-user) so that a correct list will be built the next time the command is invoked.

**Files**

*/etc/atab* Table of assignable devices

*/dev/asglock*

File to prevent concurrent access

**Diagnostics**

Exit code 0 returned if successful, 1 if problems, 2 if *device* cannot be assigned.

## Name

*at*, *atq*, *atrm* - Executes commands at a later time.

## Syntax

*at* *time* [ *day* ] [ *file* ]

*atq* [ - 1 ]

*atrm idnumber* ...

## Description

*At* causes the contents of a file to be executed as a shell script at a specified time. This command is useful for running processes at regular intervals, or when the system is not busy. The arguments are:

*time* 1 to 4 digits, followed by an optional "a" for am, "p" for pm, "n" for noon, or "m" for midnight. One- and two-digit numbers are interpreted as hours, three- and four-digit numbers as hours and minutes. If no letters follow the digits, 24-hour time is assumed.

*day* Either a month name followed by a day number, or the name of a day of the week. If the word "week" follows the name of the day, the file is invoked seven days after the day named. Names of months and days may be recognizably truncated. (See the Examples later in this section.)

*file* The name of the file containing the command(s) to be executed. If no *file* is specified, the standard input is assumed.

*At* creates a file that is executed by the shell at the specified time. This file contains a comment line that lists the user's user ID and group ID, a *cd* command that changes the working directory of the process to the one you were using when you executed *at*, assignments to the appropriate environment variables, and the *file* specified in the *at* command line. Output from processes in *file* must be redirected or, (on most systems) it is lost. *At* shell scripts are run by periodic execution of the command */usr/lib/atrun* from *cron(C)*.

The *atq* command gives the following information about files waiting to be processed:

- The user ID under which the file will run
- A unique ID number used to reference the file
- The date and time the file will be processed

The *-l* option displays the commands in each file in the queue.

The *atrm* command removes files from the "at" queue. *Atrm* uses the ID number(s) from the *atq* command to remove the specific file(s). A user can only remove his own files.

### Examples

Use the following line to place a file in the queue:

```
at 8a jan 24 file
```

In the following command line, *file* will be executed a week from this Friday at 3:30 pm.

```
at 1530 fr week file
```

To remove a file from the queue, find out the ID number(s) with

```
atq
```

Then remove the file with *atrm* :

```
atrm idnumber
```

A sample *at* file might contain the line

```
lpr biglongfile
```

which sends *biglongfile* to the lineprinter.

### Files

```
/usr/spool/at/yy.ddd.hhhh.uu
```

Activity to be performed at hour *hhhh* of day *ddd* of year *yy*. *Uu* is a unique number.

```
/usr/spool/at/lasttimedone
```

Contains *hhhh* for last hour of activity.

```
/usr/spool/at/past
```

Contains old *at* files.

```
/usr/lib/atrun
```

Program that executes activities at the specified time.

### See Also

calendar(C), cron(C), pwd(C)

AT(C)

AT(C)

### Diagnostics

Complains about various syntax errors and times out of range.

### Notes

The directory */usr/spool/at/past* should be periodically emptied by the super-user.

Due to the granularity of the execution of */usr/lib/atrun*, there may be problems in scheduling things exactly 24 hours into the future.

## Name

`awk` - Searches for and processes a pattern in a file.

## Syntax

```
awk [ -Fc ] [ -f programfile | 'program' ] [ file ... ]
```

## Description

*Awk* scans each input *file* for lines that match patterns specified in *program* or in *programfile*. When a line of *file* matches a pattern, an associated action may be performed. *Awk* is useful for compiling information, performing arithmetic on input data, and for doing iterative or conditional processing.

The options are:

- `Fc`     Sets the field separator variable (FS) to the letter "c". The default field separators are tab and space.
- `f`       Causes *awk* to take its program from *programfile*.

The arguments are:

*programfile*

A file containing an *awk* program.

*program*   An *awk* program. Programs given on the command line must be enclosed in single quotation marks to prevent interpretation by the shell.

*file ...*   The name(s) of the file or files to be processed. If no filename is given, the standard output is used.

An *awk* program consists of statements in the form:

```
pattern { action }
```

Pattern-action statements may appear on the *awk* command line, or in an *awk* program file.

If no *pattern* is given, all lines in the input file are matched. If no *action* is given, each matched line is displayed on the standard output.

A pattern may be a literal string or a regular expression, or a combination of a regular expression and a field or variable separated by operators.

*Awk* also provides two patterns, BEGIN and END, that can be used to perform actions before the first line is read, and after the last line is read, respectively.

To select a range of lines, use two patterns on a single program line, separated by a comma.

An action is a sequence of statements separated by a semicolon, newline, or right brace. See *Statements* later in this section.

### *Variables*

In addition to variables declared and initialized by the user, *awk* has the following program variables:

NR	Number of records.
NF	Number of fields in a record.
FS	Input field separator.
OFS	Output field separator.
RS	Input record separator.
ORS	Output record separator.
\$0	The current record.
\$1, \$n	Fields in the current record.
OFM	The output format for numbers. The default is %6g.

### FILENAME

The name of the input file currently being read.

Arrays may be used to store data. Arrays do not need to be dimensioned before use. For example,  $w[i]$  denotes the  $i$ th item of array  $w$ .

### *Expressions*

A pattern match with a field or variable may be tested with the following operators:

- Matches the regular expression.

!~ Does not match the regular expression.

Awk processes relational expressions using the following operators:

< Less than  
<= Less than or equal to  
== Equal to  
!= Not equal to  
>= Greater than or equal to  
> Greater than

Patterns can be combined using the operators:

&& And  
| Or  
! Not

An empty expression-list stands for the whole line. Expressions take on string or numeric values as appropriate, and are built using the following operators:

+ Addition  
- Subtraction  
\* Multiplication  
/ Division  
% Modulo

Concatenation is indicated by a blank.

The following C operators are also available in expressions:

++ Increment  
-- Decrement  
+= Add and assign  
-= Subtract and assign  
\*= Multiply and assign

- `/=`     Divide and assign
- `%=`     Modulo and assign

### Statements

```

if ( conditional ) statement [ else statement ]
while ( conditional ) statement
for ( expression ; conditional ; expression ) statement
break
continue
{ [ statement ] ... }
variable = expression
print [ expression-list ] [ >expression ]
printf format [ , expression-list ] [ >expression ]
next #skip remaining patterns on input line

```

- `while`     Used the same as in C.
- `for`        The iterative construction. It can be used the same as in the C language, or as an array iterator.
- `break`     Similar to its C counterpart.
- `continue` Similar to its C counterpart.
- `print`     Prints its arguments on the standard output, or in a file if redirected.
- `printf`    Prints *expression-list* in the format specified in *format*. See *printf(5)*.
- `next`      Stops processing the current record and moves to the next record, if any.

Comments are preceded by a number sign (#).

### Functions

*awk* has the following built-in functions:

- `exit(x)`   Terminates the *awk* program. If *x* is given, this value is *awk*'s return value. If *x* is not given, 0 is returned. If the program has an END section, it is invoked before termination.
- `exp(x)`    Exponentiation of the value of *x*.
- `index(s, t)`  
Returns the starting position of the leftmost occurrence of *t* in *s*. If *t* is not a substring of *s*, then `index(s, t)` is 0.

`int(x)` Returns the largest integer less than or equal to *x*. If *x* is negative, its value is the smallest integer greater than or equal to *x*.

`length(x)` A function whose value is the number of characters in the string (*x*). With no arguments *length* is equivalent to `$0`.

`log(x)` Natural logarithm of *x*.

`split(x, y)` Assigns the fields of string *x* to successive elements of array *y*.

`sqrt(x)` Square root of *x*.

`substr(string, index, length)` Returns the substring of *string* that begins at *index* and is *length* characters long.

## Examples

The following displays lines in *file* longer than 72 characters:

```
awk '{length > 72}' file
```

The following prints the first two fields in opposite order:

```
awk '{ print $2, $1 }' file
```

The following adds up the first columns and prints their sum and average:

```
END { s += $1 }
      { print "sum is", s, " average is", s/NR }
```

The following prints the fields in *file* in reverse order:

```
awk { for (i = NF; i > 0; -i) print $i } file
```

The following *awk* program file will print all lines in the object file whose first field is different from the first field in the previous line:

```
$1 != prev { print; prev = $1 }
```

## See Also

`grep(C)`, `lex(CP)`, `sed(C)`  
*The XENIX Text Processing Guide*

## Notes

Input whitespace is not preserved on output if fields are involved.

There are no explicit conversions between numbers and strings. To force an expression to be treated as a number add 0 to it; to force it to be treated as a string concatenate the null string (") to it.

This command is more fully documented in the *XENIX Text Processing Guide*.

*BANNER* (C)

*BANNER* (C)

**Name**

banner - Prints large letters.

**Syntax**

banner strings

**Description**

*Banner* prints its arguments (each up to 10 characters long) in large letters on the standard output. This is useful for printing names at the front of printouts.

**Name**

`basename` - Removes directory names from pathnames.

**Syntax**

```
basename string [ suffix ]
```

**Description**

*Basename* deletes any prefix ending in / and the *suffix* (if present in *string*) from *string*, and prints the result on the standard output. The result is the "base" name of the file, i.e., the filename without any preceding directory path and without an extension. It is used inside substitution marks (``) in shell procedures to construct new filenames.

The related command *dirname* deletes the last level from *string* and prints the resulting path on the standard output.

**Examples**

The following command displays the filename `memos` on the standard output:

```
basename /usr/johnh/memos.old .old
```

The following shell procedure, when invoked with the argument `/usr/src/cmd/cat.c`, compiles the named file and moves the output to a file named `cat` in the current directory:

```
cc $1
mv a.out `basename $1 .c`
```

**See Also**

`dirname(C)`, `sh(C)`

**Name**

bc - Invokes a calculator.

**Syntax**

bc [ - c ] [ - l ] [ file ... ]

**Description**

*Bc* is an interactive processor for a language that resembles C but provides unlimited precision arithmetic. It takes input from any files given, then reads the standard input. The `- l` argument stands for the name of an arbitrary precision math library. The syntax for *bc* programs is as follows: L means the letters a- z, E means expression, S means statement.

**Comments:**

Enclosed in `/*` and `*/`

**Names:**

Simple variables: L  
 Array elements: L [ E ]  
 The words "ibase", "obase", and "scale"

**Other operands:**

Arbitrarily long numbers with optional sign and decimal point  
 ( E )  
 sqrt ( E )  
 length ( E )      Number of significant decimal digits  
 scale ( E )      Number of digits right of decimal point  
 L ( E , ... , E )

**Additive operators:**

+  
 -

**Multiplicative operators:**

\*  
 /  
 % (remainder)  
 ^ (exponentiation)

## Unary operators:

```
++
-- (prefix and postfix; apply to names)
```

## Relational operators:

```
==
<=
>=
!=
<
>
```

## Assignment operators:

```
=
=+
=-
=*
=/
=%
=^
```

## Statements:

```
E
{ S ; ... ; S }
if ( E ) S
while ( E ) S
for ( E ; E ; E ) S
null statement
break
quit
```

## Function definitions:

```
define L ( L , ..., L ) {
    auto L , ... , L
    S ; ... S
    return ( E )
}
```

Functions in - l math library:

```

s(x)  Sine
c(x)  Cosine
e(x)  Exponential
l(x)  Log
a(x)  Arctangent
j(n,x) Bessel function

```

All function arguments are passed by value.

The value of a statement that is an expression is printed unless the main operator is an assignment. Either semicolons or newlines may separate statements. Assignment to *scale* influences the number of digits to be retained on arithmetic operations in the manner of *dc(C)*. Assignments to *ibase* or *obase* set the input and output number radix respectively.

The same letter may be used as an array, a function, and a simple variable simultaneously. All variables are global to the program. "Auto" variables are pushed down during function calls. When using arrays as function arguments or defining them as automatic variables, empty square brackets must follow the array name.

*Bc* is actually a preprocessor for *dc(C)*, which it invokes automatically, unless the *-c* (compile only) option is present. If the *-c* option is present, the *dc* input is sent to the standard output instead.

### Example

The following defines a function to compute an approximate value of the exponential function:

```

scale = 20
define e(x){
    auto a, b, c, i, s
    a = 1
    b = 1
    s = 1
    for(i=1; i==1; i++){
        a = a*x
        b = b*i
        c = a/b
        if(c == 0) return(s)
        s = s + c
    }
}

```

BC(C)

BC(C)

The following prints the approximate values of the exponential function of the first ten integers:

```
for(i=1; i<=10; i+ +) e(i)
```

#### Files

/usr/lib/lib.bc Mathematical library

/usr/bin/dc Desk calculator proper

#### See Also

dc(C)  
*The XENIX User's Guide*

#### Notes

A *For* statement must have all three E's.

*Quit* is interpreted when read, not when executed.

**Name**

**bdiff** - Compares files too large for *diff*.

**Syntax**

**bdiff** *file1 file2* [ *n* ] [- *s*]

**Description**

*Bdiff* finds compares two files, finds lines that are different, and prints them on the standard output. It allows processing of files that are too large for *diff*. *Bdiff* splits each file into *n*-line segments, beginning with the first nonmatching lines, and invokes *diff* upon the corresponding segments. The arguments are:

- n* The number of lines *bdiff* splits each file into for processing. The default value is 3500. This is useful when 3500-line segments are too large for *diff*.
- *s* Suppresses printing of *bdiff* diagnostics. Note that this does not suppress printing of diagnostics from *diff*.

If *file1* (or *file2*) is a dash (-), the standard input is read.

The output of *bdiff* is exactly that of *diff*. Line numbers are adjusted to account for the segmenting of the files, and the output looks as if the files had been processed whole.

**Files**

/tmp/bd????

**See Also**

diff(C)

**Notes**

Because of the segmenting of the files, *bdiff* does not necessarily find a smallest sufficient set of file differences.

**Name**

bfs - Scans big files.

**Syntax**

bfs [ - ] name

**Description**

*Bfs* is like *ed*(C) except that it is read-only and processes much larger files. Files can be up to 1024K bytes and 32K lines, with up to 255 characters per line. *Bfs* is usually more efficient than *ed* for scanning a file, since the file is not copied to a buffer. It is most useful for identifying sections of a large file where *csplit*(C) can be used to divide it into more manageable pieces for editing.

Normally, the size of the file being scanned is printed, as is the size of any file written with the *w* command. The optional dash (-) suppresses printing of sizes. Input is prompted for with an asterisk (\*) by default. If a "P" and a RETURN are typed as in *ed*, then prompting is turned off. The "P" acts as a toggle, so prompting can be turned on again by entering another "P" and a RETURN. Note that messages are given in response to errors only if prompting is turned on.

All address expressions described under *ed* are supported. In addition, regular expressions may be surrounded with two symbols other than the standard slash (/) and (?): A greater-than sign (>) indicates downward search without wraparound, and a less-than sign (<) indicates upward search without wraparound. Since *bfs* uses a different regular expression-matching routine from *ed*, the regular expressions accepted are slightly wider in scope (see *regez*(S)). The differences from *ed* syntax include the fact that parentheses and curly braces are special and need not be escaped. Differences are listed below:

+ A regular expression followed by + means *one or more times*. For example, [0-9]+ is equivalent to [0-9][0-9]\*.

{m} {m,} {m,u}

Integer values enclosed in {} indicate the number of times the preceding regular expression is to be applied. *m* is the minimum number and *u* is a number, less than 256, which is the maximum. If only *m* is present (e.g., {m}), it indicates the exact number of times the regular expression is to be applied. {m,} is analogous to {m,infinity}. The plus (+) and star (\*) operations are equivalent to {1,} and {0,} respectively.

(...)\$*n* The value of the enclosed regular expression is to be returned. The value will be stored in the (*n+1*)th argument following the subject argument. At most ten enclosed regular expressions are allowed. *Regez* makes its assignments unconditionally.

(...) Parentheses are used for grouping. An operator, e.g. \*, +, {}, can work on a single character or a regular expression enclosed in parenthesis. For example, (a\*(cb+))\*\$0.

There is also a slight difference in mark names: only the letters "a" through "z" may be used, and all 26 marks are remembered.

The e, g, v, k, n, p, q, w, =, ! and null commands operate as described under *ed*. Commands such as ---, +++-, +++=, -12, and +4p are accepted. Note that 1,10p and 1,10 will both print the first ten lines. The f command only prints the name of the file being scanned; there is no remembered filename. The w command is independent of output diversion, truncation, or crunching (see the xo, xt and xc commands, below). The following additional commands are available:

#### xf *file*

Further commands are taken from the named *file*. When an end-of-file is reached, an interrupt signal is received, or an error occurs, reading resumes with the file containing the xf. Xf commands may be nested to a depth of 10.

#### xo [*file*]

Further output from the p and null commands is diverted to the named *file*. If *file* is missing, output is diverted to the standard output. Note that each diversion causes truncation or creation of the file.

#### : *label*

This positions a *label* in a command file. The *label* is terminated by a newline, and blanks between the : and the start of the *label* are ignored. This command may also be used to insert comments into a command file, since labels need not be referenced.

#### (. . .)xb/*regular expression/label*

A jump (either upward or downward) is made to *label* if the command succeeds. It fails under any of the following conditions:

1. Either address is not between 1 and \$.
2. The second address is less than the first.
3. The regular expression doesn't match at least one line in the specified range, including the first and last lines.

On success, dot (.) is set to the line matched and a jump is made to *label*. This command is the only one that doesn't issue an error message on bad addresses, so it may be used to test whether addresses are bad before other commands are executed. Note that the command

```
xb/^/ label
```

is an unconditional jump.

The *xb* command is allowed only if it is read from somewhere other than a terminal. If it is read from a pipe only a downward jump is possible.

#### *xt number*

Output from the *p* and null commands is truncated to a maximum of *number* characters. The initial number is 255.

#### *xv*[ *digit*] [ *spaces*] [ *value*]

The variable name is the specified *digit* following the *xv*. *Xv5100* or *xv5 100* both assign the value *100* to the variable *5*. *Xv61,100p* assigns the value *1,100p* to the variable *6*. To reference a variable, put a *%* in front of the variable name. For example, using the above assignments for variables *5* and *6*:

```
1,%5p
1,%5
%6
```

prints the first 100 lines.

```
g/%5/p
```

globally searches for the characters *100* and prints each line containing a match. To escape the special meaning of *%* a *\* must precede it. For example,

```
g/".*\%[cds]/p
```

could be used to match and list lines containing *printf* characters, decimal integers, or strings.

Another feature of the *xv* command is that the first line of output from a XENIX command can be stored into a variable. The only requirement is that the first character of *value* be a *!*. For example,

```
xv5!cat junk
!rm junk
!echo "%5"
xv6!expr %6 + 1
```

puts the current line in variable 5, prints it, and increments the variable 6 by one. To escape the special meaning of ! as the first character of *value*, precede it with a \. For example,

```
xv7\!date
```

stores the value !date into variable 7.

*xbz label*

*xbn label*

These two commands test the last saved *return code* from the execution of a XENIX command (!*command*) or nonzero value, respectively, and jump to the specified label. The two examples below search for the next five lines containing the string *size*:

```
xv55
:l
/size/
xv5!expr %5 - 1
!if 0%5 != 0 exit 2
xbn l
```

```
xv45
:l
/size/
xv4!expr %4 - 1
!if 0%4 = 0 exit 2
xbz l
```

*xc [switch]*

If *switch* is 1, output from the *p* and null commands is crunched; if *switch* is 0 it isn't. Without an argument, *xc* reverses *switch*. Initially, *switch* is set for no crunching. Crunched output has strings of tabs and blanks reduced to one blank and blank lines suppressed.

### See Also

csplit(C), ed(C), regex(S)

### Diagnostics

If prompting is turned off, a question mark (?) for errors in commands. When prompting is on, self-explanatory error messages appear.

**Name**

cal - Prints a calendar.

**Syntax**

cal [[ month ] year]

**Description**

*Cal* prints a calendar for the specified year. If a month is also specified, a calendar for that month only is printed. If no arguments are specified, the current, previous, and following months are printed, along with the current date and time. The *year* must be a number between 1 and 9999; *month* must be a number between 1 and 12 or enough characters to specify a particular month. For example, *May* must be given to distinguish it from *March*, but *S* is sufficient to specify *September*. If only a month string is given, only that month of the current year is printed.

**Notes**

Beware that "cal 84" refers to the year 84, not 1984.

The calendar produced is that for England and her colonies. Note that England switched from the Julian to the Gregorian calendar in September of 1752, at which time eleven days were excised from the year. To see the result of this switch, try "cal 9 1752".

**Name**

calendar - Invokes a reminder service.

**Syntax**

calendar [ - ]

**Description**

*Calendar* consults the file *calendar* in the user's current directory and mails him lines that contain today's or tomorrow's date. Most reasonable month-day dates, such as "Sep. 7," "september 7", and "9/7", are recognized, but not "7 September", "7/12" or "07/12".

On weekends "tomorrow" extends through Monday. Lines that contain the date of a Monday will be sent to the user on the previous Friday. This is not true for holidays.

When an argument is present, *calendar* does its job for every user who has a file *calendar* in his login directory and sends the user the results by *mail*(C). Normally this is done daily, in the early morning, under the control of *cron*(C).

**Files**

calendar

/usr/lib/calprog To figure out today's and tomorrow's dates

/etc/passwd

/tmp/cal\*

/usr/lib/crontab

**See Also**

cron(C), mail(C)

**Notes**

To get reminder service, a user's *calendar* file must have read permission for all.

**Name**

`cat` - Concatenates and displays files.

**Syntax**

```
cat [ - u ] [ - s ] file ...
```

**Description**

*Cat* reads each *file* in sequence and writes it on the standard output. If no input file is given, or if a single dash (-) is given, *cat* reads from the standard input. The options are:

- s Suppresses warnings about nonexistent files.
- u Causes the output to be unbuffered.

No input file may have the same name as the output file unless it is a special file.

**Examples**

The following example displays file on the standard output:

```
cat file
```

The following example concatenates **file1** and **file2** and places the result in **file3**:

```
cat file1 file2 >file3
```

The following example concatenates **file1** and appends it to **file2**:

```
cat file1 >> file2
```

**See Also**

`cp(C)`, `pr(C)`

Name

cd - Changes working directory.

Syntax

cd [ directory ]

Description

If specified, *directory* becomes the new working directory; otherwise the value of the shell parameter \$HOME is used. The process must have search (execute) permission in all directories (components) specified in the full pathname of *directory*.

Because a new process is created to execute each command, *cd* would be ineffective if it were written as a normal command; therefore, it is recognized and executed by the shell.

If the shell is reading its commands from a terminal, and the specified directory does not exist (or some component cannot be searched), spelling correction is applied to each component of *directory*, in a search for the "correct" name. The shell then asks whether or not to try and change directory to the corrected directory name; an answer of *n* means "no", and anything else is taken as "yes".

Notes

Wildcard designators do not work with the *cd* command.

See Also

pwd(C), sh(C), chdir(S)

**Name**

chgrp - Changes group ID.

**Syntax**

chgrp *group file ...*

**Description**

*Chgrp* changes the group ID of each *file* to *group*. The group may be either a decimal group ID or a group name found in the file */etc/group*.

**Files**

*/etc/passwd*

*/etc/group*

**See Also**

chown(C), chown(S), passwd(M), group(M)

**Notes**

Only the owner or the super-user can change the group ID of a file.

**Name**

chmod - Changes the access permissions of a file or directory.

**Syntax**

chmod *mode file ...*

**Description**

The *chmod* command changes the access permissions (or *mode*) of a specified file or directory. It is used to control file and directory access by users other than the owner and super-user. The *mode* may be an expression composed of letters and operators (called *symbolic mode*), or a number (called *absolute mode*).

A *chmod* command using *symbolic mode* has the form:

```
chmod [who] + - = [permission ...] filename
```

*Who* is one or any combination of the following letters:

- a Stands for "all users". If *who* is not indicated on the command line, a is the default. The definition of "all users" depends on the user's *umask*. See *umask*(C).
- g Stands for "group", all users who have the same group ID as the owner of the file or directory.
- o Stands for "others", all users on the system.
- u Stands for "user", the owner of the file or directory.

The operators are:

- + Adds permission
- Removes permission
- = Assigns the indicated permission and removes all other permissions (if any) for that *who*. If no permission is assigned, existing permissions are removed.

Permissions can be any combination of the following letters:

- x Execute (search permission for directories)
- r Read
- w Write

- s Sets owner or group ID on execution of the file to that of the owner of the file. This permission is only useful with *u* or *g*.
- t Saves text in memory upon execution. ("Sticky bit", see *chmod(8)*). Can only be set by the super-user.

Multiple symbolic modes may be given, separated by commas, on a single command line. See the following Examples section for sample permission settings.

A *chmod* command using *absolute mode* has the form:

```
chmod mode filename
```

where *mode* is an octal number constructed by performing logical OR on the following:

4000	Set user ID on execution
2000	Set group ID on execution
1000	Sets the sticky bit (see <i>chmod(8)</i> )
0400	Read by owner
0200	Write by owner
0100	Execute (search in directory) by owner
0040	Read by group
0020	Write by group
0010	Execute (search in directory) by group
0004	Read by others
0002	Write by others
0001	Execute (search in directory) by others
0000	No permissions

### Examples

#### *Symbolic Mode*

The following command gives all users execute permission for *file*:

```
chmod +x file
```

The following command removes read and write permission for group and others from *file*:

```
chmod go-rw file
```

The following command gives other users read and write permission for *file*:

```
chmod o+ rw file
```

The following command gives read permission to group and other:

```
chmod g+ r,o+ r file
```

#### *Absolute Mode*

The following command gives all users read, write and execute permission for *file*:

```
chmod 0777 file
```

The following command gives read and write permission to all users for *file*:

```
chmod 0666 file
```

The following command gives read and write permission to the owner of *file* only:

```
chmod 0600 file
```

#### See Also

ls(C), chmod(S)

#### Notes

The user's *umask* may affect the default settings.

The user ID, group ID and sticky bit settings are only useful for binary executable files. They have no effect on shell scripts.

*CHOWN*(C)

*CHOWN*(C)

**Name**

chown - Changes owner ID.

**Syntax**

chown owner file ...

**Description**

*Chown* changes the owner ID of the *files* to *owner*. The owner may be either a decimal user ID or a login name found in the file */etc/passwd*.

**Files**

*/etc/passwd*

*/etc/group*

**See Also**

chgrp(C), chown(S), group(M), passwd(M)

**Notes**

Only the owner or the super-user can change a file's owner or group ID.

**Name**

chroot - Changes root directory for command.

**Syntax**

chroot newroot command

**Description**

The given command is executed relative to the new root. The meaning of any initial slashes (/) in pathnames is changed for a command and any of its children to *newroot*. Furthermore, the initial working directory is *newroot*.

Notice that:

```
chroot newroot command >x
```

creates the file *x* relative to the original root, not the new one.

This command is restricted to the super-user.

The new root pathname is always relative to the current root even if a *chroot* is currently in effect. The *newroot* argument is relative to the current root of the running process. Note that it is not possible to change directories to what was formerly the parent of the new root directory; i.e., the *chroot* command supports the new root as an absolute root for the duration of the *command*. This means that *"/.."* is always equivalent to *"/"*.

**See Also**

chdir(S)

**Notes**

Exercise extreme caution when referencing special files in the new root file system.

*CMCHK (C)*

*CMCHK (C)*

**Name**

cmchk

**Synopsis**

cmchk

**Description**

Reports the hard disk block size (BSIZE) in bytes.

**Name**

cmp - Compares two files.

**Syntax**

```
cmp [ - l ] [ - s ] file1 file2
```

**Description**

*Cmp* compares two files and, if they are different, displays the byte and line number of the differences. If *file1* is -, the standard input is used.

The options are:

- l Prints the byte number (decimal) and the differing bytes (octal) for each difference.
- s Returns an exit code only, 0 for identical files, 1 for different files and 2 for an inaccessible or missing file.

This command should be used to compare binary files; use *diff*(C) or *diff9*(C) to compare text files.

**See Also**

comm(C), diff(C), diff3(C)

**Diagnostics**

Exit code 0 is returned for identical files, 1 for different files, and 2 for an inaccessible or missing argument.

**Name**

comm - Selects or rejects lines common to two sorted files.

**Syntax**

comm [ - [ 123 ] ] file1 file2

**Description**

*Comm* reads *file1* and *file2*, which should be ordered in ASCII collating sequence (see *sort(C)*), and produces a three-column output: lines only in *file1*; lines only in *file2*; and lines in both files. The filename - means the standard input.

Flags 1, 2, or 3 suppress printing of the corresponding column. Thus *comm - 12* prints only the lines common to the two files; *comm - 23* prints only lines in the first file but not in the second; *comm - 123* is a no-op.

**See Also**

cmp(C), diff(C), sort(C), uniq(C)

**Name**

copy - Copies groups of files.

**Syntax**

copy [ option ] ... source ... dest

**Description**

The *copy* command copies the contents of directories to another directory. It is possible to copy whole file systems since directories are made when needed.

If files, directories, or special files do not exist at the destination, then they are created with the same modes and flags as the source. In addition, the super-user may set the user and group ID. The owner and mode are not changed if the destination file exists. Note that there may be more than one source directory. If so, the effect is the same as if the *copy* command had been issued for each source directory with the the same destination directory for each copy.

Under 3.0, options do not have to be given as separate arguments, and may appear in any order, even after the other arguments. The arguments are:

- a Asks the user before attempting a copy. If the response does not begin with a "y", then a copy is not done. This option also sets the -ad option.
- l Uses links instead whenever they can be used. Otherwise a copy is done. Note that links are never done for special files or directories.
- n Requires the destination file to be new. If not, then the *copy* command does not change the destination file. The -n flag is meaningless for directories. For special files an -n flag is assumed (i.e., the destination of a special file must not exist).
- o If set then every file copied has its owner and group set to those of the source. If not set, then the file's owner is the user who invoked the program.
- m If set, then every file copied has its modification time and access time set to that of the source. If not set, then the modification time is set to the time of the copy.
- r If set, then every directory is recursively examined as it is encountered. If not set then any directories that are found are ignored.

- ad** Asks the user whether an **-r** flag applies when a directory is discovered. If the answer does not begin with a "y", then the directory is ignored.
- v** If the verbose option is set messages are printed that reveal what the program is doing.
- source** This may be a file, directory or special file. It must exist. If it is not a directory, then the results of the command are the same as for the *cp* command.
- dest** The destination must be either a file or directory that is different from the source.

If the source and destination are anything but directories, then *copy* acts just like a *cp* command. If both are directories, then *copy* copies each file into the destination directory according to the flags that have been set.

#### Notes

Special device files can be copied. When they are copied any data associated with the specified device is *not* copied.

**Name**

cp - Copies files.

**Syntax**

cp file1 file2

cp files directory

**Description**

There are two ways to use the *cp* command. With the first way, *file1* is copied to *file2*. Under no circumstance can *file1* and *file2* be identical. With the second way, *directory* is the location of a directory into which one or more *files* are copied.

**See Also**

copy(C), cpio(C), ln(C), mv(C), rm(C), chmod(S)

**Notes**

Special device files can be copied. If the file is a named pipe, then the data in the pipe is copied to a regular file. Similarly, if the file is a device, then the file is read until the end-of-file is reached, and that data is copied to a regular file. It is illegal to copy a directory to a file.

**Name**

**cpio** - Copies file archives in and out.

**Syntax**

**cpio -o** [ **acBv** ]

**cpio -i** [ **Bcdmrtuv** ] [ **patterns** ]

**cpio -p** [ **adlmrv** ] **directory**

**Description**

*Cpio -o* (copy out) reads the standard input to obtain a list of pathnames and copies those files onto the standard output together with pathname and status information.

*Cpio -i* (copy in) extracts from the standard input (which is assumed to be the product of a previous *cpio -o*) the names of files selected by zero or more *patterns* given in the name-generating notation of *sh* (C). In *patterns*, the special characters *?*, *\**, and *[...]* match the slash ( / ) character. The default for *patterns* is *\** (i.e., select all files).

Remember to escape special characters to prevent expansion by the shell.

*Cpio -p* (*pass*) copies out and in during a single operation. Destination pathnames are interpreted relative to the named *directory*.

The meanings of the available options are:

- a Resets access times of input files after they have been copied.
- B Blocks input/output 5,120 bytes to the record (does not apply to the *pass* option; meaningful only with data directed to or from raw devices).
- d Directories are created as needed.
- c Writes header information in ASCII character form for portability.
- r Interactively renames files. If the user types a null line, the file is skipped.
- t Prints a table of contents of the input. No files are created.
- u Copies unconditionally (normally an older file will not replace a newer file with the same name).
- v Verbose: causes a list of filenames to be printed. When used with the *-t* option, the table of contents looks like

the output of an `ls -l` command (see `ls(C)`).

- l Whenever possible, links files rather than copying them. Usable only with the `-p` option.
- m Retains previous file modification time. This option is ineffective on directories that are being copied.

#### Examples

The first example below copies the contents of a directory into an archive; the second duplicates a directory hierarchy:

```
ls | cpio -o >/dev/fd
cd olddir
find . -print | cpio -pdl newdir
```

Or:

```
find . -print | cpio -oB >/dev/rfd
```

#### See Also

`ar(CP)`, `find(C)`, `cpio(F)`

#### Notes

Pathnames are restricted to 128 characters. If there are too many unique linked files, the program runs out of memory to keep track of them and thereafter linking information is lost. Only the super-user can copy special files.

**Name**

`cron` - Executes commands at specified times.

**Syntax**

`/etc/cron`

**Description**

*Cron* is the clock daemon that executes commands at specified dates and times according to the instructions in the file `/usr/lib/crontab`. Because *cron* never exits, it should be executed only once. This is best done by running *cron* from the initialization process through the file `/etc/rc`.

The file `crontab` consists of lines of six fields each. The fields are separated by spaces or tabs. The first five are integer patterns that specify the minute (0-59), hour (0-23), day of the month (1-31), month of the year (1-12), and day of the week (0-6, with 0=Sunday). Each of these patterns may contain:

- A number in the (respective) range indicated above
- Two numbers separated by a minus (indicating an inclusive range)
- A list of numbers separated by commas (meaning all of these numbers)
- An asterisk (meaning all legal values)

The sixth field is a string that is executed by the shell at the specified time(s). A % in this field is translated into a newline character. Only the first line (up to a % or end-of-line) of the command field is executed by the shell. The other lines are made available to the command as standard input.

*Cron* examines `crontab` periodically to see if it has changed; if it has, *cron* reads it. Thus it takes only a short while for entries to become effective.

**Examples**

An example `crontab` file follows:

```
30 4 * * * /etc/sa -s > /dev/null
0 4 * * * calendar -
15 4 * * * find /usr/preserve -mtime +7 -a -exec rm -f {} ;
30 4 1 1 1 /usr/lib/uucp/cleanlog
```

```
40 4 * * * find / -name '#*' -atime + 3 -exec rm -f {} ;
0,5,10,15,20,25,30,35,40,45,50,55 * * * * /usr/lib/atrun
0,10,20,30,40,50 * * * */etc/dmesg - >>/usr/adm/messages
1,21,41 * * * * (echo -n ' '; date; echo ) >/dev/console
```

A history of all actions by *cron* can be recorded in */usr/lib/cronlog*. This logging occurs only if the variable *CRONLOG* in */etc/default/cron* is set to YES. By default this value is set to NO and no logging occurs. If logging should be turned on, be sure to monitor the size of */usr/lib/crontab* so that it doesn't unreasonably consume disk space.

### Files

```
/usr/lib/crontab
/usr/lib/cronlog
/etc/default/cron
```

### See Also

```
sh(C)
```

### Notes

*Cron* reads *crontab* only when it has changed, but it reads the in-core version of that table periodically.

**Name**

crypt - Encodes and decodes files.

**Syntax**

crypt [ password ]

**Description**

*Crypt* reads from the standard input and writes on the standard output. The *password* is a key that selects a particular transformation. If no *password* is given, *crypt* demands a key from the terminal and turns off printing while the key is being typed in. *Crypt* encrypts and decrypts with the same key.

Files encrypted by *crypt* are compatible with those created by the editor *ed* (C) in encryption mode.

The security of encrypted files depends on three factors: the fundamental method of encryption must be hard to solve; direct search of the key space must be infeasible; "sneak paths" by which keys or clear text can become visible must be minimized.

The transformation of a key into the internal settings of the machine is deliberately designed to be expensive, i.e. to take a substantial fraction of a second to compute. However, if keys are restricted to (say) three lowercase letters, then encrypted files can be read by expending less than five minutes of machine time.

Since the key is an argument to the *crypt* command, it is potentially visible to users executing *ps*(C) or a derivative. To minimize this possibility, *crypt* destroys any record of the key immediately upon entry. The choice of keys and key security are the most vulnerable aspect of *crypt*.

**Example**

The following will print the contents of the file *clear*:

```
crypt key <clear >cypher
```

```
crypt key <cypher | pr
```

**See Also**

ed(C), makekey(M)

## Notes

If output is piped to *nroff*(CT) and the encryption key is *not* given on the command line, *crypt* can leave terminal modes in a strange state (see *stty*(C)).

*Crypt* implements a one-rotor machine designed along the lines of the German Enigma, but with a 256-element rotor. Methods of attack on such machines are known, but not widely; moreover the amount of work required is likely to be large.

**Name**

`csh` - Invokes a shell command interpreter with C-like syntax.

**Syntax**

`csh [ - cefinstvVxX ] [ arg ... ]`

**Description**

*Csh* is a command language interpreter. It begins by executing commands from the file `.cshrc` in the home directory of the invoker. If this is a login shell, then it also executes commands from the file `.login` there. In the normal case, the shell will then begin reading commands from the terminal, prompting with `%`. Processing of arguments and the use of the shell to process files containing command scripts will be described later.

The shell then repeatedly performs the following actions: a line of command input is read and broken into *words*. This sequence of words is placed on the command history list and then parsed. Finally each command in the current line is executed.

When a login shell terminates, it executes commands from the file `.logout` in the user's home directory.

**Lexical structure**

The shell splits input lines into words at blanks and tabs with the following exceptions. The characters `&`, `|`, `;`, `<`, `>`, `(`, `)`, form separate words. If doubled in `&&`, `||`, `<<`, or `>>`, these pairs form single words. These parser metacharacters may be made part of other words, or prevented their special meaning, by preceding them with `\`. A newline preceded by a `\` is equivalent to a blank.

In addition strings enclosed in matched pairs of quotations, `'`, ``` or `"`, form parts of a word; metacharacters in these strings, including blanks and tabs, do not form separate words. These quotations have semantics to be described subsequently. Within pairs of `'` or `"` characters a newline preceded by a `\` gives a true newline character.

When the shell's input is not a terminal, the character `#` introduces a comment which continues to the end of the input line. It does not have this special meaning when preceded by `\` and placed inside the quotation marks `'`, ```, and `"`.

**Commands**

A simple command is a sequence of words, the first of which specifies the command to be executed. A simple command or a sequence

of simple commands separated by | characters forms a pipeline. The output of each command in a pipeline is connected to the input of the next. Sequences of pipelines may be separated by ;, and are then executed sequentially. A sequence of pipelines may be executed without waiting for it to terminate by following it with an &. Such a sequence is automatically prevented from being terminated by a hangup signal; the *nohup* command need not be used.

Any of the above may be placed in parentheses to form a simple command (which may be a component of a pipeline, etc.) It is also possible to separate pipelines with || or && indicating, as in the C language, that the second is to be executed only if the first fails or succeeds respectively. (See *Expressions*.)

### *Substitutions*

The following sections describe the various transformations the shell performs on the input in the order in which they occur.

#### *History Substitutions*

History substitutions can be used to reintroduce sequences of words from previous commands, possibly performing modifications on these words. Thus history substitutions provide a generalization of a *redo* function.

History substitutions begin with the character ! and may begin anywhere in the input stream if a history substitution is not already in progress. This ! may be preceded by a \ to prevent its special meaning; a ! is passed unchanged when it is followed by a blank, tab, newline, =, or (. History substitutions also occur when an input line begins with ^. This special abbreviation will be described later.

Any input line which contains history substitution is echoed on the terminal before it is executed as it could have been typed without history substitution.

Commands input from the terminal which consist of one or more words are saved on the history list, the size of which is controlled by the *history* variable. The previous command is always retained. Commands are numbered sequentially from 1.

For example, consider the following output from the history command:

```

9 write michael
10 ex write.c
11 cat oldwrite.c
12 diff *write.c
```

The commands are shown with their event numbers. It is not usually necessary to use event numbers, but the current event number can be made part of the prompt by placing a ! in the prompt string.

With the current event 13 we can refer to previous events by event number !11, relatively as in !- 2 (referring to the same event), by a prefix of a command word as in !d for event 12 or !w for event 9, or by a string contained in a word in the command as in !?mic? also referring to event 9. These forms, without further modification, simply reintroduce the words of the specified events, each separated by a single blank. As a special case !! refers to the previous command; thus !! alone is essentially a *redo*. The form !# references the current command (the one being typed in). It allows a word to be selected from further left in the line, to avoid retyping a long name, as in !#:1.

To select words from an event we can follow the event specification by a : and a designator for the desired words. The words of a input line are numbered from 0, the first (usually command) word being 0, the second word (first argument) being 1, and so on. The basic word designators are:

- 0 First (command) word
- n  
nth argument
- ^ First argument, i.e. 1
- \$ Last argument
- % Word matched by (immediately preceding) ?e? search
- x- y  
Range of words
- y Abbreviates 0- y
- \* Abbreviates ^- \$, or nothing if only 1 word in event
- x\* Abbreviates x- \$
- x-  
Like 'x\*' but omitting word \$

The : separating the event specification from the word designator can be omitted if the argument selector begins with a !, \$, \* - or %. After the optional word designator can be placed a sequence of modifiers, each preceded by a :. The following modifiers are defined:

- h Removes a trailing pathname component
- r Removes a trailing .xxx component
- s/l/r/  
Substitutes l for r

- t Removes all leading pathname components
- & Repeats the previous substitution
- g Applies the change globally, prefixing the above
- p Prints the new command but do not execute it
- q Quotes the substituted words, preventing substitutions
- x Like q, but breaks into words at blanks, tabs, and newlines

Unless preceded by a g the modification is applied only to the first modifiable word. In any case it is an error for no word to be applicable.

The left side of substitutions are not regular expressions in the sense of the editors, but rather strings. Any character may be used as the delimiter in place of /; a \ quotes the delimiter into the / and r strings. The character & in the right side is replaced by the text from the left. A \ quotes & also. A null / uses the previous string either from a / or from a contextual scan string s in !?s?. The trailing delimiter in the substitution may be omitted if a newline follows immediately as may the trailing ? in a contextual scan.

A history reference may be given without an event specification, e.g. !\$ . In this case the reference is to the previous command unless a previous history reference occurred on the same line in which case this form repeats the previous reference. Thus !?foo? !\$ gives the first and last arguments from the command matching ?foo? .

A special abbreviation of a history reference occurs when the first nonblank character of an input line is a ^ . This is equivalent to !:s^ , providing a convenient shorthand for substitutions on the text of the previous line. Thus ^b^lib fixes the spelling of lib in the previous command. Finally, a history substitution may be surrounded with { and } if necessary to insulate it from the characters that follow. Thus, after ls - ld ^paul we might do !{l}a to do ls - ld ^paula, while !la would look for a command starting la.

#### *Quotations With ' and "*

The quotation of strings by ' and " can be used to prevent all or some of the remaining substitutions. Strings enclosed in ' are prevented any further interpretation. Strings enclosed in " are variable and command expansion may occur.

In both cases, the resulting text becomes (all or part of) a single word; only in one special case (see *Command Substitution* below) does a " quoted string yield parts of more than one word; ' quoted strings never do.

*Alias Substitution*

The shell maintains a list of aliases which can be established, displayed and modified by the *alias* and *unalias* commands. After a command line is scanned, it is parsed into distinct commands and the first word of each command, left-to-right, is checked to see if it has an alias. If it does, then the text which is the alias for that command is reread with the history mechanism available as though that command were the previous input line. The resulting words replace the command and argument list. If no reference is made to the history list, then the argument list is left unchanged.

Thus if the alias for *ls* is *ls - l* the command "*ls /usr*" would map to "*ls - l /usr*". Similarly if the alias for *lookup* was "*grep ! /etc/passwd*" then "*lookup bill*" would map to "*grep bill /etc/passwd*".

If an alias is found, the word transformation of the input text is performed and the aliasing process begins again on the reformed input line. Looping is prevented if the first word of the new text is the same as the old by flagging it to prevent further aliasing. Other loops are detected and cause an error.

Note that the mechanism allows aliases to introduce parser metasyntax. Thus we can alias print "*pr \!\* |lpr*" to make a command that paginates its arguments to the lineprinter.

*Variable Substitution*

The shell maintains a set of variables, each of which has as value a list of zero or more words. Some of these variables are set by the shell or referred to by it. For instance, the *argv* variable is an image of the shell's argument list, and words of this variable's value are referred to in special ways.

The values of variables may be displayed and changed by using the *set* and *unset* commands. Of the variables referred to by the shell a number are toggles; the shell does not care what their value is, only whether they are set or not. For instance, the *verbose* variable is a toggle which causes command input to be echoed. The setting of this variable results from the *- v* command line option.

Other operations treat variables numerically. The at-sign (@) command permits numeric calculations to be performed and the result assigned to a variable. However, variable values are always represented as (zero or more) strings. For the purposes of numeric operations, the null string is considered to be zero, and the second and subsequent words of multiword values are ignored.

After the input line is aliased and parsed, and before each command is executed, variable substitution is performed, keyed by dollar sign (\$) characters. This expansion can be prevented by preceding the dollar sign with a backslash (\) except within double quotation marks

(`?`) where it *always* occurs, and within single quotation marks (`'`) where it *never* occurs. Strings quoted by back quotation marks (```) are interpreted later (see *Command substitution* below) so dollar sign substitution does not occur there until later, if at all. A dollar sign is passed unchanged if followed by a blank, tab, or end-of-line.

Input and output redirections are recognized before variable expansion, and are variable expanded separately. Otherwise, the command name and entire argument list are expanded together. It is thus possible for the first (command) word to generate more than one word, the first of which becomes the command name, and the rest of which become arguments.

Unless enclosed in double quotation marks or given the `:q` modifier, the results of variable substitution may eventually be command and filename substituted. Within double quotation marks (`"`) a variable whose value consists of multiple words expands to a portion of a single word, with the words of the variable's value separated by blanks. When the `:q` modifier is applied to a substitution the variable expands to multiple words with each word separated by a blank and quoted to prevent later command or filename substitution.

The following sequences are provided for introducing variable values into the shell input. Except as noted, it is an error to reference a variable which is not set.

`$name`  
`${name}`

Are replaced by the words of the value of variable *name*, each separated by a blank. Braces insulate *name* from following characters which would otherwise be part of it. Shell variables have names consisting of up to 20 letters, digits, and underscores.

If *name* is not a shell variable, but is set in the environment, then that value is returned (but `:` modifiers and the other forms given below are not available in this case).

`$name[selector]`  
`${name[selector]}`

May be used to select only some of the words from the value of *name*. The selector is subjected to `$` substitution and may consist of a single number or two numbers separated by a `-`. The first word of a variable's value is numbered 1. If the first number of a range is omitted it defaults to 1. If the last member of a range is omitted it defaults to  `$#name`. The selector `*` selects all words. It is not an error for a range to be empty if the second argument is omitted or in range.

`$#name`  
`${#name}`

Gives the number of words in the variable. This is useful for later use in a `[selector]`.

**\$0** Substitutes the name of the file from which command input is being read. An error occurs if the name is not known.

**\$number**

**#{number}**

Equivalent to **\$argv[number]**.

**\$\*** Equivalent to **\$argv[\*]**.

The modifiers **:h**, **:t**, **:r**, **:q** and **:x** may be applied to the substitutions above as may **:gh**, **:gt** and **:gr**. If braces **{ }** appear in the command form then the modifiers must appear within the braces. Only one : modifier is allowed on each **\$** expansion.

The following substitutions may not be modified with **:** modifiers.

**\$? name**

**\${? name}**

Substitutes the string **1** if **name** is set, **0** if it is not.

**\$?0** Substitutes **1** if the current input filename is known, **0** if it is not.

**\$\$** Substitutes the (decimal) process number of the (parent) shell.

#### *Command and Filename Substitution*

Command and filename substitution are applied selectively to the arguments of built-in commands. This means that portions of expressions which are not evaluated are not subjected to these expansions. For commands which are not internal to the shell, the command name is substituted separately from the argument list. This occurs very late, after input-output redirection is performed, and in a child of the main shell.

#### *Command Substitution*

Command substitution is indicated by a command enclosed in back quotation marks. The output from such a command is normally broken into separate words at blanks, tabs and newlines, with null words being discarded, this text then replacing the original string. Within double quotation marks, only newlines force new words; blanks and tabs are preserved.

In any case, the single final newline does not force a new word. Note that it is thus possible for a command substitution to yield only part of a word, even if the command outputs a complete line.

#### *Filename Substitution*

If a word contains any of the characters **\***, **?**, **[** or **{** or begins with the character **~**, then that word is a candidate for filename substitution, also known as globbing. This word is then regarded as a

pattern, and replaced with an alphabetically sorted list of filenames which match the pattern. In a list of words specifying filename substitution it is an error for no pattern to match an existing filename, but it is not required for each pattern to match. Only the metacharacters \*, ?, and [ imply pattern matching, the characters ~ and { being more akin to abbreviations.

In matching filenames, the character . at the beginning of a filename or immediately following a /, as well as the character / must be matched explicitly. The character \* matches any string of characters, including the null string. The character ? matches any single character. The sequence [...] matches any one of the characters enclosed. Within [...], a pair of characters separated by - matches any character lexically between the two.

The character ~ at the beginning of a filename is used to refer to home directories. Standing alone it expands to the invoker's home directory as reflected in the value of the variable *home*. When followed by a name consisting of letters, digits and - characters the shell searches for a user with that name and substitutes their home directory; thus ~ken might expand to /usr/ken and ~ken/chmach to /usr/ken/chmach. If the character ~ is followed by a character other than a letter or / or appears not at the beginning of a word, it is left unchanged.

The metanotation a{b,c,d}e is a shorthand for abe ace ade. Left to right order is preserved, with results of matches being sorted separately at a low level to preserve this order. This construct may be nested. Thus ~source/s1/{oldls,ls}.c expands to /usr/source/s1/oldls.c /usr/source/s1/ls.c, whether or not these files exist, without any chance of error if the home directory for source is /usr/source. Similarly ../{memo,\*box} might expand to ../memo ../box ../mbox. (Note that memo was not sorted with the results of matching \*box.) As a special case {, } and {} are passed unchanged.

### *Input/Output*

The standard input and standard output of a command may be redirected with the following syntax:

< name

Opens file *name* (which is first variable, command and filename expanded) as the standard input.

<< word

Reads the shell input up to a line which is identical to *word*. *Word* is not subjected to variable, filename or command substitution, and each input line is compared to *word* before any substitutions are done on this input line. Unless a quoting backslash, double, or single quotation mark, or a back quotation mark appears in *word*, variable and command substitution is performed on the intervening lines, allowing \ to quote \$, \ and ` . Commands which are substituted have all blanks, tabs,

and newlines preserved, except for the final newline which is dropped. The resulting text is placed in an anonymous temporary file which is given to the command as standard input.

```
> name
>! name
>& name
>&! name
```

The file *name* is used as standard output. If the file does not exist then it is created; if the file exists, it is truncated, and its previous contents is lost.

If the variable *noclobber* is set, then the file must not already exist or it must be a character special file (e.g. a terminal or */dev/null*) or an error results. This helps prevent accidental destruction of files. In this case the *!* forms can be used and suppress this check.

The forms involving *&* route the diagnostic output into the specified file as well as the standard output. *Name* is expanded in the same way as *<* input filenames are.

```
>> name
>>& name
>>! name
>>&! name
```

Uses file *name* as standard output like *>* but places output at the end of the file. If the variable *noclobber* is set, then it is an error for the file not to exist unless one of the *!* forms is given. Otherwise similar to *>*.

If a command is run detached (followed by *&*) then the default standard input for the command is the empty file */dev/null*. Otherwise the command receives the environment in which the shell was invoked as modified by the input-output parameters and the presence of the command in a pipeline. Thus, unlike some previous shells, commands run from a file of shell commands have no access to the text of the commands by default; rather they receive the original standard input of the shell. The *<<* mechanism should be used to present inline data. This permits shell command scripts to function as components of pipelines and allows the shell to block read its input.

Diagnostic output may be directed through a pipe with the standard output. Simply use the form *|&* rather than just *|*

### *Expressions*

A number of the built-in commands (to be described later) take expressions, in which the operators are similar to those of C, with the same precedence. These expressions appear in the *@*, *exit*, *if*, and *while* commands. The following operators are available:

```

|| && | ^ & == != <= >= < > << >>
+ - * / % ! ` ( )

```

Here the precedence increases to the right, == and !=, <=, >=, <, and >, << and >>, + and -, \*/ and % being, in groups, at the same level. The == and != operators compare their arguments as strings, all others operate on numbers. Strings which begin with 0 are considered octal numbers. Null or missing arguments are considered 0. The result of all expressions are strings, which represent decimal numbers. It is important to note that no two components of an expression can appear in the same word; except when adjacent to components of expressions which are syntactically significant to the parser (& | < > ( ) ) they should be surrounded by spaces.

Also available in expressions as primitive operands are command executions enclosed in { and } and file enquiries of the form - l name where l is one of:

r	Read access
w	Write access
x	Execute access
e	Existence
o	Ownership
z	Zero size
f	Plain file
d	Directory

The specified name is command and filename expanded, then tested to see if it has the specified relationship to the real user. If the file does not exist or is inaccessible then all enquiries return false, i.e. 0. Command executions succeed, returning true, i.e. 1, if the command exits with status 0, otherwise they fail, returning false, i.e. 0. If more detailed status information is required then the command should be executed outside of an expression and the variable *status* examined.

### Control Flow

The shell contains a number of commands which can be used to regulate the flow of control in command files (shell scripts) and (in limited but useful ways) from terminal input. These commands all operate by forcing the shell to reread or skip in its input and, due to the implementation, restrict the placement of some of the commands.

The *foreach*, *switch*, and *while* statements, as well as the *if-then-else* form of the *if* statement require that the major keywords appear in a single simple command on an input line as shown below.

If the shell's input is not seekable, the shell buffers up input whenever a loop is being read and performs seeks in this internal buffer to accomplish the rereading implied by the loop. (To the extent that this allows, backward goto commands will succeed on nonseekable

inputs.)

### *Built-In Commands*

Built-in commands are executed within the shell. If a built-in command occurs as any component of a pipeline except the last then it is executed in a subshell.

**alias**

**alias name**

**alias name wordlist**

The first form prints all aliases. The second form prints the alias for *name*. The final form assigns the specified *wordlist* as the alias of *name*; *wordlist* is command and filename substituted. *Name* is not allowed to be *alias* or *unalias*

**break**

Causes execution to resume after the *end* of the nearest enclosing *foreach* or *while* statement. The remaining commands on the current line are executed. Multilevel breaks are thus possible by writing them all on one line.

**breaksw**

Causes a break from a *switch*, resuming after the *endsw*.

**case label:**

A label in a *switch* statement as discussed below.

**cd**

**cd name**

**chdir**

**chdir name**

Changes the shell's working directory to directory *name*. If no argument is given then changes to the home directory of the user. If *name* is not found as a subdirectory of the current directory (and does not begin with */*, *./*, or *../*), then each component of the variable *cdpath* is checked to see if it has a subdirectory *name*. Finally, if all else fails but *name* is a shell variable whose value begins with */*, then this is tried to see if it is a directory.

**continue**

Continues execution of the nearest enclosing *while* or *foreach*. The rest of the commands on the current line are executed.

**default:**

Labels the default case in a *switch* statement. The default should come after all *case* labels.

**echo wordlist**

The specified words are written to the shell's standard output. An *\c* causes the echo to complete without printing a newline. An *\n* in *wordlist* causes a newline to be printed. Otherwise the

words are echoed, separated by spaces.

else  
end  
endif  
endsw

See the description of the *foreach*, *if*, *switch*, and *while* statements below.

exec command

The specified command is executed in place of the current shell.

exit  
exit(expr)

The shell exits either with the value of the *status* variable (first form) or with the value of the specified *expr* (second form).

foreach name (wordlist)

...  
end

The variable *name* is successively set to each member of *wordlist* and the sequence of commands between this command and the matching *end* are executed. (Both *foreach* and *end* must appear alone on separate lines.)

The built-in command *continue* may be used to continue the loop prematurely and the built-in command *break* to terminate it prematurely. When this command is read from the terminal, the loop is read up once prompting with ? before any statements in the loop are executed.

glob wordlist

Like *echo* but no \ escapes are recognized and words are delimited by null characters in the output. Useful for programs which wish to use the shell to filename expand a list of words.

goto word

The specified *word* is filename and command expanded to yield a string of the form label. The shell rewinds its input as much as possible and searches for a line of the form label: possibly preceded by blanks or tabs. Execution continues after the specified line.

history

Displays the history event list.

if (expr) command

If the specified expression evaluates true, then the single *command* with arguments is executed. Variable substitution on *command* happens early, at the same time it does for the rest of the *if* command. *Command* must be a simple command, not a pipeline, a command list, or a parenthesized command list.

Input/output redirection occurs even if *expr* is false, when command is not executed.

```
if (expr) then
...
else if (expr2) then
...
else
...
endif
```

If the specified *expr* is true then the commands to the first *else* are executed; else if *expr2* is true then the commands to the second *else* are executed, etc. Any number of *else-if* pairs are possible; only one *endif* is needed. The *else* part is likewise optional. (The words *else* and *endif* must appear at the beginning of input lines; the *if* must appear alone on its input line or after an *else*.) *logout*

Terminates a login shell. The only way to log out if *ignoreof* is set.

```
nice
nice + number
nice command
nice + number command
```

The first form sets the *nice* for this shell to 4. The second form sets the *nice* to the given number. The final two forms run command at priority 4 and *number* respectively. The super-user may specify negative niceness by using "nice - number ...." The command is always executed in a subshell, and the restrictions placed on commands in simple *if* statements apply.

```
nohup
nohup command
```

The first form can be used in shell scripts to cause hangups to be ignored for the remainder of the script. The second form causes the specified command to be run with hangups ignored. Unless the shell is running detached, *nohup* has no effect. All processes detached with *&* are automatically *nohup*ed. (Thus, *nohup* is not really needed.)

```
onintr
onintr -
onintr label
```

Controls the action of the shell on interrupts. The first form restores the default action of the shell on interrupts which is to terminate shell scripts or to return to the terminal command input level. The second form *onintr -* causes all interrupts to be ignored. The final form causes the shell to execute a *goto* label when an interrupt is received or a child process terminates because it was interrupted.

In any case, if the shell is running detached and interrupts are being ignored, all forms of *onintr* have no meaning and interrupts continue to be ignored by the shell and all invoked commands.

### rehash

Causes the internal hash table of the contents of the directories in the *path* variable to be recomputed. This is needed if new commands are added to directories in the *path* while you are logged in. This should only be necessary if you add commands to one of your own directories, or if a systems programmer changes the contents of one of the system directories.

### repeat count command

The specified *command* which is subject to the same restrictions as the *command* in the one line *if* statement above, is executed *count* times. I/O redirections occurs exactly once, even if *count* is 0.

### set

set name

set name=word

set name[index]=word

set name=(wordlist)

The first form of the command shows the value of all shell variables. Variables which have other than a single word as value print as a parenthesized word list. The second form sets *name* to the null string. The third form sets *name* to the single *word*. The fourth form sets the *index*th component of *name* to *word*; this component must already exist. The final form sets *name* to the list of words in *wordlist*. In all cases the value is command and filename expanded.

These arguments may be repeated to set multiple values in a single set command. Note however, that variable expansion happens for all arguments before any setting occurs.

### setenv name value

Sets the value of the environment variable *name* to be *value*, a single string. Useful environment variables are **TERM**, the type of your terminal and **SHELL**, the shell you are using.

### shift

shift variable

The members of *argv* are shifted to the left, discarding *argv[1]*. It is an error for *argv* not to be set or to have less than one word as value. The second form performs the same function on the specified variable.

### source name

The shell reads commands from *name*. *Source* commands may be nested; if they are nested too deeply the shell may run out of file descriptors. An error in a *source* at any level terminates

all nested *source* commands. Input during *source* commands is never placed on the history list.

```
switch (string)
case str1:
...
    breaksw
...
default:
...
    breaksw
endsw
```

Each case label is successively matched, against the specified *string* which is first command and filename expanded. The file metacharacters \*, ?, and [...] may be used in the case labels, which are variable expanded. If none of the labels match before a default label is found, then the execution begins after the default label. Each case label and the default label must appear at the beginning of a line. The command *breaksw* causes execution to continue after the *endsw*. Otherwise control may fall through case labels and default labels, as in C. If no label matches and there is no default, execution continues after the *endsw*.

```
time
time command
```

With no argument, a summary of time used by this shell and its children is printed. If arguments are given the specified simple command is timed and a time summary as described under the *time* variable is printed. If necessary, an extra shell is created to print the time statistic when the command completes.

```
umask
umask value
```

The file creation mask is displayed (first form) or set to the specified value (second form). The mask is given in octal. Common values for the mask are 002 giving all access to the group and read and execute access to others, or 022 giving all access except no write access for users in the group or others.

```
unalias pattern
```

All aliases whose names match the specified pattern are discarded. Thus all aliases are removed by *unalias \**. It is not an error for nothing to be *unaliased*.

```
unhash
```

Use of the internal hash table to speed location of executed programs is disabled.

```
unset pattern
```

All variables whose names match the specified pattern are removed. Thus all variables are removed by *unset \**; this has

noticeably distasteful side-effects. It is not an error for nothing to be *unset*.

**wait**

All child processes are waited for. If the shell is interactive, then an interrupt can disrupt the wait, at which time the shell prints names and process numbers of all children known to be outstanding.

**while (expr)**

...  
**end**

While the specified expression evaluates nonzero, the commands between the *while* and the matching *end* are evaluated. *Break* and *continue* may be used to terminate or continue the loop prematurely. (The *while* and *end* must appear alone on their input lines.) Prompting occurs here the first time through the loop as for the *foreach* statement if the input is a terminal.

ⓐ

ⓐ **name = expr**

ⓐ **name[index] = expr**

The first form prints the values of all the shell variables. The second form sets the specified *name* to the value of *expr*. If the expression contains *<*, *>*, *&* or *|* then at least this part of the expression must be placed within ( ). The third form assigns the value of *expr* to the *index*th argument of *name*. Both *name* and its *index*th component must already exist.

The operators *\*=*, *+=*, etc. are available as in C. The space separating the name from the assignment operator is optional. Spaces are mandatory in separating components of *expr* which would otherwise be single words.

Special postfix *++* and *--* operators increment and decrement *name* respectively, i.e. ⓐ *i++*.

### *Predefined Variables*

The following variables have special meaning to the shell. Of these, *argv*, *child*, *home*, *path*, *prompt*, *shell* and *status* are always set by the shell. Except for *child* and *status* this setting occurs only at initialization; these variables will not then be modified unless done explicitly by the user.

The shell copies the environment variable *PATH* into the variable *path*, and copies the value back into the environment whenever *path* is set. Thus it is not necessary to worry about its setting other than in the file *.cshrc* as inferior *csh* processes will import the definition of *path* from the environment.

**argv**

Set to the arguments to the shell, it is from this variable that positional parameters are substituted,

i.e. \$1 is replaced by \$argv[1], etc.

- cdpath** Gives a list of alternate directories searched to find subdirectories in *cd* commands.
- child** The process number printed when the last command was forked with *&*. This variable is *unset* when this process terminates.
- echo** Set when the *-x* command line option is given. Causes each command and its arguments to be echoed just before it is executed. For nonbuilt-in commands all expansions occur before echoing. Built-in commands are echoed before command and filename substitution, since these substitutions are then done selectively.
- histchars** Can be assigned a two-character string. The first character is used as a history character in place of *!*, the second character is used in place of the *^* substitution mechanism. For example, set *histchars=","* will cause the history characters to be comma and semicolon.
- history** Can be given a numeric value to control the size of the history list. Any command which has been referenced in this many events will not be discarded. A *history* that is too large may run the shell out of memory. The last executed command is always saved on the history list.
- home** The home directory of the invoker, initialized from the environment. The filename expansion of *~* refers to this variable.
- ignoreeof** If set the shell ignores end-of-file from input devices that are terminals. This prevents a shell from accidentally being terminated by typing a CNTRL-D.
- mail** The files where the shell checks for mail. This is done after each command completion which will result in a prompt, if a specified interval has elapsed. The shell says "You have new mail". if the file exists with an access time not greater than its modify time.
- If the first word of the value of *mail* is numeric it specifies a different mail checking interval, in seconds, than the default, which is 10 minutes.
- If multiple mail files are specified, then the shell says "New mail in *name*" when there is mail in the file *name*.

<b>noclobber</b>	As described in the section <i>Input/output</i> , restrictions are placed on output redirection to insure that files are not accidentally destroyed, and that >> redirections refer to existing files.
<b>noglob</b>	If set, filename expansion is inhibited. This is most useful in shell scripts which are not dealing with filenames, or after a list of filenames has been obtained and further expansions are not desirable.
<b>nonomatch</b>	If set, it is not an error for a filename expansion to not match any existing files; rather, the primitive pattern is returned. It is still an error for the primitive pattern to be malformed, i.e. echo [ still gives an error.
<b>path</b>	Each word of the path variable specifies a directory in which commands are to be sought for execution. A null word specifies the current directory. If there is no <i>path</i> variable then only full pathnames will execute. The usual search path is /bin, /usr/bin, and ., but this may vary from system to system. For the super-user the default search path is /etc, /bin and /usr/bin. A shell which is given neither the -c nor the -t option will normally hash the contents of the directories in the <i>path</i> variable after reading <i>.cshrc</i> , and each time the <i>path</i> variable is reset. If new commands are added to these directories while the shell is active, it may be necessary to give the <i>rehash</i> or the commands may not be found.
<b>prompt</b>	The string which is printed before each command is read from an interactive terminal input. If a ! appears in the string it will be replaced by the current event number unless a preceding \ is given. Default is %, or # for the super-user.
<b>shell</b>	The file in which the shell resides. This is used in forking shells to interpret files which have execute bits set, but which are not executable by the system. (See the description of <i>Nonbuilt-In Command Execution</i> below.) Initialized to the (system-dependent) home of the shell.
<b>status</b>	The status returned by the last command. If it terminated abnormally, then 0200 is added to the status. Built-in commands which fail return exit status 1, all other built-in commands set status 0.
<b>time</b>	Controls automatic timing of commands. If set, then any command which takes more than this many cpu seconds will cause a line giving user,

system, and real times and a utilization percentage which is the ratio of user plus system times to real time to be printed when it terminates.

**verbose** Set by the `-v` command line option, causes the words of each command to be printed after history substitution.

#### *Nonbuilt-In Command Execution*

When a command to be executed is found to not be a built-in command the shell attempts to execute the command via `exec(S)`. Each word in the variable `path` names a directory from which the shell will attempt to execute the command. If it is given neither a `-c` nor a `-t` option, the shell will hash the names in these directories into an internal table so that it will only try an `exec` in a directory if there is a possibility that the command resides there. This greatly speeds command location when a large number of directories are present in the search path. If this mechanism has been turned off (via `unhash`), or if the shell was given a `-c` or `-t` argument, and in any case for each directory component of `path` which does not begin with a `/`, the shell concatenates with the given command name to form a pathname of a file which it then attempts to execute.

Parenthesized commands are always executed in a subshell. Thus `(cd ; pwd)` ; `pwd` prints the *home* directory; leaving you where you were (printing this after the home directory), while `cd ; pwd` leaves you in the home directory. Parenthesized commands are most often used to prevent `cd` from affecting the current shell.

If the file has execute permissions but is not an executable binary to the system, then it is assumed to be a file containing shell commands and a new shell is spawned to read it.

If there is an *alias* for *shell* then the words of the alias will be prepended to the argument list to form the shell command. The first word of the *alias* should be the full pathname of the shell (e.g. `$shell`). Note that this is a special, late occurring, case of *alias* substitution, and only allows words to be prepended to the argument list without modification.

#### *Argument List Processing*

If argument 0 to the shell is `-` then this is a login shell. The flag arguments are interpreted as follows:

- `c` Commands are read from the (single) following argument which must be present. Any remaining arguments are placed in *argv*.
- `e` The shell exits if any invoked command terminates abnormally or yields a nonzero exit status.

- f The shell will start faster, because it will neither search for nor execute commands from the file `.cshrc` in the invoker's home directory.
- i The shell is interactive and prompts for its top-level input, even if it appears to not be a terminal. Shells are interactive without this option if their inputs and outputs are terminals.
- n Commands are parsed, but not executed. This may aid in syntactic checking of shell scripts.
- s Command input is taken from the standard input.
- t A single line of input is read and executed. A `\` may be used to escape the newline at the end of this line and continue onto another line.
- v Causes the `verbose` variable to be set, with the effect that command input is echoed after history substitution.
- x Causes the `echo` variable to be set, so that commands are echoed immediately before execution.
- V Causes the `verbose` variable to be set even before `.cshrc` is executed.
- X Causes the `echo` variable to be set even before `.cshrc` is executed.

After processing of flag arguments, if arguments remain but none of the `-c`, `-i`, `-s`, or `-t` options were given, the first argument is taken as the name of a file of commands to be executed. The shell opens this file, and saves its name for possible resubstitution by `$0`. Since on a typical system most shell scripts are written for the standard shell (see `sh(C)`), the C shell will execute such a standard shell if the first character of a script is not a `#`, i.e. if the script does not start with a comment. Remaining arguments initialize the variable `argv`.

### *Signal Handling*

The shell normally ignores `quit` signals. The `interrupt` and `quit` signals are ignored for an invoked command if the command is followed by `&`; otherwise the signals have the values which the shell inherited from its parent. The shells handling of interrupts can be controlled by `ointr`. Login shells catch the `terminate` signal; otherwise this signal is passed on to children from the state in the shell's parent. In no case are interrupts allowed when a login shell is reading the file `.logout`.

### **Files**

<code>~/.cshrc</code>	Read at by each shell at the beginning of execution
<code>~/login</code>	Read by login shell, after <code>.cshrc</code> at login
<code>~/logout</code>	Read by login shell, at logout
<code>/bin/sh</code>	Shell for scripts not starting with a <code>#</code>
<code>/tmp/sh*</code>	Temporary file for <code>&lt;&lt;</code>
<code>/dev/null</code>	Source of empty file
<code>/etc/passwd</code>	Source of home directories for <code>~name</code>

### Limitations

Words can be no longer than 512 characters. The number of arguments to a command which involves filename expansion is limited to 1/6 number of characters allowed in an argument list, which is 5120, less the characters in the environment. Also, command substitutions may substitute no more characters than are allowed in an argument list.

To detect looping, the shell restricts the number of *alias* substitutions on a single line to 20.

### See Also

`access(S)`, `exec(S)`, `fork(S)`, `pipe(S)`, `signal(S)`, `umask(S)`, `wait(S)`, `a.out(F)`, `environ(F)`

### Credit

This utility was developed at the University of California at Berkeley and is used with permission.

### Notes

Built-in control structure commands like `foreach` and `while` cannot be used with `|` & or `;`.

Commands within loops, prompted for by `?`, are not placed in the *history* list.

It is not possible to use the colon (`:`) modifiers on the output of command substitutions.

*Csh* attempts to import and export the `PATH` variable for use with regular shell scripts. This only works for simple cases, where the `PATH` contains no command characters.

This version of *csh* does not support or use the process control features of the 4th Berkeley Distribution.

**Name**

`csplit` - Splits files according to context.

**Syntax**

`csplit [- s] [- k] [- f prefix] file arg1 [... argn]`

**Description**

*Csplit* reads *file* and separates it into  $n + 1$  sections, defined by the arguments *arg1* ... *argn*. By default the sections are placed in `xx00` ... `xxn` ( $n$  may not be greater than 99). These sections get the following pieces of *file*:

- 00: From the start of *file* up to (but not including) the line referenced by *arg1*.
- 01: From the line referenced by *arg1* up to the line referenced by *arg2*.
- ⋮
- $n + 1$ : From the line referenced by *argn* to the end of *file*.

The options to *csplit* are:

- s *Csplit* normally prints the character counts for each file created. If the - s option is present, *csplit* suppresses the printing of all character counts.
- k *Csplit* normally removes created files if an error occurs. If the - k option is present, *csplit* leaves previously created files intact.
- f *prefix* If the - f option is used, the created files are named *prefix00* ... *prefixn*. The default is `xx00` ... `xxn`.

The arguments (*arg1* ... *argn*) to *csplit* can be a combination of the following:

*/regexp/* A file is to be created for the section from the current line up to (but not including) the line containing the regular expression *regexp*. The current line becomes the line containing *regexp*. This argument may be followed by an optional + or - some number of lines (e.g., */Page/ - 5*).

*%regexp%* This argument is the same as */regexp/*, except that no file is created for the section.

*lno* A file is to be created from the current line up to (but not including) *lno*. The current line becomes *lno*.

{*num*} Repeat argument. This argument may follow any of the above arguments. If it follows a *rexp* type argument, that argument is applied *num* more times. If it follows *lno*, the file will be split every *lno* lines (*num* times) from that point.

Enclose all *rexp* type arguments that contain blanks or other characters meaningful to the shell in the appropriate quotation marks. Regular expressions may not contain embedded newlines. *Csplit* does not affect the original file; it is the users responsibility to remove it.

### Examples

```
csplit - f cobol file '/procedure division/' /par5./ /par16./
```

This example creates four files, `cobol00` . . . `cobol03`. After editing the "split" files, they can be recombined as follows:

```
cat cobol[0- 3] > file
```

Note that this example overwrites the original file.

```
csplit - k file 100 {99}
```

This example would split the file at every 100 lines, up to 10,000 lines. The `- k` option causes the created files to be retained if there are less than 10,000 lines; however, an error message would still be printed.

```
csplit - k prog.c '%main(% '/' )/+ 1' {20}
```

Assuming that `prog.c` follows the normal C coding convention of ending routines with a `}` at the beginning of the line, this example will create a file containing each separate C routine (up to 21) in `prog.c`.

### See Also

`ed(C)`, `sh(C)`, `regex(S)`

**Diagnostics**

Self-explanatory except for:

arg - out of range

which means that the given argument did not reference a line between the current position and the end of the file.

**Name**

**cu** - Calls another XENIX system.

**Syntax**

**cu** [ **-sspeed** ] [ **-aacu** ] [ **--line** ] [ **-h** ] [ **-o|-e** ] **telno** | **dir**

**Description**

**Cu** calls up another XENIX system. It manages an interactive conversation with possible transfers of ASCII files. *Speed* gives the transmission speed (110, 150, 300, 1200, 4800, 9600); 300 is the default value. Most modems are restricted to 300 and 1200. Directly connected lines may be set to other speeds.

The **-a** and **-l** values may be used to specify device names for the ACU and communications line devices. They can be used to override searching for the first available ACU with the right speed. The **-h** option emulates local echo, supporting calls to other computer systems which expect terminals to be in half-duplex mode. The **-e** (**-o**) option designates that even (odd) parity is to be generated for data sent to the remote system. *Telno* is the telephone number, with equal signs for secondary dial tone or minus signs for delays at appropriate places. The string **dir** for *telno* must be used for directly connected lines, and implies a null ACU.

**Cu** will try each line listed in the file **/usr/lib/uucp/L-devices** until it finds an available line with appropriate attributes or runs out of entries. After making the connection, **cu** runs as two processes: the *transmit* process reads data from the standard input and, except for lines beginning with a tilde (~), passes it to the remote system; the *receive* process accepts data from the remote system and, except for lines beginning with a tilde, passes it to the standard output. Normally, an automatic DC3/DC1 protocol is used to control input from the remote system so the buffer is not overrun. Lines beginning with a tilde have special meanings.

The *transmit* process interprets the following:

- ~.** Terminates the conversation.
- ~!** Escapes to an interactive shell on the local system.
- ~!cmd...** Runs *cmd* on the local system (via **sh -c**).
- ~\$cmd...** Runs *cmd* locally and sends its output to the remote system.
- ~%take from [ to ]** Copies file *from* (on the remote system) to file *to* on the local system. If *to* is

omitted, the *from* argument is used in both places.

- `~%put from [ to ]` Copies file *from* (on the local system) to file *to* on the remote system. If *to* is omitted, the *from* argument is used in both places.
- `~%b or ~%break` Sends a break char to the remote system.
- `~...` Sends the line `~...` to the remote system.
- `~%nostop` Turns off the DC3/DC1 input control protocol for the remainder of the session. This is useful in case the remote system is one which does not respond properly to the DC3 and DC1 characters,

The *receive* process normally copies data from the remote system to its standard output. A line from the remote system that begins with `>` initiates an output diversion to a file. The complete sequence is:

```

->[>]:file
zero or more lines to be written to file
->

```

Data from the remote system is diverted to a file (or appended, if `>>` is used). The trailing `>` terminates the diversion.

The use of `~%put` requires *stty* (C) and *cat* (C) on the remote side. It also requires that the current erase and kill characters on the remote system be identical to the current ones on the local system. Backslashes are inserted at appropriate places.

The use of `~%take` requires the existence of *echo*(C) and *cat*(C) on the remote system. Also, *stty* **tabs** mode should be set on the remote system if tabs are to be copied without expansion.

#### Files

```

/usr/lib/uucp/L-devices
/usr/spool/uucp/LCK..(tty-device)
/dev/null

```

#### See Also

*cat*(C), *echo*(C), *stty*(C), *tty*(M)

#### Diagnostics

Exit code is zero for normal exit, nonzero (various values) otherwise.

**Notes**

There is an artificial slowing of transmission by *cu* during the *put* operation so that loss of data is unlikely.

ASCII files only can be transferred using *take/put*; binary files cannot be transferred.

The maximum speed of the *cu* utility is 1200 baud.

The file `/usr/lib/uucp/L-devices` must contain information about the type of connection and speed. Here is a sample `L-devices` file:

```
tty13 ACU 1200 tty11 0 1200
```

The first device specification tells *cu* that `tty13` is an auto-communications line unit, i.e., meant to be hooked up to a modem. The second device is a direct line, or `DIR`. Such a device is meant to hook-up two XENIX systems directly over a wire. The enabled login port on the 'remote' system for `tty11` should be set up for a 1200 baud login. The baud rate of both devices is set to 1200.

## Name

date - Prints and sets the date.

## Syntax

date [ mmddhhmm[yy] ] [ +format ]

## Description

If no argument is given, or if the argument begins with +, the current date and time are printed. Otherwise, the current date is set. The first *mm* is the month number; *dd* is the day number in the month; *hh* is the hour number (24-hour system); the second *mm* is the minute number; *yy* is the last 2 digits of the year number and is optional. For example:

```
date 10080045
```

sets the date to Oct 8, 12:45 AM. The current year is the default if no year is mentioned. The system operates in GMT. *Date* takes care of the conversion to and from local standard and daylight time.

If the argument begins with +, the output of *date* is under the control of the user. The format for the output is similar to that of the first argument to *printf*(S). All output fields are of fixed size (zero padded if necessary). Each field descriptor is preceded by a percent sign (%) and will be replaced in the output by its corresponding value. A single percent sign is encoded by doubling the percent sign, i.e., by specifying "%%". All other characters are copied to the output without change. The string is always terminated with a newline character.

## Field Descriptors:

- n Inserts a newline character
- t Inserts a tab character
- m Month of year - 01 to 12
- d Day of month - 01 to 31
- y Last 2 digits of year - 00 to 99
- D Date as mm/dd/yy
- H Hour - 00 to 23
- M Minute - 00 to 59

DATE (C)

DATE(C)

- S Second - 00 to 59
- T Time as HH:MM:SS
- j Julian date - 001 to 366
- w Day of the week - Sunday = 0
- a Abbreviated weekday - Sun to Sat
- h Abbreviated month - Jan to Dec
- r Time in AM/PM notation

### Example

The line

```
date '+ DATE: %m/%d/%y%nTIME: %H:%M:%S'
```

generates as output:

```
DATE: 08/01/76  
TIME: 14:45:05
```

### Diagnostics

- no permission*      You aren't the super-user and you are trying to change the date.
- bad conversion*      The date set is syntactically incorrect.
- bad format character*      The field descriptor is not recognizable.

## Name

dc - Invokes an arbitrary precision calculator.

## Syntax

dc [ file ]

## Description

*Dc* is an arbitrary precision arithmetic package. Ordinarily it operates on decimal integers, but you may specify an input base, output base, and a number of fractional digits to be maintained. The overall structure of *dc* is a stacking (reverse Polish) calculator. If an argument is given, input is taken from that file until its end, then from the standard input. The following constructions are recognized:

*number*

The value of the number is pushed on the stack. A number is an unbroken string of the digits 0-9. It may be preceded by an underscore () to input a negative number. Numbers may contain decimal points.

## + - /\* % ^

The top two values on the stack are added (+), subtracted (-), multiplied (\*), divided (/), remaindered (%), or exponentiated (^). The two entries are popped off the stack; the result is pushed on the stack in their place. Any fractional part of an exponent is ignored.

*sz* The top of the stack is popped and stored into a register named *z*, where *z* may be any character. If the *s* is capitalized, *z* is treated as a stack and the value is pushed on it.

*lz* The value in register *z* is pushed on the stack. The register *z* is not altered. All registers start with zero value. If the *l* is capitalized, register *z* is treated as a stack and its top value is popped onto the main stack.

*d* The top value on the stack is duplicated.

*p* The top value on the stack is printed. The top value remains unchanged. *p* interprets the top of the stack as an ASCII string, removes it, and prints it.

*f* All values on the stack are printed.

*q* Exits the program. If executing a string, the recursion level is popped by two. If *q* is capitalized, the top value on the stack is popped and the string execution level is popped by that value.

- x Treats the top element of the stack as a character string and executes it as a string of *dc* commands.
- X Replaces the number on the top of the stack with its scale factor.
- [ ... ] Puts the bracketed ASCII string onto the top of the stack.
- <*x* >*x* ==*x*  
The top two elements of the stack are popped and compared. Register *x* is evaluated if they obey the stated relation.
- v Replaces the top element on the stack by its square root. Any existing fractional part of the argument is taken into account, but otherwise the scale factor is ignored.
- ! Interprets the rest of the line as a XENIX command.
- c All values on the stack are popped.
- i The top value on the stack is popped and used as the number radix for further input.
- I Pushes the input base on the top of the stack.
- o The top value on the stack is popped and used as the number radix for further output.
- O Pushes the output base on the top of the stack.
- k The top of the stack is popped, and that value is used as a nonnegative scale factor; the appropriate number of places are printed on output, and maintained during multiplication, division, and exponentiation. The interaction of scale factor, input base, and output base will be reasonable if all are changed together.
- z The stack level is pushed onto the stack.
- Z Replaces the number on the top of the stack with its length.
- ? A line of input is taken from the input source (usually the terminal) and executed.
- ; : Used by *bc* for array operations.

**Example**

This example prints the first ten values of n!:

```
[|a1+ dsa*pla10>y]sy
0sa1
lyx
```

**See Also**

bc(C)

**Diagnostics**

<i>x is unimplemented</i>	The octal number <i>x</i> corresponds to a character that is not implemented as a command
<i>stack empty</i>	Not enough elements on the stack to do what was asked
<i>Out of space</i>	The free list is exhausted (too many digits)
<i>Out of headers</i>	Too many numbers being kept around
<i>Out of pushdown</i>	Too many items on the stack
<i>Nesting Depth</i>	Too many levels of nested execution

**Notes**

*Bc* is a preprocessor for *dc*, providing infix notation and a C-like syntax which implements functions and reasonable control structures for programs. For interactive use, *bc* is preferred to *dc*.

**Name**

dd - Converts and copies a file.

**Syntax**

dd [option=value] ...

**Description**

*Dd* copies the specified input file to the specified output with possible conversions. The standard input and output are used by default. The input and output block size may be specified to take advantage of raw physical I/O.

**Option Value**

**if=file** Input filename; standard input is default

**of=file** Output filename; standard output is default

**ibs=n** Input block size *n* bytes (default is block size)

**obs=n** Output block size (default is block size)

**bs=n** Sets both input and output block size, superseding *ibs* and *obs*; also, if no conversion is specified, it is particularly efficient since no in-core copy needs to be done

**cbs=n** Conversion buffer size

**skip=n** Skips *n* input records before starting copy

**seek=n** Seeks *n* records from beginning of output file before copying

**count=n**  
Copies only *n* input records

**conv=ascii**  
Converts EBCDIC to ASCII

**conv=ebcdic**  
Converts ASCII to EBCDIC

**conv=ibm**  
Slightly different map of ASCII to EBCDIC

**conv=lcase**  
Maps alphabetic to lowercase

*Option Value***conv=ucase**

Maps alphabets to uppercase

**conv=swab**

Swaps every pair of bytes

**conv=noerror**

Does not stop processing on an error

**conv=sync**Pads every input record to *ibs***conv=... , ...**

Several comma-separated conversions

Where sizes are specified, a number of bytes is expected. A number may end with **k**, **b**, or **w** to specify multiplication by 1024, 512, or 2 respectively; a pair of numbers may be separated by **x** to indicate a product.

*Cbs* is used only if *ascii* or *ebcdic* conversion is specified. In the former case *cbs* characters are placed into the conversion buffer, converted to ASCII, and trailing blanks trimmed and newline added before sending the line to the output. In the latter case ASCII characters are read into the conversion buffer, converted to EBCDIC, and blanks added to make up an output record of size *cbs*.

After completion, *dd* reports the number of whole and partial input and output blocks.

**Examples**

This command reads an EBCDIC tape, blocked ten 80-byte EBCDIC card images per record, into the ASCII file outfile:

```
dd if=/dev/rmt0 of=outfile ibs=800 cbs=80 conv=ascii,lcase
```

Note the use of raw magtape. *Dd* is especially suited to I/O on raw physical devices because it allows reading and writing in arbitrary record sizes.

**See Also**

copy(C), cp(C), tar(C)

**Diagnostics**

*f*+*p* records in(out)

Numbers of full and partial records  
read(written)

**Notes**

The ASCII/EBCDIC conversion tables are taken from the 256-character standard in the CACM Nov, 1968.

Newlines are inserted only on conversion to ASCII; padding is done only on conversion to EBCDIC.

**Name**

devnm - Identifies device name.

**Syntax**

*/etc/devnm* [ names ]

**Description**

*Devnm* identifies the special file associated with the mounted file system where the argument *name* resides.

This command is most commonly used by */etc/rc* to construct a mount table entry for the root device.

**Examples**

Be sure to type full pathnames in this example:

*/etc/devnm /usr*

If */dev/hd1* is mounted on */usr*, this produces:

hd1 /usr

**Files**

*/dev/\** Device names

*/etc/rc* Xenix startup commands

**See Also**

setmnt(C)

**Name**

**df** - Reports the number of free disk blocks.

**Syntax**

**df** [ - t ] [ - f ] [ filesystem ... ]

**Description**

*Df* prints out the number of free blocks and free inodes available for on-line file systems by examining the counts kept in the super-blocks. One or more *filesystem* arguments may be specified by device name (for example, */dev/hd0* or */dev/usr*). If the *filesystem* argument is unspecified, then the free space on all mounted file systems is sent to the standard output. The list of mounted file systems is given in */etc/mnttab*.

The - t flag causes the total allocated block figures to be reported as well.

If the - f flag is given, only an actual count of the blocks in the free list is made (free inodes are not reported). With this option, *df* reports on raw devices.

**Files**

*/dev/\**

*/etc/mnttab*

**See Also**

*fsck(C)*, *fs(F)*, *mnttab(F)*

**Notes**

See also *Notes* under *mount(C)*.

## Name

diff - Compares two text files.

## Syntax

diff [ - efbh ] file1 file2

## Description

*Diff* tells what lines must be changed in two files to bring them into agreement. If *file1* (*file2*) is -, the standard input is used. If *file1* (*file2*) is a directory, then a file in that directory with the name *file2* (*file1*) is used. The normal output contains lines of these forms:

```
n1 a n3, n4
n1, n2 d n3
n1, n2 c n3, n4
```

These lines resemble *ed* commands to convert *file1* into *file2*. The numbers after the letters pertain to *file2*. In fact, by exchanging a for d and reading backward one may ascertain equally how to convert *file2* into *file1*. As in *ed*, identical pairs where *n1* = *n2* or *n3* = *n4* are abbreviated as a single number.

Following each of these lines come all the lines that are affected in the first file flagged by <, then all the lines that are affected in the second file flagged by >.

The - b option causes trailing blanks (spaces and tabs) to be ignored and other strings of blanks to compare equal.

The - e option produces a script of a, c and d commands for the editor *ed*, which will recreate *file2* from *file1*. The - f option produces a similar script, not useful with *ed*, in the opposite order. In connection with - e, the following shell procedure helps maintain multiple versions of a file:

```
(shift; cat $*; echo '1,$p') | ed - $1
```

This works by performing a set of editing operations on an original ancestral file. This is done by combining the sequence of *ed* scripts given as all command line arguments except the first. These scripts are presumed to have been created with *diff* in the order given on the command line. The set of editing operations is then piped as an editing script to *ed* where all editing operations are performed on the ancestral file given as the first argument on the command line. The final version of the file is then printed on the standard output. Only an ancestral file (\$1) and a chain of version-to-version *ed* scripts (\$2,\$3,...) made by *diff* need be on hand.

Except in rare circumstances, *diff* finds the smallest sufficient set of file differences.

The **-h** option does a fast, less-rigorous job. It works only when changed stretches are short and well separated, but also works on files of unlimited length. The **-e** and **-f** cannot be used with the **-h** option.

### Files

`/tmp/d????`

`/usr/lib/diffh` for **-h**

### See Also

`cmp(C)`, `comm(C)`, `ed(C)`

### Diagnostics

Exit status is **0** for no differences, **1** for some differences, **2** for errors.

### Notes

Editing scripts produced under the **-e** or **-f** option do not always work correctly on lines consisting of a single period (**.**).

## Name

diff3 - Compares three files.

## Syntax

diff3 [ - ex3 ] file1 file2 file3

## Description

*Diff3* compares three versions of a file, and publishes disagreeing ranges of text flagged with these codes:

```

===== All three files differ
=====1  File1 is different
=====2  File2 is different
=====3  File3 is different

```

The type of change suffered in converting a given range of a given file to some other range is indicated in one of these ways:

```

f : n1 a   Text is to be appended after line number n1 in
            file f, where f = 1, 2, or 3.

f : n1 , n2 c   Text is to be changed in the range line n1 to
                line n2. If n1 = n2, the range may be abbrevi-
                ated to n1.

```

The original contents of the range follows immediately after a c indication. When the contents of two files are identical, the contents of the lower-numbered file is suppressed.

Under the - e option, *diff3* publishes a script for the editor *ed* that will incorporate into *file1* all changes between *file2* and *file3*, i.e., the changes that normally would be flagged ===== and =====3. The - x option produces a script to incorporate changes flagged with "=====". Similarly, the - 3 option produces a script to incorporate changes flagged with "=====3". The following command applies a resulting editing script to *file1*:

```
(cat script; echo '1,$p') |ed - file1
```

## Files

/tmp/d3\*

/usr/lib/diff3prog

*DIFF3* (C)

*DIFF3* (C)

**See Also**

`diff(C)`

**Notes**

The `-e` option does not work properly for lines consisting of a single period.

The input file size limit is 64K bytes.

**Name**

dircmp - Compares directories.

**Syntax**

dircmp [- d] [- s] dir1 dir2

**Description**

*Dircmp* examines *dir1* and *dir2* and generates tabulated information about the contents of the directories. Listings of files that are unique to each directory are generated in addition to a list that indicates whether the files common to both directories have the same contents.

There are two options available:

- d Performs a full *diff* on each pair of like-named files if the contents of the files are not identical
- s Reports whether files are "same" or "different"

**See Also**

cmp(C), diff(C)

**Name**

`dirname` -- Delivers directory part of pathname.

**Syntax**

`dirname string`

**Description**

*Dirname* delivers all but the last component of the pathname in *string* and prints the result on the standard output. If there is only one component in the pathname, only a "dot" is printed. It is normally used inside substitution marks (``) within shell procedures.

The companion command *basename* deletes any prefix ending in a slash (/) and the *suffix* (if present in *string*) from *string*, and prints the result on the standard output.

**Examples**

The following example sets the shell variable NAME to /usr/src/cmd:

```
NAME='dirname /usr/src/cmd/cat.c'
```

This example prints /a/b/c on the standard output:

```
dirname /a/b/c/d
```

This example prints a "dot" on the standard output:

```
dirname file.ext
```

**See Also**

`basename(C)`, `sh(C)`

**Name**

disable -- Turns off terminals.

**Syntax**

disable [ -d ] [ [ -e ] tty ...

**Description**

This program manipulates the */etc/ttys* file and signals *init* to disallow logins on a particular terminal. The **-d** and **-e** options "disable" and "enable" terminals, respectively.

**Examples**

A simple example follows:

```
disable tty01
```

Multiple terminals can be disabled or enabled using the **-d** and **-e** switches before the appropriate terminal name:

```
disable tty01 -e tty02 -d tty03 tty04
```

**Files**

*/dev/tty\**

*/etc/ttys*

**See Also**

login(M), enable(C), ttys(M), getty(M), init(M)

**Warning**

Be absolutely certain to pause at least one minute before reusing this command or before using the *enable* command. Failure to do so may cause the system to crash.

**Name**

`dtype` - Determines disk type.

**Syntax**

`dtype [- s] device ...`

**Description**

*Dtype* determines type of disk, prints pertinent information on the standard output unless the silent (`- s`) option is selected, and exits with a corresponding code (see below). When more than one argument is given, the exit code corresponds to the last argument.

Disk Type	Exit Code	Message (optional)
Misc.	60	error (specified)
	61	empty or unrecognized data
	70	dump format, volume n
Storage	71	tar format[, extent e of n]
	72	cpio format
	73	cpio character (- c) format
	80	MS-DOS 1.x, 8 sec/track, single sided
MS-DOS	81	MS-DOS 1.x, 8 sec/track, dual sided
	90	MS-DOS 2.x, 8 sec/track, single sided
	91	MS-DOS 2.x, 8 sec/track, dual sided
	92	MS-DOS 2.x, 9 sec/track, single sided
	93	MS-DOS 2.x, 9 sec/track, dual sided
	94	MS-DOS 2.x fixed disk
XENIX	120	XENIX 2.x filesystem [needs fsck]
	130	XENIX 3.x filesystem [needs fsck]

**Notes**

XENIX file systems, dump, and cpio binary formats may not be recognized if created on a foreign system. This is due to such system differences as byte and word swapping and structure alignment.

This utility only works reliably for floppy diskettes.

**Name**

**du** - Summarizes disk usage.

**Syntax**

**du** [ - ars ] [ names ]

**Description**

*Du* gives the number of blocks contained in all files and (recursively) directories within each directory and file specified by the *names* argument. The block count includes the indirect blocks of the file. If *names* is missing, the current directory is used.

The optional argument **-s** causes only the grand total (for each of the specified *names*) to be given. The optional argument **-a** causes an entry to be generated for each file. Absence of either causes an entry to be generated for each directory only.

*Du* is normally silent about directories that cannot be read, files that cannot be opened, etc. The **-r** option will cause *du* to generate messages in such instances.

A file with two or more links is only counted once.

**Notes**

If the **-a** option is not used, nondirectories given as arguments are not listed.

If there are too many distinct linked files, *du* will count the excess files more than once.

Files with holes in them will get an incorrect block count.

**Name**

dump - Performs incremental file system backup.

**Syntax**

dump [ key [ arguments ] filesystem ]

**Description**

*Dump* copies to the specified device all files changed after a certain date in the *filesystem*. The *key* specifies the date and other options about the backup, where a *key* consists of characters from the set 0123456789kfusd. The meanings of these characters are described below:

- f Places the backup on the next *argument* file instead of the default device.
- u If the backup completes successfully, writes the date of the beginning of the backup to the file */etc/ddate*. This file records a separate date for each file system and each backup level.
- 0-9 This number is the "backup level". Backs up all files modified since the last date stored in the file */etc/ddate* for the same file system at lesser levels. If no date is determined by the level, the beginning of time is assumed; thus the option 0 causes the entire file system to be backed up.
- s For backups to magnetic tape, the size of the tape specified in feet. The number of feet is taken from the next *argument*. When the specified size is reached, *dump* will wait for reels to be changed. The default size is 2,300 feet.
- d For backups to magnetic tape, the density of the tape, expressed in BPI, is taken from the next *argument*. This is used in calculating the amount of tape used per write. The default is 1600.
- k This option is used when backing up to a block-structured device, such as a floppy disk. The size (in K-bytes) of the volume being written is taken from the next *argument*. If the k argument is specified, any s and d arguments are ignored. The default is to use s and d.

If no arguments are given, the *key* is assumed to be 0u and a default

file system is backed up to the default device.

The first backup should be a full level-0 backup:

dump 0u

Next, periodic level 9 backups should be made on an exponential progression of tapes or floppies:

dump 9u

(This is sometimes called the Tower of Hanoi progression after the name of the game where a similar progression occurs, i.e., 1 2 1 3 1 2 1 4 ... where backup 1 is used every other time, backup 2 every fourth, backup 3 every eighth, etc.) When the level-9 incremental backup becomes unmanageable because a tape is full or too many floppies are required, a level-1 backup should be made:

dump 1u

After this, the exponential series should progress as if uninterrupted. These level-9 backups are based on the level-1 backup, which is based on the level-0 full backup. This progression of levels of backups can be carried as far as desired.

The default file system and the backup device depend on the settings of the variables DISK and TAPE, respectively, in the file */etc/default/dump*.

## Files

<i>/etc/ddate</i>	Records backup dates of file system/level
<i>etc/default/dump</i>	Default dump information

## See Also

*XENIX Operations Guide*  
*cpio(C)*, *default(M)*, *dummdir(C)*, *restor(C)*, *dump(F)*

**DUMP(C)**

**DUMP(C)**

**Diagnostics**

If the backup requires more than one volume (where a volume is likely to be a floppy disk or tape), you will be asked to change volumes. Press RETURN after changing volumes.

**Notes**

Sizes are based on 1600 BPI for blocked tape; the raw magnetic tape device has to be used to approach these densities. Write errors to the backup device are usually fatal. Read errors on the file system are ignored.

**Warning**

When backing up to floppy disks, be sure to have enough *formatted* floppies ready before starting a backup.

Name

dumpdir - Prints the names of files on a backup archive.

Syntax

dumpdir [ f filename ]

Description

*Dumpdir* is used to list the names and inode numbers of all files and directories on an archive written with the *dump* command. This is most useful when attempting to determine the location of a particular file in a set of backup archives.

The *f* option causes *filename* to be used as the name of the backup device instead of the default. The backup device depends on the setting of the variable TAPE in the file */etc/default/dump*.

Files

rst\* Temporary files

See Also

dump(C), restor(C), default(M)

Diagnostics

If the backup extends over more than one volume (where a volume is likely a floppy disk or tape), you will be asked to change volumes. Press RETURN after changing volumes.

**Name**

echo - Echoes arguments.

**Syntax**

```
echo [ - n ] [ - e ] [ - - ] [ arg ] ...
```

**Description**

*Echo* writes its arguments separated by blanks and terminated by a newline on the standard output. The following options are recognized:

- n Prints line without a newline.
- e Prints arguments on the standard error output.
- - Prints *arg* exactly so that an argument beginning with a dash (e.g., - e or - n) can be specified.

*Echo* also understands C-like escape conventions. The following escape sequences need to be quoted so that the shell interprets them correctly:

- \b Backspace
- \c Prints line without newline; same as use of - n option
- \f Form feed
- \n Newline
- \r Carriage return
- \t Tab
- \\ Backslash
- \n The 8-bit character whose ASCII code is the 1-, 2- or 3-digit octal number *n*, which must start with a zero

*Echo* is useful for producing diagnostics in command files and for sending known data into a pipe.

**See Also**

sh(C)

**Name**

ed - Invokes the text editor.

**Syntax**

ed [ - ] [ - x ] [ file ]

**Description**

*Ed* is the standard text editor. If the *file* argument is given, *ed* simulates an *e* command (see below) on the named file; that is to say, the file is read into *ed*'s buffer so that it can be edited. The optional - suppresses the printing of character counts by *e*, *r*, and *w* commands, of diagnostics from *e* and *q* commands, and of the ! prompt after a *!shell command*. If - x is present, an *x* command is simulated first to handle an encrypted file. *Ed* operates on a copy of the file it is editing; changes made to the copy have no effect on the file until a *w* (write) command is given. The copy of the text being edited resides in a temporary file called the *buffer*. There is only one buffer.

Commands to *ed* have a simple and regular structure: zero, one, or two *addresses* followed by a single-character *command*, possibly followed by parameters to that command. These addresses specify one or more lines in the buffer. Every command that requires addresses has default addresses, so that the addresses can very often be omitted.

In general, only one command may appear on a line. Certain commands allow the input of text. This text is placed in the appropriate place in the buffer. While *ed* is accepting text, it is said to be in *input mode*. In this mode, *no* commands are recognized; all input is merely collected. Input mode is left by typing a period (.) alone at the beginning of a line.

*Ed* supports a limited form of *regular expression* notation; regular expressions are used in addresses to specify lines and in some commands (e.g., *s*) to specify portions of a line that are to be substituted. A regular expression specifies a set of character strings. A member of this set of strings is said to be *matched* by the regular expression. The regular expressions allowed by *ed* are constructed as follows:

The following one-character regular expressions match a *single* character:

- 1.1 An ordinary character (*not* one of those discussed in 1.2 below) is a one-character regular expression that matches itself.

- 1.2 A backslash (\) followed by any special character is a one-character regular expression that matches the special character itself. The special characters are:
- a. ., \*, [, and \ (dot, star, left square bracket, and backslash, respectively), which are always special, *except* when they appear within square brackets ([]); see 1.4 below).
  - b. ^ (caret), which is special at the *beginning* of an *entire* regular expression (see 3.1 and 3.2 below), or when it immediately follows the left of a pair of square brackets ([ ]) (see 1.4 below).
  - c. \$ (dollar sign), which is special at the *end* of an *entire* regular expression (see 3.2 below).
  - d. The character used to bound (i.e., delimit) an *entire* regular expression, which is special for that regular expression (for example, see how slash (/) is used in the *g* command, below.)
- 1.3 A period (.) is a one-character regular expression that matches any character except newline.
- 1.4 A nonempty string of characters enclosed in square brackets ([ ]) is a one-character regular expression that matches *any one* character in that string. If, however, the first character of the string is a caret (^), the one-character regular expression matches any character *except* newline and the remaining characters in the string. The star (\*) has this special meaning *only* if it occurs first in the string. The dash (-) may be used to indicate a range of consecutive ASCII characters; for example, [0-9] is equivalent to [0123456789]. The dash (-) loses this special meaning if it occurs first (after an initial caret (^), if any) or last in the string. The right square bracket (]) does not terminate such a string when it is the first character within it (after an initial caret (^), if any); e.g., []a-f] matches either a right square bracket (]) or one of the letters "a" through "f" inclusive. Dot, star, left bracket, and the backslash lose their special meaning within such a string of characters.

The following rules may be used to construct regular expressions from one-character regular expressions:

- 2.1 A one-character regular expression matches whatever the one-character regular expression matches.
- 2.2 A one-character regular expression followed by a star (\*) is a regular expression that matches *zero* or more occurrences of the one-character regular expression. If there is any choice, the longest leftmost string that permits a match is chosen.

- 2.3 A one-character regular expression followed by  $\{m\}$ ,  $\{m,\}$ , or  $\{m,n\}$  is a regular expression that matches a *range* of occurrences of the one-character regular expression. The values of  $m$  and  $n$  must be nonnegative integers less than 256;  $\{m\}$  matches *exactly*  $m$  occurrences;  $\{m,\}$  matches *at least*  $m$  occurrences;  $\{m,n\}$  matches any number of occurrences between  $m$  and  $n$ , inclusive. Whenever a choice exists, the regular expression matches as many occurrences as possible.
- 2.4 The concatenation of regular expressions is a regular expression that matches the concatenation of the strings matched by each component of the regular expression.
- 2.5 A regular expression enclosed between the character sequences  $($  and  $)$  is a regular expression that matches whatever the unadorned regular expression matches. See 2.6 below for a discussion of why this is useful.
- 2.6 The expression  $\backslash n$  matches the same string of characters as was matched by an expression enclosed between  $($  and  $)$  *earlier* in the same regular expression. Here  $n$  is a digit; the subexpression specified is that beginning with the  $n$ -th occurrence of  $($  counting from the left. For example, the expression  $\wedge\backslash(.*)\backslash1\$$  matches a line consisting of two repeated appearances of the same string.

Finally, an *entire regular expression* may be constrained to match only an initial segment or final segment of a line (or both):

- 3.1 A caret ( $\wedge$ ) at the beginning of an entire regular expression constrains that regular expression to match an *initial* segment of a line.
- 3.2 A dollar sign ( $\$$ ) at the end of an entire regular expression constrains that regular expression to match a *final* segment of a line. The construction  $\wedge$ *entire regular expression* $\$$  constrains the entire regular expression to match the entire line.

The null regular expression (e.g.,  $//$ ) is equivalent to the last regular expression encountered.

To understand addressing in *ed* it is necessary to know that there is a *current line* at all times. Generally speaking, the current line is the last line affected by a command; the exact effect on the current line is discussed under the description of each command. *Addresses* are constructed as follows:

1. The character  $.$  addresses the current line.
2. The character  $\$$  addresses the last line of the buffer.
3. A decimal number  $n$  addresses the  $n$ -th line of the buffer.

4. 'x addresses the line marked with the mark name character x, which must be a lowercase letter. Lines are marked with the k command described below.
5. A regular expression enclosed by slashes (/) addresses the first line found by searching *forward* from the line *following* the current line toward the end of the buffer and stopping at the first line containing a string matching the regular expression. If necessary, the search wraps around to the beginning of the buffer and continues up to and including the current line, so that the entire buffer is searched.
6. A regular expression enclosed in question marks (?) addresses the first line found by searching *backward* from the line *preceding* the current line toward the beginning of the buffer and stopping at the first line containing a string matching the regular expression. If necessary, the search wraps around to the end of the buffer and continues up to and including the current line. See also the last paragraph before *Files* below.
7. An address followed by a plus sign (+) or a minus sign (-) followed by a decimal number specifies that address plus or minus the indicated number of lines. The plus sign may be omitted.
8. If an address begins with + or -, the addition or subtraction is taken with respect to the current line; e.g., - 5 is understood to mean .- 5.
9. If an address ends with + or -, then 1 is added to or subtracted from the address, respectively. As a consequence of this rule and of rule 8 immediately above, the address - refers to the line preceding the current line. (To maintain compatibility with earlier versions of the editor, the character ^ in addresses is entirely equivalent to -.) Moreover, trailing + and - characters have a cumulative effect, so -- refers to the current line less 2.
10. For convenience, a comma (,) stands for the address pair 1,\$, while a semicolon (;) stands for the pair .,\$.

Commands may require zero, one, or two addresses. Commands that require no addresses regard the presence of an address as an error. Commands that accept one or two addresses assume default addresses when an insufficient number of addresses is given; if more addresses are given than such a command requires, the last address(es) are used.

Typically, addresses are separated from each other by a comma (,). They may also be separated by a semicolon (;). In the latter case, the current line (.) is set to the first address, and only then is the second address calculated. This feature can be used to determine the starting line for forward and backward searches (see rules 5 and

6 above). The second address of any two-address sequence must correspond to a line that follows, in the buffer, the line corresponding to the first address.

In the following list of *ed* commands, the default addresses are shown in parentheses. The parentheses are *not* part of the address; they show that the given addresses are the default.

It is generally illegal for more than one command to appear on a line. However, any command (except *e*, *f*, *r*, or *w*) may be suffixed by *p* or by *l*, in which case the current line is either printed or listed, respectively, as discussed below under the *p* and *l* commands.

(.)a  
<text>

The *append* command reads the given text and appends it after the addressed line; dot is left at the last inserted line, or, if there were no inserted lines, at the addressed line. Address 0 is legal for this command: it causes the "appended" text to be placed at the beginning of the buffer.

(.)c  
<text>

The *change* command deletes the addressed lines, then accepts input text that replaces these lines; dot is left at the last line input, or, if there were none, at the first line that was not deleted.

(.,.)d

The *delete* command deletes the addressed lines from the buffer. The line after the last line deleted becomes the current line; if the lines deleted were originally at the end of the buffer, the new last line becomes the current line.

*e file*

The *edit* command causes the entire contents of the buffer to be deleted, and then the named file to be read in; dot is set to the last line of the buffer. If no filename is given, the currently remembered filename, if any, is used (see the *f* command). The number of characters read is typed; *file* is remembered for possible use as a default filename in subsequent *e*, *r*, and *w* commands. If *file* begins with an exclamation (!), the rest of the line is taken to be a shell command. The output of this command is read for the *e* and *r* commands. For the *w* command, the file is used as the standard input for the specified command. Such a shell command is *not* remembered as the current filename.

*E file*

The *Edit* command is like *e*, except the editor does not check to see if any changes have been made to the buffer since the last *w* command.

**f** *file*

If *file* is given, the *filename* command changes the currently remembered filename to *file*; otherwise, it prints the currently remembered filename.

**(1, \$)g/regular-expression/command list**

In the global command, the first step is to mark every line that matches the given regular expression. Then, for every such line, the given *command list* is executed with *.* initially set to that line. A single command or the first of a list of commands appears on the same line as the global command. All lines of a multiline list except the last line must be ended with a *\*; *a*, *i*, and *c* commands and associated input are permitted; the *.* terminating input mode may be omitted if it would be the last line of the *command list*. An empty *command list* is equivalent to the *p* command. The *g*, *G*, *v*, and *V* commands are not permitted in the *command list*. See also *Notes* and the last paragraph before *Files* below.

**(1, \$)G/regular-expression/**

In the interactive Global command, the first step is to mark every line that matches the given regular expression. Then, for every such line, that line is printed, dot (*.*) is changed to that line, and any *one* command (other than one of the *a*, *c*, *i*, *g*, *G*, *v*, and *V* commands) may be input and is executed. After the execution of that command, the next marked line is printed, and so on; a newline acts as a null command; an ampersand (&) causes the re-execution of the most recent command executed within the current invocation of *G*. Note that the commands input as part of the execution of the *G* command may address and affect *any* lines in the buffer. The *G* command can be terminated by typing an INTERRUPT.

**h**

The *help* command gives a short error message that explains the reason for the most recent *?* diagnostic.

**H**

The *Help* command causes *ed* to enter a mode in which error messages are printed for all subsequent *?* diagnostics. It will also explain the previous diagnostic if there was one. The *H* command alternately turns this mode on and off; it is initially on.

**(.)i**

<text>

The insert command inserts the given *text* before the addressed line; dot is left at the last inserted line, or if there were no inserted lines, at the addressed line. This command differs from the *a* command only in the placement of the input *text*. Address 0 is not legal for this command.

(.,+1)j

The *join* command joins contiguous lines by removing the appropriate newline characters. If only one address is given, this command does nothing.

(.)kz

The *mark* command marks the addressed line with name *z*, which must be a lowercase letter. The address *z* then addresses this line; dot is unchanged.

(.,.)l

The *list* command prints the addressed lines in an unambiguous way: a few nonprinting characters (e.g., tab, backspace) are represented by mnemonic overstrikes, all other nonprinting characters are printed in octal, and long lines are folded. An *l* command may be appended to any command other than *e*, *f*, *r*, or *w*.

(.,.)ma

The *move* command repositions the addressed line(s) after the line addressed by *a*. Address 0 is legal for *a* and causes the addressed line(s) to be moved to the beginning of the file; it is an error if address *a* falls within the range of moved lines; dot is left at the last line moved.

(.,.)n

The *number* command prints the addressed lines, preceding each line by its line number and a tab character; dot is left at the last line printed. The *n* command may be appended to any command other than *e*, *f*, *r*, or *w*.

(.,.)p

The *print* command prints the addressed lines; dot is left at the last line printed. The *p* command may be appended to any command other than *e*, *f*, *r*, or *w*; for example, *dp* deletes the current line and prints the new current line.

P

The editor will prompt with a \* for all subsequent commands. The *P* command alternately turns this mode on and off; it is initially on.

q

The *quit* command causes *ed* to exit. No automatic write of a file is done.

Q

The editor exits without checking if changes have been made in the buffer since the last *w* command.

(\$)r *file*

The *read* command reads in the given file after the addressed line. If no filename is given, the currently remembered

filename, if any, is used (see *e* and *f* commands). The currently remembered filename is *not* changed unless *file* is the very first filename mentioned since *ed* was invoked. Address 0 is legal for *r* and causes the file to be read at the beginning of the buffer. If the read is successful, the number of characters read is typed; dot is set to the last line read in. If *file* begins with *!*, the rest of the line is taken to be a shell (*sh*(C)) command whose output is to be read. Such a shell command is *not* remembered as the current filename.

(.,.)s/*regular-expression*/*replacement*/

or

(.,.)s/*regular-expression*/*replacement*/g

The *substitute* command searches each addressed line for an occurrence of the specified regular expression. In each line in which a match is found, all (nonoverlapped) matched strings are replaced by the *replacement* if the global replacement indicator *g* appears after the command. If the global indicator does not appear, only the first occurrence of the matched string is replaced. It is an error for the substitution to fail on *all* addressed lines. Any character other than space or newline may be used instead of */* to delimit the regular expression and the *replacement*; dot is left at the last line on which a substitution occurred.

An ampersand (&) appearing in the *replacement* is replaced by the string matching the regular expression on the current line. The special meaning of the ampersand in this context may be suppressed by preceding it with a backslash. The characters  $\backslash n$ , where *n* is a digit, are replaced by the text matched by the *n*-th regular subexpression of the specified regular expression enclosed between  $\backslash($  and  $\backslash)$ . When nested parenthesized subexpressions are present, *n* is determined by counting occurrences of  $\backslash($  starting from the left. When the character *%* is the only character in the *replacement*, the *replacement* used in the most recent substitute command is used as the *replacement* in the current substitute command. The *%* loses its special meaning when it is in a replacement string of more than one character or is preceded by a  $\backslash$ .

A line may be split by substituting a newline character into it. The newline in the *replacement* must be escaped by preceding it with a  $\backslash$ . Such a substitution cannot be done as part of a *g* or *v* command list.

(.,.)ta

This command acts just like the *m* command, except that a *copy* of the addressed lines is placed after address *a* (which may be 0); dot is left at the last line of the copy.

u

The *undo* command nullifies the effect of the most recent command that modified anything in the buffer, namely the most

recent *a*, *c*, *d*, *g*, *i*, *j*, *m*, *r*, *s*, *t*, *v*, *G*, or *V* command.

(1, \$) *v*/*regular-expression/command list*

This command is the same as the global command *g* except that the *command list* is executed with dot initially set to every line that does *not* match the regular expression.

(1, \$) *V*/*regular-expression/*

This command is the same as the interactive global command *G* except that the lines that are marked during the first step are those that do *not* match the regular expression.

(1, \$) *w file*

The *write* command writes the addressed lines into the named file. If the file does not exist, it is created with mode 666 (readable and writable by everyone), unless the *umask* setting (see *sh*(C)) dictates otherwise. The currently remembered filename is *not* changed unless *file* is the very first filename mentioned since *ed* was invoked. If no filename is given, the currently remembered filename, if any, is used (see *e* and *f* commands); dot is unchanged. If the command is successful, the number of characters written is displayed. If *file* begins with an exclamation (!), the rest of the line is taken to be a shell command to which the addressed lines are supplied as the standard input. Such a shell command is *not* remembered as the current filename.

X

A key string is demanded from the standard input. Subsequent *e*, *r*, and *w* commands will encrypt and decrypt the text with this key by the algorithm of *crypt*(C). An explicitly empty key turns off encryption.

(\$)=

The line number of the addressed line is typed; dot is unchanged by this command.

!shell command

The remainder of the line after the ! is sent to the XENIX shell (*sh*(C)) to be interpreted as a command. Within the text of that command, the unescaped character % is replaced with the remembered filename; if a ! appears as the first character of the shell command, it is replaced with the text of the previous shell command. Thus, !! will repeat the last shell command. If any expansion is performed, the expanded line is echoed; dot is unchanged.

(.+1) An address alone on a line causes the addressed line to be printed. A RETURN alone on a line is equivalent to .+1p. This is useful for stepping forward through the editing buffer a line at a time.

If an interrupt signal (ASCII DEL or BREAK) is sent, *ed* prints a question mark (?) and returns to its command level.

Some size limitations: 512 characters per line, 256 characters per global command list, 64 characters per filename, and 128K characters in the buffer. The limit on the number of lines depends on the amount of user memory.

When reading a file, *ed* discards ASCII NUL characters and all characters after the last newline. Files that contain characters not in the ASCII set (bit 8 on) cannot be edited by *ed*.

If the closing delimiter of a regular expression or of a replacement string (e.g., /) would be the last character before a newline, that delimiter may be omitted, in which case the addressed line is printed. Thus the following pairs of commands are equivalent:

```
s/s1/s2s/s1/s2/p
g/s1g/s1/p
?s1?s1?
```

## Files

/tmp/e# Temporary; # is the process number

ed.hup Work is saved here if the terminal is hung up

## See Also

crypt(C), grep(C), sed(C), sh(C)

## Diagnostics

? Command errors  
? file An inaccessible file

Use the *help* and *Help* commands for detailed explanations.

If changes have been made in the buffer since the last *w* command that wrote the entire buffer, *ed* warns the user if an attempt is made to destroy *ed*'s buffer via the *e* or *q* commands: it prints ? and allows you to continue editing. A second *e* or *q* command at this point will take effect. The dash (-) command-line option inhibits this feature.

## Notes

An exclamation (!) command cannot be subject to a *g* or a *v* command.

The `!` command and the `!` escape from the `e`, `r`, and `w` commands cannot be used if the the editor is invoked from a restricted shell (see `sh(C)`).

The sequence `\n` in a regular expression does not match any character.

The `/` command mishandles DEL.

Files encrypted directly with the `crypt(C)` command with the null key cannot be edited.

Because 0 is an illegal address for the `w` command, it is not possible to create an empty file with `ed`.

**EJECT(C)**

**EJECT(C)**

**Name**

eject

**Syntax**

eject

**Description**

The eject(C) program ejects Lisa 2 Sony micro floppydisks.

**Diagnostics**

Terminal will display message "fd not loaded" if there is no floppydisk in the drive.

**Name**

enable - Turns on terminals.

**Syntax**

enable [- d] [ [- e] tty ...

**Description**

This program manipulates the */etc/ttys* file and signals *init* to allow logins on a particular terminal. The *- e* and *- d* options may be used to allow logins on some terminals and disallow logins on other terminals in a single command.

**Examples**

A simple command to enable *tty01* follows:

```
enable tty01
```

Multiple terminals can be disabled or enabled using the *- d* and *- e* switches before the appropriate terminal name:

```
enable tty01 - e tty02 - d tty03 tty04
```

**Files**

*/dev/tty\**

*/etc/ttys*

**See Also**

*login(M)*, *disable(C)*, *ttys(M)*, *getty(M)*, *init(M)*

**Warning**

Be absolutely certain to pause at least one minute before reusing this command or before using the *disable* command. Failure to do so may cause the system to crash.

**Name**

`env` - Sets environment for command execution.

**Syntax**

`env [- ] [ name=value ] ... [ command args ]`

**Description**

*Env* obtains the current *environment*, modifies it according to its arguments, then executes the command with the modified environment. Arguments of the form *name=value* are merged into the inherited environment before the command is executed. The `-` flag causes the inherited environment to be ignored completely, so that the command is executed with exactly the environment specified by the arguments.

If no command is specified, the resulting environment is printed, one name-value pair per line.

**See Also**

`sh(C)`, `exec(S)`, `profile(F)`, `environ(M)`

**Notes**

The 2.3 *printenv* command has been replaced in XENIX 3.0 by the *env* command. The *printenv* shipped is simply a link to the 3.0 command *env*.

## Name

*ex* - Invokes a text editor.

## Syntax

*ex* [ - ] [ - v ] [ - t tag ] [ - r ] [ + *lineno* ] name ...

## Description

*Ex* is the root of the editors *ex* and *vi*. *Ex* is a superset of *ed*, whose most notable extension is a display editing facility. Display based editing is the focus of *vi*.

If you have not used *ed*, or if you are a casual user, you will find that *edit* is most convenient for you. It avoids some of the complexities of *ex* which is used mostly by systems programmers and persons very familiar with *ed*.

If you have a CRT terminal, you may wish to use a display based editor; in this case see *vi(C)*, a command which focuses on the display editing portion of *ex*.

## For ed Users

If you have used *ed* you will find that *ex* has a number of new features. Intelligent terminals and high-speed terminals are very pleasant to use with *vi*. Generally, the *ex* editor uses far more of the capabilities of terminals than *ed* does. It uses the terminal capability database *termcap(M)* and the type of the terminal you are using from the variable *TERM* in the environment to determine how to drive your terminal efficiently. The *ex* editor makes use of features such as insert and delete character and line in its visual command mode, which can be abbreviated *vi*, and which is the central mode of editing when using *vi(C)*. There is also an interline editing open command, *(o)* that works on all terminals.

*Ex* contains a number of features for easily viewing the text of a file. The *z* command gives easy access to windows of text. Hitting CNTRL-D causes the editor to scroll a half-window of text and is more useful for quickly stepping through a file than just hitting the RETURN key. Of course, the screen-oriented visual mode gives constant access to editing context.

*Ex* gives you more help when you make mistakes. The *undo (u)* command allows you to reverse any single change. *Ex* gives you a lot of feedback, normally printing changed lines, and indicates when more than a few lines are affected by a command so it is easy to detect when a command has affected more lines than it should have.

The editor also normally prevents the overwriting of existing files unless you have edited them, so that you don't accidentally clobber with a *write* a file other than the one you are editing. If the system (or editor) crashes, or you accidentally hang up the phone, you can use the *recover* command to retrieve your work. This will get you back to within a few lines of where you left off.

*Ex* has several features for editing more than one file at a time. You can give it a list of files on the command line and use the *next* (n) command to edit each in turn. You can also give the *next* command a list of filenames, or a pattern used by the shell to specify a new set of files to be edited. In general, filenames in the editor may be formed with full shell metasyntax. The metacharacter "%" is also available in forming filenames and is replaced by the name of the current file. For editing large groups of related files you can use *ex's* *tag* command to quickly locate functions and other important points in any of the files. This is useful when you want to find the definition of a particular function in a large program. The command *ctags*(CP) builds a *tags* file or a group of C programs.

For moving text between files and within a file, the editor has a group of buffers named *a* through *z*. You can place text in these named buffers and carry it over when you edit another file.

The command *&* repeats the last substitute command. There is also a confirmed substitute command. You give a range of substitutions to be done and the editor interactively asks whether each substitution is desired.

You can use the substitute command in *ex* to systematically convert the case of letters between uppercase and lowercase. It is possible to ignore case in searches and substitutions. *Ex* also allows regular expressions that match words to be constructed. This is convenient, for example, when searching for the word "edit" if your document also contains the word "editor."

*Ex* has a set of *options* that you can set. One option which is very useful is the *autoindent* option that allows the editor to automatically supply leading white space to align text. You can then use the CNTRL-D key to backtab, space and tab forward to align new code easily.

Miscellaneous new useful features include an intelligent join (*j*) command which supplies whitespace between joined lines automatically, the commands *<* and *>* which shift groups of lines, and the ability to filter portions of the buffer through commands such as *sort*.

## Files

/usr/lib/ex2.0strings	Error messages
/usr/lib/ex2.0recover	Recover command

<code>/usr/lib/ex2.0preserve</code>	Preserve command
<code>/etc/termcap</code>	Describes capabilities of terminals
<code>\$HOME/.exrc</code>	Editor startup file
<code>/tmp/Exnnnnn</code>	Editor temporary
<code>/tmp/Rxnnnnn</code>	Named buffer temporary
<code>/usr/preserve</code>	Preservation directory

### See Also

`awk(C)`, `ctags(CP)`, `ed(C)`, `grep(C)`, `sed(C)`, `termcap(M)`, `vi(C)`

### Credit

This utility was developed at the University of California at Berkeley and is used with permission.

### Notes

The `undo` command causes all marks to be lost on lines changed and then restored if the marked lines were changed.

`Undo` never clears the buffer modified condition.

The `z` command prints a number of logical rather than physical lines. More than a screen full of output may result if long lines are present.

File input/output errors don't print a name if the command line `"- "` option is used.

There is no easy way to do a single scan ignoring case.

Because of the implementation of the arguments to `next`, only 512 bytes of argument list are allowed there.

The format of `/etc/termcap` and the large number of capabilities of terminals used by the editor cause terminal type setup to be rather slow.

The editor does not warn if text is placed in named buffers and not used before exiting the editor.

Null characters are discarded in input files and cannot appear in resultant files.

## Name

*expr* - Evaluates arguments as an expression.

## Syntax

*expr* arguments

## Description

The arguments are taken as an expression. After evaluation, the result is written on the standard output. Terms of the expression must be separated by blanks. Characters special to the shell must be escaped. Note that zero is returned to indicate a zero value, rather than the null string. Strings containing blanks or other special characters should be quoted. Integer-valued arguments may be preceded by a unary minus sign. Internally, integers are treated as 32-bit, 2's complement numbers.

The operators and keywords are listed below. Expressions should be quoted by the shell, since many of the characters that have special meaning in the shell also have special meaning in *expr*. The list is in order of increasing precedence, with equal precedence operators grouped within braces ( { and } ).

*expr* | *expr*

Returns the first *expr* if it is neither null nor 0, otherwise returns the second *expr*.

*expr* & *expr*

Returns the first *expr* if neither *expr* is null nor 0, otherwise returns 0.

*expr* { =, >, >=, <, <=, != } *expr*

Returns the result of an integer comparison if both arguments are integers, otherwise returns the result of a lexical comparison.

*expr* { +, - } *expr*

Addition or subtraction of integer-valued arguments.

*expr* { \*, /, % } *expr*

Multiplication, division, or remainder of the integer-valued arguments.

*expr* : *expr*

The matching operator : compares the first argument with the second argument which must be a regular expression; regular expression syntax is the same as that of *ed(C)*, except that all patterns are "anchored" (i.e., begin with a caret (^)) and therefore the caret (^) is not a special character

in that context. (Note that in the shell, the caret has the same meaning as the pipe symbol (|).) Normally the matching operator returns the number of characters matched (zero on failure). Alternatively, the `\(...\)` pattern symbols can be used to return a portion of the first argument.

### Examples

1. `a=`expr $a + 1``

Adds 1 to the shell variable a.

2. `# For $a equal to either "/usr/abc/file" or just "/file"`  
`expr $a : .*\/(.*\)|$a``

Returns the last segment of a pathname (i.e., file). Watch out for the slash alone as an argument: `expr` will take it as the division operator (see *Notes* below).

3. `expr $VAR : `*``

Returns the number of characters in \$VAR.

### See Also

`ed(C)`, `sh(C)`

### Diagnostics

As a side effect of expression evaluation, `expr` returns the following exit values:

- |   |  |
|---|--|
| 0 | If the expression is neither null nor zero |
| 1 | If the expression is null or zero          |
| 2 | For invalid expressions                    |

Other diagnostics include:

- |                            |   |
|----------------------------|---|
| <i>syntax error</i>        | For operator/operand errors                 |
| <i>nonnumeric argument</i> | If arithmetic is attempted on such a string |

**Notes**

After argument processing by the shell, *expr* cannot tell the difference between an operator and an operand except by the value. If *\$a* is an equals sign (=), the command:

```
expr $a = =
```

looks like:

```
expr = = =
```

Thus the arguments are passed to *expr* (and will all be taken as the = operator). The following permits comparing equals signs:

```
expr X$a = X=
```

*FALSE* (C)

*FALSE* (C)

**Name**

*false* - Returns with a nonzero exit value.

**Syntax**

*false*

**Description**

*False* does nothing except return with a nonzero exit value. *True*(C), *false*'s counterpart, does nothing except return with a zero exit value. *False* is typically used in shell procedures such as:

```
until false
do
    command
done
```

**See Also**

*sh*(C), *true*(C)

**Diagnostics**

*False* has exit status 1.

**Name**

**file** - Determines file type.

**Syntax**

**file file ...**

**file - f namesfile**

**Description**

*File* performs a series of tests on each argument in an attempt to classify it. If an argument appears to be ASCII, *file* examines the first 512 bytes and tries to guess its language. If an argument is an executable x.out file, *file* prints the version stamp, provided it is greater than 0.

If the first argument is a **- f** option, *file* takes the list of filenames from *namesfile*.

Several object file formats are recognized. For **a.out** and **x.out** format object files, the relationship of *cc* flags to file classification is **- i** for "separate", **- n** for "pure", and **- s** for not "not stripped".

**Notes**

It can make mistakes: in particular it often suggests that command files are C programs.

## Name

find - Finds files.

## Syntax

find pathname-list expression

## Description

*Find* recursively descends the directory hierarchy for each pathname in the *pathname-list* (i.e., one or more pathnames) seeking files that match a Boolean *expression* written in the primaries given below. In the descriptions, the argument *n* is used as a decimal integer where  $+n$  means more than *n*,  $-n$  means less than *n*, and *n* means exactly *n*.

- name *file* True if *file* matches the current filename. Normal shell argument syntax may be used if escaped (watch out for the left bracket ([), the question mark (?), and the star (\*)).
- perm *onum* True if the file permission flags exactly match the octal number *onum* (see *chmod(C)*). If *onum* is prefixed by a minus sign, more flag bits (017777, see *stat(S)*) become significant and the flags are compared:  
 $(\text{flags}\&\text{onum})==\text{onum}$
- n True if the file is a semaphore or shared data file.
- type *c* True if the type of the file is *c*, where *c* is b, c, d, p, or f, for block special file, character special file, directory, named pipe, or plain file.
- links *n* True if the file has *n* links.
- user *uname* True if the file belongs to the user *uname*. If *uname* is numeric and does not appear as a login name in the */etc/passwd* file, it is taken as a user ID.
- group *gname* True if the file belongs to the group *gname*. If *gname* is numeric and does not appear in the */etc/group* file, it is taken as a group ID.
- size *n* True if the file is *n* blocks long.

## FIND (C)

## FIND (C)

- atime *n* True if the file has been accessed in *n* days.
- mtime *n* True if the file has been modified in *n* days.
- ctime *n* True if the file has been changed in *n* days.
- exec *cmd* True if the executed *cmd* returns a zero value as exit status. The end of *cmd* must be punctuated by an escaped semicolon. A command argument {} is replaced by the current pathname.
- ok *cmd* Like - exec except that the generated command line is printed with a question mark first, and is executed only if the user responds by typing y.
- print Always true; causes the current pathname to be printed.
- newer *file* True if the current file has been modified more recently than the argument *file*.
- ( *expression* ) True if the parenthesized expression is true (parentheses are special to the shell and must be escaped).

The primaries may be combined using the following operators (in order of decreasing precedence):

### negation

The negation of a primary is specified with the exclamation (!) unary *not* operator.

### AND

The AND operation is implied by the juxtaposition of two primaries.

OR The OR operation is specified with the - o operator given between two primaries.

## Examples

The following removes all files named a.out or \*.o that have not been accessed for a week:

```
find / \ ( - name a.out - o - name '*.o' ) - atime +7 - exec rm {} \;
```

## Files

/etc/passwd

*FIND (C)*

*FIND (C)*

*/etc/group*

**See Also**

*cpio(C), sh(C), test(C), stat(S), cpio(F)*

**Name**

**finger** - Finds information about users.

**Syntax**

**finger** [ -bfilpqsw ] [ login1 [ login2-... ] ]

**Description**

By default *finger* lists the login name, full name, terminal name and write status (as a "\*" before the terminal name if write permission is denied), idle time, login time, and office location and phone number (if they are known) for each current XENIX user. (Idle time is minutes if it is a single integer, hours and minutes if a colon (:) is present, or days and hours if a "d" is present.)

A longer format also exists and is used by *finger* whenever a list of names is given. (Account names as well as first and last names of users are accepted.) This is a multiline format; it includes all the information described above as well as the user's home directory and login shell, any plan which the person has placed in the file *.plan* in their home directory, and the project on which they are working from the file *.project* also in the home directory.

*Finger* options are:

- b Briefer long output format of users.
- f Suppresses the printing of the header line (short format)
- i Quick list of users with idle times.
- l Forces long output format.
- p Suppresses printing of the *.plan* files.
- q Quick list of users.
- s Forces short output format.
- w Forces narrow format list of specified users.

**Files**

*/etc/utmp*

Who file

*/etc/passwd*

User names, offices, phones,

## FINGER (C)

## FINGER (C)

	login directories, and shells
/usr/adm/lastlog	Last login times
\$HOME/.plan	Plans
\$HOME/.project	Projects

### See Also

who(C)

### Credit

This utility was developed at the University of California at Berkeley and is used with permission.

### Notes

Only the first line of the *.project* file is printed.

The "office" column of the output will contain any text in the comment field of the user's */etc/passwd* file entry that immediately follows a comma (,). For example, if the entry is

```
johnd:eX8HinAk:201:50:John Doe, 321:/usr/johnd:/bin/sh
```

the number 321 will appear in the office column.

Idle time is computed as the elapsed time since any activity on the given terminal. This includes previous invocations of *finger* which may have modified the terminal's corresponding device file */dev/tty??.*

**Name**

format — format floppy disks

**Syntax**

format

format [-v] [-f device]

**Description**

*Format* formats micro floppydisks for use with Lisa XENIX. The command may be used either interactively or from the command line. If invoked without any arguments, the program will format the disk in drive /dev/rfd.

The following command line options are available:

**-v** This specifies verbose (or interactive) mode. In interactive mode, *format* will respond

insert disk, press RETURN to continue

After the first disk is formatted, the program will prompt:

press RETURN to format another disk, 'q' to quit

**-f device**

This formats the given file. The default device is /dev/rfd. The command

format -f /dev/nrfd

will format the disk using the no-eject device.

**Files**

/dev/rfd

/dev/nrfd

**Name**

**fsck** - Checks and repairs file systems.

**Syntax**

**/etc/fsck** [ options ] [ file-system ] ...

**Description**

*Fsck* audits and interactively repairs inconsistent conditions for XENIX file systems, whether XENIX version 2.3 or 3.0. If the file system is consistent then the number of files, number of blocks used, and number of blocks free are reported. If the file system is inconsistent the operator is prompted for concurrence before each correction is attempted. It should be noted that most corrective actions result in some loss of data. The amount and severity of the loss may be determined from the diagnostic output. The default action for each consistency correction is to wait for the operator to respond "yes" or "no". If the operator does not have write permission *fsck* defaults to the action of the `-n` option.

The following flags are interpreted by *fsck*:

- **y** Assumes a yes response to all questions asked by *fsck*.
- **n** Assumes a no response to all questions asked by *fsck*; do not open the file system for writing.
- **sb:c** Ignores the actual free list and (unconditionally) reconstructs a new one by rewriting the super-block of the file system. The file system *must* be unmounted while this is done.

The `-sb:c:c` option allows for creating an optimal free-list organization. The following forms are supported:

- **s**
- **sBlocks-per-cylinder:Blocks-to-skip** (for anything else)

If `b:c` is not given, then the values used when the file system was created are used. If these values were not specified, then a reasonable default value is used.

- **S** Conditionally reconstructs the free list. This option is like `-sb:c` above except that the free list is rebuilt only if there are no discrepancies discovered in the file system. Using `-S` forces a "no" response to all questions asked by *fsck*. This option is useful for forcing free list reorganization on uncontaminated file systems.

- t If *fsck* cannot obtain enough memory to keep its tables, it uses a scratch file. If the - t option is specified, the file named in the next argument is used as the scratch file, if needed. Without the - t flag, *fsck* prompts the operator for the name of the scratch file. The file chosen should not be on the file system being checked, and if it is not a special file or did not already exist, it is removed when *fsck* completes.
- rr Recovers the root file system. The required *filesystem* argument must refer to the root file system, and preferably to the block device (normally /dev/root .) This switch implies - y and overrides - n . If any modifications to the file system are required, the system will be automatically shutdown to insure the integrity of the file system.
- c Causes any supported file system to be converted to the type of the current file system. The user is asked to verify the request for each file system that requires conversion unless the - y option is specified. It is recommended that every file system be checked with this option, *while unmounted* if it is to be used with the current version of XENIX. To update the active root file system, it should be checked with:

```
fsck - c - rr /dev/root
```

If no *file systems* are specified, *fsck* reads a list of default file systems from the file /etc/checklist.

Inconsistencies checked are as follows:

- Blocks claimed by more than one inode or the free list

- Blocks claimed by an inode or the free list outside the range of the file system

- Incorrect link counts

- Size checks:

    Incorrect number of blocks

    Directory size not 16-byte aligned

- Bad inode format

- Blocks not accounted for anywhere

- Directory checks:

File pointing to unallocated inode  
Inode number out of range

- Super-block checks:

More than 65536 inodes  
More blocks for inodes than there are in the file system

- Bad free block list format

- Total free block or free inode count incorrect

Orphaned files and directories (allocated but unreferenced) are, with the operator's concurrence, reconnected by placing them in the lost+found directory. The name assigned is the inode number. The only restriction is that the directory lost+found must preexist in the root of the file system being checked and must have empty slots in which entries can be made. This is accomplished by making lost+found, copying a number of files to the directory, and then removing them (before *fsck* is executed).

## Files

*/etc/checklist* Contains default list of file systems to check

## See Also

*checklist(F)*, *filesystem(F)*

## Diagnostics

The diagnostics produced by *fsck* are intended to be self-explanatory.

## Notes

*Fsck* will not run on a *mounted* non-raw file system unless the file system is the root file system or unless the *-n* option is specified and no writing out of the file system will take place. If any such attempt is made, a warning is printed and no further processing of the file system is done for the specified device.

Although checking a raw device is almost always faster, there is no way to tell if the file system is mounted. And cleaning a mounted file system will almost certainly result in an inconsistent superblock.

**Warning**

For a XENIX 2.3 file system to be properly supported under XENIX 3.0, it is necessary that *fsck* be run on each 2.3 file system to be mounted under the XENIX 3.0 kernel. For the root file system, "fsck - rr /dev/root" should be run and for all other file systems "fsck /dev/??" on the *unmounted* block device should be used.

## Name

getopt - Parses command options.

## Syntax

set -- `getopt optstring \$\*`

## Description

*Getopt* is used to check and break up options in command lines for parsing by shell procedures. *Optstring* is a string of recognized option letters (see *getopt(S)*). If a letter is followed by a colon, the option is expected to have an argument which may or may not be separated from it by whitespace. The special option -- is used to delimit the end of the options. *Getopt* will place -- in the arguments at the end of the options, or recognize it if used explicitly. The shell arguments (\$1 \$2 ...) are reset so that each option is preceded by a dash (-) and in its own shell argument; each option argument is also in its own shell argument.

## Example

The following code fragment shows how one can process the arguments for a command that can take the options a and b, and the option o, which requires an argument:

```
set -- `getopt abo: $*`
if [ $? != 0 ]
then
    echo $USAGE
    exit 2
fi
for i in $*
do
    case $i in
        - a | - b)    FLAG=$i; shift;;
        - o)          OARG=$2;  shift; shift;;
        - - )        shift;  break;;
        esac
done
```

This code will accept any of the following as equivalent:

```
cmd - aoarg file file
cmd - a - o arg file file
cmd - oarg - a file file
cmd - a - oarg -- file file
```

*GETOPT(C)*

*GETOPT(C)*

**See Also**

sh(C), getopt(S)

**Diagnostics**

*Getopt* prints an error message on the standard error when it encounters an option letter not included in *optstring*.

**Name**

grep, egrep, fgrep - Searches a file for a pattern.

**Syntax**

grep [ options ] expression [ files ]

egrep [ options ] [ expression ] [ files ]

fgrep [ options ] [ strings ] [ files ]

**Description**

Commands of the *grep* family search the input *files* (standard input default) for lines matching a pattern. Normally, each line found is copied to the standard output. *Grep* patterns are limited regular *expressions* in the style of *ed(C)*; it uses a compact nondeterministic algorithm. *Egrep* patterns are full regular *expressions*; it uses a fast deterministic algorithm that sometimes needs exponential space. *Fgrep* patterns are fixed *strings*; it is fast and compact. The following *options* are recognized:

- v All lines but those matching are printed.
- x Prints only exact matches of an entire line. (*Fgrep* only.)
- c Only a count of matching lines is printed.
- l Only the names of files with matching lines are listed, separated by newlines.
- n Each line is preceded by its relative line number in the file.
- b Each line is preceded by the block number on which it was found. This is sometimes useful in locating disk block numbers by context.
- s Suppresses error messages produced for nonexistent or unreadable files.
- y Turns on matching of letters of either case in the input so that case is insignificant. Does not work for *egrep*.
- e *expression*  
Same as a simple *expression* argument, but useful when the *expression* begins with a dash (-).
- f *file*  
The regular *expression* for *grep* or *egrep*, or *strings* list (for *fgrep*) is taken from the *file*.

In all cases, the filename is output if there is more than one input file. Care should be taken when using the characters \$, \*, [, ^, |, (, ), and \ in *expression*, because they are also meaningful to the shell. It is safest to enclose the entire *expression* argument in single quotation marks.

*Fgrep* searches for lines that contain one of the *strings* separated by newlines.

*Egrep* accepts regular expressions as in *ed*(C), except for \ ( and \), with the addition of the following:

- A regular expression followed by a plus sign (+) matches one or more occurrences of the regular expression.
- A regular expression followed by a question mark (?) matches 0 or 1 occurrences of the regular expression.
- Two regular expressions separated by a vertical bar (|) or by a newline match strings that are matched by either regular expression.
- A regular expression may be enclosed in parentheses ( ) for grouping.

The order of precedence of operators is [], then \*?+, then concatenation, then the backslash (\) and the newline.

#### See Also

*ed*(C), *sed*(C), *sh*(C)

#### Diagnostics

Exit status is 0 if any matches are found, 1 if none, 2 for syntax errors or inaccessible files.

#### Notes

Ideally there should be only one *grep*, but there isn't a single algorithm that spans a wide enough range of space-time tradeoffs.

Lines are limited to 256 characters; longer lines are truncated.

*Egrep* does not recognize ranges, such as [a-z], in character classes.

When using *grep* with the -y option, the search is not made totally case insensitive in character ranges specified within brackets.

Multiple strings can be specified in *fgrep* without using a separate strings file by using the quoting conventions of the shell to imbed newlines in the *single* string argument. For example, you might type the following at the command line:

```
fgrep 'string1
string2
string3' text.file
```

Similarly, multiple strings can be specified in *egrep* by doing:

```
egrep 'string1|string2|string3' text.file
```

Thus *egrep* can do almost anything that *grep* and *fgrep* can do.

**Name**

grpcheck - Checks group file.

**Syntax**

pwcheck [file]

grpcheck [file]

**Description**

*Grpcheck* verifies all entries in the group file. This verification includes a check of the number of fields, group name, group ID, and whether all login names appear in the password file. The default group file is */etc/group*.

**Files**

*/etc/group*

*/etc/passwd*

**See Also**

pwcheck(C), group(M), passwd(M)

**Diagnostics**

Group entries in */etc/group* with no login names are flagged.

**Name**

haltsys - Closes out the file systems and halts the CPU.

**Syntax**

/etc/haltsys

**Description**

*Haltsys* does a `shutdn()` system call (see *shutdn(S)*) to flush out pending disk I/O, mark the file systems clean, and halt the processor. *Haltsys* takes effect immediately, so user processes should be killed beforehand. *Shutdown(C)* is recommended for normal system termination; it warns the users, cleans things up, and calls *haltsys*. Use *haltsys* directly only if some system problem prevents the running of *shutdown*.

**Notes**

haltsys does not lock hard disk heads.

**See Also**

shutdn(S), shutdown(C)

**Name**

hd - Displays files in hexadecimal format.

**Syntax**

hd [ - format [ - s offset ] [ - n count ] [ file ] ...

**Description**

The *hd* command displays the contents of files in hexadecimal, octal, decimal, and character formats. Control over the specification of ranges of characters is also available. The default behavior is with the following flags set: "- abx - A". This says that addresses (file offsets) and bytes are printed in hexadecimal and that characters are also printed. If no *file* argument is given, the standard input is read.

Options include:

- s *offset* Specify the beginning offset in the file where printing is to begin. If no 'file' argument is given, or if a seek fails because the input is a pipe, 'offset' bytes are read from the input and discarded. Otherwise, a seek error will terminate processing of the current file.

The *offset* may be given in decimal, hexadecimal (preceded by '0x'), or octal (preceded by a '0'). It is optionally followed by one of the following multipliers: w, l, b, or k; for words (2 bytes), long words (4 bytes), half kilobytes (512 bytes), or kilobytes (1024 bytes). Note that this is the one case where "b" does *not* stand for bytes. Since specifying a hexadecimal offset in blocks would result in an ambiguous trailing 'b', any offset and multiplier may be separated by an asterisk (\*).

- n *count* Specify the number of bytes to process. The *count* is in the same format as *offset*, above.

**Format Flags**

Format flags may specify addresses, characters, bytes, words (2 bytes) or longs (4 bytes) to be printed in hex, decimal, or octal. Two special formats may also be indicated: text or ascii. Format and base specifiers may be freely combined and repeated as desired in order to specify different bases (hexadecimal, decimal or octal) for different output formats (addresses, characters, etc.). All format flags appearing in a single argument are applied as appropriate to all other flags in that argument.

**acbwLA**

Output format specifiers for addresses, characters, bytes, words, longs and ascii respectively. Only one base specifier will be used for addresses; the address will appear on the first line of output that begins each new offset in the input.

The character format prints printable characters unchanged, special C escapes as defined in the language, and the remaining values in the specified base.

The ascii format prints all printable characters unchanged, and all others as a period (.). This format appears to the right of the first of other specified output formats. A base specifier has no meaning with the ascii format. If no other output format (other than addresses) is given, bx is assumed. If no base specifier is given, *all* of xdo are used.

**hxdo**

Output base specifiers for hexadecimal, decimal and octal. If no format specifier is given, *all* of acbwL are used.

- t Print a text file, each line preceded by the address in the file. Normally, lines should be terminated by a `\n` character; but long lines will be broken up. Control characters in the range 0x00 to 0x1f are printed as '^@' to '^\_'. Bytes with the high bit set are preceded by a tilde (~) and printed as if the high bit were not set. The special characters (^, ~, \) are preceded by a backslash (\) to escape their special meaning. As special cases, two values are represented numerically as '\177' and '\377'. This flag will override all output format specifiers except addresses.

*HEAD* (C)

*HEAD* (C)

**Name**

`head` - Prints the first few lines of a stream.

**Syntax**

`head [ - count ] [ file ... ]`

**Description**

This filter prints the first *count* lines of each of the specified files. If no files are specified, *head* reads from the standard input. If no *count* is specified, then 10 lines are printed.

**See Also**

`tail`(C)

**Credit**

This utility was developed at the University of California at Berkeley and is used with permission.

*ID* (C)

*ID* (C)

**Name**

*id* - Prints user and group IDs and names.

**Syntax**

*id*

**Description**

*id* writes a message on the standard output giving the user and group IDs and the corresponding names of the invoking process. If the effective and real IDs do not match, both are printed.

**See Also**

*logname*(C), *getuid*(S)

**Name**

join - Joins two relations.

**Syntax**

join [ options ] file1 file2

**Description**

*Join* forms, on the standard output, a join of the two relations specified by the lines of *file1* and *file2*. If *file1* is a dash (-), the standard input is used.

*File1* and *file2* must be sorted in increasing ASCII collating sequence on the fields on which they are to be joined, normally the first in each line.

There is one line in the output for each pair of lines in *file1* and *file2* that have identical join fields. The output line normally consists of the common field, then the rest of the line from *file1*, then the rest of the line from *file2*.

Fields are normally separated by blank, tab or newline. In this case, multiple separators count as one, and leading separators are discarded.

These options are recognized:

- *an* In addition to the normal output, produces a line for each unpairable line in file *n*, where *n* is 1 or 2.
- *es* Replaces empty output fields by string *s*.
- *jn m* Joins on the *m*th field of file *n*. If *n* is missing, uses the *m*th field in each file.
- *olist* Each output line comprises the fields specified in *list*, each element of which has the form *n.m*, where *n* is a file number and *m* is a field number.
- *tc* Uses character *c* as a separator (tab character). Every appearance of *c* in a line is significant.

*JOIN(C)*

*JOIN(C)*

**See Also**

*awk(C)*, *comm(C)*, *sort(C)*

**Notes**

With default field separation, the collating sequence is that of *sort* - b; with - t, the sequence is that of a plain sort.

**Name**

kill - Terminates a process.

**Syntax**

kill [ - signo ] processid ...

**Description**

*Kill* sends signal 15 (terminate) to the specified processes. This will normally kill processes that do not catch or ignore the signal. The process number of each asynchronous process started with & is reported by the shell (unless more than one process is started in a pipeline, in which case the number of the last process in the pipeline is reported). Process numbers can also be found by using *ps*(C).

For example, if process number 0 is specified, all processes in the process group are signaled.

The killed process must belong to the current user unless he is the super-user.

If a signal number preceded by - is given as the first argument, that signal is sent instead of the terminate signal (see *signal*(S)). In particular "kill - 9 ..." is a sure kill.

**See Also**

*ps*(C), *sh*(C), *kill*(S), *signal*(S)

**Name**

- l - Lists information about contents of directory.

**Syntax**

l [ - asdrucifg ] name ...

**Description**

For each directory argument, *l* lists the contents of the directory; for each file argument, *l* repeats its name and other requested information. The output is sorted alphabetically by default. When no argument is given, the current directory is listed. When several arguments are given, the arguments are first sorted appropriately, but file arguments appear before directories and their contents. Information is listed in the format of the "ls - l" command, which is identical to the *l* command. This format and all provided switches are described in *ls(C)*, to which you should refer for a complete discussion of the capabilities of *l*.

**Files**

/etc/passwd    Contains user IDs  
/etc/group     Contains group IDs

**Notes**

Newline and tab are considered printing characters in filenames.

The output device is assumed to be 80 columns wide.

## Name

lc - Lists directory contents in columns.

## Syntax

lc [ - abcdfgilmqrstuxlFR ] name ...

## Description

For each directory argument, *lc* lists the contents of the directory; for each file argument, *lc* repeats its name and any other information requested. The output is given in columns and is sorted alphabetically. When no argument is given, the current directory is listed. When several arguments are given, the arguments are first sorted appropriately, but file arguments appear before directories and their contents.

Files which are not the contents of a directory being interpreted are always sorted across the page rather than down the page in columns. This is because the individual filenames may be arbitrarily long. A stream output format is available in which files are listed across the page, separated by commas. The - m flag enables this format.

## Options follow:

- l Lists in long format, giving mode, number of links, owner, group, size in bytes, and time of last modification for each file. (See below.) If the file is a special file the size field instead contains the major and minor device numbers.
- o The same as - l, except that the group is not printed.
- g The same as - l, except that the owner is not printed.
- t Sorts by time modified (latest first) instead of by name, as is normal.
- a Lists all entries; usually "." and ".." are suppressed.
- s Gives size in blocks, including indirect blocks for each entry.
- d If the argument is a directory, lists only its name, not its contents (mostly used with - l to get status on directory).
- r Reverses the order of sort to get reverse alphabetic or oldest first as appropriate.
- u Uses time of last access instead of last modification for sorting (- t) or printing (- l).

- c Uses time of file creation for sorting or printing.
- i Prints inode number in first column of the report for each file listed.
- f Forces each argument to be interpreted as a directory and lists the name found in each slot. This option turns off - l, - t, - s, and - r, and turns on - a; the order is the order in which entries appear in the directory.
- n Same as the - l switch, but the owner's user ID appears instead of the owner's name. If used in conjunction with the - g switch, the owner's group ID appears instead of the group name.
- m  
Forces stream output format
- l Forces an output format with one entry per line.
- q Forces printing of nongraphic characters in filenames as the character "?".
- b Forces printing of nongraphic characters to be in the \ddd notation, in octal.
- x Forces columnar printing to be sorted across rather than down the page.
- F Causes directories to be marked with a trailing "/" and executable files to be marked with a trailing "\*".
- R  
Recursively lists subdirectories encountered.

The mode printed under the - l option contains 11 characters. The first character is:

- If the entry is a plain file
- d If the entry is a directory
- b If the entry is a block-type special file
- c If the entry is a character-type special file
- p If the entry is a named pipe
- s If the entry is a semaphore
- m If the entry is shared data (memory)

The next 9 characters are interpreted as 3 sets of 3 bits each. The first set refers to owner permissions; the next to permissions to others in the same user-group; and the last to all others. Within each set the 3 characters indicate permission respectively to read, to write, or to execute the file as a program. For a directory, "execute" permission is interpreted to mean permission to search the directory for a specified file. The permissions are indicated as follows:

- r If the file is readable
- w If the file is writable
- x If the file is executable
- If the indicated permission is not granted

The group-execute permission character is given as s if the file has set-group- ID mode; likewise the user-execute permission character is given as s if the file has set-user- ID mode.

The last character of the mode (normally "x" or "- ") is t if the 1000 bit of the mode is on. See *chmod(C)* for the meaning of this mode.

When the sizes of the files in a directory are listed, a total count of blocks, including indirect blocks is printed.

## Files

- /etc/passwd To get user IDs for "lc - l"
- /etc/group To get group IDs for "lc - g"

## Credit

This utility was developed at the University of California at Berkeley and is used with permission.

## Notes

Newline and tab are considered printing characters in filenames.

The output device is assumed to be 80 columns wide.

Column width choices are poor for terminals which can tab.

All switches must be given as one argument. Thus "lc - lsg" is correct, but "lc - l - s - g" is illegal.

*LINE* (C)

*LINE* (C)

**Name**

line - Reads one line.

**Syntax**

line

**Description**

*Line* copies one line (up to a newline) from the standard input and writes it on the standard output. It returns an exit code of 1 on end-of-file and always prints at least a newline. It is often used within shell files to read from the user's terminal.

**See Also**

gets(CP), sh(C)

*LOGNAME* (C)

*LOGNAME* (C)

**Name**

*logname* - Gets login name.

**Syntax**

*logname*

**Description**

*Logname* returns the contents of the environment variable *\$LOGNAME*, which is set when a user logs into the system.

**See Also**

*env*(C), *login*(M), *logname*(S), *environ*(M)

**Name**

look - Finds lines in a sorted list.

**Syntax**

look [ - df ] string [ file ]

**Description**

*Look* consults a sorted *file* and prints all lines that begin with *string*. It uses binary search.

The options *d* and *f* affect comparisons as in *sort*(C):

- *d* Dictionary order: only letters, digits, tabs and blanks participate in comparisons.
- *f* Fold. Uppercase letters compare equal to lowercase.

If no *file* is specified, */usr/dict/words* is assumed with collating sequence - *df*.

**Files**

*/usr/dict/words*

**See Also**

*sort*(C), *grep*(C)

**Name**

**ln** - Makes a link to a file.

**Syntax**

**ln file1 file2**  
**ln file1 ... directory**

**Description**

A link is a directory entry referring to a file; the same file (together with its size, all its protection information, etc). may have several links to it. There is no way to distinguish a link to a file from its original directory entry. Any changes to the file are effective independent of the name by which the file is known.

In the first case, *ln* creates a link to the existing file, *file1*. The *file2* argument is a new name referring to the same file contents as *file1*.

In the second case, *directory* is the location of a directory into which one or more links are created with corresponding file names.

You cannot link to a directory or link across file systems.

**Notes**

See also **cp(C)**, **mv(C)**, **rm(C)**

**Name**

lpr - Sends files to the lineprinter queue for printing.

**Syntax**

lpr [ option ... ] [ name ... ]

**Description**

lpr causes the named files to be queued for printing on a lineprinter. If no names appear, the standard input is assumed; thus lpr may be used as a filter.

The following options may be given (each as a separate argument and in any order) before any filename arguments:

- c Makes a copy of the file and prints the copy and not the original. Normally files are linked whenever possible.
- r Removes the file after sending it.
- m When printing is complete, reports that fact by mail (C).
- n Does not report the completion of printing by mail (C). This is the default option.

The file `/etc/default/lpd` contains the setting of the variable BANNERS, which contains the number of pages printed as a banner identifying each print out. This is normally set to either 1 or 2.

**Files**

<code>/etc/passwd</code>	User's identification and accounting data
<code>/usr/lib/lpd</code>	Lineprinter daemon
<code>/usr/spool/lpd/*</code>	Spool area
<code>/etc/default/lpd</code>	Contains BANNERS default setting

**See Also**

banner(C)

**Notes**

If your system uses extra memory, make sure the parallel port on the expansion card is disabled. On the AST board, for example, this jumper is marked IRQ.

Once a file has been queued for printing, it should not be changed or deleted until printing is complete. If you want to alter the contents of the file or to remove the file immediately, use the -c option to force lpr to make its own copy of the file.

To set the serial printer speed, find the line in /etc/rc that reads:

```
stty 300 > /dev/lp
```

This sets the baud rate on the serial printer to 300 baud. Set the number to whatever baud rate your printer will support.

**Name**

ls - Gives information about contents of directories.

**Syntax**

ls [ - logtasdrucif ] names

**Description**

For each directory named, *ls* lists the contents of that directory; for each file named, *ls* repeats its name and any other information requested. By default, the output is sorted alphabetically. When no argument is given, the current directory is listed. When several arguments are given, the arguments are first sorted appropriately, but file arguments are processed before directories and their contents. There are several options:

- l Lists in long format, giving mode, number of links, owner, group, size in bytes, and time of last modification for each file (see below). If the file is a special file, the size field will contain the major and minor device numbers, rather than a size.
- o The same as - l, except that the group is not printed.
- g The same as - l, except that the owner is not printed.
- t Sorts by time of last modification (latest first) instead of by name.
- a Lists all entries; in the absence of this option, entries whose names begin with a period (.) are *not* listed.
- s Gives size in blocks including indirect blocks for each entry.
- d If argument is a directory, lists only its name; often used with - l to get the status of a directory.
- r Reverses the order of sort to get reverse alphabetic or oldest first, as appropriate.
- u Uses time of last access instead of last modification for sorting (with the - t option) and/or printing (with the - l option).
- c Uses time of last modification of the inode (mode, etc.) instead of last modification of the file for sorting (- t) and/or printing (- l).
- i For each file, prints the inode number in the first column of the report.

- f Forces each argument to be interpreted as a directory and lists the name found in each slot. This option turns off - l, - t, - s, and - r, and turns on - a; the order is the order in which entries appear in the directory.

The mode printed under the - l option consists of 11 characters. The first character is:

- If the entry is an ordinary file d If the entry is a directory
- b If the entry is a block special file
- c If the entry is a character special file
- p If the entry is a named pipe
- s If the entry is a semaphore
- m If the entry is a shared data (memory) file

The next 9 characters are interpreted as 3 sets of 3 bits each. The first set refers to the owner's permissions; the next to permissions of others in the user-group of the file; and the last to all others. Within each set, the 3 characters indicate permission to read, to write, and to execute the file as a program, respectively. For a directory, "execute" permission is interpreted to mean permission to search the directory for a specified file.

The permissions are indicated as follows:

- r If the file is readable
- w If the file is writable
- x If the file is executable
- If the indicated permission is *not* granted

The group-execute permission character is given as s if the file has set-group-ID mode; likewise, the user-execute permission character is given as s if the file has set-user-ID mode. The last character of the mode (normally x or -) is t if the 1000 (octal) bit of the mode is on; see *chmod(C)* for the meaning of this mode. The indications of set-ID and 1000 bit of the mode are capitalized if the corresponding execute permission is *not* set.

When the sizes of the files in a directory are listed, a total count of blocks including indirect blocks is printed.

## Files

*LS* (C)

*LS* (C)

*/etc/passwd* Gets user IDs for *ls - l* and *ls - o*

*/etc/group* Gets group IDs for *ls - l* and *ls - g*

#### See Also

*chmod*(C), *find*(C), *l*(C), *lc*(C)

#### Notes

Newline and tab are considered printing characters in filenames.

All switches must be given as one argument. Thus "*ls - lsg*" is legal, but "*ls - l - s - g*" is not.

**Name**

mail - Sends, reads or disposes of mail.

**Syntax**

mail [[- u user] [- f mailbox]] [- R] [- i] [ users ...]

mail [- s subject] [- i] [ user ...]

**Description**

*Mail* is a mail processing system that supports composing of messages, and sending and receiving of mail between multiple users. When sending mail, a *user* is the name of a user or of an alias assigned to a machine or to a group of users.

Options include:

- u *user*  
Tells *mail* to read the system mailbox belonging to the specified *user*.
- f *mailbox*  
Tells *mail* to read the specified *mailbox* instead of the default user's system mailbox.
- R  
Makes the mail session "read-only" by preventing alteration of the mailbox being read. Useful when accessing system-wide mailboxes.
- i  
Tells *mail* to ignore interrupts sent from the terminal. This is useful when reading or sending mail over telephone lines where "noise" may produce unwanted interrupts.
- s *subject*  
Specifies *subject* as the text of the *Subject:* field for the message being sent.

***Sending mail***

To send a message to one or more other people, invoke *mail* with arguments which are the names of people to send to. You are then expected to type in your message, followed by a CNTRL-D at the beginning of a line.

### *Reading Mail*

To read mail, invoke *mail* with no arguments. This will check your mail out of the system-wide directory so that you can read and dispose of the messages sent to you. A message header is printed out for each message in your mailbox. The current message is initially the last numbered message and can be printed using the *print* command (which can be abbreviated *p*). You can move among the messages much as you move between lines in *ed*, with the commands *+* and *-* moving backwards and forwards, and simple numbers typing the addressed message.

### *Disposing of Mail*

After examining a message you can delete (*d*) the message or reply (*r*) to it. Deletion causes the *mail* program to forget about the message. This is not irreversible, the message can be undeleted (*u*) by giving its number, or the *mail* session can be aborted by giving the exit (*x*) command. Deleted messages will, however, usually disappear never to be seen again.

### *Specifying Messages*

Commands such as *print* and *delete* often can be given a list of message numbers as argument to apply to a number of messages at once. Thus "delete 1 2" deletes messages 1 and 2, while "delete 1-5" deletes messages 1 through 5. The special name "\*" addresses all messages, and "\$" addresses the last message; thus the command *top* which prints the first few lines of a message could be used in "top \*" to print the first few lines of all messages.

### *Replying to or Originating Mail*

You can use the *reply* command to set up a response to a message, sending it back to the person who it was from. Text you then type in, up to a CNTRL-D defines the contents of the message. While you are composing a message, *mail* treats lines beginning with a tilde (~) as special. For instance, typing "~m" (alone on a line) places a copy of the current message into the response, right shifting it by one tabstop. Other escapes set up subject fields, add and delete recipients to the message, and allow you to escape to an editor to revise the message or to a shell to run some commands. (These options are be given in the summary below.)

### *Ending a Mail Session*

You can end a *mail* session with the *quit* (*q*) command. Messages which have been examined go to your *mbox* file unless they have been deleted in which case they are discarded. Unexamined

messages go back to the post office. The `-f` option causes `mail` to read in the contents of your `mbox` (or the specified file) for processing; when you quit `mail` writes undeleted messages back to this file. The `-i` option causes `mail` to ignore interrupts.

### *Using Aliases and Distribution Lists*

It is also possible to create a personal distribution lists so that, for instance, you can send mail to "cohorts" and have it go to a group of people. Such lists can be defined by placing a line like

```
alias cohorts bill bob barry bobo betty beth bobbi
```

in the file `.mailrc` in your home directory. The current list of such aliases can be displayed by the `alias (a)` command in `mail`. System wide distribution lists can be created by editing `/usr/lib/aliases`, see `aliases(M)`; these are kept in a slightly different syntax. In `mail` you send, personal aliases will be expanded in mail sent to others so that they will be able to reply to the recipients. System wide `aliases` are not expanded when the mail is sent, but any reply returned to the machine will have the system-wide alias expanded.

`Mail` has a number of options which can be set in the `.mailrc` file to alter its behavior; thus "set askcc" enables the "askcc" feature. (These options are summarized below.)

### Summary

Each mail command is typed on a line by itself, and may take arguments following the command word. The command need not be typed in its entirety - the first command which matches the typed prefix is used. For the commands that take message lists as arguments, if no message list is given, then the next message forward that satisfies the command's requirements is used. If there are no messages forward of the current message, the search proceeds backwards, and if there are no good messages at all, `mail` types "No applicable messages" and aborts the command.

- Goes to the previous message and prints it out. If given a numeric argument *n*, goes to the *n*th previous message and prints it.
- + Goes to the next message and prints it out. If given a numeric argument *n*, goes to the *n*th next message and prints it.
- RETURN Goes to the next message and prints it out.
- ? Prints a brief summary of commands.

- ! Executes the shell command which follows.
- = Prints out the current message number.
- ^ Prints out the first message.
- \$ Prints out the last message.
- alias (a) With no arguments, prints out all currently-defined aliases. With one argument, prints out that alias. With more than one argument, adds the users named in the second and later arguments to the alias named in the first argument.
- cd (c) Changes the user's working directory to that specified, if given. If no directory is given, then changes to the user's login directory.
- delete (d) Takes a list of messages as an argument and marks them all as deleted. Deleted messages are not retained in the system mailbox after a quit, nor are they available to any command other than the *undelete* command.
- dp Deletes the current message and prints the next message. If there is no next message, *mail* says "at EOF."
- edit (e) Takes a list of messages and points the text editor at each one in turn. On return from the editor, the message is read back in.
- exit (x) Effects an immediate return to the shell without modifying the user's system mailbox, his *mbx* file, or his edit file in - f .
- file (fi) Switches mailbox files to the file given by a filename argument. (Not yet implemented.)
- forward (f) Forwards the current message to the named users. Current message is indented within forwarded message.
- Forward (F) Forwards the current message to the named users. Current message is *not* indented within forwarded message.
- headers (h) Lists the current range of headers, which is an 18 message group. If a "+" argument is given, then the next 18 message group is printed, and if a "-" argument is given, the previous 18 message group is printed. Both "+" and "-" may take a number to view a particular window. If a message-list is given, it prints the specified headers.

hold	(ho) Takes a message list and marks each message therein to be saved in the user's system mailbox instead of in <i>mbox</i> . Use only when the switch <i>autombox</i> is set. Does not override the delete command.
lpr	(l) Prints out each message in a message-list on the lineprinter.
mail	(m) Takes as argument login names and distribution group names and sends mail to those people.
mbox	(mb) Marks messages in a message list so that they are saved in the user mailbox after leaving mail.
next	(n like + or RETURN) Goes to the next message in sequence and prints it. With an argument list, types the next matching message.
print	(p) Prints out each message in a message-list on the terminal display.
quit	(q) Terminates the session, retaining all undeleted, unsaved messages in the system mailbox and removing all other messages. Files marked with a star (*) are saved; files marked with an "M" are saved in the user mailbox. If new mail has arrived during the session, the message "You have new mail" is given. If given while editing a mailbox file with the -f flag, then the edit file is rewritten. The user returns to the shell, unless the rewrite of edit file fails, in which case the user can escape with the exit command.
reply	(r) Takes a message list and sends mail to each message author. The default message must not be deleted.
Reply	(R) Takes a message list and sends mail to each message author <i>and each member of the message</i> just like the mail command. The default message must not be deleted.
save	(s) Takes a message list and a filename and appends each message in turn to the end of the file. The filename in quotes, followed by the line count and character count is echoed on the user's terminal.
set	(se) With no arguments, prints all variable values. Otherwise, sets option. Arguments are of the form "option=value" or "option".
shell	(sh) Invokes an interactive version of the shell.
size	(si) Takes a message list and prints out the size in characters of each message.

source	(so) Reads mail commands from the file given as its only argument.
top	(t) Takes a message list and prints the top few lines of each. The number of lines printed is controlled by the variable toplines and defaults to five.
undelete	(u) Takes a message list and marks each one as <i>not</i> being deleted.
unset	(uns) Takes a list of option names and discards their remembered values; the inverse of set .
visual	(v) Takes a message list and invokes the display editor on each message.
write	(w) A synonym for save .

Here is a summary of the compose escapes, which are used when composing messages to perform special functions. Compose escapes are only recognized at the beginning of lines.

~b name ...	Adds the given names to the list of blind carbon copy recipients.
~c name ...	Adds the given names to the list of carbon copy recipients.
~cc name ...	Same as ~c above.
~d	Reads the file "dead.letter" from your home directory into the message.
~e	Invokes the text editor on the message collected so far. After the editing session is finished, you may continue appending text to the message.
~h	Edits the message header fields by typing each one in turn and allowing the user to append text to the end or modify the field with the current terminal erase and kill characters.
~m messages	Reads the named messages into the message buffer, shifted right one tab. If no messages are specified, reads the current message.
~M messages	Reads the named messages into the message buffer, shifted right one tab. If no messages are specified, reads the current message. <i>not</i>

- `~p` Prints out the messages collected so far, prefaced by the message header fields.
- `~q` Aborts the message being sent, copying the message to "dead.letter" in your home directory if `save` is set.
- `~r filename` Reads the named file into the message buffer.
- `~s string` Causes the named string to become the current subject field.
- `~t name ...` Adds the given names to the direct recipient list.
- `~v` Invokes a visual editor (defined by the `VISUAL` option) on the message buffer. After you quit the editor, you may resume appending text to the end of your message.
- `~w filename` Writes the message to the named file.
- `~!cmd` Executes the indicated shell command, then returns to the message.
- `~|cmd` Pipes the message through the command as a filter. If the command gives no output or terminates abnormally, retains the original text of the message.
- `~:mail-cmd` Executes the indicated mail command, then returns to the message.
- `~"string` Inserts the string of text in the message prefaced by a single tilde (`~`). If you have changed the escape character, then you should double that character instead.

Options are controlled with the `set` and `unset` commands. An option may be either a switch, in which case it is either on or off, or a string, in which case the actual value is of interest. The switch options include the following:

- `askcc` Causes you to be prompted for additional carbon copy recipients at the end of each message. Responding with a newline indicates your satisfaction with the current list.
- `asksubject` Causes *mail* to prompt you for the subject of each message you send. If you respond with simply a newline, no subject field is sent.
- `autombox` Causes all examined messages to be saved in the user mailbox unless deleted or saved.
- `autoprint` Causes the delete command to behave like `dp` - thus, after deleting a message, the next one will be

typed automatically.

- chron Causes messages to be displayed in chronological order.
- dot Permits use of dot (.) as the end of file character when composing messages.
- ignore Causes interrupt signals from your terminal to be ignored and echoed as at-signs (@).
- metoo Usually, when a group is expanded that contains the sender, the sender is removed from the expansion. Setting this option causes the sender to be included in the group.
- nosave Prevents aborted messages from being appended to the file `dead.letter` in your home directory on receipt of two interrupts (or a ^q).
- prepend Causes messages saved in `mbx` to be prepended to the end rather than appended.
- quiet Suppresses the printing of the version header when first invoked.

The following options have string values:

- EDITOR Pathname of the text editor to use in the `edit` command and `^e` escape. If not defined, then a default editor is used.
- SHELL Pathname of the shell to use in the `!` command and the `^!` escape. A default shell is used if this option is not defined.
- VISUAL Pathname of the text editor to use in the `visual` command and `^v` escape.
- escape If defined, the first character of this option gives the character to use in the place of the tilde (~) to denote escapes.
- record If defined, gives the pathname of the file used to record all outgoing mail. If not defined, then outgoing mail is not saved.
- toplines If defined, gives the number of lines of a message to be printed out with the `top` command; normally, the first five lines are printed.

**Files**

<code>/usr/spool/mail/*</code>	System mailboxes
<code>~/mbox</code>	Your old mail
<code>~/mailrc</code>	File giving initial mail commands
<code>/tmp/R#</code>	Temporary file for editor escape
<code>/usr/lib/mail/*</code>	Backend mailers
<code>/usr/lib/Mail.help.*</code>	Help files
<code>/usr/lib/Mail.rc</code>	System initialization file
<code>/bin/mail</code>	The mail command
<code>/etc/delivermail</code>	Mail dispatch program

**See Also**

`aliases(M)`

*MESG* (C)

*MESG* (C)

### Name

*mesg* - Permits or denies messages sent to a terminal.

### Syntax

*mesg* [ *n* ] [ *y* ]

### Description

*Meeg* with argument *n* forbids messages via *write*(C) by revoking nonuser write permission on the user's terminal. *Meeg* with argument *y* reinstates permission. All by itself, *mesg* reports the current state without changing it.

### Files

/dev/tty\*

### See Also

*write*(C)

### Diagnostics

Exit status is 0 if messages are receivable, 1 if not, 2 on error.

**Name**

`mkdir` - Makes a directory.

**Syntax**

`mkdir` dirname ...

**Description**

*Mkdir* creates directories. The standard entries "dot" (`.`), for the directory itself, and "dot dot" (`..`), for its parent, are made automatically.

*Mkdir* requires write permission in the parent directory. The permissions assigned to the new directory are modified by the current file creation mask set by *umask* (C).

**See Also**

`rmdir`(C), `umask`(C)

**Diagnostics**

*Mkdir* returns exit code 0 if all directories were successfully made; otherwise, it prints a diagnostic and returns nonzero.

**Name**

`mkfs` - Constructs a file system.

**Syntax**

```
/etc/mkfs [ - y ] [ - n ] special proto [ m n ]
```

**Description**

*Mkfs* constructs a file system by writing on the special file *special* according to the directions found in the prototype file *proto*. The prototype file contains tokens separated by spaces or newlines. The first token is the name of a file to be copied onto block zero as the bootstrap program. The second token is a number specifying the size of the created file system. Typically it will be the number of blocks on the device, perhaps diminished by space for swapping. The next token is the number of inodes in the i-list. The next set of tokens comprise the specification for the root file. File specifications consist of tokens giving the mode, the user IDs, the group IDs and the initial contents of the file. The syntax of the contents field depends on the mode.

The mode token for a file is a 6-character string. The first character specifies the type of the file. (The characters `-bcd` specify regular, block special, character special and directory files respectively.) The second character of the type is either `u` or `-` to specify set-user-id mode or not. The third is `g` or `-` for the set-group-id mode. The rest of the mode is a 3-digit octal number giving the owner, group, and other read, write, execute permissions, see *chmod*(C).

Two decimal number tokens come after the mode; they specify the user and group IDs of the owner of the file.

If the file is a regular file, the next token is a pathname whence the contents and size are copied.

If the file is a block or character special file, two decimal number tokens follow which give the major and minor device numbers.

If the file is a directory, *mkfs* creates the entries "dot" (`.`) and "dot dot" (`..`) and then reads a list of names and (recursively) file specifications for the entries in the directory. The scan is terminated by a dollar sign (`$`).

If the prototype file cannot be opened and its name consists of a string of digits, *mkfs* builds a file system with a single empty directory on it. The size of the file system is the value of *proto* interpreted as a decimal number. The number of inodes is calculated as a function of the file system size. The boot program is left uninitialized.

*Mkfs* can also be used to create a file system image in a regular file, rather than on a special device file, by giving the pathname of the target file, instead of *special*.

If the target file is not a regular file, then *mkfs* checks for an existing file system on that device. If it appears the device contains a file system, operator confirmation is requested before overwriting the data. The *-y* "yes" switch overrides this, and writes over any existing data without question. The *-n* switch causes *mkfs* to terminate without question if the target contains an existing file system. The check used is to read block one from the target device (block one is the super block) and see whether the bytes are all the same. If they are not, this is taken to be meaningful data, and confirmation is requested.

A sample prototype specification follows:

```

/stand/diskboot
4872 110
d- - 777 3 1
usr   d- - 777 3 1
      sh   - - - 755 3 1 /bin/sh
      ken  d- - 755 6 1
      $
      b0   b- - 644 3 1 0 0
      c0   c- - 644 3 1 0 0
      $
$

```

#### See Also

filesystem(F) dir(F)

#### Notes

There is no way to specify links.

**Name**

`mknod` - Builds special files.

**Syntax**

`/etc/mknod name [ c ] [ b ] major minor`

`/etc/mknod name p`

`/etc/mknod name s`

`/etc/mknod name m`

**Description**

*Mknod* makes a directory entry and corresponding inode for a special file. The first argument is the *name* of the entry. In the first case, the second argument is *b* if the special file is block-type (disks, tape) or *c* if it is character-type (other devices). The last two arguments are numbers specifying the *major* device type and the *minor* device (e.g. unit, drive, or line number), which may be either decimal or octal.

The assignment of major device numbers is specific to each system.

*Mknod* can also be used to create named pipes with the *p* option; semaphores with the *s* option; and shared data (memory) with the *m* option.

Only the super-user can use the first form of the syntax.

**See Also**

`mknod(S)`

**Name**

mkuser - Adds a login ID to the system.

**Syntax**

/etc/mkuser

**Description**

*Mkuser* is used to add more user login IDs to the system. It is the preferred method for adding new users to the system, since it handles all directory creation and password file update. To add a new user to the system, *mkuser* requires four pieces of information: the login name, the initial password, and an optional comment string for the password file. It also allows the new user to be assigned to a group if required, although in most cases a default group is suitable. The program prompts for these four items and validates the given data. The login name is checked against certain criteria (i.e., it must be at least three characters and begin with a lowercase letter). The password must follow standard XENIX conventions, see *passwd*(C). The password file comment field can be up to 20 characters of information.

*Mkuser* takes some of its parameters from a default file, */etc/default/mkuser*. Currently the two settable options are the path-name for the login shell and the root path of home directories. An example default file is:

```
home=/usr
shell=/bin/sh
```

This file can be edited (by the super-user) to change these defaults. There are three other files in the directory */usr/lib* which may also be altered to suit local options. They are *mkuser.help* which is the introductory explanation given by *mkuser* on startup, *mkuser.mail* which is the initial mail message sent to new users, and *mkuser.prof*, the standard *.profile* file given to new users.

*Mkuser* allocates user IDs starting at 200, or the largest number used in the password file. The default group ID for new users is 50. The minimum group ID allowed for user accounts is 50. The program prompts the operator for an optional group specification. This is a group name.

*Mkuser* can only be executed by the super-user.

The minimum length of a legal password, and the minimum and maximum number of weeks used in password aging are specified in */etc/default/passwd* by the variables *PASLENGTH*, *MINWEEKS* and

MAXWEEKS. For example, these variables might be set as follows:

```
PASLENGTH=6  
MINWEEKS=2  
MAXWEEKS=6
```

**Files**

```
/etc/passwd  
  
/usr/spool/mail/username  
  
/etc/default/mkuser  
  
/usr/lib/mkuser.help  
  
/usr/lib/mkuser.prof  
  
/usr/lib/mkuser.mail
```

**See Also**

rmuser(C), passwd(C), pwadmin(C)

## Name

more - Views a file one screen full at a time.

## Syntax

```
more [ - cdfisur ] [ - n ] [ +linenumber ] [ +/pattern ] [ name ... ]
```

## Description

This filter allows examination of a continuous text one screen full at a time. It normally pauses after each screen full, printing "--More--" at the bottom of the screen. If the user then types a carriage return, one more line is displayed. If the user hits the SPACE bar, another screen full is displayed. Other possibilities are described below.

The command line options are:

- n An integer which is the size (in lines) of the window which *more* will use instead of the default.
- c *More* draws each page by beginning at the top of the screen and erasing each line just before it draws on it. This avoids scrolling the screen, making it easier to read while *more* is writing. This option is ignored if the terminal does not have the ability to clear to the end of a line.
- d *More* prompts with the message "Hit space to continue, Rubout to abort" at the end of each screen full. This is useful if *more* is being used as a filter in some setting, such as a class, where many users may be unsophisticated.
- f This option causes *more* to count logical, rather than screen lines. That is, long lines are not folded. This option is recommended if *nroff* output is being piped through *ul*, since the latter may generate escape sequences. These escape sequences contain characters that would ordinarily occupy screen positions, but that do not print when they are sent to the terminal as part of an escape sequence. Thus *more* may think that lines are longer than they actually are and fold lines erroneously.
- l Does not treat CNTRL-L (form feed) specially. If this option is not given, *more* pauses after any line that contains a CNTRL-L, as if the end of a screen full had been reached. Also, if a file begins with a form feed, the screen is cleared before the file is printed.
- s Squeezes multiple blank lines from the output, producing only one blank line. Especially helpful when viewing *nroff* output, this option maximizes the useful information present on the screen.

- u Normally, *more* handles underlining, such as that produced by *nroff* in a manner appropriate to the particular terminal: if the terminal can perform underlining or has a stand-out mode, *more* outputs appropriate escape sequences to enable underlining or stand-out mode for underlined information in the source file. The - u option suppresses this processing.
- r Normally, *more* ignores control characters that it does not interpret in some way. The - r option causes these to be displayed as ^C where "C" stands for any such character.
- w Normally, *more* exits when it comes to the end of its input. With - w however, *more* prompts and waits for any key to be struck before exiting.

+ *linenumber*  
Starts up at *linenumber*.

+ /*pattern*  
Starts up two lines before the line containing the regular expression *pattern*.

*More* looks in the file */etc/termcap* to determine terminal characteristics, and to determine the default window size. On a terminal capable of displaying 24 lines, the default window size is 22 lines.

*More* looks in the environment variable *MORE* to preset any flags desired. For example, if you prefer to view files using the - c mode of operation, the shell command "MORE=- c" in the .profile file causes all invocations of *more* to use this mode.

If *more* is reading from a file, rather than a pipe, then a percentage is displayed along with the "--More--" prompt. This gives the fraction of the file (in characters, not lines) that has been read so far.

Other sequences which may be typed when *more* pauses, and their effects, are as follows (*i* is an optional integer argument, defaulting to 1):

*i*<space>  
Displays *i* more lines, (or another screen full if no argument is given).

CNTRL-D  
Displays 11 more lines (a "scroll"). If *i* is given, then the scroll size is set to *i*.

d Same as CNTRL-D.

*iz* Same as typing a space except that *i*, if present, becomes the new window size.

- is* Skips *i* lines and prints a screen full of lines.
- if* Skips *i* screen fulls and prints a screen full of lines.
- q* or *Q*  
Exits from *more*.
- =* Displays the current line number.
- v* Starts up the screen editor *vi* at the current line. (Note that *vi* may not be available with your system.)
- h* or *?*  
Help command; Gives a description of all the *more* commands.
- i/expr*  
Searches for the *i*th occurrence of the regular expression *expr*. If there are less than *i* occurrences of *expr*, and the input is a file (rather than a pipe), then the position in the file remains unchanged. Otherwise, a screen full is displayed, starting two lines before the place where the expression was found. The user's erase and kill characters may be used to edit the regular expression. Erasing back past the first column cancels the search command.
- in* Searches for the *i*th occurrence of the last regular expression entered.
- ' (Single quotation mark) Goes to the point from which the last search started. If no search has been performed in the current file, this command goes back to the beginning of the file.
- !*command*  
Invokes a shell with *command*. The characters *%* and *!* in "*command*" are replaced with the current filename and the previous shell command respectively. If there is no current filename, *%* is not expanded. The sequences "*\%*" and "*\!*" are replaced by "*%*" and "*!*" respectively.
- i:n* Skips to the *i*th next file given in the command line (skips to last file if *n* doesn't make sense).
- i:p* Skips to the *i*th previous file given in the command line. If this command is given in the middle of printing out a file, *more* goes back to the beginning of the file. If *i* doesn't make sense, *more* skips back to the first file. If *more* is not reading from a file, the bell rings and nothing else happens.
- :f* Displays the current filename and line number.
- :q* or *:Q*  
Exits from *more* (same as *q* or *Q*).

. Repeats the previous command.

The commands take effect immediately, i.e., it is not necessary to type a carriage return. Up to the time when the command character itself is given, the user may hit the line kill character to cancel the numerical argument being formed. In addition, the user may hit the erase character to redisplay the "--More--(xx%)" message.

The terminal is set to *noecho* mode by this program so that the output can be continuous. What you type will thus not show on your terminal, except for the slash (/) and exclamation (!) commands.

If the standard output is not a teletype, *more* acts just like *cat*, except that a header is printed before each file (if there is more than one).

A sample usage of *more* in previewing *nroff* output would be

```
nroff - ms + 2 doc.n |more -s
```

#### Files

/etc/termcap	Terminal data base
/usr/lib/more.help	Help file

#### See Also

csh(CP), sh(C), environ(M)

#### Credit

This utility was developed at the University of California at Berkeley and is used with permission.

#### Notes

The *vi* and *help* options may not be available.

Before displaying a file, *more* attempts to detect whether it is a non-printable binary file such as a directory or executable binary image. If *more* concludes that a file is unprintable, it rightly refuses to print it. However, *more* cannot detect all possible kinds of non-printable files.

**Name**

mount - Mounts a file structure.

**Syntax**

/etc/mount [ special-device directory [ - r ] ]

/etc/umount special-device

**Description**

*Mount* announces to the system that a removable file structure is present on *special-device*. The file structure is mounted on *directory*. The *directory* must already exist; it becomes the name of the root of the newly mounted file structure.

The *mount* and *umount* commands maintain a table of mounted devices. If invoked with no arguments, for each special device *mount* prints the name of the device, the directory name of the mounted file structure, whether the file structure is readonly, and the date it was mounted.

The optional last argument indicates that the file is to be mounted read-only. Physically write-protected must be mounted in this way or errors occur when access times are updated, whether or not any explicit write is attempted.

*Umount* removes the removable file structure previously mounted on device *special-device*.

**Files**

/etc/mnttab Mount table

**See Also**

umount(C), mount(S), mnttab(F)

**Diagnostics**

*Mount* issues a warning if the file structure to be mounted is currently mounted under another name.

Busy file structures cannot be dismounted with *umount*. A file structure is busy if it contains an open file or some user's working directory.

## Notes

Some degree of validation is done on the file structure, however it is generally unwise to mount corrupt file structures.

Be warned that when in single-user mode, the commands that look in */etc/mnttab* for default arguments (for example *df*, *ncheck*, *quot*, *mount*, and *umount*) give either incorrect results (due to a corrupt */etc/mnttab* from a non-shutdown stoppage) or no results (due to an empty *mnttab* from a *shutdown* stoppage).

When multi-user this is not a problem; */etc/rc* initializes */etc/mnttab* to contain only */dev/root* and subsequent mounts update it appropriately.

The *mount(C)* and *umount(C)* commands use a lock file to guarantee exclusive access to */etc/mnttab*, the commands which just read it (those mentioned above) do not, so it is possible to they may hit a window during which it is corrupt. This is not a problem in practice since *mount* and *umount* are not frequent operations.

MV(C)

MV(C)

## Name

`mv` - Moves or renames files and directories.

## Syntax

`mv file1 file2`

`mv file ... directory`

## Description

*Mv* moves (changes the name of) *file1* to *file2*.

If *file2* already exists, it is removed before *file1* is moved. If *file2* has a mode which forbids writing, *mv* prints the mode (see *chmod(S)*) and reads the standard input to obtain a line; if the line begins with *y*, the move takes place; if not, *mv* exits.

In the second form, one or more *files* are moved to the *directory* with their original filenames.

*Mv* refuses to move a file onto itself.

## See Also

`cp(C)`, `chmod(S)`, `copy(C)`

## Notes

If *file1* and *file2* lie on different file systems, *mv* must copy the file and delete the original. In this case the owner name becomes that of the copying process and any linking relationship with other files is lost.

**Name**

ncheck - Generates names from inode numbers.

**Syntax**

ncheck [ - i numbers ] [ - a ] [ - s ] [ file-system ]

**Description**

*Ncheck* with no argument generates a pathname vs. inode number list of all files on the set of file systems specified in */etc/mnttab*. The two characters *"/."* are appended to the names of directory files. The *- i* option reduces the report to only those files whose inode numbers follow. The *- a* option allows printing of the names *.* and *..*, which are ordinarily suppressed. The *- s* option reduces the report to special files and files with *set-user-ID* mode; it is intended to discover concealed violations of security policy. A single *filesystem* may be specified rather than the default list of mounted file systems.

**Files**

*/etc/mnttab*

**See Also**

*fsck(C)*, *sort(C)*

**Diagnostics**

When the file system structure is improper, *??* denotes the "parent" of a parentless file and a pathname beginning with *...* denotes a loop.

**Notes**

See *Notes* under *mount(C)*.

**Name**

netutil - Administers the XENIX network.

**Syntax**

netutil [ - option ]

**Description**

The *netutil* command allows the user to create and maintain a network of XENIX machines. A Micnet network is a link through serial lines of two or more XENIX systems. It is used to send mail between systems with the *mail(C)* command, transfer files between systems with the *rep(C)* command, and execute commands from a remote system with the *remote(C)* command.

The *netutil* command is used to create and distribute the data files needed to implement the network. It is also used to start and stop the network. The *option* argument may be any one of *install*, *save*, *restore*, *start*, *stop*, or the numbers 1 through 5 respectively.

The *install* option interactively creates the data files needed to run the network. The *save* option saves these files on floppy disks, allowing them to be distributed to the other systems in the network. The *restore* option copies the data files from floppy disk back to a system. The *start* option starts the network. The *stop* option stops the network. An *option* may also be any decimal digit in the range 1 to 5. If invoked without an *option*, the command displays a menu from which to choose one. Once an option is selected, it prompts for additional information if needed.

A network must be installed before it can be started. Installation consists of creating appropriate configuration files with the *install* option. This option requires the name of each machine in the network, the serial lines to be used to connect the machines, the speed of transmission for each line, and the names of the users on each machine. Once created, the files must be distributed to each computer in the network with the *save* and *restore* options. The network is started by using the *start* option on each machine in the network. Once started, mail and remote commands can be passed along the network. A record of the transmissions between computers in a network can be kept in the network log files. Installation of the network is described in the *XENIX Operations Guide*.

**Files**

/bin/netutil

*NETUTIL (C)*

*NETUTIL (C)*

**See Also**

*aliases(M), aliashash(M), mail(C), micnet(M), remote(C), rcp(C),  
systemid(M), top(M) XENIX Operations Guide*

**Name**

`newgrp` - Logs user in to a new group.

**Syntax**

`newgrp [ group ]`

**Description**

*Newgrp* changes the group identification of its caller. The same person remains logged in, and the current directory is unchanged, but calculations of access permissions to files are performed with respect to the new group ID.

*Newgrp* without an argument changes the group identification to the group in the password file; in effect it changes the group identification back to the caller's original group.

A password is demanded if the group has a password and the user himself does not, or if the group has a password and the user is not listed in `/etc/group` as being a member of that group.

When most users log in, they are members of the group named `other`.

**Files**

`/etc/group`

`/etc/passwd`

**See Also**

`login(M)`, `group(M)`

**Notes**

There is no convenient way to enter a password into `/etc/group`.

Use of group passwords is not encouraged, because, by their very nature, they encourage poor security practices. Shell variables are not preserved when invoking this command unless they are explicitly exported.

**Name**

**nice** - Runs a command at a different priority.

**Syntax**

**nice** [ - increment ] **command** [ arguments ]

**Description**

*Nice* executes *command* with a lower CPU scheduling priority. Priorities range from 0 to 39, where 0 is the highest priority and 39 is the lowest. By default commands have a priority of 20. If an - increment argument is given where *increment* is in the range 1-19, *increment* is added to the default priority of 20 to produce a numerically higher priority, meaning a *lower* scheduling priority. If no *increment* is given, an increment of 10 to produce a priority of 30 is assumed.

The super-user may run commands with priority *higher* than normal by using a double negative increment. For example, an argument of --10 would decrement the default to produce a priority of 10, which is a higher scheduling priority than the default of 20.

**See Also**

nohup(C), nice(S)

**Diagnostics**

*Nice* returns the exit status of the subject command.

**Notes**

An *increment* larger than 19 is equivalent to 19.

## Name

nl - Adds line numbers to a file.

## Syntax

```
nl [- htype] [- btype] [- ftype] [- vstart#] [- iincr] [- p] [- lnum]
  [- ssep] [- wwidth] [- nformat] file
```

## Description

NL reads lines from the named *file*, or the standard input if no *file* is named, and reproduces the lines on the standard output. Lines are numbered on the left in accordance with the command options in effect.

NL views the text it reads in terms of logical pages. Line numbering is reset at the start of each logical page. A logical page consists of a header, a body, and a footer section. Empty sections are valid. Different line numbering options are independently available for header, body, and footer (e.g. no numbering of header and footer lines while numbering blank lines only in the body).

The start of logical page sections is signaled by input lines containing nothing but the following character(s):

Page Section	Line Contents
Header	\: :
Body	\:
Footer	\:

Unless signaled otherwise, *nl* assumes the text being read is in a single logical page body.

Command options may appear in any order and may be intermingled with an optional filename. Only one file may be named. The options are:

- *btype* Specifies which logical page body lines are to be numbered. Recognized *types* and their meaning are: a, number all lines; t, number lines with printable text only; n, no line numbering; *pstring*, number only lines that contain the regular expression specified in *string*. Default *type* for logical page body is t (text lines numbered).
- *htype* Same as - *btype* except for header. Default *type* for logical page header is n (no lines numbered).

- *ftype* Same as - *btype* except for footer. Default for logical page footer is *n* (no lines numbered).
- *p* Does not restart numbering at logical page delimiters.
- *vstart#* *Start#* is the initial value used to number logical page lines. Default is 1.
- *iincr* *Incr* is the increment value used to number logical page lines. Default is 1.
- *seep* *Sep* is the character(s) used in separating the line number and the corresponding text line. Default *sep* is a tab.
- *width* *Width* is the number of characters to be used for the line number. Default *width* is 6.
- *nformat* *Format* is the line numbering format. Recognized values are: *ln*, left justified, leading zeroes suppressed; *rn*, right justified, leading zeroes suppressed; *rz*, right justified, leading zeroes kept. Default *format* is *rn* (right justified).
- *inum* *Num* is the number of blank lines to be considered as one. For example, - 12 results in only the second adjacent blank being numbered (if the appropriate - *ha*, - *ba*, and/or - *fa* option is set). Default is 1.

**See Also**

pr(C)

**Name**

**nohup** - Runs a command immune to hangups and quits.

**Syntax**

**nohup** command [ arguments ]

**Description**

*Nohup* executes *command* with hangups and quits ignored. If output is not redirected by the user, it will be sent to *nohup.out*. If *nohup.out* is not writable in the current directory, output is redirected to *\$HOME/nohup.out*.

**See Also**

*nice*(C), *signal*(S)

**Name**

od - Displays files in octal format.

**Syntax**

od [- bcdox] [ file ] [ [ + ]offset[ . ][ b ] ]

**Description**

*Od* displays *file* in one or more formats as selected by the first argument. If the first argument is missing, - o is default. The meanings of the format options are:

- b Interprets bytes in octal.
- c Interprets bytes in ASCII. Certain nongraphic characters appear as C escapes: null=\0, backspace=\b, form feed=\f, newline=\n, return=\r, tab=\t; others appear as 3-digit octal numbers.
- d Interprets words in decimal.
- o Interprets words in octal.
- x Interprets words in hex.

The *file* argument specifies which file is to be displayed. If no file argument is specified, the standard input is used.

The offset argument specifies the offset in the file where displaying is to start. This argument is normally interpreted as octal bytes. If . is appended, the offset is interpreted in decimal. If b is appended, the offset is interpreted in blocks. If the file argument is omitted, the offset argument must be preceded by +.

The display continues until end-of-file.

**See Also**

hd(C), adb(CP)

**Name**

pack, pcat, unpack - Compresses and expands files.

**Syntax**

pack [ - ] name ...

pcat name ...

unpack name ...

**Description**

*Pack* attempts to store the specified files in a compressed form. Wherever possible (and useful), each input file *name* is replaced by a packed file *name.z* with the same access modes, access and modified dates, and owner as those of *name*. If *pack* is successful, *name* will be removed. Packed files can be restored to their original form using *unpack* or *pcat*.

*Pack* uses Huffman (minimum redundancy) codes on a byte-by-byte basis. If the - argument is used, an internal flag is set that causes the number of times each byte is used, its relative frequency, and the code for the byte to be printed on the standard output. Additional occurrences of - in place of *name* will cause the internal flag to be set and reset.

The amount of compression obtained depends on the size of the input file and the character frequency distribution. Because a decoding tree forms the first part of each .z file, it is usually not worthwhile to pack files smaller than three blocks, unless the character frequency distribution is very skewed, which may occur with printer plots or pictures.

Typically, text files are reduced to 60-75% of their original size. Load modules, which use a larger character set and have a more uniform distribution of characters, show little compression, the packed versions being about 90% of the original size.

*Pack* returns a value that is the number of files that it failed to compress.

No packing will occur if:

- The file appears to be already packed
- The filename has more than 12 characters
- The file has links

- The file is a directory
- The file cannot be opened
- No disk storage blocks will be saved by packing
- A file called *name.z* already exists
- The *.z* file cannot be created
- An I/O error occurred during processing

The last segment of the filename must contain no more than 12 characters to allow space for the appended *.z* extension. Directories cannot be compressed.

*Pcat* does for packed files what *cat(C)* does for ordinary files. The specified files are unpacked and written to the standard output. Thus to view a packed file named *name.z* use:

```
pcat name.z
```

or just:

```
pcat name
```

To make an unpacked copy, say *nnn*, of a packed file named *name.z* (without destroying *name.z*) use the command:

```
pcat name > nnn
```

*Pcat* returns the number of files it was unable to unpack. Failure may occur if:

- The filename (exclusive of the *.z*) has more than 12 characters
- The file cannot be opened
- The file does not appear to be the output of *pack*

*Unpack* expands files created by *pack*. For each file *name* specified in the command, a search is made for a file called *name.z* (or just *name*, if *name* ends in *.z*). If this file appears to be a packed file, it is replaced by its expanded version. The new file has the *.z* suffix stripped from its name, and has the same access modes, access and modification dates, and owner as those of the packed file.

*Unpack* returns a value that is the number of files it was unable to unpack. Failure may occur for the same reasons that it may in *pcat*, as well as in a file where the "unpacked" name already exists, or if the unpacked file cannot be created.

**Name**

passwd - Changes login password.

**Syntax**

passwd name

**Description**

This command changes (or installs) a password associated with the login *name*.

The program prompts for the old password (if any) and then for the new one (twice). The user must supply these. Passwords can be of any reasonable length, but only the first eight characters of the password are significant. The minimum number of characters allowed in a new password is determined by the PASSLENGTH variable.

Only the owner of the name or the super-user may change a password. The person attempting the change must actually know and state the old password. Only the super-user can create a null password.

The password file is not changed if the new password is the same as the old password, or if the password has not "aged" sufficiently; see *passwd(M)*.

The minimum length of a legal password, and the minimum and maximum number of weeks used in password aging are specified in */etc/default/passwd* by the variables PASSLENGTH, MINWEEKS, and MAXWEEKS. For example, these variables might be set as follows:

```
PASSLENGTH=6  
MINWEEKS=2  
MAXWEEKS=6
```

**Files**

*/etc/default/passwd*

*/etc/passwd*

**Notes**

See also *login(C)*, *pwadmin(C)*, *crypt(S)*, *default(M)*, *passwd(M)*

## Name

`pr` - Prints files on the standard output.

## Syntax

`pr [ options ] [ files ]`

## Description

*Pr* prints the named files on the standard output. If *file* is `-`, or if no files are specified, the standard input is assumed. By default, the listing is separated into pages, each headed by the page number, date and time, and the name of the file.

By default, columns are of equal width, separated by at least one space; lines which do not fit are truncated. If the `-s` option is used, lines are not truncated and columns are separated by the separation character.

If the standard output is associated with a terminal, error messages are withheld until *pr* has completed printing.

Options may appear singly or be combined in any order. Their meanings are:

- `+k` Begins printing with page *k* (default is 1).
- `-k` Produces *k*-column output (default is 1). The options `-e` and `-i` are assumed for multicolumn output.
- `-a` Prints multicolumn output across the page.
- `-m` Merges and prints all files simultaneously, one per column (overrides the `-k`, and `-a` options).
- `-d` Double-spaces the output.
- `-eck` Expands *input* tabs to character positions  $k+1$ ,  $2*k+1$ ,  $3*k+1$ , etc. If *k* is 0 or is omitted, default tab settings at every 8th position are assumed. Tab characters in the input are expanded into the appropriate number of spaces. If *c* (any nondigit character) is given, it is treated as the input tab character (default for *c* is the tab character).
- `-ick` In *output*, replaces whitespace wherever possible by inserting tabs to character positions  $k+1$ ,  $2*k+1$ ,  $3*k+1$ , etc. If *k* is 0 or is omitted, default tab settings at every 8th position are assumed. If *c* (any nondigit character) is given, it is treated as the output tab character (default for *c* is the tab character).

- *nk* Provides *k*-digit line numbering (default for *k* is 5). The number occupies the first *k*+1 character positions of each column of normal output or each line of - m output. If *c* (any nondigit character) is given, it is appended to the line number to separate it from whatever follows (default for *c* is a tab).
- *wk* Sets the width of a line to *k* character positions (default is 72 for equal-width multicolumn output, no limit otherwise).
- *ok* Offsets each line by *k* character positions (default is 0). The number of character positions per line is the sum of the width and offset.
- *lk* Sets the length of a page to *k* lines (default is 66).
- *h* Uses the next argument as the header to be printed instead of the filename.
- *p* Pauses before beginning each page if the output is directed to a terminal (*pr* will ring the bell at the terminal and wait for a carriage return).
- *f* Uses form feed character for new pages (default is to use a sequence of linefeeds). Pauses before beginning the first page if the standard output is associated with a terminal.
- *r* Prints no diagnostic reports on failure to open files.
- *t* Prints neither the 5-line identifying header nor the 5-line trailer normally supplied for each page. Quits printing after the last line of each file without spacing to the end of the page.
- *sc* Separates columns by the single character *c* instead of by the appropriate number of spaces (default for *c* is a tab).

### Examples

The following prints *file1* and *file2* as a double-spaced, three-column listing headed by "file list":

```
pr - 3dh "file list" file1 file2
```

The following writes *file1* on *file2*, expanding tabs to columns 10, 19, 28, 37, ... :

```
pr - e9 - t <file1 >file2
```

PR (C)

PR (C)

**See Also**

cat(C)

**Name**

ps - process status

**Syntax**

ps [ alx ] [ namelist ]

**Description**

*Ps* prints information about active processes. The *a* option asks for information about all processes with terminals (ordinarily only one's own processes are displayed); *x* asks even about processes with no terminal; *l* asks for a long listing. The short listing contains the process ID, tty name, the cumulative execution time of the process and an approximation to the command line.

The long listing is columnar and contains

- F** A status word consisting of flags associated with the process. Each flag is associated with a bit in the status word. These flags are added to form a single octal number. Flag bits and their meanings are 01: in core; 02: system process; 04: locked in core (e.g., for physical I/O); 10: being swapped; 20: being traced by another process.
- S** The state of the process. 0: nonexistent; S: sleeping; W: waiting; R: running; I: intermediate; Z: terminated; T: stopped.
- UID** The user ID of the process owner.
- PID** The process ID of the process; if you know the true name of a process it is possible to kill the process with the *kill* command.
- PPID** The process ID of the parent process.
- CPU** Processor utilization for scheduling.
- PRI** The priority of the process; high numbers mean low priority.
- NICE** Used in priority computation.
- ADDR** The core address of the process if resident, otherwise the disk address.
- SZ** The size in blocks of the core image of the process.
- ICT** If the process is currently resides in core memory, then **ICT** (in-core time) represents the number of seconds that the process has been resident, up to a limit of 127. If the process is currently on the swapper, then **ICT** is the number of seconds since the process was swapped out of

core.

**WCHAN**

The event for which the process is waiting or sleeping; if blank, the process is running.

**TTY** The controlling tty for the process.

**TIME** The cumulative execution time for the process.

**COMMAND**

The command and its arguments.

A process that has exited and has a parent, but has not yet been waited for by the parent is marked <defunct>. *Ps* makes an educated guess as to the filename and arguments given when the process was created by examining core memory or the swap area. The method is inherently somewhat unreliable and in any event a process is entitled to destroy this information, so the names cannot be counted on too much.

If a second argument is given, it is taken to be the file containing the system's namelist.

**Files**

/xenix	system namelist
/dev/mem	core memory
/dev	searched to find swap device and tty names

**See Also**

kill(C)

**Notes**

Things can change while *ps* is running; the picture it gives is only a close approximation to reality.

Some data printed for defunct processes is irrelevant.

**Name**

pstat - print system facts

**Syntax**

pstat [ *-a* | *-i* | *-x* ] [ *suboptions* ] [ *file* ]

**Description**

*Pstat* interprets the contents of certain system tables. If *file* is given, the tables are sought there, otherwise in */dev/mem*. The required namelist is taken from */xenix*. Options are

**-a** Under **-p**, describe all process slots rather than just active ones.

**-i** Print the inode table with the these headings:

**LOC** The core location of this table entry.

**FLAGS** Miscellaneous state variables encoded thus:

**L** locked

**U** update time *filesystem*(F) must be corrected

**A** access time must be corrected

**M** file system is mounted here

**W** wanted by another process (L flag is on)

**T** contains a text file

**C** changed time must be corrected

**CNT** Number of open file table entries for this inode.

**DEV** Major and minor device number of file system in which this inode resides.

**INO** I-number within the device.

**MODE** Mode bits, see *chmod*(S).

**NLK** Number of links to this inode.

**UID** User ID of owner.

**SIZ/DEV** Number of bytes in an ordinary file, or major and minor device of special file.

**-x** Print the text table with these headings:

**LOC** The core location of this table entry.

**FLAGS** Miscellaneous state variables encoded thus:

**T** *ptrace*(S) in effect

**W** text not yet written on swap device

**L** loading in progress

**K** locked

**w** wanted (L flag is on)

**DADDR** Disk address in swap, measured in multiples of **BLOCKSIZE** bytes.

**CADDR** Core address, measured in units of memory

	management resolution, usually either 64 or 128 bytes.
SIZE	Size of text segment, measured in units of memory management resolution, usually either 64 or 128 bytes.
IPTR	Core location of corresponding inode.
CNT	Number of processes using this text segment.
CCNT	Number of processes in core using this text segment.
-p	Print process table for active processes with these headings:
LOC	The core location of this table entry.
S	Run state encoded thus: 0 no process 1 waiting for some event 3 runnable 4 being created 5 being terminated 6 stopped under trace
F	Miscellaneous state variables, OR-ed together: 01 loaded 02 the scheduler process 04 locked 010 swapped out 020 traced 040 used in tracing 0100 locked in by <i>lock(S)</i> .
PRI	Scheduling priority, see <i>nice(S)</i> .
SIGNAL	Signals received (signals 1-16 coded in bits 0-15),
UID	Real user ID.
TIM	Time resident in seconds; times over 127 coded as 127.
CPU	Weighted integral of CPU time, for scheduler.
NI	Nice level, see <i>nice(S)</i> .
PGRP	Process number of root of process group (the opener of the controlling terminal).
PID	The process ID number.
PPID	The process ID of parent process.
ADDR	If in core, the physical address of the 'u-area' of the process measured in units of memory management resolution, usually either 64 or 128 bytes. If swapped out, the position in the swap area measured in multiples of BLOCKSIZE bytes.
SIZE	Size of process image, measured in units of memory management resolution, usually usually 64 or 128

bytes.

WCHAN Wait channel number of a waiting process.

LINK Link pointer in list of runnable processes.

TEXTP If text is pure, pointer to location of text table entry.

CLKT Countdown for *alarm(S)* measured in seconds.

-u print information about a user process; the next argument is its address as given by *ps(C)*. The process must be in main memory, or the file used can be a core image and the address 0.

-f Print the open file table with these headings:

LOC The core location of this table entry.

FLG Miscellaneous state variables encoded thus:

R open for reading

W open for writing

P pipe

CNT Number of processes that know this open file.

INO The location of the inode table entry for this file.

OFFS The file offset, see *lseek(S)*.

**Files**

/xenix namelist

/dev/mem default source of tables

**See Also**

*ps(C)*, *stat(S)*, *filesystem(F)*

**Name**

pwadmin - Performs password aging administration.

**Syntax**

pwadmin - dcf [ - min weeks ] [ - max weeks ] user

pwadmin user

**Description**

Pwadmin is used to examine and modify the password aging information in the password file. The options one can specify are as follows:

- d Displays the password aging information.
- f Forces the user to change his password at the next login.
- c Prevents the user from changing his password.
- n Disables the password aging feature.
- min Uses the next argument as the minimum number of weeks before the user can change his password. This prevents the user from changing his password back to the old one.
- max Uses the next argument as the number of weeks before the user must change his password again.

If *pwadmin* is invoked with a user name only, it interactively prompts for changes to be made to the password aging information.

**Files**

/etc/passwd

**Notes**

See also passwd(C).

**Name**

pwcheck - Checks password file.

**Syntax**

pwcheck [file]

**Description**

*Pwcheck* scans the password file and checks for any inconsistencies. The checks include validation of the number of fields, login name, user ID, group ID, and whether the login directory and optional program name exist. The default password file is */etc/passwd*.

**Files**

*/etc/passwd*

**See Also**

grpcheck(C), group(M), passwd(M)

**PWD (C)**

**PWD (C)**

**Name**

**pwd** - Prints working directory name.

**Syntax**

**pwd**

**Description**

*Pwd* prints the pathname of the working (current) directory.

**See Also**

**cd(C)**

**Diagnostics**

“Cannot open ..” and “Read error in ..” indicate possible file system trouble. In such cases, see the *Xenix Operations Guide* for information on fixing the file system.

**Name**

quot - Summarizes file system ownership.

**Syntax**

quot [ option ] ... [ filesystem ]

**Description**

*Quot* prints the number of blocks in the named *filesystem* currently owned by each user. If no *filesystem* is named, the file systems given in */etc/mnttab* are examined.

The following options are available:

- n Causes the following pipeline to produce a list of all files and their owners:

```
ncheck filesystem | sort + 0n | quot - n filesystem
```

- c Prints three columns giving file size in blocks, number of files of that size, and cumulative total of blocks in that size or smaller file. Data for files of size greater than 499 blocks are included in the figures for files of exactly size 499.
- f Prints count of number of files as well as space owned by each user.

**Files**

<i>/etc/passwd</i>	Gets user names
<i>/etc/mnttab</i>	Contains list of mounted file systems

**See Also**

du(C), ls(C)

**Notes**

Holes in files are counted as if they actually occupied space.

See also *Notes* under *mount(C)*.

**Name**

random - Generates a random number.

**Syntax**

random [- s] [ scale ]

**Description**

*Random* generates a random number on the standard output, and returns the number as its exit value. By default this number is either 0 or 1, i.e., *scale* is 1 by default. If *scale* is given a value between 1 and 255, then the range of the random value is from 0 to *scale*. If *scale* is greater than 255 an error message is printed.

With the - s "silent" option is given, then the random number is returned as an exit value but is not printed on the standard output. If an error occurs, *random* returns an exit value of zero.

**See Also**

rand(S)

**Notes**

This command does not perform any floating point computations.

*Random* uses the time of day as a seed.

**Name**

rcp - Copies files across XENIX systems.

**Syntax**

```
rcp [ options ] [srcmachine:]srcfile [destmachine:]destfile
```

**Description**

*Rcp* copies files between systems in a Micnet network. The command copies the *srcmachine:srcfile* to *destmachine:destfile*, where *srcmachine:* and *destmachine:* are optional names of systems in the network, and *srcfile* and *destfile* are pathnames of files. If a machine name is not given, the name of the current system is assumed. If - is given in place of *srcfile*, *rcp* uses the standard input as the source. Directories named on the destination machine must be publicly writable, and directories and files named on a remote source machine must be publicly readable.

The available options are:

- m  
Mails and reports completion of the command, whether there is an error or not.
- u{*machine:*}*user*  
Any mail goes to the named *user* on *machine*. The default *machine* is the machine on which *rcp* is invoked.

*Rcp* is useful for transferring small numbers of files across the network. The network consists of daemons that periodically awaken and send files from one system to another. The network must be installed using *netutil*(C) before *rcp* can be used. Also, to enable transfer of files from a remote system, the line

```
rcp=/usr/bin/rcp
```

must be added to the default file */etc/default/micnet* on the systems in the network.

**Example**

```
rcp - m machine1:/etc/mnttab /tmp/vtape
```

**See Also**

*netutil*(C), *remote*(C), *mail*(C), *micnet*(M)

*RCP(C)*

*RCP(C)*

### **Diagnostics**

If an error occurs mail is sent to the user.

### **Notes**

Full pathnames must be specified for remote files.

*Rcp* handles binary data files transparently, no extra options or protocols are needed to handle them. Wildcards are not expanded on the remote machine.

## Name

remote - Executes commands on a remote XENIX system.

## Syntax

```
remote [ - ] [ - f file ] [ - m ] [ - u user] machine command [
arguments ]
```

## Description

*Remote* is a limited networking facility that permits execution of XENIX commands across serial lines. Commands on any connected system may be executed from the host system using *remote*. A command line consisting of *command* and any blank-separated *arguments* is executed on the remote *machine*. A machine's name is located in the file */etc/systemid*. Note that wild cards are *not* expanded on the remote machine, so they should not be specified in *arguments*. The optional *- m* switch causes mail to be sent to the user telling whether the command is successful.

The available options follow:

- A dash signifies that standard input is used as the standard input for *command* on the remote *machine*. Standard input comes from the local host and not from the remote machine.
- *f file* Use the specified *file* as the standard input for *command* on the remote *machine*. The *file* exists on the local host and not on the remote machine.
- *m* Mails the user to report completion of the command. By default, mail reports only errors.
- *u* Any report mail goes to the named user rather than to the executor of the command. The user name may have a preceding *machine*: name to signify a user on some remote system.

A network of systems must first be set up and the proper daemons initialized using *netutil(C)* before *remote* can be successfully used.

## Example

The following command executes an *ls* command on the remote directory */tmp*:

```
remote - m machine1 ls - l /tmp
```

*REMOTE* (C)

*REMOTE* (C)

**See Also**

*rcp*(C), *mail*(C), *netutil*(C)

**Notes**

The *mail* command uses the equivalent of *remote* to send mail between machines.

**Note**

*/usr/lib/mail/mail.mn* is linked to */usr/bin/remote*.

**Name**

**restor** - Invokes incremental file system restorer.

**Syntax**

**restor** key [ arguments ]

**Description**

*Restor* is used to read archive media backed up with the *dump* command. The *key* specifies what is to be done. *Key* is one of the characters *rRx*t, optionally combined with *f*.

- f** Uses the first *argument* as the name of the archive instead of the default.
- r,R** The archive is read and loaded into the file system specified in *argument*. This should not be done lightly (see below). If the key is **R**, *restor* asks which archive of a multivolume set to start on. This allows *restor* to be interrupted and then restarted (an *fsck* must be done before the restart).
- x** Each file on the archive named by an *argument* is extracted. The filename has all "mount" prefixes removed; for example, if */usr* is a mounted file system, */usr/bin/lpr* is named */bin/lpr* on the archive. The extracted file is placed in a file with a numeric name supplied by *restor* (actually the inode number). In order to keep the amount of archive read to a minimum, the following procedure is recommended:
  1. Mount volume 1 of the set of backup archives.
  2. Type the *restor* command.
  3. *Restor* will announce whether or not it found the files, give the numeric name that it will assign to the file, and in the case of a tape, rewind to the start of the archive.
  4. It then asks you to "mount the desired tape volume". Type the number of the volume you choose. On a multivolume backup the recommended procedure is to mount the last through the first volumes, in that order. *Restor* checks to see if any of the requested files are on the mounted archive (or a later archive- thus the reverse order). If the requested files are not there, *restor* doesn't read through the tape. If you are working with a single-volume backup or if the number of files being restored is large, respond to the query with **1** and *restor* will read the archives in sequential order.

t Prints the date the archive was written and the date the file system was backed up.

The r option should only be used to restore a complete backup archive onto a clear file system, or to restore an incremental backup archive onto a file system so created. Thus:

```
/etc/mkfs /dev/hd1 10000
restor r /dev/hd1
```

is a typical sequence to restore a complete backup. Another *restor* can be done to get an incremental backup in on top of this.

A *dump* followed by a *mkfs* and a *restor* is used to change the size of a file system.

### Files

rst*	Temporary files
/etc/default/dump	Name of default archive device

The default archive unit varies with installation.

### See Also

dump(C), fsck(C), mkfs(C)

### Diagnostics

There are various diagnostics involved with reading the archive and writing the disk. There are also diagnostics if the i-list or the free list of the file system is not large enough to hold the dump.

If the dump extends over more than one disk or tape, it may ask you to change disks or tapes. Reply with a newline when the next unit has been mounted.

### Notes

It is not possible to successfully *restor* an entire active root file system.

**Name**

`rm`, `rmdir` - Removes files or directories.

**Syntax**

`rm [ - fri ] file ...`

`rmdir dir ...`

**Description**

*Rm* removes the entries for one or more files from a directory. If an entry was the last link to the file, the file is destroyed. Removal of a file requires write permission in its directory, but neither read nor write permission on the file itself.

If a file has no write permission and the standard input is a terminal, its permissions are printed and a line is read from the standard input. If that line begins with `y` the file is deleted, otherwise the file remains. No questions are asked when the `-f` option is given or if the standard input is not a terminal.

If a designated file is a directory, an error comment is printed unless the optional argument `-r` has been used. In that case, *rm* recursively deletes the entire contents of the specified directory, and the directory itself.

If the `-i` (interactive) option is in effect, *rm* asks whether to delete each file, and if the `-r` option is in effect, whether to examine each directory.

*Rmdir* removes empty directories.

**See Also**

`rmdir(C)`

**Diagnostics**

Generally self-explanatory. It is forbidden to remove the file `..` to avoid the consequences of inadvertently doing something like:

```
rm -r .*
```

It is also forbidden to remove the root directory of a given file system.

**Name**

`rmdir` - Removes directories.

**Syntax**

`rmdir dir ...`

**Description**

*Rm* removes the entries for one or more subdirectories from a directory. A directory must be empty before it can be removed. *Rmdir* enforces a standard and *safe* procedure for removing a directory; the contents of the directory must be removed before the directory itself can be deleted with *rmdir*. Note that the "`rm -r dir`" command is a more dangerous alternative to *rmdir*.

*Rmdir* removes entries for the named directories, which must be empty.

**See Also**

`rm(C)`

**Notes**

*Rmdir* will refuse to remove the root directory of a mounted file system.

**Name**

**rmuser** - Removes a user from the system.

**Syntax**

**/etc/rmuser**

**Description**

*Rmuser* removes users from the system. It begins by prompting for a user name; after receiving a valid user name as a response, it then deletes the named user's entry in the password file, and removes the user's mailbox file, the *.profile* file, and the entire home directory. It will also remove the users group entry in */etc/group* if the user was the only remaining member of that group, and the group ID was greater than 50.

Before removing a user ID from the system, make sure its mailbox is empty and that all files belonging to that user ID have been saved or deleted as required.

The *rmuser* program will refuse to remove a user ID or any of its files if one or more of the following checks fails:

- The user name given is one of the "system" user names such as root, sys, sysinfo, cron, or uucp. All user IDs less than 200 are considered reserved for system use, and cannot be removed using *rmuser*. Likewise all group IDs less than 50 are not removable using *rmuser*.
- The user's mailbox exists and is not empty.
- The user's home directory contains files other than *.profile*.

*Rmuser* can only be executed by the super-user.

**Files**

*/etc/passwd*

*/usr/spool/mail/username*

*\$HOME*

**See Also**

*mkuser(C)*, *dump(C)*

**Name**

rsh - Invokes a restricted shell (command interpreter).

**Syntax**

rsh [ flags ] [ name [ arg1 ... ] ]

**Description**

*Rsh* is a restricted version of the standard command interpreter *sh*(C). It is used to set up login names and execution environments whose capabilities are more controlled than those of the standard shell. The actions of *rsh* are identical to those of *sh*, except that changing directory with *cd*, setting the value of \$PATH, using command names containing slashes, and redirecting output using > and >> are all disallowed.

When invoked with the name - rsh, *rsh* reads the user's .profile (from \$HOME/.profile). It acts as the standard *sh* while doing this, except that an interrupt causes an immediate exit, instead of causing a return to command level. The restrictions above are enforced after .profile is interpreted.

When a command to be executed is found to be a shell procedure, *rsh* invokes *sh* to execute it. Thus, it is possible to provide to the end user shell procedures that have access to the full power of the standard shell, while restricting him to a limited menu of commands; this scheme assumes that the end user does not have write and execute permissions in the same directory.

The net effect of these rules is that the writer of the .profile has complete control over user actions, by performing guaranteed setup actions, then leaving the user in an appropriate directory (probably *not* the login directory).

*Rsh* is actually just a link to *sh* and any *flags* arguments are the same as for *sh*(C).

The system administrator often sets up a directory of commands that can be safely invoked by *rsh*.

**See Also**

sh(C), profile(M)

**Name**

sddate - Prints and sets backup dates.

**Syntax**

```
sddate [ name lev date ]
```

**Description**

If no argument is given, the contents of the backup date file `"/etc/ddate"` are printed. The backup date file is maintained by `dump(C)` and contains the date of the most recent backup for each backup level for each filesystem.

If arguments are given, an entry is replaced or made in `"/etc/ddate"`. `name` is the last component of the device pathname. `lev` is the backup level number (from 0 to 9), and `date` is a time in the form taken by `date(C)`:

```
mmddhhmm[yy]
```

Where the first `mm` is a two-digit month in the range 01-12, `dd` is a two-digit day of the month, `hh` is a two-digit military hour from 00-23, and the final `mm` is a two-digit minute from 00-59. An optional two-digit year, `yy`, is presumed to be an offset from the year 1900, i.e., 19`yy`.

Some sites may wish to back up file systems by copying them verbatim to backup media. `Sddate` could be used to make a "level 0" entry in `"/etc/ddate"`, which would then allow incremental backups.

For example:

```
sddate rhd0 5 10081520
```

makes an `"/etc/ddate"` entry showing a level 5 backup of `"/dev/rhd0"` on October 8, at 3:20 PM.

**Files**

```
/etc/ddate
```

*SDDATE* (C)

*SDDATE* (C)

**See Also**

*dump*(C), *date*(C)

**Diagnostics**

*bad conversion* If the date set is syntactically incorrect.

**Name**

`sdiff` - Compares files side-by-side.

**Syntax**

`sdiff [ options ... ] file1 file2`

**Description**

*Sdiff* uses the output of *diff(C)* to produce a side-by-side listing of two files indicating those lines that are different. Each line of the two files is printed with a blank gutter between them if the lines are identical, a < in the gutter if the line only exists in *file1*, a > in the gutter if the line only exists in *file2*, and a | for lines that are different.

For example:

```

x      |      y
a      a
b      <
c      <
d      d      d
      >      c

```

The following options exist:

- `w n` Uses the next argument, *n*, as the width of the output line. The default line length is 130 characters.
- `l` Only prints the left side of any lines that are identical.
- `s` Does not print identical lines.
- `o output` Uses the next argument, *output*, as the name of a third file that is created as a user-controlled merging of *file1* and *file2*. Identical lines of *file1* and *file2* are copied to *output*. Sets of differences, as produced by *diff(C)*, are printed; where a set of differences share a common gutter character. After printing each set of differences, *sdiff* prompts the user with a % and waits for one of the following user-typed commands:

- l Appends the left column to the output file
- r Appends the right column to the output file
- s Turns on silent mode; does not print identical lines

- v Turns off silent mode
- e l Calls the editor with the left column
- e r Calls the editor with the right column
- e b  
Calls the editor with the concatenation of  
left and right
- e Calls the editor with a zero length file
- q Exits from the program

On exit from the editor, the resulting file is concatenated  
on the end of the *output* file.

**See Also**

diff(C), ed(C)

**Name**

`sed` - Invokes the stream editor.

**Syntax**

`sed [ - n ] [ - e script ] [ - f sfile ] [ files ]`

**Description**

*Sed* copies the named *files* (standard input default) to the standard output, edited according to a script of commands. The `- f` option causes the script to be taken from file *sfile*; these options accumulate. If there is just one `- e` option and no `- f` options, the flag `- e` may be omitted. The `- n` option suppresses the default output. A script consists of editing commands, one per line, of the following form:

[ address [ , address ] ] function [ arguments ]

In normal operation, *sed* cyclically copies a line of input into a *pattern space* (unless there is something left after a `D` command), applies in sequence all commands whose *addresses* select that pattern space, and at the end of the script copies the pattern space to the standard output (except under `- n`) and deletes the pattern space.

Some of the commands use a *hold space* to save all or part of the *pattern space* for subsequent retrieval.

An *address* is either a decimal number that counts input lines cumulatively across files, a `$` that addresses the last line of input, or a context address, i.e., a */regular expression/* in the style of *ed*(C) modified as follows:

- In a context address, the construction `\?regular expression?`, where `?` is any character, is identical to `/regular expression/`. Note that in the context address `\xabc\xdefx`, the second `x` stands for itself, so that the regular expression is `abcdef`.
- The escape sequence `\n` matches a newline *embedded* in the pattern space.
- A period `.` matches any character except the *terminal* newline of the pattern space.
- A command line with no addresses selects every pattern space.
- A command line with one address selects each pattern space that matches the address.

- A command line with two addresses selects the inclusive range from the first pattern space that matches the first address through the next pattern space that matches the second. (If the second address is a number less than or equal to the line number first selected, only one line is selected.) Thereafter the process is repeated, looking again for the first address.

Editing commands can be applied only to nonselected pattern spaces by use of the negation function ! (below).

In the following list of functions the maximum number of permissible addresses for each function is indicated in parentheses.

The *text* argument consists of one or more lines, all but the last of which end with backslashes to hide the newlines. Backslashes in *text* are treated like backslashes in the replacement string of an *s* command, and may be used to protect initial blanks and tabs against the stripping that is done on every script line. The *rfile* or *wfile* argument must terminate the command line and must be preceded by exactly one blank. Each *wfile* is created before processing begins. There can be at most 10 distinct *wfile* arguments.

- (1) a\  
*text* Appends *text*, placing it on the output before reading the next input line.
- (2) b *label* Branches to the : command bearing the *label*. If *label* is empty, branches to the end of the script.
- (2) c\  
*text* Changes *text* by deleting the pattern space and then appending *text*. With 0 or 1 address or at the end of a 2-address range, places *text* on the output and starts the next cycle.
- (2) d Deletes the pattern space and starts the next cycle.
- (2) D Deletes the initial segment of the pattern space through the first newline and starts the next cycle.
- (2) g Replaces the contents of the pattern space with the contents of the hold space.
- (2) G Appends the contents of the hold space to the pattern space.
- (2) h Replaces the contents of the hold space with the contents of the pattern space.
- (2) H Appends the contents of the pattern space to the hold space.

- (1) *i* \  
*text*      Inserts *text* on the standard output.
- (2) *l*      Lists the pattern space on the standard output with non-printing characters spelled in two-digit ASCII and long lines folded.
- (2) *n*      Copies the pattern space to the standard output. Replaces the pattern space with the next line of input.
- (2) *N*      Appends the next line of input to the pattern space with an embedded newline. (The current line number changes.)
- (2) *p*      Prints (copies) the pattern space on the standard output.
- (2) *P*      Prints (copies) the initial segment of the pattern space through the first newline to the standard output.
- (1) *q*      Quits *sed* by branching to the end of the script. No new cycle is started.
- (2) *r rfile*      Reads the contents of *rfile* and places them on the output before reading the next input line.
- (2) *s/regular expression/replacement/flags*  
Substitutes the *replacement* string for instances of the *regular expression* in the pattern space. Any character may be used instead of */*. For a more detailed description see *ed(C)*. *Flags* is zero or more of:
- g*      Globally substitutes for all nonoverlapping instances of the *regular expression* rather than just the first one.
- p*      Prints the pattern space if a replacement was made.
- w wfile*  
            Writes the pattern space to *wfile* if a replacement was made.
- (2) *t label*      Branches to the colon (*:*) command bearing *label* if any substitutions have been made since the most recent reading of an input line or execution of a *t* command. If *label* is empty, *t* branches to the end of the script.
- (2) *w wfile*      Writes the pattern space to *wfile*.
- (2) *x*      Exchanges the contents of the pattern and hold spaces.
- (2) *y/string1/string2/*  
Replaces all occurrences of characters in *string1* with the corresponding characters in *string2*. The lengths of

*string1* and *string2* must be equal.

(2)! *function*

Applies the *function* (or group, if *function* is { }) only to lines *not* selected by the address(es).

(0) : *label* This command does nothing; it bears a *label* for b and t commands to branch to.

(1) = Places the current line number on the standard output as a line.

(2) { Executes the following commands through a matching } only when the pattern space is selected.

(0) An empty command is ignored.

See Also

awk(C), ed(C), grep(C)  
The *XENIX Text Processing Guide*

Notes

This command is more fully documented in the *XENIX Text Processing Guide*.

**Name**

setmnt - Establishes */etc/mnttab* table.

**Syntax**

*/etc/setmnt*

**Description**

*Setmnt* creates the */etc/mnttab* table (see *mnttab(F)*), which is needed for both the *mount(C)* and *umount(C)* commands. *Setmnt* reads the standard input and creates a *mnttab* entry for each line. Input lines have the format:

fileSYS node

where *fileSYS* is the name of the file system's *special file* (e.g., "hd0") and *node* is the root name of that file system. Thus *fileSYS* and *node* become the first two strings in the *mnttab(F)* entry.

**Files**

*/etc/mnttab*

**See Also**

*mnttab(F)*

**Notes**

If *fileSYS* or *node* are longer than 128 characters errors can occur.

*Setmnt* silently enforces an upper limit on the maximum number of *mnttab* entries.

*Setmnt* is normally invoked by */etc/rc* when the system boots up.

**Name**

`settime` - Changes the access and modification dates of files.

**Syntax**

`settime mmddhhmm [ yy ] [ - f fname ] name ...`

**Description**

Sets the access and modification dates for one or more files. The dates are set to the specified date, or to the access and modification dates of the file specified via `- f`. Exactly one of these methods must be used to specify the new date(s). The first *mm* is the month number; *dd* is the day number in the month; *hh* is the hour number (24 hour system); the second *mm* is the minute number; *yy* is the last two digits of the year and is optional. For example:

```
settime 1008004583 ralph pete
```

sets the access and modification dates of files *ralph* and *pete* to Oct 8, 12:45 AM, 1983. Another example:

```
settime - f ralph john
```

This sets the access and modification dates of the file *john* to those of the file *ralph*.

**Notes**

Use of *touch* in place of *settime* is encouraged.

**Name**

sh - Invokes the shell command interpreter.

**Syntax**

sh [ - ceiknrstuvx ] [ args ]

**Description**

The shell is the standard command programming language that executes commands read from a terminal or a file. See *Invocation* below for the meaning of arguments to the shell.

*Commands*

A *simple-command* is a sequence of nonblank *words* separated by *blanks* (a *blank* is a tab or a space). The first word specifies the name of the command to be executed. Except as specified below, the remaining words are passed as arguments to the invoked command. The command name is passed as argument 0 (see *exec(S)*). The *value* of a simple-command is its exit status if it terminates normally, or (octal) 200+ *status* if it terminates abnormally (see *signal(S)* for a list of status values).

A *pipeline* is a sequence of one or more *commands* separated by a vertical bar (|). (The caret (^) also has the same effect.) The standard output of each command but the last is connected by a *pipe(S)* to the standard input of the next command. Each command is run as a separate process; the shell waits for the last command to terminate.

A *list* is a sequence of one or more pipelines separated by ;, &, &&, or || and optionally terminated by ; or &. Of these four symbols, ; and & have equal precedence, which is lower than that of && and ||. The symbols && and || also have equal precedence. A semicolon (;) causes sequential execution of the preceding pipeline; an ampersand (&) causes asynchronous execution of the preceding pipeline (i.e., the shell does *not* wait for that pipeline to finish). The symbol && (||) causes the *list* following it to be executed only if the preceding pipeline returns a zero (nonzero) exit status. An arbitrary number of newlines may appear in a *list*, instead of semicolons, to delimit commands.

A *command* is either a simple-command or one of the following commands. Unless otherwise stated, the value returned by a command is that of the last simple-command executed in the command:

**for name [ in word ... ] do list done**

Each time a for command is executed, *name* is set to the next *word* taken from the in *word* list. If *inword* is omitted, then the for command executes the *do list* once for each positional parameter that is set (see *Parameter Substitution* below). Execution ends when there are no more words in the list.

**case word in [ pattern [ |pattern ] ... ) list ;; ] ... esac**

A case command executes the *list* associated with the first *pattern* that matches *word*. The form of the patterns is the same as that used for filename generation (see *Filename Generation* below).

**if list then list [ elif list then list ] ... [ else list ] fi**

The *list* following if is executed and, if it returns a zero exit status, the *list* following the first then is executed. Otherwise, the *list* following elif is executed and, if its value is zero, the *list* following the next then is executed. Failing that, the *else list* is executed. If no *else list* or *then list* is executed, then the if command returns a zero exit status.

**while list do list done**

A while command repeatedly executes the *while list* and, if the exit status of the last command in the list is zero, executes the *do list*; otherwise the loop terminates. If no commands in the *do list* are executed, then the while command returns a zero exit status; until may be used in place of while to negate the loop termination test.

**(list)**

Executes *list* in a subshell.

**{list;}**

*list* is simply executed.

The following words are only recognized as the first word of a command and when not quoted:

if then else elif fi case esac for while until do done { }

### *Comments*

A word beginning with **#** causes that word and all the following characters up to a newline to be ignored.

### *Command Substitution*

The standard output from a command enclosed in a pair of grave accents (``) may be used as part or all of a word; trailing newlines are removed.

*Parameter Substitution*

The character **\$** is used to introduce substitutable *parameters*. Positional parameters may be assigned values by set. Variables may be set by writing:

```
name=value [ name=value ] ...
```

Pattern-matching is not performed on *value*.

**`\${parameter}`**

A *parameter* is a sequence of letters, digits, or underscores (a *name*), a digit, or any of the characters **\***, **@**, **#**, **?**, **-**, **\$**, and **!**. The value, if any, of the parameter is substituted. The braces are required only when *parameter* is followed by a letter, digit, or underscore that is not to be interpreted as part of its name. A *name* must begin with a letter or underscore. If *parameter* is a digit then it is a positional parameter. If *parameter* is **\*** or **@**, then all the positional parameters, starting with **\$1**, are substituted (separated by spaces). Parameter **\$0** is set from argument zero when the shell is invoked.

**`\${parameter:- word}`**

If *parameter* is set and is nonnull then substitute its value; otherwise substitute *word*.

**`\${parameter:=word}`**

If *parameter* is not set or is null, then set it to *word*; the value of the parameter is then substituted. Positional parameters may not be assigned to in this way.

**`\${parameter:? word}`**

If *parameter* is set and is nonnull then substitute its value; otherwise, print *word* and exit from the shell. If *word* is omitted, then the message "parameter null or not set" is printed.

**`\${parameter:+ word}`**

If *parameter* is set and is nonnull then substitute *word*; otherwise substitute nothing.

In the above, *word* is not evaluated unless it is to be used as the substituted string, so that in the following example, `pwd` is executed only if `d` is not set or is null:

```
echo `${d:- `pwd`}`
```

If the colon (**:**) is omitted from the above expressions, then the shell only checks whether *parameter* is set.

The following parameters are automatically set by the shell:

**#** The number of positional parameters in decimal

- Flags supplied to the shell on invocation or by the `set` command
- ? The decimal value returned by the last synchronously executed command
- \$ The process number of this shell
- ! The process number of the last background command invoked

The following parameters are used by the shell:

#### HOME

The default argument (home directory) for the `cd` command

#### PATH

The search path for commands (see *Execution* below)

#### MAIL

If this variable is set to the name of a mail file, then the shell informs the user of the arrival of mail in the specified file

PS1 Primary prompt string, by default "\$ "

PS2 Secondary prompt string, by default "> "

IFS Internal field separators, normally space, tab, and newline

The shell gives default values to `PATH`, `PS1`, `PS2`, and `IFS`, while `HOME` and `MAIL` are not set at all by the shell (although `HOME` is set by `login(C)`).

#### *Blank Interpretation*

After parameter and command substitution, the results of substitution are scanned for internal field separator characters (those found in `IFS`) and split into distinct arguments where such characters are found. Explicit null arguments (" " or ') are retained. Implicit null arguments (those resulting from *parameters* that have no values) are removed.

#### *Filename Generation*

Following substitution, each command *word* is scanned for the characters \*, ?, and [. If one of these characters appears then the word is regarded as a *pattern*. The word is replaced with alphabetically sorted filenames that match the pattern. If no filename is found that matches the pattern, then the word is left unchanged. The character . at the start of a filename or immediately following a /, as well as the character / itself, must be matched explicitly. These characters and their matching patterns are:

- \* Matches any string, including the null string.
- ? Matches any single character.
- [...]  
Matches any one of the enclosed characters. A pair of characters separated by - matches any character lexically between the pair, inclusive.

### Quoting

The following characters have a special meaning to the shell and cause termination of a word unless quoted:

; & ( ) | ^ < > newline space tab

A character may be *quoted* (i.e., made to stand for itself) by preceding it with a \. The pair \newline is ignored. All characters enclosed between a pair of single quotation marks ( ' '), except a single quotation mark, are quoted. Inside double quotation marks ( " " ), parameter and command substitution occurs and \ quotes the characters \, ', ", and \$. "\$\*" is equivalent to "\$1 \$2 ...", whereas "\$@" is equivalent to "\$1" "\$2" ....

### Prompting

When used interactively, the shell prompts with the value of PS1 before reading a command. If at any time a newline is typed and further input is needed to complete a command, then the secondary prompt (i.e., the value of PS2) is issued.

### Input/Output

Before a command is executed, its input and output may be redirected using a special notation interpreted by the shell. The following may appear anywhere in a simple-command or may precede or follow a *command*. They are *not* passed on to the invoked command; substitution occurs before *word* or *digit* is used:

- <word      Use file *word* as standard input (file descriptor 0).
- >word      Use file *word* as standard output (file descriptor 1).  
If the file does not exist then it is created; otherwise, it is truncated to zero length.
- >>word     Use file *word* as standard output. If the file exists then output is appended to it (by first seeking to the end-of-file); otherwise, the file is created.

`<<[- ]word` The shell input is read up to a line that is the same as *word*, or to an end-of-file. The resulting document becomes the standard input. If any character of *word* is quoted, then no interpretation is placed upon the characters of the document; otherwise, parameter and command substitution occurs, (unescaped) `\newline` is ignored, and `\` must be used to quote the characters `\`, `$`, ```, and the first character of *word*. If `-` is appended to `<<`, then all leading tabs are stripped from *word* and from the document.

`<&digit` The standard input is duplicated from file descriptor *digit* (see `dup(S)`). Similarly for the standard output using `>`.

`<&-` The standard input is closed. Similarly for the standard output using `>`.

If one of the above is preceded by a digit, then the file descriptor created is that specified by the digit (instead of the default 0 or 1). For example:

```
... 2>&1
```

creates file descriptor 2 that is a duplicate of file descriptor 1.

If a command is followed by `&` then the default standard input for the command is the empty file `/dev/null`. Otherwise, the environment for the execution of a command contains the file descriptors of the invoking shell as modified by input/output specifications.

### Environment

The *environment* (see `environ(M)`) is a list of name-value pairs that is passed to an executed program in the same way as a normal argument list. The shell interacts with the environment in several ways. On invocation, the shell scans the environment and creates a parameter for each name found, giving it the corresponding value. Executed commands inherit the same environment. If the user modifies the values of these parameters or creates new ones, none of these affects the environment unless the `export` command is used to bind the shell's parameter to the environment. The environment seen by any executed command is thus composed of any unmodified name-value pairs originally inherited by the shell, plus any modifications or additions, all of which must be noted in `export` commands.

The environment for any *simple-command* may be augmented by prefixing it with one or more assignments to parameters. Thus:

```
TERM=450 cmd args
```

and

(export TERM; TERM=450; cmd args)

are equivalent (as far as the above execution of *cmd* is concerned).

If the *-k* flag is set, all keyword arguments are placed in the environment, even if they occur after the command name.

### *Signals*

The INTERRUPT and QUIT signals for an invoked command are ignored if the command is followed by *&*; otherwise signals have the values inherited by the shell from its parent, with the exception of signal 11 (but see also the *trap* command below).

### *Execution*

Each time a command is executed, the above substitutions are carried out. Except for the *Special Commands* listed below, a new process is created and an attempt is made to execute the command via *exec(S)*.

The shell parameter *PATH* defines the search path for the directory containing the command. Alternative directory names are separated by a colon (:). The default path is *:/bin:/usr/bin* (specifying the current directory, */bin*, and */usr/bin*, in that order). Note that the current directory is specified by a null pathname, which can appear immediately after the equal sign or between the colon delimiters anywhere else in the path list. If the command name contains a */* then the search path is not used. Otherwise, each directory in the path is searched for an executable file. If the file has execute permission but is not an *a.out* file, it is assumed to be a file containing shell commands. A subshell (i.e., a separate process) is spawned to read it. A parenthesized command is also executed in a subshell.

### *Special Commands*

The following commands are executed in the shell process and, except as specified, no input/output redirection is permitted for such commands:

*:* No effect; the command does nothing. A zero exit code is returned.

*. file*

Reads and executes commands from *file* and returns. The search path specified by *PATH* is used to find the directory containing *file*.

- break [ n ]**  
Exits from the enclosing for or while loop, if any. If *n* is specified then breaks *n* levels.
- continue [ n ]**  
Resumes the next iteration of the enclosing for or while loop. If *n* is specified then resumes at the *n*-th enclosing loop.
- cd [ arg ]**  
Changes the current directory to *arg*. The shell parameter HOME is the default *arg*.
- eval [ arg ... ]**  
The arguments are read as input to the shell and the resulting command(s) executed.
- exec [ arg ... ]**  
The command specified by the arguments is executed in place of this shell without creating a new process. Input/output arguments may appear and, if no other arguments are given, cause the shell input/output to be modified.
- exit [ n ]**  
Causes a shell to exit with the exit status specified by *n*. If *n* is omitted then the exit status is that of the last command executed (an end-of-file will also cause the shell to exit.)
- export [ name ... ]**  
The given *names* are marked for automatic export to the *environment* of subsequently executed commands. If no arguments are given, a list of all names that are exported in this shell is printed.
- newgrp [ arg ... ]**  
Equivalent to `exec newgrp arg ....`
- read [ name ... ]**  
One line is read from the standard input and the first word is assigned to the first *name*, the second word to the second *name*, etc., with leftover words assigned to the last *name*. The return code is 0 unless an end-of-file is encountered.
- readonly [ name ... ]**  
The given *names* are marked *readonly* and the values of the these *names* may not be changed by subsequent assignment. If no arguments are given, then a list of all *readonly* names is printed.
- set [ - ekntuvx [ arg ... ] ]**  
- e If the shell is noninteractive, exits immediately if a command exits with a nonzero exit status.

- k Places all keyword arguments in the environment for a command, not just those that precede the command name.
- n Reads commands but does not execute them.
- t Exits after reading and executing one command.
- u Treats unset variables as an error when substituting.
- v Prints shell input lines as they are read.
- x Prints commands and their arguments as they are executed.
- - Does not change any of the flags; useful in setting \$! to -.

Using + rather than - causes these flags to be turned off. These flags can also be used upon invocation of the shell. The current set of flags may be found in \$- . The remaining arguments are positional parameters and are assigned, in order, to \$1, \$2, .... If no arguments are given then the values of all names are printed.

#### shift

The positional parameters from \$2 ... are renamed \$1 ....

#### test

Evaluates conditional expressions. See *test(C)* for usage and description.

#### times

Prints the accumulated user and system times for processes run from the shell.

#### trap [ *arg* ] [ *n* ] ...

*arg* is a command to be read and executed when the shell receives signal(s) *n*. (Note that *arg* is scanned once when the trap is set and once when the trap is taken.) Trap commands are executed in order of signal number. Any attempt to set a trap on a signal that was ignored on entry to the current shell is ineffective. An attempt to trap on signal 11 (memory fault) produces an error. If *arg* is absent then all trap(s) *n* are reset to their original values. If *arg* is the null string then this signal is ignored by the shell and by the commands it invokes. If *n* is 0 then the command *arg* is executed on exit from the shell. The trap command with no arguments prints a list of commands associated with each signal number.

#### umask [ *ooo* ]

The user file-creation mask is set to the octal number *ooo* where *o* is an octal digit (see *umask(C)*). If *ooo* is omitted, the current value of the mask is printed.

SH (C)

SH (C)

**wait**

Waits for all child processes to terminate, and reports the termination status. If *n* is not given then all currently active child processes are waited for. The return code from this command is always 0.

### Invocation

If the shell is invoked through *exec(S)* and the first character of argument 0 is -, commands are initially read from */etc/profile* and then from *\$HOME/.profile*, if such files exist. Thereafter, commands are read as described below, which is also the case when the shell is invoked as */bin/sh*. The flags below are interpreted by the shell on invocation only; note that unless the -c or -s flag is specified, the first argument is assumed to be the name of a file containing commands, and the remaining arguments are passed as positional parameters to that command file:

- c *string* If the -c flag is present then commands are read from *string*.
- s If the -s flag is present or if no arguments remain then commands are read from the standard input. Any remaining arguments specify the positional parameters. Shell output is written to file descriptor 2.
- i If the -i flag is present or if the shell input and output are attached to a terminal, then this shell is *interactive*. In this case TERMINATE is ignored (so that kill 0 does not kill an interactive shell) and INTERRUPT is caught and ignored (so that wait is interruptible). In all cases, QUIT is ignored by the shell.
- r If the -r flag is present the shell is a restricted shell (see *reh(C)*).

The remaining flags and arguments are described under the set command above.

### Exit Status

Errors detected by the shell, such as syntax errors, cause the shell to return a nonzero exit status. If the shell is being used noninteractively then execution of the shell file is abandoned. Otherwise, the shell returns the exit status of the last command executed (see also the exit command above).

### Files

*/etc/profile*

*\$HOME/.profile*

*/tmp/sh\**

*/dev/null*

**See Also**

cd(C), env(C), login(C), newgrp(C), rsh(C), test(C), umask(C),  
dup(S), exec(S), fork(S), pipe(S), signal(S), umask(S), wait(S),  
a.out(F), profile(M), environ(M)

**Notes**

The command `readonly` (without arguments) produces the same output as the command `export`.

If `<<` is used to provide standard input to an asynchronous process invoked by `&`, the shell gets mixed up about naming the input document; a garbage file `/tmp/sh*` is created and the shell complains about not being able to find that file by another name.

The comment format for the Bourne shell `sh(C)` has been changed. Under XENIX 2.3 (the equivalent of UNIX V7) and all prior versions, the shell ignored anything from a colon to the end of the line enclosed in single quotes. The colon required at least one whitespace between the colon and the initial quote. E.g:

```
: 'this is a 2.3 bourne shell comment'
```

Under 3.0, the comment convention is like the `csh(C)`. Anything from a pound sign `#` to the end of line is ignored. E.g.:

```
# This is a 3.0 bourne shell comment
```

**Name**

shutdown - Terminates all processing.

**Syntax**

/etc/shutdown [ time ] [ su ]

**Description**

*Shutdown* is part of the XENIX operation procedures. Its primary function is to terminate all currently running processes in an orderly and cautious manner. The *time* argument is the number of minutes before a shutdown will occur; default is five minutes. The optional *su* argument lets the user go single-user, without completely shutting down the system. However, the system is shut down for multiuser use. *Shutdown* goes through the following steps. First, all users logged on the system are notified to log off the system by a broadcasted message. All file system super-blocks are updated before the system is stopped (see *sync(C)*). This must be done before rebooting the system, to insure file system integrity.

**See Also**

*sync(C)*, *umount(C)*, *wall(C)*

**Diagnostics**

The most common error diagnostic that will occur is *device busy*. This diagnostic appears when a particular file system could not be unmounted. See *umount(C)*.

**Notes**

Once *shutdown* has been invoked it must be allowed to run to completion and must *not* be interrupted by pressing BREAK or DEL.

Shutdown does not lock the hard disk heads.

*SLEEP* (C)

*SLEEP* (C)

**Name**

sleep - Suspends execution for an interval.

**Syntax**

sleep time

**Description**

*Sleep* suspends execution for *time* seconds. It is used to execute a command after a certain amount of time as in:

```
(sleep 105; command)&
```

or to execute a command every so often, as in:

```
while true
do
    command
    sleep 37
done
```

**See Also**

alarm(S), sleep(S)

**Notes**

*Time* must be less than 65536 seconds.

## Name

sort - Sorts and merges files.

## Syntax

```
sort [ - cmubdfinrtx ] [ +pos1 [ - pos2 ] ] ... [ - o output ]
[ files ]
```

## Description

*Sort* merges and sorts lines from all named files and writes the result on the standard output. A dash (-) may appear as a file in the *files* argument signifying the standard input. If no input files are named, the standard input is sorted.

The default sort key is an entire line. Default ordering is lexicographic by bytes in machine collating sequence. The ordering is affected globally by the following options, one or more of which may appear.

- b Ignores leading blanks (spaces and tabs) in field comparisons.
- d "Dictionary" order: only letters, digits and blanks are significant in comparisons.
- f Folds uppercase letters onto lowercase.
- i Ignores characters outside the ASCII octal range 040-0176 in nonnumeric comparisons.
- n An initial numeric string, consisting of optional blanks, optional minus sign, and zero or more digits with optional decimal point, is sorted by arithmetic value. Option n implies option b.
- r Reverses the sense of comparisons.
- tx "Tab character" separating fields is x.

The notation *+pos1 - pos2* restricts a sort key to a field beginning at *pos1* and ending just before *pos2*. *Pos1* and *pos2* each have the form *m.n*, optionally followed by one or more of the flags *bdfinr*, where *m* tells a number of fields to skip from the beginning of the line and *n* tells a number of characters to skip further. If any flags are present they override all the global ordering options for this key. If the *b* option is in effect *n* is counted from the first nonblank in the field; *b* is attached independently to *pos2*. A missing *.n* means *.0*; a missing *- pos2* means the end of the line. Under the *- tx* option, fields are strings separated by *x*; otherwise fields are

nonempty nonblank strings separated by blanks.

When there are multiple sort keys, later keys are compared only after all earlier keys compare equal. Lines that otherwise compare equal are ordered with all bytes significant. Very long lines are silently truncated.

These option arguments are also understood:

- c Checks that the input file is sorted according to the ordering rules; gives no output unless the file is out of sort.
- m Merges only, the input files are already sorted.
- u Suppresses all but one in each set of duplicated lines. Ignored bytes and bytes outside keys do not participate in this comparison.
- o The next argument is the name of an output file to use instead of the standard output. This file may be the same as one of the inputs.

### Examples

The following prints in alphabetical order all the unique spellings in a list of words (capitalized words differ from uncapitalized):

```
sort - u + 0f + 0 list
```

The following prints the password file (*passwd*(M)) sorted by user ID (the third colon-separated field):

```
sort - t: + 2n /etc/passwd
```

The following prints the first instance of each month in an already sorted file of (month-day) entries (the options - um with just one input file make the choice of a unique representative from a set of equal lines predictable):

```
sort - um + 0 - 1 dates
```

### Files

```
/usr/tmp/stm???
```

***SORT(C)***

***SORT(C)***

**See Also**

***comm(C), join(C), uniq(C)***

**Diagnostics**

**Comments and exits with nonzero status for various trouble conditions and for disorder discovered under option - c.**

**Name**

`split` - Splits a file into pieces.

**Syntax**

`split [ - n ] [ file [ name ] ]`

**Description**

*Split* reads *file* and writes it in *n*-line pieces (default 1000), as many as necessary, onto a set of output files. The name of the first output file is *name* with *aa* appended, and so on lexicographically. If no output name is given, *x* is default.

If no input file is given, or if a dash (-) is given instead, then the standard input file is used.

**See Also**

`bfs`(C), `csplit`(C)

**Name**

*stty* - Sets the options for a terminal.

**Syntax**

*stty* [ - a ] [ - g ] [ options ]

**Description**

*Stty* sets certain terminal I/O options for the device that is the current standard input; without arguments, it reports the settings of certain options; with the - a option, it reports all of the option settings; with the - g option, it reports current settings in a form that can be used as an argument to another *stty* command. Detailed information about the modes listed in the first five groups below may be found in *tty(M)*. Options in the last group are implemented using options in the previous groups. The options are selected from the following:

*Control Modes*

*parenb* (- *parenb*)

Enables (disables) parity generation and detection.

*parodd* (- *parodd*)

Selects odd (even) parity.

*cs5 cs6 cs7 cs8*

Selects character size (see *tty(M)*).

**0** Hangs up phone line immediately.

**50 75 110 134 150 200 300 600**

**1200 1800 2400 4800 9600 exta**

Sets terminal baud rate to the number given, if possible.

*hupcl* (- *hupcl*)

Hangs up (does not hang up) phone connection on last close.

*hup* (- *hup*)

Same as *hupcl* (- *hupcl*).

*cstopb* (- *cstopb*)

Uses two(one) stop bits per character.

*cread* (- *cread*)

Enables (disables) the receiver.

**clocal** (- clocal)

Assumes a line without (with) modem control.

*Input Modes*

**ignbrk** (- ignbrk)

Ignores (does not ignore) break on input.

**brkint** (- brkint)

Signals (does not signal) INTR on break.

**ignpar** (- ignpar)

Ignores (does not ignore) parity errors.

**parmrk** (- parmrk)

Marks (does not mark) parity errors (see *ty(M)*).

**inpck** (- inpck)

Enables (disables) input parity checking.

**istrip** (- istrip)

Strips (does not strip) input characters to 7 bits.

**inlcr** (- inlcr)

Maps (does not map) NL to CR on input.

**igncr** (- igncr)

Ignores (does not ignore) CR on input.

**icrnl** (- icrnl)

Maps (does not map) CR to NL on input.

**iuclc** (- iuclc)

Maps (does not map) uppercase alphabets to lowercase on input.

**ixon** (- ixon)

Enables (disables) START/STOP output control. Output is stopped by sending an ASCII DC3 and started by sending an ASCII DC1.

**ixany** (- ixany)

Allows any character (only DC1) to restart output.

**ixoff** (- ixoff)

Requests that the system send (not send) START/STOP characters when the input queue is nearly empty/full.

**Output Modes****opost (- opost)**

Post-processes output (does not post-process output; ignores all other output modes).

**olcuc (- olcuc)**

Maps (does not map) lowercase alphabets to uppercase on output.

**onlcr (- onlcr)**

Maps (does not map) NL to CR-NL on output.

**ocrnl (- ocrnl)**

Maps (does not map) CR to NL on output.

**onocr (- onocr)**

Does not (does) output CRs at column zero.

**onlret (- onlret)**

On the terminal NL performs (does not perform) the CR function.

**ofill (- ofill)**

Uses fill characters (use timing) for delays.

**ofdel (- ofdel)**

Fill characters are DELs (NULs).

**cr0 cr1 cr2 cr3**

Selects style of delay for carriage returns (see *ty(M)*).

**nl0 nl1**

Selects style of delay for linefeeds (see *ty(M)*).

**tab0 tab1 tab2 tab3**

Selects style of delay for horizontal tabs (see *ty(M)*).

**bs0 bs1**

Selects style of delay for backspaces (see *ty(M)*).

**ff0 ff1**

Selects style of delay for form feeds (see *ty(M)*).

**vt0 vt1**

Selects style of delay for vertical tabs (see *ty(M)*).

*Local Modes***isig** (- isig)

Enables (disables) the checking of characters against the special control characters INTR and QUIT.

**icanon** (- icanon)

Enables (disables) canonical input (ERASE and KILL processing).

**xcase** (- xcase)

Canonical (unprocessed) upper/lowercase presentation.

**echo** (- echo)

Echoes back (does not echo back) every character typed.

**echoe** (- echoe)

Echoes (does not echo) ERASE character as a backspace-space-backspace string. Note: this mode will erase the ERASEed character on many CRT terminals; however, it does *not* keep track of column position and, as a result, may be confusing on escaped characters, tabs, and backspaces.

**echok** (- echok)

Echoes (does not echo) NL after KILL character.

**lfkc** (- lfkc)

The same as echok (- echok); obsolete.

**echonl** (- echonl)

Echoes (does not echo) NL.

**noflsh** (- noflsh)

Disables (enables) flush after INTR or QUIT.

*Control Assignments***control-character-C**

Sets *control-character* to *C*, where *control-character* is *erase*, *kill*, *intr*, *quit*, *eof*, *eol*. If *C* is preceded by a caret (^) (escaped from the shell), then the value used is the corresponding CNTRL character (e.g., “^D” is a CNTRL-D); “^?” is interpreted as DEL and “^\_” is interpreted as undefined.

**min i, time i** ( $0 < i < 127$ )

When - icanon is not set, read requests are not satisfied until at least min characters have been received or the timeout value time has expired. See *tty(C)*.

**line i**

Sets the line discipline to *i* ( $0 < i < 127$ ). There are currently no line disciplines implemented.

*Combination Modes***evenp or parity**

Enables parenb and cs7.

**oddp**

Enables parenb, cs7, and parodd.

**- parity, - evenp, or - oddp**

Disables parenb, and sets cs8.

**raw (- raw or cooked)**

Enables (disables) raw input and output (no ERASE, KILL, INTR, QUIT, EOT, or output post processing).

**nl (- nl)**

Unsets (sets) icrnl, onlcr. In addition - nl unsets inlcr, igncr, ocrnl, and onlret.

**lcase (- lcase)**

Sets (unsets) xcase, iucl, and olcuc.

**LCASE (- LCASE)**

Same as lcase (- lcase).

**tabs (- tabs or tab3)**

Preserves (expands to spaces) tabs when printing.

**ek** Resets ERASE and KILL characters back to normal CNTRL-H and CNTRL-U.**sane**

Resets all modes to some reasonable values. Useful when a terminal's settings have been hopelessly scrambled.

**term**

Sets all modes suitable for the terminal type *term*, where *term* is one of tty33, tty37, vt05, tn300, ti700, or tek.

**See Also**

ioctl(S), tty(M)

**Notes**

Many combinations of options make no sense, but no checking is performed.

## Name

`su` - Makes the user super-user or another user.

## Syntax

```
su [ - ] [ name [ arg ... ] ]
```

## Description

`su` allows you to become another user without logging off. The default user *name* is root (i.e., super-user).

To use `su`, the appropriate password must be supplied (unless you are already super-user). If the password is correct, `su` executes a new shell with the user ID set to that of the specified user. `su` prompts for a log comment. To restore normal user ID privileges, type a CNTRL-D to the new shell.

Any additional arguments are passed to the shell, permitting the super-user to run shell procedures with restricted privileges (an *arg* of the form `-c string` executes *string* via the shell). When additional arguments are passed, `/bin/sh` is always used. When no additional arguments are passed, `su` uses the shell specified in the password file.

An initial dash (`-`) causes the environment to be changed to the one that would be expected if the user actually logged in again. This is done by invoking the shell with an *arg0* of `- su` causing the `.profile` in the home directory of the new user ID to be executed. Otherwise, the environment is passed along with the possible exception of `$PATH`, which is set to `/bin:/etc:/usr/bin` for root. Note that `.profile` can check *arg0* for `- sh` or `- su` to determine how it was invoked.

## Files

<code>/etc/passwd</code>	The system password file
<code>\$HOME/.profile</code>	User's profile

## See Also

`env(C)`, `login(C)`, `sh(C)`, `environ(M)`

*SUM* (C)

*SUM* (C)

**Name**

sum - Calculates checksum and counts blocks in a file.

**Syntax**

sum [ - r ] file

**Description**

*Sum* calculates and prints a 16-bit checksum for the named file, and also prints the number of blocks in the file. It is typically used to look for bad spots, or to validate a file communicated over a transmission line. The option - r causes an alternate algorithm to be used in computing the checksum.

**See Also**

wc(C)

**Diagnostics**

“Read error” is indistinguishable from end-of-file on most devices; check the block count.

*SYNC*(C)

*SYNC*(C)

**Name**

*sync* - Updates the super-block.

**Syntax**

*sync*

**Description**

*Sync* executes the *sync* system primitive. If the system is to be stopped, *sync* must be called to ensure file system integrity. Note that *shutdown*(C) automatically calls *sync* before shutting down the system.

**See Also**

*sync*(S)

**Name**

sysadmin - Performs file system backups and restores files.

**Syntax**

*/etc/sysadmin*

**Description**

*Sysadmin* is a script for performing file system backups and for restoring files from backup disks. It can do a daily incremental backup (level 9), or a periodic full backup (level 0). It can provide a listing of the files backed up and also has a facility to restore individual files from a backup.

*Sysadmin* operates on XENIX format diskettes. The version provided backs up the root file system. The script can be edited to operate on additional file systems if required.

You must be the super-user to use this program.

**Files**

*/tmp/backup.list*

**See Also**

*dump(C)*, *restor(C)*, *mkfs(C)*, *dumpdir(C)*

**Name**

`tail` - Delivers the last part of a file.

**Syntax**

`tail [ ± [number][lbc] [ - f ] ] [ file ]`

**Description**

*Tail* copies the named file to the standard output beginning at a designated place. If no file is named, the standard input is used.

Copying begins at distance *+number* from the beginning, or *-number* from the end of the input (if *number* is null, the value 10 is assumed). *Number* is counted in units of lines, blocks, or characters, according to the appended option l, b, or c. When no units are specified, counting is by lines.

With the *-f* ("follow") option, if the input file is not a pipe, the program will not terminate after the line of the input file has been copied, but will enter an endless loop, wherein it sleeps for a second and then attempts to read and copy further records from the input file. Thus it may be used to monitor the growth of a file that is being written by some other process. For example, the command:

```
tail -f file
```

will print the last ten lines of *file*, followed by any lines that are appended to *file* between the time *tail* is initiated and killed.

**See Also**

`dd(C)`

**Notes**

Tails relative to the end of the file are kept in a buffer, and thus are limited in length. Unpredictable results can occur if character special files are "tailed".

**Name**

tar - Archives files.

**Syntax**

tar [ key ] [ files ]

**Description**

*Tar* saves and restores files to and from an archive medium which is typically a storage device such as floppy disk or tape, or a regular file. Its actions are controlled by the *key* argument. The *key* is a string of characters containing at most one function letter and possibly one or more function modifiers. Valid function letters are c, t, x, u, and r. Other arguments to the command are *files* (or directory names) specifying which files are to be backed up or restored. In all cases, appearance of a directory name refers to the files and (recursively) subdirectories of that directory.

The function portion of the key is specified by one of the following letters:

- r      The named *files* are written to the end of the archive. The c function implies this function.
- x      The named *files* are extracted from the archive. If a named file matches a directory whose contents had been written onto the archive, this directory is (recursively) extracted. The owner, modification time, and mode are restored (if possible). If no *files* argument is given, the entire contents of the archive are extracted. Note that if several files with the same name are on the archive, the last one overwrites all earlier ones.
- t      The names of the specified files are listed each time that they occur on the archive. If no *files* argument is given, all the names on the archive are listed.
- u      The named *files* are added to the archive if they are not already there, or if they have been modified since last written on that archive.
- c      Creates a new archive; writing begins at the beginning of the archive, instead of after the last file. This command implies the r function.

The following characters may be used in addition to the letter that selects the desired function:

- 0,...,7 This modifier selects the drive on which the archive is mounted. The default is 1.
- v Normally, *tar* does its work silently. The v (verbose) option causes it to type the name of each file it treats, preceded by the function letter. With the t function, v gives more information about the archive entries than just the name.
- w Causes *tar* to print the action to be taken, followed by the name of the file, and then wait for the user's confirmation. If a word beginning with y is given, the action is performed. Any other input means "no".
- f Causes *tar* to use the next argument as the name of the archive instead of /dev/mt?. If the name of the file is a dash (-), *tar* writes to the standard output or reads from the standard input, whichever is appropriate. Thus, *tar* can be used as the head or tail of a pipeline. *Tar* can also be used to move hierarchies with the command:
- ```
cd fromdir; tar cf - . | (cd todir; tar xf - )
```
- b Causes *tar* to use the next argument as the blocking factor for archive records. Block size is 512 bytes. The default is 1, the maximum is 20. This option should only be used with raw magnetic tape archives (see f above). The blocking factor is determined automatically when reading tapes (key letters x and t).
- F Causes *tar* to use the next argument as the name of a file from which succeeding arguments are taken. A lone dash (-) signifies that arguments will be taken from the standard input.
- l Tells *tar* to print an error message if it cannot resolve all of the links to the files being backed up. If l is not specified, no error messages are printed.
- m Tells *tar* to not restore the modification times. The modification time of the file will be the time of extraction.
- k Causes *tar* to use the next argument as the size of an archive volume in kilobytes. The minimum value allowed is 100. This option is useful when the archive is not intended for a magnetic tape device, but for some fixed size device, such as floppy disk (See f above). Very large files are split into "extents" across volumes. When restoring from a multivolume archive, *tar* only prompts for a new volume if a split file has been partially restored.
- n Indicates the archive device is not a magnetic tape. The k option implies this. Listing and extracting the contents of an

archive are sped because *tar* can seek over files it wishes to skip. Sizes are printed in kilobytes instead of tape blocks.

- p** Indicates that files are extracted using their original permissions. It is possible that a non-super-user may be unable to extract files because of the permissions associated with the files or directories being extracted.

### Examples

If the name of a floppy disk device is ~~/dev/fd1~~<sup>/dev/cd</sup>, then a tar format file can be created on this device by typing:

```
tar cvfk /dev/fd1/dev/cd 400
tar cvfk /dev/fd1 360 files
```

where *files* are the names of files you want archived and ~~360~~<sup>400</sup> is the capacity of the floppy disk in kilobytes. Note that arguments to key letters are given in the same order as the key letters themselves, thus the *fk* key letters have corresponding arguments ~~/dev/fd1~~<sup>/dev/cd</sup> and 360. Note that if a *file* is a directory then the contents of the directory are recursively archived. To print a listing of the archive, type:

```
tar tvf /dev/fd1
```

At some later time you will likely want to extract the files from the archive floppy. You can do this by typing:

```
tar xvf /dev/fd1
```

The above command extracts all files from the archive using the exact same pathnames as used when the archive was created. Because of this behavior, it is normally best to save archive files with relative pathnames rather than absolute ones, since directory permissions may not let you read the files into the absolute directories specified.

In the above examples, the *v* verbose option is used simply to confirm the reading or writing of archive files on the screen. Also, a normal file could be substituted for the floppy device ~~/dev/fd1~~ in the examples.

### Files

```
/etc/default/dump
```

```
/tmp/tar*
```

### Diagnostics

Prints an error message about bad key characters and archive

read/write errors.

Prints an error message if not enough memory is available to hold the link tables.

## Notes

There is no file read for default devices. Therefore, you must always specify a device when using tar.

There is no way to ask for the *n*th occurrence of a file.

The *u* option can be slow.

The *b* option should not be used with archives that are going to be updated. If the archive is on a disk file, the *b* option should not be used at all, because updating an archive stored on disk can destroy it. In order to update (*r* or *u* option) a tar archive, do not use raw magtape and do not use the *b* option. This applies both when updating and when the archive was first created.

The limit on filename length is 100 characters.

Systems with a 1K-byte file system cannot specify raw disk devices unless the *b* option is used to specify an even number of blocks. This means that one cannot update a raw-mode disk partition. used.

Don't do:

```
tar xF - -
```

This would imply taking two things from the standard input at the same time.

TEE (C)

TEE (C)

### Name

tee - Creates a tee in a pipe.

### Syntax

- tee [ - i ] [ - a ] [ file ] ...

### Description

*Tee* transcribes the standard input to the standard output and makes copies in the *files*. The `- i` option ignores interrupts; the `- a` option causes the output to be appended to the *files* rather than overwriting them.

### Examples

The following example illustrates the creation of temporary files at each stage in a pipeline:

```
grep ABC |tee ABC.grep |sort |tee ABC.sort |more
```

This example shows how to tee output to the terminal screen:

```
grep ABC |tee /dev/tty |sort |uniq >final.file
```

## Name

test - Tests conditions.

## Syntax

```
test expr
[ expr ]
```

## Description

*Test* evaluates the expression *expr* and, if its value is true, returns a zero (true) exit status; otherwise, a *test* returns a nonzero exit status if there are no arguments. The following primitives are used to construct *expr*:

- r *file* True if *file* exists and is readable.
- w *file* True if *file* exists and is writable.
- x *file* True if *file* exists and is executable.
- f *file* True if *file* exists and is a regular file.
- d *file* True if *file* exists and is a directory.
- c *file* True if *file* exists and is a character special file.
- b *file* True if *file* exists and is a block special file.
- u *file* True if *file* exists and its set-user-ID bit is set.
- g *file* True if *file* exists and its set-group-ID bit is set.
- k *file* True if *file* exists and its sticky bit is set.
- s *file* True if *file* exists and has a size greater than zero.
- t [ *fdes* ] True if the open file whose file descriptor number is *fdes* (1 by default) is associated with a terminal device.
- z *s1* True if the length of string *s1* is zero.
- n *s1* True if the length of the string *s1* is nonzero.
- s1* = *s2* True if strings *s1* and *s2* are identical.
- s1* != *s2* True if strings *s1* and *s2* are *not* identical.

## TEST(C)

## TEST(C)

- `s1` True if `s1` is *not* the null string.
- `n1 - eq n2` True if the integers `n1` and `n2` are algebraically equal. Any of the comparisons `- ne`, `- gt`, `- ge`, `- lt`, and `- le` may be used in place of `- eq`.

These primaries may be combined with the following operators:

- `!` Unary negation operator
- `- a` Binary *and* operator
- `- o` Binary *or* operator (`- a` has higher precedence than `- o`)
- `( expr )` Parentheses for grouping

Notice that all the operators and flags are separate arguments to `test`. Notice also that parentheses are meaningful to the shell and, therefore, must be escaped.

### See Also

`find(C)`, `sh(C)`

### Warning

In the second form of the command (i.e., the one that uses `[]`, rather than the word `test`), the square brackets must be delimited by blanks.

**Name**

`touch` - Updates access and modification times of a file.

**Syntax**

`touch [ - amc ] [ mmdhhmm[yy] ] files`

**Description**

*Touch* causes the access and modification times of each argument to be updated. If no time is specified (see *date(C)*) the current time is used. The `- a` and `- m` options cause *touch* to update only the access or modification times respectively (default is `- am`). The `- c` option silently prevents *touch* from creating the file if it did not previously exist.

The return code from *touch* is the number of files for which the times could not be successfully modified (including files that did not exist and were not created).

**See Also**

`date(C)`, `utime(S)`

## Name

tr - Translates characters.

## Syntax

```
tr [ - cds ] [ string1 [ string2 ] ]
```

## Description

*Tr* copies the standard input to the standard output with substitution or deletion of selected characters. Input characters found in *string1* are mapped into the corresponding characters of *string2*. Any combination of the options - cds may be used:

- c      Complements the set of characters in *string1* with respect to the universe of characters whose ASCII codes are 001 through 377 octal
- d      Deletes all input characters in *string1*
- s      Squeezes all strings of repeated output characters that are in *string2* to single characters

The following abbreviation conventions may be used to introduce ranges of characters or repeated characters into the strings:

- [a- z]    Stands for the string of characters whose ASCII codes run from character a to character z, inclusive.
- [a\*n]    Stands for n repetitions of a. If the first digit of n is 0, n is considered octal; otherwise, n is taken to be decimal. A zero or missing n is taken to be huge; this facility is useful for padding *string2*.

The escape character \ may be used as in the shell to remove special meaning from any character in a string. In addition, \ followed by 1, 2, or 3 octal digits stands for the character whose ASCII code is given by those digits.

The following example creates a list of all the words in *file1* one per line in *file2*, where a word is taken to be a maximal string of alphabets. The strings are quoted to protect the special characters from interpretation by the shell; 012 is the ASCII code for newline:

```
tr - cs "[A- Z][a- z]" "[\012*]" <file1 >file2
```

TR (C)

TR (C)

**See Also**

ed(C), sh(C), ascii(M)

**Notes**

- Won't handle ASCII NUL in *string1* or *string2*; always deletes NUL from input.

*TRUE* (C)

*TRUE* (C)

### Name

true - Returns with a zero exit value.

### Syntax

true

### Description

*True* does nothing except return with a zero exit value. *False*(C), *true*'s counterpart does nothing except return with a nonzero exit value. *True* is typically used in shell procedures such as:

```
while true
do
    command
done
```

### See Also

sh(C), false (C)

### Diagnostics

*True* has exit status zero.

**Name**

tset - Sets terminal modes.

**Syntax**

```
tset [ - ] [ -hrsulQS ] [ -e[c] ] [ -E[c] ] [ -k[c] ]
[ -m [ident][test baudrate]:type ] [ type ]
```

**Description**

*Tset* causes terminal dependent processing such as setting erase and kill characters, setting or resetting delays, and the like. It is driven by the */etc/ttytype* and */etc/termcap* files.

The type of terminal is specified by the *type* argument. The type may be any type given in */etc/termcap*. If *type* is not specified, the terminal type is the value of the environment variable TERM, unless the *-h* flag is set or any *-m* argument is given. In this case the type is read from */etc/ttytype* (the port name to terminal type database). The port name is determined by a *ttyname(S)* call on the diagnostic output. If the port is not found in */etc/ttytype* the terminal type is set to *unknown*.

Ports for which the terminal type is indeterminate are identified in */etc/ttytype* as *dialup*, *plugboard*, etc. The user can specify how these identifiers should map to an actual terminal type. The mapping flag, *-m*, is followed by the appropriate identifier (a four-character or longer substring is adequate), an optional test for baud rate, and the terminal type to be used if the mapping conditions are satisfied. If more than one mapping is specified, the first correct mapping prevails. A missing identifier matches all identifiers. Baud rates are specified as with *stty(C)*, and are compared with the speed of the diagnostic output. The test may be any combination of: *>*, *=*, *<*, *@*, and *!*. (Note: *@* is a synonym for *=* and *!* inverts the sense of the test. Remember to escape characters meaningful to the shell.)

If the *type* as determined above begins with a question mark, the user is asked if he really wants that type. A null response means to use that type; otherwise, another type can be entered which will be used instead. (The question mark must be escaped to prevent filename expansion by the shell.)

*Tset* is most useful when included in the *.login* (for *csH(C)*) or *.profile* (for *sh(C)*) file executed automatically at login, with *-m* mapping used to specify the terminal type you most frequently dial in on.

## Options

- e This flag sets the erase character to be the named character *c* on all terminals, so to override this option one can say *-e#*. The default for *c* is the backspace character on the terminal, usually CNTRL-H.
- E This flag is identical to *-e* except that it only operates on terminals that can backspace.
- k This option sets the kill character to the named character, *c*, with *c* defaulting to CNTRL-U. No kill processing is done if *-k* is not specified. In all of these flags, “X” where *X* is any character is equivalent to CNTRL-X.
- This option prints the terminal type on the standard output; this can be used to get the terminal type by saying:

```
set termtype = `tset -`
```

If no other options are given, *tset* operates in “fast mode” and *only* outputs the terminal type, bypassing all other processing.

- s This option outputs “setenv” commands (if your default shell is *csh*(C) or “export” and assignment commands (if your default shell is *sh*(C));

For the *-s* option with the *sh* shell, use:

```
tset -s ... > /tmp/tset$$
/tmp/tset$$
rm /tmp/tset$$
```

- S This option only outputs the strings to be placed in the environment variables.

If you are using *csh*, use:

```
set noglob
set term=(`tset -S ....`)
setenv TERM $term[1]
setenv TERMCAP "$term[2]"
unset term
unset noglob
```

- r This option prints the terminal type on the diagnostic output.

- Q This option suppresses printing the "Erase set to" and "Kill set to" messages.
- l This option suppresses outputting the terminal initialization strings.
- m This option is the mapping flag. It is used to specify the terminal type you most frequently use. It is followed by the appropriate identifier for your terminal, listed in */etc/ttytype*. When you log on the system will set the terminal type to *ident* unless you specify otherwise.

**Examples**

```
tset gt42
```

Sets the terminal type to *gt42*.

```
tset -mdialup\>300:adm3a -mdialup:dw2 -Qr -c#
```

If the entry in */etc/ttytype* corresponding to the login port is "dialup", and the port speed is greater than 300 baud, set the terminal type to *adm3a*. If the */etc/ttytype* entry is "dialup" and the port speed is less than or equal to 300 baud, set the terminal type to *dw2*. Set the erase character to "#", and print the terminal type (but not the erase character) on standard error.

```
tset -m dial:ti733 -m plug:\?hp2621 -m unknown:\? -e -k`U
```

If the */etc/ttytype* entry begins with "dial", the terminal type becomes *ti733*. If the entry begins with "plug", *tset* prompts with

```
TERM = (hp2621)
```

Enter the correct terminal type if it is different than that shown. If the entry is "unknown", *tset* prompts with

```
TERM = (unknown)
```

In any case erase is set to the terminal's backspace character, and the terminal type is printed on standard error.

**Files**

/etc/ttytype      Port name to terminal type map database  
/etc/termcap      Terminal capability database

**See Also**

tty(M), termcap(M), terminals(M), stty(C)

**Credit**

This utility was developed at the University of California at Berkeley and is used with permission.

TTY(C)

TTY(C)

### Name

`tty` - Gets the terminal's name.

### Syntax

- `tty [ - s ]`

### Description

The `tty` command prints the pathname of the user's terminal on the standard output. The `- s` option inhibits printing, allowing you to test just the exit code.

### Exit Codes

0 if the standard input is a terminal, 1 otherwise.

### Diagnostics

*not a tty* If the standard input is not a terminal and `- s` is not specified

**Name**

umask - Sets file-creation mode mask.

**Syntax**

umask [ ooo ]

**Description**

The user file-creation mode mask is set to *ooo*. The three octal digits refer to read/write/execute permissions for *owner*, *group*, and *others*, respectively. Only the low-order 9 bits of *cmask* and the file mode creation mask are used. The value of each specified digit is "subtracted" from the corresponding "digit" specified by the system for the creation of any file (see *umask(S)* or *creat(S)*). This is actually a binary masking operation, and thus the name "umask". In general, binary ones remove a given permission and zeros have no effect at all. For example, *umask 022* removes *group* and *others* write permission (files normally created with mode 777 become mode 755 ; files created with mode 666 become mode 644).

If *ooo* is omitted, the current value of the mask is printed.

*Umask* is recognized and executed by the shell. By default, login shells have a *umask* of 022.

**See Also**

*chmod(C)*, *sh(C)*, *chmod(S)*, *creat(S)*, *umask(S)*

**Name**

umount - Dismounts a file structure.

**Syntax**

- /etc/umount special-device

**Description**

*Umount* announces to the system that the removable file structure previously mounted on device *special-device* is to be removed. Any pending I/O for the file system is completed, and the file structure is flagged clean. For fuller explanation of the mounting process see *mount(C)*.

**Files**

/etc/mnttab Mount table

**See Also**

mount(C), mount(S), mnttab(F)

**Diagnostics**

*device busy* An executing process is using a file on the named file system

*UNAME* (C)

*UNAME* (C)

## Name

`uname` - Prints the current XENIX name.

## Syntax

`uname [ - snrmduva ]`

## Description

*Uname* prints the current system name of XENIX on the standard output file. The options cause selected information returned by *uname*(S) to be printed:

- s Prints the system name (default)
- n Prints the nodename (the nodename may be a name that the system is known by to a communications network)
- r Prints the operating system release
- m  
Manufacturer Prints original supplier of XENIX system
- d Distributor Prints OEM for this system
- u Prints user serial number for this system
- v Prints the operating system version
- a Prints all the above information

## See Also

`uname`(S)

**Name**

uniq - Reports repeated lines in a file.

**Syntax**

uniq [ - udc [ +n ] [ - n ] ] [ input [ output ] ]

**Description**

*Uniq* reads the *input* file and compares adjacent lines. In the normal case, the second and succeeding copies of repeated lines are removed; the remainder is written on the output file. *Input* and *output* should always be different. Note that repeated lines must be adjacent in order to be found; see *sort(C)*. If the *-u* flag is used, just the lines that are not repeated in the original file are output. The *-d* option specifies that one copy of just the repeated lines is to be written. The normal mode output is the union of the *-u* and *-d* mode outputs.

The *-c* option supersedes *-u* and *-d* and generates an output report in default style but with each line preceded by a count of the number of times it occurred.

The *n* arguments specify skipping an initial portion of each line in the comparison:

- *n*     The first *n* fields together with any blanks before each are ignored. A field is defined as a string of nonspace, nontab characters separated by tabs and spaces from its neighbors.
- + *n*     The first *n* characters are ignored. Fields are skipped before characters.

**See Also**

comm(C), sort(C)

## Name

units - Converts units.

## Syntax

units

## Description

*Units* converts quantities expressed in various standard scales to their equivalents in other scales. It works interactively in this fashion:

```
You have: inch
You want: cm
          * 2.540000e+ 00
          / 3.937008e- 01
```

A quantity is specified as a multiplicative combination of units optionally preceded by a numeric multiplier. Powers are indicated by suffixed positive integers, division by the usual sign:

```
You have: 15 lbs force/in2
You want: atm
          * 1.020689e+ 00
          / 9.797299e- 01
```

*Units* only does multiplicative scale changes; thus it can convert Kelvin to Rankine, but not Centigrade to Fahrenheit. Most familiar units, abbreviations, and metric prefixes are recognized, as well as the following:

```
pi      Ratio of circumference to diameter
c       Speed of light
e       Charge on an electron
g       Acceleration of gravity
force   Same as g
mole    Avogadro's number
water   Pressure head per unit height of water
au      Astronomical unit
```

UNITS (C)

UNITS (C)

Pound is not recognized as a unit of mass; lb is. Compound names are run together, (e.g. lightyear). British units that differ from their US counterparts are prefixed with "br". For a complete list of units, type:

```
cat /usr/lib/unittab
```

**Files**

```
/usr/lib/unittab
```

**Name**

`uucp`, `uulog` - copies files from XENIX to XENIX.

**Syntax**

`uucp` [ option ] ... source-file ... destination-file

`uulog` [ option ] ...

**Description**

`uucp` copies files named by the source-file arguments to the destination-file argument. A filename may be a pathname on your machine, or may have the form:

system-name!pathname

where "system-name" is taken from a list of system names which `uucp` knows about. Shell metacharacters `!*[]` appearing in `pathname` will be expanded on the appropriate system.

Pathnames may be a full pathname, or a pathname preceded by `~user` where `user` is a user ID on the specified system and is replaced by that user's login directory. Anything else is prefixed by the current directory.

If the result is an erroneous pathname for the remote system the copy will fail. If the destination-file is a directory, the last part of the source-filename is used.

`uucp` preserves execute permissions across the transmission and gives 0666 read and write permissions (see `chmod(S)`).

The following options are interpreted by `uucp`:

- d            Makes all necessary directories for the file copy.
- c            Uses the source file when copying out rather than copying the file to the spool directory.
- m            Sends mail to the requester when the copy is complete.

`uulog` maintains a summary log of `uucp` and `uuz(CP)` transactions in the file `/usr/spool/uucp/LOGFILE` by gathering information from partial log files named `/usr/spool/uucp/LOG.*.?`. It removes the partial log files.

The options cause *uulog* to print logging information:

- *sys*  
Prints information about work involving system *sys*.
- *user*  
Prints information about work done for the specified *user*.

### Files

*/usr/spool/uucp* Spool directory

*/usr/lib/uucp/\** Other data and program files

### See Also

*uux*(CP), *mail*(C)

### Warning

The domain of remotely accessible files can (and for obvious security reasons, usually should) be severely restricted. You will very likely not be able to fetch files by pathname; ask a responsible person on the remote system to send them to you. For the same reasons you will probably not be able to send files to arbitrary pathnames.

### Notes

For security reasons, all files received by *uucp* should be owned by *uucp*.

The *- m* option will only work sending files or receiving a single file. Receiving multiple files specified by special shell characters *\*[]* will not activate the *- m* option.

This version of *uucp* is based on a version 7 implementation of the program.

**Name**

uunow - initiate a uucp connection now

**Synopsis**

uunow [ - w ] sitename1 [ - w ] [ sitenameN ]

**Description**

uunow initiates a uucp(C) connection between your site and sitenameN. The command should normally be run in the background or you will have to wait until all spooled work (both machines) is disposed of. A typical invocation of uunow might be by cron(CP), which will automatically run uunow at a time specified by using the correct syntax in /usr/lib/crontab.

If the - w option is specified, the connection will only be established if there is work for sitenameN spooled. Otherwise, the connection is always attempted.

**Diagnostics**

If /dev/sitenameNwire or /dev/cu10 is locked by uucp, a warning is issued.

**See Also**

uux(C), uucp(C), cron(S)

**Notes**

Dialer devices other than /dev/cu10 cause no warnings if busy.

**Name**

uusend - send a file to a remote host

**Synopsis**

uusend [ - m mode ] sourcefile sys1!sys2!...!remotefile

**Description**

*uusend* sends a file to a given location on a remote system. The system need not be directly connected to the local system, but a chain of uucp(C) links needs to connect the two systems.

If the - m option is specified, the mode of the file on the remote end will be taken from the octal number given. Otherwise, the mode of the input file will be used.

The sourcefile can be "- ", meaning to use the standard input. Both of these options are primarily intended for internal use of *uusend*.

The remotefile can include the ~userid syntax.

**Diagnostics**

Errors at systems more than one removed from yours will be flushed.

**See Also**

uux(C), uucp(C)

**Notes**

You must use *uusend* to send a file through systems since *uucp* will not handle it.

All systems along the line must have the *uusend* command available and allow remote execution of it.

Some *uucp* systems have a bug where binary files cannot be the input to a *uux* command. If this bug exists in any system along the line, the file contents will be damaged.

**Name**

`uux` - executes command on remote XENIX.

**Syntax**

`uux [ - ] command-string`

**Description**

`uux` will gather 0 or more files from various systems, execute a command on a specified system and send standard output to a file on a specified system.

The command-string is made up of one or more arguments that look like a shell command line, except that the command and filenames may be prefixed by system-name!. A null system-name is interpreted as the local system.

Filenames may be (1) a full pathname; (2) a pathname preceded by `~zzz`; where `zzz` is a user ID on the specified system and is replaced by that user's login directory; or (3) anything else prefixed by the current directory.

The `"-"` option will cause the standard input to the `uux` command to be the standard input to the command-string.

For example, the command

```
uux "!diff usg!/usr/dan/f1 pwba!/a4/dan/f1 > !f1.diff"
```

will get the `f1` files from the `usg` and `pwba` machines, execute a `diff` command and put the results in `f1.diff` in the local directory.

Any special shell characters such as `<>`;| should be quoted either by quoting the entire command-string, or quoting the special characters as individual arguments.

**Files**

|                                   |                         |
|-----------------------------------|-------------------------|
| <code>/usr/spool/uucp</code>      | Spool directory         |
| <code>/usr/lib/uucp/L.cmds</code> | Other data and programs |

**See Also**

`uucp(C)`

**Warning**

An installation may, and for security reasons generally will, limit the list of commands executable on behalf of an incoming request from *uuz*. Typically, a restricted site will permit little other than the receipt of mail via *uuz*.

**Notes**

Only the first command of a shell pipeline may have a system-name!. All other commands are executed on the system of the first command.

The shell metacharacter \* will probably not perform as expected.

The shell tokens << and >> are not implemented.

There is no notification of denial of execution on the remote machine.

**Name**

vi - Invokes a screen-oriented display editor.

**Syntax**

vi [ - *option...* ] [ *command* ] [ *filename* ]

**Description**

Vi offers a powerful set of text editing operations based on a set of mnemonic commands. Most commands are single keystrokes that perform simple editing functions. Vi displays a full screen "window" into the file you are editing. The contents of this window can be changed quickly and easily within vi. While editing, visual feedback is provided (the name vi itself is short for "visual").

Vi and the line editor ex are one and the same editor: the names vi and ex identify a particular user interface rather than any underlying functional difference. The differences in user interface, however, are quite striking. Ex is a powerful line-oriented editor, similar to the editor ed. However, in both ex and ed, visual updating of the terminal screen is limited, and commands are entered on a command line. Vi, on the other hand, is a screen-oriented editor designed so that what you see on the screen corresponds exactly and immediately to the contents of the file you are editing.

Options available on the vi command line:

- t       Equivalent to an initial *tag* command; edits the file containing the tag and positions the editor at its definition.
- r       Used in recovering after an editor or system crash, retrieving the last saved version of the named file. If no file is specified, this option prints a list of saved files.
- l       Specific to editing LISP, this option sets the showmatch and lisp options.
- wn      Sets the default window size to *n*. Useful on dialups to start in small windows.
- x       Causes vi to prompt for a key used to encrypt and decrypt the contents of the named files.
- R       Sets a readonly option so that files can be viewed but not edited.

### *The Editing Buffer*

Vi performs no editing operations on the file that you name during invocation. Instead, it works on a copy of the file in an *editing buffer*. The editor remembers the name of the file specified at invocation, so that it can later copy the editing buffer back to the named file. The contents of the named file are not affected until the changes are copied back to the original file. This allows editing of the buffer without immediately destroying the contents of the original file.

When you invoke vi with a single filename argument, the named file is copied to a temporary editing buffer. When the file is written out, the temporary file is written back to the named file.

### *Modes of Operation*

Within vi there are three distinct modes of operation:

- |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Command Mode   | Within command mode, signals from the keyboard are interpreted as editing commands.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Insert Mode    | Insert mode can be entered by typing any of the vi insert, append, open, substitute, change, or replace commands. Once in insert mode, letters typed at the keyboard are inserted into the editing buffer.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ex Escape Mode | The vi and ex editors are one and the same editor differing mainly in their user interface. In vi commands are usually single keystrokes. In ex, commands are lines of text terminated by a RETURN. Vi has a special "escape" command that gives access to many of these line-oriented ex commands. To escape to ex escape mode, type a colon (:). The colon is echoed on the status line as a prompt for the ex command. An executing command can be aborted by pressing INTERRUPT. Most file manipulation commands are executed in ex escape mode; for example, the commands to read in a file, and to write out the editing buffer to a file. |

### *Special Keys*

There are several special keys in vi. These keys are used to edit, delimit, or abort commands and command lines.

ESC Used to return to vi command mode, cancel partially formed commands.

#### RETURN

Terminates ex commands when in ex escape mode. Also used to start a new line when in insert mode.

#### INTERRUPT

Often the same as the DEL or RUBOUT key on many terminals. Generates an interrupt, telling the editor to stop what it is doing. Used to abort any command that is executing.

/ Used to specify a string to be searched for. The slash appears on the status line as a prompt for a search string. The question mark (?) works exactly like the slash key, except that it is used to search backward in a file instead of forward.

:

The colon is a prompt for an ex command. You can then type in any ex command, followed by an ESC or RETURN and the given ex command is executed.

The following characters are special in insert mode:

BKSP Backs up the cursor one character on the current line. The last character typed before the BKSP is removed from the input buffer, but remains displayed on the screen.

CNTRL-U Moves the cursor back to the first character of the insertion, and restarts insertion.

CNTRL-V Removes the special significance of the next typed character. Use CNTRL-V to insert control characters. Line feed and CNTRL-J cannot be inserted in the text except as newline characters. CNTRL-Q and CNTRL-S are trapped by the operating system before they are interpreted by vi, so they too cannot be inserted as text.

CNTRL-W Moves the cursor back to the first character of the last inserted word.

CNTRL-T During an insertion, with the *autoindent* option set and at the beginning of the current line, typing this character will insert *shiftwidth* whitespace.

CNTRL-@ If typed as the first character of an insertion it is replaced with the last text inserted, and the insertion terminates. Only 128 characters are saved from the last insertion. If more than 128 characters were inserted, then this command inserts no characters. A CNTRL-@ cannot be part of a file, even if quoted.

*Invoking and Exiting Vi*

To enter vi type:

|                 |                                         |
|-----------------|-----------------------------------------|
| vi              | <i>Edits empty editing buffer</i>       |
| vi file         | <i>Edits named file</i>                 |
| vi + 123 file   | <i>Goes to line 123</i>                 |
| vi + 45 file    | <i>Goes to line 45</i>                  |
| vi + /word file | <i>Finds first occurrence of "word"</i> |
| vi + /tty file  | <i>Finds first occurrence of "tty"</i>  |

There are several ways to exit the editor:

- ZZ The editing buffer is written to the file *only* if any changes were made.
- :x The editing buffer is written to the file *only* if any changes were made.
- :q! Cancels an editing session. The exclamation mark (!) tells vi to quit unconditionally. In this case, the editing buffer is not written out.

**Vi Commands**

Vi is a visual editor with a window on the file. What you see on the screen is vi's notion of what the file contains. Commands do not cause any change to the screen until the complete command is typed. Most commands may take a preceding count that specifies repetition of the command. This count parameter is not given in the following command descriptions, but is implied unless overridden by some other prefix argument. When vi gets an improperly formatted command it rings a bell.

*Cursor Movement*

The cursor movement keys allow you to move your cursor around in a file. Note in particular the arrow keys (if available on your terminal), the "h" "j", "k", and "l" cursor keys, and SPACE, BKSP, CNTRL-N, and CNTRL-P. These three sets of keys perform identical functions.

Forward Space - l, SPACE, or -->

Syntax: l  
SPACE

--&gt;

Function: Moves the cursor forward one character. If a count is given, move forward *count* characters. You cannot move past the end of the line.

Backspace - h, BKSP, or <--

Syntax: h  
BKSP  
<--

Function: Moves cursor backward one character. If a count is given, moves backward *count* characters. Note that you cannot move past the beginning of the current line.

Next Line - +, RETURN, j, CNTRL-N, and LF

Syntax: +  
RETURN

Function: Moves the cursor down to the beginning of the next line.

Syntax: j  
CNTRL-N  
LF  
(down arrow)

Function: Moves the cursor down one line, remaining in the same column. Note the difference between these commands and the preceding set of next line commands which move to the *beginning* of the next line.

Previous Line - k, CNTRL-P, and -

Syntax: k  
CNTRL-P  
(up arrow)

Function: Moves the cursor up one line, remaining in the same column. If a count is given then the cursor is moved *count* lines.

Syntax: -

Function: Moves the cursor up to the beginning of the previous line. If a count is given then the cursor is moved up a *count* lines.

Beginning of Line - 0 and ^

Syntax: ^  
0

**Function:** Moves the cursor to the beginning of the current line. Note that **O** always moves the cursor to the first character of the current line. The caret (**^**) works somewhat differently: it moves to the first character on a line that is not a tab or a space. This is useful when editing files that have a great deal of indentation, such as program texts.

**End of Line - \$**

**Syntax:** **\$**

**Function:** Moves the cursor to the end of the current line. Note that the cursor resides on top of the last character on the line. If a count is given, then the cursor is moved forward *count*- 1 lines to the end of the line.

**Goto Line - G**

**Syntax:** [*linenumber*]G

**Function:** Moves the cursor to the beginning of the line specified by *linenumber*. If no *linenumber* is given, the cursor moves to the beginning of the *last* line in the file. To find the line number of the current line, use CNTRL-G.

**Column - |**

**Syntax:** [*column*]

**Function:** Moves the cursor to the column in the current line given by *column*. If no *column* is given then the cursor is moved to the first column in the current line.

**Word Forward - w and W**

**Syntax:** w  
W

**Function:** Moves the cursor forward to the beginning of the next word. The lowercase **w** command searches for a word defined as a string of alphanumeric characters separated by punctuation or whitespace (i.e., tab, newline, or space characters). The uppercase **W** command searches for a word defined as a string of nonwhitespace characters.

**Back Word - b and B**

**Syntax:** b  
B

**Function:** Moves the cursor backward to the beginning of a word. The lowercase **b** command searches backward for a word defined as a string of alphanumeric characters separated

by punctuation or whitespace (i.e., tab, newline, or space characters). The uppercase **B** command searches for a word defined as a string of non-whitespace characters. If the cursor is already within a word, then it moves backward to the beginning of that word.

#### End - e and E

Syntax: e  
E

Function: Moves the cursor to the end of a word. The lowercase **e** command moves the cursor to the last character of a word, where a word is defined as a string of alphanumeric characters separated by punctuation or whitespace (i.e., tab, newline, or space characters). The uppercase **E** moves the cursor to the last character of a word where a word is defined as a string of nonwhitespace characters. If the cursor is already within a word, then it moves to the end of that word.

#### Sentence - ( and )

Syntax: (  
)

Function: Moves the cursor to the beginning (left parenthesis) or end of a sentence (right parenthesis). A sentence is defined as a sequence of characters ending with a period (.), question mark (?), or exclamation mark (!), followed by either two spaces or a newline. A sentence begins on the first nonwhitespace character following a preceding sentence. Sentences are also delimited by paragraph and section delimiters. See below.

#### Paragraph - { and }

Syntax: }  
{

Function: Moves the cursor to the beginning (}) or end (}) of a paragraph. A paragraph is defined with the *paragraphs* option. By default, paragraphs are delimited by the *proff* macros ".IP", ".LP", ".P", ".QP", and ".bp". Paragraphs also begin after empty lines.

#### Section - [[ and ]]

Syntax: ]]  
[[

Function: Moves the cursor to the beginning (]] or end (]] of a section. A section is defined with the *sections* option. By

default, sections are delimited by the nroff macros “.NH” and “.SH”. Sections also start at formfeeds (CNTRL-L) and at lines beginning with a brace {}.

#### Match Delimiter - %

Syntax: %

Function: Moves the cursor to a matching delimiter, where a delimiter is a parenthesis, a bracket, or a brace. This is useful when matching pairs of nested parentheses, brackets, and braces.

#### Home - H

Syntax: [*offset*]H

Function: Moves the cursor to upper left corner of screen. Use this command to quickly move to the top of the screen. If an *offset* is given, then the cursor is homed *offset*-1 number of lines from the top of the screen. Note that the command “dH” deletes all lines from the current line to the top line shown on the screen.

#### Middle Screen - M

Syntax: M

Function: Moves the cursor to the beginning of the screen's middle line. Use this command to quickly move to the middle of the screen from either the top or the bottom. Note that the command “dM” deletes from the current line to the line specified by the M command.

#### Lower Screen - L

Syntax: [*offset*]L

Function: Moves the cursor to the lowest line on the screen. Use this command to quickly move to the bottom of the screen. If an *offset* is given, then the cursor is homed *offset*-1 number of lines from the bottom of the screen. Note that the command “dL” deletes all lines from the current line to the bottom line shown on the screen.

#### Previous Context - “ and ”

Syntax: “  
           `character`  
           ”  
           `character`

**Function:** Moves the cursor to previous context or to context marked with the `m` command. If the single quotation mark or back quotation mark is doubled, then the cursor is moved to previous context. If a single character is given after either quotation mark, then the cursor is moved to the location of the specified mark as defined by the `m` command. Previous context is the location in the file of the last "nonrelative" cursor movement. The single quotation mark ( `'` ) syntax is used to move to the beginning of the line representing the previous context. The back quotation mark ( ``` ) syntax is used to move to the previous context *within* a line.

### *The Screen Commands*

The screen commands are *not* cursor movement commands and cannot be used in delete commands as the delimiters of text objects. However, the screen commands do move the cursor and are useful in paging or scrolling through a file. These commands are described below:

#### **Page – CNTRL-U and CNTRL-D**

**Syntax:**    `[size]CNTRL-U`  
               `[size]CNTRL-D`

**Function:** Scrolls the screen up a half window (CNTRL-U) or down a half window (CNTRL-D). If *size* is given, then the scroll is *size* number of lines. This value is remembered for all later scrolling commands.

#### **Scroll – CNTRL-F and CNTRL-B**

**Syntax:**    `CNTRL-F`  
               `CNTRL-B`

**Function:** Pages screen forward and backward. Two lines of continuity are kept between pages if possible. A preceding count gives the number of pages to move forward or backward.

#### **Status – CNTRL-G**

**Syntax:**    `BELL`  
               `CNTRL-G`

**Function:** Prints vi status on status line. This gives you the name of the file you are editing, whether it has been modified, the current line number, the number of lines in the file, and the percentage of the file (in lines) that precedes the cursor.

**Zero Screen - z**

Syntax: `{linenumber}z{size}RETURN`  
`{linenumber}z{size}.`  
`{linenumber}z{size}-`

Function: Redraws the display with the current line placed at or "zeroed" at the top, middle, or bottom of the screen, respectively. If you give a *size*, then the number of lines displayed is equal to *size*. If a preceding *linenumber* is given, then the given line is placed at the top of the screen. If the last argument is a RETURN, then the current line is placed at the top of the screen. If the last argument is a period (.), then the current line is placed in the middle of the screen. If the last argument is a minus sign (-), then the current line is placed at the bottom of the screen.

**Redraw - CNTRL-R or CNTRL-L**

Syntax: `CNTRL-R`  
`CNTRL-L`

Function: Redraws the screen. Use this command to erase any system messages that may scramble your screen. Note that system messages do not affect the file you are editing.

***Text Insertion***

The text insertion commands always place you in insert mode. Exit from insert mode is always done by pressing ESC. The following insertion commands are "pure" insertion commands; no text is deleted when you use them. This differs from the text modification commands change, replace, and substitute, which delete and then insert text in one operation.

**Insert - i and I**

Syntax: `i{text}ESC`  
`I{text}ESC`

Function: Insert *text* in editing buffer. The lowercase *i* command places you in insert mode. *Text* is inserted *before* the character beneath the cursor. To insert a newline, just press a RETURN. Exit insert mode by typing the ESC key. The uppercase *I* command places you in insert mode, but begins text insertion at the beginning of the current line, rather than before the cursor.

**Append - a and A**

Syntax: a[*text*]ESC  
A[*text*]ESC

Function: Appends *text* to the editing buffer. The lowercase a command works *exactly* like the lowercase i command, except that text insertion begins after the cursor and not before. This is the one way to add text to the end of a line. The uppercase A command begins appending text at the end of the current line rather than after the cursor.

#### Open New Line – o and O

Syntax: o[*text*]ESC  
O[*text*]ESC

Function: Opens a new line and inserts *text*. The lowercase o command opens a new line below the current line; uppercase O opens a new line *above* the current line. After the new line has been opened, both these commands work like the I command.

#### Text Deletion

Many of the text deletion commands use the letter "d" as an operator. This operator deletes text objects delimited by the cursor and a cursor movement command. Deleted text is always saved away in a buffer. The delete commands are described below:

#### Delete Character – x and X

Syntax: x  
X

Function: Deletes a character. The lowercase x command deletes the character beneath the cursor. With a preceding count, *count* characters are deleted to the right beginning with the character beneath the cursor. This is a quick and easy way to delete a few characters. The uppercase X command deletes the character just before the cursor. With a preceding count, *count* characters are deleted backward, beginning with the character just before the cursor.

#### Delete – d and D

Syntax: d*cursor-movement*  
dd  
D

Function: Deletes a text object. The lowercase d command takes a *cursor-movement* as an argument. If the *cursor-movement* is an intraline command, then deletion takes place from

the cursor to the end of the text object delimited by the *cursor-movement*. Deletion forward deletes the character beneath the cursor; deletion backward does not. If the *cursor-movement* is a multiline command, then deletion takes place from and including the current line to the text object delimited by the *cursor-movement*.

The **dd** command deletes whole lines. The uppercase **D** command deletes from and including the cursor to the end of the current line.

Deleted text is automatically pushed on a stack of buffers numbered 1 through 9. The most recently deleted text is also placed in a special delete buffer that is logically buffer 0. This special buffer is the default buffer for all (put) commands using the double quotation mark (") to specify the number of the buffer for delete, put, and yank commands. The buffers 1 through 9 can be accessed with the **p** and **P** (put) commands by appending the double quotation mark (") to the number of the buffer. For example

"4p

puts the contents of delete buffer number 4 in your editing buffer just below the current line. Note that the last deleted text is "put" by default and does not need a preceding buffer number.

### *Text Modification*

The text modification commands all involve the replacement of text with other text. This means that some text will necessarily be deleted. All text modification commands can be "undone" with the **u** command, discussed below:

**Undo - u and U**

Syntax: **u**  
**U**

Function: Undoes the last insert or delete command. The lowercase **u** command undoes the last insert or delete command. This means that after an insert, **u** deletes text; and after a delete, **u** inserts text. For the purposes of undo, all text modification commands are considered insertions.

The uppercase **U** command restores the current line to its state before it was edited, no matter how many times the current line has been edited since you moved to it.

**Repeat - .**

Syntax: **.**

**Function:** Repeats the last insert or delete command. A special case exists for repeating the **p** and **P** "put" commands. When these commands are preceded by the name of a delete buffer, then successive **u** commands print out the contents of the delete buffers.

#### Change - **c** and **C**

**Syntax:** *ccursor-movement text*ESC  
**C***text*ESC  
*cc**text*ESC

**Function:** Changes a text object and replaces it with *text*. Text is inserted as with the **i** command. A dollar sign (\$) marks the extent of the change. The **c** command changes arbitrary text objects delimited by the cursor and a *cursor-movement*. The **C** and **cc** commands affect whole lines and are identical in function.

#### Replace - **r** and **R**

**Syntax:** *rchar*  
**R***text*ESC

**Function:** Overstrikes character or line with *char* or *text*, respectively. Use **r** to overstrike a single character and **R** to overstrike a whole line. A count multiplies the replacement text count times.

#### Substitute - **s** and **S**

**Syntax:** *stext*ESC  
**S***text*ESC

**Function:** Substitutes current character or current line with *text*. Use **s** to replace a single character with new text. Use **S** to replace the current line with new text. If a preceding count is given, then *text* substitutes for count number of characters or lines depending on whether the command is **s** or **S**, respectively.

#### Filter - **!**

**Syntax:** *!cursor-movement cmd*RETURN

**Function:** Filters the text object delimited by the cursor and *cursor-movement* through the command, *cmd*. For example, the following command sorts all lines between the cursor and the bottom of the screen, substituting the designated lines with the sorted lines:

**!L**sort

Arguments and shell metacharacters may be included as part of *cmd*; however, standard input and output are always associated with the text object being filtered.

### Join Lines - J

Syntax: J

Function: Joins the current line with the following line. If a count is given, then count lines are joined.

### Shift - < and >

Syntax: > {*cursor-movement*}  
 < {*cursor-movement*}  
 >>  
 <<

Function: Shifts text left (>) or right (<). Text is shifted by the value of the option *shiftwidth*, which is normally set to eight spaces. Both the > and < commands shift all lines in the text object delimited by the current line and *cursor-movement*. The >> and << commands affect whole lines. All versions of the command can take a preceding count that acts to multiply the number of objects affected.

### Text Movement

The text movement commands move text in and out of the named buffers a-z and out of the delete buffers 1-9. These commands either "yank" text out of the editing buffer and into a named buffer or "put" text into the editing buffer from a named buffer or a delete buffer. By default, text is put and yanked from the "unnamed buffer", which is also where the most recently deleted text is placed. Thus it is quite reasonable to delete text, move your cursor to the location where you want the deleted text placed, and then put the text back into the editing buffer at this new location with the p or P command.

The named buffers are most useful for keeping track of several chunks of text that you want to keep on hand for later access, movement, or rearrangement. These buffers are named with the letters "a" through "z". To refer to one of these buffers (or one of the numbered delete buffers) in a command such as put, yank, or delete, use a quotation mark. For example, to yank a line into the buffer named a, type:

```
"ayy
```

To put this text back into the file, type:

"ap

If you delete text into the buffer named *A* rather than *a*, then text is appended to the buffer.

Note that the contents of the named buffers are not destroyed when you switch files. Therefore, you can delete or yank text into a buffer, switch files, and then do a put. Buffer contents are *destroyed* when you exit the editor, so be careful.

#### Put - p and P

Syntax:    [*\*alphanumeric*]p  
          [*\*alphanumeric*]P

Function: Puts text from a buffer into the editing buffer. If no buffer name is specified, then text is put from the unnamed buffer. The lowercase *p* command puts text either below the current line or after the cursor, depending on whether the buffer contains a partial line or not. The uppercase *P* command puts text either above the current line or before the cursor, again depending on whether the buffer contains a partial line or not.

#### Yank - y and Y

Syntax:    [*\*letter*]ycursor-movement  
          [*\*letter*]yy  
          [*\*letter*]Y

Function: Copies text in the editing buffer to a named buffer. If no buffer name is specified, then text is yanked into the unnamed buffer. If an uppercase *letter* is used, then text is appended to the buffer and does not overwrite and destroy the previous contents. When a *cursor-movement* is given as an argument, the delimited text object is yanked. The *Y* and *yy* commands yank a single line, or, if a preceding count is given, multiple lines can be yanked.

#### Searching

The search commands search either forward or backward in the editing buffer for text that matches a given regular expression.

#### Search - / and ?

Syntax:    /[*pattern*]/[*offset*]RETURN  
          /[*pattern*]RETURN  
          ?[*pattern*]?[*offset*]RETURN  
          ?[*pattern*]RETURN

**Function:** Searches forward (/) or backward (?) for *pattern*. A string is actually a regular expression. The trailing delimiter is not required. If no *pattern* is given, then last *pattern* searched for is used. After the second delimiter, an *offset* may be given, specifying the beginning of a line relative to the line on which *pattern* was found. For example

/word/-

finds the beginning of the line immediately preceding the line containing "word" and

/word/+ 2

finds the beginning of the line two lines after the line containing "word". See also the *ignorecase* and *magic* options.

#### Next String - n and N

**Syntax:** n  
N

**Function:** Repeats the last search command. The n command repeats the search in the same direction as the last search command. The N command repeats the search in the opposite direction of the last search command.

#### Find Character - f and F

**Syntax:** fchar  
Fchar  
;  
,

**Function:** Finds character *char* on the current line. The lowercase f searches forward on the line; the uppercase F searches backward. The semicolon (;) repeats the last character search. The comma (,) reverses the direction of the search.

#### To Character - t and T

**Syntax:** tchar  
Tchar  
;  
,

**Function:** Moves the cursor up to but not on to *char*. The semicolon (;) repeats the last character search. The comma (,) reverses the direction of the search.

**Mark - m**

Syntax: *mletter*

Function: Marks a place in the file with a lowercase *letter*. You can move to a mark using the "to mark" commands described below. It is often useful to create a mark, move the cursor, and then delete from the cursor to the mark "a" with the following command:

d'a

**To Mark - ' and `**

Syntax: *'letter*  
*`letter*

Function: Move to *letter*. These commands let you move to the location of a mark. Marks are denoted by single lowercase alphabetic characters. Before you can move to a mark, it must first be created with the *m* command. The back quotation mark ( ``` ) moves you to the exact location of the mark within a line; the forward quotation mark ( `'` ) moves you to the beginning of the line containing the mark. Note that these commands are also legal cursor movement commands.

***Exit and Escape Commands***

There are several commands that are used to escape from vi command mode and to exit the editor. These are described below:

**Ex Escape - :**

Syntax: **:**

Function: Enters ex escape mode to execute an ex command. The colon appears on the status line as a prompt for an ex command. You then can enter an ex command line terminated by either a RETURN or an ESC and the ex command will execute. You are then prompted to type RETURN to return to vi command mode. During the input of the ex command line or during execution of the ex command you may press INTERRUPT to abort what you are doing and return to vi command mode.

**Exit Editor - ZZ**

Syntax: **ZZ**

Function: Exit vi and write out the file if any changes have been made. This returns you to the shell from which you

invoked vi.

Quit to Ex - Q

Syntax: Q

Function: Enters the ex editor. When you do this, you will still be editing the same file. You can return to vi by typing the vi command from ex.

### Ex Commands

Typing the colon (:) escape command when in command mode, produces a colon prompt on the status line. This prompt is for a command available in the line-oriented editor, ex. In general, ex commands let you write out or read in files, escape to the shell, or switch editing files.

Many of these commands perform actions that affect the "current" file by default. The current file is normally the file that you named when you invoked vi, although the current file can be changed with the "file" command, f, or with the "next" command, n. In most respects, these commands are identical to similar commands for the editor, ed. All such ex commands are aborted by either a RETURN or an ESC. We shall use a RETURN in our examples. Command entry is terminated by typing an INTERRUPT.

#### *Command Structure*

Most ex command names are English words, and initial prefixes of the words are acceptable abbreviations. In descriptions, only the abbreviation is discussed, since this is the most frequently used form of the command. The ambiguity of abbreviations is resolved in favor of the more commonly used commands. As an example, the command substitute can be abbreviated s while the shortest available abbreviation for the set command is se.

Most commands accept prefix addresses specifying the lines in the file that they are to affect. A number of commands also may take a trailing count specifying the number of lines to be involved in the command. Counts are rounded down if necessary. Thus, the command "10p" will print the tenth line in the buffer while "move 5" will move the current line after line 5.

Some commands take other information or parameters, stated after the command name. Examples might be option names in a set command, such as "set number", a filename in an edit command, a regular expression in a substitute command, or a target address for a copy command, such as

## 1,5 copy 25

A number of commands have variants. The variant form of the command is invoked by placing an exclamation mark (!) immediately after the command name. Some of the default variants may be controlled by options; in this case, the exclamation mark turns off the meaning of the default.

In addition, many commands take flags, including the characters "p" and "l". A "p" or "l" must be preceded by a blank or tab. In this case, the command abbreviated by these characters is executed after the command completes. Since `ex` normally prints the new current line after each change, `p` is rarely necessary. Any number of plus (+) or minus (-) characters may also be given with these flags. If they appear, the specified offset is applied to the current line value before the printing command is executed.

Most commands that change the contents of the editor buffer give feedback if the scope of the change exceeds a threshold given by the `report` option. This feedback helps to detect undesirably large changes so that they may be quickly and easily reversed with the `undo` command. After commands with global effect, you will be informed if the net change in the number of lines in the buffer during this command exceeds this threshold.

*Command Addressing*

The following specifies the line addressing syntax for `ex` commands:

- . The current line. Most commands leave the current line as the last line which they affect. The default address for most commands is the current line, thus "." is rarely used alone as an address.
- n* The *n*th line in the editor's buffer, lines being numbered sequentially from 1.
- \$ The last line in the buffer.
- % An abbreviation for "1,\$", the entire buffer.
- + *n* or - *n* An offset, *n* relative to the current buffer line. The forms "+ 3" "+3" and "+++" are all equivalent. If the current line is line 100 they all address line 103.

*/pattern/* or *?pattern?*

Scan forward and backward respectively for a text matching the regular expression given by *pattern*. Scans normally wrap around the end of the buffer. If all that is desired is to print the next line containing *pattern*, then the trailing slash (/) or question

mark (?) may be omitted. If *pattern* is omitted or explicitly empty, then the string matching the last specified regular expression is located. The forms "RETURN" and "?RETURN" scan using the last named regular expression. After a substitute, "RETURN" and "?RETURN" would scan using that substitute's regular expression.

" or 'x

Before each nonrelative motion of the current line dot (.), the previous current line is marked with a label, subsequently referred to with two single quotation marks ('). This makes it easy to refer or return to this previous context. Marks are established with the vi m command, using a single lowercase letter as the name of the mark. Marked lines are later referred to with the notation

'x.

where x is the name of a mark.

Addresses to commands consist of a series of addresses, separated by a colon (,) or a semicolon (;). Such address lists are evaluated left to right. When addresses are separated by a semicolon (;) the current line (.) is set to the value of the previous addressing expression before the next address is interpreted. If more addresses are given than the command requires, then all but the last one or two are ignored. If the command takes two addresses, the first addressed line must precede the second in the buffer. Null address specifications are permitted in a list of addresses, the default in this case is the current line "."; thus ",100" is equivalent to ".,100". It is an error to give a prefix address to a command which expects none.

#### *Command Format*

The following is the format for all ex commands:

[address] [command] [!] [parameters] [count] [flags]

All parts are optional depending on the particular command and its options. The following section describes specific commands.

#### *Argument List Commands*

The argument list commands allow you to work on a set of files, by remembering the list of filenames that are specified when you invoke vi. The args command lets you examine this list of filenames. The file command gives you information about the current file. The n (next) command lets you either edit the next file in the argument list or change the list. And the rewind command lets you restart

editing the files in the list. All of these commands are described below:

**args**           The members of the argument list are printed, with the current argument delimited by brackets. For example, a list might look like this:

file1 file2 [file3] file4 file5

The current file is *file3*.

**f**               Prints the current filename, whether it has been modified since the last **write** command, whether it is readonly, the current linenummer, the number of lines in the buffer, and the percentage of the buffer that you have edited. In the rare case that the current file is "[Not edited]" this is noted also; in this case you have to use the form "w!" to write to the file, since the editor is not sure that a **w** command will not destroy a file unrelated to the current contents of the buffer.

**f file**           The current filename is changed to *file* which is considered "[Not edited]".

**n**               The next file in the command line argument list is edited.

**n!**               This variant suppresses warnings about the modifications to the buffer not having been written out, discarding irretrievably any changes that may have been made.

**n [+ command] filelist**  
The specified *filelist* is expanded and the resulting list replaces the current argument list; the first file in the new list is then edited. If *command* is given (it must contain no spaces), then it is executed after editing the first such file.

**rew**            The argument list is rewound, and the first file in the list is edited.

**rew!**           Rewinds the argument list discarding any changes made to the current buffer.

### *Edit Commands*

To edit a file other than the one you are currently editing, you will often use one of the variations of the **e** command.

In the following discussions, note that the name of the current file is always remembered by vi and is specified by a percent sign (%). The name of the *previous* file in the editing buffer is specified by a number sign (#).

The edit commands are described below:

*e file* Used to begin an editing session on a new file. The editor first checks to see if the buffer has been modified since the last w command was issued. If it has been, a warning is issued and the command is aborted. The command otherwise deletes the entire contents of the editor buffer, makes the named file the current file and prints the new filename. After ensuring that this file is sensible, (i.e., that it is not a binary file, directory, or a device), the editor reads the file into its buffer. If the read of the file completes without error, the number of lines and characters read is printed on the status line. If there were any non-ASCII characters in the file they are stripped of their non-ASCII high bits, and any null characters in the file are discarded. If none of these errors occurred, the file is considered edited. If the last line of the input file is missing the trailing newline character, it is supplied and a complaint issued. The current line is initially the first line of the file.

*e! file* This variant form suppresses the complaint about modifications having been made and not written from the editor buffer, thus discarding all changes that have been made before editing the new file.

*e + n file* Causes the editor to begin editing at line *n* rather than at the first line. The argument *n* may also be an editor command containing no spaces; for example, "+ /pattern".

CNTRL-^ This is a shorthand equivalent for ":e #RETURN", which returns to the previous position in the last edited file. If you do not want to write the file you should use ":e! #RETURN" instead.

### *Write Commands*

The write commands let you write out all or part of your editing buffer to either the current file or to some other file. These commands are described below:

*w file* Writes changes made back to *file*, printing the number of lines and characters written. Normally, *file* is omitted and the buffer is written to the name of the current file. If *file* is specified,

then text will be written to that file. The editor writes to a file only if it is the current file and is edited, or if the file does not exist. Otherwise, you must give the variant form *w!* to force the write. If the file does not exist it is created. The current filename is changed only if there is no current filename; the current line is never changed.

If an error occurs while writing the current and *edited* file, the editor prints

No write since last change

even if the buffer had not previously been modified.

*w>* *file*

Appends the buffer contents at the end of an existing file. Previous file contents are not destroyed.

*w!* *name*

Overrides the checking of the normal *write* command, and writes to any file that the system permits.

*w!* *command*

Writes the specified lines into *command*. Note the difference between

*w!* *file*

which overrides checks and

*w!* *cmd*

which writes to a command. The output of this command is displayed on the screen and not inserted in the editing buffer.

### *Read Commands*

The read commands let you read text into your editing buffer at any location you specify. The text you read in must be at least one line long, and can be either a file or the output from a command.

*r* *file*

Places a copy of the text of the given file in the editing buffer after the specified line. If no file is given then the current filename is used. The current filename is not changed unless there is none, in which case the file becomes the current name. If the file buffer is empty and there is no current name then this is treated as an *e* command.

Address 0 is legal for this command and causes the file to be read at the beginning of the buffer. Statistics are given as for the *e* command when the *r* successfully terminates.

After an *r* the current line is the last line read.

*r !command*

Reads the output of *command* into the buffer after the specified line. A blank or tab before the exclamation mark (!) is mandatory.

*Quit Commands*

There are several ways to exit vi. Some abort the editing session, some write out the editing buffer before exiting, and some warn you if you decide to exit without writing out the buffer. All of these ways of exiting are described below:

*q* Exits vi. No automatic write of the editor buffer to a file is performed. However, vi issues a warning message if the file has changed since the last *w* command was issued, and does not quit. Vi will also issue a diagnostic if there are more files in the argument list left to edit. Normally, you will wish to save your changes, and you should give a *w* command. If you wish to discard them, use the "*q!*" command variant.

*q!* Quits from the editor, discarding changes to the buffer without complaint.

*wq name* Like a *w* and then a *q* command.

*wq! name* This variant overrides checking of the *w* command so that you can write to file that the system allows.

*x name* If any changes have been made and not written, writes the buffer out and then quits. Otherwise, it just quits.

*Global and Substitute Commands*

The global and substitute commands allow you to perform complex changes to a file in a single command. Learning how to use these commands is a must for the serious user of vi.

*g/pattern/cmds*

The *g* command has two distinct phases. In the first phase, each line matching *pattern* in the editing buffer is marked. Next, the given command list is executed with the current line, dot (*.*), initially set to each marked line.

The command list consists of the remaining commands on the current input line and may continue to multiple lines by ending all but the last such line with a backslash (*\*). This multiple-line option will not work from within vi, you must switch to *ex* to do it. If *cmds* (or the trailing

slash (/) delimiter) is omitted, then each line matching *pattern* is printed.

The *g* command itself may not appear in *cmds*. The options *autoprint* and *autoindent* are inhibited during a global command and the value of the *report* option is temporarily infinite, in deference to a *report* for the entire global. Finally, the context mark (') or (') is set to the value of the current line (.) before the global command begins and is not changed during a global command.

The following global commands, most of them substitutions, cover the most frequent uses of the global command.

- g/s1/p* This command simply prints all lines that contain the string "s1".
- g/s1/s//s2/* This command substitutes the *first* occurrence of "s1" on all lines that contain it with the string "s2".
- g/s1/s//s2/g* This command substitutes all occurrences of "s1" with the string "s2". This includes multiple occurrences of "s1" on a line.
- g/s1/s//s2/gp* This command works the same as the preceding example, except that in addition, all changed lines are printed on the screen.
- g/s1/s//s2/gc* This command asks you to confirm that you want to make each substitution of the string "s1" with the string "s2". If you type a "y" then the given substitution is made, otherwise it is not.
- g/s0/s/s1/s2/g* This command marks all those lines that contain the string "s0", and then for those lines only, it substitutes all occurrences of the string "s1" with "s2".
- g!/pattern/cmds* This variant form of *g* runs *cmds* at each line not matching *pattern*.

*s/pattern/repl/options*

On each specified line, the first instance of text matching the regular expression *pattern* is replaced by the replacement text *repl*. If the *global* indicator option character "g" appears, then all instances on a line are substituted. If the *confirm* indication character "c" appears, then before each substitution the line to be substituted is printed on the screen with the string to be substituted marked with caret (^) characters. By typing a "y", you cause the substitution to be performed; any other input causes no

change to take place. After an *s* command the current line is the last line substituted.

*v/pattern/cmds* A synonym for the global command variant *g!*, running the specified *cmds* on each line that does not match *pattern*.

#### *Text Movement Commands*

The text movement commands are largely superseded by commands available in *vi* command mode. However, the following two commands are still quite useful.

*co addr flags* A copy of the specified lines is placed after *addr*, which may be "0". The current line "." addresses the last line of the copy.

*[range]maddr* The *m* command moves the lines specified by *range* after the line given by *addr*. For example, "m+" swaps the current line and the following line, since the default range is just the current line. The first of the moved lines becomes the current line (dot).

#### *Shell Escape Commands*

You will often want to escape from the editor to execute normal commands. You may also want to change your working directory so that your editing can be done with respect to a different working directory. These operations are described below:

*cd directory* The specified *directory* becomes the current directory. If no directory is specified, the current value of the *home* option is used as the target directory. After a *cd* the current file is not considered to have been edited so that write restrictions on preexisting files still apply.

*sh* A new shell is created. You may invoke as many commands as you like in this shell. To return to *vi*, type a CNTRL-D to terminate the shell.

*!command* The remainder of the line after the exclamation (!) is sent to a shell to be executed. Within the text of *command* the characters "%" and "#" are expanded as the filenames of the current file and the last edited file and the character "!" is replaced with the text of the previous command. Thus, in particular, "!!" repeats the last such shell escape. If any such expansion is performed, the expanded line is echoed. The current line is unchanged by this command.

If there has been “[No write]” of the buffer contents since the last change to the editing buffer, then a diagnostic is printed before the command is executed as a warning. A single exclamation (!) is printed when the command completes.

### *Other Commands*

The following command descriptions explain how to use miscellaneous ex commands that do not fit into the above categories:

**abbr** Maps the first argument to the following string. For example, the following command

```
:abbr rainbow yellow green blue red
```

maps “rainbow” to “yellow green blue red”. Abbreviations can be turned off with the **unabbreviate** command, as in:

```
:una rainbow
```

**map, map!**

Maps any character or escape sequence to an existing command sequence. Characters mapped with **map!** work only in insert mode, while characters mapped with **map** work only in command mode.

**nu**

Prints each specified line preceded by its buffer line number. The current line is left at the last line printed. To get automatic line numbering of lines in the buffer, set the *number* option.

**preserve**

The current editor buffer is saved as though the system had just crashed. This command is for use only in emergencies when a **w** command has resulted in an error and you don't know how to save your work.

**=**

Prints the line number of the addressed line. The current line is unchanged.

**recover *file***

Recovers *file* from the system save area. The system saves a copy of the editing buffer only if you have made changes to the file, the system crashes, or you execute a **preserve** command. Except when you use **preserve** you will be notified by mail when a file is saved.

**set *argument***

With no arguments, **set** prints those options whose values have been changed from their defaults; with the argument *all* it prints all of the option values.

Giving an option name followed by a question mark (?) causes the current value of that option to be printed. The "?" is unnecessary unless the option is Boolean valued. Switch options are given values either with

`set option`

to turn them on or

`set nooption`

to turn them off. String and numeric options are assigned with

`set option=value`

More than one parameter may be given to *set*; all are interpreted from left to right.

#### *tag label*

The focus of editing switches to the location of *label*. If necessary, vi will switch to a different file in the current directory to find *label*. If you have modified the current file before giving a *tag* command, you must first write it out. If you give another *tag* command with no argument, then the previous *label* is used.

Similarly, if you type only a CNTRL-], vi searches for the word immediately after the cursor as a tag. This is equivalent to typing ":tag", this word, and then a RETURN.

The tags file is normally created by a program such as *ctags*, and consists of a number of lines with three fields separated by blanks or tabs. The first field gives the name of the tag, the second the name of the file where the tag resides, and the third gives an addressing form which can be used by the editor to find the tag. This field is usually a contextual scan using */pattern/* to be immune to minor changes in the file. Such scans are always performed as if the *nomagic* option was set. The tag names in the tags file must be sorted alphabetically. There are a number of options that can be set to affect the vi environment. These can be set with the *ex set* command either while editing or immediately after vi is invoked in the vi start-up file, *.exrc*.

The first thing that must be done before you can use vi, is to set the terminal type so that vi understands how to talk to the particular terminal you are using.

Each time vi is invoked, it reads commands from the file named *.exrc* in your home directory. This file normally sets the user's preferred options so that they need not be set manually each time you invoke vi. Each of the options is described in detail below.

*Options*

There are only two kinds of options: switch options and string options. A switch option is either on or off. A switch is turned off by prefixing the word *no* to the name of the switch within a set command. String options are strings of characters that are assigned values with the syntax *option=string*. Multiple options may be specified on a line. Vi options are listed below:

autoindent, ai default: noai

Can be used to ease the preparation of structured program text. For each line created by an append, change, insert, open, or substitute operation, vi looks at the preceding line to determine and insert an appropriate amount of indentation. To back the cursor up to the preceding tab stop, you can type CNTRL-D. The tab stops going backward are defined as multiples of the *shiftwidth* option. You cannot backspace over the indent, except by typing a CNTRL-D.

Specially processed in this mode is a line with no characters added to it, which turns into a completely blank line (the whitespace provided for the *autoindent* is discarded.) Also specially processed in this mode are lines beginning with a caret (^) and immediately followed by a CNTRL-D. This causes the input to be repositioned at the beginning of the line, but retains the previous indent for the next line. Similarly, a "0" followed by a CNTRL-D repositions the cursor at the beginning but without retaining the previous indent. *Autoindent* doesn't happen in global commands.

autoprint ap default: ap

Causes the current line to be printed after each ex copy, move, or substitute command. This has the same effect as supplying a trailing "p" to each such command. *Autoprint* is suppressed in globals, and only applies to the last of many commands on a line.

autowrite, aw default: noaw

Causes the contents of the buffer to be automatically written to the current file if you have modified it when you give a next, rewind, tag, or ! command, or a CNTRL-~ (switch files) or CNTRL-] (tag go to) command.

beautify, bf default: nobeautify

Causes all control characters except tab, new line and formfeed to be discarded from the input. A complaint is registered the first time a backspace character is discarded. *Beautify* does not apply to command input.

directory, dir default: dir=/tmp

Specifies the directory in which vi places the editing buffer file. If this directory is not writable, then the editor will exit abruptly when it fails to write to the buffer file.

- edcompatible** default: noedcompatible  
Causes the presence or absence of *g* and *c* suffixes on substitute commands to be remembered, and to be toggled on and off by repeating the suffixes. The suffix *r* causes the substitution to be like the command, instead of like *&*.
- errorbells, eb** default: noeb  
Error messages are preceded by a bell. If possible, the editor always places the error message in inverse video instead of ringing the bell.
- hardtabs, ht** default: ht=8  
Gives the boundaries on which terminal hardware tabs are set or on which the system expands tabs.
- ignorecase, ic** default: noic  
Maps all uppercase characters in the text to lowercase in regular expression matching. In addition, all uppercase characters in regular expressions are mapped to lowercase except in character class specifications enclosed in brackets.
- lisp** default: nolisp  
*Autoindent* indents appropriately for LISP code, and the ( ) { } [[ and ]] commands are modified to have meaning for LISP.
- list** default: nolist  
All printed lines will be displayed unambiguously, showing tabs and end-of-lines.
- magic** default: magic  
If *nomagic* is set, the number of regular expression metacharacters is greatly reduced, with only up-arrow (^) and dollar sign (\$) having special effects. In addition the metacharacters "" and "&" in replacement patterns are treated as normal characters. All the normal metacharacters may be made *magic* when *nomagic* is set by preceding them with a backslash (\).
- mesg** default: nomesg  
Causes write permission to be turned off to the terminal while you are in visual mode, if *nomesg* is set. This prevents people writing to your screen with the write command and scrambling your screen as you edit.
- number, n** default: nonumber  
Causes all output lines to be printed with their line numbers.
- open** default: open  
If set to *noopen*, the commands open and visual are not permitted from ex. This is set to prevent confusion resulting from accidental entry to open or visual mode.
- optimize, opt** default: optimize  
Output of text to the screen is expedited by setting the terminal

so that it does not perform automatic carriage returns when printing more than one line of output, thus greatly speeding output on terminals without addressable cursors when text with leading whitespace is printed.

paragraphs, para default: para=IPLPPPQPP TPbp  
Specifies paragraph delimiters for the { and } operations. The pairs of characters in the option's value are the names of the nroff macros that start paragraphs.

prompt default: prompt  
Ex input is prompted for with a colon (:). If *noprompt* is set, when ex command mode is entered with the Q command, no colon prompt is displayed on the status line.

redraw default: noredraw  
The editor simulates (using great amounts of output), an intelligent terminal on a dumb terminal. Useful only at very high speed.

remap default: remap  
If on, mapped characters are repeatedly tried until they are unchanged. For example, if *o* is mapped to *O* and *O* is mapped to *I*, *o* will map to *I* if *remap* is set, and to *O* if *noremmap* is set.

report default: report=5  
Specifies a threshold for feedback from commands. Any command that modifies more than the specified number of lines will provide feedback as to the scope of its changes. For global commands and the undo command, which have potentially far reaching scope, the net change in the number of lines in the buffer is presented at the end of the command, subject to this same threshold. Thus notification is suppressed during a g command on the individual commands performed.

scroll default: scroll= window  
Determines the number of logical lines scrolled when CNTRL-D is received from a terminal input in command mode, and the number of lines printed by a command mode z command (double the value of *scroll*).

sections default: sections=SHNHH HU  
Specifies the section macros for the [[ and ]] operations. The pairs of characters in the option's value are the names of the nroff macros that start paragraphs.

shell, sh default: sh=/bin/sh  
Gives the pathname of the shell forked for the shell escape command "!", and by the shell command. The default is taken from SHELL in the environment, if present.

shiftwidth, sw default: sw=8  
Gives the width of a software tab stop, used in reverse tabbing

with CNTRL-D when using *autoindent* to append text, and by the shift commands.

showmatch, sm default: nosm

When a ) or } is typed, moves the cursor to the matching ( or { for one second if this matching character is on the screen.

tabstop, ts default: ts=8

The editor expands tabs in the input file to be on *tabstop* boundaries for the purposes of display.

taglength, tl default: tl=0

The first *taglength* characters in a tag name are significant, but all others are ignored. A value of zero (the default) means that all characters are significant.

tags default: tags=tags /usr/lib/tags

A path of files to be used as tag files for the tag command. A requested tag is searched for in the specified files, sequentially. By default files named *tag* are searched for in the current directory and in /usr/lib.

term default=value of shell TERM variable

The terminal type of the output device.

terse default: noterse

Shorter error diagnostics are produced for the experienced user.

warn default: warn

Warn if there has been “[No write since last change]” before a shell escape command (!).

window default: window=speed dependent

This specifies the number of lines in a text window. The default is 8 at slow speeds (600 baud or less), 16 at medium speed (1200 baud), and the full screen (minus one line) at higher speeds.

w300, w1200, w9600

These are not true options but set *window* (above) only if the speed is slow (300), medium (1200), or high (9600), respectively.

wrapscan, ws default: ws

Searches using the regular expressions in addressing will wrap around past the end of the file.

wrapmargin, wm default: wm=0

Defines the margin for automatic insertion of newlines during text input. A value of zero specifies no wrap margin.

writeany, wa default: nowa

Inhibits the checks normally made before write commands,

allowing a write to any file that the system protection mechanism will allow.

## Regular Expressions

A regular expression specifies a set of strings of characters. A member of this set of strings is said to be *matched* by the regular expression. Vi remembers two previous regular expressions: the previous regular expression used in a substitute command and the previous regular expression used elsewhere, referred to as the previous *scanning* regular expression. The previous regular expression can always be referred to by a null regular expression: e.g., “//” or “??”.

The regular expressions allowed by vi are constructed in one of two ways depending on the setting of the *magic* option. The *ex* and *vi* default setting of *magic* gives quick access to a powerful set of regular expression metacharacters. The disadvantage of *magic* is that the user must remember that these metacharacters are *magic* and precede them with the backslash (\) to use them as “ordinary” characters. With *nomagic* set, regular expressions are much simpler, there being only two metacharacters. The power of the other metacharacters is still available by preceding the now ordinary character with a “\”. Note that “\” is thus always a metacharacter. In this discussion the *magic* option is assumed. With *nomagic* the only special characters are the caret (^) at the beginning of a regular expression, the dollar sign (\$) at the end of a regular expression, and the backslash (\). The tilde (~) and the ampersand (&) also lose their special meanings related to the replacement pattern of a substitute.

The following basic constructs are used to construct *magic* mode regular expressions.

### *char*

An ordinary character matches itself. Ordinary characters are any characters except a caret (^) at the beginning of a line, a dollar sign (\$) at the end of line, a star (\*) as any character other than the first, and any of the following characters:

. \ | ^

These characters must be escaped (i.e., preceded) by a backslash (\) if they are to be treated as ordinary characters.

- ^ At the beginning of a pattern this forces the match to succeed only at the beginning of a line.
- \$ At the end of a regular expression this forces the match to succeed only at the end of the line.
- .
- Matches any single character except the newline character.

- \< Forces the match to occur only at the beginning of a "word"; that is, either at the beginning of a line, or just before a letter, digit, or underline and after a character not one of these.
- \> Similar to "\<", but matching the end of a "word", i.e. either the end of the line or before a character which is not a letter, a digit, or the underline character.

**[string]**

Matches any single character in the class defined by *string*. Most characters in *string* define themselves. A pair of characters separated by a dash (-) in *string* defines the set of characters between the specified lower and upper bounds, thus "[a-z]" as a regular expression matches any single lowercase letter. If the first character of *string* is a caret (^) then the construct matches those characters which it otherwise would not. Thus "[^a-z]" matches anything but a lowercase letter or a newline. To place any of the characters caret, left bracket, or dash in *string* they must be escaped with a preceding backslash (\).

The concatenation of two regular expressions first matches the left-most regular expression and then the longest string that can be recognized as a regular expression. The first part of this new regular expression matches the first regular expression and the second part matches the second. Any of the single character matching regular expressions mentioned above may be followed by a "star" (\*) to form a regular expression that matches zero or more adjacent occurrences of the characters matched by the prefixing regular expression. The tilde (~) may be used in a regular expression to match the text that defined the replacement part of the last s command. A regular expression may be enclosed between the sequences "\(" and "\)" to remember the text matched by the enclosed regular expression. This text can later be interpolated into the replacement text using the notation

\digit

where *digit* enumerates the set of remembered regular expressions.

The basic metacharacters for the replacement pattern are the ampersand (&) and the tilde (~) these are given as "\&" and "\~" when *nomagic* is set. Each instance of the ampersand is replaced by the characters matched by the regular expression. In the replacement pattern the tilde stands for the text of the previous replacement pattern.

Other metasequences possible in the replacement pattern are always introduced by a backslash (\). The sequence "\n" is replaced by the text matched by the *n*th regular subexpression enclosed between "\(" and "\)". When nested, parenthesized subexpressions are present, *n* is determined by counting occurrences of "\(" starting from the left. The sequences "\u" and "\l" cause the immediately following character in the replacement to be converted to uppercase

or lowercase, respectively, if this character is a letter. The sequences "\U" and "\L" turn such conversion on, either until "\E" or "\e" is encountered, or until the end of the replacement pattern.

### Limitations

When using vi, you should note the following limits:

250,000 lines in a file

1024 characters per line

256 characters per global command list

128 characters per filename

128 characters in the previous inserted and deleted text

100 characters in a shell escape command

63 characters in a string valued option

30 characters in a tag name

### Notes

The */usr/lib/ex2.1\$preserve* program can be used to restore vi buffer files that were lost as a result of a system crash. The program searches the */tmp* directory for vi buffer files and places them in the directory */usr/preserve*. The owner can retrieve these files using the *-r* option.

The */usr/lib/ex2.1\$preserve* program must be placed in the system startup file, */etc/rc*, before the command that cleans out the */tmp* directory. See the *XENIX Operations Guide* for more information on */etc/rc*.

**Name**

vsh -- menu driven visual shell

**Syntax**

vsh

**Description**

Vsh is a highly interactive, visually oriented shell which eases many XENIX activities. The vsh features both standard and customizable XENIX command menus and on-line help. The vsh displays information and menus in windows on the screen. To enter vsh, simply type

vsh

from a shell prompt. Vsh can also be made a user's default shell by changing their shell entry in /etc/passwd (the last colon-separated field). Help is available from all menus by typing the question mark character.

The very last line of the screen is a status line. The status line displays the current pathname, the date, time and operating system name. If you have new mail, the status line will indicate so. Above the status line is the message line, which displays messages, error or otherwise, from vsh.

A command menu is displayed at the bottom of the screen. The standard menu contains a range of commonly used XENIX commands. Above the command menu is the output window. This window contains a scrolling display of the output from commands. This window is not visible at start-up, but is displayed while running certain commands such as '='.

In the top of the screen is a window with a listing of the current working directory. To alter the size of this window use the *Window* command from the main command menu. Items in the listing window may be selected using standard key commands (q.v.). Two special key commands are used with the listing window. The equals sign '=' ('SHOW') key displays the contents of the currently selected file or directory. The minus sign '-' ('GOAWAY') key will return you to the listing window.

Commands may be invoked in one of two ways. A command can be selected by pressing the first letter of its name. Alternatively, press the space bar. Each time the space bar is pressed, the next menu item will be highlighted. This highlighting indicates that the command has been selected. Backspace moves to the previous

selection.

Once a command is selected, press the return key. A menu is displayed which gives the valid arguments for the particular command. The default choice is shown in parentheses, e.g.:

recursive: Yes (No)

To send the output to another program, one may type a vertical bar in the "output:" field of the commands' menu.

When the menu is filled in, press RETURN to start the command.

#### Main Menu Commands

The following menu options are available from the standard main menu. Certain sub-commands are available under the Options selection. These are described in the next section.

**Copy** Copy a file to a new file. Copy the contents of a directory to a new directory.

**Delete** Delete a file or directory.

**Edit** Invoke an editor for a file. Default is the visual editor vi(C).

**Help** Get help on diverse topics. A menu is displayed at the bottom of the screen of available help topics.

**Mail** Send or read XENIX mail.

**Name** Rename a directory or file.

**Options** Perform various commands. See OPTIONS section.

**Print** Print file or files on systems' lineprinter.

**Quit** Quit the visual shell.

**Run** Run a specified XENIX command or applications program.

**View** View a specified file or directory listing. This file or directory listing will be displayed in the upper window. Use the *vsh* scrolling commands to move around (see KEY COMMANDS Section).

**Window**

Reset upper window 'redraw' characteristics and height.

#### Options Subcommand

The Options selection on the main menu has several important commands grouped under the selections Directory, Filesystem, Output, and Permissions. These are as follows:

**Directory**

**Make** Make a directory under current working directory.

**Usage** Display disk usage by number of blocks in current working directory.

**Filesystem**

**Create** Create a filesystem.

**FilesCheck**

Check file system consistency.

**Mount** Mount a file system on a specified mount-point.

**SpaceFree**

Report number of disk blocks available on all or some mounted file systems.

**Unmount**

Unmount specified file system if it is not currently busy.

**Output**

**VShell** Echo vsh commands in output window (default).

**XENIX** Echo actual XENIX commands in output window. For instance, if running "Options Filesystem FilesCheck", the command *fsck* will be displayed in the output window if "Options Output Xenix" is set.

**Permissions**

Change permissions on a file or directory.

**Key Commands**

The following keyboard commands allow editing of menus and fields, and give access to various vsh features.

<CTRL-E>

Move the cursor up one line.

<CTRL-X>

Move the cursor down one line.

<CTRL-S>

Move the cursor left one character.

<CTRL-D>

Move the cursor right one character.

- <CTRL-R><CTRL-E>  
Scroll page up.
- <CTRL-R><CTRL-X>  
Scroll page down.
- <CTRL-R><CTRL-S>  
Scroll page left.
- <CTRL-R><CTRL-D>  
Scroll page right.
- <CTRL-Q>  
Home. Go to start of menu.
- <CTRL-Z>  
End. Go to the end of menu.
- <CTRL-C>  
Cancel. Stop present operation and return to the main command menu.
- <RETURN>  
Start the present command.
- <TAB>, <CTRL-I>, or <CTRL-A>  
Move to and select entire contents of next field in command line.
- <SPACE>  
Select next item in menu.
- <BACKSPACE> or <CTRL-H>  
Select previous menu item. In editing command lists, deletes character. Replacement text may then be typed.
- <CTRL-Y> or <DEL>  
Delete selected character.
- <CTRL-L>  
Move to next character to right of current cursor position.
- <CTRL-K>  
Move to next character to left of current cursor position.
- <CTRL-P>  
Move to next word to right of current cursor position.
- <CTRL-O>  
Move to next word to left of current cursor position.
- ? Help. Request information about the selected command or command in progress at the time of the request.

- = Show. Display sub-directory listings and text files in directory listings. Display submenus for commands in main menu.
- Goaway. Return listing window to current or parent directory after a show command.
- @ Display the Modify menu.
- ! Redraw the screen.
- | Display filter menu.

**Files**

- /usr/lib/vsh/menu.def  
standard menu definition file.
- /usr/lib/vsh/.mnu  
extension for customized command menus.
- /usr/lib/vsh/VSHELL.HPP  
help file
- /usr/lib/vsh/VSHELL.HPT  
yet another help file

**Notes**

Mouse commands given in the help menus are not yet supported.

*WAIT(C)*

*WAIT(C)*

**Name**

*wait* - Awaits completion of background processes.

**Syntax**

*wait*

**Description**

Waits until all background processes started with an ampersand (&) have finished and reports on abnormal terminations.

Because the *wait(S)* system call must be executed in the parent process, the shell itself executes *wait*, without creating a new process.

**See Also**

*sh(C)*

**Notes**

Not all the processes of a pipeline with three or more stages are children of the shell, and thus cannot be waited for.

WALL (C)

WALL (C)

### Name

wall - Writes to all users.

### Syntax

/etc/wall

### Description

*Wall* reads a message from the standard input until an end-of-file. It then sends this message to all users currently logged in preceded by "Broadcast Message from ...". *Wall* is used to warn all users, for example, prior to shutting down the system.

The sender should be super-user to override any protections the users may have invoked.

### Files

/dev/tty\*

### See Also

mesg(C), write(C)

### Diagnostics

*Cannot send to ...*      The open on a user's tty file has failed.

WC(C)

WC(C)

**Name**

wc - Counts lines, words and characters.

**Syntax**

wc [ - lwc ] [ names ]

**Description**

*Wc* counts lines, words and characters in the named files, or in the standard input if no *names* appear. It also keeps a total count for all named files. A word is a maximal string of characters delimited by spaces, tabs, or newlines.

The options *l*, *w*, and *c* may be used in any combination to specify that a subset of lines, words, and characters are to be reported. The default is *-lwc*.

When *names* are specified on the command line, they will be printed along with the counts.

**Name**

what - Identifies files.

**Syntax**

what files

**Description**

*What* searches the given files for all occurrences of the pattern @ (#) and prints out what follows until the first tilde (~), greater-than sign (>), new-line, backslash (\) or null character. The SCCS command *get*(CP) substitutes this string as part of the @ (#) string.

For example, if the shell procedure in file **print** contains

```
# @ (#) this is the print program
# @ (#) syntax: print [files]
pr $* |lpr
```

then the command

```
what print
```

displays the name of the file **print** and the identifying strings in that file:

```
print:
      this is the print program
      syntax: print [files]
```

*What* is intended to be used with the *get*(CP) command, which automatically inserts identifying information, but it can also be used where the information is inserted manually.

**See Also**

admin(CP), get(CP)

**Name**

who - Lists who is on the system.

**Syntax**

who [ who-file ] [ am I ]

**Description**

*Who*, without an argument, lists the login name, terminal name, and login time for each current XENIX user.

Without an argument, *who* examines the */etc/utmp* file to obtain its information. If a file is given, that file is examined. Typically the given file will be */usr/adm/wtmp*, which contains a record of all the logins since it was created. Then *who* lists logins, logouts, and crashes since the creation of the *wtmp* file. Each login is listed with user name, terminal name (with */dev/* suppressed), and date and time. When an argument is given, logouts produce a similar line without a user name. Reboots produce a line with *x* in the place of the device name, and a fossil time indicative of when the system went down.

With two arguments, as in *who am I* (and also *who are you*), *who* tells who you are logged in as.

**Files**

*/etc/utmp*

**See Also**

*getuid(S)*, *utmp(M)*

*WHODO* (C)

*WHODO* (C)

**Name**

*whodo* - Determines who is doing what.

**Syntax**

- */etc/whodo*

**Description**

*Whodo* produces merged, reformatted, and dated output from the *who*(C) and *ps*(C) commands.

**See Also**

*ps*(C), *who*(C)

## Name

write - Writes to another user.

## Syntax

write user [ tty ]

## Description

*Write* copies lines from your terminal to that of another user. When first called, it sends the message:

Message from *your-logname your-tty* ...

The recipient of the message should write back at this point. Communication continues until an end-of-file is read from the terminal or an interrupt is sent. At that point, *write* writes

(end of message)

on the other terminal and exits.

If you want to write to a user who is logged in more than once, the *tty* argument may be used to indicate the appropriate terminal.

Permission to write may be denied or granted by use of the *mesg*(C) command. At the outset, writing is allowed. Certain commands, in particular *nroff*(CT) and *pr*(C), disallow messages in order to prevent messy output.

If the character ! is found at the beginning of a line, *write* calls the shell to execute the rest of the line as a command.

The following protocol is suggested for using *write*: when you first write to another user, wait for him or her to write back before starting to send. Each party should end each message with a distinctive signal ((o) for "over" is conventional), indicating that the other may reply; (oo) for "over and out" is suggested when conversation is to be terminated.

**WRITE (C)**

**WRITE (C)**

**Files**

**/etc/utmp**      **To find user**

**/bin/sh**        **To execute !**

**See Also**

**mail(C), mesg(C), who(C)**

## Name

xargs - Constructs and executes commands.

## Syntax

xargs [ flags ] [ command [ initial-arguments ] ]

## Description

*Xargs* combines the fixed *initial-arguments* with arguments read from the standard input to execute the specified *command* one or more times. The number of arguments read for each *command* invocation and the manner in which they are combined are determined by the flags specified.

*Command*, which may be a shell file, is searched for using the shell \$PATH variable. If *command* is omitted, /bin/echo is used.

Arguments read in from standard input are defined to be contiguous strings of characters delimited by one or more blanks, tabs, or newlines; empty lines are always discarded. Blanks and tabs may be embedded as part of an argument if escaped or quoted: Characters enclosed in quotes (single or double) are taken literally, and the delimiting quotes are removed. Outside of quoted strings a backslash (\) will escape the next character.

Each argument list is constructed starting with the *initial-arguments*, followed by some number of arguments read from standard input (exception: see -i flag). Flags -i, -l, and -n determine how arguments are selected for each command invocation. When none of these flags are coded, the *initial-arguments* are followed by arguments read continuously from standard input until an internal buffer is full, and then *command* is executed with the accumulated args. This process is repeated until there are no more args. When there are flag conflicts (e.g., -l vs. -n), the last flag has precedence. *Flag* values are:

- *number* *Command* is executed for each *number* lines of nonempty arguments from the standard input. This is instead of the default single line of input for each *command*. The last invocation of *command* will be with fewer lines of arguments if fewer than *number* remain. A line is considered to end with the first newline *unless* the last character of the line is a blank or a tab; a trailing blank/tab signals continuation through the next nonempty line. If *number* is omitted 1 is assumed. Option -x is forced.
- *ireplstr* Insert mode: *command* is executed for each line from the standard input, taking the entire line as a single arg,

inserting it in *initial-arguments* for each occurrence of *replstr*. A maximum of 5 arguments in *initial-arguments* may each contain one or more instances of *replstr*. Blanks and tabs at the beginning of each line are thrown away. Constructed arguments may not grow larger than 255 characters, and option *-x* is also forced. *{}* is assumed for *replstr* if not specified.

- *number* Executes *command* using as many standard input arguments as possible, up to *number* arguments maximum. Fewer arguments will be used if their total size is greater than *size* characters, and for the last invocation if there are fewer than *number* arguments remaining. If option *-x* is also coded, each *number* arguments must fit in the *size* limitation, else *xargs* terminates execution.
- *t* Trace mode: The *command* and each constructed argument list are echoed to file descriptor 2 just prior to their execution.
- *p* Prompt mode: The user is asked whether to execute *command* each invocation. Trace mode (*-t*) is turned on to print the command instance to be executed, followed by a *?... prompt*. A reply of *y* (optionally followed by anything) will execute the command; anything else, including just a carriage return, skips that particular invocation of *command*.
- *x* Causes *xargs* to terminate if any argument list would be greater than *size* characters; *-x* is forced by the options *-i* and *-l*. When neither of the options *-i*, *-l*, or *-n* are coded, the total length of all arguments must be within the *size* limit.
- *size* The maximum total size of each argument list is set to *size* characters; *size* must be a positive integer less than or equal to 470. If *-s* is not coded, 470 is taken as the default. Note that the character count for *size* includes one extra character for each argument and the count of characters in the command name.
- *eofstr* *Eofstr* is taken as the logical end-of-file string. Underscore (*\_*) is assumed for the logical EOF string if *-e* is not coded. *-e* with no *eofstr* coded turns off the logical EOF string capability (underscore is taken literally). *Xargs* reads standard input until either end-of-file or the logical EOF string is encountered.

*Xargs* terminates if it either receives a return code of *-1* from, or if it cannot execute, *command*. When *command* is a shell program, it should explicitly *exit* (see *sh(C)*) with an appropriate value to avoid accidentally returning with *-1*.

**Examples**

The following will move all files from directory **\$1** to directory **\$2**, and echo each move command just before doing it:

```
ls $1 | xargs -i -t mv $1/{} $2/{}
```

The following will combine the output of the parenthesized commands onto one line, which is then echoed to the end of file *log*:

```
(logname; date; echo $0 $*) | xargs >>log
```

The user is asked which files in the current directory are to be printed and prints them one at a time:

```
ls | xargs -p -l lpr
```

Or many at a time:

```
ls | xargs -p -l | xargs lpr
```

The following will execute *diff(C)* with successive pairs of arguments originally typed as shell arguments:

```
echo $* | xargs -n2 diff
```

YES (C)

YES (C)

**Name**

`yes` - Prints string repeatedly.

**Syntax**

`yes [ string ]`

**Description**

`Yes` repeatedly outputs "y", or if a single string argument is given, then *arg* is output repeatedly. The command will continue indefinitely unless aborted. Useful in pipes to commands that prompt for input and require a "y" response for a yes. In this case, *yes* terminates when the command it pipes to terminates, so that no infinite loop occurs.

## CONTENTS

---

### *Miscellaneous (M)*

|               |                                                      |
|---------------|------------------------------------------------------|
| intro         | Introduction to miscellaneous features and files     |
| aliases       | Micnet aliasing files                                |
| aliashash     | Micnet alias hash table generator                    |
| ascii         | Map of the ASCII character set                       |
| console       | Lisa keyboard and screen                             |
| daemon.mn     | Micnet mailer daemon                                 |
| default       | Default program information directory                |
| environ       | The user environment                                 |
| fd            | Lisa II floppy devices                               |
| fixperm       | Correct or initialize file permissions and ownership |
| getty         | Set terminal mode                                    |
| group         | Format of the group file                             |
| init          | Process control initialization                       |
| ld            | Invokes the link editor                              |
| lisa          | Contrast - Lisa special devices                      |
| login         | Gives access to the system                           |
| lp            | Lineprinter device                                   |
| machine       | Description of host machine                          |
| makekey       | Generates an encryption key                          |
| mem, kmem     | Core memory image file                               |
| messages      | Description of system console messages               |
| micnet        | The Micnet default commands file                     |
| mouse         | Lisa mouse pointing device                           |
| null          | The null file                                        |
| passwd        | The password file                                    |
| pf            | ProFile disk drives                                  |
| profile       | Setting up an environment at login time              |
| systemid      | The Micnet system identification file                |
| termcap       | Terminal capability data base                        |
| terminals     | List of supported terminals                          |
| top, top.next | The Micnet topology files                            |
| tty           | General terminal interface                           |
| ttys          | Log in terminals file                                |
| utmp, wtmp    | Formats of utmp and wtmp entries                     |



# Index

---

|                               |           |
|-------------------------------|-----------|
| aliases.hash file             | aliases   |
| ASCII character set           | ascii     |
| Default information           | default   |
| Description of host machine   | machine   |
| /dev/kmem file                | mem       |
| Encryption, key               | makekey   |
| Environment, setup            | profile   |
| Environment, user             | environ   |
| faliases file                 | aliases   |
| Group entries                 | group     |
| Initialization, system        | init      |
| Lineprinter device            | lp        |
| Link editor                   | ld        |
| floppy disk drives            | Lisa      |
| Lisa keyboard and screen      | console   |
| Lisa mouse pointing device    | mouse     |
| Lisa special devices          | lisa      |
| Login, system                 | login     |
| Login, records                | utmp      |
| maliases file                 | aliases   |
| Memory image, actual          | mem       |
| Memory image, virtual         | mem       |
| Messages, system              | messages  |
| Micnet, alias hash file       | aliases   |
| Micnet, alias hash program    | aliashash |
| Micnet, default commands      | micnet    |
| Micnet, forwarding aliases    | aliases   |
| Micnet, machine aliases       | aliases   |
| Micnet, mailer daemon         | daemon.mn |
| Micnet, system identification | systemid  |
| Micnet, topology files        | top       |
| Micnet, user aliases          | aliases   |
| Null file                     | null      |
| Password entries              | passwd    |
| ProFile                       | pf        |
| Terminal, capabilities        | termcap   |
| Terminal, interface           | tty       |
| Terminal, login file          | ttys      |
| Terminal, login modes         | getty     |
| Terminal, name list           | terminals |
| top.next file                 | top       |
| wtmp file                     | utmp      |



*INTRO (M)*

*INTRO (M)*

**Name**

intro - Introduction to miscellaneous features and files.

**Description**

This section contains miscellaneous information useful in maintaining the system. Included are descriptions of files, devices, tables and programs that are important in maintaining the entire system.

## Name

aliases, aliases.hash, maliases, faliases - Micnet aliasing files.

## Description

These files contain the alias definitions for a Micnet network. Aliases are short names or abbreviations that may be used in the *mail* command to refer to specific machines or users in a network. Aliasing allows a complex combination of site, machine, and user names to be represented by a single name.

The *aliases*, *maliases*, and *faliases* files each define a different type of alias. The *aliases* file defines the standard aliases which are names for specific systems and users and, in some case, for commands. The *maliases* file defines machine aliases, names and paths for specific systems. The *faliases* file defines forwarding aliases which are temporary names for forwarding mail intended for one system or user to another.

The *aliases.hash* file is the hashed version of the *aliases* file created by the *aliashash* command. The file is used by the *mail* command to resolve all standard aliases and is identical to the *aliases* file except for a hash table at the beginning of the file. The hash table allows for more efficient access to the entries in the file. The *aliases* file need only be present to generate the *aliases.hash* file. The *aliases* file is not required to run the network.

Each file contains zero or more lines. Each line lists the alias and its meaning. The alias can have up to eight letters and numbers, but must begin with a letter. The meaning can have site, machine, and user login names and other aliases (its exact composition depends on the type of alias). A colon (:) separating the alias and meaning is required.

In the *aliases* file, a line can have the forms:

```
alias:[site!]machine:]user,[site!]machine:]user]...
```

```
alias:[site!]machine:]command-pipeline
```

```
alias:error-message
```

*Site* and *machine* are the site and machine names of the system to which the user belongs or on which the specified command is to be executed. The site and machine names must end with an exclamation mark (!) or colon (:), respectively, and must be defined in a systemid file. A machine alias may be used in place of a site and machine name if it is followed by a question mark.

*User* is a user login name or another alias. User names in a list must be separated by commas. A newline may immediately follow a

comma. Spaces and tabs are allowed, but only immediately before or after a comma or newline.

*Command-pipeline* is any valid command (with necessary arguments) preceded by a pipe symbol (|) and enclosed in double quotation marks. Spaces may separate the command and arguments, but there must be no space between the first double quotation mark and the pipe symbol.

*Error-message* is any sequence of letters, numbers, and punctuation marks (except a double quotation mark) preceded by a number sign (#) and enclosed in double quotation marks.

In the *faliases* file, each line can have the same form as lines in the *aliases* file except that no more than one user name can be given for any one alias.

In the *maliases* file a line has the form:

```
alias:[[site!]machine:]...
```

*Site* and *machine* are the site and machine names for a specific network and system. Multiple site and machine names direct messages along the specified path of systems. If no site or machine name is given, the alias is ignored.

Before the *mail* program sends a message, it searches the *aliases.hash*, *faliases*, and *maliases* files to see if any of the names given with the command are aliases. Each file is searched in turn, (*aliases.hash*, *faliases*, then *maliases*) and if a match is found, the alias is replaced with its meaning. If no match is found, the name is assumed to be the valid login name of a user on that machine. The search in the *aliases.hash* file continues until all aliases have been replaced, so it is possible for several replacements to occur for a single name. (If a loop exists, processing continues indefinitely.) The *faliases* file is searched once, from beginning to end, even if it is empty. The *maliases* file is searched only if the alias contains a machine alias.

When an alias is a user or a list of users, the *mail* command sends the message to each user in the list. When it is a command-pipeline, the *mail* command starts execution of the command on the specified machine and sends the message as input. When the alias is an error-message, the *mail* command ignores the message and instead displays the alias and its meaning at the standard error.

In all files, any line beginning with a number sign (#) is considered a comment and is ignored.

As a special feature, any alias that contains a site name as the first component of its meaning is automatically prepended with the machine alias *uucp?*. This alias may be explicitly defined in the *maliases* file to help direct mail between networks to the system

*ALIASES* (M)

*ALIASES* (M)

performing the uucp link.

#### **Files**

/usr/lib/mail/aliases

/usr/lib/mail/aliases.hash

/usr/lib/mail/maliases

/usr/lib/mail/faliases

#### **See Also**

aliashash(M), netutil(C), systemid(M), top(M)

## Name

aliashash - Micnet alias hash table generator

## Syntax

aliashash [ -v ] [ -o output-file ] [ input-file ]

## Description

The *aliashash* command reads the *input-file* and generates a *output-file* containing a hash table of alias definitions for a Micnet network. The *input-file* must name a file containing alias definitions in the form described for the *aliases* file (see *aliases(M)*). If the *-o* option is not used to specify an *output-file*, the command creates a file with the same name as the *input-file* but with *.hash* appended to it. If no *input-file* is given, the command reads the file named */usr/lib/mail/aliases* and creates the file named */usr/lib/mail/aliases.hash*.

If invoked with the *-v* option, the command lists information about the hash table.

The *output-file* will contain both the alias definitions given in the *input-file* and the new hash table. The hash table appears at the beginning of the file and is separated from the alias definitions by a blank line. The hash table has three or more lines. The first line is:

```
#<hash>
```

The second line has 4 entries: the bytes per table entry, the maximum number of items per hash value, the number of entries in the table, and the offset (in bytes) from the beginning of the file to the beginning of the alias definitions.

The next lines (up to the end of the hash table) contain the hash table entries. Each line has 8 entries (separated by spaces) and each entry has 2 fields. The first field (1 byte) is a checksum (represented as a printable character) the second field is a pointer (in bytes) to the alias definition. The pointer is represented as a hexadecimal number with leading blanks if necessary and is always relative to the start of the definitions.

The *aliashash* command is normally invoked by the *install* option of the *netutil* command. If the alias definitions of a network must be changed, the definitions in the *aliases* file should be changed and a new *aliases.hash* file created using the *aliashash* command. The new *aliases.hash* file must then be copied to all other computers in the network.

**Files**

/usr/lib/mail/aliashash

/usr/lib/mail/aliases

/usr/lib/mail/aliases.hash

**See Also**

aliases(M), netutil(C)

**Warning**

Do not use the *aliashash* command to create the *aliases.hash* file while the network is running. If necessary, create a temporary output file, *aliases.hash-*, using the *-o* option, then type:

```
mv aliases.hash- aliases.hash
```

This will prevent disruption of the network.

## Name

ascii - Map of the ASCII character set.

## Description

Ascii is a map of the ASCII character set. It lists both octal and hexadecimal equivalents of each character. It contains:

|         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 000 nul | 001 soh | 002 stx | 003 etx | 004 eot | 005 enq | 006 ack | 007 bel |
| 010 bs  | 011 ht  | 012 nl  | 013 vt  | 014 np  | 015 cr  | 016 so  | 017 si  |
| 020 dle | 021 dcl | 022 dc2 | 023 dc3 | 024 dc4 | 025 nak | 026 syn | 027 etb |
| 030 can | 031 em  | 032 sub | 033 esc | 034 fs  | 035 gs  | 036 rs  | 037 us  |
| 040 sp  | 041 !   | 042 "   | 043 #   | 044 \$  | 045 %   | 046 &   | 047 '   |
| 050 (   | 051 )   | 052 *   | 053 +   | 054 ,   | 055 -   | 056 .   | 057 /   |
| 060 0   | 061 1   | 062 2   | 063 3   | 064 4   | 065 5   | 066 6   | 067 7   |
| 070 8   | 071 9   | 072 :   | 073 ;   | 074 <   | 075 =   | 076 >   | 077 ?   |
| 100 @   | 101 A   | 102 B   | 103 C   | 104 D   | 105 E   | 106 F   | 107 G   |
| 110 H   | 111 I   | 112 J   | 113 K   | 114 L   | 115 M   | 116 N   | 117 O   |
| 120 P   | 121 Q   | 122 R   | 123 S   | 124 T   | 125 U   | 126 V   | 127 W   |
| 130 X   | 131 Y   | 132 Z   | 133 [   | 134 \   | 135 ]   | 136 ^   | 137 _   |
| 140 `   | 141 a   | 142 b   | 143 c   | 144 d   | 145 e   | 146 f   | 147 g   |
| 150 h   | 151 i   | 152 j   | 153 k   | 154 l   | 155 m   | 156 n   | 157 o   |
| 160 p   | 161 q   | 162 r   | 163 s   | 164 t   | 165 u   | 166 v   | 167 w   |
| 170 x   | 171 y   | 172 z   | 173 {   | 174     | 175 }   | 176 ~   | 177 del |

|        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 00 nul | 01 soh | 02 stx | 03 etx | 04 eot | 05 enq | 06 ack | 07 bel |
| 08 bs  | 09 ht  | 0a nl  | 0b vt  | 0c np  | 0d cr  | 0e so  | 0f si  |
| 10 dle | 11 dcl | 12 dc2 | 13 dc3 | 14 dc4 | 15 nak | 16 syn | 17 etb |
| 18 can | 19 em  | 1a sub | 1b esc | 1c fs  | 1d gs  | 1e rs  | 1f us  |
| 20 sp  | 21 !   | 22 "   | 23 #   | 24 \$  | 25 %   | 26 &   | 27 '   |
| 28 (   | 29 )   | 2a *   | 2b +   | 2c ,   | 2d -   | 2e .   | 2f /   |
| 30 0   | 31 1   | 32 2   | 33 3   | 34 4   | 35 5   | 36 6   | 37 7   |
| 38 8   | 39 9   | 3a :   | 3b ;   | 3c <   | 3d =   | 3e >   | 3f ?   |
| 40 @   | 41 A   | 42 B   | 43 C   | 44 D   | 45 E   | 46 F   | 47 G   |
| 48 H   | 49 I   | 4a J   | 4b K   | 4c L   | 4d M   | 4e N   | 4f O   |
| 50 P   | 51 Q   | 52 R   | 53 S   | 54 T   | 55 U   | 56 V   | 57 W   |
| 58 X   | 59 Y   | 5a Z   | 5b [   | 5c \   | 5d ]   | 5e ^   | 5f _   |
| 60 `   | 61 a   | 62 b   | 63 c   | 64 d   | 65 e   | 66 f   | 67 g   |
| 68 h   | 69 i   | 6a j   | 6b k   | 6c l   | 6d m   | 6e n   | 6f o   |
| 70 p   | 71 q   | 72 r   | 73 s   | 74 t   | 75 u   | 76 v   | 77 w   |
| 78 x   | 79 y   | 7a z   | 7b {   | 7c     | 7d }   | 7e ~   | 7f del |

## Files

/usr/pub/ascii

**Name**

console, tty01, tty02 - Lisa keyboard and screen.

**Description**

The console, tty01, and tty02 device files provide character I/O between the system and the Lisa screen and keyboard. Each file corresponds to a separate teletype device with an independent bit-mapped screen display and keyboard access. The files are used chiefly to display characters at the Lisa screen devices and read characters from the keyboard, but may also be used to generate bit-mapped graphics.

Although all three files may be open at the same time, only one of the corresponding devices can be active at any given time. The active device displays its own bit-mapped screen and takes sole possession of the keyboard. Changing from one active device to the next is accomplished by typing APPLE-ENTER (using the APPLE or COMMAND key and the ENTER key found in the numeric keypad). The changes are sequential, passing from console to tty01 to tty02 and back again. If the device is active, a write to the corresponding file affects the current screen and a read from the file reads the next line from the keyboard. If the device is not active, a write to the file is saved in the device's screen display and displayed when the device becomes active; a read to the file waits until the keyboard becomes active before returning.

When used to display characters, the screen has 30 lines of 88 characters each. When a new character is written to the screen, it is placed at the active position (usually marked by a cursor) and the active position moves one character to the right. If no room remains on a line, the active position moves to the next line down. If no room remains on the screen, the screen is scrolled up one line. The character sizes are normally 8 bits by 8 bits with an extra line above and below. The G2 and G3 alternate character sets described below are 10 bits high by 8 bits wide.

The following character sequences (defined by ANSI X3.64-1979) may be used to control and modify the screen display.

**CONSOLE (M)****CONSOLE (M)**

| <i>Character</i>                          | <i>Character Code</i> | <i>Meaning</i>                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ED<br>(Erase in Display)                  | ESC   Ps J            | Erases all or part of the display. If Ps=0, erases from the active position to the end of the display. If Ps=1, erases from the beginning of the display to the active position. If Ps=2, erases the entire display.                                                                                                                  |
| EL<br>(Erase in Line)                     | ESC   Ps K            | Erases all or part of a line. If Ps=0, erases from the active position to the end of the line. If Ps=1, erases from the beginning of the line to the active position. If Ps=2, erases the entire line.                                                                                                                                |
| SGR<br>(Select Graphic Rendition)         | ESC   Ps m            | Selects the mode or font for rendering subsequent character graphics. If Ps=0, normal. If Ps=1, bold. If Ps=4, underscore. If Ps=7, inverse. If Ps=10, normal font. If Ps=11, GS2 font. If Ps=12, GS3 font. Some modes may be combined by separating the parameters by “;”. For example, to reset to normal mode, use: ESC   0 ; 10 m |
| CUP<br>(Cursor Position)                  | ESC   P1 ; P2 H       | Moves the active position to the location given by P1 (vertical) and P2 (horizontal).                                                                                                                                                                                                                                                 |
| HVP<br>(Horizontal and Vertical Position) | ESC   P1 ; P2 f       | Moves the active position to the location given by P1 (vertical) and P2 (horizontal).                                                                                                                                                                                                                                                 |

*CONSOLE (M)*

CUU  
(Cursor Up)

CUD  
(Cursor Down)

CUF  
(Cursor Forward)

CUB  
(Cursor Backward)

HPA  
(Horizontal  
Position Absolute)

HPR  
(Horizontal  
Position Relative)

VPA  
(Vertical Position  
Absolute)

VPR  
(Vertical Position  
Relative)

IL  
(Insert Line)

ICH  
(Insert Character)

DL  
(Delete Line)

DCH  
(Delete Character)

ESC | Pn A

ESC | Pn B

ESC | Pn C

ESC | Pn D

ESC | Pn '

ESC | Pn a

ESC | Pn d

ESC | Pn e

ESC | Pn L

ESC | Pn @

ESC | Pn M

ESC | Pn P

*CONSOLE (M)*

Moves the active position up Pn number of lines.

Moves the active position down Pn number of lines.

Moves the active position to the right by Pn number of characters.

Moves the active position to the left by Pn number of characters.

Moves the active position to the character position given by Pn.

Moves the active position right by Pn characters.

Moves the active position to the line given by Pn.

Moves the active position down Pn lines.

Inserts Pn previously deleted lines at the active line.

Inserts Pn previously deleted characters at the active position.

Deletes Pn lines beginning with the active line.

Deletes Pn characters beginning with the active position.

SS2  
(Single Shift 2)

ESC N

Signals that the next character belongs to the G2 graphic set. Characters in the G2 set correspond to the ruling character set of the H19 or Z19 terminal.

SS3  
(Single Shift 3)

ESC O

Signals that the next character belongs to the G3 graphic set. Characters in the G3 character set are not currently defined.

These character sequences correspond to the terminal type *lisa* as defined in */etc/termcap* file.

Note that the ASCII characters FS (Quit) and DEL (Rubout) can only be generated by a combination of keys (e.g., CNTRL-\ for FS and CNTRL-[ for DEL). These key combinations can be defined with the *stty(C)* or *tset(C)* command.

The files may be used to generate graphics on the Lisa screen display. When a file is opened by a program, the bit-mapped screen display of the corresponding device is automatically mapped into the user's logical address space. This display memory extends from hexadecimal address **F00000** to address **F07FFF**. The bits in this screen memory represent the pixels on the Lisa screen. There are 720 bits (90 bytes) of screen memory for each of the 364 horizontal line of pixels on the screen. (Screen pixels form a grid 720 horizontal by 364 vertical pixels.) Bit 7 of the byte at the hexadecimal address **F00000** represents the pixel at the upper left corner of the screen and bit 0 of the byte at address **F07FFB** represents the pixel in the bottom right corner. Graphics are created by changing the value of the screen bits to change the color of the pixels. When a bit is set to 0, the corresponding pixel is white. When a bit is set to 1, the pixel is black. Note that the bits in the bytes after **F07FFB** should not be changed. Also, the system maps only one screen display at a time. If two files have been opened, the screen display of the first file is mapped; the second file is mapped as soon as the first file is closed.

#### Files

*/dev/console*

*/dev/tty01*

/dev/tty02

**See Also**

mouse(M)

**Notes**

The driver does not provide keyboard recognition. The keyboard layout used is the New U.S. Standard. There is no current support for the GS3 font, or for alternate fonts. It is anticipated that unused positions in the G2 and G3 graphic sets will be used to support user-defined fonts. There is no current support for European characters in either the keyboard or display driver. The bold graphic rendition does not work well with characters like m and w. Bold and inverse are incompatible with each other.

**Name**

daemon.mn - Micnet mailer daemon

**Syntax**

/usr/lib/mail/daemon.mn [-ex]

**Description**

The mailer daemon performs the "backend" networking functions of the *mail*, *rcp*, and *remote* commands by establishing and servicing the serial communication link between computers in a Micnet network.

When invoked, the daemon creates multiple copies of itself, one copy for each serial line used in the network. Each copy opens the serial line, creates a startup message for the LOG file, and waits for a response from the daemon at the other end. The startup message lists the names of the machines to be connected, the serial line to be used, and the current date and time. If the daemon receives a correct response, it establishes the serial link and adds the message "first handshake complete" to the LOG file. If there is no response the daemon waits indefinitely.

If invoked with the *-x* switch, the daemon records each transmission in the LOG file. A transmission entry shows the direction of the transmission (tx for transmit, rx for receive), the number of bytes transmitted, the elapsed time for the transmission (in minutes and seconds), and the time of day of the transmission (in hours, minutes, and seconds). Each entry has the form:

*direction byte\_count elapsed\_time time\_of\_day*

The daemon also records the date and time every hour. The date and time have the same format as described for the *date* command.

If invoked with the *-e* switch, the daemon records all transmission errors in the LOG file. An error entry shows the cause of the error preceded by the name of the daemon subroutine which detected the error.

The mailer daemon is normally invoked by the *start* option of the *netutil* command and is stopped by the *stop* option.

During the normal course of execution, the mailer daemon uses several files in the */usr/spool/micnet/remote* directory. These files provide storage for LOG entries, commands issued by the *remote(C)* command, and a list of processes under daemon control.

*DAEMON.MN* (M)

*DAEMON.MN* (M)

**Files**

*/usr/lib/mail/daemon.mn*

*/usr/spool/micnet/remote/\*/LOG*

*/usr/spool/micnet/remote/\*/mn*

*/usr/spool/micnet/remote/local/mn\**

*/usr/spool/micnet/remote/lock*

*/usr/spool/micnet/remote/pids*

**See Also**

*netutil*(C)

**Name**

default - Default program information directory.

**Description**

The files in the directory */etc/default* contain the default information used by system commands such as *dump(C)* and *remote(C)*. Default information is any information required by the command that is not explicitly given when the command is invoked.

The directory may contain zero or more files. Each file corresponds to one or more commands. A command searches a file whenever it has been invoked without sufficient information. Each file contains zero or more entries which define the default information. Each entry has the form:

keyword

or

keyword=value

where *keyword* identifies the type of information available and *value* defines its value. Both *keyword* and *value* must consist of letters, digits, and punctuation. The exact spelling of a *keyword* and the appropriate *values* depend on the command and are described with the individual commands.

Any line in a file beginning with a number sign (#) is considered a comment and is ignored.

**Files**

*/etc/default/dump*

*/etc/default/dumpdir*

*/etc/default/lpd*

*/etc/default/mkuser*

*/etc/default/passwd*

*/etc/default/quot*

*/etc/default/micnet*

*/etc/default/restor*

*DEFAULT*(M)

*DEFAULT*(M)

*/etc/default/su*

**See Also**

*dump*(C), *dumpdir*(C), *lpr*(C), *mkuser*(C), *pwadmin*(C), *quot*(C),  
*remote*(C), *restor*(C), *su*(C)

**Name**

environ - The user environment.

**Description**

The user environment is a collection of information about a user, such as his login directory, mailbox, and terminal type. The environment is stored in special "environment variables," which can be assigned character values, such as names of files, directories, and terminals. These variables are automatically made available to programs and commands invoked by the user. The commands can then use the values to access the user's files and terminal.

The following is a short list of environment variables.

- |      |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PATH | Defines the search path for the directories containing commands. The system searches these directories whenever a user types a command without giving a full pathname. The search path is one or more directory names separated by colons (:). Initially, PATH is set to <code>:/bin:/usr/bin</code> .                                                                                                                        |
| HOME | Names the user's login directory. Initially, HOME is set to the login directory given in the user's <code>passwd</code> file entry.                                                                                                                                                                                                                                                                                           |
| TERM | Defines the type of terminal being used. This information is used by commands such as <code>more(C)</code> which rely on information about the capabilities of the user's terminal. The variable may be set to any valid terminal name (see <code>terminals(M)</code> ) directly or by using the <code>tect(C)</code> command.                                                                                                |
| TZ   | Defines time zone information. This information is used by <code>date(C)</code> to display the appropriate time. The variable may have any value of the form <code>xxxnzzz</code> where <code>xxx</code> is standard local time zone abbreviation, <code>n</code> is the difference in hours from GMT, and <code>zzz</code> is the daylight-saving local time zone abbreviation (if any). For example, <code>EST5EDT</code> . |

The environment can be changed by assigning a new value to a variable. An assignment has the form

```
name=value
```

For example, the assignment

```
TERM=h29
```

sets the TERM variable to the value "h29". The new value can be "exported" to each subsequent invocation of a shell by exporting the variable with the *export* command (see *sh*(C)) or by using the *env*(C) command.

A user may also add variables to the environment, but must be sure that the new names do not conflict with exported shell variables such as MAIL, PS1, PS2, and IFS. Placing assignments in the *.profile* file is a useful way to change the environment automatically before a session begins.

Note that the environment is made available to all programs as a string of arrays. Each string has the form:

```
name=value
```

where the *name* is the name of an exported variable and the *value* is the variable's current value. For programs started with a *exec*(S) call, the environment is available through the external pointer *environ*. For other programs, individual variables in environment are available through *getenv*(S) calls.

#### See Also

*env*(C), *login*(M), *sh*(C), *exec*(S), *getenv*(SC), *profile*(M)

**Name**

**fd** - Lisa floppy disk drives.

**Description**

The file **fd** provides block-buffered access to the built-in Lisa floppy disk drive. The file accesses the disk via the system's normal buffering mechanism and may be read and written without regard to physical disk records. Each disk is 800 blocks long.

The file **rfd** provides a "raw" interface for direct transmission between the disk and the user's read or write buffer. When accessing the raw file, the user's buffer must begin on a word boundary and the count in a *read(S)*, *write(S)*, or *lseek(S)* call must be a multiple of 512 bytes (one disk block).

Whenever the devices **fd** and **rfd** are closed, the system will automatically eject the disk. There are special files named **nfd** and **nrfd**, which will not automatically eject the disk when the file is closed (the 'n' is for no-eject).

The following *ioctl(S)* call requests may be used to format and unclamp floppy disks. These calls require exclusive use of the device and prevent subsequent opens until the device is closed.

**FDIOCFDSK**

Formats one or more tracks of a floppy disk. The third call parameter must give the starting track number (0-45) in bits 5-0 and the side number (0 or 1) in bit 6.

**FDIOCFTRK**

Formats one track. The third call parameter must give the track number (0-45) in bits 5-0 and the side number (0 or 1) in bit 6.

**FDIOCUNLD**

Unlocks and ejects the floppy disk in the disk drive given by the file descriptor. Further operations on the drive are forbidden until another disk is loaded.

**Files**

*/dev/fd /dev/rfd /dev/nfd /dev/nrfd*

**Diagnostics**

The following messages may be printed on the console:

*fd write protected*

An attempt was made to open for writing a write-protected floppy disk.

FD(M)

FD(M)

*fd not loaded*

An attempt was made to open a drive which had no disk in place.

*fd in use*

The disk eject button was pushed on an open drive.

**See Also**

eject(C)

**Name**

fixperm - Correct or initialize file permissions and ownership.

**Synopsis**

fixperm [-c |-s |-n |-v |-f |-l |-S |-d[BSTOA]] specfile

**Description**

For each line in the specification file *specfile*, *fixperm* makes the listed pathname conform to a specification. *fixperm* is typically used to configure a XENIX system upon installation. Only the superuser can run *fixperm* with any flag but -n, -f or -l (see options).

The specification file has the following format: Each non-blank line consists of either a comment or an item specification. A comment is any text from a pound sign "#" up to the end of the line. There is one item specification per line. An item specification consists of a package specifier a permission specification, owner and group specifications, the number of links on the file, and the file name.

The package specifier consists of one of the following letters:

- B Base Package
- S Software Development
- T Text Processing Package
- O Optional user-defined package.

After the package specifier is a permission specification. The permission specification consists of a file type, followed by a numeric permission specification. The item specification is one of the following characters:

- x Executable
- a Archive
- e Empty file (create if -c option given)
- b Block device
- c Character device
- d Directory

## f Text file.

The numeric permission conforms to the scheme described in `chmod(C)`. The owner and group permissions are in the third column separated by a slash: e.g.: "bin/bin". The fourth column indicates the number of links. If there are links to the file, the next line will contain the linked filename with no other information. The fifth column is a pathname. The pathname must be relative, i.e., not preceded by a slash "/". The sixth column is only used for special files, giving the major and minor device numbers.

## Options

The following options are available from the command line:

- c Create empty files and missing directories.
- d<character>  
Process input lines beginning with given package specifier character (see above). For instance, -dT will only process items specified as belonging to the Text Processing Package, -dA will process all lines.
- f List files only on standard output.
- l List files and directories on standard output.
- n Report all significant errors, other than non-stripped files and those previous to version 3.
- v Report all significant errors, including non-stripped files and executable files previous to version 3.
- s Modify special device file in addition to the rest of the permlist.
- S Executable files must be x.out format.

The following two lines make a distribution and invoke `tar(C)` to archive only the files in `base.perm` on `/dev/whatever`:

```
# /etc/fixperm -f /etc/base.perms > list
# tar cF /dev/whatever list
```

This example reports base package errors in your file system:

```
# /etc/fixperm -n -dB /etc/base.perms
```

*FIXPERM (M)*

*FIXPERM (M)*

**Notes**

Usually fixperm is only run by a shell script at installation.

**Name**

getty — Sets terminal mode.

**Syntax**

/etc/getty [ char ]

**Description**

*Getty* automatically adapts a terminal's serial line to allow proper communication between the terminal and the system. It is one of three programs (*init*(M), *getty*(M), and *login*(C)) used by the system to enable a terminal and allow user logins.

*Getty* is initially called by *init* which passes a single character argument *char*. (*Init* reads the argument from the *ttys* file.) *Getty* uses *char* to set the initial line speed and to determine the type of terminal to be accessed. It then writes a "system!login:" message, indicating the user may log in on the machine named *system*.

If the user types a name and terminates it with a newline (ASCII LF) or carriage return (ASCII CR), *getty* scans the name for uppercase alphabetic characters. If only uppercase characters are found, *getty* adapts the system to map all subsequent lowercase characters into the corresponding uppercase characters. Furthermore, if the name terminates with a carriage return character, *getty* sets the terminal's serial line mode to CRMOD (see *ioctl*(S)).

If, on the other hand, the user presses the BREAK key, *getty* writes the login message again. It also changes the serial line speed if *char* is one of those which cause "cycling" as described below. This allows the system to adapt to terminals whose line speeds vary.

After a name has been typed and scanned, *getty* passes it to *login*(C) which asks for the user's password and completes the login process.

The *char* argument may be any one of the following:

- 0 Cycles through 300–1200–150–110 baud. Useful as a default for dialup lines accessed by a variety of terminals.
- Intended for an on-line Teletype model 33, for example an operator's console.
- 1 Optimized for a 150-baud Teletype model 37.
- 2 Intended for an on-line 9600-baud terminal that requires delays, for example the Tectronix 4104.
- 3 Starts at 1200 baud, cycles to 300 and back. Useful with

212 datasets where most terminals run at 1200 speed.

- 4 Useful for on-line console DECwriter (LA36).
- 5 Same as 3 above, but starts at 300.
- 6 Intended for machine-to-machine (such as over a network) logins at 2400 baud.
- 9 On-line 9600 baud terminal that doesn't require delays.

The following types are intended for general-purpose on-line terminals (unlike the specialized settings above), and differ only in the baud rate:

- a 50 baud.
- b 75 baud.
- c 110 baud.
- d 134.5 baud, usually with 2 stop bits.
- e 150 baud.
- f 200 baud.
- g 300 baud.
- h 600 baud.
- i 1200 baud.
- j 1800 baud.
- k 2400 baud.
- l 4800 baud.
- m 9600 baud.
- n External baud rate "A," usually 19200 baud.
- o External baud rate "B," often either 3600 or 7200 baud.

*Getty* is intended to be invoked by *init*(M). Invoking *getty* as an ordinary command is not recommended.

**See Also**

*login*(C), *ioctl*(S), *ttys*(M), *init*(M)

**Files**

*/etc/ttys*, */etc/systemid*

**Name**

group - Format of the group file.

**Description**

*Group* contains for each group the following information:

- Group name
- Encrypted password (optional)
- Numerical group ID
- Comma-separated list of all user allowed in the group

This is an ASCII file. The fields are separated by colons; each group is separated from the next by a newline. If the password field is null, no password is demanded.

This file resides in directory */etc*. Because of the encrypted passwords, it can and does have general read permission and can be used, for example, to map numerical group IDs to names.

**Files**

*/etc/group*

**See Also**

*newgrp(C)*, *passwd(C)*, *crypt(S)*, *passwd(M)*

**Name**

init - Process control initialization.

**Syntax**

*/etc/init*

**Description**

The *init* program is invoked as the last step of the boot procedure and as the first step in enabling terminals for user logins. *Init* is one of three programs (*init*, *getty*(M), and *login*(M)) used to initialize a system for execution.

*Init* creates a process for each terminal on which a user may log in. It begins by opening the console device, */dev/console*, for reading and writing. It then invokes a shell which asks for a password to start the system in maintenance mode. The user may type the password or terminate the shell by typing ASCII end-of-file (CNTRL-D) at the console. If the shell terminates, *init* performs several steps to begin normal operation. It invokes a shell and reads the commands in the */etc/rc* file. This command file performs housekeeping tasks such as removing temporary files, mounting file systems, and starting daemons. Then *init* reads the file */etc/ttys* and forks several times to create a process for each terminal device in the file. Each line in the */etc/ttys* lists the state of the line (0 for closed, 1 for open), the line mode, and the serial line (see *ttys*(M)). Each process opens the appropriate serial line for reading and writing, assigning the file descriptors 0, 1, and 2 to the line and establishing it as the standard input, output, and error files. If the serial line is connected to a modem, the process delays opening the line until someone has dialed up and a carrier has been established on the line.

Once *init* has opened a line, it executes the *getty* program, passing the line mode as an argument. The *getty* program reads the user's name and invokes *login*(M) to complete the login process (see *getty*(M) for details). *Init* waits until the user logs out by typing ASCII end-of-file (CNTRL-D) or by hanging up. It responds by waking up and removing the former user's login entry from the file *utmp*, which records current users, and makes a new entry in the file *wtmp*, which is a history of logins and logouts. Then the corresponding line is reopened and *getty* is reinvoked.

*Init* has special responses to the hangup, interrupt, and quit signals. The hangup signal SIGHUP causes *init* to change the system from normal operation to maintenance mode. The interrupt signal SIGINT causes *init* to read the *ttys* file again to open any new lines and close lines that have been removed. The quit signal SIGQUIT causes *init* to disallow any further logins. In general, these signals have a significant effect on the system and should not be used by a naive

*INIT*(M)

*INIT*(M)

user. Instead, similar functions can be safely performed with the *enable*(C), *disable*(C), and *shutdown*(C) commands.

#### Files

*/dev/tty\**

*/etc/utmp*

*/usr/adm/wtmp*

*/etc/ttys*

*/etc/rc*

#### See Also

*disable*(C), *enable*(C), *login*(M), *kill*(C), *sh*(C), *shutdown*(C), *ttys*(M), *getty*(M)

**Name**

ld - loads Intel 8086 relocatable format to x.out.

**Synopsis**

ld [options] files [libraries]

**Description**

ld combines one or more object modules in INTEL 8086 relocatable format, resolves external references, and searches libraries, producing an executable x.out runfile. This file is made executable only if no errors occur during the load. The default output file name is x.out. The argument routines are concatenated in the order specified. The entry point of the output is the beginning of the first routine.

ld handles Intel 8086 Small and Medium Models. Where the regular expression [SM] occurs in this manual page, it means that there are two separate files with one of the capital letter S or M appearing at that point in their name. The files are requisite to each model. Note: many loader errors are caused by incorrect INTEL model libraries or objects.

If a routine from a library references another routine in the library, and the library has not been processed by ranlib(CP), the referenced routine must appear after the referencing routine in the library. Thus the order of programs within libraries may be important. If the first member of a library is named \_\_.SYMDEF, then it is understood to be a dictionary for the library such as produced by ranlib; the dictionary is searched iteratively to satisfy as many references as possible.

ld automatically searches the libraries /usr/lib/[SM]libc.a and /usr/lib/[SM]libcfp.a. These libraries are, respectively, the standard C library for the 8086 and the 8086/8087 floating point libraries.

ld allows the user two methods of specifying libraries from the command-line. The library may be specified verbatim, as the argument following a -l flag. In this case one space must occur in the command line between the -l and the relative or absolute pathname name of a library to search.

An abbreviated library name is specified from the command line by the -l flag appended to an abbreviation. In this case there is no space between the -l and the abbreviation. The abbreviated library name is expanded to /usr/lib/[SM]lib<abbreviation>.a. For example, -ltermlib gets expanded to /usr/lib/Slibtermlib.a if no -M flag has been seen yet, and /usr/lib/Mlibtermlib.a if preceded

by -M in the argument list.

The symbols "\_etext", "\_edata" and "\_end" ("etext", "edata" and "end" in C) are reserved, and if referred to are set respectively to the first location above the program, the first location above initialized data, and the first location above all data. It is erroneous to define these symbols.

Except for -l, the following should appear before the file names.

- m [name] Create a memory map in name. This map specifies the load addresses of the executable.
- o [name] Output executable will be called name. Default is x.out.
- i Split I and D (separate text and data).
- C Case is significant in the symbol table of the objects loaded.
- F [hex no] Fixed stack size. This restricts the stack size to [hex no] bytes. Default is 16K.
- M Allow Medium Model.
- s Strip symbol table from output runfile.
- d Verbose (debug) mode. Tell user which pass is being executed.
- l [library] Search library file. Name is verbatim.
- l [name] Expand lib to /usr/lib/[SM]lib<name>.a.
- v Set header version bit for 2.3. Default is 3.0.

## Files

|                 |                   |
|-----------------|-------------------|
| /bin/ld         | the loader itself |
| /lib/[SM]lib*.a | libraries         |
| x.out           | output file       |

## Notes

See also 8086 Object Module Format, (OMF), Intel External Product Specification, 1981.

as(CP), cc(CP).

The portion of the load map sorted by address is jumbled.

**Name**

contrast – Lisa special devices.

**Description**

The *contrast* file provides access to the contrast control of the Lisa console display. The function of the file is similar to a manual contrast control on a monitor. Each byte written to the device changes the contrast level – the higher the byte value, the sharper the contrast. If multiple bytes are written in a single call, the second and later bytes will be delayed to effect a seemingly continuous change.

**Files**

/dev/contrast

**NOTES**

Many keys and key combinations have special meanings to the system. These keys and key combinations have special names that are unique to the system and may or may not correspond to the keytop labels on your keyboard. To help you find the special keys, the following table shows which keys on the Lisa terminal correspond to system keys. In this table, a hyphen (-) between keys means hold down the first key while pressing the second.

| XENIX Name | Lisa Keytop | Action                                                                                        |
|------------|-------------|-----------------------------------------------------------------------------------------------|
| INTERRUPT  | Apple-C     | Stops current action and returns to the shell. This key is also called the DELETE or RUB key. |
| BACKSPACE  | Backspace   | Deletes the first character to the left of the cursor.                                        |
| CNTRL-D    | Apple-D     | Signals the end of input from the keyboard; also exits current shell.                         |
| CNTRL-H    | Apple-H     | Deletes the first character to the left of the cursor. Also called the ERASE key.             |
| CNTRL-Q    | Apple-Q     | Starts printing after it has been stopped with CNTRL-S.                                       |
| CNTRL-S    | Apple-S     | Stops printing at the standard output device (does not stop the program).                     |

**LISA (M)**

**LISA (M)**

**CNTRL-U**

**Apple-U**

Deletes all characters on the current line. Also called the KILL key.

**Apple-\**

Quits current command and creates a *core* file (Recommended for debugging only).

**ESCAPE**

**Clear**

Exits the current mode; for example, exits insert mode when in the editor *vi*.

## Name

login - Gives access to the system.

## Description

The *login* command is used at the beginning of each terminal session and allows you to identify yourself to the system. It cannot be invoked except when a connection is first established, or after the previous user has logged out by sending an end-of-file ( CNTRL-D ) to his initial shell.

*Login* asks for your user name, and if appropriate, your password. Echoing is turned off (where possible) during the typing of your password, so it will not appear on the written record of the session.

At some installations, an option may be invoked that will require you to enter a second "external" password. This will occur only for dial-up connections, and will be prompted by the message "External security:". Both passwords are required for a successful login.

If password aging has been invoked by the super-user on your behalf, your password may have expired. In this case, you will be shunted into *passwd(C)* to change it, after which you may attempt to log in again.

If you do not complete the login successfully within a certain period of time (e.g., one minute), you are likely to be returned to the "login:" prompt or silently disconnected from a dial-up line.

After a successful login, accounting files are updated, you are informed of the existence of any mail, and the start-up profile files (i.e., */etc/profile* and *\$HOME/.profile*) (if any) are executed (see *profile(M)*). *Login* initializes the user and group IDs and the working directory, then executes a command interpreter (usually *sh(C)*) according to specifications found in the */etc/passwd* file. Argument 0 of the command interpreter is a dash (-) followed by the last component of the interpreter's pathname. The *environment* (see *environ(M)*) is initialized to:

HOME= your-login-directory

PATH=:/bin:/usr/bin

Initially, *umask* is set to octal 022 by *login*.

## Files

*/etc/utmp*

Accounting

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| <code>/usr/adm/wtmp</code>             | Accounting                        |
| <code>/usr/spool/mail/your-name</code> | Mailbox for user <i>your-name</i> |
| <code>/etc/motd</code>                 | Message of the day                |
| <code>/etc/passwd</code>               | Password file                     |
| <code>/etc/profile</code>              | System profile                    |
| <code>\$HOME/.profile</code>           | Personal profile                  |

**See Also**

mail(C), newgrp(C), sh(C), passwd(C), su(C), umask(C),  
passwd(M), profile(M), environ(M), getty(M)

**Diagnostics***Login incorrect*

The user name or the password is incorrect.

*No shell, cannot open password file, no directory:*

Your account has not been properly set up.

*Your password has expired. Choose a new one.*

Password aging is implemented and yours has expired.

**Notes**

Under 3.0, only the super-user may execute *login* from a shell. Hence non-super-users must log out in order to log in as another user.

Furthermore, there has been a change in *login*'s functionality. Pre-system III *login*, if invoked from the command line while someone is logged on already, logs the current user out and logs in the new user. The new 3.0 *login* nests, i.e., the current user is not logged out. Thus it is somewhat like *su*, except that the new user's *.login* or *.profile* is run. Permissions and environment are those of the new user. When the new user logs out, the previous user is still running. This practice is not recommended, as nested logins can impair system performance.

**Name**

lp - Lineprinter device.

**Description**

The lp file is used for character I/O between the system and the standard Lisa dot matrix printer. This file directs output through a parallel communications port to the printer. The printer must be attached to the lower parallel port of a two-port parallel port card installed in expansion slot 1 of the Lisa.

The file is accessed by the lineprinter daemon, *lpd*, which is in turn called by *lpr(C)*. The lineprinter daemon does not perform any special translations. For convenience, the daemon sets the printer's tab width to 8 columns whenever it opens the file and sends a page eject to the printer whenever it closes the file.

**File**

/dev/lp

**See Also**

*lpr(C)*

**Name**

Machine -- Description of host machine.

**Description**

This page lists the internal characteristics of the Apple Lisa computer and its associated hardware. The information is intended for software developers who wish to transfer relocatable object or executable files from other XENIX machines to the Lisa and then prepare the files for execution on the Lisa.

|                                 |                           |
|---------------------------------|---------------------------|
| Central Processing Unit         | Motorola M68000           |
| Disk Block Size(BSIZE)          | 512 bytes                 |
| Disk Capacity:                  |                           |
| Profile Hard Disk (formatted)   | 9728 blocks (4864K bytes) |
| Sony Micro Disk (formatted)     | 800 blocks (851K bytes)   |
| Memory Management Scheme        | Paging with MMU           |
| Memory Page Size                | 512 bytes                 |
| Shared (Pure) Text              | Supported                 |
| Variable Stack Size             | Supported                 |
| Data Relocation Base Addresses: |                           |
| Impure Text                     | Size of the text          |
| Pure Text                       | 0x0L                      |
| Text Relocation Base Adresses:  |                           |
| Impure Text                     | 0x0L                      |
| Pure Text                       | 0x800000L                 |

Binary executable files without the required relocation base addresses (as described above) will not run on the Lisa. However, binary executable files with the "short" form of relocation still attached can be adapted for execution on the Lisa with the *ld(M)* command. See the examples at the end of the *ld(M)* reference page.

**See Also***ld(M)*

**Name**

makekey - Generates an encryption key.

**Syntax**

/usr/lib/makekey

**Description**

*Makekey* improves the usefulness of encryption schemes by increasing the amount of time required to search the key space. It reads 10 bytes from its standard input, and writes 13 bytes on its standard output. The output depends on the input in a way that is intended to be difficult to compute (i.e., to require a substantial fraction of a second).

The first 8 input bytes (the *input key*) can be arbitrary ASCII characters. The last 2 input bytes (the *salt*) are best chosen from the set of digits, dot (.), slash (/), and uppercase and lowercase letters. The *salt* characters are repeated as the first 2 characters of the output. The remaining 11 output characters are chosen from the same set as the *salt* and constitute the *output key*.

The transformation performed is essentially the following: the *salt* is used to select one of 4,096 cryptographic machines all based on the National Bureau of Standards DES algorithm, but broken in 4,096 different ways. Using the *input key* as the key, a constant string is fed into the machine and recirculated. The 64 bits that come out are distributed into the 66 *output key* bits in the result.

*Makekey* is intended for use with programs that perform encryption (e.g., *ed(C)* and *crypt(C)*). Usually its input and output will be pipes.

**See Also**

*crypt(C)*, *ed(C)*, *passwd(M)*

**Name**

mem, kmem - Memory image file.

**Description**

The mem file provides access to the computer's physical memory. All byte addresses in the file are interpreted as memory addresses. Thus, memory locations can be examined in the same way as individual bytes in a file. Note that accessing a nonexistent location causes an error.

The kmem file is the same as mem except that it corresponds to kernel virtual memory rather than physical memory.

In rare cases, the mem and kmem files may be used to write to memory and memory-mapped devices. Such patching is not intended for the naive user and may lead to a system crash if not conducted properly. Patching device registers is likely to lead to unexpected results if the device has read-only or write-only bits.

**Files**

/dev/mem

/dev/kmem

**Name**

messages - Description of system console messages.

**Description**

This section describes the various nondevice system messages which may appear on the system console. Device-related messages start with the name of the device driver; these messages are documented by device in other pages in this section.

Most of these system messages begin with "panic:" and are fatal (the system refuses to execute further). Fatal messages represent hardware problems or kernel software inconsistencies. Such internal inconsistencies are usually traceable to hardware problems themselves, often forms of memory failure.

A few messages represent kernel operation problems, typically the overflow of a critical table. These potential problems are guarded against by the kernel. It takes extreme situations to bring them about, so they should never occur in normal system use.

The messages are categorized as follows:

**Fatal**

Recovery is impossible.

**System inconsistency**

A contradictory situation exists in the kernel.

**Abnormal**

A probably legitimate but extreme situation exists.

**Hardware**

Indicates a hardware problem.

Many of the following messages are accompanied by a device specification, *dev*. This will print as *nn/mm* where *nn* is the major number and *mm* is the minor number of the offending device. If you do not recognize the device by its numbers type:

```
ls -l /dev |grep nn |grep mm
```

This will allow you to associate numbers with a physical device.

The messages are presented below in alphabetical order:

**bad block on dev *dev***

A nonexistent disk block was found on, or is being inserted in, the structure's free list. *System inconsistency*.

bad count on dev *dev*

Bad free count on dev *dev*

A structural inconsistency in the superblock of a file system. The system attempts a repair, but this message will probably be followed by more complaints about this file system. *System inconsistency.*

err on dev *nam dev*

This is the way that most device driver diagnostic messages start. The message will indicate the specific driver and complaint. The *nam* is a word identifying the device.

Inode table overflow

Each open file requires an inode entry to be kept in memory. When this table overflows the specific request (usually *open(2)* or *creat(2)*) is refused. Although not fatal to the system, this event may damage the operation of various spoolers, daemons, the mailer, and other important utilities. Anomalous results and missing data files are a common result. *Abnormal.*

interrupt from unknown device, vec=xxxx

The CPU received an interrupt via a supposedly unused vector. This message is followed by "Panic: unknown interrupt." Typically this event comes about when a hardware failure miscalculates the vector of a valid interrupt. *Hardware.*

no file

There are too many open files, the system has run out of entries in its "open file" table. The warnings given for the message "inode table overflow" apply here. *Abnormal.*

no space on dev *dev*

This message means that the specified file system has run out of free blocks. Although not normally as serious, the warnings discussed for "inode table overflow" apply: often programs are written casually and ignore the error code returned when they tried to write to the disk; this results in missing data and "holes" in data files. The system administrator should keep close watch on the amount of free disk space and take steps to avoid this situation.

\*\* Normal System Shutdown \*\*

This message appears when the system has been shutdown properly. It indicates that the machine may now be rebooted or powered down.

Out of inodes on dev *dev.*

The indicated file system has run out of free inodes. The number of inodes available on a file system is determined when *mkfs(C)* is run. The default number is quite generous, this message should be very rare. The only recourse is to remove some worthless files from that file system, or dump the

entire system to a backup device, rerun *mkfs(C)* with more inodes specified, and restore the files from backup.

out of text

When programs linked with the *ld - i* or *- n* switch are run, a table entry is made so that only one copy of the pure text will be in memory even if there are multiple copies of the program running. This message appears when this table is full. The system refuses to run the program which caused the overflow. Note that there is only one entry in this table for each different pure text program. Multiple copies of one program will not require multiple table entries. Each "sticky" program (see *chmod(C)*) requires a permanent entry in this table; nonsticky pure text programs require an entry only when there is at least one copy being executed.

panic: /0 trap

A divide-by-zero occurred when executing kernel or device driver code. *System inconsistency, fatal.*

panic: blkdev

An internal disk I/O request, already verified as valid, is discovered to be referring to a nonexistent disk. *System inconsistency, fatal.*

panic: devtab

An internal disk I/O request, already verified as valid, is discovered to be referring to a nonexistent disk. *System inconsistency, fatal.*

panic: core free list

The internal memory allocation list has become corrupted. *System inconsistency, fatal.*

panic: free mm <1 pages

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: freeing free mm

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: iaddress > 2<sup>24</sup>

This indicates an attempted reference to an illegal block number, one so large that it could only occur on a file system larger than 8 billion bytes. *System inconsistency, fatal.*

panic: iinit

The super-block of the root file system could not be read. This message occurs only at boot time. *Hardware, fatal.*

panic: impossible data page

The internal description of a task's memory has become

corrupted. *System inconsistency, fatal.*

panic: impossible stack page

The internal description of a task's memory has become corrupted. *System inconsistency, fatal.*

panic: impossible text page

The internal description of a task's memory has become corrupted. *System inconsistency, fatal.*

panic: Ill. TTY driver

An attempt was made to call an illegal tty driver. *System inconsistency, fatal.*

panic: Impossible trap type

The system hardware generated a trap of an unknown type. *Hardware, fatal.*

panic: IO err in swap

A fatal I/O error occurred while reading or writing the swap area. *Hardware, fatal.*

panic: Kernel data too large

An attempt to boot a XENIX kernel whose "data+ bss" segments are too large.

panic: mmblock

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: mmufreemm

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: mmugetmm

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: mmumvmap

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: mmusub:chk

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: memory parity

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

panic: multi seg data

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

## panic: no fs

A file system descriptor has disappeared from its table. *System inconsistency, fatal.*

## panic: no imt

A mounted file system has disappeared from the mount table. *System inconsistency, fatal.*

## panic: no procs

Each user is limited in the amount of simultaneous processes he can have; an attempt to create a new process when none is available or when the user's limit is exceeded is refused. That is an occasional event and produces no console messages; this panic occurs when the kernel has certified that a free process table entry is available and yet can't find one when it goes to get it. *System inconsistency, fatal.*

## panic: out of swap

There is insufficient space on the swap disk to hold a task. The system refuses to create tasks when it feels there is insufficient disk space, but it is possible to create situations to fool this mechanism. *Abnormal, fatal.*

## panic: overflow trap

The CPU generated an overflow trap while executing kernel or device driver code. *System inconsistency, fatal.*

## panic: request for &lt;1 mem

The internal memory management tables have become corrupted. *System inconsistency, fatal.*

## panic: Text on Non-Sep

The internal description of a task's memory has become corrupted. *System inconsistency, fatal.*

## panic: Timeout table overflow

The timeout table is full. Timeout requests are generated by device drivers, there should usually be room for one entry per system serial line plus ten more for other usages. *Abnormal, fatal.*

## panic: too much text

The internal description of a task's memory has become corrupted. *System inconsistency, fatal.*

## panic: trap in sys

The CPU has generated an illegal instruction trap while executing kernel or device driver code. This message is preceded with an information dump describing the trap. *System inconsistency, fatal.*

## panic: unknown interrupt

The CPU received an interrupt via a supposedly unused vector.

Typically this event comes about when a hardware failure miscomputes the vector of a valid interrupt. *Hardware, fatal.*

Stray int: level *n*

The CPU received an interrupt via a supposedly unused vector. This message is followed by "panic: unknown interrupt." This event comes about when a hardware failure miscomputes the vector of a valid interrupt. *Hardware, fatal.*

supervisor trap *type*

This message precedes a "panic:" message. The *type* is the trap number given by the particular processor. *System inconsistency, fatal.*

**Name**

micnet - The Micnet default commands file.

**Description**

The micnet file lists the system commands that may be executed through the *remote* command. The file is required for each system in a Micnet network. Whenever a *remote* command is received through the network, the Micnet programs search the micnet file for the system command specified with the *remote* command. If found, the command is executed. Otherwise, the command is ignored and an error message is returned to the system which issued the *remote* command.

The file may contain one or more lines. If all commands may be executed, then only the line

```
executeall
```

is required in the file. Otherwise, the commands must be listed individually. A line that defines an individual command has the form:

```
command=commandpath
```

*Command* is the command name to be specified in a *remote* command. *Commandpath* is the full pathname of the command on the specified system. The equal sign (=) separates the command and commandpath. For example, the line

```
cat=/bin/cat
```

defines the command name *cat* (used in the *remote* command) to refer to the system command *cat* in the */bin* directory.

When *executeall* is set, commands are sought in a series of default directories. Initially, the directories are */bin* and */usr/bin*. The default directories can be explicitly defined in the file by including a line of the form:

```
execpath=PATH=directory[:directory]...
```

The first part of the line, *execpath=PATH=*, is required. Each *directory* must be a valid pathname. The colon is required to separate directories. For example, the line

```
execpath=PATH=/bin:/usr/bin:/usr/bobf/bin
```

sets the default directories to */bin*, */usr/bin*, and */usr/bobf/bin*.

**Files**

/etc/default/micnet

**See Also**

aliases(M), netutil(C), systemid(M), top(M)

**Notes**

The rcp command cannot be executed from a remote system unless the micnet file contains either *executeall* , or the line

rcp=/usr/bin/rcp

**Name**

mouse -- Lisa mouse pointing device.

**Description**

The file **mouse** provides access to the Lisa mouse, a pointing device that controls the motion of a cursor on the Lisa console display and allows input from a button on the mouse body. The file allows user programs to get information about the mouse, such as current cursor position and state of the button, and to control its characteristics, such as the shape of the cursor and response to events.

When the file is opened, the mouse is immediately associated with the active Lisa console device (see *console(M)*). A cursor in the shape of an arrow appears on the screen and begins to track the subsequent motions of the mouse. Information about the mouse position and button status is generated and can be read using *ioctl(CP)* and *read(CP)* calls. This information is updated whenever one or more events occur such as pressing or releasing the button. Mouse positions are given in terms of horizontal and vertical pixels. Horizontal positions range from 0 to 720. Vertical positions range from 0 to 364. The position (0,0) is the upper left corner of the screen.

The chief interface between a user's program and the file is the *ioctl* call. This call can be used to pass information to and from the opened file. The content of the information and the subsequent action of the mouse depend on the *request* given with the call. To use these *requests* in a C program, the following include statements must be incorporated into the program:

```
#include    <ioctl.h>
#include    <mouse.h>
```

Furthermore, many *requests* require a pointer to one of the following structures as the third parameter in the corresponding *ioctl* call.

```
struct  mous_curs  {
    char    mc_hctr, mc_vctr; /* center of cursor */
    unsigned short  mc_and[MCSIZE];
                                /* nand'ed with screen */
    unsigned short  mc_xor[MCSIZE];
                                /* xor'ed with screen */
};
```

```

struct mous_pos {
    short  mp_x, mp_y;    /* x and y position */
};

struct mous_bstat {
    short  mb_stat; /* state of button(s) */
    short  mb_count;
            /* count of presses or releases */
    short  mb_x, mb_y;
            /* cursor position at last press or release */
};

```

The following is a list of all *requests*:

- MIOC**           Reset the mouse.  
 Initializes the mouse parameters, placing the cursor at the center of the screen, limiting cursor movement to the limits of the screen, setting the mickey/pixel ratio to 8 horizontally and 16 vertically, and setting the cursor counter to -1.
- MIOCSCUR**       Show cursor.  
 Increments a counter associated with the graphic cursor. If the counter is 0, the cursor is displayed on the screen. The initial value of the counter is -1.
- MIOCHCUR**       Hide cursor.  
 Decrements the counter associated with the graphic cursor. If the counter is less than 0, the cursor is removed from the screen. This call should precede any change to the display. For each call to hide the cursor, there should be a subsequent call to show the cursor.
- MIOCGPOS**       Get cursor position.  
 Returns the current cursor position in the third parameter of the *ioctl* call. The parameter must be a pointer to a structure of type *struct mous\_pos* as defined above.
- MIOCSPOS**       Set cursor position.  
 Moves the mouse cursor to the screen location given in the structure pointed to by the third parameter. The structure must have the type *struct mous\_pos* as defined above. The specified

screen location must be within the limits given by the MIOCSVMM and MIOCSHMM requests.

- MIOCB1DN** Get primary button press information.  
Returns the current button information in the structure pointed to by the third parameter. The information defined the current button status (pressed or released), a count of the number of times the button was pressed since the last call, and the cursor position at the time of the last button press. The structure must have the type *struct mous\_bstat* as described above.
- MIOCB1UP** Get primary button release information.  
Returns the current button information in the structure pointed to by the third parameter. The information describes the current button status (pressed or released), a count of the number of times the button was released since the last call, and the cursor position at the time of the last button released. The structure must have the type *struct mous\_bstat* as described above.
- MIOCB2D** Get secondary button press information.  
Unused. Maintains compatibility with two-button mouse.
- MIOCB2UP** Get secondary button release information.  
Unused. Maintains compatibility with two-button mouse.
- MIOCGRFC** Set graphics cursor.  
Defines the shape and center of the graphical cursor as given by the structure pointed to by the third parameter. The structure must have the type *struct mous\_curs* as defined above. The cursor is actually a square array which moves over the top of the screen display and affects the color of the screen pixels under it. The arrays *mc\_and* and *mc\_xor* define the shape of the cursor by defining the color of the screen pixels. The colors are created by first logically ANDing *mc\_and* with the screen under the cursor, then logically XORing *mc\_xor* with the result. The following tables shows the pixel color.

*MOUSE (M)*

*MOUSE (M)*

| If <i>mc_and</i> bit is: | If <i>mc_xor</i> bit is: | Then the result is: |
|--------------------------|--------------------------|---------------------|
| 0                        | 0                        | White pixel         |
| 0                        | 1                        | Black pixel         |
| 1                        | 0                        | Unchanged screen    |
| 1                        | 1                        | Inverted screen     |

The values of *mc\_hctr* and *mc\_vctr* define the horizontal and vertical location of the cursor's center (or "hot spot"). This is always relative to the upper left corner of the cursor array. The cursor is defined to be at horizontal position 0 when the cursor's center is at that position; similarly, the cursor is at vertical position 0 when the center is there. The default cursor is a large arrow pointing upward and to the left. The default center is the tip of the arrow.

**MIOCTXTC**

Set text cursor.

Unused. Permits later expansion of the mouse device.

**MIOCFILT**

Set read filter.

Causes the mouse device to update status information whenever the event(s) given by the third parameter occur. The third parameter, a word, represents a bit mask. When a bit is 1, the corresponding event causes updates. The events and mask values are defined as follows:

|                  |     |                                                 |
|------------------|-----|-------------------------------------------------|
| <b>MOUSFMOVE</b> | 01  | Produce input record on cursor movement.        |
| <b>MOUSFBIDN</b> | 02  | Produce record when button pressed.             |
| <b>MOUSFB1UP</b> | 04  | Produce record when button released.            |
| <b>MOUSFKBRD</b> | 040 | Produce record when keyboard character pressed. |

The read filter is initially set to zero.

- MIOCSRAT** Set mickey/pixel ratio.  
Sets the ratios of mouse movement to cursor movement to the values given in the structure pointed to by the third parameter. The structure must have type *struct mous\_pos* as defined above. The ratios are defined as the number of mouse increments (or "mickeys") required to produce a cursor movement of 8 pixels (mickeys are roughly 1/100 of an inch). The initial values of the ratios are 8 horizontally and 16 vertically.
- MIOCSHMM** Set horizontal minimum/maximum.  
Sets the minimum and maximum horizontal cursor positions to the values given in the structure pointed to by the third parameter. The structure must have type *struct mous\_pos* as defined above. The values must not exceed the limit of the screen.
- MIOCSVMM** Set vertical minimum/maximum.  
Sets the minimum and maximum vertical cursor positions to the values given in the structure pointed to by the third parameter. The structure must have type *struct mous\_pos* as defined above. The values must not exceed the limit of the screen.

After a MIOCFILT request, a user program may use a *read* call to read status information directly from the *mouse* file. The information has the form:

```

struct      mous_rec          /* record returned by
                                read */
                                char  mr_flag;          /* reason(s) for record */
                                char  mr_bstat;         /* state of buttons */
                                char  mr_char;          /* keyboard character
  if MOUSFKBRD */
                                char  mr_key;           /* unencoded key
  if MOUSFKBRD */
                                short  mr_x, mr_y;      /* cursor position at
  last event */
                                long   mr_time;         /* time at last event */
;

```

The number of bytes to be read must be equal to *sizeof (struct mous\_rec)*. The bit values in *mr\_flag* specify the event that

generated the information and correspond exactly to the bits defined with MIOCFILT. Multiple bits are set if more than one event occurred. When the MOUSFKBRD event is enabled, the character in *mr\_char* is also put onto the teletype input queue.

**Files**

/dev/mouse

**See Also**

mouse(S)

**Diagnostics**

If an error occurs,  $-1$  will be returned and one of the following values will be set into the external variable *errno*.

*s- IENXIOs0*

If the process does not have an associated display when an *open* is attempted.

*s- IEINVALs0*

If a parameter passed via *ioctl* is out of range.

*s- IEFAULTs0*

If a memory fault occurs when trying to access the values in a structure passed to *ioctl*.

*s- IEIOs0*

If an invalid byte count is passed to *read*.

*NULL* (M)

*NULL* (M)

**Name**

null - The null file.

**Description**

Data written on a null special file is discarded.

Reads from a null special file always return 0 bytes.

**Files**

/dev/null

**Name**

passwd - The password file.

**Description**

*Passwd* contains the following information for each user:

- Login name
- Encrypted password
- Numerical user ID
- Numerical group ID
- Comment
- Initial working directory
- Program to use as shell

This is an ASCII file. Each field within each user's entry is separated from the next by a colon (:). The comment can contain any desired information. Each user is separated from the next by a newline. If the password field is null, no password is demanded; if the shell field is null, *sh*(C) is used.

This file resides in the directory */etc*. Because the passwords are encrypted, the file has general read permission and can be used, for example, to map numerical user IDs to names.

The encrypted password consists of 13 characters chosen from a 64-character alphabet (., /, 0-9, A-Z, a-z), except when the password is null, in which case the encrypted password is also null. Password aging is in effect for a particular user if his encrypted password in the password file is followed by a comma and a nonnull string of characters from the above alphabet. (Such a string must be introduced by the super-user.) The first character of the age denotes the maximum number of weeks for which a password is valid. A user who attempts to log in after his password has expired will be forced to supply a new one. The next character denotes the minimum period in weeks which must expire before the password may be changed. The remaining characters define the week (counted from the beginning of 1970) when the password was last changed. (A null string is equivalent to zero.) The first and second characters must have numerical values in the range 0-63, where the dot (.) is equal to 0 and lowercase z is equal to 63. If the numerical value of both characters is 0, the user will be forced to change his password the next time he logs in. If the second character is greater than the first, only the super-user will be able to change the password.

*PASSWD* (M)

*PASSWD* (M)

**Files**

*/etc/passwd*

**See Also**

*login*(M), *passwd*(C), *a64l*(S), *crypt*(S), *getpwent*(S), *group*(M), *pwadmin*(C).

**Name**

pf – Profile disk drives

**Description**

The files **pf\*** provide block-buffered access to Profile hard disks connected to Lisa parallel ports. The file **pf0** refers to the disk connected to the built-in parallel port. The other files refer to disks connected to expansion parallel port cards. The files access the disks via the system's normal buffering mechanism and may be read and written without regard to physical disk records. The following table shows the size, in blocks, of each disk.

| device file | Lisa 2/10 | Lisa 2/5 |
|-------------|-----------|----------|
| pf0         | 19456     | 9728     |
| pf2         | 9728      | 9728     |
| pf4         | 9728      | 9728     |
| pf5         | 9728      | 9728     |

The files **rpf\*** provide a "raw" interface for direct transmission between the disk and the user's read or write buffer. When accessing a raw file, the user's buffer must begin on a word boundary and the counts in *read(S)*, *write(S)*, and *lseek(S)* calls must be a multiple of 512 bytes (one disk block).

**Files**

/dev/pf\* /dev/rpf\*

**Diagnostics**

The following messages may be printed on the console:

*pf n not on line*

An attempt was made to open a file for which no disk was plugged in.

*handshake error with pf n*

The device at the other end of the parallel port did not observe the handshake protocol for a Profile hard disk.

**Name**

profile - Sets up an environment at login time.

**Description**

The optional file `.profile` permits automatic execution of commands whenever a user logs in. The file is generally used to personalize a user's work environment by setting exported environment variables and terminal mode (see `environ(C)`).

When a user logs in, the user's login shell looks for `.profile` in the login directory. If found, the shell executes the commands in the file before beginning the session. The commands in the file must have the same format as if typed at the keyboard. Any line beginning with the number sign (`#`) is considered a comment and is ignored. The following is an example of a typical file:

```
# Tell me when new mail comes in
MAIL=/usr/mail/myname
# Add my /bin directory to the shell search sequence
PATH=$PATH:$HOME/bin
# Make some environment variables global
export MAIL PATH TERM
# Set file creation mask
umask 22
```

Note that the file `/etc/profile` is a system-wide profile that, if it exists, is executed for every user before the user's `.profile` is executed.

**Files**

```
$HOME/.profile
/etc/profile
```

**See Also**

`env(C)`, `login(M)`, `mail(C)`, `sh(C)`, `stty(C)`, `su(C)`, `environ(M)`

**Name**

systemid - The Micnet system identification file.

**Description**

The systemid file contains the machine and site names for a system in a Micnet network. A *machine name* identifies a system and distinguishes it from other systems in the same network. A *site name* identifies the network to which a system belongs and distinguishes the network from other networks in the same chain.

The systemid file may contain a *site name* and up to four different *machine names*. The file has the form:

```
[site-name]
machine-name1
[machine-name2]
[machine-name3]
[machine-name4]
```

The file must contain at least one machine name. The other machine names are optional, serving as alternate names for the same machine. The file must contain a site name if more than one machine name is given or if the network is connected to another through a uucp link. The site name, when given, must be on the first line.

Each name can have up to eight letters and numbers but must always begin with a letter. There is never more than one name to a line. A line beginning with a pound sign (#) is considered a comment line and is ignored.

The Micnet network requires one systemid file on each system in a network with each file containing a unique set of machine names. If the network is connected to another network through a uucp link, then each file in the network must contain the same site name.

The systemid file is used primarily during resolution of aliases. When aliases contain site and/or machine names the name is compared with the names in the file and removed if there is a match. If there is no match, the alias (and associated message, file, or command) is passed on to the specified site or machine for further processing.

*SYSTEMID* (M)

*SYSTEMID* (M)

**Files**

*/etc/systemid*

**See Also**

- *aliases*(M), *netutil*(C), *top*(M)

## Name

termcap - Terminal capability data base.

## Description

The file `/etc/termcap` is a data base describing terminals. This data base is used by programs such as `vi`(C) and `cu`(S). Terminals are described in `termcap` by giving a set of capabilities and by describing how operations are performed. Padding requirements and initialization sequences are included in `termcap`.

Entries in `termcap` consist of a number of ':' separated fields. The first entry for each terminal gives the names which are known for the terminal, separated by vertical bar (|) characters. The first name is always 2 characters long for compatibility with older systems. The second name given is the most common abbreviation for the terminal, and the last name given should be a long name fully identifying the terminal. The second name should contain no blanks; the last name may well contain blanks for readability.

## Capabilities

The following is a list of the capabilities that can be defined for a given terminal. In this list, (P) indicates padding may be specified, (P\*) indicates that padding may be based on the number of lines affected, and uppercase names indicate XENIX extensions (except for CC).

| Name | Type | Pad? | Description                                         |
|------|------|------|-----------------------------------------------------|
| ae   | str  | (P)  | End alternate character set                         |
| al   | str  | (P*) | Add new blank line                                  |
| am   | bool |      | Terminal has automatic margins                      |
| as   | str  | (P)  | Start alternate character set                       |
| bc   | str  |      | Backspace if not ^H                                 |
| BE   | str  |      | Bell character                                      |
| bs   | bool |      | Terminal can backspace with ^H                      |
| BS   | str  |      | Sent by BACKSPACE key (if not bc)                   |
| bt   | str  | (P)  | Back tab                                            |
| bw   | bool |      | Backspace wraps from column 0 to last column        |
| CC   | str  |      | Command character in prototype if terminal settable |
| cd   | str  | (P*) | Clear to end of display                             |
| ce   | str  | (P)  | Clear to end of line                                |
| CF   | str  |      | Cursor off                                          |
| ch   | str  | (P)  | Like cm but horizontal motion only, line stays same |
| CL   | str  |      | Sent by CHAR LEFT key                               |
| cl   | str  | (P*) | Clear screen                                        |
| cm   | str  | (P)  | Cursor motion                                       |

|    |          |                                             |
|----|----------|---------------------------------------------|
| CN | str      | Sent by CANCEL key                          |
| co | num      | Number of columns in a line                 |
| CO | str      | Cursor on                                   |
| CR | str      | Sent by CHAR RIGHT key                      |
| cr | str (P*) | Carriage return, (default ^M)               |
| cs | str (P)  | Change scrolling region (vt100), like cm    |
| cv | str (P)  | Like ch but vertical only.                  |
| CW | str      | Sent by CHANGE WINDOW key                   |
| da | bool     | Display may be retained above               |
| db | bool     | Display may be retained below               |
| dB | num      | Number of millisecc of bs delay needed      |
| dC | num      | Number of millisecc of cr delay needed      |
| dc | str (P*) | Delete character                            |
| dF | num      | Number of millisecc of ff delay needed      |
| DK | str      | Sent by down arrow key (if not kd)          |
| DL | str      | Sent by DELETE key                          |
| DL | str      | Sent by destructive character delete key    |
| dl | str (P*) | Delete line                                 |
| dm | str      | Delete mode (enter)                         |
| dN | num      | Number of millisecc of nl delay needed      |
| do | str      | Down one line                               |
| dT | num      | Number of millisecc of tab delay needed     |
| ed | str      | End delete mode                             |
| EE | str      | Edit mode end                               |
| EG | num      | Number of chars taken by ES and EE          |
| ei | str      | End insert mode; give `ei=:`<br>if ic       |
| EN | str      | Sent by END key                             |
| eo | str      | Can erase overstrikes with a blank          |
| ES | str      | Edit mode start                             |
| ff | str (P*) | Hardcopy terminal page eject (default ^L)   |
| G1 | str      | Upper-right (1st quadrant) corner character |
| G2 | str      | Upper-left (2nd quadrant) corner character  |
| G3 | str      | Lower-left (3rd quadrant) corner character  |
| G4 | str      | Lower-right (4th quadrant) corner character |
| GD | str      | Down-tick character                         |
| GE | str      | Graphics mode end                           |
| GG | num      | Number of chars taken by GS and GE          |
| GH | str      | Horizontal bar character                    |
| GS | str      | Graphics mode start                         |
| GU | str      | Up-tick character                           |
| GV | str      | Vertical bar character                      |
| hc | bool     | Hardcopy terminal                           |
| hd | str      | Half-line down (forward 1/2 linefeed)       |
| HM | str      | Sent by HOME key (if not kh)                |
| ho | str      | Home cursor (if no cm)                      |
| HP | str      | Sent by HELP key                            |
| hu | str      | Half-line up (reverse 1/2 linefeed)         |
| hz | str      | Hazeltine; can't print `s                   |
| ic | str (P)  | Insert character                            |
| if | str      | Name of file containing is                  |
| im | bool     | Insert mode (enter); give `im=:q' if ic     |
| in | bool     | Insert mode distinguishes nulls on display  |

|       |      |      |                                                        |
|-------|------|------|--------------------------------------------------------|
| ip    | str  | (P*) | Insert pad after character inserted                    |
| is    | str  |      | Terminal initialization string                         |
| k0-k9 | str  |      | Sent by 'other' function keys 0-9                      |
| kb    | str  |      | Sent by backspace key                                  |
| kd    | str  |      | Sent by terminal down arrow key                        |
| ke    | str  |      | Out of 'keypad transmit' mode                          |
| KF    | str  |      | Key-click off                                          |
| kh    | str  |      | Sent by home key                                       |
| kl    | str  |      | Sent by terminal left arrow key                        |
| kn    | num  |      | Number of 'other' keys                                 |
| KO    | str  |      | Key-click on                                           |
| ko    | str  |      | Termcap entries for other non-function keys            |
| kr    | str  |      | Sent by terminal right arrow key                       |
| ks    | str  |      | Put terminal in 'keypad transmit' mode                 |
| ku    | str  |      | Sent by terminal up arrow key                          |
| l0-l9 | str  |      | Labels on 'other' function keys                        |
| LD    | str  |      | Sent by line delete key                                |
| LF    | str  |      | Sent by line feed key                                  |
| li    | num  |      | Number of lines on screen or page                      |
| LK    | str  |      | Sent by left arrow key (if not kl)                     |
| ll    | str  |      | Last line, first column (if no cm)                     |
| ma    | str  |      | Arrow key map, used by vi version 2 only               |
| mi    | bool |      | Safe to move while in insert mode                      |
| ml    | str  |      | Memory lock on above cursor                            |
| MN    | str  |      | Sent by minus sign key                                 |
| MP    | str  |      | Multiplan initialization string                        |
| MR    | str  |      | Multiplan reset string                                 |
| mu    | str  |      | Memory unlock (turn off memory lock)                   |
| nc    | bool |      | No correctly working carriage return<br>(DM2500,H2000) |
| nd    | str  |      | Non-destructive space (cursor right)                   |
| nl    | str  | (P*) | Newline character (default \n)                         |
| ns    | bool |      | Terminal is a CRT but doesn't scroll                   |
| NU    | str  |      | Sent by NEXT UNLOCKED CELL key                         |
| os    | bool |      | Terminal overstrikes                                   |
| pc    | str  |      | Pad character (rather than null)                       |
| PD    | str  |      | Sent by PAGE DOWN key                                  |
| PL    | str  |      | Sent by PAGE LEFT key                                  |
| PR    | str  |      | Sent by PAGE RIGHT key                                 |
| PS    | str  |      | Sent by plus sign key                                  |
| pt    | bool |      | Has hardware tabs<br>(may need to be set with is)      |
| PU    | str  |      | Sent by PAGE UP key                                    |
| RC    | str  |      | Sent by RECALC key                                     |
| RF    | str  |      | Sent by TOGGLE REFERENCE key                           |
| RK    | str  |      | Sent by right arrow key (if not kr)                    |
| RT    | str  |      | Sent by RETURN key                                     |
| RT    | str  |      | Sent by return key                                     |
| se    | str  |      | End stand out mode                                     |
| sf    | str  | (P)  | Scroll forwards                                        |
| sg    | num  |      | Number of blank chars left by so or se                 |
| so    | str  |      | Begin stand out mode                                   |
| sr    | str  | (P)  | Scroll reverse (backwards)                             |

|    |      |     |                                                          |
|----|------|-----|----------------------------------------------------------|
| ta | str  | (P) | Tab (other than ^I or with padding)                      |
| TB | str  |     | Sent by TAB key                                          |
| tc | str  |     | Entry of similar terminal - must be last                 |
| te | str  |     | String to end programs that use cm                       |
| ti | str  |     | String to begin programs that use cm                     |
| uc | str  |     | Underscore one char and move past it                     |
| ue | str  |     | End underscore mode                                      |
| ug | num  |     | Number of blank chars left by us or ue                   |
| UK | str  |     | Sent by up arrow key (if not ku)                         |
| ul | bool |     | Terminal underlines even though<br>it doesn't overstrike |
| up | str  |     | Upline (cursor up)                                       |
| us | str  |     | Start underscore mode                                    |
| vb | str  |     | Visible bell (may not move cursor)                       |
| ve | str  |     | Sequence to end open/visual mode                         |
| vs | str  |     | Sequence to start open/visual mode                       |
| WL | str  |     | Sent by WORD LEFT key                                    |
| WR | str  |     | Sent by WORD RIGHT key                                   |
| xb | bool |     | Beehive (f1=escape, f2=ctrl C)                           |
| xn | bool |     | A newline is ignored after a wrap<br>(Concept)           |
| xr | bool |     | Return acts like ce \r \n<br>(Delta Data)                |
| xs | bool |     | Standard out not erased by writing over it<br>(HP 264?)  |
| xt | bool |     | Tabs are destructive, magic so char<br>(Telaray 1061)    |

### A Sample Entry

The following entry describes the Concept- 100, and is among the more complex entries in the *termcap* file. (This particular concept entry is outdated, and is used as an example only.)

```
c1|c100|concept100:is=\EU\Ef\E7\E5\E8\EI\ENH\EK\E\200\Eo&\200:\
:al=3*\E`R:am:bs:cd=16*\E`C:ce=16\E`S:cl=2*\L:\
:cm=\Ea%+ %+:co#80:dc=16\E`A:dl=3*\E`B:ei=\E\200:\
:eo:im=\E`P:in:ip=16*:li#24:mi:nd=\E=:\
:se=\Ed\Ee:so=\ED\EE:ta=8\t:ul:up=\E;:vb=\Ek\EK:xn:
```

Entries may continue onto multiple lines by giving a \ as the last character of a line, and that empty fields may be included for readability (here between the last field on a line and the first field on the next). Capabilities in *termcap* are of three types: Boolean capabilities which indicate that the terminal has some particular feature, numeric capabilities giving the size of the terminal or the size of particular delays, and string capabilities, which give a sequence which can be used to perform particular terminal operations.

### Types of Capabilities

All capabilities have two letter codes. For instance, the fact that the Concept has 'automatic margins' (i.e. an automatic return and

linefeed when the end of a line is reached) is indicated by the capability `am`. Hence the description of the Concept includes `am`. Numeric capabilities are followed by the character `#` and then the value. Thus `co` which indicates the number of columns the terminal has gives the value `'80'` for the Concept.

Finally, string valued capabilities, such as `ce` (clear to end of line sequence) are given by the two character code, an `'='`, and then a string ending at the next following `:'`. A delay in milliseconds may appear after the `'='` in such a capability, and padding characters are supplied by the editor after the remainder of the string is sent to provide this delay. The delay can be either a integer, e.g. `'20'`, or an integer followed by an `'*'`, i.e. `'3*'`. A `'*'` indicates that the padding required is proportional to the number of lines affected by the operation, and the amount given is the per-affected-unit padding required. When a `'*'` is specified, it is sometimes useful to give a delay of the form `'3.5'` specify a delay per unit to tenths of milliseconds.

A number of escape sequences are provided in the string valued capabilities for easy encoding of characters there. A `\E` maps to an ESCAPE character, `\x` maps to a control-x for any appropriate x, and the sequences `\n` `\r` `\t` `\b` `\f` give a newline, return, tab, backspace and formfeed. Finally, characters may be given as three octal digits after a `\`, and the characters `^` and `\` may be given as `\^` and `\\`. If it is necessary to place a `:` in a capability it must be escaped in octal as `\072`. If it is necessary to place a null character in a string capability it must be encoded as `\200`. The routines that deal with *termcap* use C strings, and strip the high bits of the output very late so that a `\200` comes out as a `\000` would.

### *Preparing Descriptions*

We now outline how to prepare descriptions of terminals. The most effective way to prepare a terminal description is by imitating the description of a similar terminal in *termcap* and to build up a description gradually, using partial descriptions with *ex* to check that they are correct. Be aware that a very unusual terminal may expose deficiencies in the ability of the *termcap* file to describe it or bugs in *ex*. To easily test a new terminal description you can set the environment variable `TERMCAP` to a pathname of a file containing the description you are working on and the editor will look there rather than in *etc/termcap*. `TERMCAP` can also be set to the *termcap* entry itself to avoid reading the file when starting up the editor.

### *Basic capabilities*

The number of columns on each line for the terminal is given by the `co` numeric capability. If the terminal is a CRT, then the number of lines on the screen is given by the `li` capability. If the terminal wraps around to the beginning of the next line when it reaches the right margin, then it should have the `am` capability. If the terminal can clear its screen, then this is given by the `cl` string capability. If the terminal can backspace, then it should have the `bs` capability,

unless a backspace is accomplished by a character other than `^H` in which case you should give this character as the `bc` string capability. If it overstrikes (rather than clearing a position when a character is struck over) then it should have the `os` capability.

A very important point here is that the local cursor motions encoded in *termcap* are undefined at the left and top edges of a CRT terminal. The editor will never attempt to backspace around the left edge, nor will it attempt to go up locally off the top. The editor assumes that feeding off the bottom of the screen will cause the screen to scroll up, and the `am` capability tells whether the cursor sticks at the right edge of the screen. If the terminal has switch selectable automatic margins, the *termcap* file usually assumes that this is on, i.e. `am`.

These capabilities suffice to describe hardcopy and 'glass-tty' terminals. Thus the model 33 teletype is described as

```
t3|33|tty33:co#72:os
```

while the Lear Siegler ADM-3 is described as

```
cl|adm3|si adm3:am:bs:cl=^Z:li#24:co#80
```

#### Cursor addressing

Cursor addressing in the terminal is described by a `cm` string capability, with *printf*(S) like escapes `%x` in it. These substitute to encodings of the current line or column position, while other characters are passed through unchanged. If the `cm` string is thought of as being a function, then its arguments are the line and then the column to which motion is desired, and the `%` encodings have the following meanings:

|                      |                                                           |
|----------------------|-----------------------------------------------------------|
| <code>%d</code>      | as in <i>printf</i> , 0 origin                            |
| <code>%2</code>      | like <code>%2d</code>                                     |
| <code>%3</code>      | like <code>%3d</code>                                     |
| <code>%</code>       | like <code>%c</code>                                      |
| <code>%+x</code>     | adds <i>x</i> to value, then <code>%</code>               |
| <code>%&gt;xy</code> | if value > <i>x</i> adds <i>y</i> , no output.            |
| <code>%r</code>      | reverses order of line and column, no output              |
| <code>%i</code>      | increments line/column (for 1 origin)                     |
| <code>%%</code>      | gives a single <code>%</code>                             |
| <code>%a</code>      | exclusive or row and column with 0140 (DM2500)            |
| <code>%B</code>      | BCD $(16*(x/10)) + (x\%10)$ , no output.                  |
| <code>%D</code>      | Reverse coding $(x-2*(x\%16))$ , no output. (Delta Data). |

Consider the HP2645, which, to get to row 3 and column 12, needs to be sent `\E&a12c03Y` padded for 6 milliseconds. Note that the order of the rows and columns is inverted here, and that the row and column are printed as two digits. Thus its `cm` capability is '`cm=6\E&%r%2c%2Y`'. The Microterm ACT-IV needs the current row and column sent preceded by a `^T`, with the row and column simply encoded in binary, '`cm=^T%%`'. Terminals which use '`%`'

need to be able to backspace the cursor (bs or bc), and to move the cursor up one line on the screen (up introduced below). This is necessary because it is not always safe to transmit `\t`, `\n` `^D` and `\r`, as the system may change or discard them.

A final example is the LSI ADM-3a, which uses row and column offset by a blank character, thus `'cm=\E=%+ %+'`.

#### *Cursor motions*

If the terminal can move the cursor one position to the right, leaving the character at the current position unchanged, then this sequence should be given as `nd` (non-destructive space). If it can move the cursor up a line on the screen in the same column, this should be given as `up`. If the terminal has no cursor addressing capability, but can home the cursor (to very upper left corner of screen) then this can be given as `hc`; similarly a fast way of getting to the lower left hand corner can be given as `ll`; this may involve going up with `up` from the home position, but the editor will never do this itself (unless `ll` does) because it makes no assumption about the effect of moving up from the home position.

#### *Area clears*

If the terminal can clear from the current position to the end of the line, leaving the cursor where it is, this should be given as `ce`. If the terminal can clear from the current position to the end of the display, then this should be given as `cd`. The editor only uses `cd` from the first column of a line.

#### *Insert/delete line*

If the terminal can open a new blank line before the line where the cursor is, this should be given as `al`; this is done only from the first position of a line. The cursor must then appear on the newly blank line. If the terminal can delete the line which the cursor is on, then this should be given as `dl`; this is done only from the first position on the line to be deleted. If the terminal can scroll the screen backwards, then this can be given as `sb`, but just `al` suffices. If the terminal can retain display memory above then the `da` capability should be given; if display memory can be retained below then `db` should be given. These let the editor understand that deleting a line on the screen may bring non-blank lines up from below or that scrolling back with `sb` may bring down non-blank lines.

#### *Insert/delete character*

There are two basic kinds of intelligent terminals with respect to insert/delete character which can be described using *termcap*. The most common insert/delete character operations affect only the characters on the current line and shift characters off the end of the line. Other terminals, such as the Concept 100 and the Perkin Elmer Owl, make a distinction between typed and untyped blanks on the screen,

shifting upon an insert or delete only to an untyped blank on the screen which is either eliminated, or expanded to two untyped blanks. You can find out which kind of terminal you have by clearing the screen and then typing text separated by cursor motions. Type 'abc def' using local cursor motions (not spaces) between the 'abc' and the 'def'. Then position the cursor before the 'abc' and put the terminal in insert mode. If typing characters causes the rest of the line to shift rigidly and characters to fall off the end, then your terminal does not distinguish between blanks and untyped positions. If the 'abc' shifts over to the 'def' which then move together around the end of the current line and onto the next as you insert, you have the second type of terminal, and should give the capability in, which stands for 'insert null'. If your terminal does something different and unusual then you may have to modify the editor to get it to use the insert mode your terminal defines. No known terminals have an insert mode not falling into one of these two classes.

The editor can handle both terminals that have an insert mode and terminals which send a simple sequence to open a blank position on the current line. Give as im the sequence to get into insert mode, or give it an empty value if your terminal uses a sequence to insert a blank position. Give as ei the sequence to leave insert mode (give this, with an empty value also if you gave im an empty value). Now give as ic any sequence needed to be sent just before sending the character to be inserted. Most terminals with a true insert mode will not give ic, terminals which send a sequence to open a screen position should give it here. (Insert mode is preferable to the sequence to open a position on the screen if your terminal has both.) If post insert padding is needed, give this as a number of milliseconds in ip (a string option). Any other sequence which may need to be sent after an insert of a single character may also be given in ip.

It is occasionally necessary to move around while in insert mode to delete characters on the same line (e.g. if there is a tab after the insertion position). If your terminal allows motion while in insert mode you can give the capability mi to speed up inserting in this case. Omitting mi will affect only speed. Some terminals (notably Datamedia's) must not have mi because of the way their insert mode works.

Finally, you can specify delete mode by giving dm and ed to enter and exit delete mode, and dc to delete a single character while in delete mode.

#### *Highlighting, underlining, and visible bells*

If your terminal has sequences to enter and exit standout mode these can be given as so and se respectively. If there are several flavors of standout mode (such as inverse video, blinking, or underlining - half bright is not usually an acceptable 'standout' mode unless the terminal is in inverse video mode constantly) the preferred mode is inverse video by itself. If the code to change into or out of standout mode leaves one or even two blank spaces on the

screen, as the TVI 912 and Teleray 1061 do, this is acceptable, and although it may confuse some programs slightly, it can't be helped.

Codes to begin underlining and end underlining can be given as `us` and `ue` respectively. If the terminal has a code to underline the current character and move the cursor one space to the right, such as the Microterm Mime, this can be given as `uc`. (If the underline code does not move the cursor to the right, give the code followed by a nondestructive space.)

If the terminal has a way of flashing the screen to indicate an error quietly (a bell replacement) then this can be given as `vb`; it must not move the cursor. If the terminal should be placed in a different mode during open and visual modes of `ez`, this can be given as `vs` and `ve`, sent at the start and end of these modes respectively. These can be used to change, e.g., from a underline to a block cursor and back.

If the terminal needs to be in a special mode when running a program that addresses the cursor, the codes to enter and exit this mode can be given as `ti` and `te`. This arises, for example, from terminals like the Concept with more than one page of memory. If the terminal has only memory relative cursor addressing and not screen relative cursor addressing, a one screen-sized window must be fixed into the terminal for cursor addressing to work properly.

If your terminal correctly generates underlined characters (with no special codes needed) even though it does not overstrike, then you should give the capability `ul`. If overstrikes are erasable with a blank, then this should be indicated by giving `eo`.

### Keypad

If the terminal has a keypad that transmits codes when the keys are pressed, this information can be given. Note that it is not possible to handle terminals where the keypad only works in local (this applies, for example, to the unshifted HP 2621 keys). If the keypad can be set to transmit or not transmit, give these codes as `ks` and `ke`. Otherwise the keypad is assumed to always transmit. The codes sent by the left arrow, right arrow, up arrow, down arrow, and home keys can be given as `k1`, `kr`, `ku`, `kd`, and `kh` respectively. If there are function keys such as `f0`, `f1`, ..., `f9`, the codes they send can be given as `k0`, `k1`, ..., `k9`. If these keys have labels other than the default `f0` through `f9`, the labels can be given as `l0`, `l1`, ..., `l9`. If there are other keys that transmit the same code as the terminal expects for the corresponding function, such as clear screen, the *termcap* 2 letter codes can be given in the `ko` capability, for example, `'ko=cl,ll,sf,sb:'`, which says that the terminal has clear, home down, scroll down, and scroll up keys that transmit the same thing as the `cl`, `ll`, `sf`, and `sb` entries.

The `ma` entry is also used to indicate arrow keys on terminals which have single character arrow keys. It is obsolete but still in use in

version 2 of vi, which must be run on some minicomputers due to memory limitations. This field is redundant with kl, kr, ku, kd, and kh. It consists of groups of two characters. In each group, the first character is what an arrow key sends, the second character is the corresponding vi command. These commands are h for kl, j for kd, k for ku, l for kr, and H for kh. For example, the mime would be :ma=<sup>^</sup>Kj<sup>^</sup>Zk<sup>^</sup>XI: indicating arrow keys left (<sup>^</sup>H), down (<sup>^</sup>K), up (<sup>^</sup>Z), and right (<sup>^</sup>X). (There is no home key on the mime.)

#### Miscellaneous

If the terminal requires other than a null (zero) character as a pad, then this can be given as pc.

If tabs on the terminal require padding, or if the terminal uses a character other than <sup>^</sup>I to tab, then this can be given as ta.

Hazeltine terminals, which don't allow "" characters to be printed should indicate hz. Datamedia terminals, which echo carriage-return linefeed for carriage return and then ignore a following linefeed should indicate nc. Early Concept terminals, which ignore a linefeed immediately after an am wrap, should indicate xn. If an erase-eol is required to get rid of standout (instead of merely writing on top of it), xs should be given. Teleray terminals, where tabs turn all characters moved over to blanks, should indicate xt. Other specific terminal problems may be corrected by adding more capabilities of the form xz.

Other capabilities include is, an initialization string for the terminal, and if, the name of a file containing long initialization strings. These strings are expected to properly clear and then set the tabs on the terminal, if the terminal has settable tabs. If both are given, is will be printed before if. This is useful where if is *fuorlibfaboetfoid* but is clears the tabs first.

#### Similar Terminals

If there are two very similar terminals, one can be defined as being just like the other with certain exceptions. The string capability tc can be given with the name of the similar terminal. This capability must be *last* and the combined length of the two entries must not exceed 1024. Since *termib* routines search the entry from left to right, and since the tc capability is replaced by the corresponding entry, the capabilities given at the left override the ones in the similar terminal. A capability can be cancelled with xx<sup>Ⓢ</sup> where xx is the capability. For example:

```
hn |2621nl:ks@:ke@:tc=2621:
```

This defines a 2621nl that does not have the ks or ke capabilities, and hence does not turn on the function key labels when in visual mode. This is useful for different modes for a terminal, or for different user preferences.

**Files**

*/etc/termcap* File containing terminal descriptions

**See Also**

*ex*(C), *curses*(S), *termcap*(S), *tset*(C), *vi*(C), *more*(C)

**Credit**

This utility was developed at the University of California at Berkeley and is used with permission.

**Notes**

*Ex* allows only 256 characters for string capabilities, and the routines in *termcap*(S) do not check for overflow of this buffer. The total length of a single entry (excluding only escaped newlines) may not exceed 1024.

The *ma*, *vs*, and *ve* entries are specific to the *vi* program.

Not all programs support all entries. There are entries that are not supported by any program.

**Name**

terminals – List of supported terminals.

**Description**

The following list, derived from the file `/etc/termcap` shows, for each terminal, the 'canonical name' (suitable for use as a TERM shell variable) and a short description of the terminal. The advice in *termcap (M)* will assist users in creating termcap entries for terminals not currently supported.

| Name       | Terminal                                      |
|------------|-----------------------------------------------|
| 2621       | hp 2621                                       |
| 2621wl     | hp 2621 with labels                           |
| 3045       | datamedia 3045a                               |
| 4025       | tektronix 4024/4025/4027                      |
| 4025-17    | tek 4025 17 line window                       |
| 4025-17ws  | tek 4025 17 line window in workspace          |
| 4025ex     | tek 4025                                      |
| 8001       | ISC8001                                       |
| 912b       | new televideo                                 |
| 925        | newer televideo                               |
| TWO        | Altos Computer Systems II                     |
| a980       | adds consul 980                               |
| aa         | ann arbor                                     |
| aaa        | ann arbor ambassador/48 lines                 |
| aaadb      | ann arbor ambassador 48/destructive backspace |
| act5s      | skinny act5                                   |
| adds       | adds viewpoint                                |
| adm12      | lsi adm12                                     |
| adm31      | lsi adm31                                     |
| adm3a      | lsi adm3a                                     |
| adm42      | lsi adm42                                     |
| ampex      | ampex dialogue                                |
| bh3m       | beehiveIII m                                  |
| c100       | concept 100                                   |
| c1004p     | c100 w/4 pages                                |
| c100rv     | c100 rev video                                |
| c100rv4p   | c100 w/4 pages                                |
| c100rv4pna | c100 with no arrows                           |
| c100rvs    | slow reverse concept 100                      |
| c100s      | slow concept 100                              |
| c3102      | cromemco 3102                                 |
| cci        | cci 4574                                      |

*TERMINALS (M)**TERMINALS (M)*

|            |                                                      |
|------------|------------------------------------------------------|
| cdc456     | dc                                                   |
| cdc456tst  | dc456tst                                             |
| cit80      | c.itoh 80                                            |
| d132       | datagraphix 132a                                     |
| datapoint  | datapoint 3360                                       |
| delta      | delta data 5000                                      |
| digilog    | digilog 333                                          |
| dm1520     | datamedia 1520                                       |
| dm1521     | datamedia 1521                                       |
| dm2500     | datamedia 2500                                       |
| dm3025     | datamedia 3025a                                      |
| dt80       | datamedia dt80/1                                     |
| dt80132    | datamedia dt80/1 in 132 char mode                    |
| du         | dialup                                               |
| dumb       | unknown                                              |
| ep40       | execuport 4000                                       |
| ep48       | execuport 4080                                       |
| exidy      | exidy2500                                            |
| fox        | perkin elmer 1100                                    |
| fre100     | Freedom 100                                          |
| h1500      | hazeltine 1500                                       |
| h1510      | hazeltine 1510                                       |
| h1520      | hazeltine 1520                                       |
| h19        | heathkit h19                                         |
| hp         | hp 264x series                                       |
| ibm        | IBM PC xenix console display                         |
| ibm3101    | IBM 3101-10                                          |
| ibmc       | IBM PC xenix color console display                   |
| intext     | ISC modified owl 1200                                |
| lisa       | Apple Lisa XENIX console display (black on white)    |
| liswb      | Apple Lisa XENIX console display (white on black)    |
| microb     | micro bee series                                     |
| microterm  | microterm act iv                                     |
| microterm5 | microterm act v                                      |
| mime       | microterm mime1                                      |
| mime2a     | microterm mime2a (emulating an enhanced vt52)        |
| mime2as    | microterm mime2a (emulating an enhanced soroc iq120) |
| mime3a     | mime1 emulating 3a                                   |
| mime3ax    | mime1 emulating enhanced 3a                          |
| mimehb     | half bright mime1                                    |
| owl        | perkin elmer 1200                                    |
| pixel      | Pixel terminal                                       |
| regent     | adds regent series                                   |

**TERMINALS (M)****TERMINALS (M)**

|            |                                                |
|------------|------------------------------------------------|
| regent100  | adds regent 100                                |
| regent25   | adds regent 25                                 |
| regent25a  | adds regent 25a                                |
| sb1        | beehive super bee                              |
| sb2        | fixed superbee                                 |
| soroc      | Soroc 120                                      |
| superbeeic | bee with insert char                           |
| t1061      | teleray 1061                                   |
| t3700      | dumb teleray 3700                              |
| t3800      | teleray 3800 series                            |
| tek        | tektronix 4012                                 |
| tek4014    | tektronix 4014                                 |
| tek4014sm  | tektronix 4014 in small font                   |
| tek4023    | tektronix 4023                                 |
| tvi910     | old televideo 910                              |
| tvi910+    | televideo 910 PLUS                             |
| tvi912     | old televideo                                  |
| tvi950     | televideo950                                   |
| vi200      | visual 200                                     |
| vi50       | Visual's emulation of adds viewpoint           |
| vi55       | Visual's new old terminal using ADDS emulation |
| vt100n     | vt100 w/no init                                |
| vt100s     | dec vt100 132 cols 14 lines                    |
| vt100w     | dec vt100 132 cols                             |
| vt52       | dec vt52                                       |
| wy100      | wyse 100                                       |
| zen30      | zentec 30                                      |

**Files**

/etc/termcap

**See Also**

tset(C), environ(M), termcap(M)

**Name**

top, top.next - The Micnet topology files.

**Description**

These files contain the topology information for a Micnet network. The topology information describes how the individual systems in the network are connected and what path a message must take from one system to reach another. Each file contains one or more lines of text. Each line of text defines a connection or a communication path.

The *top* file defines connections between systems. Each line lists the machine names of the connected systems, the serial lines used to make the connection, and the speed (baud rate) of transmission between the systems. Each line has the form:

```
machine1 tty1 machine2 tty2 speed
```

*machine1* and *machine2* are the machine names of the respective systems (as given in the *systemid* files). *tty1* and *tty2* are the device names (e.g., *tty01*) of the connecting serial lines. The speed must be an acceptable baud rate (e.g., 110, 300, ..., 19200).

The *top.next* file contains information about how to reach a particular system from a given system. There may be several lines for each system in the network. Each line lists the machine name of a system, followed by the machine name of a system connected to it, followed by the machine names of all the systems that may be reached by going through the second system. Such a line has the form:

```
machine1 machine2 machine3 [machine4]...
```

The machine names must be the names of the respective systems (as given by the first machine name in the *systemid* files).

The *top.next* file must be present even if there are only two computers in the network. In such a case, the file must be empty.

In the *top* and *top.next* files, any line beginning with a number sign (#) is considered a comment and is ignored.

**Files**

```
/usr/lib/mail/top
```

```
/usr/lib/mail/top.next
```

*TOP* (M)

*TOP* (M)

**See Also**

*aliases*(M), *netutil*(C), *systemid*(M), *top*(M)

## Name

tty - General terminal interface.

## Description

This section describes both a particular special file and the general nature of the terminal interface.

The file `/dev/tty` is, in each process, a synonym for the control terminal associated with the process group of that process, if any. It is useful for programs or shell sequences that wish to be sure of writing messages on the terminal no matter how output has been redirected. It can also be used for programs that demand the name of a file for output, when typed output is desired and it is tiresome to find out what terminal is currently in use.

All asynchronous communications ports use the same general interface, no matter what hardware is involved. The remainder of this section discusses the common features of this interface.

When a terminal file is opened, it normally causes the process to wait until a connection is established. In practice, users' programs seldom open these files; they are opened by `getty(M)` and become a user's standard input, output, and error files. The very first terminal file opened by the process group leader of a terminal file not already associated with a process group becomes the *control terminal* for that process group. The control terminal plays a special role in handling quit and interrupt signals, as discussed below. The control terminal is inherited by a child process during a `fork(S)`. A process can break this association by changing its process group using `setpgrp(S)`.

A terminal associated with one of these files ordinarily operates in full-duplex mode. Characters may be typed at any time, even while output is occurring, and are only lost when the system's character input buffers become completely full, which is rare, or when the user has accumulated the maximum allowed number of input characters that have not yet been read by some program. Currently, this limit is 256 characters. When the input limit is reached, all the saved characters are thrown away without notice.

Normally, terminal input is processed in units of lines. A line is delimited by a newline (ASCII LF) character, an end-of-file (ASCII EOT) character, or an end-of-line character. This means that a program attempting to read will be suspended until an entire line has been typed. Also, no matter how many characters are requested in the read call, at most one line will be returned. It is not, however, necessary to read a whole line at once; any number of characters may be requested in a read, even one, without losing information.

Erase and kill processing is normally done during input. By default, a CNTRL-H or BACKSPACE erases the last character typed, except

that it will not erase beyond the beginning of the line. By default, a CNTRL-U kills (deletes) the entire input line, and optionally outputs a newline character. Both these characters operate on a key-stroke basis, independent of any backspacing or tabbing that may have been done. Both the erase and kill characters may be entered literally by preceding them with the escape character (\). In this case the escape character is not read. The erase and kill characters may be changed (see *stty(C)*).

Certain characters have special functions on input. These functions and their default character values are summarized as follows:

- INTR (Rubout or ASCII DEL) Generates an *interrupt* signal which is sent to all processes with the associated control terminal. Normally, each such process is forced to terminate, but arrangements may be made either to ignore the signal or to receive a trap to an agreed-upon location; see *signal(S)*.
- QUIT (CNTRL-\ or ASCII FS) Generates a *quit* signal. Its treatment is identical to the interrupt signal except that, unless a receiving process has made other arrangements, it will not only be terminated but a core image file (called *core*) will be created in the current working directory.
- ERASE (CNTRL-H) Erases the preceding character. It will not erase beyond the start of a line, as delimited by a NL, EOF, or EOL character.
- KILL (CNTRL-U) Deletes the entire line, as delimited by a NL, EOF, or EOL character.
- EOF (CNTRL-D or ASCII EOT) May be used to generate an end-of-file from a terminal. When received, all the characters waiting to be read are immediately passed to the program, without waiting for a newline, and the EOF is discarded. Thus, if there are no characters waiting, which is to say the EOF occurred at the beginning of a line, zero characters will be passed back, which is the standard end-of-file indication.
- NL (ASCII LF) Is the normal line delimiter. It cannot be changed or escaped.
- EOL (ASCII NUL) Is an additional line delimiter, like NL. It is not normally used.
- STOP (CNTRL-S or ASCII DC3) Can be used to temporarily suspend output. It is useful with CRT terminals to prevent output from disappearing before it can be read. While output is suspended, STOP characters are ignored and not read.

START (CNTRL-Q or ASCII DC1) Is used to resume output which has been suspended by a STOP character. While output is not suspended, START characters are ignored and not read. The start/stop characters cannot be changed or escaped.

The character values for INTR, QUIT, ERASE, KILL, EOF, and EOL may be changed to suit individual tastes. The ERASE, KILL, and EOF characters may be escaped by a preceding \ character, in which case no special function is carried out.

When the carrier signal from the dataset drops, a *hangup* signal is sent to all processes that have this terminal as the control terminal. Unless other arrangements have been made, this signal causes the processes to terminate. If the hangup signal is ignored, any subsequent read returns with an end-of-file indication. Thus programs that read a terminal and test for end-of-file can terminate appropriately when hung up on.

When one or more characters are written, they are transmitted to the terminal as soon as previously-written characters have finished typing. Input characters are echoed by putting them in the output queue as they arrive. If a process produces characters more rapidly than they can be typed, it will be suspended when its output queue exceeds a given limit. When the queue has drained down to the given threshold, the program is resumed.

Several *ioctl(S)* system calls apply to terminal files. The primary calls use the following structure, defined in the file *termio.h*:

```
#define NCC      8
struct termio {
    unsigned short  c_iflag;    /* input modes */
    unsigned short  c_oflag;    /* output modes */
    unsigned short  c_cflag;    /* control modes */
    unsigned short  c_lflag;    /* local modes */
    char            c_line;      /* line discipline */
    unsigned char   c_cc[NCC];  /* control chars */
};
```

The special control characters are defined by the array *c\_cc*. The relative positions and initial values for each function are as follows:

```
0  VINTR  DEL
1  VQUIT  FS
2  VERASE BKSP
3  VKILL  CNTRL-U, CNTRL-H,
4  VEOF   EOT
5  VEOL   NUL
6  Reserved
7  Reserved
```

The *c\_iflag* field describes the basic terminal input control:

|        |         |                                         |
|--------|---------|-----------------------------------------|
| IGNBRK | 0000001 | Ignores break condition                 |
| BRKINT | 0000002 | Signals interrupt on break              |
| IGNPAR | 0000004 | Ignores characters with parity errors   |
| PARMRK | 0000010 | Marks parity errors                     |
| INPCK  | 0000020 | Enables input parity check              |
| ISTRIP | 0000040 | Strips character                        |
| INLCR  | 0000100 | Maps NL to CR on input                  |
| IGNCR  | 0000200 | Ignores CR                              |
| ICRNL  | 0000400 | Maps CR to NL on input                  |
| IUCLC  | 0001000 | Maps uppercase to lowercase on input    |
| IXON   | 0002000 | Enables start/stop output control       |
| IXANY  | 0004000 | Enables any character to restart output |
| IXOFF  | 0010000 | Enables start/stop input control        |

If IGNBRK is set, the break condition (a character framing error with data all zeros) is ignored, that is, not put on the input queue and therefore not read by any process. Otherwise, if BRKINT is set the break condition will generate an interrupt signal and flush both the input and output queues. If IGNPAR is set, characters with other framing and parity errors are ignored.

If PARMRK is set, a character with a framing or parity error which is not ignored is read as the 3-character sequence: 0377, 0, X, where X is the data of the character received in error. To avoid ambiguity in this case, if ISTRIP is not set, a valid character of 0377 is read as 0377, 0377. If PARMRK is not set, a framing or parity error which is not ignored is read as the character NUL (0).

If INPCK is set, input parity checking is enabled. If INPCK is not set, input parity checking is disabled. This allows output parity generation without input parity errors.

If ISTRIP is set, valid input characters are first stripped to 7-bits, otherwise all 8-bits are processed.

If INLCR is set, a received NL character is translated into a CR character. If IGNCR is set, a received CR character is ignored (not read). Otherwise if ICRNL is set, a received CR character is translated into a NL character.

If IUCLC is set, a received uppercase alphabetic character is translated into the corresponding lowercase character.

If IXON is set, start/stop output control is enabled. A received STOP character will suspend output and a received START character will restart output. All start/stop characters are ignored and not read. If IXANY is set, any input character will restart output which has been suspended.

If IXOFF is set, the system will transmit START characters when the input queue is nearly empty and STOP characters when nearly full.

The initial input control value is all bits clear.

The *c\_flag* field specifies the system treatment of output:

|        |         |                                       |
|--------|---------|---------------------------------------|
| OPOST  | 0000001 | Postprocesses output                  |
| OLCUC  | 0000002 | Maps lowercase to uppercase on output |
| ONLCR  | 0000004 | Maps NL to CR-NL on output            |
| OCRNL  | 0000010 | Maps CR to NL on output               |
| ONOCR  | 0000020 | No CR output at column 0              |
| ONLRET | 0000040 | NL performs CR function               |
| OFILL  | 0000100 | Uses fill characters for delay        |
| OFDEL  | 0000200 | Fills is DEL, else NUL                |
| NLDLY  | 0000400 | Selects newline delays:               |
| NL0    | 0       |                                       |
| NL1    | 0000400 |                                       |
| CRDLY  | 0003000 | Selects carriage return delays:       |
| CR0    | 0       |                                       |
| CR1    | 0001000 |                                       |
| CR2    | 0002000 |                                       |
| CR3    | 0003000 |                                       |
| TABDLY | 0014000 | Selects horizontal tab delays:        |
| TAB0   | 0       |                                       |
| TAB1   | 0004000 |                                       |
| TAB2   | 0010000 |                                       |
| TAB3   | 0014000 | Expands tabs to spaces                |
| BSDLY  | 0020000 | Selects backspace delays:             |
| BS0    | 0       |                                       |
| BS1    | 0020000 |                                       |
| VTDLY  | 0040000 | Selects vertical tab delays:          |
| VT0    | 0       |                                       |
| VT1    | 0040000 |                                       |
| FFDLY  | 0100000 | Selects form feed delays:             |
| FF0    | 0       |                                       |
| FF1    | 0100000 |                                       |

If OPOST is set, output characters are post-processed as indicated by the remaining flags, otherwise characters are transmitted without change.

If OLCUC is set, a lowercase alphabetic character is transmitted as the corresponding uppercase character. This function is often used in conjunction with IUCLC.

If ONLCR is set, the NL character is transmitted as the CR-NL character pair. If OCRNL is set, the CR character is transmitted as the NL character. If ONOCR is set, no CR character is transmitted when at column 0 (first position). If ONLRET is set, the NL character is assumed to perform the carriage return function; the column pointer will be set to 0 and the delays specified for CR will be used. Otherwise the NL character is assumed to perform the linefeed function; the column pointer will remain unchanged. The column pointer is also set to 0 if the CR character is actually transmitted.

The delay bits specify how long transmission stops to allow for mechanical or other movement when certain characters are sent to the terminal. In all cases a value of 0 indicates no delay. If OFILL is set, fill characters will be transmitted for delay instead of a timed delay. This is useful for high baud rate terminals which need only a minimal delay. If OFDEL is set, the fill character is DEL, otherwise NUL.

If a form feed or vertical tab delay is specified, it lasts for about 2 seconds.

Newline delay lasts about 0.10 seconds. If ONLRET is set, the carriage return delays are used instead of the newline delays. If OFILL is set, 2 fill characters will be transmitted.

Carriage return delay type 1 is dependent on the current column position, type 2 is about 0.10 seconds, and type 3 is about 0.15 seconds. If OFILL is set, delay type 1 transmits 2 fill characters, and type 2 transmits 4 fill characters.

Horizontal tab delay type 1 is dependent on the current column position. Type 2 is about 0.10 seconds. Type 3 specifies that tabs are to be expanded into spaces. If OFILL is set, 2 fill characters will be transmitted for any delay.

Backspace delay lasts about 0.05 seconds. If OFILL is set, 1 fill character will be transmitted.

The actual delays depend on line speed and system load.

The initial output control value is all bits clear.

The *c\_flag* field describes the hardware control of the terminal:

|       |         |            |
|-------|---------|------------|
| CBAUD | 0000017 | Baud rate: |
| B0    | 0       | Hang up    |
| B50   | 0000001 | 50 baud    |
| B75   | 0000002 | 75 baud    |
| B110  | 0000003 | 110 baud   |

|        |         |                               |
|--------|---------|-------------------------------|
| B134   | 0000004 | 134.5 baud                    |
| B150   | 0000005 | 150 baud                      |
| B200   | 0000006 | 200 baud                      |
| B300   | 0000007 | 300 baud                      |
| B600   | 0000010 | 600 baud                      |
| B1200  | 0000011 | 1200 baud                     |
| B1800  | 0000012 | 1800 baud                     |
| B2400  | 0000013 | 2400 baud                     |
| B4800  | 0000014 | 4800 baud                     |
| BE600  | 0000015 | 9600 baud                     |
| EXTA   | 0000016 | External A                    |
| EXTB   | 0000017 | External B                    |
|        |         |                               |
| CSIZE  | 0000060 | Character size:               |
| CS5    | 0       | 5 bits                        |
| CS6    | 0000020 | 6 bits                        |
| CS7    | 0000040 | 7 bits                        |
| CS8    | 0000060 | 8 bits                        |
| CSTOPB | 0000100 | Sends two stop bits, else one |
| CREAD  | 0000200 | Enables receiver              |
| PARENB | 0000400 | Parity enable                 |
| PARODD | 0001000 | Odd parity, else even         |
| HUPCL  | 0002000 | Hangs up on last close        |
| CLOCAL | 0004000 | Local line, else dial-up      |

The CBAUD bits specify the baud rate. The zero baud rate, B0, is used to hang up the connection. If B0 is specified, the data-terminal-ready signal will not be asserted. Without this signal, the line is disconnected if connected through a modem. For any particular hardware, impossible speed changes are ignored.

The CSIZE bits specify the character size in bits for both transmission and reception. This size does not include the parity bit, if any. If CSTOPB is set, 2 stop bits are used, otherwise 1 stop bit. For example, at 110 baud, 2 stops bits are required.

If PARENB is set, parity generation and detection is enabled and a parity bit is added to each character. If parity is enabled, the PARODD flag specifies odd parity if set, otherwise even parity is used.

If CREAD is set, the receiver is enabled. Otherwise no characters will be received.

If HUPCL is set, the line will be disconnected when the last process with the line open closes it or terminates. That is, the data-terminal-ready signal will not be asserted.

If CLOCAL is set, the line is assumed to be a local, direct connection with no modem control. The data-terminal-ready and request-to-send signals are asserted, but incoming modem signals are ignored. If CLOCAL is not set, modem control is assumed. This means the data-terminal-ready and request-to-send signals are asserted. Also,

the carrier-detect signal must be returned before communications can proceed.

The initial hardware control value after open is B9600, CS8, CREAD, HUPCL.

The *c\_lflag* field of the argument structure is used by the line discipline to control terminal functions. The basic line discipline (0) provides the following:

|        |         |                                             |
|--------|---------|---------------------------------------------|
| ISIG   | 0000001 | Enable signals                              |
| ICANON | 0000002 | Canonical input (erase and kill processing) |
| XCASE  | 0000004 | Canonical upper/lower presentation          |
| ECHO   | 0000010 | Enables echo                                |
| ECHOE  | 0000020 | Echoes erase character as BS-SP-BS          |
| ECHOK  | 0000040 | Echoes NL after kill character              |
| ECHONL | 0000100 | Echoes NL                                   |
| NOFLSH | 0000200 | Disables flush after interrupt or quit      |
| XCLUDE | 0100000 | Exclusive use of the line.                  |

If ISIG is set, each input character is checked against the special control characters INTR and QUIT. If an input character matches one of these control characters, the function associated with that character is performed. If ISIG is not set, no checking is done. Thus these special input functions are possible only if ISIG is set. These functions may be disabled individually by changing the value of the control character to an unlikely or impossible value (e.g. 0377).

If ICANON is set, canonical processing is enabled. This enables the erase and kill edit functions, and the assembly of input characters into lines delimited by NL, EOF, and EOL. If ICANON is not set, read requests are satisfied directly from the input queue. A read will not be satisfied until at least VMIN characters have been received or the timeout value VTIME has expired. This allows fast bursts of input to be read efficiently while still allowing single character input. The VMIN and VTIME values are stored in the position for the EOF and EOL characters respectively. The time value represents tenths of seconds.

If XCASE is set, and if ICANON is set, an uppercase letter is accepted on input by preceding it with a \ character, and is output preceded by a \ character. In this mode, the following escape sequences are generated on output and accepted on input:

For: Use :

|    |     |
|----|-----|
| \  | \\  |
| \n | \\n |
| \r | \\r |
| \t | \\t |
| \f | \\f |
| \b | \\b |
| \a | \\a |
| \c | \\c |
| \e | \\e |
| \0 | \\0 |
| \1 | \\1 |
| \2 | \\2 |
| \3 | \\3 |
| \4 | \\4 |
| \5 | \\5 |
| \6 | \\6 |
| \7 | \\7 |
| \8 | \\8 |
| \9 | \\9 |
| \a | \\a |
| \b | \\b |
| \c | \\c |
| \d | \\d |
| \e | \\e |
| \f | \\f |
| \g | \\g |
| \h | \\h |
| \i | \\i |
| \j | \\j |
| \k | \\k |
| \l | \\l |
| \m | \\m |
| \n | \\n |
| \o | \\o |
| \p | \\p |
| \q | \\q |
| \r | \\r |
| \s | \\s |
| \t | \\t |
| \u | \\u |
| \v | \\v |
| \w | \\w |
| \x | \\x |
| \y | \\y |
| \z | \\z |
| \[ | \\[ |
| \] | \\] |
| \^ | \\^ |
| \_ | \\_ |
| \` | \\` |
| \  | \\  |
| \~ | \\~ |

For example, A is input as \a, \n as \\n, and \N as \\N.

If ECHO is set, characters are echoed as received.

When ICANON is set, the following echo functions are possible. If ECHO and ECHOE are set, the erase character is echoed as ASCII BS SP BS, which will clear the last character from a CRT screen. If ECHOE is set and ECHO is not set, the erase character is echoed as ASCII SP BS. If ECHOK is set, the NL character will be echoed after the kill character to emphasize that the line will be deleted. Note that an escape character preceding the erase or kill character removes any special function. If ECHONL is set, the NL character will be echoed even if ECHO is not set. This is useful for terminals set to local echo (so-called half duplex). Unless escaped, the EOF character is not echoed. Because EOT is the default EOF character, this prevents terminals that respond to EOT from hanging up.

If NOFLSH is set, the normal flush of the input and output queues associated with the quit and interrupt characters will not be done.

If XCLUDE is set, any subsequent attempt to open the tty device using `open(S)` will fail for all users except the super-user. If the call fails, it returns EBUSY in `errno`. XCLUDE is useful for programs which must have exclusive use of a communications line. It is not intended for the line to the program's controlling terminal. XCLUDE must be cleared before the setting program terminates, otherwise subsequent attempts to open the device will fail.

The initial line-discipline control value is all bits clear.

The primary `ioctl(S)` system calls have the form:

```
ioctl (fildes, command, arg)
struct termio *arg;
```

The commands using this form are:

|         |                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------|
| TCGETA  | Gets the parameters associated with the terminal and stores them in the <code>termio</code> structure referenced by <code>arg</code> .      |
| TCSETA  | Sets the parameters associated with the terminal from the structure referenced by <code>arg</code> . The change is immediate.               |
| TCSETAW | Waits for the output to drain before setting the new parameters. This form should be used when changing parameters that will affect output. |
| TCSETAF | Waits for the output to drain, then flushes the input queue and sets the new parameters.                                                    |

Additional *ioctl*(S) calls have the form:

```
ioctl (fdes, command, arg)
int arg;
```

The commands using this form are:

|        |                                                                                                                              |
|--------|------------------------------------------------------------------------------------------------------------------------------|
| TCSBRK | Waits for the output to drain. If <i>arg</i> is 0, then sends a break (zero bits for 0.25 seconds).                          |
| TCXONC | Starts/stops control. If <i>arg</i> is 0, suspends output; if 1, restarts suspended output.                                  |
| TCFLSH | If <i>arg</i> is 0, flushes the input queue; if 1, flushes the output queue; if 2, flushes both the input and output queues. |

#### Files

*/dev/tty*

*/dev/tty\**

*/dev/console*

#### See Also

*stty*(C), *ioctl*(S)

**Name**

ttys – Login terminals file.

**Description**

The `/etc/ttys` file contains a list of the device special files associated with possible login terminals, and defines which files are to be opened by the `init(M)` program on system start-up.

The file contains one or more entries of the form

*state mode name*

The *name* must be the filename of a device special file. Only the filename may be supplied, the path is assumed to be `/dev`. If *state* is "1", the file is enabled for logins; if "0", the file is disabled. The *mode* is used as an argument to the `getty(M)` program. It defines the line speed and type of device associated with the terminal. A list of arguments is provided in `getty(M)`.

For example, the entry "12tty02" means the serial line tty02 is to be opened for logging in at 9600 baud.

**Files**

`/etc/ttys`

**See Also**

`init(M)`, `getty(M)`, `enable(C)`, `disable(C)`

**Name**

utmp, wtmp - Formats of utmp and wtmp entries.

**Description**

The files `utmp` and `wtmp` hold user and accounting information for use by commands such as `who(C)`, `accton1` (see `accton(C)`), and `login(M)`. They have the following structure, as defined by `/usr/include/utmp.h`:

```
struct utmp
{
    char    ut_line[8];        /* tty name */
    char    ut_name[8];       /* login name */
    long    ut_time;          /* time on */
};
```

**Files**

`/etc/utmp`

`/usr/adm/wtmp`

`/usr/include/utmp.h`

**See Also**

`accton(C)`, `login(M)`, `who(C)`, `write(C)`

