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**agetty** [*options*] *port* *baudrate* [*term*]

System administration command. The Linux version of **getty**. Set terminal type, modes, speed, and line discipline. **agetty** is invoked by **init**. It is the second process in the series **init-getty-login-shell**, which ultimately connects a user with the Linux system. **agetty** reads the user's login name and invokes the **login** command with the user's name as an argument. While reading the name, **agetty** attempts to adapt the system to the speed and type of device being used.

You must specify a port, which **agetty** will search for in the */dev* directory. You may use *-*, in which case **agetty** reads from standard input. You must also specify *baudrate*, which may be a comma-separated list of rates, through which **agetty** will step. Optionally, you may specify the *term*, which is used to override the TERM environment variable.

### Options

**-h**

Specify hardware, not software, flow control.

**-i**

Suppress printing of */etc/issue* before printing the login prompt.

**-l program**

Specify the use of *program* instead of */bin/login*.

**-m**

Attempt to guess the appropriate baud rate.

**-t timeout**

Specify that **agetty** should exit if the **open** on the line succeeds and there is no response to the login prompt in *timeout* seconds.

**-L**

Do not require carrier detect; operate locally only. Use this when connecting terminals.

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### apmd [*options*]

System administration command. **apmd** handles events reported by the Advanced Power Management BIOS driver. The driver reports on battery level and requests to enter sleep or suspend mode. **apmd** will log any reports it gets via **syslogd** and take steps to make sure that basic sleep and suspend requests are handled gracefully. You can fine-tune the behavior of **apmd** by specifying an **apmd\_proxy** command to run when it receives an event.

### Options

#### **-c n, --check n**

Set the number of seconds to wait for an event before rechecking the power level. Default is to wait indefinitely. Setting this causes the battery levels to be checked more frequently.

#### **-P command, --apmd\_prxy command**

Specify the **apmd\_proxy** command to run when APM driver events are reported. This is generally a shell script. The *command* will be invoked with parameters indicating what kind of event was received. The parameters are in the next list.

#### **-p n, --percentage n**

Log information whenever the power changes by *n* percent. The default is 5. Values greater than 100 will disable logging of power changes.

#### **-V, --version**

Print version and exit.

#### **-v, --version**

Verbose mode; all events are logged.

#### **-W, --wall**

Use **wall** to alert all users of a low battery status.

**-w *n*, --warn *n***

Log a warning at ALERT level when the battery charge drops below *n* percent. The default is 10. Negative values disable low battery level warnings.

**-q, --quiet**

Disable low battery level warnings.

**-, --help**

Print help summary and exit.

**Parameters**

The apmd proxy script will be invoked with the following parameters:

**start**

Invoked when the daemon starts.

**stop**

Invoked when the daemon stops.

**suspend [ system | user ]**

Invoked when a suspend request has been made. The second parameter indicates whether the request was made by the system or by the user.

**standby [ system | user ]**

Invoked when a standby request has been made. The second parameter indicates whether the request was made by the system or by the user.

**resume [ suspend | standby | critical ]**

Invoked when the system resumes normal operation. The second parameter indicates the mode the system was in before resuming. (**critical** suspends indicate an emergency shutdown. After a **critical** suspend the system may be unstable and you can use the **resume** command to help you recover from the suspension.

**change power**

Invoked when system power is changed from AC to battery or from battery to AC.

**change battery**

Invoked when the APM BIOS driver reports that the battery is low.

**change capability**

Invoked when the APM BIOS driver reports some hardware that affects its capability has been added or removed.

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### apropos *string* ...

Search the short manual page descriptions in the **whatis** database for occurrences of each *string* and display the result on the standard output. Like **whatis**, except that it searches for strings instead of words. Equivalent to **man -k**.

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**ar** [-V] *key* [*args*] [*posname*] *archive* [*files*]

Maintain a group of *files* that are combined into a file *archive*. Used most commonly to create and update library files as used by the link editor (**ld**). Only one key letter may be used, but each can be combined with additional *args* (with no separations between). *posname* is the name of a file in *archive*. When moving or replacing *files*, you can specify that they be placed before or after *posname*. -V prints the version number of **ar** on standard error.

## Key

**d**Delete *files* from *archive*.**m**Move *files* to end of *archive*.**p**Print *files* in *archive*.**q**Append *files* to *archive*.**r**Replace *files* in *archive*.**t**List the contents of *archive* or list the named *files*.**x**Extract contents from *archive* or only the named *files*.

## Arguments

- a**  
Use with **r** or **m** key to place *files* in the archive after *posname*.
- b**  
Same as **a** but before *posname*.
- c**  
Create *archive* silently.
- f**  
Truncate long filenames.
- i**  
Same as **b**.
- l**  
For backward compatibility; meaningless in Linux.
- o**  
Preserve original timestamps.
- s**  
Force regeneration of *archive* symbol table (useful after running **strip**).
- S**  
Do not regenerate symbol table.
- u**  
Use with **r** to replace only *files* that have changed since being put in *archive*.
- v**  
Verbose; print a description of actions taken.

### Example

Replace **mylib.a** with object files from the current directory:

```
ar r mylib.a `ls *.o`
```

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## arch

Print machine architecture type to standard output. Equivalent to **uname -m**.

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### arp [*options*]

TCP/IP command. Clear, add to, or dump the kernel's ARP cache (*/proc/net/arp*).

#### Options

##### **-v**

Verbose mode.

##### **-t type**

Search for *type* entries when examining the ARP cache. *type* must be **ether** (Ethernet) or **ax25** (AX.25 packet radio); **ether** is the default.

##### **-a [*hosts*]**

Display *hosts*' entries or, if none are specified, all entries.

##### **-d host**

Remove *host*'s entry.

##### **-s host hardware-address**

Add the entry *host hardware-address*, where **ether** class addresses are 6 hexadecimal bytes, colon-separated.

##### **-f file**

Read entries from *file* and add them.

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**as** [*options*] *files*

Generate an object file from each specified assembly language source *file*. Object files have the same root name as source files but replace the *.s* suffix with *.o*. There may be some additional system-specific options.

### Options

**--** [ | *files* ]

Read input files from standard input, or from *files* if the pipe is used.

**-a**[*dhlns*][=*file*]

With only the **-a** option, list source code, assembler listing, and symbol table. The other options specify additional things to list or omit:

**-ad**

Omit debugging directives.

**-ah**

Include the high-level source code, if available.

**-al**

Include an assembly listing.

**-an**

Suppress forms processing.

**-as**

Include a symbol listing.

**=*file***

Set the listing filename to *file*.

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**-defsym** *symbol=value*

Define the *symbol* to have the value *value*, which must be an integer.

**-f**

Skip preprocessing.

**--gstabs**

Generate stabs debugging information.

**-o** *objfile*

Place output in object file *objfile* (default is *file.o*).

**-v**

Display the version number of the assembler.

**-I** *path*

Include *path* when searching for **.include** directives.

**-K**

Warn before altering difference tables.

**-L**

Do not remove local symbols, which begin with **L**.

**-R**

Combine both data and text in text section.

**-W**

Quiet mode.

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Execute commands at a specified *time* and optional *date*. The commands are read from standard input or from a file. (See also **batch**.) End input with *EOF*. *time* can be formed either as a numeric hour (with optional minutes and modifiers) or as a keyword. It can contain an optional *date*, formed as a month and date, a day of the week, or a special keyword (*today* or *tomorrow*). An increment can also be specified.

The **at** command can always be issued by a privileged user. Other users must be listed in the file */etc/at.allow* if it exists; otherwise, they must not be listed in */etc/at.deny*. If neither file exists, only a privileged user can issue the command.

**Options****-c** *job* [*job...*]

Display the specified jobs on the standard output. This option does not take a time specification.

**-d** *job* [*job...*]

Delete the specified jobs. Same as **atrm**.

**-f** *file*

Read job from *file*, not standard input.

**-l**

Report all jobs that are scheduled for the invoking user. Same as **atq**.

**-m**

Mail user when job has completed, regardless of whether output was created.

**-q** *letter*

Place job in queue denoted by *letter*, where *letter* is any single letter from a-z or A-Z. Default queue is **a**. (The batch queue defaults to **b**.) Higher-lettered queues run at a lower priority.

**-v**

Display the version number.

**Time**

*hh:mm* [*modifiers*]

Hours can have one digit or two (a 24-hour clock is assumed by default); optional minutes can be given as one or two digits; the colon can be omitted if the format is *h*, *hh*, or *hhmm*; (e.g., valid times are 5, 5:30, 0530, 19:45). If modifier **am** or **pm** is added, *time* is based on a 12-hour clock. If the keyword **zulu** is added, times correspond to Greenwich Mean Time.

**midnight** | **noon** | **teatime** | **now**

Use any one of these keywords in place of a numeric time. **teatime** translates to 4:00 p.m.; **now** must be followed by an *increment*.

**Date**

*month num* [, *year*]

*month* is one of the 12 months, spelled out or abbreviated to its first three letters; *num* is the calendar date of the month; *year* is the four-digit year. If the given *month* occurs before the current month, **at** schedules that month next year.

*day*

One of the seven days of the week, spelled out or abbreviated to its first three letters.

**today** | **tomorrow**

Indicate the current day or the next day. If *date* is omitted, **at** schedules **today** when the specified *time* occurs later than the current time; otherwise, **at** schedules **tomorrow**.

**Increment**

Supply a numeric increment if you want to specify an execution time or day *relative* to the current time. The number should precede any of the keywords **minute**, **hour**, **day**, **week**, **month**, or **year** (or their plural forms). The keyword **next** can be used as a synonym of + 1.

**Examples**

Note that the first two commands are equivalent:

```
at 1945 pm December 9
at 7:45pm Dec 9
at 3 am Saturday
at now + 5 hours
at noon next day
```

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### atq [*options*]

List the user's pending jobs, unless the user is a privileged user; in that case, everybody's jobs are listed. Same as **at -l**.

#### Options

##### **-q** *queue*

Query only the specified queue and ignore all other queues.

##### **-v**

Show jobs that have completed but not yet been deleted.

##### **-V**

Print the version number.

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**atrm** [*options*] *job* [*job...*]

Delete jobs that have been queued for future execution. Same as **at -d**.

### Options

**-q** *queue*

Remove job from the specified queue.

**-v**

Print the version number and then exit.

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**badblocks** [*options*] *device* *block-count*

System administration command. Search *device* for bad blocks. You must specify the number of blocks on the device (*block-count*).

### Options

**-b** *blocksize*

Expect *blocksize*-byte blocks.

**-o** *file*

Direct output to *file*.

**-v**

Verbose mode.

**-w**

Test by writing to each block and then reading back from it.

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### cut options [files]

Cut out selected columns or fields from one or more *files*. In the following options, *list* is a sequence of integers. Use a comma between separate values and a hyphen to specify a range (e.g., **1-10,15,20** or **50-**). See also **paste** and **join**.

#### Options

##### **-b list, --bytes list**

Specify *list* of positions; only bytes in these positions will be printed.

##### **-c list, --characters list**

Cut the column positions identified in *list*.

##### **-d c, --delimiter c**

Use with **-f** to specify field delimiter as character *c* (default is tab); special characters (e.g., a space) must be quoted.

##### **-f list, --fields list**

Cut the fields identified in *list*.

##### **-n**

Don't split multibyte characters.

##### **-s, --only-delimited**

Use with **-f** to suppress lines without delimiters.

##### **--output-delimiter=string**

Use *string* as the output delimiter. By default, the output delimiter is the same as the input delimiter.

**--help**

Print help message and then exit.

**--version**

Print version information and then exit.

**Examples**

Extract usernames and real names from */etc/passwd*:

```
cut -d: -f1,5 /etc/passwd
```

Find out who is logged on, but list only login names:

```
who | cut -d" " -f1
```

Cut characters in the fourth column of *file*, and paste them back as the first column in the same file:

```
cut -c4 file | paste - file
```

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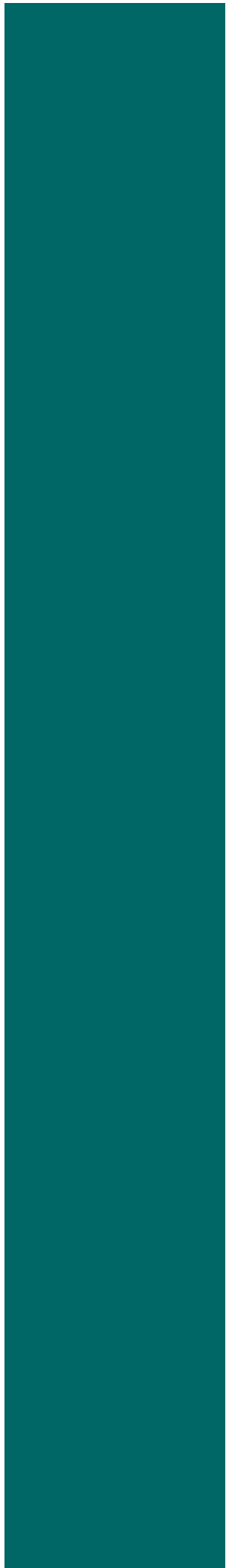
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**date** [*options*] [+*format*] [*date*]

Print the current date and time. You may specify a display *format*. *format* can consist of literal text strings (blanks must be quoted) as well as field descriptors, whose values will appear as described in the following entries (the listing shows some logical groupings). A privileged user can change the system's date and time.

### Options

**+format**

Display current date in a nonstandard format. For example:

```
% date +"%A %j %n%k %p"
Tuesday 248
15 PM
```

The default is `%a %b %e %T %Z %Y`—e.g., Tue Sep 5 14:59:37 EDT 2000.

**-d date, --date date**

Display *date*, which should be in quotes and may be in the format *d days* or *m months d days* to print a date in the future. Specify **ago** to print a date in the past. You may include formatting (see the "Format" section that follows).

**-f datefile, --file=datefile**

Like **-d** but printed once for each line of *datefile*.

**-I [timespec], --iso-8601[=timespec]**

Display in ISO-8601 format. If specified, *timespec* can have one of the values **date** (for date only), **hours**, **minutes**, or **seconds** to get the indicated precision.

**-r file, --reference=file**

Display the time *file* was last modified.

**-R, --rfc-822**

Display the date in RFC 822 format.

**--help**

Print help message and exit.

**--version**

Print version information and exit.

**-s date, --set date**

Set the date.

**-u, --universal**

Set the date to Greenwich Mean Time, not local time.

**Format**

**%**

Literal %.

**-**

Do not pad fields (default: pad fields with zeros).

**—**

Pad fields with space (default: zeros).

**%a**

Abbreviated weekday.

**%b**

Abbreviated month name.

**%c**

Country-specific date and time format.

**%d**

Day of month (01-31).

**%h**

Same as **%b**.

**%j**

Julian day of year (001-366).

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**%k**

Hour in 24-hour format, without leading zeros (0-23).

**%l**

Hour in 12-hour format, without leading zeros (1-12).

**%m**

Month of year (01-12).

**%n**

Insert a new line.

**%p**

String to indicate AM or PM.

**%r**

Time in **%I:%M:%S %p** (12-hour) format.

**%s**

Seconds since "The Epoch," 1970-01-01 00:00:00 UTC (a nonstandard extension).

**%t**

Insert a tab.

**%w**

Day of week (Sunday = 0).

**%x**

Country-specific date format.

**%y**

Last two digits of year (00-99).

**%z**

RFC 822-style numeric time zone.

**%A**

Full weekday.

**%B**

Full month name.

**%D**



Date in **%m/%d/%y** format.

### **%H**

Hour in 24-hour format (00-23).

### **%I**

Hour in 12-hour format (01-12).

### **%M**

Minutes (00-59).

### **%S**

Seconds (00-59).

### **%T**

Time in **%H:%M:%S** format.

### **%U**

Week number in year (00-53); start week on Sunday.

### **%V**

Week number in year (01-52); start week on Monday.

### **%W**

Week number in year (00-53); start week on Monday.

### **%X**

Country-specific time format.

### **%Y**

Four-digit year (e.g., 1996).

### **%Z**

Time zone name.

## **Strings for setting date**

Strings for setting the date may be numeric or nonnumeric. Numeric strings consist of time, day, and year in the format *MMDDhhmm[[CC]YY][.ss]*. Nonnumeric strings may include month strings, time zones, a.m., and p.m.

### *time*

A two-digit hour and two-digit minute (*hhmm*); *hh* uses 24-hour format.

### *day*

A two-digit month and two-digit day of month (*MMDD*); default is

current day and month.

*year*

The year specified as either the full four-digit century and year or just the two-digit year; the default is the current year.

### Examples

Set the date to July 1 (**0701**), 4 a.m. (**0400**), 1995 (**95**):

```
date 0701040095
```

The command:

```
date +"Hello%t Date is %D %n%t Time is %T"
```

produces a formatted date as follows:

```
Hello      Date is 05/09/93
          Time is 17:53:39
```

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Make a copy of an input file (**if**) using the specified conditions, and send the results to the output file (or standard output if **of** is not specified). Any number of options can be supplied, although **if** and **of** are the most common and are usually specified first. Because **dd** can handle arbitrary blocksizes, it is useful when converting between raw physical devices.

**Options****bs=*n***

Set input and output blocksize to *n* bytes; this option overrides **ibs** and **obs**.

**cbs=*n***

Set the size of the conversion buffer (logical record length) to *n* bytes. Use only if the conversion *flag* is **ascii**, **ebcdic**, **ibm**, **block**, or **unblock**.

**conv=*flags***

Convert the input according to one or more (comma-separated) *flags* listed next. The first five *flags* are mutually exclusive.

**ascii**

EBCDIC to ASCII.

**ebcdic**

ASCII to EBCDIC.

**ibm**

ASCII to EBCDIC with IBM conventions.

**block**

Variable-length records (i.e., those terminated by a newline) to fixed-length records.

**unblock**

Fixed-length records to variable-length.

**lcase**

Uppercase to lowercase.

**ucase**

Lowercase to uppercase.

**noerror**

Continue processing after read errors.

**notrunc**

Don't truncate output file.

**swab**

Swap each pair of input bytes.

**sync**

Pad input blocks to **ibs** with trailing zeros.

**count=*n***

Copy only *n* input blocks.

**ibs=*n***

Set input blocksize to *n* bytes (default is 512).

**if=*file***

Read input from *file* (default is standard input).

**obs=*n***

Set output blocksize to *n* bytes (default is 512).

**of=*file***

Write output to *file* (default is standard output).

**seek=*n***

Skip *n* output-sized blocks from start of output file.

**skip=*n***

Skip *n* input-sized blocks from start of input file.

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### **--help**

Print help message and then exit.

### **--version**

Print the version number and then exit.

You can multiply size values (*n*) by a factor of 1024, 512, or 2 by appending the letter **k**, **b**, or **w**, respectively. You can use the letter **x** as a multiplication operator between two numbers.

### **Examples**

Convert an input file to all lowercase:

```
dd if=caps_file of=small_file conv=lc case
```

Retrieve variable-length data; write it as fixed-length to **out**:

```
data_retrieval_cmd | dd of=out conv=sync,block
```

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### debugfs *[[option] device]*

System administration command. Debug an **ext2** filesystem. *device* is the special file corresponding to the device containing the **ext2** filesystem (e.g., */dev/hda3*).

#### Option

**-w**

Open the filesystem read-write.

#### Commands

**cat** *file*

Dump the contents of an inode to standard output.

**cd** *directory*

Change the current working directory to *directory*.

**chroot** *directory*

Change the root directory to be the specified inode.

**close**

Close the currently open filesystem.

**clri** *file*

Clear the contents of the inode corresponding to *file*.

**dump** *file out\_file*

Dump the contents of an inode to *out\_file*.

**expand\_dir** *directory*

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Expand *directory*.

**find\_free\_block** [*goal*]

Find first free block starting from *goal* (if specified) and allocate it.

**find\_free\_inode** [*dir* [*mode*]]

Find a free inode and allocate it.

**freeb** *block*

Mark *block* as not allocated.

**freei** *file*

Free the inode corresponding to *file*.

**help**

Print a list of commands understood by **debugfs**.

**icheck** *block*

Do block-to-inode translation.

**initialize** *device* *blocksize*

Create an **ext2** filesystem on *device*.

**kill\_file** *file*

Remove *file* and deallocate its blocks.

**ln** *source\_file* *dest\_file*

Create a link.

**ls** [*pathname*]

Emulate the **ls** command.

**modify\_inode** *file*

Modify the contents of the inode corresponding to *file*.

**mkdir** *directory*

Make *directory*.

**mknod** *file* [**p**[[**c****b**] *major* *minor*]]

Create a special device file.

**ncheck** *inode*

Do inode-to-name translation.

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**open** [-w] *device*

Open a filesystem.

**pwd**

Print the current working directory.

**quit**

Quit **debugfs**.

**rm** *file*

Remove *file*.

**rmdir** *directory*

Remove *directory*.

**setb** *block*

Mark *block* as allocated.

**seti** *file*

Mark in use the inode corresponding to *file*.

**show\_super\_stats**

List the contents of the super block.

**stat** *file*

Dump the contents of the inode corresponding to *file*.

**testb** *block*

Test whether *block* is marked as allocated.

**testi** *file*

Test whether the inode corresponding to *file* is marked as allocated.

**unlink** *file*

Remove a link.

**write** *source\_file* *file*

Create a file in the filesystem named *file*, and copy the contents of *source\_file* into the destination file.

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### depmod [*options*] *modules*

System administration command. Create a dependency file for the modules given on the command line. This dependency file can be used by **modprobe** to automatically load the relevant *modules*. The normal use of **depmod** is to include the line `/sbin/depmod -a` in one of the files in `/etc/rc.d` so the correct module dependencies will be available after booting the system.

### Options

**-a**

Create dependencies for all modules listed in `/etc/conf.modules`.

**-d**

Debug mode. Show all commands being issued.

**-e**

Print a list of all unresolved symbols.

**-v**

Print a list of all processed modules.

### Files

`/etc/conf.modules`

Information about modules: which ones depend on others, and which directories correspond to particular types of modules.

`/sbin/insmod`, `/sbin/rmmod`

Programs that **depmod** relies on.

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**df** [*options*] [*name*]

Report the amount of free disk space available on all mounted filesystems or on the given *name*. (**df** cannot report on unmounted filesystems.) Disk space is shown in 1KB blocks (default) or 512-byte blocks (if the environment variable POSIXLY\_CORRECT is set). *name* can be a device name (e.g., */dev/hd\**), the directory name of a mounting point (e.g., */usr*), or a directory name (in which case **df** reports on the entire filesystem in which that directory is mounted).

### Options

**-a, --all**

Include empty filesystems (those with 0 blocks).

**--block-size=*n***

Show space as *n*-byte blocks.

**-h, --human-readable**

Print sizes in a format friendly to human readers (e.g., 1.9G instead of 1967156).

**-H, --si**

Like **-h**, but show as power of 1000 rather than 1024.

**-i, --inodes**

Report free, used, and percent-used inodes.

**-k, --kilobytes**

Print sizes in kilobytes.

**-l, --local**

Show local filesystems only.

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**-m, --megabytes**

Print sizes in megabytes.

**--no-sync**

Show results without invoking **sync** first (i.e., without flushing the buffers). This is the default.

**-P, --portability**

Use POSIX output format (i.e., print information about each filesystem on exactly one line).

**--sync**

Invoke **sync** (flush buffers) before getting and showing sizes.

**-t type, --type=type**

Show only *type* filesystems.

**-T, --print-type**

Print the type of each filesystem in addition to the sizes.

**-x type, --exclude-type=type**

Show only filesystems that are not of type *type*.

**--help**

Print help message and then exit.

**--version**

Print the version and then exit.

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**diff** [*options*] [*diroptions*] *file1 file2*

Compare two text files. **diff** reports lines that differ between *file1* and *file2*. Output consists of lines of context from each file, with *file1* text flagged by a < symbol and *file2* text by a > symbol. Context lines are preceded by the **ed** command (**a**, **c**, or **d**) that would be used to convert *file1* to *file2*. If one of the files is -, standard input is read. If one of the files is a directory, **diff** locates the filename in that directory corresponding to the other argument (e.g., **diff my\_dir junk** is the same as **diff my\_dir/junk junk**). If both arguments are directories, **diff** reports lines that differ between all pairs of files having equivalent names (e.g., *olddir/program* and *newdir/program*); in addition, **diff** lists filenames unique to one directory, as well as subdirectories common to both. See also **cmp**.

### Options

**-a, --text**

Treat all files as text files. Useful for checking to see if binary files are identical.

**-b, --ignore-space-change**

Ignore repeating blanks and end-of-line blanks; treat successive blanks as one.

**-B, --ignore-blank-lines**

Ignore blank lines in files.

**-c**

Context **diff**: print 3 lines surrounding each changed line.

**-C n, --context[=*n*]**

Context **diff**: print *n* lines surrounding each changed line. The default context is 3 lines.

**-d, --minimal**



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To speed up comparison, ignore segments of numerous changes and output a smaller set of changes.

**-Dsymbol, --ifdef=symbol**

When handling C files, create an output file that contains all the contents of both input files, including **#ifdef** and **#ifndef** directives that reflect the directives in both files.

**-e, --ed**

Produce a script of commands (**a**, **c**, **d**) to re-create *file2* from *file1* using the **ed** editor.

**-F regexp, --show-function-line[=regexp]**

For context and unified **diff**, show the most recent line containing *regexp* before each block of changed lines.

**-H**

Speed output of large files by scanning for scattered small changes; long stretches with many changes may not show up.

**--help**

Print brief usage message.

**--horizon-lines=n**

In an attempt to find a more compact listing, keep *n* lines on both sides of the changed lines when performing the comparison.

**-i, --ignore-case**

Ignore case in text comparison. Uppercase and lowercase are considered the same.

**-I regexp, --ignore-matching-lines=regexp**

Ignore lines in files that match the regular expression *regexp*.

**-l, --paginate**

Paginate output by passing it to **pr**.

**-L label, --label label, --label=label**

For context and unified **diff**, print *label* in place of the filename being compared. The first such option applies to the first filename and the second option to the second filename.

**--left-column**

For two-column output (**-y**), show only left column of common lines.

**-n, --rcs**

Produce output in RCS **diff** format.

**-N, --new-file**

Treat nonexistent files as empty.

**-p, --show-c-function**

When handling files in C or C-like languages such as Java, show the function containing each block of changed lines. Assumes **-c** but can also be used with a unified **diff**.

**-P, --unidirectional-new-file**

If two directories are being compared and the first lacks a file that is in the second, pretend that an empty file of that name exists in the first directory.

**-q, --brief**

Output only whether files differ.

**-r, --recursive**

Compare subdirectories recursively.

**-s, --report-identical-files**

Indicate when files do not differ.

**-S filename, --starting-file=filename**

For directory comparisons, begin with the file *filename*, skipping files that come earlier in the standard list order.

**--suppress-common-lines**

For two-column output (**-y**), do not show common lines.

**-t, --expand-tabs**

Produce output with tabs expanded to spaces.

**-T, --initial-tab**

Insert initial tabs into output to line up tabs properly.

**-u**

Unified **diff**: print old and new versions of lines in a single block, with 3 lines surrounding each block of changed lines.

**-U n, --unified[=n]**

Unified **diff**: print old and new versions of lines in a single block, with *n* lines surrounding each block of changed lines. The default context is 3 lines.

**-v, --version**

Print version number of this version of **diff**.

**-w, --ignore-all-space**

Ignore all whitespace in files for comparisons.

**-W *n*, --width=*n***

For two-column output (**-y**), produce columns with a maximum width of *n* characters. Default is 130.

**-x *regexp*, --exclude=*regexp***

Do not compare files in a directory whose names match *regexp*.

**-X *filename*, --exclude-from=*filename***

Do not compare files in a directory whose names match patterns described in the file *filename*.

**-y, --side-by-side**

Produce two-column output.

**-n**

For context and unified **diff**, print *n* lines of context. Same as specifying a number with **-C** or **-U**.

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**diff3** [*options*] *file1 file2 file3*

Compare 3 files and report the differences. No more than one of the files may be given as - (indicating that it is to be read from standard input). The output is displayed with the following codes:

```
====
```

All three files differ.

```
====1
```

*file1* is different.

```
====2
```

*file2* is different.

```
====3
```

*file3* is different.

**diff3** is also designed to merge changes in two differing files based on a common ancestor file (i.e., when two people have made their own set of changes to the same file). **diff3** can find changes between the ancestor and one of the newer files and generate output that adds those differences to the other new file. Unmerged changes are places where both of the newer files differ from each other and at least one of them from the ancestor. Changes from the ancestor that are the same in both of the newer files are called *merged changes*. If all three files differ in the same place, it is called an *overlapping change*.

This scheme is used on the command line with the ancestor being *file2*, the second filename. Comparison is made between *file2* and *file3*, with those differences then applied to *file1*.

### Options

**-3, --easy-only**

Create an **ed** script to incorporate into *file1* unmerged, nonoverlapping differences between *file1* and *file3*.

**-a, --text**

Treat files as text.

**-A, --show-all**

Create an **ed** script to incorporate all changes, showing conflicts in bracketed format.

**-e, --ed**

Create an **ed** script to incorporate into *file1* all unmerged differences between *file2* and *file3*.

**-E, --show-overlap**

Create an **ed** script to incorporate unmerged changes, showing conflicts in bracketed format.

**-x, --overlap-only**

Create an **ed** script to incorporate into *file1* all differences where all three files differ (overlapping changes).

**-X**

Same as **-x**, but show only overlapping changes, in bracketed format.

**-m, --merge**

Create file with changes merged (not an **ed** script).

**-L label, --label=label**

Use *label* to replace filename in output.

**-i**

Append the **w** (save) and **q** (quit) commands to **ed** script output.

**-T, --initial-tab**

Begin lines with a tab instead of two spaces in output to line tabs up properly.

**-v, --version**

Print version information and then exit.

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**dip** [*options*] [*chat scriptfile*]

System administration command. Set up or initiate dial-up Internet connections. **dip** can be used to establish connections for users dialing out or dialing in. Commands can be used in interactive mode or placed in a script file for use in dial-out connections. To establish dial-in connections, **dip** is often is used as a shell and may be executed using the commands **diplogin** or **diplogini**.

### Options

**-a**

In dial-in mode, prompt for username and password. Same as the **diplogini** command.

**-i**

Initiate a login shell for a dial-in connection. Same as the **diplogin** command.

**-k**

Kill the most recent **dip** process or the process running on the device specified by the **-l** option.

**-l device**

Used with the **-k** option. Specifies a tty *device*.

**-m mtu**

Maximum Transfer Unit. The default is 296.

**-p protocol**

The *protocol* to use: SLIP, CSLIP, PPP, or TERM.

**-t**

Command mode. This is usually done for testing.

**-v**

Verbose mode.

## Commands

Most of these commands can be used either in interactive mode or in a script file.

**beep** *times*

Beep the terminal the specified number of *times*.

**bootp**

Retrieve local and remote IP addresses using the BOOTP protocol.

**break**

Send a BREAK.

**chatkey** *keyword code*

Map a modem response keyword to a numeric code.

**config** [**interface**|**routing**] [**pre**|**up**|**down**|**post**] *arguments*

Modify **interface** characteristics or the **routing** table, before the link comes up, when it is up, when it goes down, or after it is down. The syntax for *arguments* is the same as arguments for the **ifconfig** or **route** commands.

**databits** *7|8*

Set the number of data bits.

**dec** *\$variable* [*value*]

Decrement *\$variable* by *value*. The default is 1.

**default**

Set default route to the IP address of the host connected to.

**dial** *phonenumber* [*timeout*]

Dial *phonenumber*. Abort if remote modem doesn't answer within *timeout* seconds. Set **\$errlvl** according to the modem response.

**echo** **on|off**

Enable or disable the display of modem commands.

**exit** [*n*]

Exit the script. Optionally return the number *n* as the exit status.

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## **flush**

Clear the input buffer.

## **get** *\$variable* [**ask**|**remote** [*timeout*]] *value*

Set *\$variable* to *value*. If **ask** is specified, prompt the user for a value. If **remote** is specified, retrieve the value from the remote system. Abort after *timeout* seconds.

## **goto** *label*

Jump to the section identified by *label*.

## **help**

List available commands.

## **if** *expr* **goto** *label*

Jump to the section identified by *label* if the expression evaluates to true. An expression compares a variable to a constant using one of these operators: =, !=, <, >, <=, or >=.

## **inc** *\$variable* [*value*]

Increment *\$variable* by *value*. The default is 1.

## **init** *string*

Set the *string* used to initialize the modem. The default is ATE0 Q0 V1 X1.

## **mode** *protocol*

Set the connection *protocol*. Valid values are SLIP, CSLIP, PPP, and TERM. The default is SLIP.

## **netmask** *mask*

Set the subnet mask.

## **parity** E|O|N

Set the line parity to even, odd, or none.

## **password**

Prompt user for password.

## **proxyarp**

Install a proxy ARP entry in the local ARP table.

## **print** *\$variable*

Display the content of *\$variable*.

## **psend** *command*

Execute *command* in a shell, and send output to the serial device. Commands are executed using the user's real UID.

**port** *device*

Specify the serial device the modem is attached to.

**quit**

Exit with a nonzero exit status. Abort the connection.

**reset**

Reset the modem.

**securid**

Prompt user for the variable part of an ACE System SecureID password and send it together with the stored prefix to the remote system.

**securidf** *prefix*

Store the fixed part of an ACE System SecureID password.

**send** *string*

Send *string* to the serial device.

**shell** *command*

Execute *command* in a shell using the user's real UID.

**skey** [*timeout*]

Wait for an S/Key challenge, then prompt user for the secret key. Generate and send the response. Abort if challenge is not received within *timeout* seconds. S/Key support must be compiled into **dip**.

**sleep** *time*

Wait *time* seconds.

**speed** *bits-per-second*

Set the port speed. Default is 38400.

**stopbits** 1|2

Set the number of stop bits.

**term**

Enable terminal mode. Pass keyboard input directly to the serial device.

**timeout** *time*

Set the number of seconds the line can be inactive before the link is closed.

**wait** *text* [*timeout*]

Wait *timeout* seconds for *text* to arrive from the remote system. If *timeout* is not specified, wait forever.

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### **dirname** *pathname*

Print *pathname* excluding the last level. Useful for stripping the actual filename from a pathname. If there are no slashes (no directory levels) in *pathname*, **dirname** prints . to indicate the current directory. See also **basename**.

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### dmesg [*options*]

System administration command. Display the system control messages from the kernel ring buffer. This buffer stores all messages since the last system boot or the most recent ones, if the buffer has been filled.

#### Options

**-c**

Clear buffer after printing messages.

**-n *level***

Set the level of system message that will display on console.

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### dnsdomainname

TCP/IP command. Print the system's DNS domain name. See also **hostname**.

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**grep** [*options*] *pattern* [*files*]

Search one or more *files* for lines that match a regular expression *pattern*. Regular expressions are described in Chapter 9. Exit status is 0 if any lines match, 1 if none match, and 2 for errors. See also **egrep** and **fgrep**.

### Options

**-a, --text**

Don't suppress output lines with binary data; treat as text.

**-b, --byte-offset**

Print the byte offset within the input file before each line of output.

**-B, --byte-offset**

Print the byte offset within the input file before each line of output.

**-c, --count**

Print only a count of matched lines. With **-v** or **--invert-match** option, count nonmatching lines.

**-d action, --directories=action**

Define an *action* for processing directories. Possible actions are:

**read**

Read directories like ordinary files (default).

**skip**

Skip directories.

**recurse**

Recursively read all files under each directory. Same as **-r**.

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**-e *pattern*, --regexp=*pattern***

Search for *pattern*. Same as specifying a pattern as an argument, but useful in protecting patterns beginning with **-**.

**-f *file*, --file=*file***

Take a list of patterns from *file*, one per line.

**-h, --no-filename**

Print matched lines but not filenames (inverse of **-l**).

**-i, --ignore-case**

Ignore uppercase and lowercase distinctions.

**-l, --files-with-matches**

List the names of files with matches but not individual matched lines; scanning per file stops on the first match.

**-n, --line-number**

Print lines and their line numbers.

**-q, --quiet, --silent**

Suppress normal output in favor of quiet mode; the scanning stops on the first match.

**-r, --recursive**

Recursively read all files under each directory. Same as **-d recurse**.

**-s, --no-messages**

Suppress error messages about nonexistent or unreadable files.

**-v, --invert-match**

Print all lines that *don't* match *pattern*.

**-w, --word-regexp**

Match on whole words only. Words are divided by characters that are not letters, digits, or underscores.

**-x, --line-regexp**

Print lines only if *pattern* matches the entire line.

**-A *num*, --after-context=*num***

Print *num* lines of text that occur after the matching line.

**-B *num*, --before-context=*num***

[XML](#)

Print *num* lines of text that occur before the matching line.

**-C[*num*], --context=[*num*], -*num***

Print *num* lines of leading and trailing context. Default context is 2 lines.

**-L, --files-without-match**

List files that contain no matching lines.

**-V, --version**

Print the version number and then exit.

## Examples

List the number of users who use **tcsh**:

```
grep -c /bin/tcsh /etc/passwd
```

List header files that have at least one **#include** directive:

```
grep -l '^#include' /usr/include/*
```

List files that don't contain *pattern*:

```
grep -c pattern files | grep :0
```

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Frontend to the **groff** document-formatting system, which normally runs **troff** along with a postprocessor appropriate for the selected output device. Options without arguments can be grouped after a single dash (-). A filename of - denotes standard input.

**Options****-a**

Generate an ASCII approximation of the typeset output.

**-b**

Print a backtrace.

**-C**

Enable compatibility mode.

**-dcs, -dname=s**Define the character *c* or string *name* to be the string *s*.**-e**Preprocess with **eqn**.**-E**

Don't print any error messages.

**-fam**Use *fam* as the default font family.



**-Fdir**

Search *dir* for subdirectories with *DESC* and font files before the default */usr/lib/groff/font*.

**-h**

Print a help message.

**-i**

Read standard input after all *files* have been processed.

**-l**

Send the output to a printer (as specified by the *print* command in the device description file).

**-Larg**

Pass *arg* to the spooler. Each argument should be passed with a separate **-L** option.

**-mname**

Read the macro file *tmac.name*.

**-Mdir**

Search directory *dir* for macro files before the default directory */usr/lib/groff/tmac*.

**-num**

Set the first page number to *num*.

**-N**

Don't allow newlines with **eqn** delimiters; equivalent to **eqn**'s **-N** option.

**-olist**

Output only pages specified in *list*, which is a comma-separated list of page ranges.

**-p**

Preprocess with **pic**.

**-Parg**

Pass *arg* to the postprocessor. Each argument should be passed with a separate **-P** option.

**-rcn, -name=n**

Set the number register *c* or *name* to *n*. *c* is a single character and *n* is any **troff** numeric expression.

**-R**

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Preprocess with **refer**.

**-s**

Preprocess with **soelim**.

**-S**

Use safer mode (i.e., pass the **-S** option to **pic** and use the **-msafer** macros with **troff**).

**-t**

Preprocess with **tbl**.

**-Tdev**

Prepare output for device *dev*; the default is **ps**.

**-v**

Make programs run by **groff** print out their version number.

**-V**

Print the pipeline on stdout instead of executing it.

**-wname**

Enable warning *name*. You can specify multiple **-w** options. See the **troff** manpage for a list of warnings.

**-Wname**

Disable warning *name*. You can specify multiple **-W** options. See the **troff** manpage for a list of warnings.

**-z**

Suppress **troff** output (except error messages).

**-Z**

Do not postprocess **troff** output. Normally **groff** automatically runs the appropriate postprocessor.

## Devices

**ascii**

Typewriter-like device

**dvi**

TeX dvi format

**latin1**

Typewriter-like devices using the ISO Latin-1 character set

### **ps**

PostScript

### **X75**

75-dpi X11 previewer

### **X100**

100-dpi X11 previewer

### **lj4**

HP LaserJet4-compatible (or other PCL5-compatible) printer

## **Environment variables**

### **GROFF\_COMMAND\_PREFIX**

If set to be X, **groff** will run **Xtroff** instead of **troff**.

### **GROFF\_FONT\_PATH**

Colon-separated list of directories in which to search for the *devname* directory.

### **GROFF\_TMAC\_PATH**

Colon-separated list of directories in which to search for the macro files.

### **GROFF\_TMPDIR**

If set, temporary files will be created in this directory; otherwise, they will be created in TMPDIR (if set) or */tmp* (if TMPDIR is not set).

### **GROFF\_TYPESETTER**

Default device.

### **PATH**

Search path for commands that **groff** executes.

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### groupadd [*options*] *group*

System administration command. Create new group account *group*.

#### Options

##### **-gid**

Assign numerical group ID. (By default, the first available number above 500 is used.) The value must be unique unless the **-o** option is used.

##### **-o**

Accept a nonunique *gid* with the **-g** option.

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### groupdel *group*

System administration command. Remove *group* from system account files. You may still need to find and change permissions on files that belong to the removed group.

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### groupmod [*options*] *group*

System administration command. Modify group information for *group*.

#### Options

##### **-g** *gid*

Change the numerical value of the group ID. Any files that have the old *gid* will have to be changed manually. The new *gid* must be unique unless the **-o** option is used.

##### **-n** *name*

Change the group name to *name*.

##### **-o**

Override. Accept a nonunique *gid*.

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### groups [*options*] [*users*]

Show the groups that each *user* belongs to (default user is the owner of the current group). Groups are listed in */etc/passwd* and */etc/group*.

#### Options

##### **--help**

Print help message.

##### **--version**

Print version information.

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### grpck [*option*] [*files*]

System administration command. Remove corrupt or duplicate entries in the */etc/group* and */etc/gshadow* files. Generate warnings for other errors found. **grpck** will prompt for a "yes" or "no" before deleting entries. If the user replies "no," the program will exit. If run in a noninteractive mode, the reply to all prompts is "no." Alternate group and gshadow *files* can be checked. If other errors are found, the user will be encouraged to run the **groupmod** command.

### Option

**-n**

Noninteractive mode.

### Exit codes

**0**

Success.

**1**

Syntax error.

**2**

One or more bad group entries found.

**3**

Could not open group files.

**4**

Could not lock group files.

**5**



Could not write group files.

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**grpconv****grpunconv**

System administration command. Like **pwconv**, the **grpconv** command creates a shadowed group file to keep your encrypted group passwords safe from password cracking programs. **grpconv** creates the `/etc/gshadow` file based on your existing `/etc/groups` file and replaces your encrypted password entries with **x**. If you add new entries to the `/etc/groups` file, you can run **grpconv** again to transfer the new information to `/etc/gshadow`. It will ignore entries that already have a password of **x** and convert those that do not. **grpunconv** restores the encrypted passwords to your `/etc/groups` file and removes the `/etc/gshadow` file.

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**gs** [*options*] [*files*]

An interpreter for Adobe Systems' PostScript and PDF (Portable Document Format) languages; used for document processing. With - in place of *files*, standard input is used.

### Options

**--filename arg1 ...**

Take the next argument as a filename, but use all remaining arguments to define ARGUMENTS in userdict (not systemdict) as an array of those strings, before running the file.

**-gnumber1xnumber2**

Specify width and height of device; intended for systems like the X Window System.

**-q**

Quiet startup.

**-rnumber, -rnumber1xnumber2**

Specify X and Y resolutions (for the benefit of devices, such as printers, that support multiple X and Y resolutions). If only one number is given, it is used for both X and Y resolutions.

**-Dname=token, -dname=token**

Define a name in systemdict with the given definition. The token must be exactly one token (as defined by the token operator) and must not contain any whitespace.

**-Dname, -dname**

Define a name in systemdict with a null value.

### **-Idirectories**

Adds the designated list of directories at the head of the search path for library files.

### **-Sname=string, -sname=string**

Define a name in systemdict with a given string as value.

### **Special names**

#### **-dDISKFONTs**

Causes individual character outlines to be loaded from the disk the first time they are encountered.

#### **-dNOBIND**

Disables the **bind** operator. Useful only for debugging.

#### **-dNOCACHE**

Disables character caching. Useful only for debugging.

#### **-dNODISPLAY**

Suppresses the normal initialization of the output device. May be useful when debugging.

#### **-dNOPAUSE**

Disables the prompt and pause at the end of each page.

#### **-dNOPLATFONTs**

Disables the use of fonts supplied by the underlying platform (e.g., the X Window System).

#### **-dSAFER**

Disables the **deletefile** and **renamefile** operators and the ability to open files in any mode other than read-only.

#### **-dWRITESYSTEMDICT**

Leaves systemdict writable.

#### **-sDEVICE=device**

Selects an alternate initial output device.

#### **-sOUTPUTFILE=filename**

Selects an alternate output file (or pipe) for the initial output device.

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**gunzip** [*options*] [*files*]

Uncompress *files* compressed by **gzip**. See **gzip** for a list of options.

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Compress executables. When run, these files automatically uncompress, thus trading time for space. **gzexe** creates backup files (*filename~*), which should be removed after testing the original.

**Option****-d**

Decompress files.

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**gzip** [*options*] [*files*]

**gunzip** [*options*] [*files*]

**zcat** [*options*] [*files*]

Compress specified files (or read from standard input) with Lempel-Ziv coding (LZ77). Rename compressed file to *filename.gz*; keep ownership modes and access/modification times. Ignore symbolic links. Uncompress with **gunzip**, which takes all of **gzip**'s options, except those specified. **zcat** is identical to **gunzip -c** and takes the options **-fhLV**, described here. Files compressed with the **compress** command can be decompressed using these commands.

### Options

**-n, --fast, --best**

Regulate the speed of compression using the specified digit *n*, where **-1** or **--fast** indicates the fastest compression method (less compression) and **-9** or **--best** indicates the slowest compression method (most compression). The default compression level is **-6**.

**-a, --ascii**

ASCII text mode: convert end-of-lines using local conventions. This option is supported only on some non-Unix systems.

**-c, --stdout, --to-stdout**

Print output to standard output, and do not change input files.

**-d, --decompress, --uncompress**

Same as **gunzip**.

**-f, --force**

Force compression. **gzip** would normally prompt for permission to continue when the file has multiple links, its *.gz* version already exists,

or it is reading compressed data to or from a terminal.

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**-h --help**

Display a help screen and then exit.

**-l, --list**

Expects to be given compressed files as arguments. Files may be compressed by any of the following methods: **gzip**, **deflate**, **compress**, **lzh**, and **pack**. For each file, list uncompressed and compressed sizes (the latter being always -1 for files compressed by programs other than **gzip**), compression ratio, and uncompressed name. With **-v**, also print compression method, the 32-bit CRC of the uncompressed data, and the timestamp. With **-N**, look inside the file for the uncompressed name and timestamp.

**-L, --license**

Display the **gzip** license and quit.

**-n, --no-name**

When compressing, do not save the original filename and timestamp by default. When decompressing, do not restore the original filename if present, and do not restore the original timestamp if present. This option is the default when decompressing.

**-N, --name**

Default. Save original name and timestamp. When decompressing, restore original name and timestamp.

**-q, --quiet**

Print no warnings.

**-r, --recursive**

When given a directory as an argument, recursively compress or decompress files within it.

**-S *suffix*, --suffix *suffix***

Append *.suffix*. Default is **gz**. A null suffix while decompressing causes **gunzip** to attempt to decompress all specified files, regardless of suffix.

**-t, --test**

Test compressed file integrity.

**-v, --verbose**

Print name and percent size reduction for each file.

**-V, --version**

Display the version number and compilation options.

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**logger** [*options*] [*message...*]

TCP/IP command. Add entries to the system log (via **syslogd**). A message can be given on the command line, or standard input is logged.

### Options

**-f** *file*

Read *message* from *file*.

**-i**

Include the process ID of the **logger** process.

**-p** *pri*

Enter message with the specified priority *pri*. Default is **user.notice**.

**-t** *tag*

Mark every line in the log with the specified *tag*.

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### login [*name* / *option*]

Log in to the system. **login** asks for a username (*name* can be supplied on the command line) and password (if appropriate).

If successful, **login** updates accounting files, sets various environment variables, notifies users if they have mail, and executes startup shell files.

Only the root user can log in when */etc/nologin* exists. That file is displayed before the connection is terminated. Furthermore, root may connect only on a tty that is listed in */etc/securetty*. If *~/.hushlogin* exists, execute a quiet login. If */var/adm/lastlog* exists, print the time of the last login.

### Options

**-f**

Suppress second login authentication.

**-h** *host*

Specify name of remote host. Normally used by servers, not humans; may be used only by root.

**-p**

Preserve previous environment.

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### logname *[option]*

Consult `/var/run/utmp` for user's login name. If found, print it; otherwise, exit with an error message.

### Options

#### **--help**

Print a help message and then exit.

#### **--version**

Print version information and then exit.

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### logrotate [*options*] *config\_files*

System administration command. Manipulate log files according to commands given in *config\_files*.

#### Options

##### **-d**

Debug mode. No changes will be made to log files.

##### **-s, --state file**

Save state information in *file*. The default is */var/lib/logrotate.status*.

##### **--usage**

Usage version and copyright information.

#### Commands

##### **compress**

Compress old versions of log files with **gzip**.

##### **copytruncate**

Copy log file, then truncate it in place. For use with programs whose logging cannot be temporarily halted.

##### **create [*permissions*] [*owner*] [*group*]**

After rotation, re-create log file with the specified *permissions*, *owner*, and *group*. *permissions* must be in octal. If any of these parameters is missing, the log file's original attributes will be used.

##### **daily**

Rotate log files every day.

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**delaycompress**

Don't compress log file until the next rotation.

**errors** *address*

Mail any errors to the given *address*.

**endscript**

End a **postrotate** or **prerotate** script.

**ifempty**

Rotate log file even if it is empty. Overrides the default **notifempty** option.

**include** *file*

Read the *file* into current file. If *file* is a directory, read all files in that directory into the current file.

**mail** *address*

Mail any deleted logs to *address*.

**monthly**

Rotate log files only the first time **logrotate** is run in a month.

**nocompress**

Override **compress**.

**nocopytruncate**

Override **copytruncate**.

**nocreate**

Override **create**.

**nodelaycompress**

Override **delaycompress**.

**noolddir**

Override **olddir**.

**notifempty**

Override **ifempty**.

**olddir** *directory*

Move logs into *directory* for rotation. *directory* must be on the same physical device as the original log files.

[XML](#)

### **postrotate**

Begin a script of directives to apply after the log file is rotated. The script ends when the **endscript** directive is read.

### **prerotate**

Begin a script of directives to apply before a log file is rotated. The script ends when the **endscript** directive is read.

### **rotate** *number*

The *number* of times to rotate a log file before removing it.

### **size** *n*[**k**|**M**]

Rotate log file when it is greater than *n* bytes. *n* can optionally be followed by **k** for kilobytes or **M** for megabytes.

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**look** [*options*] *string* [*file*]

Search for lines in *file* (*/usr/dict/words* by default) that begin with *string*.

### Options

**-a**

Use alternate dictionary */usr/dict/web2*.

**-d**

Compare only alphanumeric characters.

**-f**

Search is not case-sensitive.

**-t *character***

Stop checking after the first occurrence of *character*.

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### lpc *[command]*

System administration command. Control line printer. If executed without a command, **lpc** will accept commands from standard input.

#### Commands

##### ?, help *[commands]*

Get a list of commands or help on specific commands.

##### abort all *printer*

Terminate current printer daemon and disable printing for the specified *printer*.

##### clean all *printer*

Remove files that cannot be printed from the specified printer queues.

##### disable all *printer*

Disable specified printer queues.

##### down all *printer message*

Disable specified printer queues and put *message* in the printer status file.

##### enable all *printer*

Enable the specified printer queues.

##### exit, quit

Exit **lpc**.

##### restart all *printer*

Try to restart printer daemons for the specified printers.

**start all***printer*

Enable the printer queues and start printing daemons for the specified printers.

**status all***printer*

Return the status of the specified printers.

**stop all***printer*

Disable the specified printer daemons after any current jobs are completed.

**topq printer** [*jobnumbers*] [*users*]

Put the specified jobs at the top of the printer's queue in the order the jobs are listed.

**up all***printer*

Enable print queues and restart daemons for the specified printers.

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### lpd [*option*] [*port*]

TCP/IP command. Line printer daemon. **lpd** is usually invoked at boot time from the *rc2* file. It makes a single pass through the printer configuration file (traditionally */etc/printcap*) to find out about the existing printers and prints any files left after a crash. It then accepts requests to print files in a queue, transfer files to a spooling area, display a queue's status, or remove jobs from a queue. In each case, it forks a child process for each request, then continues to listen for subsequent requests. If *port* is specified, **lpd** listens on that port; otherwise, it uses the **getservbyname** call to ascertain the correct port.

The file *lock* in each spool directory prevents multiple daemons from becoming active simultaneously. After the daemon has set the lock, it scans the directory for files beginning with *cf*. Lines in each *cf* file specify files to be printed or nonprinting actions to be performed. Each line begins with a key character, which specifies information about the print job or what to do with the remainder of the line. Key characters are:

**C**

Classification—string to be used for the classification line on the burst page.

**c**

**cifplot** file.

**f**

Formatted file—name of a file to print that is already formatted.

**g**

Graph file.

**H**

Hostname—name of machine where **lpd** was invoked.

**J**

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Job name—string to be used for the jobname on the burst page.

**L**

Literal—this line contains identification information from the password file and causes the banner page to be printed.

**I**

Formatted file, but suppress page breaks and printing of control characters.

**M**

Mail—send mail to the specified user when the current print job completes.

**n**

**ditroff** file.

**P**

Person—login name of person who invoked **lpd**.

**r**

DVI file.

**T**

Title—string to be used as the title for **pr**.

**t**

**troff** file.

**U**

Unlink—name of file to remove upon completion of printing.

**Option**

**-l**

Enable logging of all valid requests.

**Files**

*/etc/printcap*

Printer description file

*/var/spool/\**

Spool directories

*/var/spool/\*/minfree*

[XML](#)

Minimum free space to leave

*/dev/lp\**

Printer devices

*/etc/hosts.equiv*

Machine names allowed printer access

*/etc/hosts.lpd*

Machine names allowed printer access, but not under same administrative control

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### lpq [*options*] [*user*]

Check the print spool queue for status of print jobs. For each job, display username, rank in the queue, filenames, job number, and total file size (in bytes). If *user* is specified, display information only for that user.

#### Options

**-l**

Print information about each file comprising a job.

**-Pprinter**

Specify which printer to query. Without this option, **lpq** uses the printer set in the PRINTER environment variable or the default system printer.

*num*

Check status for job number *num*.

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### lpr [*options*] *files*

Send *files* to the printer spool queue.

#### Options

**-c**

Expect data produced by **cifplot**.

**-d**

Expect data produced by TeX in the DVI (device- independent) format.

**-f**

Use a filter that interprets the first character of each line as a standard carriage control character.

**-g**

Expect standard plot data as produced by the **plot** routines.

**-l**

Use a filter that allows control characters to be printed and suppresses page breaks.

**-n**

Expect data from **ditroff** (device-independent **troff**).

**-p**

Use **pr** to format the files.

**-t**

Expect data from **troff** (phototypesetter commands).

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**-v**

Expect a raster image for devices like the Benson Varian.

**-Pprinter**

Output to *printer* instead of the printer specified in the PRINTER environment variable or the system default.

**-h**

Do not print the burst page.

**-m**

Send mail to notify of completion.

**-r**

Remove the file upon completion of spooling. Cannot be used with the -s option.

**-s**

Use symbolic links instead of copying files to the spool directory. This can save time and disk space for large files. Files should not be modified or removed until they have been printed.

**-# num**

Print *num* copies of each listed file.

**-C string**

Replace system name on the burst page with *string*.

**-J name**

Replace the job name on the burst page with *name*. If omitted, uses the first file's name.

**-T title**

Use *title* as the title when using **pr**.

**-i [cols]**

Indent the output. Default is 8 columns. Specify number of columns to indent with the *cols* argument.

**-w num**

Set *num* characters as the page width for **pr**.

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**lprm** [*options*] [*jobnum*] [*user*]

Remove a print job from the print spool queue. You must specify a job number or numbers, which can be obtained from **lpq**. A privileged user may use the *user* parameter to remove all files belonging to a particular user or users.

### Options

**-Pprinter**

Specify printer name. Normally, the default printer or printer specified in the PRINTER environment variable is used.

-

Remove all jobs in the spool owned by *user*.

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### lpstat [*options*]

Show the status of the print queue. With options that take a *list* argument, omitting the list produces all information for that option. *list* can be separated by commas or, if enclosed in double quotes, by spaces.

#### Options

##### **-a** [*list*]

Show whether the *list* of printer or class names is accepting requests.

##### **-c** [*list*]

Show information about printer classes named in *list*.

##### **-d**

Show the default printer destination.

##### **-f** [*list*]

Verify that the *list* of forms is known to **lp**.

##### **-l**

Use after **-f** to describe available forms, after **-p** to show printer configurations, or after **-s** to describe printers appropriate for the specified character set or print wheel.

##### **-o** [*list*]

Show the status of output requests. *list* contains printer names, class names, or request IDs.

##### **-p** [*list*]

Show the status of printers named in *list*.



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- r**  
Show whether the print scheduler is on or off.
- R**  
Show the job's position in the print queue.
- s**  
Summarize the print status (shows almost everything).
- t**  
Show all status information (reports everything).
- u [list]**  
Show request status for users on *list*. *list* can be **all** to show information on all users.
- v [list]**  
Show device associated with each printer named in *list*.

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### Iptest [*length*] [*count*]

Generate a lineprinter test pattern on standard output. Prints a standard ripple pattern of all printable ASCII characters, offset by one position on each succeeding line.

#### Parameters

##### *length*

Specify the output line length (default is 79).

##### *count*

Specify the number of lines to print (default is 200).

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List contents of directories. If no *names* are given, list the files in the current directory. With one or more *names*, list files contained in a directory *name* or that match a file *name*. *names* can include filename metacharacters. The options let you display a variety of information in different formats. The most useful options include **-F**, **-R**, **-l**, and **-s**. Some options don't make sense together (e.g., **-u** and **-c**).

### Options

#### **-l, --format=single-column**

Print one entry per line of output.

#### **-a**

List all files, including the normally hidden files whose names begin with a period.

#### **-b, --escape**

Display nonprinting characters in octal and alphabetic format.

#### **-c, --time-ctime, --time=status**

List files by status change time (not creation/modification time).

#### **--color, --colour, --color=yes, --colour=yes**

Colorize the names of files depending on the type of file.

#### **--color=no, --colour=no**

Disables colorization. This is the default. Provided to override a previous color option.

#### **--color=tty, --colour=tty**

Same as **--color**, but only if standard output is a terminal. Very useful for shell scripts and command aliases, especially if your favorite pager does not support color control codes.

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**-d, --directory**

Report only on the directory, not its contents.

**-f**

Print directory contents in exactly the order in which they are stored, without attempting to sort them.

**--full-time**

List times in full, rather than use the standard abbreviations.

**--help**

Print a help message and then exit.

**-i, --inode**

List the inode for each file.

**-k, --kilobytes**

If file sizes are being listed, print them in kilobytes. This option overrides the environment variable POSIXLY\_CORRECT.

**-l, --format=long, --format=verbose**

Long format listing (includes permissions, owner, size, modification time, etc.).

**-m, --format=commas**

Merge the list into a comma-separated series of names.

**-n, --numeric-uid-gid**

Like **-l**, but use group-ID and user-ID numbers instead of owner and group names.

**-p**

Mark directories by appending / to them.

**-q, --hide-control-chars**

Show nonprinting characters as ? .

**-r, --reverse**

List files in reverse order (by name or by time).

**-s, --size**

Print size of the files in blocks.

**-t, --sort=time**

Sort files according to modification time (newest first).

**-u, --time=atime, --time=access, --time=use**

Sort files according to the file access time.

**--version**

Print version information on standard output, then exit.

**-x, --format=across, --format=horizontal**

List files in rows going across the screen.

**-A, --almost-all**

List all files, including the normally hidden files whose names begin with a period. Does not include the `.` and `..` directories.

**-B, --ignore-backups**

Do not list files ending in `~`, unless given as arguments.

**-C, --format=vertical**

List files in columns (the default format).

**-F, --classify**

Flag filenames by appending `/` to directories, `*` to executable files, `@` to symbolic links, `|` to FIFOs, and `=` to sockets.

**-G, --no-group**

In long format, do not display group name.

**-I, --ignore *pattern***

Do not list files whose names match the shell pattern *pattern*, unless they are given on the command line.

**-L, --dereference**

List the file or directory referenced by a symbolic link rather than the link itself.

**-N, --literal**

Do not list filenames.

**-Q, --quote-name**

Quote filenames with `"`; quote nongraphic characters with alphabetic and octal backslash sequences.

**-R, --recursive**



Recursively list subdirectories as well as the specified (or current) directory.

**-S, --sort=size**

Sort by file size, largest to smallest.

**-T, --tabsize *n\_cols***

Assume that each tabstop is *n\_cols* columns wide. The default is 8.

**-U, --sort=none**

Do not sort files. Similar to **-f** but display in long format.

**-X, --sort=extension**

Sort by file extension.

## Examples

List all files in the current directory and their sizes; use multiple columns and mark special files:

```
ls -asCF
```

List the status of directories */bin* and */etc*:

```
ls -ld /bin /etc
```

List C source files in the current directory, the oldest first:

```
ls -rt *.c
```

Count the nonhidden files in the current directory:

```
ls | wc -l
```

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### `/usr/sbin/rpc.pcnfsd`

NFS/NIS command. NFS authentication and print request server. **pcnfsd** is an RPC server that supports ONC clients on PC systems. **pcnfsd** reads the configuration file `/etc/pcnfsd.conf`, if present, then services RPC requests directed to program number 150001. This current release of the **pcnfsd** daemon (as of this printing) supports both Version 1 and Version 2 of the **pcnfsd** protocol. Requests serviced by **pcnfsd** fall into three categories: authentication, printing, and other. Only the authentication and printing services have administrative significance.

#### Authentication

When **pcnfsd** receives a PCNFSD\_AUTH or PCNFSD2\_AUTH request, it will log in the user by validating the username and password, returning the corresponding user ID, group IDs, home directory, and **umask**. At this time, **pcnfsd** will also append a record to the *wtmp* database. If you do not want to record PC logins in this way, add the line:

```
wtmp off
```

to the `/etc/pcnfsd.conf` file.

#### Printing

**pcnfsd** supports a printing model based on the use of NFS to transfer the actual print data from the client to the server. The client system issues a PCNFSD\_PR\_INIT or PCNFSD2\_PR\_INIT request, and the server returns the path to a spool directory that the client may use and that is exported by NFS. **pcnfsd** creates a subdirectory for each of its clients; the parent directory is normally `/usr/spool/pcnfs` and the subdirectory is the hostname of the client system. If you want to use a different parent directory, add the line:

```
spooldir path
```

to the `/etc/pcnfsd.conf` file. Once a client has mounted the spool directory and has transferred print data to a file in this directory, **pcnfsd** will issue a PCNFSD\_PR\_START or PCNFSD2\_PR\_START request. **pcnfsd** constructs a command based on the printing services of the server operating system and executes the command using the identity of the PC user. Every print request

includes the name of the printer to be used. **pcnfsd** interprets a printer as either a destination serviced by the system print spooler or as a virtual printer. Virtual printers are defined by the following line in the */etc/pcnfsd.conf* file:

```
printer  name alias-for command
```

where *name* is the name of the printer you want to define, *alias-for* is the name of a real printer that corresponds to this printer, and *command* is a command that will be executed whenever a file is printed on *name*.

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## perl

A powerful text-processing language that combines many of the most useful features of shell programs, C, **awk**, and **sed**, as well as adding extended features of its own. For more information, see *Learning Perl* by Randal L. Schwartz and *Programming Perl*, 2d ed., by Larry Wall, Tom Christiansen, and Randal L. Schwartz.

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### pidof [*options*] *programs*

Display the process IDs of the listed program or programs. **pidof** is actually a symbolic link to **killall5**.

#### Options

**-o** *pids*

Omit all processes with the specified process ID. You may list several process IDs.

**-s**

Return a single process ID.

**-x**

Also return process IDs of shells running the named scripts.

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### ping [*options*] *host*

System administration command. Confirm that a remote host is online and responding. **ping** is intended for use in network testing, measurement, and management. Because of the load it can impose on the network, it is unwise to use **ping** during normal operations or from automated scripts.

#### Options

##### **-c** *count*

Stop after sending (and receiving) *count* ECHO\_RESPONSE packets.

##### **-d**

Set SO\_DEBUG option on socket being used.

##### **-f**

Flood **ping**-output packets as fast as they come back or 100 times per second, whichever is more. This can be very hard on a network and should be used with caution; only a privileged user may use this option.

##### **-i** *wait*

Wait *wait* seconds between sending each packet. Default is to wait 1 second between each packet. This option is incompatible with the **-f** option.

##### **-l** *preload*

Send *preload* number of packets as fast as possible before falling into normal mode of behavior.

##### **-n**

Numeric output only. No attempt will be made to look up symbolic names for host addresses.

**-p *digits***

Specify up to 16 pad bytes to fill out packet sent. This is useful for diagnosing data-dependent problems in a network. *digits* are in hex. For example, **-p ff** will cause the sent packet to be filled with all 1s.

**-q**

Quiet output—nothing is displayed except the summary lines at startup time and when finished.

**-r**

Bypass the normal routing tables and send directly to a host on an attached network.

**-s *packetsize***

Specify number of data bytes to be sent. Default is 56, which translates into 64 ICMP data bytes when combined with the 8 bytes of ICMP header data.

**-v**

Verbose—list ICMP packets received other than ECHO\_RESPONSE.

**-R**

Set the IP record route option, which will store the route of the packet inside the IP header. The contents of the record route will be printed if the **-v** option is given, and will be set on return packets if the target host preserves the record route option across echoes or the **-I** option is given.

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### in.pop2d

System administration command. Allow users to connect to port 109 and request the contents of their mailbox in `/var/spool/mail`. **pop2d** requires a username and password before providing mail and can serve individual messages. See also **pop3d**.

### Commands

Each command must be entered on a separate line.

#### HELO

Prompt for username and password.

#### FOLD

Open `/var/spool/mail/$USER`.

#### HOST

Open `/var/spool/pop/$USER`.

#### READ

Read a message.

#### RETR

Retrieve a message.

#### ACKS

Save the last message retrieved and move to next message.

#### ACKD

Delete the last message retrieved and move to next message.

## NACK

Save the last message retrieved and expect to resend it.

## QUIT

Exit.

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### in.pop3d

System administration command. **pop3d** is a more recent version of **pop2d**. It behaves similarly but accepts a slightly different list of commands.

#### Commands

##### USER

Prompt for name.

##### PASS

Prompt for password.

##### STAT

Display the number of messages in the mailbox and its total size.

##### LIST

Display individual messages' sizes.

##### DELE

Delete a message.

##### NOOP

Perform a null operation.

##### LAST

Print the number of the most recently received message that has been read.

##### RSET

Reset: clear all deletion marks.

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**TOP**

Print the first part of a message.

**QUIT**

Exit.

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### rpc.portmap [*option*]

NFS/NIS command. RPC program number to IP port mapper. **portmap** is a server that converts RPC program numbers to IP port numbers. It must be running in order to make RPC calls. When an RPC server is started, it tells **portmap** what port number it is listening to and what RPC program numbers it is prepared to serve. When a client wishes to make an RPC call to a given program number, it first contacts **portmap** on the server machine to determine the port number where RPC packets should be sent. **portmap** must be the first RPC server started.

### Option

#### -d

Run **portmap** in debugging mode. Does not allow **portmap** to run as a daemon.

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### powerd *device*

System administration command. Monitor the connection to an uninterruptible power supply, which the user must specify via *device*. When power goes low, signal **init** to run its **powerwait** and **powerfail** entries; when full power is restored, signal **init** to run its **powerokwait** entries.

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**pppd** [*options*] [*tty*] [*speed*]

System administration command. PPP stands for the Point-to-Point Protocol; it allows datagram transmission over a serial connection. **pppd** attempts to configure *tty* for PPP (searching in */dev*) or, by default, the controlling terminal. You can also specify a baud rate of *speed*.

### Options

#### **asynmap** *map*

Specify which control characters cannot pass over the line. *map* should be a 32-bit hex number, where each bit represents a character to escape. For example, bit 00000001 represents the character 0x00; bit 80000000 represents the character 0x1f or `_`. You may specify multiple characters.

#### **auth**

Require self-authentication by peers before allowing packets to move.

#### **connect** *command*

Connect as specified by *command*, which may be a binary or shell command.

#### **debug, -d**

Increment the debugging level.

#### **defaultroute**

Add a new default route in which the peer is the gateway. When the connection shuts down, remove the route.

#### **-detach**

Operate in the foreground. By default, **pppd** forks and operates in the background.

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### **disconnect** *command*

Close the connection as specified by *command*, which may be a binary or shell command.

### **domain** *d*

Specify a domain name of *d*.

### **escape** *character-list*

Escape all characters in *character-list*, which should be a comma-separated list of hex numbers. You cannot escape 0x20-0x3f or 0x5e.

### **file** *file*

Consult *file* for options.

### **lock**

Allow only **pppd** to access the device.

### **mru** *bytes*

Refuse packets of more than *bytes* bytes.

### **name** *name*

Specify a machine name for the local system.

### **netmask** *mask*

Specify netmask (for example, 255.255.255.0).

### **passive, -p**

Do not exit if peer does not respond to attempts to initiate a connection. Instead, wait for a valid packet from the peer.

### **silent**

Send no packets until after receiving one.

*[local\_IP\_address]:[remote\_IP\_address]*

Specify the local and/or remote interface IP addresses, as hostnames or numeric addresses.

### **Files**

*/var/run/pppn.pid*

**pppd**'s process ID. The *n* in *pppn.pid* is the number of the PPP interface unit corresponding to this **pppd** process.

*/etc/ppp/ip-up*

Binary or script to be executed when the PPP link becomes active.

[XML](#)

*/etc/ppp/ip-down*

Binary or script to be executed when the PPP link goes down.

*/etc/ppp/pap-secrets*

Contains usernames, passwords, and IP addresses for use in PAP authentication.

*/etc/ppp/options*

System defaults. Options in this file are set *before* the command-line options.

*~/.ppprc*

The user's default options. These are read before command-line options but after the system defaults.

*/etc/ppp/options.ttyname*

Name of the default serial port.

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Convert a text file or files to a paginated, columned version, with headers. If - is provided as the filename, read from standard input.

**Options**

**+beg\_pag[:end-pag], --pages=[beg\_pag[:end-pag]]**

Begin printing on page *beg\_pag* and end on *end-pag* if specified.

**-num\_cols, --columns=num\_cols**

Print in *num\_cols* number of columns, balancing the number of lines in the columns on each page.

**-a, --across**

Print columns horizontally, not vertically.

**-c, --show-control-chars**

Convert control characters to hat notation (such as  $\wedge$ C) and other unprintable characters to octal backslash format.

**-d, --double-space**

Double space.

**-e[tab-char[width]], --expand-tabs=[tab-char[width]]**

Convert tabs (or *tab-chars*) to spaces. If *width* is specified, convert tabs to *width* characters (default is 8).

**-f, -F, --form-feed**

Separate pages with form feeds, not newlines.

**-h header, --header=header**

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Use *header* for the header instead of the filename.

**-i***[out-tab-char[out-tab-width]]*, **--output-tabs***[=out-tab-char[out-tab-width]]*

Replace spaces with tabs on output. Can specify alternative tab character (default is tab) and width (default is 8).

**-J**, **--join-lines**

Merge full lines; ignore **-W** if set.

**-l** *lines*, **--length***=lines*

Set page length to *lines* (default 66). If *lines* is less than 10, omit headers and footers.

**-m**, **--merge**

Print all files, one file per column.

**-n***[delimiter[digits]]*, **--number-lines***[=delimiter[digits]]*

Number columns, or, with the **-m** option, number lines. Append *delimiter* to each number (default is a tab) and limit the size of numbers to *digits* (default is 5).

**-o** *width*, **--indent***=width*

Set left margin to *width*.

**-r**, **--no-file-warnings**

Continue silently when unable to open an input file.

**-s***[delimiter]*, **--separator***[=delimiter]*

Separate columns with *delimiter* (default is a tab) instead of spaces.

**-S***[string]*, **--sep-string***[=string]*

Separate columns with *string*. Default is a tab with **-J** and a space otherwise.

**-t**, **--omit-header**

Suppress headers, footers, and fills at end of pages.

**-T**, **--omit-pagination**

Like **-t** but also suppress form feeds.

**-v**, **--show-non-printing**

Convert unprintable characters to octal backslash format.

**-w** *page\_width*, **--width***=page\_width*

Set the page width to *page\_width* characters for multi-column output. Default is 72.

[XML](#)

**-W *page\_width*, --page-width=*page\_width***

Set the page width to always be *page\_width* characters. Default is 72.

**--help**

Print a help message and then exit.

**--version**

Print version information and then exit.

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### **praliases** [*option*]

System administration command. **praliases** prints the current **sendmail** mail aliases. (Usually defined in the `/etc/aliases` or `/etc/aliases.db` file.)

### Option

**-f file**

Read the aliases from the specified file instead of sendmail's default alias files.

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Print values of all environment variables or, optionally, only the specified *variables*.

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### printf *formats* [*strings*]

Print *strings* using the specified *formats*. *formats* can be ordinary text characters, C-language escape characters, or more commonly, a set of conversion arguments listed here.

#### Arguments

**%s**

Print the next *string*.

**%n\$s**

Print the *n*th *string*.

**%[-]m[.n]s**

Print the next *string*, using a field that is *m* characters wide. Optionally, limit the field to print only the first *n* characters of *string*. Strings are right-adjusted unless the left-adjustment flag, -, is specified.

#### Examples

```
printf '%s %s\n' "My files are in" $HOME
printf '%-25.15s %s\n' "My files are in" $HOME
```

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TCP/IP command. System status server that maintains the database used by the **rwho** and **runtime** programs. Its operation is predicated on the ability to broadcast messages on a network. As a producer of information, **rwhod** periodically queries the state of the system and constructs status messages, which are broadcast on a network. As a consumer of information, it listens for other **rwhod** servers' status messages, validates them, then records them in a collection of files located in the directory */var/spool/rwho*. Messages received by the **rwhod** server are discarded unless they originated at an **rwhod** server's port. Status messages are generated approximately once every 3 minutes.

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**script** [*option*] [*file*]

Fork the current shell and make a typescript of a terminal session. The typescript is written to *file*. If no *file* is given, the typescript is saved in the file *typescript*. The script ends when the forked shell exits, usually with Ctrl-D or **exit**.

### Option

**-a**

Append to *file* or *typescript* instead of overwriting the previous contents.

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**sed** [*options*] [*command*] [*files*]

Stream editor—edit one or more *files* without user interaction. See Chapter 12, for more information.

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**sendmail** [*flags*] [*address...*]

System administration command. **sendmail** is a mail transfer agent (MTA) or, more simply, a mail router. It accepts mail from a user's mail program, interprets the mail address, rewrites the address into the proper form for the delivery program, and routes the mail to the correct delivery program.

### Command-line flags

**-bx**

Set operation mode to *x*. Operation modes are:

**a**

Run in ARPAnet mode.

**d**

Run as a daemon.

**i**

Initialize the alias database.

**m**

Deliver mail (default).

**p**

Print the mail queue.

**s**

Speak SMTP on input side.

**t**

Run in test mode.

**-v**

Verify addresses; do not collect or deliver.

**-C file**

Use configuration file *file*.

**-d level**

Set debugging level.

**-F name**

Set full name of user to *name*.

**-f name**

Sender's name is *name*.

**-h cnt**

Set hop count (number of times message has been processed by **sendmail**) to *cnt*.

**-n**

Do not alias or forward.

**-o x value**

Set option *x* to value *value*. Options are described below.

**-p protocol**

Receive messages via the *protocol* protocol.

**-q [time]**

Process queued messages immediately, or at intervals indicated by *time* (for example, **-q30m** for every half hour).

**-r name**

Obsolete form of **-f**.

**-t**

Read head for **To:**, **Cc:**, and **Bcc:** lines, and send to everyone on those lists.

**-v**

Verbose.

**-X file**

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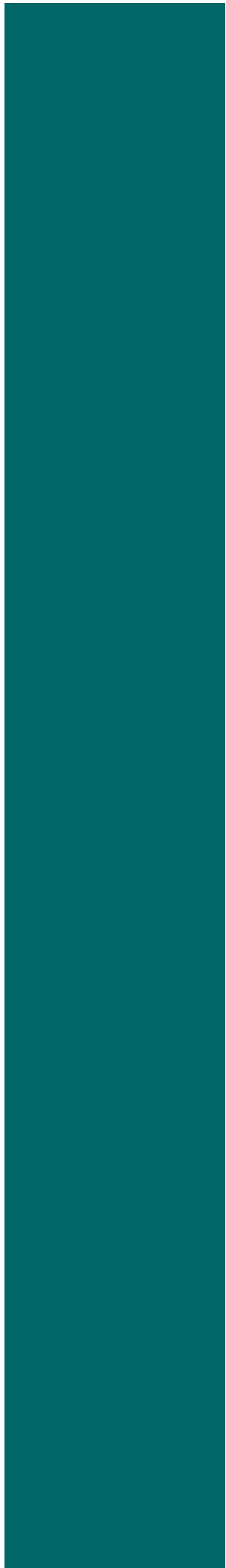
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Log all traffic to *file*. Not to be used for normal logging.

## Configuration options

The following options can be set with the **-o** flag on the command line or the **O** line in the configuration file:

### **7**

Format all incoming messages in 7 bits.

### **amin**

If the **D** option is set, wait *min* minutes for the *aliases* file to be rebuilt before returning an alias database out-of-date warning.

### **Afile**

Use alternate alias file.

### **bminblocks[/maxsize]**

Require at least *minblocks* to be free, and optionally set the maximum message size to *maxsize*. If *maxsize* is omitted, the slash is optional.

### **Bchar**

Set unquoted space replacement character.

### **c**

On mailers that are considered "expensive" to connect to, don't initiate immediate connection.

### **Cnum**

Checkpoint the queue when mailing to multiple recipients. **sendmail** will rewrite the list of recipients after each group of *num* recipients has been processed.

### **dx**

Set the delivery mode to *x*. Delivery modes are **d** for deferred delivery, **i** for interactive (synchronous) delivery, **b** for background (asynchronous) delivery, and **q** for queue only—i.e., deliver the next time the queue is run.

### **D**

Try to automatically rebuild the alias database if necessary.

### **ex**

Set error processing to mode *x*. Valid modes are **m** to mail back the error message, **w** to write back the error message, **p** to print the errors on the terminal (default), **q** to throw away error messages, and **e** to do special processing for the BerkNet.

### **Etext**

Set error message header. *text* is either text to add to an error message or the name of a file. A filename must include its full path and begin with a */*.

## **f**

Save Unix-style **From** lines at the front of messages.

## **Fmode**

Set default file permissions for temporary files. If this option is missing, default permissions are 0644.

## **G**

Compare local mail names to the GECOS section in the password file.

## **g n**

Default group ID to use when calling mailers.

## **Hfile**

SMTP help file.

## **h num**

Allow a maximum of *num* hops per message.

## **i**

Do not take dots on a line by themselves as a message terminator.

## **I arg**

Use DNS lookups and tune them. Queue messages on connection refused. The *arg* arguments are identical to resolver flags without the RES\_ prefix. Each flag can be preceded by a plus or minus to enable or disable the corresponding name server option. There must be a whitespace between the **I** and the first flag.

## **j**

Use MIME format for error messages.

## **Jpath**

Set an alternative *forward* search path.

## **knum**

Specify size of the connection cache.

## **Ktime**

Time out connections after *time*.

## **l**

Do not ignore **Errors-To** header.

### ***Ln***

Specify log level.

### ***m***

Send to **me** (the sender) also if I am in an alias expansion.

### ***MXvalue***

Define a macro's value in command line. Assign *value* to macro *X*.

### ***n***

When running **newaliases**, validate the right side of aliases.

### ***o***

If set, this message may have old-style headers. If not set, this message is guaranteed to have new-style headers (i.e., commas instead of spaces between addresses).

### ***pwhat,what,...***

Tune how private you want the SMTP daemon. The *what* arguments should be separated from one another by commas. The *what* arguments may be any of the following:

#### **public**

Make SMTP fully public (default).

#### **needmailhelo**

Require site to send HELO or ELHO before sending mail.

#### **needexpnhelo**

Require site to send HELO or ELHO before answering an address expansion request.

#### **needvrfyhelo**

Like preceding argument but for verification requests.

#### **noexpn**

Deny all expansion requests.

#### **novrfy**

Deny all verification requests.

#### **authwarnings**

Insert special headers in mail messages advising recipients that the message may not be authentic.

### **goaway**

Set all of the previous arguments (except **public**).

### **restrictmailq**

Allow only users of the same group as the owner of the queue directory to examine the mail queue.

### **restrictqrun**

Limit queue processing to root and the owner of the queue directory.

### **P***user*

Send copies of all failed mail to *user* (usually postmaster).

### **q***fact*

Multiplier (factor) for high-load queuing.

### **Q***queuedir*

Select the directory in which to queue messages.

### **R**

Don't prune route addresses.

### **S***file*

Save statistics in the named file.

### **s**

Always instantiate the queue file, even under circumstances in which it is not strictly necessary.

### **T***time*

Set the timeout on undelivered messages in the queue to the specified time.

### **tstz, dtz**

Set name of the time zone.

### **U***database*

Consult the user database *database* for forwarding information.

### **uN**

Set default user ID for mailers.

### **v**

Run in verbose mode.

### ***Vhost***

Fall-back MX host. *host* should be the fully qualified domain name of the fallback host.

### **w**

Use a record for an ambiguous MX.

### ***xload***

Queues messages when load level is higher than *load*.

### ***Xload***

Refuse SMTP connections when load is higher than *load*.

### ***yfactor***

Penalize large recipient lists by *factor*.

### **Y**

Deliver each job that is run from the queue in a separate process. This helps limit the size of running processes on systems with very low amounts of memory.

### ***zfactor***

Multiplier for priority increments. This determines how much weight to give to a message's precedence header. **sendmail**'s default is 1800.

### ***Zinc***

Increment priority of items remaining in queue by *inc* after each job is processed. **sendmail** uses 90,000 by default.

## **sendmail support files**

### ***/usr/lib/sendmail***

Binary of **sendmail**.

### ***/usr/bin/newaliases***

Link to */usr/lib/sendmail*; causes the alias database to be rebuilt.

### ***/usr/bin/mailq***

Prints a listing of the mail queue.

### ***/etc/sendmail.cf***

Configuration file, in text form.

### ***/etc/sendmail.hf***

SMTP help file.



*/usr/lib/sendmail.st*

Statistics file. Doesn't need to be present.

*/etc/aliases*

Alias file, in text form.

*/etc/aliases.{pag,dir}*

Alias file in **dbm** format.

*/var/spool/mqueue*

Directory in which the mail queue and temporary files reside.

*/var/spool/mqueue/qf*

Control (queue) files for messages.

*/var/spool/mqueue/df*

Data files.

*/var/spool/mqueue/lf*

Lockfiles.

*/var/spool/mqueue/xf*

Temporary versions of *af* files, used during queue-file rebuild.

*/var/spool/mqueue/nf*

Used when creating a unique ID.

*/var/spool/mqueue/xf*

Transcript of current session.

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**setfdprm** [*options*] *device* [*name*]

Load disk parameters used when autoconfiguring floppy devices.

### Options

**-c** *device*

Clear parameters of *device*.

**-n** *device*

Disable format-detection messages for *device*.

**-p** *device* [*name* | *parameter*]

Permanently reset parameters for *device*. You can use *name* to specify a configuration, or you can specify individual parameters. The parameters that can be specified are **dev**, **size**, **sect**, **heads**, **tracks**, **stretch**, **gap**, **rate**, **spec1**, or **fmt\_gap**. Consult */etc/fdprm* for the original values.

**-y** *device*

Enable format-detection messages for *device*.

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### **setsid** *command* [*arguments*]

System administration command. Execute the named command and optional command *arguments* in a new session.

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**sh** [*options*] [*file* [*arguments*]]

The standard Unix shell, a command interpreter into which all other commands are entered. On Linux, this is just another name for the **bash** shell. For more information, see Chapter 7, .

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**shar** [*options*] *files*

**shar -S** [*options*]

Create shell archives (or shar files) that are in text format and can be mailed. These files may be unpacked later by executing them with `/bin/sh`. Other commands may be required on the recipient's system, such as **compress**, **gzip**, and **uuencode**. The resulting archive is sent to standard output, unless the **-o** option is given.

### Options

**-a, --net-headers**

Allows automatic generation of headers. The **-n** option is required if the **-a** option is used.

**-b bits, --bits-per-code=bits**

Use **-b bits** as a parameter to **compress** (when doing compression). Default value is 12. The **-b** option automatically turns on **-Z**.

**-c, --cut-mark**

Start the shar file with a line that says "Cut here."

**-d delimiter, --here-delimiter=delimiter**

Use *delimiter* for the files in the shar instead of SHAR\_EOF.

**-f, --basename**

Causes only simple filenames to be used when restoring, which is useful when building a shar from several directories or another directory. (If a directory name is passed to **shar**, the substructure of that directory will be restored whether or not **-f** is used.)

**-g level, --level-for-gzip=level**

Use *-level* as a parameter to **gzip** (when doing compression). Default is 9. The **-g** option turns on the **-z** option by default.

**--help**

Print a help summary on standard output, then exit.

**-l nn, --whole-size-limit=nn**

Limit the output file size to *nn* kilobytes but don't split input files. Requires use of **-o**.

**-m, --no-timestamp**

Don't generate **touch** commands to restore the file modification dates when unpacking files from the archive.

**-n name, --archive-name=name**

Name of archive to be included in the header of the shar files. Required if the **-a** option is used.

**--no-i18n**

Do not produce internationalized shell archives; use default English messages. By default, **shar** produces archives that will try to output messages in the unpacker's preferred language (as determined by LANG/LC\_MESSAGES).

**-o prefix, --output-prefix=prefix**

Save the archive to files *prefix.01* through *prefix.nn* (instead of sending it to standard output). This option must be used when either **-l** or **-L** is used.

**-p, --intermix-type**

Allow positional parameter options. The options **-B**, **-T**, **-z**, and **-Z** may be embedded, and files to the right of the option will be processed in the specified mode.

**--print-text-domain-dir**

Print the directory **shar** looks in to find messages files for different languages, then immediately exit.

**-q, --quiet, --silent**

Turn off verbose mode.

**-s who@where, --submitter=who@where**

Supply submitter name and address, instead of allowing **shar** to determine it automatically.

**--version**

Print the version number of the program on standard output, then exit.

**-w, --no-character-count**

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Do *not* check each file with **wc -c** after unpacking. The default is to check.

**-x, --no-check-existing**

Overwrite existing files without checking. Default is to check and not overwrite existing files. If **-c** is passed as a parameter to the script when unpacking (**sh archive -c**), existing files will be overwritten unconditionally. See also **-X**.

**-z, --gzip**

**gzip** and **uuencode** all files prior to packing. Must be unpacked with **uudecode** and **gunzip** (or **zcat**).

**-B, --uencode**

Treat all files as binary; use **uuencode** prior to packing. This increases the size of the archive, and it must be unpacked with **uudecode**.

**-D, --no-md5-digest**

Do *not* use md5sum digest to verify the unpacked files. The default is to check.

**-F, --force-prefix**

Force the prefix character to be prepended to every line even if not required. May slightly increase the size of the archive, especially if **-B** or **-Z** is used.

**-L *nn*, --split-size-limit=*nn***

Limit output file size to *nn* kilobytes and split files if necessary. The archive parts created with this option must be unpacked in correct order. Requires use of **-o**.

**-M, --mixed-uuencode**

Pack files in mixed mode (the default). Distinguishes files as either text or binary; binaries are uuencoded prior to packing.

**-P, --no-piping**

Use temporary files instead of pipes in the shar file.

**-Q, --quiet-unshar**

Disable verbose mode.

**-S, --stdin-file-list**

Read list of files to be packed from standard input rather than from the command line. Input must be in a form similar to that generated by the **find** command, with one filename per line.

**-T, --text-files**

Treat all files as text.

**-V, --vanilla-operation**

Produce shars that rely only upon the existence of **sed** and **echo** in the unsharing environment.

**-X, --query-user**

Prompt user to ask if files should be overwritten when unpacking.

**-Z, --compress**

Compress and uuencode all files prior to packing.

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### showmount *[options] [host]*

NFS/NIS command. Show information about an NFS server. This information is maintained by the **mountd** server on *host*. The default value for *host* is the value returned by **hostname**. With no options, show the clients that have mounted directories from the host. **showmount** is usually found in */usr/sbin*, which is not in the default search path.

### Options

#### **-a, --all**

Print all remote mounts in the format:

```
hostname:directory
```

where *hostname* is the name of the client and *directory* is the root of the filesystem that has been mounted.

#### **-d, --directories**

List directories that have been remotely mounted by clients.

#### **-e, --exports**

Print the list of exported filesystems.

#### **-h, --help**

Provide a short help summary.

#### **--no-headers**

Do not print headers.

#### **-v, --version**

Report the current version number of the program.

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### shutdown [*options*] when [*message*]

System administration command. Terminate all processing. *when* may be a specific time (in *hh:mm* format), a number of minutes to wait (in *+m* format), or **now**. A broadcast *message* notifies all users to log off the system. Processes are signaled with SIGTERM, to allow them to exit gracefully. */etc/init* is called to perform the actual shutdown, which consists of placing the system in runlevel 1. Only privileged users can execute the **shutdown** command. Broadcast messages, default or defined, are displayed at regular intervals during the grace period; the closer the shutdown time, the more frequent the message.

### Options

**-c**

Cancel a shutdown that is in progress.

**-f**Reboot fast, by suppressing the normal call to **fsck** when rebooting.**-h**

Halt the system when shutdown is complete.

**-k**

Print the warning message, but suppress actual shutdown.

**-n**Perform shutdown without a call to **init**.**-r**

Reboot the system when shutdown is complete.

**-t *sec***

Ensure a *sec*-second delay between killing processes and changing the runlevel.

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**size** [*options*] [*objfile*...]

Print the number of bytes of each section of *objfile* and its total size. If *objfile* is not specified, *a.out* is used.

### Options

**-d**

Display the size in decimal and hexadecimal.

**--format** *format*

Imitate the **size** command from either System V (**--format sysv**) or BSD (**--format berkeley**).

**-o**

Display the size in octal and hexadecimal.

**--radix** *num*

Specify how to display the size: in hexadecimal and decimal (if *num* is **10** or **16**) or hexadecimal and octal (if *num* is **8**).

**-x**

Display the size in hexadecimal and decimal.

**-A**

Imitate System V's **size** command.

**-B**

Imitate BSD's **size** command.

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### slattach [*options*] [*tty*]

TCP/IP command. Attach serial lines as network interfaces, thereby preparing them for use as point-to-point connections. Only a privileged user may attach or detach a network interface.

#### Options

##### **-c** *command*

Run *command* when the connection is severed.

##### **-d**

Debugging mode.

##### **-e**

Exit immediately after initializing the line.

##### **-h**

Exit when the connection is severed.

##### **-l**

Create UUCP-style lockfile in */var/spool/uucp*.

##### **-L**

Enable 3-wire operation.

##### **-m**

Suppress initialization of the line to 8 bits raw mode.

##### **-n**

Similar to **mesg -n**.



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**-p** *protocol*

Specify *protocol*, which may be **slip**, **adaptive**, **ppp**, or **kiss**.

**-q**

Quiet mode; suppress messages.

**-s** *speed*

Specify line speed.

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### **tunelp** *device* [*options*]

System administration command. Control a lineprinter's device parameters. Without options, print information about device(s).

#### Options

##### **-a** [**on|off**]

Specify whether or not to abort if the printer encounters an error. By default, do not abort.

##### **-c** *n*

Retry device *n* times if it refuses a character. (Default is 250.) After exhausting *n*, sleep before retrying.

##### **-i** *irq*

Use *irq* for specified parallel port. Ignore **-t** and **-c**. If 0, restore noninterrupt driven (polling) action.

##### **-o** [**on|off**]

Specify whether to abort if device is not online or is out of paper.

##### **-q** [**on|off**]

Specify whether to print current IRQ setting.

##### **-r**

Reset port.

##### **-s**

Display printer's current status.

##### **-t** *time*

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Specify a delay of *time* in jiffies to sleep before resending a refused character to the device. A jiffy is defined as either one tick of the system clock or one AC cycle time; it should be approximately 1/100th of a second.

**-w *time***

Specify a delay of *time* in jiffies to sleep before resending a strobe signal.

**-C [on|off]**

Specify whether to be extremely careful in checking for printer error.

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**ul** [*options*] [*names*]

Translate underscores to underlining. The correct sequence with which to do this will vary by terminal type. Some terminals are unable to handle underlining.

### Options

**-i**

Translate -, when on a separate line, to underline, instead of translating underscores.

**-t** *terminal-type*

Specify terminal type. By default, TERM is consulted.

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**umount** [*options*] [*special-device/directory*]

System administration command. Unmount a filesystem. **umount** announces to the system that the removable file structure previously mounted on device *special-device* is to be removed. **umount** also works by specifying the directory. Any pending I/O for the filesystem is completed, and the file structure is flagged as clean.

### Options

**-a**

Unmount all filesystems that are listed in */etc/mtab*.

**-n**

Unmount, but do not record changes in */etc/mtab*.

**-t type**

Unmount only filesystems of type *type*.

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### uname [options]

Print information about the machine and operating system. Without options, print the name of the operating system (Linux).

#### Options

##### **-a, --all**

Combine all the system information from the other options.

##### **-m, --machine**

Print the hardware the system is running on.

##### **-n, --nodename**

Print the machine's hostname.

##### **-r, --release**

Print the release number of the kernel.

##### **-s, --sysname**

Print the name of the operating system (Linux).

##### **-p, --processor**

Print the type of processor (not available on all versions).

##### **-v**

Print build information about the kernel.

##### **--help**

Display a help message and then exit.

**--version**

Print version information and then exit.

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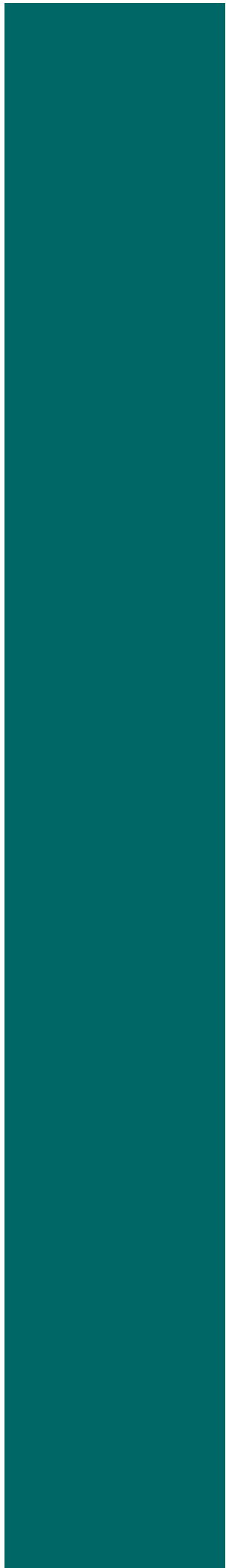
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### **uncompress** [*options*] *files*

Uncompress files that were **compressed** (i.e., whose names end in .Z). See **compress** for the available options; **uncompress** takes all the same options except **-r** and **-b**.

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### **unexpand** [*options*] [*files*]

Convert strings of initial whitespace, consisting of at least two spaces and/or tabs to tabs. Read from standard input if given no file or a file named -.

#### Options

##### **-a, --all**

Convert all, not just initial, strings of spaces and tabs.

##### **-nums, -t nums, --tabs nums**

*nums* is a comma-separated list of integers that specify the placement of tab stops. If a single integer is provided, the tab stops are set to every *integer* spaces. By default, tab stops are 8 spaces apart. With **-t** and **--tabs**, the list may be separated by whitespace instead of commas. This option implies **-a**.

##### **--help**

Print help message and then exit.

##### **--version**

Print the version number and then exit.

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**uniq** [*options*] [*file1* [*file2*]]

Remove duplicate adjacent lines from sorted *file1*, sending one copy of each line to *file2* (or to standard output). Often used as a filter. Specify only one of **-d** or **-u**. See also **comm** and **sort**.

### Options

**-n, -f n, --skip-fields=n**

Ignore first *n* fields of a line. Fields are separated by spaces or by tabs.

**+n, -s n, --skip-chars=n**

Ignore first *n* characters of a field.

**-c, --count**

Print each line once, prefixing number of instances.

**-d, --repeated**

Print duplicate lines once but no unique lines.

**-i, --ignore-case**

Ignore case differences when checking for duplicates.

**-u, --unique**

Print only unique lines (no copy of duplicate entries is kept).

**-w n, --check-chars=n**

Compare only first *n* characters per line (beginning after skipped fields and characters).

**--help**

Print a help message and then exit.

**--version**

Print version information and then exit.

### Examples

Send one copy of each line from **list** to output file **list.new**:

```
uniq list list.new
```

Show which names appear more than once:

```
sort names | uniq -d
```

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### unshar [options] [files]

Unpack a shell archive (shar file). **unshar** scans mail messages looking for the start of a shell archive. It then passes the archive through a copy of the shell to unpack it. **unshar** accepts multiple files. If no files are given, standard input is used.

#### Options

##### **-c, --overwrite**

Overwrite existing files.

##### **-d directory, --directory=directory**

Change to *directory* before unpacking any files.

##### **-e, --exit-0**

Sequentially unpack multiple archives stored in same file; uses clue that many **shar** files are terminated by an exit 0 at the beginning of a line. (Equivalent to **-E "exit 0"**.)

##### **-E string, --split-at=string**

Like **-e**, but allows you to specify the string that separates archives.

##### **-f, --force**

Same as **-c**.

##### **--help**

Print help message and then exit.

##### **--version**

Print the version number and then exit.



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### update [*options*]

System administration command. **update** is a daemon that controls how often the kernel's disk buffers are flushed to disk. **update** is also known as **bdf**flush. The daemon forks a couple of processes to call system functions *flush()* and *sync()*. When called by an unprivileged user, no daemon is created. Instead, **update** calls *sync()* and then exits. By default, update will wake up every 5 seconds and *flush()* some dirty buffers. If that doesn't work, it will try waking up every 30 seconds to *sync()* the buffers to disk. Not all of the listed options are available in every version of **update**.

### Options

#### -d

Display the kernel parameters. This does not start the **update** daemon.

#### -f *seconds*

Call *flush()* at this interval. Default is 5.

#### -h

Help. Print a command summary.

#### -s *seconds*

Call *sync()* at this interval. Default is 30.

#### -S

Always use *sync()* instead of flush.

#### -0 *percent*

Flush buffers when the specified *percent* of the buffer cache is dirty.

#### -1 *blocks*

The maximum number of dirty blocks to write out per wake cycle.

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**-2 buffers**

The number of clean buffers to try to obtain each time the free buffers are refilled.

**-3 blocks**

Flush buffers if dirty blocks exceed *blocks* when trying to refill the buffers.

**-4 percent**

Percent of buffer cache to scan when looking for free clusters.

**-5 seconds**

Time for a data buffer to age before being flushed.

**-6 seconds**

Time for a nondata buffer to age before being flushed.

**-7 constant**

The time constant to use for load average.

**-8 ratio**

How low the load average can be before trimming back the number of buffers.

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### uptime

Print the current time, amount of time logged in, number of users currently logged in (which may include the same user multiple times), and system load averages. This output is also produced by the first line of the **w** command.

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**useradd** [*options*] [*user*]

System administration command. Create new user accounts or update default account information. Unless invoked with the **-D** option, *user* must be given. **useradd** will create new entries in system files. Home directories and initial files may also be created as needed.

### Options

**-c** *comment*

Comment field.

**-d** *dir*

Home directory. The default is to use *user* as the directory name under the *home* directory specified with the **-D** option.

**-e** *date*

Account expiration *date*. *date* is in the format MM/DD/YYYY. Two-digit year fields are also accepted. The value is stored as the number of days since January 1, 1970. This option requires the use of shadow passwords.

**-f** *days*

Permanently disable account this many *days* after the password has expired. A value of -1 disables this feature. This option requires the use of shadow passwords.

**-g** *group*

Initial *group* name or ID number. If a different default group has not been specified using the **-D** option, the default group is 1.

**-G** *groups*

Supplementary *groups* given by name or number in a comma-separated

list with no whitespace.

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**-k [dir]**

Copy default files to user's home directory. Meaningful only when used with the **-m** option. Default files are copied from */etc/skel/* unless an alternate *dir* is specified.

**-m**

Make user's home directory if it does not exist. The default is not to make the home directory.

**-o**

Override. Accept a nonunique *uid* with the **-u** option. (Probably a bad idea.)

**-s shell**

Login *shell*.

**-u uid**

Numerical user ID. The value must be unique unless the **-o** option is used. The default value is the smallest ID value greater than 99 and greater than every other *uid*.

**-D [options]**

Set or display defaults. If *options* are specified, set them. If no options are specified, display current defaults. The options are:

**-b dir**

Home directory prefix to be used in creating home directories. If the **-d** option is not used when creating an account, the *user* name will be appended to *dir*.

**-e date**

Expire *date*. Requires the use of shadow passwords.

**-f days**

Number of *days* after a password expires to disable an account. Requires the use of shadow passwords.

**-g group**

Initial *group* name or ID number.

**-s shell**

Default login *shell*.

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System administration command. Delete all entries for *user* in system account files.

**Option****-r**

Remove the home directory of *user* and any files contained in it.

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**znew** [*options*] [*files*]

Uncompress **.Z** files and recompress them in **.gz** format.

### Options

**-9**

Optimal (and slowest) compression method.

**-f**

Recompress even if *filename.gz* already exists.

**-t**

Test new **.gz** files before removing **.Z** files.

**-v**

Verbose mode.

**-K**

If the original **.Z** file is smaller than the **.gz** file, keep it.

**-P**

Pipe data to conversion program. This saves disk space.

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**banner** [*option*] [*characters*]

Print *characters* as a poster. If no *characters* are supplied, **banner** prompts for them and reads an input line from standard input. By default, the results go to standard output, but they are intended to be sent to a printer.

### Option

**-w** *width*

Set width to *width* characters. Note that if your banner is in all lowercase, it will be narrower than *width* characters. If *-w* is not specified, the default width is 132. If *-w* is specified but *width* is not provided, the default is 80.

### Example

```
/usr/games/banner -w50 Happy Birthday! |lpr
```

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Remove leading directory components from a path. If *suffix* is given, remove that also. The result is printed to standard output.

**Options****--help**

Print help message and then exit.

**--version**

Print the version number and then exit.

**Examples**

```
% basename /usr/lib/libm.a
libm.a
```

```
% basename /usr/lib/libm.a .a
libm
```

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### batch [options] [time]

Execute commands entered on standard input. If time is omitted, execute them when the system load permits (when the load average falls below 0.8). Very similar to **at**, but does not insist that the execution time be entered on the command line. See **at** for details.

#### Options

##### **-f file**

Read job from *file*, not standard input.

##### **-m**

Mail user when job has completed, regardless of whether output was created.

##### **-q letter**

Place job in queue denoted by *letter*, where *letter* is one letter from a-z or A-Z. The default queue is **a**. (The batch queue defaults to **b**.) Higher-lettered queues run at a lower priority.

##### **-V**

Print the version number and then exit.

##### **-v**

Display the time a job will be executed.

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**bash** [*options*] [*file* [*arguments*;]]

**sh** [*options*] [*file* [*arguments*]]

Standard Linux shell, a command interpreter into which all other commands are entered. For more information, see Chapter 7.

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**bc** [*options*] [*files*]

**bc** is a language (and compiler) whose syntax resembles that of C, but with unlimited-precision arithmetic. **bc** consists of identifiers, keywords, and symbols, which are briefly described in the following entries. Examples are given at the end.

Interactively perform arbitrary-precision arithmetic or convert numbers from one base to another. Input can be taken from *files* or read from the standard input. To exit, type **quit** or **EOF**.

### Options

**-l, --mathlib**

Make functions from the math library available.

**-s, --standard**

Ignore all extensions, and process exactly as in POSIX.

**-w, --warn**

When extensions to POSIX **bc** are used, print a warning.

**-q, --quiet**

Do not display welcome message.

**-v, --version**

Print version number.

### Identifiers

An identifier is a series of one or more characters. It must begin with a lowercase letter but may also contain digits and underscores. No uppercase letters are allowed. Identifiers are used as names for variables, arrays, and functions. Variables normally store arbitrary-precision numbers. Within the

same program you may name a variable, an array, and a function using the same letter. The following identifiers would not conflict:

$x$

Variable  $x$ .

$x[i]$

Element  $i$  of array  $x$ .  $i$  can range from 0 to 2047 and can also be an expression.

$x(y,z)$

Call function  $x$  with parameters  $y$  and  $z$ .

### Input-output keywords

**ibase**, **obase**, **scale**, and **last** store a value. Typing them on a line by themselves displays their current value. You can also change their values through assignment. The letters A-F are treated as digits whose values are 10-15.

**ibase =  $n$**

Numbers that are input (e.g., typed) are read as base  $n$  (default is 10).

**obase =  $n$**

Numbers that are displayed are in base  $n$  (default is 10). Note: Once **ibase** has been changed from 10, use A to restore **ibase** or **obase** to decimal.

**scale =  $n$**

Display computations using  $n$  decimal places (default is 0, meaning that results are truncated to integers). **scale** is normally used only for base-10 computations.

**last**

Value of last printed number.

### Statement keywords

A semicolon or a newline separates one statement from another. Curly braces are needed when grouping multiple statements.

**if (*rel-expr*) {*statements*} [else {*statements*}]**

Do one or more *statements* if relational expression *rel-expr* is true. Otherwise, do nothing, or if *else* (an extension) is specified, do alternative *statements*. For example:

```
if(x==y) {i = i + 1} else {i = i - 1}
```

**while (*rel-expr*) {*statements*}**

Repeat one or more *statements* while *rel-expr* is true; for example:

```
while(i>0) {p = p*n; q = a/b; i = i-1}
```

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**for** (*expr1*; *rel-expr*; *expr2*) {*statements*}

Similar to **while**; for example, to print the first 10 multiples of 5, you could type:

```
for(i=1; i<=10; i++) i*5
```

GNU **bf** does not require three arguments to **for**. A missing argument 1 or 3 means that those expressions will never be evaluated. A missing argument 2 evaluates to the value 1.

**break**

Terminate a **while** or **for** statement.

**print** *list*

GNU extension. It provides an alternate means of output. *list* consists of a series of comma-separated strings and expressions; **print** displays these entities in the order of the list. It does not print a newline when it terminates. Expressions are evaluated, printed, and assigned to the special variable *last*. Strings (which may contain special characters, i.e., characters beginning with \) are simply printed. Special characters can be:

**a**

Alert or bell

**b**

Backspace

**f**

Form feed

**n**

Newline

**r**

Carriage return

**q**

Double quote

**t**

Tab

## \

Backslash

**continue**

GNU extension. When within a **for** statement, jump to the next iteration.

### **halt**

GNU extension. Cause the **bc** processor to quit.

### **limits**

GNU extension. Print the limits enforced by the local version of **bc**.

## **Function keywords**

### **define** *f(args)* {

Begin the definition of function *f* having the arguments *args*. The arguments are separated by commas. Statements follow on successive lines. End with a **}**.

### **auto** *x, y*

Set up *x* and *y* as variables local to a function definition, initialized to 0 and meaningless outside the function. Must appear first.

### **return**(*expr*)

Pass the value of expression *expr* back to the program. Return 0 if (*expr*) is left off. Used in function definitions.

### **sqrt**(*expr*)

Compute the square root of expression *expr*.

### **length**(*expr*)

Compute how many significant digits are in *expr*.

### **scale**(*expr*)

Same as **length**, but count only digits to the right of the decimal point.

### **read**( )

GNU extension. Read a number from standard input. Return value is the number read, converted via the value of **ibase**.

## **Math library functions**

These are available when **bc** is invoked with **-l**. Library functions set **scale** to 20.

### **s**(*angle*)

Compute the sine of *angle*, a constant or expression in radians.

### **c**(*angle*)

Compute the cosine of *angle*, a constant or expression in radians.

### **a**(*n*)

Compute the arctangent of  $n$ , returning an angle in radians.

### ***e(expr)***

Compute **e** to the power of *expr*.

### ***l(expr)***

Compute the natural log of *expr*.

### ***j(n, x)***

Compute the Bessel function of integer order  $n$ .

## **Operators**

These consist of operators and other symbols. Operators can be arithmetic, unary, assignment, or relational:

### **arithmetic**

+ - \* / % ^

### **unary**

- ++ --

### **assignment**

=+ =- =\* =/ =% =^ =

### **relational**

< <= > >= == !=

## **Other symbols**

### ***/\* \*/***

Enclose comments.

### ***()***

Control the evaluation of expressions (change precedence). Can also be used around assignment statements to force the result to print.

Use to group statements.

### ***[]***

Indicate array index.

### ***"text"***

Use as a statement to print *text*.

## **Examples**

Note in these examples that when you type some quantity (a number or

expression), it is evaluated and printed, but assignment statements produce no display.

```
ibase = 8
```

*Octal input*

```
20
```

*Evaluate this octal number*

```
16
```

*Terminal displays decimal value*

```
obase = 2
```

*Display output in base 2 instead of base 10*

```
20
```

*Octal input*

```
10000
```

*Terminal now displays binary value*

```
ibase = A
```

*Restore base-10 input*

```
scale = 3
```

*Truncate results to 3 decimal places*

```
8/7
```

*Evaluate a division*

```
1.001001000
```

*Oops! Forgot to reset output base to 10*

```
obase=10
```



*Input is decimal now, so A isn't needed*

```
8/7  
1.142
```

*Terminal displays result (truncated)*

The following lines show the use of functions:

```
define p(r,n){
```

*Function p uses two arguments*

```
auto v
```

*v is a local variable*

```
v = r^n
```

*r raised to the n power*

```
return(v)}
```

*Value returned*

```
scale=5  
x=p(2.5,2)
```

```
x = 2.5 ^ 2
```

```
x
```

*Print value of x*

```
6.25  
length(x)
```

*Number of digits*

```
3  
scale(x)
```

*Number of places right of decimal point*

2

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### **biff** [*arguments*]

Notify user of mail arrival and sender's name. **biff** operates asynchronously. Mail notification works only if your system is running the **comsat(8)** server. The command **biff y** enables notification, and the command **biff n** disables notification. With no arguments, **biff** reports **biff**'s current status.

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### bison [*options*] *file*

Given a *file* containing context-free grammar, convert into tables for subsequent parsing while sending output to *file.c*. This utility is both to a large extent compatible with **yacc** and named for it. All input files should use the suffix *.y*; output files will use the original prefix. All long options (those preceded by **--**) may instead be preceded by **+**.

#### Options

**-b prefix, --file-prefix=prefix**

Use *prefix* for all output files.

**-d, --defines**

Generate *file.h*, producing **#define** statements that relate **bison**'s token codes to the token names declared by the user.

**-r, --raw**

Use **bison** token numbers, not **yacc**-compatible translations, in *file.h*.

**-k, --token-table**

Include token names and values of YYNTOKENS, YYNNTS, YYNRULES, and YYNSTATES in *file.c*.

**-l, --no-lines**

Exclude **#line** constructs from code produced in *file.c*. (Use after debugging is complete.)

**-n, --no-parser**

Suppress parser code in output, allowing only declarations. Assemble all translations into a switch statement body and print it to *file.act*.

**-o file, --output-file=file**

Output to *file*.

**-p *prefix*, --name-prefix=*prefix***

Substitute *prefix* for *yy* in all external symbols.

**-t, --debug**

Compile runtime debugging code.

**-v, --verbose**

Verbose mode. Print diagnostics and notes about parsing tables to *file.output*.

**-V, --version**

Display version number.

**-y, --yacc, --fixed-output-files**

Duplicate **yacc**'s conventions for naming output files.

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### **bootpd** [*options*] [*configfile*] [*dumpfile*]

TCP/IP command. Internet Boot Protocol server. **bootpd** normally is run by */etc/inetd* by including the following line in the file */etc/inetd.conf*:

```
bootps dgram udp wait root /etc/bootpd bootpd
```

This causes **bootpd** to be started only when a boot request arrives. It may also be started in standalone mode, from the command line. Upon startup, **bootpd** first reads its configuration file, */etc/bootptab* (or the *configfile* listed on the command line), then begins listening for BOOTREQUEST packets.

**bootpd** looks in */etc/services* to find the port numbers it should use. Two entries are extracted: **bootps**—the **bootp** server listening port—and **bootpc**—the destination port used to reply to clients.

If **bootpd** is compiled with the `-DDEBUG` option, receipt of a SIGUSR1 signal causes it to dump its memory-resident database to the file */etc/bootpd.dump* or the command-line specified *dumpfile*.

### Options

#### **-c** *directory*

Force **bootpd** to work in *directory*.

#### **-d** *level*

Specify the debugging level. Omitting *level* will increment the level by 1.

#### **-t** *timeout*

Specify a timeout value in minutes. A timeout value of 0 means wait forever.

### Configuration file

The **bootpd** configuration file has a format in which two-character, case-

sensitive tag symbols are used to represent host parameters. These parameter declarations are separated by colons. The general format is:

```
hostname:tg=value:tg=value:tg=value
```

where *hostname* is the name of a bootp client and *tg* is a tag symbol. The currently recognized tags are listed next.

## Tags

Tag	Meaning
<b>bf</b>	Bootfile
<b>bs</b>	Bootfile size in 512-octet blocks
<b>cs</b>	Cookie server address list
<b>ds</b>	Domain name server address list
<b>gw</b>	Gateway address list
<b>ha</b>	Host hardware address
<b>hd</b>	Bootfile home directory
<b>hn</b>	Send hostname
<b>ht</b>	Host hardware type (see Assigned Numbers RFC)
<b>im</b>	Impress server address list
<b>ip</b>	Host IP address
<b>lg</b>	Log server address list
<b>lp</b>	<b>lpr</b> server address list
<b>ns</b>	IEN-116 name server address list
<b>rl</b>	Resource location protocol server address list
<b>sm</b>	Host subnet mask
<b>tc</b>	Table continuation
<b>to</b>	Time offset in seconds from UTC
<b>ts</b>	Time server address list
<b>vm</b>	Vendor magic cookie selector

There is also a generic tag, **T<sub>n</sub>**, where *n* is an RFC 1048 vendor field tag number. Generic data may be represented as either a stream of hexadecimal numbers or as a quoted string of ASCII characters.

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### bootpgw [*options*] *server*

Internet Boot Protocol Gateway. Maintain a gateway that forwards **bootpd** requests to *server*. In addition to dealing with BOOTREPLY packets, also deal with BOOTREQUEST packets. **bootpgw** is normally run by */etc/inetd* by including the following line in the file */etc/inetd.conf*:

```
bootps dgram udp wait root /etc/bootpgw bootpgw
```

This causes **bootpgw** to be started only when a boot request arrives. **bootpgw** takes all the same options as **bootpd**, except **-c**.

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### bootptest [*options*] *server* [*template*]

TCP/IP command. Test *server's* **bootpd** daemon by sending requests every second for 10 seconds or until the server responds. Read options from the *template* file, if provided.

#### Options

##### **-f** *file*

Read the boot filename from *file*.

##### **-h**

Identify client by hardware, not IP, address.

##### **-m** *magic-number*

Provide *magic-number* as the first word of the vendor options field.

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**bzip2** [*options*] *filenames*

**bunzip2** [*options*] *filenames*

**bzcat** [*option*] *filenames*

**bzip2recover** *filenames*

File compression and decompression utility similar to **gzip**, but uses a different algorithm and encoding method to get better compression. **bzip2** replaces each file in *filenames* with a compressed version of the file and with a *.bz2* extension appended. **bunzip2** decompresses each file compressed by **bzip2** (ignoring other files, except to print a warning). **bzcat** decompresses all specified files to standard output, and **bzip2recover** is used to try to recover data from damaged files.

### Options

--

End of options; treat all subsequent arguments as filenames.

**-dig**

Set block size to *dig* x 100KB when compressing, where *dig* is a single digit from 1 to 9.

**-c, --stdout**

Compress or decompress to standard output.

**-d, --decompress**

Force decompression.

**-f, --force**

Force overwrite of output files. Default is not to overwrite. Also forces breaking of hard links to files.

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**-k, --keep**

Keep input files; don't delete them.

**-L, --license, -V, --version**

Print license and version information and exit.

**-q, --quiet**

Quiet. Print only critical messages.

**-s, --small**

Use less memory, at the expense of speed.

**-t, --test**

Check the integrity of the files, but don't actually compress them.

**-v, --verbose**

Verbose. Show the compression ratio for each file processed. Add more -v's to increase the verbosity.

**-z, --compress**

Forces compression, even if invoked as **bunzip2** or **bzcat**.

**--repetitive-fast, --repetitive-best**

Sometimes useful in versions earlier than 0.9.5 (which has an improved sorting algorithm) for providing some control over the algorithm.

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c++ [*options*] *files*

See [g++](#).

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Print a 12-month calendar (beginning with January) for the given *year* or a one-month calendar of the given *month* and *year*. *month* ranges from 1 to 12. *year* ranges from 1 to 9999. With no arguments, print a calendar for the current month.

### Options

**-j**

Display Julian dates (days numbered 1 to 365, starting from January 1).

**-m**

Display Monday as the first day of the week.

**-y**

Display entire year.

### Examples

```
cal 12 1995
cal 1994 > year_file
```

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### cardctl [*options*] *command*

System administration command. Control PCMCIA sockets or select the current scheme. The current scheme is sent along with the address of any inserted cards to configuration scripts (by default located in */etc/pcmcia*). The **scheme** command displays or changes the scheme. The other commands operate on a named card socket number or, if no number is given, all sockets.

### Commands

#### config [*socket*]

Display current socket configuration.

#### eject [*socket*]

Prepare the system for the card(s) to be ejected.

#### ident [*socket*]

Display card identification information.

#### insert [*socket*]

Notify system that a card has been inserted.

#### reset [*socket*]

Send reset signal to card.

#### resume [*socket*]

Restore power to socket and reconfigure for use.

#### scheme [*name*]

Display current scheme or change to specified scheme *name*.

#### status [*socket*]

Display current socket status.

**suspend** [*socket*]

Shut down device and cut power to socket.

**Options**

**-c** *directory*

Look for card configuration information in *directory* instead of */etc/pcmcia*.

**-f** *file*

Use *file* to keep track of the current scheme instead of */var/run/pcmcia-scheme*.

**-s** *file*

Look for current socket information in *file* instead of */var/run/stab*.

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### cardmgr [options]

System administration command. The PCMCIA card daemon. **cardmgr** monitors PCMCIA sockets for devices that have been added or removed. When a card is detected, it attempts to get the card's ID and configure it according to the card configuration database (usually stored in `/etc/pcmcia/config`). By default, **cardmgr** both creates a system log entry when it detects cards and beeps. Two high beeps mean it successfully identified and configured a device. One high beep followed by one low beep means it identified the device, but was unable to configure it successfully. One low beep means it could not identify the inserted card. Information on the currently configured cards can be found in `/var/run/stab`.

### Options

#### **-c***directory*

Look in *directory* for the card configuration database instead of `/etc/pcmcia`.

#### **-d**

use **modprobe** instead of **insmod** to load the PCMCIA device driver.

#### **-f**

Run in the foreground to process the current cards, then run as a daemon.

#### **-m***directory*

Look in *directory* for card device modules instead of `/lib/modules/`uname -r``.

#### **-o**

Configure the cards present in one pass, then exit.

#### **-p***file*

Write **cardmgr**'s process ID to *file* instead of */var/run/cardmgr.pid*.

**-q**

Run in quiet mode. No beeps.

**-sfile**

Write current socket information to *file* instead of */var/run/stab*.

**-v**

Verbose mode.

**-V**

Print version number and exit.

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**cat** [*options*] [*files*]

Read (concatenates) one or more *files* and print them on standard output. Read standard input if no *files* are specified or if - is specified as one of the files; input ends with EOF. You can use the > operator to combine several files into a new file or >> to append files to an existing file.

### Options

**-A, --show-all**

Same as **-vET**.

**-b, --number-nonblank**

Number all nonblank output lines, starting with 1.

**-e**

Same as **-vE**.

**-E, --show-ends**

Print \$ at the end of each line.

**-n, --number**

Number all output lines, starting with 1.

**-s, --squeeze-blank**

Squeeze down multiple blank lines to one blank line.

**-t**

Same as **-vT**.

**-T, --show-tabs**

Print TAB characters as ^I.

**-u**

Ignored; retained for Unix compatibility.

**-v, --show-nonprinting**

Display control and nonprinting characters, with the exception of LINEFEED and TAB.

### Examples

```
cat ch1
```

*Display a file*

```
cat ch1 ch2 ch3 > all
```

*Combine files*

```
cat note5 >> notes
```

*Append to a file*

```
cat > temp1
```

*Create file at terminal; end with EOF*

```
cat > temp2 << STOP
```

*Create file at terminal; end with*

```
STOP
```

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**cpp** [*options*] [ *ifile* [ *ofile* ] ]

GNU C language preprocessor. **cpp** is invoked as the first pass of any C compilation by the **gcc** command. The output of **cpp** is a form acceptable as input to the next pass of the C compiler, and **cpp** normally invokes **gcc** after it finishes processing. *ifile* and *ofile* are, respectively, the input and output for the preprocessor; they default to standard input and standard output.

### Options

**-\$**

Do not allow \$ in identifiers.

**-dM**

Suppress normal output. Print series of **#defines** that create the macros used in the source file.

**-dD**

Similar to **-dM** but exclude predefined macros and include results of preprocessing.

**-idirafter *dir***

Search *dir* for header files when a header file is not found in any of the included directories.

**-imacros *file***

Process macros in *file* before processing main files.

**-include *file***

Process *file* before main file.

**-iprefix *prefix***

When adding directories with **-iwithprefix**, prepend *prefix* to the directory's name.

**-iwithprefix *dir***

Append *dir* to the list of directories to be searched when a header file cannot be found in the main include path. If **-iprefix** has been set, prepend that prefix to the directory's name.

**-lang-c, -lang-c++, -lang-objc, -lang-objc++**

Expect the source to be in C, C++, Objective C, or Objective C++, respectively.

**-lint**

Display all lint commands in comments as **#pragma lint *command***.

**-nostdinc**

Search only specified, not standard, directories for header files.

**-nostdinc++**

Suppress searching of directories believed to contain C++-specific header files.

**-pedantic**

Warn verbosely.

**-pedantic-errors**

Produce a fatal error in every case in which **-pedantic** would have produced a warning.

**-traditional**

Behave like traditional C, not ANSI.

**-undef**

Suppress definition of all nonstandard macros.

**-Aname[=*def*]**

Assert *name* with value *def* as if defined by a **#assert**.

**-C**

Pass along all comments (except those found on **cpp** directive lines). By default, **cpp** strips C-style comments.

**-Dname[=*def*]**

Define *name* with value *def* as if by a **#define**. If no *=def* is given, *name* is defined with value 1. **-D** has lower precedence than **-U**.

**-H**

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Print pathnames of included files, one per line, on standard error.

### **-Idir**

Search in directory *dir* for **#include** files whose names do not begin with / before looking in directories on standard list. **#include** files whose names are enclosed in double quotes and do not begin with / will be searched for first in the current directory, then in directories named on **-I** options, and last in directories on the standard list.

### **-M [-MG]**

Suppress normal output. Print a rule for **make** that describes the main source file's dependencies. If **-MG** is specified, assume that missing header files are actually generated files, and look for them in the source file's directory.

### **-MD file**

Similar to **-M**, but output to *file*; also compile the source.

### **-MM**

Similar to **-M**. Describe only those files included as a result of **#include "file"**.

### **-MMD file**

Similar to **-MD**, but describe only the user's header files.

### **-P**

Preprocess input without producing line-control information used by next pass of C compiler.

### **-Uname**

Remove any initial definition of *name*, where *name* is a reserved symbol predefined by the preprocessor or a name defined on a **-D** option. Names predefined by **cpp** are **unix** and **i386** (for Intel systems).

### **-Wcomment, -Wcomments**

Warn when encountering the beginning of a nested comment.

### **-Wtraditional**

Warn when encountering constructs that are interpreted differently in ANSI from traditional C.

## **Special names**

**cpp** understands various special names, some of which are:

### **DATE**

Current date (e.g., Oct 10 1999)

### **FILE**

Current filename (as a C string)

### \_\_LINE\_\_

Current source line number (as a decimal integer)

### \_\_TIME\_\_

Current time (e.g., 12:00:00)

These special names can be used anywhere, including macros, just like any other defined names. **cpp**'s understanding of the line number and filename may be changed using a **#line** directive.

## Directives

All **cpp** directive lines start with **#** in column 1. Any number of blanks and tabs is allowed between the **#** and the directive. The directives are:

### **#assert** *name (string)*

Define a question called *name*, with an answer of *string*. Assertions can be tested with **#if** directives. The predefined assertions for **#system**, **#cpu**, and **#machine** can be used for architecture-dependent changes.

### **#unassert** *name*

Remove assertion for question *name*.

### **#define** *name token-string*

Define a macro called *name*, with a value of *token-string*. Subsequent instances of *name* are replaced with *token-string*.

### **#define** *name( arg, ... , arg ) token-string*

This allows substitution of a macro with arguments. *token-string* will be substituted for *name* in the input file. Each call to *name* in the source file includes arguments that are plugged into the corresponding *args* in *token-string*.

### **#undef** *name*

Remove definition of the macro *name*. No additional tokens are permitted on the directive line after *name*.

### **#ident** *string*

Put *string* into the comment section of an object file.

### **#include** "*filename*", **#include**<*filename*>

Include contents of *filename* at this point in the program. No additional tokens are permitted on the directive line after the final " or >.

### **#line** *integer-constant "filename"*

Cause **cpp** to generate line-control information for the next pass of the C compiler. The compiler behaves as if *integer-constant* is the line number of the next line of source code and *filename* (if present) is the name of

the input file. No additional tokens are permitted on the directive line after the optional *filename*.

### **#endif**

End a section of lines begun by a test directive (**#if**, **#ifdef**, or **#ifndef**). No additional tokens are permitted on the directive line.

### **#ifdef name**

Lines following this directive and up to matching **#endif** or next **#else** or **#elif** will appear in the output if *name* is currently defined. No additional tokens are permitted on the directive line after *name*.

### **#ifndef name**

Lines following this directive and up to matching **#endif** or next **#else** or **#elif** will appear in the output if *name* is not currently defined. No additional tokens are permitted on the directive line after *name*.

### **#if constant-expression**

Lines following this directive and up to matching **#endif** or next **#else** or **#elif** will appear in the output if *constant-expression* evaluates to nonzero.

### **#elif constant-expression**

An arbitrary number of **#elif** directives are allowed between an **#if**, **#ifdef**, or **#ifndef** directive and an **#else** or **#endif** directive. The lines following the **#elif** and up to the next **#else**, **#elif**, or **#endif** directive will appear in the output if the preceding test directive and all intervening **#elif** directives evaluate to zero, and the *constant-expression* evaluates to nonzero. If *constant-expression* evaluates to nonzero, all succeeding **#elif** and **#else** directives will be ignored.

### **#else**

Lines following this directive and up to the matching **#endif** will appear in the output if the preceding test directive evaluates to 0, and all intervening **#elif** directives evaluate to 0. No additional tokens are permitted on the directive line.

### **#error**

Report fatal errors.

### **#warning**

Report warnings, but then continue processing.

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### **cfdisk** [*options*] [*device*]

System administration command. Partition a hard disk. *device* may be */dev/hda* (default), */dev/hdb*, */dev/sda*, */dev/sdb*, */dev/sdc*, or */dev/sdd*. See also **fdisk**.

### Options

#### **-a**

Highlight the current partition with a cursor, not reverse video.

#### **-c cylinders**

Specify the number of cylinders.

#### **-h heads**

Specify the number of heads.

#### **-s sectors**

Specify the number of sectors per track.

#### **-z**

Do not read the partition table; partition from scratch.

#### **-P format**

Display the partition table in *format*, which must be **r** (raw data), **s** (sector order), or **t** (raw format).

### Commands

#### **up arrow, down arrow**

Move among partitions.

#### **b**

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Toggle partition's bootable flag.

**d**

Delete partition (allow other partitions to use its space).

**g**

Alter the disk's geometry. Prompt for what to change: cylinders, heads, or sectors (**c**, **h**, or **s**, respectively).

**h**

Help.

**m**

Attempt to ensure maximum usage of disk space in the partition.

**n**

Create a new partition. Prompt for more information.

**p**

Display the partition table.

**q**

Quit without saving information.

**t**

Prompt for a new filesystem type, and change to that type.

**u**

Change the partition size units, rotating from megabytes to sectors to cylinders and back.

**W**

Save information. Note that this letter must be uppercase.

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### **chattr** [*options*] *mode files*

Modify file attributes. Specific to Linux Second Extended Filesystem. Behaves similarly to symbolic **chmod**, using +, -, and =. *mode* is in the form *opcode attribute*. See also **lsattr**.

#### Options

**-R**

Modify directories and their contents recursively.

**-V**

Print modes of attributes after changing them.

**-v** *version*

Set the file's version.

#### Opcodes

**+**

Add attribute.

**-**

Remove attribute.

**=**

Assign attributes (removing unspecified attributes).

#### Attributes

**A**

Don't update access time on modify.



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**a**

Append only for writing. Can be set or cleared only by a privileged user.

**c**

Compressed.

**d**

No dump.

**i**

Immutable. Can be set or cleared only by a privileged user.

**s**

Secure deletion; the contents are zeroed on deletion.

**u**

Undeletable.

**S**

Synchronous updates.

**Examples**

```
chattr +a myfile
```

*As superuser*

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**chfn** [*options*] [*username*]

Change the information that is stored in */etc/passwd* and displayed when a user is fingered. Without *options*, **chfn** enters interactive mode and prompts for changes. To make a field blank, enter the keyword **none**. Only a privileged user can change information for another user. For regular users, **chfn** prompts for the user's password before making the change.

### Options

**-f, --full-name**

Specify new full name.

**-h, --home-phone**

Specify new home phone number.

**-o, --office**

Specify new office number.

**-p, --office-phone**

Specify new office phone number.

**-u, --help**

Print help message and then exit.

**-v, --version**

Print version information and then exit.

### Example

```
chfn -f "Ellen Siever" ellen
```

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Change the group of one or more *files* to *newgroup*. *newgroup* is either a group ID number or a group name located in */etc/group*. Only the owner of a file or a privileged user may change its group.

**Options****-c, --changes**

Print information about those files that are changed.

**-f, --silent, --quiet**

Do not print error messages about files that cannot be changed.

**--help**

Print help message and then exit.

**-R, --recursive**

Traverse subdirectories recursively, applying changes.

**--reference=*filename***

Change the group to that associated with *filename*. In this case, *newgroup* is not specified.

**-v, --verbose**

Verbosely describe ownership changes.

**--version**

Print version information and then exit.

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**chmod** [*options*] *mode files*

**chmod** [*options*] **--reference=filename** *files*

Change the access *mode* (permissions) of one or more *files*. Only the owner of a file or a privileged user may change its mode. *mode* can be numeric or an expression in the form of *who opcode permission*. *who* is optional (if omitted, default is **a**); choose only one *opcode*. Multiple modes may be specified, separated by commas.

### Options

**-c, --changes**

Print information about files that are changed.

**-f, --silent, --quiet**

Do not notify user of files that **chmod** cannot change.

**--help**

Print help message and then exit.

**-R, --recursive**

Traverse subdirectories recursively, applying changes.

**--reference=filename**

Change permissions to those associated with *filename*.

**-v, --verbose**

Print information about each file, whether changed or not.

**--version**

Print version information and then exit.

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### Who

- u** User
- g** Group
- o** Other
- a** All (default)

### Opcode

- +** Add permission.
- Remove permission.
- =** Assign permission (and remove permission of the unspecified fields).

### Permissions

- r** Read.
- w** Write.
- x** Execute.
- s** Set user (or group) ID.
- t** Sticky bit; save text (file) mode or prevent removal of files by nonowners (directory).
- u** User's present permission.

**g**

Group's present permission.

**o**

Other's present permission.

Alternatively, specify permissions by a three-digit octal number. The first digit designates owner permission; the second, group permission; and the third, other's permission. Permissions are calculated by adding the following octal values:

**4**

Read.

**2**

Write.

**1**

Execute.

Note: A fourth digit may precede this sequence. This digit assigns the following modes:

**4**

Set user ID on execution to grant permissions to process based on file's owner, not on permissions of user who created the process.

**2**

Set group ID on execution to grant permissions to process based on the file's group, not on permissions of user who created the process.

**1**

Set sticky bit.

## Examples

Add execute-by-user permission to *file*:

```
chmod u+x file
```

Either of the following will assign read/write/execute permission by owner (7), read/execute permission by group (5), and execute-only permission by others (1) to *file*:

```
chmod 751 file
chmod u=rwx,g=rx,o=x file
```

Any one of the following will assign read-only permission to *file* for everyone:

```
chmod =r file
chmod 444 file
chmod a-wx,a+r file
```

Set the user ID, assign read/write/execute permission by owner, and assign read/execute permission by group and others:

```
chmod 4755 file
```

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**chown** [*options*] *newowner files*

**chown** [*options*] **--reference=filename** *files*

Change the ownership of one or more *files* to *newowner*. *newowner* is either a user ID number or a login name located in */etc/passwd*. **chown** also accepts users in the form *newowner:newgroup* or *newowner.newgroup*. The last two forms change the group ownership as well. If no owner is specified, the owner is unchanged. With a period or colon but no group, the group is changed to that of the new owner. Only the current owner of a file or a privileged user may change its owner.

### Options

**-c, --changes**

Print information about those files that are changed.

**--dereference**

Follow symbolic links.

**-f, --silent, --quiet**

Do not print error messages about files that cannot be changed.

**-h, --no-dereference**

Change the ownership of each symbolic link (on systems that allow it), rather than the referenced file.

**-v, --verbose**

Print information about all files that **chown** attempts to change, whether or not they are actually changed.

**-R, --recursive**

Traverse subdirectories recursively, applying changes.

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**--reference=*filename***

Change owner to the owner of *filename* instead of specifying a new owner explicitly.

**--help**

Print help message and then exit.

**--version**

Print version information and then exit.

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### chpasswd [*option*]

System administration command. Change user passwords in a batch. **chpasswd** accepts input in the form of one *username:password* pair per line. If the **-e** option is not specified, *password* will be encrypted before being stored.

### Option

**-e**

Passwords given are already encrypted.

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### **chroot** *newroot* [*command*]

System administration command. Change root directory for *command* or, if none is specified, for a new copy of the user's shell. This command or shell is executed relative to the new root. The meaning of any initial / in pathnames is changed to *newroot* for a command and any of its children. In addition, the initial working directory is *newroot*. This command is restricted to privileged users.

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**chsh** [*options*] [*username*]

Change your login shell, interactively or on the command line. Warn if *shell* does not exist in */etc/shells*. Specify the full path to the shell. **chsh** prompts for your password. Only a privileged user can change another user's shell.

### Options

**-l, --list-shells**

Print valid shells, as listed in */etc/shells*, and then exit.

**-s shell, --shell shell**

Specify new login shell.

**-u, --help**

Print help message and then exit.

**-v, --version**

Print version information and then exit.

### Example

```
chsh -s /bin/tcsh
```

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### cksum [*files*]

Compute a cyclic redundancy check (CRC) checksum for all *files*; used to ensure that a file was not corrupted during transfer. Read from standard input if the character - or no files are given. Display the resulting checksum, the number of bytes in the file, and (unless reading from standard input) the filename.

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Clear the terminal display.

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**cmp** [*options*] *file1 file2* [*skip1* [*skip2*]]

Compare *file1* with *file2*. Use standard input if *file1* is - or missing. See also **comm** and **diff**. Files can be of any type. *skip1* and *skip2* are optional offsets in the files at which the comparison is to start.

### Options

#### **-c, --print-chars**

Print differing bytes as characters.

#### **-i num, --ignore-initial=num**

Ignore the first *num* bytes of input.

#### **-l, --verbose**

Print offsets and codes of all differing bytes.

#### **-s, --quiet, --silent**

Work silently; print nothing, but return exit codes:

**0**

Files are identical.

**1**

Files are different.

**2**

Files are inaccessible.

### Example

Print a message if two files are the same (exit code is 0):

```
cmp -s old new && echo 'no changes'
```

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### col [options]

A postprocessing filter that handles reverse linefeeds and escape characters, allowing output from **tbl** or **nroff** to appear in reasonable form on a terminal.

#### Options

##### -b

Ignore backspace characters; helpful when printing manpages.

##### -f

Process half-line vertical motions, but not reverse line motion. (Normally, half-line input motion is displayed on the next full line.)

##### -l n

Buffer at least *n* lines in memory. The default buffer size is 128 lines.

##### -x

Normally, **col** saves printing time by converting sequences of spaces to tabs. Use **-x** to suppress this conversion.

#### Examples

Run *myfile* through **tbl** and **nroff**, then capture output on screen by filtering through **col** and **more**:

```
tbl myfile | nroff | col | more
```

Save manpage output for the **ls** command in *out.print*, stripping out backspaces (which would otherwise appear as ^H):

```
man ls | col -b > out.print
```

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### colcrt [*options*] [*files*]

A postprocessing filter that handles reverse linefeeds and escape characters, allowing output from **tbl** or **nroff** to appear in reasonable form on a terminal. Put half-line characters (e.g., subscripts or superscripts) and underlining (changed to dashes) on a new line between output lines.

#### Options

-

Do not underline.

-2

Double space by printing all half-lines.

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### colrm [*start* [*stop*]]

Remove specified columns from a file, where a column is a single character in a line. Read from standard input and write to standard output. Columns are numbered starting with 1; begin deleting columns at (including) the *start* column, and stop at (including) the *stop* column. Entering a tab increments the column count to the next multiple of either the *start* or *stop* column; entering a backspace decrements it by 1.

### Example

```
colrm 3 5 < test1 > test2
```

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**column** [*options*] [*files*]

Format input from one or more *files* into columns, filling rows first. Read from standard input if no files are specified.

### Options

**-c *num***

Format output into *num* columns.

**-s *char***

Delimit table columns with *char*. Meaningful only with **-t**.

**-t**

Format input into a table. Delimit with whitespace, unless an alternate delimiter has been provided with **-s**.

**-x**

Fill columns before filling rows.

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**comm** [*options*] *file1 file2*

Compare lines common to the sorted files *file1* and *file2*. Three-column output is produced: lines unique to *file1*, lines unique to *file2*, and lines common to both files. **comm** is similar to **diff** in that both commands compare two files. But **comm** can also be used like **uniq**; that is, **comm** selects duplicate or unique lines between *two* sorted files, whereas **uniq** selects duplicate or unique lines within the *same* sorted file.

### Options

-

Read the standard input.

-*num*

Suppress printing of column *num*. Multiple columns may be specified and should not be space-separated.

--help

Print help message and exit.

--version

Print version information and exit.

### Example

Compare two lists of top-10 movies, and display items that appear in both lists:

```
comm -12 siskel_top10 ebert_top10
```

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### **compress** [*options*] *files*

Compress one or more *files*, replacing each with the compressed file of the same name with *.Z* appended. If no file is specified, compress standard input. Each file specified is compressed separately. **compress** ignores files that are symbolic links. See also **gzip**.

#### Options

**-b** *maxbits*

Limit the maximum number of bits.

**-c**

Write output to standard output, not to a *.Z* file.

**-d**

Decompress instead of compressing. Same as **uncompress**.

**-f**

Force generation of an output file even if one already exists.

**-r**

If any of the specified files is a directory, compress recursively.

**-v**

Print compression statistics.

**-V**

Print version and compilation information and then exit.

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### domainname [name]

NFS/NIS command. Set or display name of current NIS domain. With no argument, **domainname** displays the name of the current NIS domain. Only a privileged user can set the domain name by giving an argument; this is usually done in a startup script.

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**dosfsck** [*options*] *device*

**fsck.ext2** [*options*] *device*

System administration command. Similar to **fsck**, but specifically intended for MS-DOS filesystems. When checking an MS-DOS filesystem, **fsck** calls this command. Normally **dosfsck** stores all changes in memory, then writes them when checks are complete.

### Options

**-a**

Automatically repair the system; do not prompt the user.

**-A**

Use the Atari version of the MS-DOS filesystem.

**-d file**

Drop the named file from the file allocation table. Force checking, even if kernel has already marked the filesystem as valid. **dosfsck** will normally exit without checking if the system appears to be clean.

**-l file**

Consult *file* for a list of bad blocks, in addition to checking for others.

**-n**

Ensure that no changes are made to the filesystem. When queried, answer "no."

**-p**

"Preen." Repair all bad blocks noninteractively.

**-t**

Display timing statistics.

**-v**

Verbose.

**-y**

When queried, answer "yes."

**-B** *size*

Expect to find the superblock at *size*; if it's not there, exit.

**-F**

Flush buffer caches before checking.

**-L** *file*

Consult *file* for list of bad blocks instead of checking filesystem for them.

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**du** [*options*] [*directories*]

Print disk usage (as the number of 1KB blocks used by each named directory and its subdirectories; default is current directory).

### Options

**-a, --all**

Print usage for all files, not just subdirectories.

**-b, --bytes**

Print sizes in bytes.

**-c, --total**

In addition to normal output, print grand total of all arguments.

**-D, --dereference-args**

Follow symbolic links, but only if they are command-line arguments.

**-h, --human-readable**

Print sizes in human-reader-friendly format.

**-H, --si**

Like **-h**, but show as power of 1000 rather than 1024.

**-k, --kilobytes**

Print sizes in kilobytes (this is the default).

**-l, --count-links**

Count the size of all files, whether or not they have already appeared (i.e., via a hard link).

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**-L, --dereference**

Follow symbolic links.

**--exclude=*pattern***

Exclude files that match *pattern*.

**--max-depth=*num***

Report sizes for directories only down to *num* levels below the starting point (which is level 0).

**-m, --megabytes**

Print sizes in megabytes.

**-s, --summarize**

Print only the grand total for each named directory.

**-S, --separate-dirs**

Do not include the sizes of subdirectories when totaling the size of parent directories.

**-x, --one-file-system**

Display usage of files in current filesystem only.

**-X, --exclude-from=*file***

Exclude files that match any pattern in *file*.

**--help**

Print help message and then exit.

**--version**

Print the version and then exit.

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### **dumpe2fs** *device*

System administration command. Print information about *device's* superblock and blocks group.

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### dumpkeys [options]

Print information about the keyboard driver's translation tables to standard output. Further information is available in the manual pages under *keytables*.

#### Options

##### **-1, --separate-lines**

Print one line for each modifier/keycode pair and prefix **plain** to each unmodified keycode.

##### **-charset, --charset=charset**

Specify character set with which to interpret character code values. The default character set is **iso-8859-1**. The full list of valid character sets is available with the **--help** option.

##### **--compose-only**

Print compose key combinations only. Requires compose key support in the kernel.

##### **-f, --full-table**

Output in canonical, not short, form: for each key, print a row with modifier combinations divided into columns.

##### **--funcs-only**

Print function key string definitions only; do not print key bindings or string definitions.

##### **-h, --help**

Print help message and the version.

##### **-i, --short-info**



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Print in short-info format, including information about acceptable keycode keywords in the keytable files; the number of actions that can be bound to a key; a list of the ranges of action codes (the values to the right of a key definition); and the number of function keys that the kernel supports.

**--keys-only**

Print key bindings only; do not print string definitions.

**-l, --long-info**

Print the same information as in **--short-info**, plus a list of the supported action symbols and their numeric values.

**-n, --numeric**

Print action code values in hexadecimal notation; do not attempt to convert them to symbolic notation.

**-S num, --shape=num**

Print using *num* to determine table shape. Values of *num* are:

**0**

Default

**1**

Same as **--full-table**

**2**

Same as **--separate-lines**

**3**

One line for each keycode up to the first hole, then one line per modifier/keycode pair

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**e2fsck** [*options*] *device*

**fsck.ext2** [*options*] *device*

System administration command. Similar to **fsck**, but specifically intended for Linux Second Extended Filesystems. When checking a second extended filesystem, **fsck** calls this command.

### Options

**-b** *superblock*

Use *superblock* instead of default superblock.

**-d**

Debugging mode.

**-f**

Force checking, even if kernel has already marked the filesystem as valid. **e2fsck** will normally exit without checking if the system appears to be clean.

**-l** *file*

Consult *file* for a list of bad blocks, in addition to checking for others.

**-n**

Ensure that no changes are made to the filesystem. When queried, answer "no."

**-p**

"Preen." Repair all bad blocks noninteractively.

**-t**

Display timing statistics.

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**-v**

Verbose.

**-y**

When queried, answer "yes."

**-B *size***

Expect to find the superblock at *size*; if it's not there, exit.

**-F**

Flush buffer caches before checking.

**-L *file***

Consult *file* for list of bad blocks instead of checking filesystem for them.

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### echo [-n] [*string*]

This is the **/bin/echo** command. **echo** also exists as a command built into the C shell and **bash**. The following character sequences have special meanings:

<b>\a</b>	Alert (bell)
<b>\b</b>	Backspace
<b>\c</b>	Suppress trailing newline
<b>\f</b>	Form feed
<b>\n</b>	Newline
<b>\r</b>	Carriage return
<b>\t</b>	Horizontal tab
<b>\v</b>	Vertical tab
<b>\\</b>	Literal backslash

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**`\nnn`**

The octal character whose ASCII code is *nnn*.

**Options**

**`-e`**

Enable character sequences with special meaning. (In some versions, this option is not required in order to make the sequences work.)

**`-E`**

Disable character sequences with special meaning.

**`-n`**

Suppress printing of newline after text.

**`--help`**

Print help message and then exit.

**`--version`**

Print version information and then exit.

**Examples**

```
/bin/echo "testing printer" | lp  
/bin/echo "TITLE\nTITLE" > file ; cat doc1 doc2 >> file  
/bin/echo "Warning: ringing bell \a"
```

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**egrep** [*options*] [*regexp*] [*files*]

Search one or more *files* for lines that match an extended regular expression *regexp*. **egrep** doesn't support the regular expressions  $\langle$ ,  $\rangle$ ,  $\backslash n$ ,  $\langle <$ ,  $\rangle >$ ,  $\{$ , or  $\}$  but does support the other expressions, as well as the extended set  $+$ ,  $?$ ,  $|$ , and  $( )$ . Remember to enclose these characters in quotes. Regular expressions are described in Chapter 9. Exit status is 0 if any lines match, 1 if none match, and 2 for errors.

See **grep** for the list of available options. Also see **fgrep**. **egrep** typically runs faster than those commands.

### Examples

Search for occurrences of *Victor* or *Victoria* in *file*:

```
egrep 'Victor(ia)*' file
egrep '(Victor|Victoria)' file
```

Find and print strings such as *old.doc1* or *new.doc2* in *files*, and include their line numbers:

```
egrep -n '(old|new)\.doc?' files
```

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### emacs [*options*] [*files*]

A text editor and all-purpose work environment. For more information, see Chapter 10.

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**env** [*option*] [*variable=value ...*] [*command*]

Display the current environment or, if an environment *variable* is specified, set it to a new *value* and display the modified environment. If *command* is specified, execute it under the modified environment.

### Options

**-i, --ignore-environment**

Ignore current environment entirely.

**-u name, --unset name**

Unset the specified variable.

**--help**

Print help message and then exit.

**--version**

Print version information and then exit.

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### etags [*options*] *files*

Create a list of function and macro names that are defined in the specified C, Pascal, FORTRAN, **yacc**, or **flex** source *files*. The output list (named *tags* by default) contains lines of the form:

```
name      file      context
```

where *name* is the function or macro name, *file* is the source file in which *name* is defined, and *context* is a search pattern that shows the line of code containing *name*. After the list of tags is created, you can invoke Emacs on any file and type:

```
ESC-x visit-tags-table
```

You will be prompted for the name of the tag table; the default is TAGS. To switch to the source file associated with the *name* listed in *tagsfile*, type:

```
ESC-x find-tag
```

You will be prompted for the tag you would like Emacs to search for. **ctags** produces an equivalent tags file for use with **vi**.

### Options

#### **-a, --append**

Append tag output to existing list of tags.

#### **-d, --defines**

Include tag entries for C preprocessor definitions.

#### **-i file, --include=file**

Add a note to the tags file that *file* should be consulted in addition to the normal input file.

#### **-l language, --language=language**

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Consider the files that follow this option to be written in *language*. Use the **-h** option for a list of languages and their default filename extensions.

**-o file, --output=file**

Write to *file*.

**-r regexp, --regex=regexp**

Include a tag for each line that matches *regexp* in the files following this option.

**-C, --c++**

Expect *.c* and *.h* files to contain C++, not C, code.

**-D, --no-defines**

Do not include tag entries for C preprocessor definitions.

**-H, -h, --help**

Print usage information.

**-R, --noregex**

Don't include tags based on regular-expression matching for the files that follow this option.

**-S, --ignore-indentation**

Normally **etags** uses indentation to parse the tag file; this option tells it to rely on it less.

**-V, --version**

Print the version number.

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**ex** [*options*] *file*

An interactive command-based editor. For more information, see Chapter 11.

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### expand [*options*] *files*

Convert tabs in given files (or standard input, if the file is named -) to appropriate number of spaces; write results to standard output.

#### Options

**-tabs, -t, --tabs** *tabs*

*tabs* is a comma-separated list of integers that specify the placement of tab stops. If exactly one integer is provided, the tab stops are set to every *integer* spaces. By default, tab stops are 8 spaces apart. With **-t** and **--tabs**, the list may be separated by whitespace instead of commas.

**-i, --initial**

Convert tabs only at the beginning of lines.

**--help**

Print help message and then exit.

**--version**

Print version information and then exit.

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**expr** *arg1 operator arg2 [ operator arg3 ... ]*

Evaluate arguments as expressions and print the result. Arguments and operators must be separated by spaces. In most cases, an argument is an integer, typed literally or represented by a shell variable. There are three types of operators: arithmetic, relational, and logical, as well as keyword expressions. Exit status for **expr** is **0** (expression is nonzero and nonnull), **1** (expression is 0 or null), or **2** (expression is invalid).

### Arithmetic operators

Use these to produce mathematical expressions whose results are printed:

+

Add *arg2* to *arg1*.

-

Subtract *arg2* from *arg1*.

\*

Multiply the arguments.

/

Divide *arg1* by *arg2*.

%

Take the remainder when *arg1* is divided by *arg2*.

Addition and subtraction are evaluated last, unless they are grouped inside parentheses. The symbols \*, (, and ) have meaning to the shell, so they must be escaped (preceded by a backslash or enclosed in single quotes).

### Relational operators

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Use these to compare two arguments. Arguments can also be words, in which case comparisons are defined by the locale. If the comparison statement is true, the result is 1; if false, the result is 0. Symbols > and < must be escaped.

=, ==

Are the arguments equal?

!=

Are the arguments different?

&gt;

Is *arg1* greater than *arg2*?

&gt;=

Is *arg1* greater than or equal to *arg2*?

&lt;

Is *arg1* less than *arg2*?

&lt;=

Is *arg1* less than or equal to *arg2*?

**Logical operators**

Use these to compare two arguments. Depending on the values, the result can be *arg1* (or some portion of it), *arg2*, or 0. Symbols | and & must be escaped.

|

Logical OR; if *arg1* has a nonzero (and nonnull) value, the result is *arg1*; otherwise, the result is *arg2*.

&amp;

Logical AND; if both *arg1* and *arg2* have a nonzero (and nonnull) value, the result is *arg1*; otherwise, the result is 0.

:

Like **grep**; *arg2* is a pattern to search for in *arg1*. *arg2* must be a regular expression. If part of the *arg2* pattern is enclosed in \( \), the result is the portion of *arg1* that matches; otherwise, the result is simply the number of characters that match. By default, a pattern match always applies to the beginning of the first argument (the search string implicitly begins with a ^). Start the search string with .\* to match other parts of the string.

**Keywords****index** *string character-list*

Return the first position in *string* that matches the first possible character in *character-list*. Continue through *character-list* until a match is found, or return 0.

**length** *string*

Return the length of *string*.

**match** *string regex*

Same as *string : regex*.

**quote** *token*

Treat *token* as a string, even if it would normally be a keyword or an operator.

**substr** *string start length*

Return a section of *string*, beginning with *start*, with a maximum length of *length* characters. Return **null** when given a negative or nonnumeric *start* or *length*.

**Examples**

Division happens first; result is 10:

```
expr 5 + 10 / 2
```

Addition happens first; result is 7 (truncated from 7.5):

```
expr \( 5 + 10 \) / 2
```

Add 1 to variable *i*. This is how variables are incremented in shell scripts:

```
i=\expr $i + 1\
```

Print 1 (true) if variable **a** is the string "hello":

```
expr $a = hello
```

Print 1 (true) if **b** plus 5 equals 10 or more:

```
expr $b + 5 \>= 10
```

Find the 5th, 6th, and 7th letters of the word *character*:

```
expr substr character 5 3
```

In the examples that follow, variable **p** is the string "version.100". This command prints the number of characters in **p**:

```
expr $p : '.*'
```

*Result is 11*

Match all characters and print them:

```
expr $p : '\(.*\)
```

*Result is "version.100"*

Print the number of lowercase letters at the beginning of **p**:

```
expr $p : '[a-z]*'
```

*Result is 7*

Match the lowercase letters at the beginning of **p**:

```
expr $p : '\([a-z]*\)'
```

*Result is "version"*

Truncate **\$x** if it contains five or more characters; if not, just print **\$x**. (Logical OR uses the second argument when the first one is 0 or null; i.e., when the match fails.)

```
expr $x : '\(.....\)' \| $x
```

In a shell script, rename files to their first five letters:

```
mv $x \expr $x : '\(.....\)' \| $x\
```

(To avoid overwriting files with similar names, use **mv -i**.)

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A null command that returns an unsuccessful (nonzero) exit status. Normally used in **bash** scripts. See also **true**.

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### fdformat [*options*] *device*

Low-level format of a floppy disk. The device for a standard format is usually `/dev/fd0` or `/dev/fd1`.

#### Option

**-n**

Do not verify format after completion.

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### **fdisk** [*options*] [*device*]

System administration command. Maintain disk partitions via a menu. **fdisk** displays information about disk partitions, creates and deletes disk partitions, and changes the active partition. It is possible to assign a different operating system to each of the four partitions, though only one partition is active at any given time. You can also divide a physical partition into several logical partitions. The minimum recommended size for a Linux system partition is 40MB. Normally, *device* will be */dev/hda*, */dev/hdb*, */dev/sda*, */dev/sdb*, */dev/hdc*, */dev/hdd*, and so on. See also **cmdisk**.

### Options

**-l**

List partition tables and exit.

**-spartition**

Display the size of *partition*, unless it is a DOS partition.

### Commands

**a**

Toggle a bootable flag on current partition.

**d**

Delete current partition.

**l**

List all partition types.

**m**

Main menu.

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- n** Create a new partition; prompt for more information.
- p** Print a list of all partitions and information about each.
- q** Quit; do not save.
- t** Replace the type of the current partition.
- u** Modify the display/entry units, which must be cylinders or sectors.
- v** Verify: check for errors; display a summary of the number of unallocated sectors.
- w** Save changes; exit.

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### fetchmail [options] [servers...]

System administration command. Retrieve mail from mail servers and forward it to the local mail delivery system. **fetchmail** retrieves mail from servers that support the common mail protocols POP2, POP3, IMAP2bis, and IMAP4. Messages are delivered via SMTP through port 25 on the local host and through your system's mail delivery agent (such as *sendmail*), where they can be read through the user's mail client. **fetchmail** settings are stored in the `~/.fetchmailrc` file. Parameters and servers can also be set on the command line, which will override settings in the `.fetchmailrc` file. **fetchmail** is compatible with the **popclient** program, and users can use both without having to adjust file settings.

### Options

#### **-a, --all**

Retrieve all messages from server, even ones that have already been seen but left on the server. The default is to only retrieve new messages.

#### **-A type, --auth type**

Specify the type of authentication. *type* may be: **password**, **kerberos\_v5**, or **kerberos**. Authentication type is usually established by **fetchmail** by default, so this option isn't very useful.

#### **-B n, --fetchlimit n**

Set the maximum number of messages (*n*) accepted from a server per query.

#### **-b n, --batchlimit n**

Set the maximum number of messages sent to an SMTP listener per connection. When this limit is reached, the connection will be broken and reestablished. The default of 0 means no limit.

#### **-c, --check**

Check for mail on a single server without retrieving or deleting



messages. Works with IMAP but not well with other protocols, if at all.

**-D** *[domain]*, **--smtpaddress** *[domain]*

Specify the *domain* name placed in RCPT TO lines sent to SMTP. The default is the local host.

**-E** *header*, **--envelope** *header*

Change the header assumed to contain the mail's envelope address (usually "X-Envelope-to:") to *header*.

**-e** *n*, **--expunge** *n*

Tell an IMAP server to EXPUNGE (i.e., purge messages marked for deletion) after *n* deletes. A setting of 0 indicates expunging only at the end of the session. Normally, an **expunge** occurs after each delete.

**-F**, **--flush**

For POP3 and IMAP servers, remove previously retrieved messages from the server before retrieving new ones.

**-f** *file*, **--fetchmailrc** *file*

Specify a nondefault name for the **fetchmail** configuration file.

**-I** *specification*, **--interface** *specification*

Require that the mail server machine is up and running at a specified IP address (or range) before polling. The *specification* is given as *interface/ipaddress/mask*. The first part indicates the type of TCP connection expected (*sl0*, *ppp0*, etc.), the second is the IP address, and the third is the bit mask for the IP, assumed to be 255.255.255.255.

**-K**, **--nokeep**

Delete all retrieved messages from the mail server.

**-k**, **--keep**

Keep copies of all retrieved messages on the mail server.

**-l** *size*, **--limit** *size*

Set the maximum message size that will be retrieved from a server. Messages larger than this size will be left on the server and marked unread.

**-M** *interface*, **--monitor** *interface*

In daemon mode, monitor the specified TCP/IP *interface* for any activity besides itself, and skip the poll if there is no other activity. Useful for PPP connections that automatically time out with no activity.

**-m** *command*, **--mda** *command*

Pass mail directly to mail delivery agent, rather than send to port 25. The *command* is the path and options for the mailer, such as */usr/lib/sendmail -oem*. A %T in the command will be replaced with

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the local delivery address, and an **%F** will be replaced with the message's **From** address.

**-n, --norewrite**

Do not expand local mail IDs to full addresses. This option will disable expected addressing and should only be used to find problems.

**-P n, --port n**

Specify a port to connect to on the mail server. The default port numbers for supported protocols are usually sufficient.

**-p proto, --protocol proto**

Specify the protocol to use when polling a mail server. *proto* can be:

**POP2**

Post Office Protocol 2.

**POP3**

Post Office Protocol 3.

**APOP**

POP3 with MD5 authentication.

**RPOP**

POP3 with RPOP authentication.

**KPOP**

POP3 with Kerberos v4 authentication on port 1109.

**IMAP**

IMAP2bis, IMAP4, or IMAP4rev1. **fetchmail** autodetects their capabilities.

**IMAP-K4**

IMAP4 or IMAP4rev1 with Kerberos v4 authentication.

**IMAP-GSS**

IMAP4 or IMAP4rev1 with GSSAPI authentication.

**ETRN**

ESMTP.

**-Q string, --qvirtual string**

Remove the prefix *string*, which is the local user's hostid, from the address in the envelope header (such as "Delivered-To:").

**-r** *folder*, **--folder** *folder*

Retrieve the specified mail *folder* from the mail server.

**-s**, **--silent**

Suppress status messages during a **fetch**.

**-U**, **--uidl**

For POP3, track the age of kept messages via unique ID listing.

**-u** *name*, **--username** *name*

Specify the user *name* to use when logging into the mail server.

**-V**, **--version**

Print the version information for **fetchmail** and display the options set for each mail server. Performs no **fetch**.

**-v**, **--verbose**

Display all status messages during a **fetch**.

**-Z** *nnn*, **--antispam** *nnn*

Specify the SMTP error *nnn* to signal a spam block from the client. If *nnn* is -1, this option is disabled.

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**fgrep** [*options*] *pattern* [*files*]

Search one or more *files* for lines that match a literal text string *pattern*. Exit status is 0 if any lines match, 1 if not, and 2 for errors.

See **grep** for the list of available options. Also see **egrep**.

### Examples

Print lines in *file* that don't contain any spaces:

```
fgrep -v ' ' file
```

Print lines in *file* that contain the words in **spell\_list**:

```
fgrep -f spell_list file
```

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### file [options] files

Classify the named *files* according to the type of data they contain. **file** checks the magic file (usually */usr/share/magic*) to identify some file types.

#### Options

##### **-b**

Brief mode; do not prepend filenames to output lines.

##### **-c**

Check the format of the magic file (*files* argument is invalid with **-c**). Usually used with **-m**.

##### **-f file**

Read the names of files to be checked from *file*.

##### **-L**

Follow symbolic links. By default, symbolic links are not followed.

##### **-m file**

Search for file types in *file* instead of */usr/share/magic*.

##### **-n**

Flush standard output after checking a file.

##### **-s**

Check files that are block or character special files in addition to checking ordinary files.

##### **-v**

Print the version.

**-z**

Attempt checking of compressed files.

Many file types are understood. Output lists each filename, followed by a brief classification such as:

```
ascii text
c program text
c-shell commands
data
empty
iAPX 386 executable
directory
[nt]roff, tbl, or eqn input text
shell commands
symbolic link to ../usr/etc/arp
```

### Example

List all files that are deemed to be troff/nroff input:

```
file * | grep roff
```

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**find** [*pathnames*] [*conditions*]

An extremely useful command for finding particular groups of files (numerous examples follow this description). **find** descends the directory tree beginning at each *pathname* and locates files that meet the specified *conditions*. The default pathname is the current directory. The most useful conditions include **-print** (which is the default if no other expression is given), **-name** and **-type** (for general use), **-exec** and **-size** (for advanced users), and **-mtime** and **-user** (for administrators).

Conditions may be grouped by enclosing them in `\( \)` (escaped parentheses), negated with **!** (use `!\` in the C shell), given as alternatives by separating them with **-o**, or repeated (adding restrictions to the match; usually only for **-name**, **-type**, **-perm**). Modification refers to editing of a file's contents. Change refers to modification, permission or ownership changes, and so on; therefore, for example, **-ctime** is more inclusive than **-atime** or **-mtime**.

### Conditions and actions

**-atime** *+n* | *-n* | *n*

Find files that were last accessed more than *n* (*+n*), less than *n* (*-n*), or exactly *n* days ago. Note that **find** changes the access time of directories supplied as *pathnames*.

**-ctime** *+n* | *-n* | *n*

Find files that were changed more than *n* (*+n*), less than *n* (*-n*), or exactly *n* days ago. A change is anything that changes the directory entry for the file, such as a **chmod**.

**-depth**

Descend the directory tree, skipping directories and working on actual files first (and *then* the parent directories). Useful when files reside in unwritable directories (e.g., when using **find** with **cpio**).

**-exec** *command* { } \;

Run the Linux *command*, from the starting directory on each file

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matched by **find** (provided *command* executes successfully on that file; i.e., returns a 0 exit status). When *command* runs, the argument { } substitutes the current file. Follow the entire sequence with an escaped semicolon (;).

**-follow**

Follow symbolic links and track the directories visited (don't use this with **-type l**).

**-group gname**

Find files belonging to group *gname*. *gname* can be a group name or a group ID number.

**-inum n**

Find files whose inode number is *n*.

**-links n**

Find files having *n* links.

**-mount, -xdev**

Search for files that reside only on the same filesystem as *pathname*.

**-mtime +n | -n | n**

Find files that were last modified more than *n* (+*n*), less than *n* (-*n*), or exactly *n* days ago. A modification is a change to a file's data.

**-name pattern**

Find files whose names match *pattern*. Filename metacharacters may be used but should be escaped or quoted.

**-newer file**

Find files that have been modified more recently than *file*; similar to **-mtime**. Affected by **-follow** only if it occurs after **-follow** on the command line.

**-ok command { };**

Same as **-exec** but prompts user to respond with **y** before *command* is executed.

**-perm nnn**

Find files whose permission flags (e.g., **rwx**) match octal number *nnn* exactly (e.g., 664 matches **-rw-rw-r--**). Use a minus sign before *nnn* to make a "wildcard" match of any unspecified octal digit (e.g., **-perm -600** matches **-rw-\*\*\*\*\***, where \* can be any mode).

**-print**

Print the matching files and directories, using their full pathnames. Return true.

[XML](#)

### **-regex** *pattern*

Like **-path** but uses **grep**-style regular expressions instead of the shell-like globbing used in **-name** and **-path**.

### **-size** *n[c]*

Find files containing *n* blocks, or if **c** is specified, *n* characters long.

### **-type** *c*

Find files whose type is *c*. *c* can be **b** (block special file), **c** (character special file), **d** (directory), **p** (fifo or named pipe), **l** (symbolic link), **s** (socket), or **f** (plain file).

### **-user** *user*

Find files belonging to *user* (name or ID).

### **-daystart**

Calculate times from the start of the day today, not 24 hours ago.

### **-maxdepth** *num*

Do not descend more than *num* levels of directories.

### **-mindepth** *num*

Begin applying tests and actions only at levels deeper than *num* levels.

### **-noleaf**

Normally, **find** assumes that each directory has at least two hard links that should be ignored (a hard link for its name and one for "."; i.e., two fewer "real" directories than its hard link count indicates). **-noleaf** turns off this assumption, a useful practice when **find** runs on non-Unix-style filesystems. This forces **find** to examine all entries, assuming that some might prove to be directories into which it must descend (a time-waster on Unix).

### **-amin** *+n | -n | n*

Find files last accessed more than *n* (*+n*), less than *n* (*-n*), or exactly *n* minutes ago.

### **-anewer** *file*

Find files that were accessed after *file* was last modified. Affected by **-follow** when after **-follow** on the command line.

### **-cmin** *+n | -n | n*

Find files last changed more than *n* (*+n*), less than *n* (*-n*), or exactly *n* minutes ago.

### **-cnewer** *file*

Find files that were changed after they were last modified. Affected by **-follow** when after **-follow** on the command line.

**-empty**

Continue if file is empty. Applies to regular files and directories.

**-false**

Return false value for each file encountered.

**-fstype *type***

Match files only on *type* filesystems. Acceptable types include **minix**, **ext**, **ext2**, **xia**, **msdos**, **umsdos**, **vfat**, **proc**, **nfs**, **iso9660**, **hpfs**, **sysv**, **smb**, and **ncpfs**.

**-gid *num***

Find files with numeric group ID of *num*.

**-iname *pattern***

A case-insensitive version of **-lname**.

**-iname *pattern***

A case-insensitive version of **-name**.

**-ipath *pattern***

A case-insensitive version of **-path**.

**-iregex *pattern***

A case-insensitive version of **-regex**.

**-lname *pattern***

Search for files that are symbolic links, pointing to files named *pattern*. *pattern* can include shell metacharacters and does not treat / or . specially. The match is case-insensitive.

**-mmin *+n* | *-n* | *n***

Find files last modified more than *n* (*+n*), less than *n* (*-n*), or exactly *n* minutes ago.

**-nouser**

The file's user ID does not correspond to any user.

**-nogroup**

The file's group ID does not correspond to any group.

**-path *pattern***

Find files whose names match *pattern*. Expect full pathnames relative to the starting pathname (i.e., do not treat / or . specially).

**Examples**

List all files (and subdirectories) in your home directory:

```
find $HOME -print
```

List all files named *chapter1* in the */work* directory:

```
find /work -name chapter1 -print
```

List all files beginning with *memo* owned by *ann*:

```
find /work -name 'memo*' -user ann -print
```

Search the filesystem (begin at root) for manpage directories:

```
find / -type d -name 'man*' -print
```

Search the current directory, look for filenames that *don't* begin with a capital letter, and send them to the printer:

```
find . \! -name '[A-Z]*' -exec lpr \;
```

Find and compress files whose names *don't* end with *.gz*:

```
gzip \find . \! -name '*.gz' -print\
```

Remove all empty files on the system (prompting first):

```
find / -size 0 -ok rm \;
```

Search the system for files that were modified within the last two days (good candidates for backing up):

```
find / -mtime -2 -print
```

Recursively **grep** for a pattern down a directory tree:

```
find /book -print | xargs grep '[Nn]utshell'
```

If the files *kt1* and *kt2* exist in the current directory, their names can be printed with the command:

```
$ find . -name 'kt[0-9]'
./kt1
./kt2
```

Since the command prints these names with an initial *./* path, you need to specify the *./* when using the **-path** option:

```
$ find . -path './kt[0-9]'
./kt1
./kt2
```

The **-regex** option uses a complete pathname, like **-path**, but treats the following argument as a regular expression rather than a glob pattern (although in this case the result is the same):

```
$ find . -regex './kt[0-9]'
./kt1
./kt2
```

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### finger [options] users

Display data about one or more *users*, including information listed in the files *.plan* and *.project* in each *user's* home directory. You can specify each *user* either as a login name (exact match) or as a first or last name (display information on all matching names). Networked environments recognize arguments of the form *user@host* and *@host*.

### Options

#### -l

Force long format (default): everything included by the **-s** option and home directory, home phone, login shell, mail status, *.plan*, *.project*, and *.forward*.

#### -m

Suppress matching of users' "real" names.

#### -p

Omit *.plan* and *.project* files from display.

#### -s

Show short format: login name, real name, terminal name, write status, idle time, office location, and office phone number.

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### **in.fingerd** [*option*]

TCP/IP command. Remote user information server. **fingerd** provides a network interface to the **finger** program. It listens for TCP connections on the **finger** port and, for each connection, reads a single input line, passes the line to **finger**, and copies the output of **finger** to the user on the client machine. **fingerd** is started by **inetd** and must have an entry in **inetd**'s configuration file, */etc/inetd.conf*.

### Option

**-w**

Include additional information, such as uptime and the name of the operating system.

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**flex** [*options*] [*file*]

**flex** (Fast Lexical Analyzer Generator) is a faster variant of **lex**. It generates a lexical analysis program (named *lex.yy.c*) based on the regular expressions and C statements contained in one or more input *files*. See also **bison**, **yacc**, and the O'Reilly book *lex & yacc* by John Levine, Tony Mason, and Doug Brown.

### Options

- b**  
Generate backup information to *lex.backup*.
- d**  
Debug mode.
- f**  
Use faster compilation (limited to small programs).
- h**  
Help summary.
- i**  
Scan case-insensitively.
- l**  
Maximum **lex** compatibility.
- o file**  
Write output to *file* instead of *lex.yy.c*.
- p**

Print performance report.

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**-s**

Exit if the scanner encounters input that does not match any of its rules.

**-t**

Print to standard out. (By default, **flex** prints to *lex.yy.c*.)

**-v**

Print a summary of statistics.

**-w**

Suppress warning messages.

**-B**

Generate batch (noninteractive) scanner.

**-F**

Use the fast scanner table representation.

**-I**

Generate an interactive scanner (default).

**-L**

Suppress **#line** directives in *lex.yy.c*.

**-P prefix**

Change default **yy** prefix to *prefix* for all globally visible variable and function names.

**-V**

Print version number.

**-7**

Generate a 7-bit scanner.

**-8**

Generate an 8-bit scanner (default).

**-+**

Generate a C++ scanner class.

**-C**

Compress scanner tables but do not use equivalence classes.

[XML](#)

**-Ca**

Align tables for memory access and computation. This creates larger tables but gives faster performance.

**-Ce**

Construct equivalence classes. This creates smaller tables and sacrifices little performance (default).

**-Cf**

Generate full scanner tables, not compressed.

**-CF**

Generate faster scanner tables, like **-F**.

**-Cm**

Construct metaequivalence classes (default).

**-Cr**

Bypass use of the standard I/O library. Instead use **read()** system calls.

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**fmt** [*options*] [*files*]

Convert text to specified width by filling lines and removing newlines. Concatenate files on the command line, or read text from standard input if - (or no file) is specified. By default, preserve blank lines, spacing, and indentation. **fmt** attempts to break lines at the end of sentences and to avoid breaking lines after a sentence's first word or before its last.

### Options

**-c, --crown-margin**

Crown margin mode. Do not change each paragraph's first two lines' indentation. Use the second line's indentation as the default for subsequent lines.

**-p prefix, --prefix=prefix**

Format only lines beginning with *prefix*.

**-s, --split-only**

Suppress line-joining.

**-t, --tagged-paragraph**

Tagged paragraph mode. Same as crown mode when the indentation of the first and second lines differs. If the indentation is the same, treat the first line as its own separate paragraph.

**-u, --uniform-spacing**

Print exactly one space between words and two between sentences.

**-w width, --width=width**

Set output width to *width*. The default is 75.

**--help**

Print help message and then exit.

**--version**

Print version information and then exit.

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### fold [option] [files]

Break the lines of the named *files* so that they are no wider than the specified width (default is 80). **fold** breaks lines exactly at the specified width, even in the middle of a word. Reads from standard input when given - as a file.

#### Options

##### **-b, --bytes**

Count bytes, not columns (i.e., consider tabs, backspaces, and carriage returns to be one column).

##### **-s, --spaces**

Break at spaces only, if possible.

##### **-w, --width width**

Set the maximum line width to *width*. Default is 80.

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### formail [*options*]

Filter standard input into mailbox format. If no sender is apparent, provide the sender *foo@bar*. By default, escape bogus **From** lines with >.

#### Options

##### +*skip*

Do not split first *skip* messages.

##### -*total*

Stop after splitting *total* messages.

##### -**a** *headerfield*

Append *headerfield* to header, unless it already exists. If *headerfield* is **Message-ID** or **Resent-Message-ID** with no contents, generate a unique message ID.

##### -**b**

Do not escape bogus **From** lines.

##### -**c**

When header fields are more than one line long, concatenate the lines.

##### -**d**

Do not assume that input must be in strict mailbox format.

##### -**e**

Allow messages to begin one immediately after the other; do not require empty space between them.

##### -**f**

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Do not edit non-mailbox-format lines. By default, formail prepends **From** to such lines.

**-i** *headerfield*

Append *headerfield* whether or not it already exists. Rename each existing *headerfield* to **Old-*headerfield***, unless they are empty.

**-k**

For use only with **-r**. Keep the body as well as the fields specified by **-r**.

**-m** *minfields*

Require at least *minfields* before recognizing the beginning of a new message. Default is 2.

**-n**

Allow simultaneous **formail** processes to run.

**-p** *prefix*

Escape lines with *prefix* instead of >.

**-q**

Do not display write errors, duplicate messages, and mismatched **Content-Length** fields. This is the default; use **-q-** to turn it off.

**-r**

Throw away all existing fields, retaining only **X-Loop**, and generate autoreply header instead. You can preserve particular fields with the **-i** option.

**-s**

Must be the last option; everything following it will be assumed to be its arguments. Divide input to separate mail messages, and pipe them to the program specified or concatenate them to standard output (by default).

**-t**

Assume sender's return address to be valid. (By default, **formail** favors machine-generated addresses.)

**-u** *headerfield*

Delete all but the first occurrence of *headerfield*.

**-x** *headerfield*

Display the contents of *headerfield* on a single line.

**-z**

When necessary, add a space between field names and contents. Remove ("zap") empty fields.



[XML](#)

**-A** *headerfield*

Append *headerfield* whether or not it already exists.

**-B**

Assume that input is in BABYL **rmail** format.

**-D** *maxlen idcache*

Remember old message IDs (in *idcache*, which will grow no larger than approximately *maxlen*). When splitting, refuse to output duplicate messages. Otherwise, return true on discovering a duplicate. With **-r**, look at the sender's mail address instead of the message ID.

**-I** *headerfield*

Append *headerfield* whether or not it already exists. Remove existing fields.

**-R** *oldfield newfield*

Change all fields named *oldfield* to *newfield*.

**-U** *headerfield*

Delete all but the last occurrence of *headerfield*.

**-Y**

Format in traditional Berkeley style (i.e., ignore **Content-Length** fields).

**-X** *headerfield*

Display the field name and contents of *headerfield* on a single line.

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Display statistics about memory usage: total free, used, physical, swap, shared, and buffers used by the kernel.

**Options****-b**

Calculate memory in bytes.

**-k**

Default. Calculate memory in kilobytes.

**-m**

Calculate memory in megabytes.

**-o**Do not display "buffer adjusted" line. The **-o** switch disables the display "-/+ buffers" line.**-s** *time*Check memory usage every *time* seconds.**-t**

Display all totals on one line at the bottom of output.

**-V**

Display version information.

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System administration command. Call the filesystem checker for the appropriate system type, to check and repair filesystems. If a filesystem is consistent, the number of files, number of blocks used, and number of blocks free are reported. If a filesystem is inconsistent, **fsck** prompts before each correction is attempted. **fsck**'s exit code can be interpreted as the sum of all of those conditions that apply:

**1**

Errors were found and corrected.

**2**

Reboot suggested.

**4**

Errors were found but not corrected.

**8****fsck** encountered an operational error.**16****fsck** was called incorrectly.**128**

A shared library error was detected.

**Options****--**

Pass all subsequent options to filesystem-specific checker. All options that **fsck** doesn't recognize will also be passed.

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**-r**

Interactive mode; prompt before making any repairs.

**-s**

Serial mode.

**-t** *fstype*

Specify the filesystem type. Do not check filesystems of any other type.

**-A**

Check all filesystems listed in */etc/fstab*.

**-N**

Suppress normal execution; just display what would be done.

**-R**

Meaningful only with **-A**: check all filesystems listed in */etc/fstab* except the root filesystem.

**-T**

Suppress printing of title.

**-V**

Verbose mode.

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### fsck.minix [options] device

System administration command. Similar to **fsck**, but specifically intended for Linux MINIX filesystems.

#### Options

- a**  
Automatic mode; repair without prompting.
- f**  
Force checking, even if kernel has already marked the filesystem. **fsck.minix** will normally exit without checking if the system appears to be clean.
- l**  
List filesystems.
- m**  
Enable MINIX-like "mode not cleared" warnings.
- r**  
Interactive mode; prompt before making any repairs.
- s**  
Display information about superblocks.
- v**  
Verbose mode.

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**ftp** [*options*] [*hostname*]

Transfer files to and from remote network site *hostname*. **ftp** prompts the user for a command. The commands are listed after the options. Some of the commands are toggles, meaning they turn on a feature when it is off and vice versa.

### Options

**-d**

Enable debugging.

**-g**

Disable filename globbing.

**-i**

Turn off interactive prompting.

**-n**

No autologin upon initial connection.

**-v**

Verbose. Show all responses from remote server.

### Commands

**![*command* [*args*]]**

Invoke an interactive shell on the local machine. If arguments are given, the first is taken as a command to execute directly, with the rest of the arguments as that command's arguments.

**\$ *macro-name* [*args*]**

Execute the macro *macro-name* that was defined with the **macdef** command. Arguments are passed to the macro unglobbed.

**account** [*passwd*]

Supply a supplemental password that will be required by a remote system for access to resources once a login has been successfully completed. If no argument is given, the user will be prompted for an account password in a nonechoing mode.

**append** *local-file* [*remote-file*]

Append a local file to a file on the remote machine. If *remote-file* is not given, the local filename is used after being altered by any **ntrans** or **nmap** setting. File transfer uses the current settings for *type*, *format*, *mode*, and *structure*.

**ascii**

Set the file transfer type to network ASCII (default).

**bell**

Sound a bell after each file transfer command is completed.

**binary**

Set file transfer type to support binary image transfer.

**bye**

Terminate FTP session and then exit **ftp**.

**case**

Toggle remote computer filename case mapping during **mget**. The default is off. When **case** is on, files on the remote machine with all-uppercase names will be copied to the local machine with all-lowercase names.

**cd** *remote-directory*

Change working directory on remote machine to *remote-directory*.

**cdup**

Change working directory of remote machine to its parent directory.

**chmod** [*mode*] [*remote-file*]

Change file permissions of *remote-file*. If options are omitted, the command prompts for them.

**close**

Terminate FTP session and return to command interpreter.

**cr**

Toggle carriage return stripping during ASCII-type file retrieval.

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**delete** *remote-file*

Delete file *remote-file* on remote machine.

**debug** [*debug-value*]

Toggle debugging mode. If *debug-value* is specified, it is used to set the debugging level.

**dir** [*remote-directory*] [*local-file*]

Print a listing of the contents in the directory *remote-directory*, and, optionally, place the output in *local-file*. If no directory is specified, the current working directory on the remote machine is used. If no local file is specified or - is given instead of the filename, output comes to the terminal.

**disconnect**

Synonym for **close**.

**form** *format*

Set the file transfer form to *format*. Default format is *file*.

**get** *remote-file* [*local-file*]

Retrieve the *remote-file* and store it on the local machine. If the local filename is not specified, it is given the same name it has on the remote machine, subject to alteration by the current **case**, **ntrans**, and **nmap** settings. If local file is -, output comes to the terminal.

**glob**

Toggle filename expansion for **mdelete**, **mget**, and **mput**. If globbing is turned off, the filename arguments are taken literally and not expanded.

**hash**

Toggle hash-sign (#) printing for each data block transferred.

**help** [*command*]

Print help information for *command*. With no argument, **ftp** prints a list of commands.

**idle** [*seconds*]

Get/set idle timer on remote machine. *seconds* specifies the length of the idle timer; if omitted, the current idle timer is displayed.

**image**

Same as **binary**.

**lcd** [*directory*]

Change working directory on local machine. If *directory* is not specified, the user's home directory is used.

**ls** [*remote-directory*] [*local-file*]

Print listing of contents of directory on remote machine, in a format chosen by the remote machine. If *remote-directory* is not specified, current working directory is used.

**macdef** *macro-name*

Define a macro. Subsequent lines are stored as the macro *macro-name*; a null line terminates macro input mode. When **\$i** is included in the macro, loop through arguments, substituting the current argument for **\$i** on each pass. Escape **\$** with **\**.

**mdelete** *remote-files*

Delete the *remote-files* on the remote machine.

**mdir** *remote-files local-file*

Like **dir**, except multiple remote files may be specified.

**mget** *remote-files*

Expand the wildcard expression *remote-files* on the remote machine and do a **get** for each filename thus produced.

**mkdir** *directory-name*

Make a directory on the remote machine.

**mls** *remote-files local-file*

Like **nlist**, except multiple remote files may be specified, and the local file must be specified.

**mode** [*mode-name*]

Set file transfer mode to *mode-name*. Default mode is stream mode.

**modtime** [*file-name*]

Show last modification time of the file on the remote machine.

**mput** [*local-files*]

Expand wildcards in *local-files* given as arguments and do a **put** for each file in the resulting list.

**newer** *remote-file* [*local-file*]

Get file if remote file is newer than local file.

**nlist** [*remote-directory*] [*local-file*]

Print list of files of a directory on the remote machine to *local-file* (or the screen if *local-file* is not specified). If *remote-directory* is unspecified, the current working directory is used.

**nmap** [*inpattern outpattern*]

Set or unset the filename mapping mechanism. The mapping follows the pattern set by *inpattern*, a template for incoming filenames, and *outpattern*, which determines the resulting mapped filename. The sequences **\$1** through **\$9** are treated as variables, for example, the *inpattern* **\$1.\$2**, along with the input file *readme.txt*, would set **\$1** to **readme** and **\$2** to **txt**. An *outpattern* of **\$1.data** would result in an output file of *readme.data*. **\$0** corresponds to the complete filename. [*string1*, *string2*] is replaced by *string1*, unless that string is null, in which case it's replaced by *string2*.

### **ntrans** [*inchars* [*outchars* ]]

Set or unset the filename character translation mechanism. Characters in a filename matching a character in *inchars* are replaced with the corresponding character in *outchars*. If no arguments are specified, the filename mapping mechanism is unset. If arguments are specified:

- Characters in remote filenames are translated during **mput** and **put** commands issued without a specified remote target filename.
- Characters in local filenames are translated during **mget** and **get** commands issued without a specified local target filename.

### **open** *host* [*port*]

Establish a connection to the specified *host* FTP server. An optional *port* number may be supplied, in which case **ftp** will attempt to contact an FTP server at that port.

### **prompt**

Toggle interactive prompting.

### **proxy** *ftp-command*

Execute an FTP command on a secondary control connection (i.e., send commands to two separate remote hosts simultaneously).

### **put** *local-file* [*remote-file*]

Store a local file on the remote machine. If *remote-file* is left unspecified, the local filename is used after processing according to any **ntrans** or **nmap** settings in naming the remote file. File transfer uses the current settings for *type*, *file*, *structure*, and *transfer mode*.

### **pwd**

Print name of the current working directory on the remote machine.

### **quit**

Synonym for **bye**.

### **quote** *arg1* *arg2*...

Send the arguments specified, verbatim, to the remote FTP server.

### **recv** *remote-file* [*local-file*]

Synonym for **get**.

**reget** *remote-file* [*local-file*]

Retrieve a file (like **get**), but restart at the end of *local-file*. Useful for restarting a dropped transfer.

**remotehelp** [*command-name*]

Request help from the remote FTP server. If *command-name* is specified, remote help for that command is returned.

**remotestatus** [*filename*]

Show status of the remote machine, or, if *filename* is specified, *filename* on remote machine.

**rename** [*from*] [*to*]

Rename file *from* on remote machine to *to*.

**reset**

Clear reply queue.

**restart** *marker*

Restart the transfer of a file from a particular byte count.

**rmdir** [*directory-name*]

Delete a directory on the remote machine.

**runique**

Toggle storing of files on the local system with unique filenames. When this option is on, rename files as **.1** or **.2**, and soon, as appropriate, to preserve unique filenames, and report each such action. Default value is off.

**send** *local-file* [*remote-file*]

Synonym for **put**.

**sendport**

Toggle the use of PORT commands.

**site** [*command*]

Get/set site-specific information from/on remote machine.

**size** *filename*

Return size of *filename* on remote machine.

**status**

Show current status of **ftp**.

**struct** [*struct-name*]



Set the file transfer structure to *struct-name*. By default, **stream** structure is used.

### **sunique**

Toggle storing of files on remote machine under unique filenames.

### **system**

Show type of operating system running on remote machine.

### **tenex**

Set file transfer type to that needed to talk to TENEX machines.

### **trace**

Toggle packet tracing.

### **type** [*type-name*]

Set file transfer **type** to *type-name*. If no type is specified, the current type is printed. The default type is network ASCII.

### **umask** [*mask*]

Set user file-creation mode mask on the remote site. If mask is omitted, the current value of the mask is printed.

### **user** *username* [*password*] [*account*]

Identify yourself to the remote FTP server. **ftp** will prompt the user for the password, if not specified and the server requires it, and the account field.

### **verbose**

Toggle verbose mode.

### **?** [*command*]

Same as **help**.

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### in.ftpd [options]

TCP/IP command. Internet File Transfer Protocol server. The server uses the TCP protocol and listens at the port specified in the **ftpd** service specification. **ftpd** is started by **inetd** and must have an entry in **inetd**'s configuration file, */etc/inetd.conf*.

#### Options

**-d**

Write debugging information to the syslog.

**-l**

Log each FTP session in the syslog.

**-Tmaxtimeout**

Set maximum timeout period in seconds. Default limit is 15 minutes.

**-timeout**

Set timeout period to *timeout* seconds.

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**fuser** [*options*] [*files* | *filesystems*]

Identify processes that are using a file or filesystem. **fuser** outputs the process IDs of the processes that are using the *files* or local *filesystems*. Each process ID is followed by a letter code: **c** if process is using file as current directory, **e** if executable, **f** if an open file, **m** if a shared library, and **r** if the root directory. Any user with permission to read */dev/kmem* and */dev/mem* can use **fuser**, but only a privileged user can terminate another user's process. **fuser** does not work on remote (NFS) files.

If more than one group of files is specified, the options may be respecified for each additional group of files. A lone dash (-) cancels the options currently in force, and the new set of options applies to the next group of files.

### Options

-

Return all options to defaults.

*-signal*Send *signal* instead of SIGKILL.**-a**

Display information on all specified files, even if they are not being accessed by any processes.

**-i**Request user confirmation to kill a process. Ignored if **-k** is not also specified.**-k**

Send SIGKILL signal to each process.

**-l**

List signal names.

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**-m**

Expect *files* to exist on a mounted filesystem; include all files accessing that filesystem.

**-s**

Silent.

**-u**

User login name, in parentheses, also follows process ID.

**-v**

Verbose.

**-V**

Display version information.

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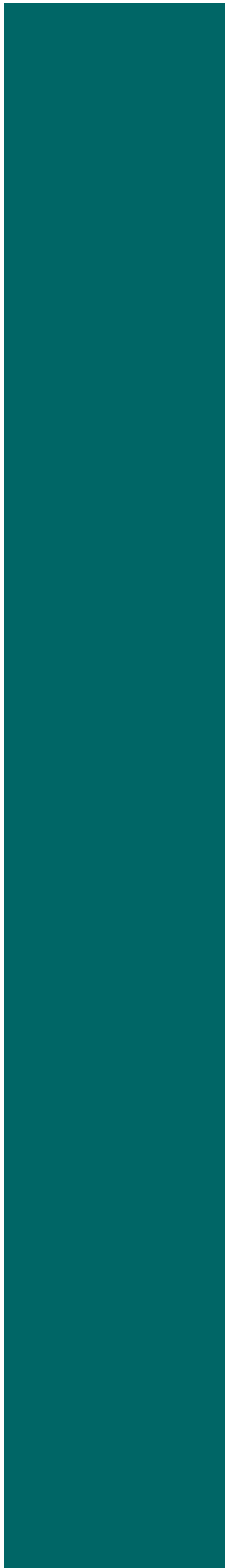
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### g++ [options] files

Invoke **gcc** with the options necessary to make it recognize C++. **g++** recognizes all the file extensions **gcc** does, in addition to C++ source files (.C, .cc, or .cxx files) and C++ preprocessed files (.ii files). See also **gcc**.

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### halt [options]

System administration command. Insert a note in the file `/var/log/wtmp`; if the system is in runlevel 0 or 6, stop all processes; otherwise, call **shutdown -nf**.

#### Options

##### -d

Suppress writing to `/var/log/wtmp`.

##### -f

Call **halt** even when **shutdown -nf** would normally be called (i.e., force a call to **halt**, even when not in runlevel 0 or 6).

##### -n

Suppress normal call to **sync**.

##### -w

Suppress normal execution; simply write to `/var/log/wtmp`.

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### head *[options] [files]*

Print the first few lines (default is 10) of one or more *files*. If *files* is missing or -, read from standard input. With more than one file, print a header for each file.

#### Options

##### **-c num[bkm], --bytes num**

Print first *num* bytes or, if *num* is followed by **b**, **k**, or **m**, first *num* 512-byte blocks, 1-kilobyte blocks, or 1-megabyte blocks.

##### **--help**

Display help and then exit.

##### **-n num, --lines num, -num**

Print first *num* lines. Default is 10.

##### **-q, --quiet, --silent**

Quiet mode; never print headers giving filenames.

##### **-v, --verbose**

Print filename headers, even for only one file.

##### **--version**

Output version information and then exit.

#### Examples

Display the first 20 lines of **phone\_list**:

```
head -20 phone_list
```

Display the first 10 phone numbers having a 202 area code:

```
grep '(202)' phone_list | head
```

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System administration command. Print information about specified hosts or zones in DNS. Hosts may be IP addresses or hostnames; **host** converts IP addresses to hostnames by default and appends the local domain to hosts without a trailing dot. Default servers are determined in */etc/resolv.conf*. For more information about hosts and zones, try Chapters 1 and 2 of *DNS and BIND* by Paul Albitz and Cricket Liu, published by O'Reilly & Associates.

## Options

**-a**Same as **-t ANY**.**-c class**

Search for specified resource record class (IN, INTERNET, CS, CSNET, CH, CHAOS, HS, HESIOD, ANY, or \*). Default is IN.

**-d**Debugging mode. **-dd** is a more verbose version.**-e**

Do not print information about domains outside of specified zone. For hostname queries, do not print "additional information" or "authoritative nameserver."

**-f file**Output to *file* as well as standard out.**-i**Given an IP address, return the corresponding *in-addr.arpa* address,

class (always PTR), and hostname.

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**-l zone**

List all machines in *zone*.

**-m**

Print only MR, MG, and MB records; recursively expand MR (renamed mail box) and MG (mail group) records to MB (mail box) records.

**-o**

Do not print output to standard out.

**-p [server]**

For use with **-l**. Query only the zone's primary nameserver (or *server*) for zone transfers, instead of those authoritative servers that respond. Useful for testing unregistered zones.

**-q**

Quiet. Suppress warning, but not error, messages.

**-r**

Do not ask contacted server to query other servers, but require only the information that it has cached.

**-t type**

Look for *type* entries in the resource record. *type* may be A, NS, PTR, ANY, or \* (all).

**-u**

Use TCP, not UDP.

**-v**

Verbose. Include all fields from resource record, even time-to-live and class, as well as "additional information" and "authoritative nameservers" (provided by the remote nameserver).

**-vv**

Very verbose. Include information about *host's* defaults.

**-w**

Never give up on queried server.

**-x**

Allow multiple hosts or zones to be specified. If a server is also specified, the argument must be preceded by **-X**.

**-A**

[XML](#)

For hostnames, look up the associated IP address, and then reverse look up the hostname, to see if a match occurs. For IP addresses, look up the associated hostname, and determine whether the host recognizes that address as its own. For zones, check IP addresses for all hosts. Exit silently if no incongruities are discovered.

**-C**

Similar to **-I**, but also check to see if the zone's name servers are really authoritative. The zone's SOA (start of authority) records specify authoritative name servers (in NS fields). Those servers are queried; if they do not have SOA records, host reports a lame delegation. Other checks are made as well.

**-D**

Similar to **-H** but include the names of hosts with more than one address per defined name.

**-E**

Similar to **-H** but do not treat extra-zone hosts as errors. Extra-zone hosts are hosts in an undefined subdomain.

**-F file**

Redirect standard out to *file*, and print extra resource record output only on standard out.

**-G zone**

Similar to **-H** but include the names of gateway hosts.

**-H zone**

Print the number of unique hosts within *zone*. Do not include aliases. Also list all errors found (extra-zone names, duplicate hosts).

**-I chars**

Do not print warnings about domain names containing illegal characters *chars*, such as `_`.

**-L level**

For use with **-I**. List all delegated zones within this zone, up to *level* deep, recursively.

**-P servers**

For use with **-I**. *servers* should be a comma-separated list. Specify preferred hosts for secondary servers to use when copying over zone data. Highest priority is given to those servers that match the most domain components in a given part of *servers*.

**-R**

Treat non-fully-qualified hostnames as BIND does, searching each component of the local domain.

**-S**

For use with **-l**. Print all hosts within the zone to standard out. Do not print hosts within subzones. Include class and IP address. Print warning messages (illegal names, lame delegations, missing records, etc.) to standard error.

**-T**

Print time-to-live values (how long information about each host will remain cached before the nameserver refreshes it).

**-X** *server*

Specify a server to query, and allow multiple hosts or zones to be specified.

**-Z**

When printing resource records, include trailing dot in domain names, and print time-to-live value and class name.

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### hostid

Print the ID number in hexadecimal of the current host.

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**hostname** [*option*] [*nameofhost*]

Set or print name of current host system. A privileged user can set the hostname with the *nameofhost* argument.

### Option

**-a, --alias**

Display the alias name of the host (if used).

**-d, --domain**

Print DNS domain name.

**-f, --fqdn, --long**

Print fully qualified domain name.

**-F file, --file file**

Consult *file* for hostname.

**-h, --help**

Print a help message and then exit.

**-i, --ip-address**

Display the IP address(es) of the host.

**-s, --short**

Trim domain information from the printed name.

**-v, --verbose**

Verbose mode.



**-V, --version**

Print version information and then exit.

**-y, --yp, --nis**

Display the NIS domain name. A privileged user can set a new NIS domain name with *nameofhost*.

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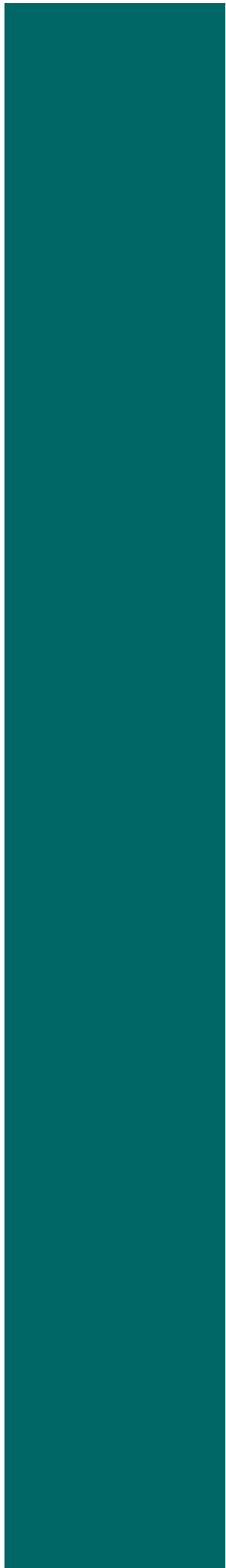
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### hwclock [options]

System administration command. Read or set the hardware clock. This command maintains change information in */etc/adjtime*, which can be used to adjust the clock based on how much it drifts over time. **hwclock** replaces the **clock** command. The single-letter options are included for compatibility with the older command.

### Options

You may specify only one of the following options:

#### -a

Adjust the hardware clock based on information in */etc/adjtime* and set the system clock to the new time.

#### --adjust

Adjust the hardware clock based on information in */etc/adjtime*.

#### --date *date*

Meaningful only with the **--set** option. *date* is a string appropriate for use with the **date** command.

#### --debug

Print information about what **hwclock** is doing.

#### -r, --show

Print the current time stored in the hardware clock.

#### -s, --hctosys

Set the system time in accordance with the hardware clock.

#### --set

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Set the hardware clock according to the time given in the **--date** parameter.

**--test**

Do not actually change anything. This is good for checking syntax.

**-u, --utc**

The hardware clock is stored in Universal Coordinated Time.

**--version**

Print version and exit.

**-w, --systohc**

Set the hardware clock in accordance with the system time.

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### icmpinfo [options]

TCP/IP command. Intercept and interpret ICMP packets. Print the address and name of the message's sender, the source port, the destination port, the sequence, and the packet size. By default, provide information only about packets that are behaving oddly.

#### Options

**-k**Kill the **syslogd** process begun by **-l**.**-l**Record via **syslogd**. Only a privileged user may use this option.**-n**

Use IP addresses instead of hostnames.

**-p**

Suppress decoding of port number: do not attempt to guess the name of the service that is listening at that port.

**-s**

Include IP address of interface that received the packet, in case there are several interfaces on the host machine.

**-v**Verbose. Include information about normal ICMP packets. You may also specify **-vv** and **-vvv** for extra verbosity.

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Display information about yourself or another user: user ID, group ID, effective user ID and group ID if relevant, and additional group IDs.

### Options

**-g, --group**

Print group ID only.

**-G, --groups**

Print supplementary groups only.

**-n, --name**

With **-u**, **-g**, or **-G**, print user or group name, not number.

**-r, --real**

With **-u**, **-g**, or **-G**, print real, not effective, user ID or group ID.

**-u, --user**

Print user ID only.

**--help**

Print help message and then exit.

**--version**

Print version information.

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**in.identd** [*options*] [*kernelfile* [*kmemfile*]]

TCP/IP command. Provide the name of the user whose process is running a specified TCP/IP connection. You may specify the kernel and its memory space.

### Options

**-a** *ip\_address*

Bind to *ip\_address*. Useful only with **-b**. By default, bind to the INADDR\_ANY address.

**-b**

Run standalone; not for use with **inetd**.

**-d**

Allow debugging requests.

**-gid**

Attempt to run in the group *gid*. Useful only with **-b**.

**-i**

Run as a daemon, one process per request.

**-l**

Log via **syslogd**.

**-m**

Allow multiple requests per session.

**-n**

Return user IDs instead of usernames.

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**-N**

Do not provide a user's name or user ID if the file *.noident* exists in the user's home directory.

**-o**

When queried for the type of operating system, always return OTHER.

**-pport**

Listen at *port* instead of the default, port 113.

**-tseconds**

Exit if no new requests have been received before *seconds* seconds have passed. Note that, with **-i** or **-w**, the next new request will result in **identd** being restarted. Default is infinity (never exit).

**-uuid**

Attempt to run as *uid*. Useful only with **-b**.

**-V**

Print version and exit.

**-w**

Run as a daemon, one process for all requests.

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### ifconfig [*interface*]

#### ifconfig [*interface address\_family parameters addresses*]

TCP/IP command. Assign an address to a network interface and/or configure network interface parameters. **ifconfig** is typically used at boot time to define the network address of each interface on a machine. It may be used at a later time to redefine an interface's address or other parameters. Without arguments, **ifconfig** displays the current configuration for a network interface. Used with a single *interface* argument, **ifconfig** displays that particular interface's current configuration.

#### Arguments

##### *interface*

String of the form *name unit*, for example, **en0**.

##### *address\_family*

Since an interface may receive transmissions in differing protocols, each of which may require separate naming schemes, you can specify the *address\_family* to change the interpretation of the remaining parameters. You may specify **inet** (the default; for TCP/IP), **ax25** (AX.25 Packet Radio), **ddp** (Appletalk Phase 2), or **ipx** (Novell).

##### *Parameters*

The following parameters may be set with **ifconfig**:

##### **allmulti/-allmulti**

Enable/disable sending of incoming frames to the kernel's network layer.

##### **arp/-arp**

Enable/disable use of the Address Resolution Protocol in mapping between network-level addresses and link-level addresses.

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**broadcast**

(**inet** only.) Specify address to use to represent broadcasts to the network. Default is the address with a host part of all 1s (i.e., x.y.z.255 for a class C network).

**debug/-debug**

Enable/disable driver-dependent debugging code.

**dest\_address**

Specify the address of the correspondent on the other end of a point-to-point link.

**down**

Mark an interface "down" (unresponsive).

**hw class address**

Set the interface's hardware class and address. *class* may be **ether** (Ethernet), **ax25** (AX.25 Packet Radio), or **ARCnet**.

**irq addr**

Set the device's interrupt line.

**metric n**

Set routing metric of the interface to *n*. Default is 0.

**mtu num**

Set the interface's Maximum Transfer Unit (MTU).

**multicast**

Set the multicast flag.

**netmask mask**

(**inet** only.) Specify how much of the address to reserve for subdividing networks into subnetworks. *mask* can be specified as a single hexadecimal number with a leading 0x, with a dot notation Internet address, or with a pseudonetwork name listed in the network table */etc/networks*.

**pointpoint/-pointpoint [address]**

Enable/disable point-to-point interfacing, so that the connection between the two machines is dedicated.

**up**

Mark an interface "up" (ready to send and receive).

**trailers/-trailers**



[XML](#)

Request/disable use of a "trailer" link-level encapsulation when sending.

*address*

Either a hostname present in the hostname database (*/etc/hosts*), or an Internet address expressed in the Internet standard dot notation.

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### imake options

C preprocessor (**cpp**) interface to the **make** utility. **imake** (for *include make*) solves the portability problem of **make** by allowing machine dependencies to be kept in a central set of configuration files, separate from the descriptions of the various items to be built. The targets are contained in the *Imakefile*, a machine-independent description of the targets to be built, written as **cpp** macros. **imake** uses **cpp** to process the configuration files and the *Imakefile*, and to generate machine-specific *Makefiles*, which can then be used by **make**.

One of the configuration files is a template file, a master file for **imake**. This template file (default is *Imake.tmpl*) **#includes** the other configuration files that contain machine dependencies such as variable assignments, site definitions, and **cpp** macros, and directs the order in which the files are processed. Each file affects the interpretation of later files and sections of *Imake.tmpl*. Comments may be included in **imake** configuration files, but the initial **#** needs to be preceded with an empty C comment:

```
/* */#
```

For more information, see **cpp** and **make**. Also check out the Nutshell Handbook *Software Portability with imake*, by Paul DuBois.

### Options

#### **-Ddefine**

Set directory-specific variables. This option is passed directly to **cpp**.

#### **-e**

Execute the generated *Makefile*. Default is to leave this to the user.

#### **-f filename**

Name of per-directory input file. Default is *Imakefile*.

#### **-Idirectory**

Directory in which **imake** template and configuration files may be

found. This option is passed directly to **cpp**.

### **-s filename**

Name of **make** description file to be generated. If *filename* is a `—`, the output is written to **stdout**. The default is to generate, but not execute, a *Makefile*.

### **-Ttemplate**

Name of master template file used by **cpp**. This file is usually located in the directory specified with the **-I** option. The default file is *Imake.tmpl*.

### **-v**

Print the **cpp** command line used to generate the *Makefile*.

## Tools

Following is a list of tools used with **imake**:

### **makedepend [options] files**

Create header file dependencies in *Makefiles*. **make-depend** reads the named input source *files* in sequence and parses them to process **#include**, **#define**, **#undef**, **#ifdef**, **#ifndef**, **#endif**, **#if**, and **#else** directives so it can tell which **#include** directives would be used in a compilation. **makedepend** determines the dependencies and writes them to the *Makefile*. **make** then knows which object files must be recompiled when a dependency has changed. **makedepend** has the following options:

### **-- options --**

Ignore any unrecognized options following a double hyphen. A second double hyphen terminates this action. Recognized options between the hyphens are processed normally.

### **-a**

Append dependencies to any existing ones instead of replacing existing ones.

### **-ffilename**

Write dependencies to *filename* instead of to *Makefile*.

### **-m**

Print a warning when encountering a multiple inclusion.

### **-sstring**

Use *string* as delimiter in file, instead of **# DO NOT DELETE THIS LINE — make depend depends on it**.

### **-v**

Verbose. List all files included by main source file.

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[XML](#)**-Dname**

Define *name* with the given value (first form) or with value 1 (second form).

**-Idir**

Add directory *dir* to the list of directories searched.

**-Ydir**

Search only *dir* for include files. Ignore standard include directories.

**mkdirhier dir...**

Create directory *dir* and all missing parent directories during file installation operations.

**xmkmf [option] [topdir] [curdir]**

Bootstrap a *Makefile* from an *Imakefile*. *topdir* specifies the location of the project root directory. *curdir* (usually omitted) is specified as a relative pathname from the top of the build tree to the current directory. The **-a** option is equivalent to the following command sequence:

```
% xmkmf
% make Makefiles
% make includes
% make depend
```

**Configuration files**

Following is a list of the **imake** configuration files:

*Imake.tpl*

Master template for **imake**. *Imake.tpl* includes all the other configuration files, plus the *Imakefile* in the current directory.

*Imake.params*

Contains definitions that apply across sites and vendors.

*Imake.rules*

Contains **cpp** macro definitions that are configured for the current platform. The macro definitions are fed into **imake**, which runs **cpp** to process the macros. Newlines (line continuations) are indicated by the string `@@\` (double at sign, backslash).

*site.def*

Contains site-specific (as opposed to vendor-specific) information, such as installation directories, what set of programs to build, and any special versions of programs to use during the build. The *site.def* file changes from machine to machine.

*Project.tpl*

File containing X-specific variables.

### *Library.tpl*

File containing library rules.

### *Server.tpl*

File containing server-specific rules.

### *.cf*

The *.cf* files are the vendor-specific *VendorFiles* that live in *Imake.vb*. A *.cf* file contains platform-specific definitions, such as version numbers of the operating system and the compiler and workarounds for missing commands. The definitions in *.cf* files override the defaults, defined in *Imake.params*.

## The Imakefile

The *Imakefile* is a per-directory file that indicates targets to be built and installed and rules to be applied. **imake** reads the *Imakefile* and expands the rules into *Makefile* target entries. An *Imakefile* may also include definitions of **make** variables and list the dependencies of the targets. The dependencies are expressed as **cpp** macros, defined in *Imake.rules*. Whenever you change an *Imakefile*, you need to rebuild the *Makefile* and regenerate header file dependencies. For more information on **imake**, see *Software Portability with imake* by Paul DuBois.

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### imapd

TCP/IP command. The Interactive Mail Access Protocol (IMAP) server daemon. **imapd** is invoked by **inetd** and listens on port 143 for requests from IMAP clients. IMAP allows mail programs to access remote mailboxes as if they were local. IMAP is a richer protocol than POP because it allows a client to retrieve message-level information from a server mailbox instead of the entire mailbox. IMAP can be used for online and offline reading. The popular Pine mail client contains support for IMAP.

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### inetd [*option*] [*configuration\_file*]

TCP/IP command. Internet services daemon. **inetd** listens on multiple ports for incoming connection requests. When it receives one, it spawns the appropriate server. When started, **inetd** reads its configuration information from either *configuration\_file*, or from the default configuration file */etc/inetd.conf*. It then issues a call to **getservbyname**, creates a socket for each server, and binds each socket to the port for that server. It does a **listen** on all connection-based sockets, then waits, using **select** for a connection or datagram.

When a connection request is received on a listening socket, **inetd** does an **accept**, creating a new socket. It then forks, dups, and execs the appropriate server. The invoked server has I/O to **stdin**, **stdout**, and **stderr** done to the new socket, connecting the server to the client process.

When there is data waiting on a datagram socket, **inetd** forks, dups, and execs the appropriate server, passing it any server program arguments. A datagram server has I/O to **stdin**, **stdout**, and **stderr** done to the original socket. If the datagram socket is marked as **wait**, the invoked server must process the message before **inetd** considers the socket available for new connections. If the socket is marked **nowait**, **inetd** continues to process incoming messages on that port.

The following servers may be started by **inetd**: **bootpd**, **bootpgw**, **fingerd**, **ftpd**, **imapd**, **popd**, **rexecd**, **rlogind**, **rshd**, **talkd**, **telnetd**, and **tftpd**. Do not arrange for **inetd** to start **named**, **routed**, **rwhod**, **sendmail**, **listen**, or any NFS server.

**inetd** rereads its configuration file when it receives a hangup signal, SIGHUP. Services may be added, deleted, or modified when the configuration file is reread.

### Option

#### -d

Turn on socket-level debugging and print debugging information to stdout.

### Files

*/etc/inetd.conf*

Default configuration file.

*/var/run/inetd.pid*

inetd's process ID.

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### info [options] [topics]

GNU hypertext reader: display online documentation previously built from Texinfo input. Info files are arranged in a hierarchy and can contain menus for subtopics. When entered without options, the command displays the top-level info file (usually `/usr/local/info/dir`). When *topics* are specified, find a subtopic by choosing the first *topic* from the menu in the top-level info file, the next *topic* from the new menu specified by the first *topic*, and so on. The initial display can also be controlled by the `-f` and `-n` options.

### Options

**-d** *directories*, **--directory** *directories*

Search *directories*, a colon-separated list, for info files. If this option is not specified, use the INFOPATH environment variable or the default directory (usually `/usr/local/info`).

**--dribble** *file*

Store each keystroke in *file*, which can be used in a future session with the **--restore** option to return to this place in **info**.

**-f** *file*, **--file** *file*

Display specified info file.

**-n** *node*, **--node** *node*

Display specified node in the info file.

**-o** *file*, **--output** *file*

Copy output to *file* instead of displaying it at the screen.

**--help**

Display brief help.

**--restore *file***

When starting, execute keystrokes in *file*.

**--subnodes**

Display subtopics.

**--version**

Display version.

**--vi-keys**

Use **vi**-like key bindings.

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**init** [*option*] [*runlevel*]

System administration command.

### Option

**-t** *seconds*

When changing runlevels, send SIGKILL *seconds* after SIGTERM. Default is 20.

### Files

**init** is the first process run by any Unix machine at boot time. It verifies the integrity of all filesystems and then creates other processes, using **fork** and **exec**, as specified by */etc/inittab*. Which processes may be run are controlled by *runlevel*. All process terminations are recorded in */var/run/utmp* and */var/log/wtmp*. When the runlevel changes, **init** sends SIGTERM and then, after 20 seconds, SIGKILL to all processes that cannot be run in the new runlevel.

### Runlevels

The current runlevel may be changed by **telinit**, which is often just a link to **init**. The default runlevels vary from distribution to distribution, but these are standard:

**0**

Halt the system.

**1, s, S**

Single-user mode.

**6**

Reboot the system.

**q, Q**

Reread */etc/inittab*.

Check the */etc/inittab* file for runlevels on your system.

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**insmod** [*options*] *file* [*symbol=value ...*]

System administration command. Load the module *file* into the kernel, changing any symbols that are defined on the command line. If the module file is named *file.o* or *file.mod*, the module will be named *file*.

### Options

**-f**

Force loading of module, even if some problems are encountered.

**-m**

Output a load map.

**-o *name***

Name module *name* instead of attempting to name it from the object file's name.

**-x**

Do not export: do not add any external symbols from the module to the kernel's symbol table.

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### install [options] [file] directories

System administration command. Used primarily in makefiles to update files. **install** copies files into user-specified directories. It will not overwrite a file. Similar to **cp** but attempts to set permission modes, owner, and group.

#### Options

##### **-d, --directory**

Create any missing directories.

##### **-g group, --group group**

Set group ID of new file to *group* (privileged users only).

##### **-m mode, --mode mode**

Set permissions of new file to *mode* (octal or symbolic). By default, the mode is **0755**.

##### **-o [owner], --owner [owner]**

Set ownership to *owner* or, if unspecified, to root (privileged users only).

##### **-s, --strip**

Strip symbol tables.

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### `ipchains` *command* [*options*]

System administration command. Edit IP firewall rules in the 2.2 Linux kernel. A 2.2 Linux kernel compiled with firewall support will examine the headers of all network packets and compare them to matching rules to see what it should do with the packet. A firewall rule consists of some matching criteria and a target, a result to be applied if the packet matches the criteria. The rules are organized into chains. You can use these rules to build a firewall or just reject certain kinds of network connections.

Firewall rules are organized into chains, an ordered checklist that the kernel works through looking for matches. There are three built-in chains **input**, **output**, and **forward**. Packets entering the system are tested against the **input** chain. Those exiting the system are checked against the **output** chain. If an incoming packet is destined for some other system, it is checked against the **forward** chain. Each of these chains has a default target, a policy, in case no match is found. User-defined chains can be created and used as targets for packets, but they have no default policies. If no match can be found in a user-defined chain, the packet is returned to the chain from which it was called and tested against the next rule in that chain.

**ipchains** only changes the rules in the running kernel. When the system is powered off, all those changes are lost. You can use the **ipchains-save** command to make a script you can later run with **ipchains-restore** to restore your firewall settings. Such a script is often called at boot up and many distributions have an **ipchains** initialization script that uses the output from **ipchains-save**.

### Commands

**ipchains** is always invoked with one of the following commands:

**-A** *chain rules*, **--append** *chain rules*

Append new *rules* to *chain*.

**-I** *chain number rules*, **--insert** *<chain number rules*

Insert *rules* into *chain* at the ordinal position given by *number*.



**-D chain rules, --delete chain rules**

Delete *rules* from *chain*. Rules can be specified by their ordinal number in the chain as well as by a general rule description.

**-R chain number rule, --replace chain number rule**

Replace a rule in *chain*. The rule to be replaced is specified by its ordinal *number*.

**-C chain rule, --check chain rules**

Construct a network packet that matches the given *rule* and check how *chain* will handle it. The rule must describe the source, destination, protocol, and interface of the packet to be constructed.

**-L [chain], --list \$PARAMETER**

List the rules in *chain*. If no chain is specified, list the rules in all chains.

**-ML, --masquerading --list**

List masquerading connections.

**-MS tcp tcpfin udp, --masquerading --set tcp tcpfin udp**

Set timeout value in seconds for masquerading connections. **-MS** always takes three parameters specifying the timeout values for TCP sessions, TCP sessions that have received a FIN packet, and UDP packets.

**-F chain, --flush chain**

Remove all rules from *chain*.

**-Z [chain], --zero [chain]**

Reset the packet and byte counters in *chain*. If no chain is specified, all chains will be reset. When used without specifying a chain and combined with the **-L** command, it lists the current counter values before they are reset.

**-N chain, --new-chain chain**

Create a new *chain*. The chain's name must be unique.

**-X [chain], --delete-chain chain**

Delete *chain*. Only user-defined chains can be deleted, and there can be no references to the chain to be deleted. If no argument is given, all user-defined chains will be deleted.

**-P chain target, --policy chain target**

Set the policy for a built-in *chain*; the target itself cannot be a chain.

**-h [icmp]**

Print a brief help message. If the option **icmp** is given, print a list of valid ICMP types.

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## Targets

A target can be the name of a chain or one of the following special values:

### ACCEPT

Let the packet through.

### DENY

Drop the packet.

### MASQ

Masquerade the packet so it appears that it originated from the current system. Reverse packets from masqueraded connections are unmasqueraded automatically. This is a legal target for only the **forward** chain, or user-defined chains used in forwarding packets. To use this target, the kernel must be compiled with support for IP masquerading.

### REDIRECT [*port*]

Redirect incoming packets to a local *port* on which you are running a transparent proxy program. If the specified port is 0 or is not given, the destination port of the packet is used as the redirection port.

**REDIRECT** is only a legal target for the **input** chain or user-defined chains used in handling incoming packets. The kernel must be compiled with support for transparent proxies.

### REJECT

Drop the packet and send an ICMP message back to the sender indicating the packet was dropped.

### RETURN

Return to the chain from which this chain was called and check the next rule. If **RETURN** is the target of a rule in a built-in chain, then the built-in chain's default policy is applied.

## Rule specification parameters

These options are used to create rules for use with the preceding commands. Rules consist of some matching criteria and usually a target to jump to (-j) if the match is made. Many of the parameters for these matching rules can be expressed as a negative with an exclamation point (!) meaning "not." Those rules will match everything except the given parameter.

### -p [!] *name*, --protocol [!]*\$PARAMETER*

Match packets of protocol *name*. The value of *name* can be given as a name or number as found in the file */etc/protocols*. The most common values are **tcp**, **udp**, **icmp**, or the special value **all**. The number 0 is equivalent to **all**, and this is the default value when this option is not used.

### -s [!] *address[/mask]* [!] [*port*], --source [!] *address[/mask]* [!] [*port*]

Specifies the source *address* and *port* of the packet that will match this rule. The address may be supplied as a hostname, a network name, or an IP address. The optional mask is the netmask to use and may be supplied

either in the traditional form (e.g., /255.255.255.0) or in the modern form (e.g., /24). The optional port specifies the TCP, UDP, or ICMP type that will match. You may supply a port specification only if you've supplied the **-p** parameter with one of the **tcp**, **udp** or **icmp** protocols. A colon can be used to indicate an inclusive range of ports or ICMP values to be used. (e.g., 20:25 for ports 20 through 25). If the first *port* parameter is missing, the default value is 0. If the second is omitted, the default value is 65535.

**-d** [!] *address[/mask]* [!] [*port*], **--destination** [!] *address[/mask]* [*port*]

Match packets with the destination *address*. The syntax for this command's parameters is the same as for the **-s** option.

**-j** *target*, **--jump** *target*

Jump to a special target or a user-defined chain. If this option is not specified for a rule, matching the rule only increases the rule's counters and the packet is tested against the next rule.

**-i** [!] *name*, **--interface** *name*

Match packets from interface *name*[+]. *name* is the network interface used by your system (e.g., **eth0** or **ppp0**). A + can be used as a wildcard, so **ppp+** would match any interface name beginning with **ppp**.

[!] **-f**, [!]**--fragment** *\$PARAMETER*

The rule applies to everything but the first fragment of a fragmented packet.

**--source-port** [!] *port*

Match packets from the source *port*. The syntax for specifying ports can be found in the preceding description of the **-s** option.

**--destination-port** [!] *port*

Match packets with the destination *port*. The syntax for specifying ports can be found in the preceding description of the **-s** option.

**--icmp-type** [!] *type*

Match packets with ICMP type name or number of *type*.

## Options

**-b**, **--bidirectional**

Put rule in both the input and output chain so packets will be matched in both directions.

**-v**, **--verbose**

Verbose mode.

**-n**, **--numeric**

Print all IP address and port numbers in numeric form. By default, names are displayed when possible.

**-l, --log**

Log information for the matching packet to the system log.

**-t *andmask xormask*, --TOS *andmask xormask***

Change the Type of Service field in the packet's header. The TOS field is first ANDed with the 8-bit hexadecimal mask *andmask*, then XORed with the 8-bit hexadecimal mask *xormask*. Rules that would affect the least significant bit (LSB) portion of the TOS field are rejected.

**-x, --exact**

Expand all numbers in a listing (**-L**). Display the exact value of the packet and byte counters instead of rounded figures.

**[!] -y, --syn**

Match only incoming TCP connection requests, those with the SYN bit set and the ACK and FIN bits cleared. This blocks incoming TCP connections but leaves outgoing connections unaffected.

**--line-numbers**

Used with the **-L** command. Add the line number to the beginning of each rule in a listing indicating its position in the chain.

**--no-warnings**

Disable all warnings

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### ipchains-restore [*options*]

System administration command. Restore firewall rules. **ipchains-restore** takes commands generated by **ipchains-save** and uses them to restore the firewall rules for each chain. Often used by initialization scripts to restore firewall settings on boot.

#### Options

**-f**

Force updates of existing chains without asking.

**-v**

Print rules as they are being restored.

**-p**

If a nonexisting chain is targeted by a rule, create it.

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### ipchains-save [*chain*] [*option*]

System administration command. Print the IP firewall rules currently stored in the kernel to **stdout**. If no *chain* is given, all chains will be printed. Output is usually redirected to a file, which can later be used by **ipchains-restore** to restore the firewall.

#### Option

- v

Print out rules to stderr as well as stdout, making them easier to see when redirecting output.

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**ipfwadm** *category command parameters [options]*

**ipfwadm** *-M [ -l | -s ] [options]*

Administer a firewall and its rules, firewall accounting, and IP masquerading in the 2.0 Linux kernel. This command is replaced with **ipchains** in the 2.2 kernel, and **ipchains** is replaced by **iptables** in the 2.4 kernel.

There are four categories of rules: IP packet accounting, IP input firewall, IP output firewall, and IP forwarding firewall. The rules are maintained in lists, with a separate list for each category. See the manpage for **ipfw(4)** for a more detailed description of how the lists work.

Each **ipfwadm** command specifies only one category and one rule. To create a secure firewall, you issue multiple **ipfwadm** commands; the combination of their rules work together to ensure that your firewall operates as you intend it to. The second form of the command is for masquerading. The commands **-l** and **-s** described in the later list are the only ones that can be used with the masquerading category, **-M**.

### Categories

One of the following flags is required to indicate the category of rules to which the command that follows the category applies.

**-A** *[direction]*

IP accounting rules. Optionally, a direction can be specified:

**in**

Count only incoming packets.

**out**

Count only outgoing packets.

**both**

Count both incoming and outgoing packets; this is the default.

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**-F**

IP forwarding firewall rules.

**-I**

IP input firewall rules.

**-M**

IP masquerading administration. Can be used only with the **-I** or **-S** command.

**-O**

IP output firewall rules.

**Commands**

The category is followed by a command indicating the specific action to be taken. Unless otherwise specified, only one action can be given on a command line. For the commands that can include a policy, the valid policies are:

**accept**

Allow matching packets to be received, sent, or forwarded.

**deny**

Block matching packets from being received, sent, or forwarded.

**reject**

Block matching packets from being received, sent, or forwarded and also return an ICMP error message to the sending host.

The commands are:

**-a [policy]**

Append one or more rules to the end of the rules for the category. No policy is specified for accounting rules. For firewall rules, a policy is required. When the source and/or destination names resolve to more than one address, a rule is added for each possible address combination.

**-c**

Check whether this IP packet would be accepted, denied, or rejected by the type of firewall represented by this category. Valid only when the category is **-I**, **-O**, or **-F**. Requires the **-V** parameter to be specified (see "Parameters," later).

**-d [policy]**

Delete one or more entries from the list of rules for the category. No policy is specified for accounting rules. The parameters specified with this command must exactly match the parameters from an append or insert command, or no match will be found and the rule will not be

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removed. Only the first matching rule in the list of rules is deleted.

**-f**

Remove (flush) all rules for the category.

**-h**

Display a help message with a brief description of the command syntax. Specified with no category:

```
% ipfwadm -h
```

**-i** *[policy]*

Insert a new rule at the beginning of the selected list for the category. No policy is specified for accounting rules. For firewall rules, a policy is required. When the source and/or destination names resolve to more than one address, a rule is added for each possible address combination.

**-l**

List all rules for the category. This option may be combined with the **-z** option to reset the packet and byte counters after listing their current values. Unless the **-x** option is also specified, the packet and byte counters are shown as *numberK* or *numberM*, rounded to the nearest integer. See also the **-e** option described under "Options" later.

**-p** *policy*

Change the default policy for the selected type of firewall to *policy*. The default policy is used when no matching rule is found. Valid only with **-I**, **-O**, or **-F**.

**-s** *tcp tcpfin udp*

Set the masquerading timeout values; valid only with **-M**. The three parameters are required and represent the timeout value in seconds for TCP sessions, TCP sessions after receiving a FIN packet, and UDP packets, respectively. A timeout value of 0 preserves the current timeout value of the corresponding entry.

**-z**

Reset the packet and byte counters for all rules in the category. This command may be combined with the **-l** command.

**Parameters**

The following parameters can be specified with the **-a**, **-i**, **-d**, or **-c** commands, except as noted. Multiple parameters can be specified on a single **ipfwadm** command line.

**-D** *address[/mask] [port ...]*

The destination specification (optional). See the description of **-S** for the syntax, default values, and other requirements. ICMP types cannot be specified with **-D**.

**-P** *protocol*

The protocol of the rule or packet; possible values are **tcp**, **udp**, **icmp**, or **all**. Defaults to **all**, which matches all protocols. **-P** cannot be specified with the **-c** command.

### **-S** *address[/mask] [port ...]*

The source IP address, specified as a hostname, a network name, or an IP address. The source address and mask default to 0.0.0.0/0. If **-S** is specified, **-P** must also be specified. The optional mask is specified as a network mask or as the number of 1s on the left of the network mask (e.g., a mask of 24 is equivalent to 255.255.255.0). The mask defaults to 32. One or more values of *port* may optionally be specified, indicating what ports or ICMP types the rule applies to. The default is **all**. Ports may be specified by their */etc/services* entry. The syntax for indicating a range of ports is:

```
lowport:highport
```

For example:

```
-S 172.29.16.1/24 ftp:ftp-data
```

### **-V** *address*

The address of the network interface the packet is received from (if category is **-I**) or is being sent to (if category is **-O**). *address* can be a hostname or an IP address, and defaults to 0.0.0.0, which matches any interface address. **-V** is required with the **-c** command:

```
-V 172.29.16.1
```

### **-W** *name*

Identical to **-V** but takes a device name instead of its address:

```
-W ppp0
```

## Options

### **-b**

Bidirectional mode. The rule matches IP packets in both directions. This option is valid only with the **-a**, **-i**, and **-d** commands.

### **-e**

Extended output. Used with the **-l** command to also show the interface address and any rule options. When listing firewall rules, also shows the packet and byte counters and the TOS (Type of Service) masks. When used with **-M**, also shows information related to delta sequence numbers.

### **-k**

Match TCP acknowledgment packets (i.e., only TCP packets with the ACK bit set). This option is ignored for all other protocols and is valid only with the **-a**, **-i**, and **-d** commands.

### **-m**

Accept masquerade packets for forwarding, making them appear to have

originated from the local host. Recognizes reverse packets and automatically demasquerades them, bypassing the forwarding firewall. This option is valid only in forwarding firewall rules with policy **accept**. The kernel must have been compiled with CONFIG\_IP\_MASQUERADE defined.

**-n**

Numeric output. Print IP addresses and port numbers in numeric format.

**-o**

Log packets that match this rule to the kernel log. This option is valid only with the **-a**, **-i**, and **-d** commands. The kernel must have been compiled with CONFIG\_IP\_FIREWALL\_VERBOSE defined.

**-r** [*port*]

Redirect packets to a local socket, even if they were sent to a remote host. If *port* is 0 (the default), the packet's destination port is used. This option is valid only in input firewall rules with policy **accept**. The kernel must have been compiled with CONFIG\_IP\_TRANSPARENT\_PROXY defined.

**-t** *andmask xormask*

Specify masks used for modifying the TOS field in the IP header. When a packet is accepted (with or without masquerading) by a firewall rule, its TOS field is bitwise ANDed with *andmask*, and the result is bitwise XORed with *xormask*. The masks are specified as 8-bit hexadecimal values. This option is valid only with the **-a**, **-i**, and **-d** commands and has no effect when used with accounting rules or with firewall rules for rejecting or denying a packet.

**-v**

Verbose output. Print detailed information about the rule or packet to be added, deleted, or checked. This option is valid only with the **-a**, **-i**, **-d**, and **-c** commands.

**-x**

Expand numbers. Display the exact value of the packet and byte counters, instead of a rounded value. This option is valid only when the counters are being listed anyway (see also the **-e** option).

**-y**

Match TCP packets with the SYN bit set and the ACK bit cleared. This option is ignored for packets of other protocols and is valid only with the **-a**, **-i**, and **-d** commands.

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### **iptables** *command [options]*

System administration command. Configure *netfilter* filtering rules. In the 2.4 kernel, the **ipchains** firewall capabilities are replaced with the *netfilter* kernel module. *netfilter* can be configured to work just like **ipchains**, but it also comes with the module **iptables**, which is similar to **ipchains** but extensible. *iptables* rules consist of some matching criteria and a target, a result to be applied if the packet matches the criteria. The rules are organized into chains. You can use these rules to build a firewall, masquerade your local area network, or just reject certain kinds of network connections.

There are three built-in tables for **iptables**, one for network filtering (**filter**), one for Network Address Translation (**nat**), and the last for specialized packet alterations (**mangle**). Firewall rules are organized into chains, ordered check lists of rules that the kernel works through looking for matches. The **filter** table has three built-in chains: **INPUT**, **OUTPUT**, and **FORWARD**. The **INPUT** and **OUTPUT** chains handle packets originating from or destined for the host system. The **FORWARD** chain handles mail just passing through the host system. The **nat** table also has three built-in chains: **PREROUTING**, **POSTROUTING**, and **OUTPUT**. **mangle** has only two chains: **PREROUTING** and **OUTPUT**.

*netfilter* checks packets entering the system. After applying any **PREROUTING** rules it passes them to the **INPUT** chain or to the **FORWARD** chain if the packet is just passing through. Upon leaving, the system packets are passed to the **OUTPUT** chain and then on to any **POSTROUTING** rules. Each of these chains has a default target, a policy, in case no match is found. User-defined chains can also be created and used as targets for packets but do not have default policies. If no match can be found in a user-defined chain, the packet is returned to the chain from which it was called and tested against the next rule in that chain.

**iptables** only changes the rules in the running kernel. When the system is powered off, all changes are lost. You can use the **iptables-save** command to make a script you can run with **iptables-restore** to restore your firewall settings. Such a script is often called at bootup. Many distributions will have an **iptables** initialization script that uses the output from **iptables-save**.

### Commands

**iptables** is always invoked with one of the following commands:

**-A** *chain rules*, **--append** *chain rules*

Append new *rules* to *chain*.

**-I** *chain number rules*, **--insert** *chain number rules*

Insert *rules* into *chain* at the ordinal position given by *number*.

**-D** *chain rules*, **--delete** *chain rules*

Delete *rules* from *chain*. Rules can be specified by their ordinal number in the chain as well as by a general rule description.

**-R** *chain number rule*, **--replace** *chain number rule*

Replace a rule in *chain*. The rule to be replaced is specified by its ordinal *number*.

**-C** *chain rule*, **--check** *chain rules*

Check how *chain* will handle a network packet that matches the given *rule*. The rule must describe the source, destination, protocol, and interface of the packet to be constructed.

**-L** [*chain*], **--list** *\$PARAMETER*

List the rules in *chain* or all chains if *chain* is not specified.

**-F** [*chain*], **--flush** *chain*

Remove all rules from *chain* or from all chains if *chain* is not specified.

**-Z** [*chain*], **--zero** *chain*

Zero the packet and byte counters in *chain*. If no chain is specified, all chains will be reset. When used without specifying a chain and combined with the **-L** command, it lists the current counter values before they are reset *chain*.

**-N** *chain*, **--new-chain** *chain*

Create a new *chain*. The chain's name must be unique. This is how user-defined chains are created.

**-X** [*chain*], **--delete-chain** *chain*

Delete the specified user-defined *chain* or all user-defined chains if no chain is specified.

**-P** *chain target*, **--policy** *chain target*

Set the default policy for a built-in *chain*; the target itself cannot be a chain.

**-E** *old-chain new-chain*, **--rename-chain** *old-chain new-chain*

Rename *old-chain* to *new-chain*.

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**-h [icmp]**

Print a brief help message. If the option **icmp** is given, print a list of valid ICMP types.

**Targets**

A target may be the name of a chain or one of the following special values.

**ACCEPT**

Let the packet through.

**DROP**

Drop the packet.

**QUEUE**

Send packets to the user space for processing.

**RETURN**

Stop traversing the current chain and return to the point in the previous chain from which this one was called. If **RETURN** is the target of a rule in a built-in chain, the built-in chain's default policy is applied.

**Rule specification parameters**

These options are used to create rules for use with the preceding commands. Rules consist of some matching criteria and usually a target to jump to (**-j**) if the match is made. Many of the parameters for these matching rules can be expressed as a negative with an exclamation point (!) meaning "not." Those rules will match everything except the given parameter.

**-p [!] *name*, --protocol [!]*\$PARAMETER***

Match packets of protocol *name*. The value of *name* can be given as a name or number as found in the file */etc/protocols*. The most common values are **tcp**, **udp**, **icmp**, or the special value **all**. The number 0 is equivalent to **all** and this is the default value when this option is not used. If there are extended matching rules associated with the specified protocol, they will be loaded automatically. You need not use the **-m** option to load them.

**-s [!] *address[/mask]* [!] [*port*], --source [!] *address[/mask]* [!] [*port*]**

Match packets with the source *address*. The address may be supplied as a hostname, a network name, or an IP address. The optional mask is the netmask to use and may be supplied either in the traditional form (e.g., */255.255.255.0*) or in the modern form (e.g., */24*).

**-d [!] *address[/mask]* [!] [*port*], --destination [!] *address[/mask]* [*port*]**

Match packets from the destination *address*. See the description of **-s** for the syntax of this option.

**-j *target*, --jump *target***

Jump to a special target or a user-defined chain. If this option is not

specified for a rule, matching the rule only increases the rule's counters, and the packet is tested against the next rule.

**-i [!] *name*[+], --in-interface *name*[+]**

Match packets being received from interface *name*. *name* is the network interface used by your system (e.g., **eth0** or **ppp0**). A + can be used as a wildcard, so **ppp+** would match any interface name beginning with **ppp**

**-o [!] *name*[+], --out-interface *name*[+]**

Match packets being sent from interface *name*. See the description of **-i** for the syntax for *name*.

**[!] -f, [!]--fragment *\$PARAMETER***

The rule applies only to the second or further fragments of a fragmented packet.

## Options

**-v, --verbose**

Verbose mode.

**-n, --numeric**

Print all IP address and port numbers in numeric form. By default, text names are displayed when possible.

**-x, --exact**

Expand all numbers in a listing (**-L**). Display the exact value of the packet and byte counters instead of rounded figures.

**-m *module*, --match**

Explicitly load matching rule extensions associated with *module*. See the following section, "Match Extensions."

**-h [*icmp*], --help [*icmp*]**

Print help message. If **icmp** is specified, a list of valid ICMP type names will be printed. **-h** can also be used with the **-m** option to get help on an extension module.

**--line-numbers**

Used with the **-L** command. Add the line number to the beginning of each rule in a listing, indicating its position in the chain.

## Match extensions

Several kernel modules come with netfilter to extend matching capabilities of rules. Those associated with particular protocols are loaded automatically when the **-p** option is used to specify the protocol. Others need to be loaded explicitly with the **-m** option.

**tcp**

Loaded when **-p tcp** is the only protocol specified.

**--source-port [!] [port][:port], --sport [!] [port][:port]**

Match the specified source ports. Using the colon specifies an inclusive range of services to match. If the first port is omitted, 0 is the default. If the second port is omitted, 65535 is the default. You can also use a dash instead of a colon to specify the range.

**--destination-port [!] [port][:port], --dport [!] [port][:port]**

Match the specified destination ports. The syntax is the same as for **--source-port**.

**--tcp-flags [!] *mask comp***

Match the packets with the TCP flags specified by *mask* and *comp*. *mask* is a comma-separated list of flags that should be examined. *comp* is a comma-separated list of flags that must be set for the rule to match. Valid flags are SYN, ACK, FIN, RST, URG, PSH, ALL, and NONE.

**[!] --syn**

Match packets with the SYN bit set and the ACK and FIN bits cleared. These are packets that request TCP connections; blocking them prevents incoming connections. Shorthand for **--tcp-flags SYN,RST,ACK SYN**.

## udp

Loaded when **-p udp** is the only protocol specified.

**--source-port [!] [port][:port], --sport [!] [port][:port]**

Match the specified source ports. The syntax is the same as for the **--source-port** option of the TCP extension.

**--destination-port [!] [port][:port], --dport [!] [port][:port]**

Match the specified destination ports. The syntax is the same as for **--source-port** option of the TCP extension.

## icmp

Loaded when **-p icmp** is the only protocol specified.

**--icmp-type [!] *type***

Match the specified icmp *type*. *type* may be a numeric ICMP type or one of the ICMP type names shown by the command **iptables -p icmp -h**.

## mac

Loaded explicitly with the **-m** option.

**--mac-source [!] *address***

Match the source *address* that transmitted the packet. *address*

must be given in colon-separated hexbyte notation (for example, --**mac-source 00:60:08:91:CC:B7**).

## limit

Loaded explicitly with the **-m** option. The **limit** extensions are used to limit the number of packets matched. This is useful when combined with the **LOG** target. Rules using this extension match until the specified limit is reached.

### --limit *rate*

Match addresses at the given *rate*. *rate* is specified as a number with an optional **/second**, **/minute**, **hour**, or **/day** suffix. When this option is not set, the default is '3/hour'.

### --limit-burst [*number*]

Set the maximum *number* of packets to match in a burst. Once the number has been reached, no more packets are matched for this rule until the number has recharged. It recharges at the rate set by the **--limit** option. When not specified, the default is 5.

## multiport

Loaded explicitly with the **-m** option. The **multiport** extensions match sets of source or destination ports. These rules can be used only in conjunction with **-p tcp** and **-p udp**. Up to 15 ports can be specified in a comma-separated list.

### --source-port [*ports*]

Match the given source *ports*.

### --destination-port [*ports*]

Match the given destination *ports*.

### --port [*ports*]

Match if the packet has the same source and destination port and that port is one of the given *ports*.

## mark

Loaded explicitly with the **-m** option. This module works with the **MARK** extension target:

### --mark *value*[/*mask*]

Match the given unsigned mark value. If a mask is specified, it is logically ANDed with the mark before comparison.

## owner

Loaded explicitly with the **-m** option. The **owner** extensions match a local packet's creator's user, group process, and session IDs. This makes sense only as a part of the **OUTPUT** chain.

### --uid-owner *userid*

Match packets created by a process owned by *userid*.

**--gid-owner** *groupid*

Match packets created by a process owned by *groupid*.

**--pid-owner** *processid*

Match packets created by process ID *processid*.

**--sid-owner** *sessionid*

Match packets created by a process in the session *sessionid*.

## state

Loaded explicitly with the **-m** option. This module matches the connection state of a packet.

**--state** *states*

Match the packet if it has one of the states in the comma-separated list *states*. Valid states are **INVALID**, **ESTABLISHED**, **NEW**, and **RELATED**.

## tos

Loaded explicitly with the **-m** option. This module matches the Type of Service field in a packet's header.

**--tos** *value*

Match the packet if it has a TOS of *value*. *value* can be a numeric value or a Type of Service name. **iptables -m tos -h** will give you a list of valid TOS values.

## Target extensions

Extension targets are optional additional targets supported by separate kernel modules. They have their own associated options.

## LOG

Log the packet's information in the system log.

**--log-level** *level*

Set the syslog level by name or number (as defined by *syslog.conf*).

**--log-prefix** *prefix*

Begin each log entry with the string *prefix*. The prefix string may be up to 30 characters long.

**--log-tcp-sequence**

Log the TCP sequence numbers. This is a security risk if your log is readable by users.

### **--log-tcp-options**

Log options from the TCP packet header.

### **--log-ip-options**

Log options from the IP packet header.

## **MARK**

Used to mark packets with an unsigned integer value you can use later with the **mark** matching extension. Valid only with the **mangle** table.

### **--set-mark value**

Mark the packet with *value*.

## **REJECT**

Drop the packet and, if appropriate, send an ICMP message back to the sender indicating the packet was dropped. If the packet was an ICMP error message, an unknown ICMP type, or a nonhead fragment, or if too many ICMP messages have already been sent to this address, no message is sent.

### **--reject-with type**

Send the specified ICMP message type. Valid values are **icmp-net-unreachable**, **icmp-host-unreachable**, **icmp-port-unreachable**, or **icmp-proto-unreachable**. If the packet was an ICMP ping packet, *type* may also be **echo-reply**.

## **TOS**

Set the Type of Service field in the IP header. **TOS** is a valid target only for rules in the **mangle** table.

### **--set-tos value**

Set the TOS field to *value*. You can specify this as an 8-bit value or as a TOS name. You can get a list of valid names using **iptables -j TOS -h**.

## **SNAT**

Modify the source address of the packet and all future packets in the current connection. **SNAT** is valid only as a part of the **POSTROUTING** chain in the **nat** table.

### **--to-source address[-address][port-port]**

Specify the new source address or range of addresses. If a **tcp** or **udp** protocol has been specified with the **-p** option, source ports may also be specified. If none is specified, map the new source to the same port if possible. If not, map ports below 512 to other ports below 512, those between 512 and 1024 to other ports below 1024, and ports above 1024 to other ports above 1024.

## **DNAT**



Modify the destination address of the packet and all future packets in the current connection. **DNAT** is valid only as a part of the **POSTROUTING** chain in the **nat** table.

**--to-destination** *address*[-*address*][*port*-*port*]

Specify the new destination address or range of addresses. The arguments for this option are the same as the **--to-source** argument for the **SNAT** extension target.

## MASQUERADE

Masquerade the packet so it appears that it originated from the current system. Reverse packets from masqueraded connections are unmasqueraded automatically. This is a legal target only for chains in the *nat* table that handle incoming packets and should be used only with dynamic IP addresses (like dial-up.) For static addresses use **DNAT**.

**--to-ports** *port*[-*port*]

Specify the port or range of ports to use when masquerading. This option is only valid if a **tcp** or **udp** protocol has been specified with the **-p** option. If this option is not used, the masqueraded packet's port will not be changed.

## REDIRECT [--to-port *port*]

Redirect the packet to a local *port*. This is useful for creating transparent proxies.

**--to-ports** *port*[-*port*]

Specify the port or range of ports on the local system to which the packet should be redirected. This option is valid only if a **tcp** or **udp** protocol has been specified with the **-p** option. If this option is not used, the redirected packet's port will not be changed.

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### iptables-restore [*file*]

System administration command. Restore firewall rules. **iptables-restore** takes commands generated by **iptables-save** and uses them to restore the firewall rules for each chain. Often used by initialization scripts to restore firewall settings on boot. *file* is the name of a file whose contents were generated by **iptables-save**. If not specified, the command takes its input from stdin. This command was not completed at the time this book went to print. There may be options not listed here.

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### iptables-save [*chain*]

System administration command. Print the IP firewall rules currently stored in the kernel to stdout. If no *chain* is given, all chains will be printed. Output may be redirected to a file that can later be used by **iptables-restore** to restore the firewall. This command was not completed at the time this book went to print. There may be options not listed here.

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### ispell [*options*] [*files*]

Compare the words of one or more named *files* with the system dictionary. Display unrecognized words on the top of the screen, accompanied by possible correct spellings, and allow editing, via a series of commands.

#### Options

##### **-b**

Back up original file in *filename.bak*.

##### **-d file**

Search *file* instead of standard dictionary file.

##### **-m**

Suggest different root/affix combinations.

##### **-n**

Expect nroff or troff input file.

##### **-p file**

Search *file* instead of personal dictionary file.

##### **-t**

Expect TeX or LaTeX input file.

##### **-w chars**

Consider *chars* to be legal, in addition to a-z and A-Z.

##### **-x**

Do not back up original file.



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**-B**

Search for missing blanks (resulting in concatenated words) in addition to ordinary misspellings.

**-C**

Do not produce error messages in response to concatenated words.

**-L *number***

Show *number* lines of context.

**-M**

List interactive commands at bottom of screen.

**-N**

Suppress printing of interactive commands.

**-P**

Do not attempt to suggest more root/affix combinations.

**-S**

Sort suggested replacements by likelihood that each is correct.

**-T *type***

Expect all files to be formatted by *type*.

**-W *n***

Never consider words that are *n* characters or less to be misspelled.

**-V**

Use hat notation (^**L**) to display control characters and **M-** to display characters with the high bit set.

**Interactive Commands**

**?**

Display help screen.

**space character**

Accept the word in this instance.

***number***

Replace with suggested word that corresponds to *number*.

**!*command***

[XML](#)

Invoke shell and execute *command* in it. Prompt before exiting.

**a**

Accept word as correctly spelled, but do not add it to personal dictionary.

**i**

Accept word and add it (capitalized, if so in file) to personal dictionary.

**l**

Search system dictionary for words.

**q**

Exit without saving.

**r**

Replace word.

**u**

Accept word and add lowercase version of it to personal dictionary.

**x**

Skip to the next file, saving changes.

**^L**

Redraw screen.

**^Z**

Suspend **ispell**.

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**join** [*options*] *file1 file2*

Join lines of two sorted files by matching on a common field. If either *file1* or *file2* is -, read from standard input.

### Options

**-a *filename***

Print a line for each unpairable line in file *filename*, in addition to the normal output.

**-e *string***

Replace missing input fields with *string*.

**-i, --ignore-case**

Ignore case differences when comparing keys.

**-1 *fieldnum1***

Join field in *file1* is *fieldnum1*. Default is the first field.

**-2 *fieldnum2***

Join field in *file2* is *fieldnum2*. Default is the first field.

**-o *fieldlist***

Order the output fields according to *fieldlist*, where each entry in the list is in the form *filename.fieldnum*. Entries are separated by commas or blanks.

**-t *char***

Specifies the field-separator character (default is whitespace).

**-v *filename***

Print only unpairable lines from file *filenum*.

**--help**

Print help message and then exit.

**--version**

Print the version number and then exit.

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### `kbd_mode` [*option*]

Print or set the current keyboard mode, which may be RAW, MEDIUMRAW, or XLATE.

#### Options

- a**  
Set mode to XLATE (ASCII mode).
- k**  
Set mode to MEDIUMRAW (keycode mode).
- s**  
Set mode to RAW (scancode mode).
- u**  
Set mode to UNICODE (UTF-8 mode).

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### **kbdrate** [*options*]

System administration command. Control the rate at which the keyboard repeats characters, as well as its delay time. Using this command without options sets a repeat rate of 10.9 characters per second; the default delay is 250 milliseconds. When Linux boots, however, it sets the keyboard rate to 30 characters per second.

#### Options

**-s**

Suppress printing of messages.

**-r** *rate*

Specify the repeat rate, which must be one of the following numbers (all in characters per second): 2.0, 2.1, 2.3, 2.5, 2.7, 3.0, 3.3, 3.7, 4.0, 4.3, 4.6, 5.0, 5.5, 6.0, 6.7, 7.5, 8.0, 8.6, 9.2, 10.0, 10.9, 12.0, 13.3, 15.0, 16.0, 17.1, 18.5, 20.0, 21.8, 24.0, 26.7, or 30.0.

**-d** *delay*

Specify the delay, which must be one of the following (in milliseconds): 250, 500, 750, or 1000.

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### kerneld

System administration command. **kerneld** automatically loads kernel modules when they are needed, thereby reducing kernel memory usage from unused loaded modules and replacing manual loading of modules with **modprobe** or **insmod**. If a module has not been used for more than one minute, **kerneld** automatically removes it.

**kerneld** comes with the modules-utilities package and is set up during kernel configuration; its functionality is provided by interactions between that package and the kernel. **kerneld** is aware of most common types of modules. When more than one possible module can be used for a device (such as a network driver), **kerneld** uses the configuration file */etc/conf.modules*, which contains path information and aliases for all loadable modules, to determine the correct module choice.

**kerneld** can also be used to implement dial-on-demand networking, such as SLIP or PPP connections. The network connection request can be processed by **kerneld** to load the proper modules and set up the connection to the server.

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### kill [*option*] *IDs*

This is the **/bin/kill** command; there is also a shell command of the same name. Send a signal to terminate one or more process *IDs*. You must own the process or be a privileged user. If no signal is specified, TERM is sent.

#### Options

**-l**

List all signals.

**-p**

Print the process ID of the named process, but don't send it a signal. To use this option, specify the full path (e.g., **/bin/kill -p**).

**-signal**

The signal number (from */usr/include/sys/signal.h*) or name (from **kill -l**). With a signal number of 9 (HUP), the kill cannot be caught by the process; use this to kill a process that a plain **kill** doesn't terminate. The default is TERM.

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### lsattr [*options*] [*files*]

Print attributes of files on a Linux Second Extended File System. See also **chattr**.

#### Options

**-a**

List all files in specified directories.

**-d**

List directories' attributes, not the attributes of the contents.

**-R**

List directories and their contents recursively.

**-v**

List version of files.

**-V**

List version and then exit.

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### lsmod

System administration command. List all loaded modules: their name, size (in 4KB units) and, if appropriate, a list of referring modules.

### File

*[/proc/modules](#)*

Source of the same information.

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Macro processor for C and other files.

**Options****-e, --interactive**

Operate interactively, ignoring interrupts.

**-dflags, --debug=flags**Specify *flag*-level debugging.**-ln, --arglength=n**

Specify the length of debugging output.

**-o file, --error-output=file**Place output in *file*. Despite the name, print error messages on standard error.**-p, --prefix-built-ins**Prepend **m4\_** to all built-in macro names.**-s, --synclines**Insert **#line** directives for the C preprocessor.**-Bn**Set the size of the push-back and argument collection buffers to *n* (default is 4096).**-Dname[=value], --define=name[=value]**Define *name* as *value* or, if *value* is not specified, define *name* as null.



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**-E, --fatal-warnings**

Consider all warnings to be fatal, and exit after the first of them.

**-Ffile, --freeze-state file**

Record **m4**'s frozen state in *file*, for later reloading.

**-G, --traditional**

Behave like traditional **m4**, ignoring GNU extensions.

**-Hn, --hashsize=n**

Set symbol-table hash array to *n* (default is 509).

**-Idirectory, --include=directory**

Search *directory* for include files.

**-Q, --quiet, --silent**

Suppress warning messages.

**-Rfile, --reload-state file**

Load state from *file* before starting execution.

**-Uname, --undefine=name**

Undefine *name*.

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### mail [options] [users]

Read mail or send mail to other *users*. The **mail** utility allows you to compose, send, receive, forward, and reply to mail. **mail** has two main modes: compose mode, in which you create a message, and command mode, in which you manage your mail.

While **mail** is a powerful utility, it can be tricky for a novice user. Most Linux distributions include **pine** and **elm**, which are much easier to use.

This section presents **mail** commands, options, and files. To get you started, here are two of the most basic commands.

To enter interactive mail-reading mode, type:

```
mail
```

To begin writing a message to *user*, type:

```
mail user
```

Enter the text of the message, one line at a time, pressing Enter at the end of each line. To end the message, enter a single period (.) in the first column of a new line, and press Enter.

### Command-line options

#### **-b list**

Set blind carbon copy field to comma-separated *list*.

#### **-c list**

Set carbon copy field to comma-separated *list*.

#### **-d**

Print debugging information.

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**-f** [*file*]

Process contents of *file*, instead of */var/spool/mail/\$user*. If *file* is omitted, process *mbox* in the user's home directory.

**-i**

Do not respond to tty interrupt signals.

**-n**

Do not consult */etc/mail.rc* when starting up.

**-p**

Read mail in POP mode.

**-s** *subject*

Set subject to *subject*.

**-u**

Process contents of */var/spool/mail/\$user*. Default.

**-v**

Verbose. Print information about mail delivery to standard out.

**-I**

Interactive—even when standard input has been redirected from the terminal.

**-N**

When printing a mail message or entering a mail folder, do not display message headers.

**-P**

Disable POP mode.

**Compose-mode commands**

**~!**

Execute a shell escape from compose mode.

**~?**

List compose mode escapes.

**~b** *names*

Add names to or edit the *Bcc:* header.

**~c** *names*

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Add names to or edit the *Cc:* header.

**~d**

Read in the *dead.letter* file.

**~e**

Invoke text editor.

**~f** *messages*

Insert *messages* into message being composed.

**~F** *messages*

Similar to **~f**, but include message headers.

**~h**

Add to or change all the headers interactively.

**~m** *messages*

Similar to **~f**, but indent with a tab.

**~M** *messages*

Similar to **~m**, but include message headers.

**~p**

Print message header fields and message being sent.

**~q**

Abort current message composition.

**~r** *filename*

Append file to current message.

**~s** *string*

Change *Subject:* header to *string*.

**~t** *names*

Add names to or edit the **To** list.

**~v**

Invoke editor specified with the VISUAL environment variable.

**~|** *command*

Pipe message through *command*.

**~:** *mail-command*

Execute *mail-command*.

*~~string*

Insert *string* in text of message, prefaced by a single tilde (~). If string contains a ~, it must be escaped with a \.

## Command-mode commands

<b>?</b>	List summary of commands (help screen).
<b>!</b>	Execute a shell command.
<b>- num</b>	Print <i>num</i> th previous message; defaults to immediately previous.
<b>alias (a)</b>	Print or create alias lists.
<b>alternates (alt)</b>	Specify remote accounts on remote machines that are yours. Tell mail not to reply to them.
<b>chdir (c)</b>	<b>cd</b> to home or specified directory.
<b>copy (co)</b>	Similar to <b>save</b> , but do not mark message for deletion.
<b>delete (d)</b>	Delete message.
<b>dp</b>	Delete current message and display next one.
<b>edit (e)</b>	Edit message.
<b>exit (ex, x)</b>	Exit <b>mail</b> without updating folder.
<b>file (fi)</b>	Switch folders.
<b>folder (fold)</b>	Read messages saved in a file. Files can be:
	# Previous
	% System mailbox
	% <i>user</i> <i>user's</i> system mailbox
	& <i>mbox</i>
	+ <i>folder</i> File in <i>folder</i> directory.
<b>folders</b>	List folders.
<b>headers (h)</b>	List message headers at current prompt.
<b>headers+ (h+)</b>	Move forward one window of headers.
<b>headers- (h-)</b>	Move back one window of headers.
<b>help</b>	Same as <b>?</b> .
<b>hold (ho)</b>	Hold messages in system mailbox.
<b>ignore</b>	Append list of fields to ignored fields.
<b>mail user (m)</b>	Compose message to <i>user</i> .
<b>mbox</b>	Default. Move specified messages to <i>mbox</i> on exiting.
<b>next (n)</b>	Type next message or next message that matches argument.
<b>preserve (pr)</b>	Synonym for <b>hold</b> .
<b>print [list] (p)</b>	Display each message in <i>list</i> .
<b>Print [list] (P)</b>	Similar to <b>print</b> , but include header fields.
<b>quit (q)</b>	Exit <b>mail</b> and update folder.
<b>reply (r)</b>	Send mail to all on distribution list.
<b>Reply (R)</b>	Send mail to author only.
<b>respond</b>	Same as <b>reply</b> .
<b>retain</b>	Always include this list of header fields when printing messages. With no arguments, list retained fields.
<b>save (s)</b>	Save message to folder.

<b>saveignore</b>	Remove ignored fields when saving.
<b>saveretain</b>	Override <b>saveignore</b> to retain specified fields.
<b>set (se)</b>	Set or print <b>mail</b> options.
<b>shell (sh)</b>	Enter a new shell.
<b>size</b>	Print size of each specified message.
<b>source</b>	Read commands from specified file.
<b>top</b>	Print first few lines of each specified message.
<b>type (t)</b>	Same as <b>print</b> .
<b>Type (T)</b>	Same as <b>Print</b> .
<b>unalias</b>	Discard previously defined aliases.
<b>undelete (u)</b>	Restore deleted message.
<b>unread (U)</b>	Mark specified messages as unread.
<b>unset (uns)</b>	Unset <b>mail</b> options.
<b>visual (v)</b>	Edit message with editor specified by the VISUAL environment variable.
<b>write (w)</b>	Write message, without header, to file.
<b>xit (x)</b>	Same as <b>exit</b> .
<b>z</b>	Move <b>mail</b> 's attention to next windowful of text. Use <b>z-</b> to move it back.

## mail options

These options are used inside of the *.mailrc* file. The syntax is **set option** or **unset option**.

<b>append</b>	Append (do not prepend) messages to <i>mbox</i> .
<b>ask</b>	Prompt for subject.
<b>askbcc</b>	Prompt for blind carbon copy recipients.
<b>askcc</b>	Prompt for carbon copy recipients.
<b>asksub</b>	Prompt for <b>Subject</b> line.
<b>autoprint</b>	Print next message after a delete.
<b>chron</b>	Display messages in chronological order, most recent last.
<b>debug</b>	Same as <b>-d</b> on command line.
<b>dot</b>	Interpret a solitary <b>.</b> as an EOF.
<b>folder</b>	Define directory to hold mail folders.
<b>hold</b>	Keep message in system mailbox upon quitting.
<b>ignore</b>	Ignore interrupt signals from terminal. Print them as <b>@</b> .
<b>ignoreeof</b>	Do not treat <b>^D</b> as an EOF.
<b>metoo</b>	Do not remove sender from groups when mailing to them.
<b>noheader</b>	Same as <b>-N</b> on command line.

<b>nokerberos</b>	Retrieve POP mail via POP3, not KPOP, protocol.
<b>nosave</b>	Do not save aborted letters to <i>dead.letter</i> .
<b>pop-mail</b>	Retrieve mail with POP3 protocol, and save it in <i>mbox.pop</i> .
<b>prompt</b>	Set prompt to a different string.
<b>Replyall</b>	Switch roles of <b>Reply</b> and <b>reply</b> .
<b>quiet</b>	Do not print version at startup.
<b>searchheaders</b>	When given the specifier <i>/x;y</i> , expand all messages that contain the string <i>y</i> in the <i>x</i> header field.
<b>verbose</b>	Same as <b>-v</b> on command line.
<b>verbose-pop</b>	Display status while retrieving POP mail.

### Special files

<i>calendar</i>	Contains reminders that the operating system mails to you.
<i>.maildelivery</i>	Mail delivery configuration file.
<i>.mailrc</i>	Mail configuration file.
<i>triplog</i>	Keeps track of your automatic response recipients.
<i>tripnote</i>	Contains automatic message.

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System administration command. List all messages in the **sendmail** mail queue. Equivalent to **sendmail -bp**.

**Option****-v**

Verbose mode.

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### mailstats [*options*]

System administration command. Display a formatted report of the current **sendmail** mail statistics.

#### Options

##### **-C** *file*

Use **sendmail** configuration file *file* instead of the default *sendmail.cf* file.

##### **-f** *file*

Use **sendmail** statistics file *file* instead of the file specified in the **sendmail** configuration file.

##### **-o**

Don't show the name of the mailer in the report.

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**make** [*options*] [*targets*] [*macro definitions*]

Update one or more *targets* according to dependency instructions in a description file in the current directory. By default, this file is called *makefile* or *Makefile*. Options, targets, and macro definitions can be in any order. Macros definitions are typed as:

*name=string*

For more information on **make**, see *Managing Projects with make* by Andrew Oram and Steve Talbott.

### Options

#### **-d, --debug**

Print detailed debugging information.

#### **-e, --environment-overrides**

Override **makefile** macro definitions with environment variables.

#### **-f *makefile*, --file=*makefile*, --makefile=*makefile***

Use *makefile* as the description file; a filename of **-** denotes standard input.

#### **-h, --help**

Print options to **make** command.

#### **-i, --ignore-errors**

Ignore command error codes (same as **.IGNORE**).

#### **-j [*jobs*], --jobs [=*jobs*]**

Attempt to execute *jobs* jobs simultaneously, or, if no number is specified, as many jobs as possible.

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**-k, --keep-going**

Abandon the current target when it fails, but keep working with unrelated targets.

**-l [*load*], --load-average [=*load*], --max-load [=*load*]**

Attempt to keep load below *load*, which should be a floating-point number. Used with **-j**.

**-n, --just-print, --dry-run, --recon**

Print commands but don't execute (used for testing).

**-o *file*, --old-file=*file*, --assume-old=*file***

Never remake *file* or cause other files to be remade on account of it.

**-p, --print-data-base**

Print rules and variables in addition to normal execution.

**-q, --question**

Query; return 0 if file is up-to-date; nonzero otherwise.

**-r, --no-built-in-rules**

Do not use default rules.

**-s, --silent, --quiet**

Do not display command lines (same as **.SILENT**).

**-t, --touch**

Touch the target files, without remaking them.

**-v, --version**

Show version of **make**.

**-w, --print-directory**

Display the current working directory before and after execution.

**--warn -undefined -variables**

Print warning if a macro is used without being defined.

**-C *directory*, --directory *directory***

**cd** to *directory* before beginning **make** operations. A subsequent **-C** directive will cause **make** to attempt to **cd** into a directory relative to the current working directory.

**-I *directory*, --include-dir *directory***

Include *directory* in list of directories that contain included files.



### **-S, --no-keep-going, --stop**

Cancel previous **-k** options. Useful in recursive **makes**.

### **-W file, --what-if file, --new-file file, --assume-new file**

Behave as though *file* has been recently updated.

## **Description file lines**

Instructions in the description file are interpreted as single lines. If an instruction must span more than one input line, use a backslash (\) at the end of the line so that the next line is considered as a continuation. The description file may contain any of the following types of lines:

### *Blanklines*

Blank lines are ignored.

### *Commentlines*

A pound sign (#) can be used at the beginning of a line or anywhere in the middle. **make** ignores everything after the #.

### *Dependencylines*

Depending on one or more targets, certain commands that follow will be executed. Possible formats include:

```
targets : dependencies
targets : dependencies ; command
```

Subsequent commands are executed if *dependency* files (the names of which may contain wildcards) do not exist or are newer than a target. If no prerequisites are supplied, then subsequent commands are *always* executed (whenever any of the targets are specified). No tab should precede any *targets*.

### *Suffixrules*

These specify that files ending with the first suffix can be prerequisites for files ending with the second suffix (assuming the root filenames are the same). Either of these formats can be used:

```
.suffix.suffix:
.suffix:
```

The second form means that the root filename depends on the filename with the corresponding suffix.

### *Commands*

Commands are grouped below the dependency line and are typed on lines that begin with a tab. If a command is preceded by a hyphen (-), **make** ignores any error returned. If a command is preceded by an at sign (@), the command line won't echo on the display (unless **make** is called with **-n**).

### *macrodefinitions*

These have the following form:

```
name = string
```

or

```
define name  
string  
endif
```

Blank space is optional around the =.

### *includestatements*

Similar to the C include directive, these have the form:

```
include files
```

### **Internal macros**

#### **\$?**

The list of prerequisites that have been changed more recently than the current target. Can be used only in normal description file entries—not suffix rules.

#### **\$@**

The name of the current target, except in description file entries for making libraries, where it becomes the library name. Can be used both in normal description file entries and in suffix rules.

#### **\$<**

The name of the current prerequisite that has been modified more recently than the current target.

#### **\$\***

The name—without the suffix—of the current prerequisite that has been modified more recently than the current target. Can be used only in suffix rules.

#### **\$%**

The name of the corresponding **.o** file when the current target is a library module. Can be used both in normal description file entries and in suffix rules.

#### **\$^**

A space-separated list of all dependencies, with no duplications.

#### **\$+**

A space-separated list of all dependencies, including duplications.

### **Pattern rules**

These are a more general application of the idea behind suffix rules. If a target

and a dependency both contain %, GNU **make** will substitute any part of an existing filename. For instance, the standard suffix rule:

```
$(CC) -o $@ $<
```

can be written as the following pattern rule:

```
% .o : % .c
$(CC) -o $@ $<
```

## Macro modifiers

### D

The directory portion of any internal macro name except **\$?**. Valid uses are:

```
$( *D)   $$(@D)   $( ?D)   $( <D)
$( %D)   $(@D)   $( ^D)
```

### F

The file portion of any internal macro name except **\$?**. Valid uses are:

```
$( *F)   $$(@F)   $( ?F)   $( <F)
$( %F)   $(@F)   $( ^F)
```

## Functions

### **\$(subst from, to, string)**

Replace all occurrences of *from* with *to* in *string*.

### **\$(patsubst pattern, to, string)**

Similar to **subst**, but treat % as a wildcard within *pattern*. Substitute *to* for any word in *string* that matches *pattern*.

### **\$(strip string)**

Remove all extraneous whitespace.

### **\$(findstring substring, mainstring)**

Return *substring* if it exists within *mainstring*; otherwise, return null.

### **\$(filter pattern, string)**

Return those words in *string* that match at least one word in *pattern*. *patterns* may include the wildcard %.

### **\$(filter-out pattern, string)**

Remove those words in *string* that match at least one word in *pattern*.  
*patterns* may include the wildcard %.

**\$(sort *list*)**

Return *list*, sorted in lexical order.

**\$(dir *list*)**

Return the directory part (everything up to the last slash) of each filename in *list*.

**\$(notdir *list*)**

Return the nondirectory part (everything after the last slash) of each filename in *list*.

**\$(suffix *list*)**

Return the suffix part (everything after the last period) of each filename in *list*.

**\$(basename *list*)**

Return everything but the suffix part (everything up to the last period) of each filename in *list*.

**\$(addsuffix *suffix,list*)**

Return each filename given in *list* with *suffix* appended.

**\$(addprefix *prefix,list*)**

Return each filename given in *list* with *prefix* prepended.

**\$(join *list1,list2*)**

Return a list formed by concatenating the two arguments, word by word (e.g., **\$(join a b,.c .o)** becomes **a.c b.o**).

**\$(word *n,string*)**

Return the *n*th word of *string*.

**\$(words *string*)**

Return the number of words in *string*.

**\$(firstword *list*)**

Return the first word in the list *list*.

**\$(wildcard *pattern*)**

Return a list of existing files in the current directory that match *pattern*.

**\$(origin *variable*)**

Return one of the following strings that describes how *variable* was

defined: **undefined, default, environment, environment override, file, command line, override, or automatic.**

### **\$(shell *command*)**

Return the results of *command*. Any newlines in the result are to be converted to spaces. This function works similarly to backquotes in most shells.

### **Macro string substitution**

#### **\$(*macro:s1=s2*)**

Evaluates to the current definition of *\$(macro)*, after substituting the string *s2* for every occurrence of *s1* that occurs either immediately before a blank or tab or at the end of the macro definition.

### **Special target names**

#### **.DEFAULT:**

Commands associated with this target are executed if **make** can't find any description file entries or suffix rules with which to build a requested target.

#### **.EXPORT\_ALL\_VARIABLES:**

If this target exists, export all macros to all child processes.

#### **.IGNORE:**

Ignore error codes. Same as the **-i** option.

#### **.PHONY:**

Always execute commands under a target, even if it is an existing, up-to-date file.

#### **.PRECIOUS:**

Files you specify for this target are not removed when you send a signal (such as an interrupt) that aborts **make** or when a command line in your description file returns an error.

#### **.SILENT:**

Execute commands, but do not echo them. Same as the **-s** option.

#### **.SUFFIXES:**

Suffixes associated with this target are meaningful in suffix rules. If no suffixes are listed, the existing list of suffix rules is effectively "turned off."

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### makedbm [options] infile outfile

NFS/NIS command. Make NIS **dbm** file. **makedbm** takes *infile* and converts it to a pair of files in **ndbm** format, namely *outfile.pag* and *outfile.dir*. Each line of the input file is converted to a single **dbm** record. All characters up to the first TAB or SPACE form the key, and the rest of the line is the data. If line ends with **\&**, the data for that record is continued on to the next line. It is left for the NIS clients to interpret **#**; **makedbm** does not treat it as a comment character. *infile* can be **-**, in which case the standard input is read.

**makedbm** generates a special entry with the key **yp\_last\_modified**, which is the date of *infile* (or the current time, if *infile* is **-**).

### Options

#### **-b**

Interdomain. Propagate a map to all servers using the interdomain name server **named**.

#### **-d yp\_domain\_name**

Create a special entry with the key **yp\_domain\_name**.

#### **-i yp\_input\_file**

Create a special entry with the key **yp\_input\_file**.

#### **-l**

Convert keys of the given map to lowercase.

#### **-m yp\_master\_name**

Create a special entry with the key **yp\_master\_name**. If no master hostname is specified, **yp\_master\_name** is set to the local hostname.

#### **-o yp\_output\_file**

Create a special entry with the key **yp\_output\_name**.

**-s**

Secure map. Accept connections from secure NIS networks only.

**-u dbm filename**

Undo a **dbm** file—print out a **dbm** file, one entry per line, with a single space separating keys from values.

### Example

It is easy to write shell scripts to convert standard files such as */etc/passwd* to the key value form used by **makedbm**. For example, the **awk** program:

```
BEGIN { FS = ":";OFS = "\t";}  
{ print $1, $0}
```

takes the */etc/passwd* file and converts it to a form that can be read by **makdbm** to make the NIS file *passwd.byname*. That is, the key is a username and the value is the remaining line in the */etc/passwd* file.

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### **makemap** [*options*] *type name*

System administration command. Transfer from standard input to **sendmail**'s database maps. Input should be formatted as:

*key value*

You may comment lines with #, may substitute parameters with %**n**, and must escape literal % by entering it as %%. The *type* must be **dbm**, **btree**, or **hash**. The *name* is a filename to which **makemap** appends standard suffixes.

### Options

**-d**

Allow duplicate entries. Valid only with **btree** type maps.

**-f**

Suppress conversion of uppercase to lowercase.

**-N**

Append a zero byte to each key.

**-o**

Append to existing file instead of replacing it.

**-r**

If some keys already exist, replace them. (By default, **makemap** will exit when encountering a duplicated key.)

**-s**

Ignore safety checks.

**-v**

Verbose mode.

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**man** [*options*] [*section*] [*title*]

Display information from the online reference manuals. **man** locates and prints the named *title* from the designated reference *section*.

### Options

**-7, --ascii**

Expect a pure ASCII file, and format it for a 7-bit terminal or terminal emulator.

**-a, --all**

Show all pages matching *title*.

**-b**

Leave blank lines in output.

**-d, --debug**

Display debugging information. Suppress actual printing of manual pages.

**-f, --whatis**

Same as **whatis** command.

**-k, --apropos**

Same as **apropos** command.

**-l, --local-file**

Search local files, not system files, for manual pages. If **i** is given as *filename*, search standard input.

**-m systems, --systems=systems**

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Search *systems'* manual pages. *systems* should be a comma-separated list.

**-p** *preprocessors*, **--preprocessor=preprocessors**

Preprocess manual pages with *preprocessors* before turning them over to **nroff**, **troff**, or **groff**. Always runs **soelim** first.

**-r** *prompt*, **--prompt=prompt**

Set prompt if **less** is used as pager.

**-t**, **--troff**

Format the manual page with `/usr/bin/groff -Tgv -mandoc`. Implied by **-T** and **-Z**.

**-u**, **--update**

Perform a consistency check between manual page cache and filesystem.

**-w**, **--where**, **--location**

Print pathnames of entries on standard output.

**-D**, **--default**

Reset all options to their defaults.

**-L** *locale*, **--locale=locale**

Assume current locale to be *locale*; do not consult the **setlocale()** function.

**-M** *path*, **--manpath=path**

Search for manual pages in *path*. Ignore **-m** option.

**-P** *pager*, **--pager=pager**

Select paging program *pager* to display the entry.

**-T** *device*, **--troff-device[=device]**

Format **groff** or **troff** output for *device*, such as **dvi**, **latin1**, **X75**, and **X100**.

**-Z**, **--ditroff**

Do not allow postprocessing of manual page after **groff** has finished formatting it.

### Section names

Manual pages are divided into sections, depending on their intended audience:

#### 1

Executable programs or shell commands

[XML](#)

**2**

System calls (functions provided by the kernel)

**3**

Library calls (functions within system libraries)

**4**

Special files (usually found in */dev*)

**5**

File formats and conventions (e.g., */etc/passwd*)

**6**

Games

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Macro packages and conventions

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System administration commands (usually only for a privileged user)

**9**

Kernel routines (nonstandard)

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### manpath [options]

Attempt to determine path to manual pages. Check \$MANPATH first; if that is not set, consult */etc/man.conf*, user environment variables, and the current working directory. The **manpath** command is a symbolic link to **man**, but most of the options are ignored for **manpath**.

#### Options

##### **-d, --debug**

Print debugging information.

##### **-h**

Print help message and then exit.

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**merge** [*options*] *file1 file2 file3*

Perform a three-way file merge. **merge** incorporates all changes that lead from *file2* to *file3* and puts the results into *file1*. **merge** is useful for combining separate changes to an original. Suppose *file2* is the original, and both *file1* and *file3* are modifications of *file2*. Then **merge** combines both changes. A conflict occurs if both *file1* and *file3* have changes in a common segment of lines. If a conflict is found, **merge** normally outputs a warning and puts brackets around the conflict, with lines preceded by <<<<<<< and >>>>>>. A typical conflict looks like this:

```
<<<<<<< file1
relevant lines from file1

=====
relevant lines from file3

>>>>>>> file3
```

If there are conflicts, the user should edit the result and delete one of the alternatives.

### Options

**-e**

Don't warn about conflicts.

**-p**Send results to standard output instead of overwriting *file1*.**-q**

Quiet; do not warn about conflicts.

**-A**

Output conflicts using the **-A** style of **diff3**. This merges all changes leading from *file2* to *file3* into *file1* and generates the most verbose output.

**-E**

Output conflict information in a less verbose style than **-A**; this is the default.

**-L label**

Specify up to three labels to be used in place of the corresponding filenames in conflict reports. That is:

```
merge -L x -L y -L z file_a file_b file_c
```

generates output that looks as if it came from *x*, *y*, and *z* instead of from *file\_a*, *file\_b*, and *file\_c*.

**-V**

Print version number.

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### mesg [*option*]

Change the ability of other users to send **write** messages to your terminal. With no options, display the permission status.

#### Options

**n**

Forbid **write** messages.

**y**

Allow **write** messages (the default).

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**mimencode** [*options*] [*filename*] [-**o** *output\_file*]

**mimencode** [*options*] [*filename*] [-**o** *output\_file*]

Translate to and from MIME encoding formats, the proposed standard for Internet multimedia mail formats. By default, **mimencode** reads standard input and sends a base64-encoded version of the input to standard output.

### Options

**-b**

Use the (default) base64 encoding.

**-o** *output\_file*

Send output to the named file rather than to standard output.

**-p**

Translate decoded CRLF sequences into the local newline convention during decoding and do the reverse during encoding; meaningful only when the default base64 encoding is in effect.

**-q**

Use the quoted-printable encoding instead of base64.

**-u**

Decode the standard input rather than encode it.

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### mkdir [options] directories

Create one or more *directories*. You must have write permission in the parent directory in order to create a directory. See also **rmdir**. The default mode of the new directory is 0777, modified by the system or user's **umask**.

#### Options

##### **-m, --mode mode**

Set the access *mode* for new directories. See **chmod** for an explanation of acceptable formats for *mode*.

##### **-p, --parents**

Create intervening parent directories if they don't exist.

##### **--verbose**

Print a message for each directory created.

##### **--help**

Print help message and then exit.

##### **--version**

Print version number and then exit.

#### Examples

Create a read-only directory named **personal**:

```
mkdir -m 444 personal
```

The following sequence:

```
mkdir work; cd work
mkdir junk; cd junk
```

```
mkdir questions; cd ../../
```

can be accomplished by typing this:

```
mkdir -p work/junk/questions
```

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**mke2fs** [*options*] *device* [*blocks*]

**mkfs.ext2** [*options*] *device* [*blocks*]

System administration command. Format *device* as a Linux Second Extended Filesystem. You may specify the number of blocks on the device or allow **mke2fs** to guess.

### Options

**-b** *block-size*

Specify block size in bytes.

**-c**

Scan *device* for bad blocks before execution.

**-f** *fragment-size*

Specify fragment size in bytes.

**-i** *bytes-per-inode*

Create an inode for each *bytes-per-inode* of space. *bytes-per-inode* must be 1024 or greater; it is 4096 by default.

**-l** *filename*

Consult *filename* for a list of bad blocks.

**-m** *percentage*

Reserve *percentage* percent of the blocks for use by privileged users.

**-q**

Quiet mode.

**-v**

Verbose mode.

**-S**

Write only superblock and group descriptors; suppress writing of inode table and block and inode bitmaps. Useful only when attempting to salvage damaged systems.

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**mkfs** [*options*] [*fs-options*] *filesystem* [*blocks*]

System administration command. Construct a filesystem on a device (such as a hard disk partition). *filesystem* is either the name of the device or the mountpoint. **mkfs** is actually a frontend that invokes the appropriate version of **mkfs** according to a filesystem type specified by the **-t** option. For example, a Linux Second Extended Filesystem uses **mkfs.ext2** (which is the same as **mke2fs**); MS-DOS filesystems use **mkfs.msdos**. *fs-options* are options specific to the filesystem type. *blocks* is the size of the filesystem in 1024-byte blocks.

### Options

#### **-v**

Produce verbose output, including all commands executed to create the specific filesystem.

#### **-t *fs-type***

Tells **mkfs** what type of filesystem to construct.

### filesystem-specific options

These options must follow generic options and not be combined with them. Most filesystem builders support these three options:

#### **-c**

Check for bad blocks on the device before building the filesystem.

#### **-l *file***

Read the file *file* for the list of bad blocks on the device.

#### **-v**

Produce verbose output.

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**mkfs.minix** [*options*] *device size*

System administration command. Creates a MINIX filesystem. See **mkfs**.

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### mklost+found

System administration command. Create a *lost+found* directory in the current working directory. Intended for Linux Second Extended Filesystems.

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### mkraid [*options*] *devices*

System administration command. Set up RAID array *devices* as defined in the */etc/raidtab* configuration file. **mkraid** can be used to initialize a new array or upgrade older RAID device arrays for the new kernel. Initialization will destroy any data on the disk devices used to create the array.

#### Options

**-c file, --configfile file**

Use *file* instead of */etc/raidtab*.

**-f, --force**

Initialize the devices used to create the RAID array even if they currently have data.

**-h, --help**

Print a usage message and then exit.

**-o, --upgrade**

Upgrade an older array to the current kernel's RAID version. Preserve data on the old array.

**-V, --version**

Print version information and then exit.

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### mkswap [*option*] *device* [*size*]

System administration command. Create swap space on *device*. You may specify its *size* in blocks; each block is a page of about 4KB.

#### Option

**-c**

Check for bad blocks before creating the swap space.

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### **modprobe** [*options*] [*modules*]

System administration command. With no options, attempt to load the specified module, as well as all modules on which it depends. If more than one module is specified, attempt to load further modules only if the previous module failed to load.

#### Options

##### **-a**

Load all listed modules, not just the first one.

##### **-l** [*pattern*]

List all existing modules. This option may be combined with **-t** to specify a type of module, or you may include a *pattern* to search for.

##### **-r**

Remove the specified modules, as well as the modules on which they depend.

##### **-t** *type*

Load only a specific type of module. Consult */etc/conf.modules* for the directories in which all modules of that type reside.

#### Files

*/etc/conf.modules*

Information about modules: which ones depend on others, which directories correspond to particular types of modules.

*/sbin/insmod, /sbin/rmmod, /sbin/depmod*

Programs that **modprobe** relies on.

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**more** [*options*] [*files*]

Display the named *files* on a terminal, one screenful at a time. See **less** for an alternative to **more**. Some commands can be preceded by a number.

### Options

**+num**

Begin displaying at line number *num*.

**-num number**

Set screen size to *number* lines.

**+/pattern**

Begin displaying two lines before *pattern*.

**-c**

Repaint screen from top instead of scrolling.

**-d**

Display the prompt "Hit space to continue, Del to abort" in response to illegal commands; disable bell.

**-f**

Count logical rather than screen lines. Useful when long lines wrap past the width of the screen.

**-l**

Ignore form-feed (Ctrl-L) characters.

**-p**

Page through the file by clearing each window instead of scrolling. This is sometimes faster.

**-r**

Force display of control characters, in the form ^x.

**-s**

Squeeze; display multiple blank lines as one.

**-u**

Suppress underline characters.

### Commands

All commands in **more** are based on **vi** commands. An argument can precede many commands.

### SPACE

Display next screen of text.

**z**

Display next *lines* of text, and redefine a screenful to *lines* lines. Default is one screenful.

### RETURN

Display next *lines* of text, and redefine a screenful to *lines* lines. Default is one line.

**d, ^D**

Scroll *lines* of text, and redefine scroll size to *lines* lines. Default is one line.

**q, Q, INTERRUPT**

Quit.

**s**

Skip forward one line of text.

**f**

Skip forward one screen of text.

**b, ^B**

Skip backward one screen of text.

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=

Print number of current line.

*/pattern*

Search for *pattern*, skipping to *numth* occurrence if an argument is specified.

**n**

Repeat last search, skipping to *numth* occurrence if an argument is specified.

**!cmd, :!cmd**

Invoke shell and execute *cmd* in it.

**v**

Invoke **vi** editor on the file, at the current line.

**^L**

Redraw screen.

**:n**

Skip to next file.

**:p**

Skip to previous file.

**:f**

Print current filename and line number.

**.**

Reexecute previous command.

## Examples

Page through *file* in "clear" mode, and display prompts:

```
more -cd file
```

Format *doc* to the screen, removing underlines:

```
nroff doc | more -u
```

View the manpage for the **grep** command; begin near the word "BUGS" and compress extra whitespace:

```
man grep | more +/BUGS -s
```

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**mount** [*options*] [*special-device*] [*directory*]

System administration command. Mount a file structure. **mount** announces to the system that a removable file structure is present on *special-device*. The file structure is mounted on *directory*, which must already exist and should be empty; it then becomes the name of the root of the newly mounted file structure. If **mount** is invoked with no arguments, it displays the name of each mounted device, the directory on which it is mounted, whether the file structure is read-only, and the date it was mounted. Only a privileged user can use the **mount** command.

### Options

**-a**

Mount all filesystems listed in */etc/fstab*. Note: this is the only option that cannot take a *special-device* or *node* argument.

**-f**

Fake mount. Go through the motions of checking the device and directory, but do not actually mount the filesystem.

**-n**

Do not record the mount in */etc/mtab*.

**-o option**

Note: this is the only option to **mount** that requires a *special-device* or *node* argument. Qualify the mount with one of the specified *options*:

**async**

Read input and output to the device asynchronously.

**auto**

Allow mounting with the **-a** option.



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**defaults**

Use all options' default values (**async**, **auto**, **dev**, **exec**, **nouser**, **rw**, **suid**).

**dev**

Interpret any special devices that exist on the filesystem.

**exec**

Allow binaries to be executed.

**noauto**

Do not allow mounting via the **-a** option.

**nodev**

Do not interpret any special devices that exist on the filesystem.

**noexec**

Do not allow the execution of binaries on the filesystem.

**nosuid**

Do not acknowledge any **suid** or **sgid** bits.

**nouser**

Only privileged users will have access to the filesystem.

**remount**

Expect the filesystem to have already been mounted, and remount it.

**ro**

Allow read-only access to the filesystem.

**rw**

Allow read/write access to the filesystem.

**suid**

Acknowledge **suid** and **sgid** bits.

**sync**

Read input and output to the device synchronously.

**user**

Allow unprivileged users to mount the filesystem. Note that the defaults on such a system will be **nodev**, **noexec**, and **nosuid**, unless otherwise specified.

### **check=relaxed|normal|strict**

Specify how strictly to regulate the integration of an MS-DOS filesystem when mounting it.

### **conv=binary|text|auto**

Specify method by which to convert files on MS-DOS and ISO 9660 filesystems.

### **debug**

Turn debugging on for MS-DOS and **ext2fs** filesystems.

### **errors=continue|remount|ro|panic**

Specify action to take when encountering an error. **ext2fs** filesystems only.

### **-r**

Mount filesystem read-only.

### **-t type**

Specify the filesystem type. Possible values are: **minix**, **ext**, **ext2**, **xiafs**, **hpfs**, **msdos**, **umsdos**, **vfat**, **proc**, **nfs**, **iso9660**, **smbfs**, **ncpfs**, **affs**, **ufs**, **romfs**, **sysv**, **xenix**, and **coherent**. Note that **ext** and **xiafs** are valid only for kernels older than 2.1.21 and that **sysv** should be used instead of **xenix** and **coherent**.

### **-v**

Display mount information verbosely.

### **-w**

Mount filesystem read/write. This is the default.

## **Files**

### */etc/fstab*

List of filesystems to be mounted and options to use when mounting them.

### */etc/mtab*

List of filesystems that are currently mounted and the options with which they were mounted.

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### rpc.mountd [*options*]

NFS/NIS command. NFS mount request server. **mountd** reads the file */etc/exports* to determine which filesystems are available for mounting by which machines. It also provides information as to what filesystems are mounted by which clients. See also **nfsd**.

#### Options

##### **-d, --debug**

Debug mode. Output all debugging information via **syslogd**.

##### **-f file, --exports-file file**

Read the export permissions from *file* instead of */etc/exports*.

##### **-n, --allow-non-root**

Accept even those mount requests that enter via a non-reserved port.

##### **-p, --promiscuous**

Accept requests from any host that sends them.

##### **-r, --re-export**

Allow re-exportation of imported filesystems.

##### **-v, --version**

Print the version number.

#### File

*/etc/exports*

Information about mount permissions.

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Move or rename files and directories. The source (first column) and target (second column) determine the result (third column):

Source	Target	Result
File	<i>name</i> (nonexistent)	Rename file to <i>name</i> .
File	Existing file	Overwrite existing file with source file.
Directory	<i>name</i> (nonexistent)	Rename directory to <i>name</i> .
Directory	Existing directory	Move directory to be a subdirectory of existing directory.
One or more files	Existing directory	Move files to directory.

### Options

#### **-b, --backup**

Back up files before removing.

#### **-f, --force**

Force the move, even if *target* file exists; suppress messages about restricted access modes.

#### **--help**

Print a help message and then exit.

#### **-i, --interactive**

Query user before removing files.

#### **-u, --update**

Do not remove a file or link if its modification date is the same as or newer than that of its replacement.

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### **-v, --verbose**

Print the name of each file before moving it.

### **--version**

Print version information and then exit.

### **-S suffix, --suffix=suffix**

Override the SIMPLE\_BACKUP\_SUFFIX environment variable, which determines the suffix used for making simple backup files. If the suffix is not set either way, the default is a tilde (~).

### **-V value, --version-control=value**

Override the VERSION\_CONTROL environment variable, which determines the type of backups made. The acceptable values for version control are:

#### **t, numbered**

Always make numbered backups.

#### **nil, existing**

Make numbered backups of files that already have them, simple backups of the others. The default.

#### **never, simple**

Always make simple backups.

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### named [options]

TCP/IP command. Internet domain name server. **named** is used by resolver libraries to provide access to the Internet distributed naming database. With no arguments, **named** reads */etc/named.boot* for any initial data and listens for queries on a privileged port. See RFC 1034 and RFC 1035 for more details.

There are several **named** binaries available at different Linux archives, displaying various behaviors. If your version doesn't behave like the one described here, never fear—it should have come with documentation.

### Options

#### **-d** *debuglevel*

Print debugging information. *debuglevel* is a number indicating the level of messages printed.

#### **-p** *port*

Use *port* as the port number. Default is 42.

#### **[-b]** *bootfile*

File to use instead of *named.boot*. The **-b** is optional and allows you to specify a filename that begins with a leading dash.

### File

#### */etc/named.boot*

Read when **named** starts up.

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**namei** [*options*] *pathname* [*pathname . . .*]

Follow a pathname until a terminal point is found (e.g., a file, directory, char device, etc.). If **namei** finds a symbolic link, it shows the link and starts following it, indenting the output to show the context. **namei** prints an informative message when the maximum number of symbolic links this system can have has been exceeded.

### Options

**-m**

Show the mode bits of each file type in the style of **ls**; for example: "rwxr-xr-x".

**-x**

Show mountpoint directories with a **D**, rather than a **d**.

### File type characters

For each line of output, **namei** prints the following characters to identify the file types found:

**-**

A regular file

**?**

An error of some kind

**b**

A block device

**c**

A character device

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**d**

A directory

**f:**

The pathname **namei** is currently trying to resolve

**l**

A symbolic link (both the link and its contents are output)

**s**

A socket

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**netdate** [*options*] [*protocol*] *hostname...*

TCP/IP command. Set the system time according to the time provided by one of the hosts in the list *hostname*. **netdate** tries to ascertain which host is the most reliable source. When run by an unprivileged user, **netdate** reports the current time, without attempting to set the system clock. You may specify the *protocol*—**udp** (the default) or **tcp**—once, or several times for various hosts.

### Options

**-l** *time*

The most reliable host is chosen from the list by sorting the hosts into groups based on the times they return when questioned. The first host from the largest group is then polled a second time. The differences between its time and the local host's time on each poll are recorded. These two differences are then compared. If the gap between them is greater than *time* (the default is five seconds), the host is rejected as inaccurate.

**-v**

Display the groups into which hosts are sorted.

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### netstat [*options*]

TCP/IP command. Show network status. For all active sockets, print the protocol, the number of bytes waiting to be received, the number of bytes to be sent, the port number, the remote address and port, and the state of the socket.

### Options

- a**  
Show the state of all sockets, not just active ones.
- c**  
Display information continuously, refreshing once every second.
- i**  
Include statistics for network devices.
- n**  
Show network addresses as numbers.
- o**  
Include additional information such as username.
- r**  
Show routing tables.
- t**  
List only TCP sockets.
- u**  
List only UDP sockets.

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**-v**

Print the version number and exit.

**-w**

List only raw sockets.

**-x**

List only Unix domain sockets.

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### newgrp [*group*]

Change user's group identification to the specified group. If no group is specified, change to the user's login group. The new group is then used for checking permissions.

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**newusers** *file*

System administration command. Create or update system users from entries in *file*. Each line in *file* has the same format as an entry in */etc/passwd*, except passwords are unencrypted, and group IDs can be given as a name or number. During an update, the password age field is ignored if the user already exists in the */etc/shadow* password file. If a group name or ID does not already exist, it will be created. If a home directory does not exist, it will be created.

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### rpc.nfsd [options]

System administration command. Daemon that starts the NFS server daemons that handle client filesystem requests. These daemons are user-level processes. The options are exactly the same as in **mountd**.

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**nice** [*option*] [*command*] [*arguments*]

Execute a *command* (with its *arguments*) with lower priority (i.e., be "nice" to other users). With no arguments, **nice** prints the default scheduling priority (niceness). If **nice** is a child process, it prints the parent process's scheduling priority. Niceness has a range of -20 (highest priority) to 19 (lowest priority).

### Options

#### --help

Print a help message and then exit.

#### -n *adjustment*, -*adjustment*, --**adjustment**=*adjustment*

Run *command* with niceness incremented by *adjustment* (1-19); default is 10. A privileged user can raise priority by specifying a negative *adjustment* (e.g., -5).

#### --version

Print version information and then exit.

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**nm** [*options*] [*objfiles*]

Print the symbol table (name list) in alphabetical order for one or more object files. If no object files are specified, perform operations on *a.out*. Output includes each symbol's value, type, size, name, and so on. A key letter categorizing the symbol can also be displayed. If no object file is given, use *a.out*.

### Options

**-a, --debug-syms**

Print debugger symbols.

**-f format**

Specify output format (**bsd**, **sysv**, or **posix**). Default is **bsd**.

**-g, --extern-only**

Print external symbols only.

**-n, -v, --numeric-sort**

Sort the external symbols by address.

**-p, --no-sort**

Don't sort the symbols at all.

**-r, --reverse-sort**

Sort in reverse, alphabetically or numerically.

**--size-sort**

Sort by size.

**-u, --undefined-only**

Report only the undefined symbols.

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**-A, -o, -print-file-name**

Print input filenames before each symbol.

**-C, --demangle**

Translate low-level symbol names into readable versions.

**-D, --dynamic**

Print dynamic, not normal, symbols. Useful only when working with dynamic objects (some kinds of shared libraries, for example).

**-P, --portability**

Same as **-f posix**.

**-V, --version**

Print **nm**'s version number on standard error.

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### ps [*options*]

Report on active processes. Note that you do not need to include a - before options. In options, *list* arguments should either be separated by commas or be put in double quotes. In comparing the amount of output produced, note that **e** prints more than **a** and **l** prints more than **f**.

### Options

#### *pids*

Include only specified processes, which are given in a comma-delimited list.

#### **a**

List all processes.

#### **c**

Consult **task\_struct** for command name.

#### **e**

Include environment.

#### **f**

"Forest" family tree format.

#### **h**

Suppress header.

#### **j**

Jobs format.

#### **l**

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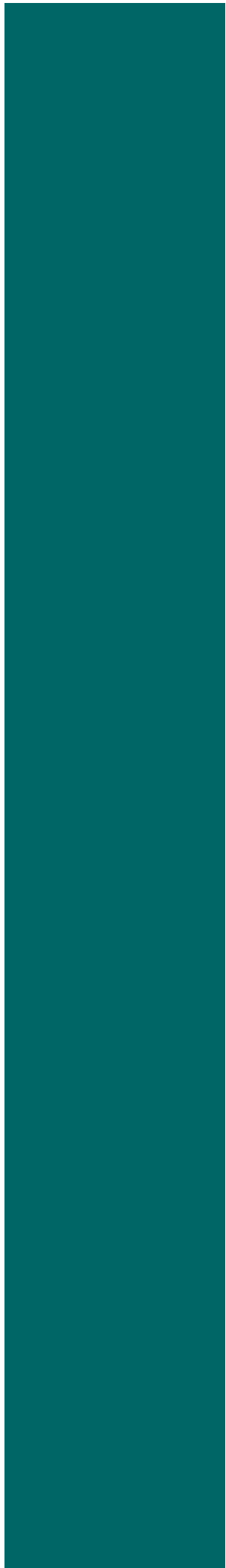
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- m** Produce a long listing.
- n** Memory format.
- r** Print user IDs and WCHAN numerically.
- s** Exclude processes that are not running.
- sortdelimiter**[+|-]key[, [+|-]key[,...]]
- ttty** Similar to **O**, but designed to protect multiletter sort keys. See the later list, "Sort keys".
- u** Display only processes running on *tty*.
- v** Include username and start time.
- vm** **vm** format.
- w** Wide format. Don't truncate long lines.
- x** Include processes without an associated terminal.
- O**[+|-]key[, [+|-]key[,...]] Sort processes. (See the following list, "Sort keys.")
- +** Return key to default direction.
- Reverse default direction on key.
- S** Include child processes' CPU time and page faults.



[XML](#)

## Sort keys

### **c, cmd**

Name of executable.

### **C, cmdline**

Whole command line.

### **f, flags**

Flags.

### **g, pgrp**

Group ID of process.

### **G, tpgid**

Group ID of associated tty.

### **j, cutime**

Cumulative user time.

### **J, cstime**

Cumulative system time.

### **k, utime**

User time.

### **K, stime**

System time.

### **m, minflt**

Number of minor page faults.

### **M, majflt**

Amount of major page faults.

### **n, cminflt**

Total minor page faults.

### **N, cmajflt**

Total major page faults.

### **o, session**

Session ID.

### **p, pid**

Process ID.

**P, ppid**

Parent's process ID.

**r, rss**

Resident set size.

**R, resident**

Resident pages.

**s, size**

Kilobytes of memory used.

**S, share**

Number of shared pages.

**t, tty**

tty.

**T, start\_time**

Process's start time.

**U, uid**

User ID.

**u, user**

User's name.

**v, vsize**

Bytes of VM used.

**y, priority**

Kernel's scheduling priority.

**Fields**

**PRI**

Process's scheduling priority. A higher number indicates lower priority.

**NI**

Process's **nice** value. A higher number indicates less CPU time.

**SIZE**



Size of virtual image.

## **RSS**

Resident set size (amount of physical memory), in kilobytes.

## **WCHAN**

Kernel function in which process resides.

## **STAT**

Status:

### **R**

Runnable

### **T**

Stopped

### **D**

Asleep and not interruptible

### **S**

Asleep

### **Z**

Zombie

### **W**

No resident pages (second field)

### **N**

Positive **nice** value (third field)

## **TT**

Associated tty.

## **PAGEIN**

Number of major page faults.

## **TRS**

Size of resident text.

## **SWAP**

Amount of swap used, in kilobytes.

## **SHARE**

Shared memory.

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### psupdate [*mapfile*]

System administration command. Update the **psupdate** database (on some systems */boot/psupdate*; on others, */etc/psdatabase*), which contains information about the kernel image system map file. If no *mapfile* is specified, **psupdate** uses the default (which is either */usr/src/linux/vmlinux* or */usr/src/linux/tools/zSystem*, depending on the distribution).

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System administration command. Remove corrupt or duplicate entries in the */etc/passwd* and */etc/shadow* files. **pwck** will prompt for a "yes" or "no" before deleting entries. If the user replies "no," the program will exit. Alternate *passwd* and *shadow files* can be checked. If correctable errors are found, the user will be encouraged to run the **usermod** command.

**Option****-n**

Noninteractive mode. Don't prompt for input, and delete no entries. Return appropriate exit status.

**Exit status****0**

Success.

**1**

Syntax error.

**2**

One or more bad password entries found.

**3**

Could not open password files.

**4**

Could not lock password files.

**5**

Could not write password files.

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System administration command. Convert unshadowed entries in */etc/passwd* into shadowed entries in the */etc/shadow* file. Replace the encrypted password in */etc/passwd* with an x. Shadowing passwords keeps them safe from password cracking programs. **pwconv** creates additional expiration information for the */etc/shadow* file from entries in your */etc/login.defs* file. If you add new entries to the */etc/passwd* file, you can run **pwconv** again to transfer the new information to */etc/shadow*. Already shadowed entries are ignored. **pwunconv** restores the encrypted passwords to your */etc/passwd* file and removes the */etc/shadow* file. Some expiration information is lost in the conversion.

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### pwd

Print the full pathname of the current working directory. See also the **dirs** shell command, built in to both **bash** and **csh/tcsh**.

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### quota [*options*] [*user/group*]

Display disk usage and total space allowed for a designated user or group. With no argument, the quota for the current user is displayed. This command reports quotas for all filesystems listed in */etc/fstab*.

#### Options

**-g**

Given with a *user* argument, display the quotas for the groups of which the user is a member, instead of the user's quotas.

**-q**

Display information only for filesystems in which the user is over quota.

**-u**

The default behavior. When used with **-g**, display both user and group quota information.

**-v**

Display quotas for filesystems even if no storage is currently allocated.

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**raidstart** [*options*] [*devices*]

**raidstop** [*options*] [*devices*]

System administration command. Start or stop RAID *devices* as defined in the RAID configuration file, */etc/raidtab*. If option **-a** (or **--all**) is used, no *devices* need to be given; the command will be applied to all the devices defined in the configuration file.

### Options

**-a, --all**

Apply command to all devices defined in the RAID configuration file.

**-c file, --configfile file**

Use *file* instead of */etc/raidtab*.

**-h, --help**

Print usage message and exit.

**-V, --version**

Print version and exit.

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**ramsize** [*option*] [*image* [*size* [*offset*]]]

System administration command. If no options are specified, print usage information for the RAM disk. The pair of bytes at offset 504 in the kernel image normally specify the RAM size; with a kernel *image* argument, print the information found at that offset. To change that information, specify a new *size* (in kilobytes). You may also specify a different *offset*. Note that **rdev -r** is the same as **ramsize**.

### Option

**-o** *offset*

Same as specifying an *offset* as an argument.

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**ranlib** *filename*

Generate an index for archive file *filename*. Same as running **ar -s**.

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### rarp [*options*]

System administration command. Administer the Reverse Address Resolution Protocol table (usually */proc/net/rarp*).

#### Options

##### **-a** [*hostname*]

Show all entries. If *hostname* is specified, show only the entries relevant to *hostname*, which may be a list.

##### **-d** *hostname*

Remove the entries relevant to *hostname*, which may be a list.

##### **-s** *hostname hw\_addr*

Add a new entry for *hostname*, with the hardware address *hw\_addr*.

##### **-t** *type*

Check only for *type* entries when consulting or changing the table. *type* may be **ether** (the default) or **ax25**.

##### **-v**

Verbose mode.

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**rcp** [*options*] *file1 file2*

**rcp** [*options*] *file ... directory*

Copy files between two machines. Each *file* or *directory* is either a remote filename of the form *rname@rhost:path* or a local filename.

### Options

**-k**

Attempt to get tickets for remote host; query **krb\_realmofhost** to determine realm.

**-p**

Preserve modification times and modes of the source files.

**-r**

If any of the source files are directories, **rcp** copies each subtree rooted at that name. The destination must be a directory.

**-x**

Turns on DES encryption for all data passed by **rcp**.

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**rdate** [*options*] [*host...*]

TCP/IP command. Retrieve the date and time from a host or hosts on the network and optionally set the local system time.

### Options

**-p**

Print the retrieved dates.

**-s**

Set the local system time from the host; must be specified by root.

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**rdev** [*options*] [*image* [*value* [*offset*]]]

System administration command. If no arguments are specified, display a line, in */etc/mtab* syntax, that describes the root filesystem. Otherwise, change the values of the bytes in the kernel image that describe the RAM disk size (by default located at decimal byte offset 504 in the kernel), VGA mode (default 506), and root device (default 508). You must specify the kernel *image* to change and may specify a new *value* and a different *offset*.

### Options

**-o** *offset*

Same as specifying an *offset* as an argument. The offset is given in decimal.

**-r**

Behave like **ramsize**.

**-s**

Behave like **swapdev**.

**-v**

Behave like **vidmode**.

**-R**

Behave like **rootflags**.

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**rdist** [*options*] [*names*]

System administration command. Remote file distribution client program. **rdist** maintains identical copies of files over multiple hosts. It reads commands from a file named *distfile* to direct the updating of files and/or directories. An alternative *distfile* can be specified with the **-f** option or the **-c** option.

### Options

**-a** *num*

Do not update filesystems with fewer than *num* bytes free.

**-c** *name* [*login@*]*host[:dest]*

Interpret the arguments as a small *distfile*, where *login* is the user to log in as, *host* is the destination host, *name* is the local file to transfer, and *dest* is the remote name where the file should be installed.

**-d** *var=value*

Define *var* to have *value*. This option defines or overrides variable definitions in the *distfile*. Set the variable *var* to *value*.

**-f** *file*

Read input from *file* (by default, *distfile*). If *file* is **-**, read from standard input.

**-l** *options*

Specify logging options on the local machine.

**-m** *machine*

Update only *machine*. May be specified multiple times for multiple machines.

**-n**

Suppress normal execution. Instead, print the commands that would have been executed.

**-options**

Specify one or more *options*, which must be comma-separated.

**chknfs**

Suppress operations on files that reside on NFS filesystems.

**chkreadonly**

Check filesystem to be sure it is not read-only before attempting to perform updates.

**chksym**

Do not update files that exist on the local host but are symbolic links on the remote host.

**compare**

Compare files; use this comparison rather than age as the criteria for determining which files should be updated.

**follow**

Interpret symbolic links, copying the file to which the link points instead of creating a link on the remote machine.

**ignlnks**

Ignore links that appear to be unresolvable.

**nochkgroup**

Do not update a file's group ownership unless the entire file needs updating.

**nochkmode**

Do not update file mode unless the entire file needs updating.

**nochkowner**

Do not update file ownership unless the entire file needs updating.

**nodescend**

Suppress recursive descent into directories.

**noexec**

Suppress **rdist** of executables that are in *a.out* format.

**numchkgroup**

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Check group ownership by group ID instead of by name.

### **numchkowner**

Check file ownership by user ID instead of by name.

### **quiet**

Quiet mode; do not print commands as they execute.

### **remove**

Remove files that exist on the remote host but not the local host.

### **savetargets**

Save updated files in *name.old*.

### **verify**

Print a list of all files on the remote machine that are out of date, but do not update them.

### **whole**

Preserve directory structure by creating subdirectories on the remote machine. For example, if you **rdist** the file */foo/bar* into the directory */baz*, it would produce the file */baz/foo/bar*, instead of the default, */baz/bar*.

### **younger**

Do not update files that are younger than the master files.

### **-p path**

Specify the path to search for **rdistd** on the remote machine.

### **-t seconds**

Specify the timeout period (default 900 seconds) after which **rdist** will sever the connection if the remote server has not yet responded.

### **-A num**

Specify the minimum number of inodes that **rdist** requires.

### **-D**

Debugging mode.

### **-F**

Execute all commands sequentially, without forking.

### **-L options**

Specify logging options on the remote machine.

**-M** *num*

Do not allow more than *num* child **rdist** processes to run simultaneously.  
Default is 4.

**-P** *path*

Specify path to **rsh** on the local machine.

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### **rdistd** options

System administration command. Start the **rdist** server. Note that you *must* specify the **-S** option, unless you are simply querying for version information with **-V**.

#### Options

**-D**

Debugging mode.

**-S**

Start the server.

**-V**

Display the version number and exit immediately.

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### reboot [*options*]

System administration command. Close out filesystems, shut down the system, then reboot the system. Because this command immediately stops all processes, it should be run only in single-user mode. If the system is not in runlevel 0 or 6, **reboot** calls **shutdown -nf**.

#### Options

**-d**

Suppress writing to */var/log/wtmp*.

**-f**

Call **reboot** even when **shutdown** would normally be called.

**-n**

Suppress normal call to **sync**.

**-w**

Suppress normal execution; simply write to */var/log/wtmp*.

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**renice** [*priority*] [*options*] [*target*]

Control the scheduling priority of various processes as they run. May be applied to a process, process group, or user (*target*). A privileged user may alter the priority of other users' processes. *priority* must, for ordinary users, lie between 0 and the environment variable PRIO\_MAX (normally 20), with a higher number indicating increased niceness. A privileged user may set a negative priority, as low as PRIO\_MIN, to speed up processes.

### Options

**+num**

Specify number by which to increase current priority of process, rather than an absolute priority number.

**-num**

Specify number by which to decrease current priority of process, rather than an absolute priority number.

**-g**

Interpret *target* parameters as process group IDs.

**-p**

Interpret *target* parameters as process IDs (default).

**-u**

Interpret *target* parameters as usernames.

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**reset**

Clear screen (reset terminal).

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Reverse the lines of a file onto standard output. The order of characters on each line is also reversed. If no file is specified, **rev** reads from standard input.

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### rexecd *command-line*

TCP/IP command. Server for the **rexec** routine, providing remote execution facilities with authentication based on usernames and passwords. **rexecd** is started by **inetd** and must have an entry in **inetd**'s configuration file, */etc/inetd.conf*. When **rexecd** receives a service request, the following protocol is initiated:

0. The server reads characters from the socket up to a null byte. The resulting string is interpreted as an ASCII number, base 10.
1. If the number received in step 1 is nonzero, it is interpreted as the port number of a secondary stream to be used for stderr. A second connection is then created to the specified port on the client's machine.
2. A null-terminated username of at most 16 characters is retrieved on the initial socket.
3. A null-terminated, unencrypted password of at most 16 characters is retrieved on the initial socket.
4. A null-terminated command to be passed to a shell is retrieved on the initial socket. The length of the command is limited by the upper bound on the size of the system's argument list.
5. **rexecd** then validates the user, as is done at login time and, if the authentication was successful, changes to the user's home directory and establishes the user and group protections of the user.
6. A null byte is returned on the connection associated with stderr, and the command line is passed to the normal login shell of the user. The shell inherits the network connections established by **rexecd**.

### Diagnostics

#### Username too long

Name is longer than 16 characters.

#### Password too long

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Password is longer than 16 characters.

**Command too long**

Command passed is too long.

**Login incorrect**

No password file entry for the username exists.

**Password incorrect**

Wrong password was supplied.

**No remote directory**

**chdir** to home directory failed.

**Try again**

**fork** by server failed.

**<shellname>:...**

**fork** by server failed. User's login shell could not be started.

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### **rlogin** *rhost* [*options*]

Remote login. **rlogin** connects the terminal on the current local host system to the remote host system *rhost*. The remote terminal type is the same as your local terminal type. The terminal or window size is also copied to the remote system if the server supports it.

#### Options

**-8**

Allow an 8-bit input data path at all times.

**-ec**

Specify escape character *c* (default is ~).

**-d**

Debugging mode.

**-k**

Attempt to get tickets from remote host, requesting them in the realm as determined by **krb\_realm-ofhost**.

**-l** *username*

Specify a different *username* for the remote login. Default is the same as your local username.

**-x**

Turns on DES encryption for all data passed via the **rlogin** session.

**-E**

Do not interpret any character as an escape character.

**-K**

Suppress all Kerberos authentication.

**-L**

Allow **rlogin** session to be run without any output postprocessing (i.e., run in **litout** mode).

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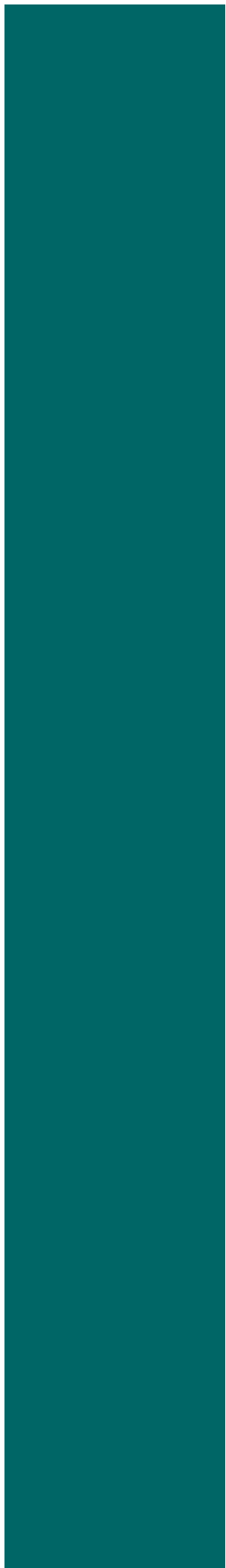
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### rlogind [options]

TCP/IP command. Server for the **rlogin** program, providing a remote login facility, with authentication based on privileged port numbers from trusted hosts. **rlogind** is invoked by **inetd** when a remote login connection is requested and executes the following protocol:

- The server checks the client's source port. If the port is not in the range 0-023, the server aborts the connection.
- The server checks the client's source address and requests the corresponding hostname. If the hostname cannot be determined, the dot-notation representation of the host address is used.

The login process propagates the client terminal's baud rate and terminal type, as found in the environment variable, TERM.

### Options

**-a**

Verify hostname.

**-l**Do not authenticate hosts via a nonroot *.rhosts* file.**-n**

Suppress keep-alive messages.

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### rm [options] files

Delete one or more *files*. To remove a file, you must have write permission in the directory that contains the file, but you need not have permission on the file itself. If you do not have write permission on the file, you will be prompted (**y** or **n**) to override.

#### Options

##### **-d, --directory**

Remove directories, even if they are not empty. Available only to a privileged user.

##### **-f, --force**

Remove write-protected files without prompting.

##### **--help**

Print a help message and then exit.

##### **-i, --interactive**

Prompt for **y** (remove the file) or **n** (do not remove the file).

##### **-r, -R, --recursive**

If *file* is a directory, remove the entire directory and all its contents, including subdirectories. Be forewarned: use of this option can be dangerous.

##### **-v, --verbose**

Turn on verbose mode. (**rm** prints the name of each file before removing it.)

##### **--version**

Print version information and then exit.

--

Mark the end of options. Use this when you need to supply a filename beginning with -.

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**rmail** *user...*

TCP/IP command. Handle remote mail received via **uucp**, collapsing **From** lines in the form generated by **mail** into a single line of the form **return-path!sender** and passing the processed mail onto **sendmail**. **rmail** is explicitly designed for use with **uucp** and **sendmail**.

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### rmdir [*options*] *directories*

Delete the named *directories* (not the contents). *directories* are deleted from the parent directory and must be empty (if not, **rm -r** can be used instead). See also **mkdir**.

#### Options

##### --help

Print a help message and then exit.

##### --ignore-fail-on-non-empty

Ignore failure to remove directories that are not empty.

##### -p, --parents

Remove *directories* and any intervening parent directories that become empty as a result; useful for removing subdirectory trees.

##### --verbose

Turn on verbose mode; print message for each directory as it is processed.

##### --version

Print version information and then exit.

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### rmmod [*option*] *modules*

System administration command. Unload a module or list of modules from the kernel. This command is successful only if the specified modules are not in use and no other modules are dependent on them.

#### Option

**-r**

Recursively remove stacked modules (all modules that use the specified module).

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**rootflags** [*option*] *image* [*flags* [*offset*]]

System administration command. Sets *flags* for a kernel *image*. If no arguments are specified, print *flags* for the kernel image. *flags* is a 2-byte integer located at offset 498 in a kernel *image*. Currently the only effect of *flags* is to mount the root filesystem in read-only mode if *flags* is non-zero. You may change *flags* by specifying the kernel *image* to change, the new *flags*, and the byte-offset at which to place the new information (the default is 498). Note that **rdev -R** is a synonym for **rootflags**. If LILO is used, **rootflags** is not needed. *flags* can be set from the LILO prompt during a boot.

### Option

**-o** *offset*

Same as specifying an *offset* as an argument.

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**route** [*option*] [*command*]

TCP/IP command. Manually manipulate the routing tables normally maintained by **routed**. **route** accepts two commands: **add**, to add a route, and **del**, to delete a route. The two commands have the following syntax:

```
add [-net | -host] address [gw gateway]
    [netmask mask] [mss tcp-mss] [dev device]
del address
```

*address* is treated as a plain route unless **-net** is specified or *address* is found in */etc/networks*. **-host** can be used to specify that *address* is a plain route whether or not it is found in */etc/networks*. The keyword *default* means to use this route for all requests if no other route is known. You can specify the *gateway* through which to route packets headed for that address, its *netmask*, TCP *mss*, and the *device* with which to associate the route. Only a privileged user may modify the routing tables.

If no command is specified, **route** prints the routing tables.

### Option

**-n**

Show numerical addresses; do not look up hostnames. (Useful if DNS is not functioning properly.)

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### routed [options] [logfile]

TCP/IP command. Network routing daemon. **routed** is invoked by a privileged user at boot time to manage the Internet routing tables. The routing daemon uses a variant of the Xerox NS Routing Information Protocol in maintaining up-to-date kernel routing-table entries. When **routed** is started, it uses the SIOCGIFCONF **ioctl** call to find those directly connected interfaces configured into the system and marked up. **routed** transmits a REQUEST packet on each interface, then enters a loop, listening for REQUEST and RESPONSE packets from other hosts. When a REQUEST packet is received, **routed** formulates a reply based on the information maintained in its internal tables. The generated RESPONSE packet contains a list of known routes. Any RESPONSE packets received are used to update the routing tables as appropriate.

When an update is applied, **routed** records the change in its internal tables, updates the kernel routing table, and generates a RESPONSE packet reflecting these changes to all directly connected hosts and networks.

### Options

**-d**

Debugging mode. Log additional information to the *logfile*.

**-g**

Offer a route to the default destination.

**-q**

Opposite of **-s** option.

**-s**

Force **routed** to supply routing information, whether it is acting as an internetwork router or not.

**-t**

Stop **routed** from going into background and releasing itself from the

controlling terminal, so that interrupts from the keyboard will kill the process.

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### rpcgen [*options*] *file*

Parse *file*, which should be written in the RPC language, and produce a program written in C that implements the RPC code. Place header code generated from *file.x* in *file.h*, XDR routines in *file\_xdr.c*, server code in *file\_svc.c*, and client code in *file\_clnt.c*. Lines preceded by % are not parsed. By default, **rpcgen** produces SunOS 4.1-compatible code.

**-a**

Produce all files (client and server).

**-5**

Produce SVR4-compatible code.

**-c**

Create XDR routines. Cannot be used with other options.

**-C**

Produce ANSI C code (default).

**-Dname[=*value*]**

Define the symbol *name*, and set it equal to *value* or 1.

**-h**

Produce a header file. With **-T**, make the file support RPC dispatch tables. Cannot be used with other options.

**-I**

Produce an **inetd**-compatible server.

**-K secs**



Specify amount of time that the server should wait after replying to a request and before exiting. Default is 120. A *secs* of -1 prevents the program from ever exiting.

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**-l**

Produce client code. Cannot be used with other options.

**-m**

Produce server code only, suppressing creation of a "main" routine. Cannot be used with other options.

**-N**

New style. Allow multiple arguments for procedures. Not necessarily backward compatible.

**-o [file]**

Print output to *file* or standard output.

**-Ss**

Create skeleton server code only.

**-t**

Create RPC dispatch table. Cannot be used with other options.

**-T**

Include support for RPC dispatch tables.

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**rpcinfo** [*options*] [*host*] [*program*] [*version*]

NFS/NIS command. Report RPC information. *program* can be either a name or a number. If a *version* is specified, **rpcinfo** attempts to call that version of the specified *program*. Otherwise, it attempts to find all the registered version numbers for the specified *program* by calling Version 0, and it attempts to call each registered version.

### Options

**-b** *program version*

Make an RPC broadcast to the specified *program* and *version*, using UDP, and report all hosts that respond.

**-d** *program version*

Delete the specified *version* of *program's* registration. Can be executed only by the user who added the registration or a privileged user.

**-n** *portnum*

Use *portnum* as the port number for the **-t** and **-u** options, instead of the port number given by the portmapper.

**-p** [*host*]

Probe the portmapper on *host* and print a list of all registered RPC programs. If *host* is not specified, it defaults to the value returned by **hostname**.

**-t** *host program [version]*

Make an RPC call to *program* on the specified *host*, using TCP, and report whether a response was received.

**-u** *host program [version]*

Make an RPC call to *program* on the specified *host*, using UDP, and

report whether a response was received.

## Examples

To show all of the RPC services registered on the local machine, use:

```
$ rpcinfo -p
```

To show all of the RPC services registered on the machine named **klaxon**, use:

```
$ rpcinfo -p klaxon
```

To show all machines on the local net that are running the Network Information Service (NIS), use:

```
$ rpcinfo -b ypserv version | uniq
```

where *version* is the current NIS version obtained from the results of the **-p** switch earlier in this list.

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### rpm [options]

The Red Hat Package Manager. A freely available packaging system for software distribution and installation. RPM packages are built, installed, and queried with the **rpm** command. For detailed information on **rpm**, see Chapter 5.

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**rsh** [*options*] *host* [*command*]

Execute *command* on remote host, or, if no command is specified, begin an interactive shell on the remote host using **rlogin**.

### Options

**-d**

Enable socket debugging.

**-k**

Cause **rsh** to obtain tickets for the remote host in realm instead of the remote host's realm as determined by **krb\_realmofhost(3)**.

**-l *username***

Attempt to log in as *username*. By default, the name of the user executing **rsh** is used.

**-n**

Redirects the input to **rsh** from the special device */dev/null*. (This should be done when backgrounding **rsh** from a shell prompt, to direct the input away from the terminal.)

**-x**

Turns on DES encryption for all data exchange.

**-K**

Suppress Kerberos authentication.

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### rshd [options]

TCP/IP command. Remote shell server for programs such as **rcmd** and **rcp**, which need to execute a noninteractive shell on remote machines. **rshd** is started by **inetd** and must have an entry in **inetd**'s configuration file, */etc/inetd.conf*.

All options are exactly the same as those in **rlogind**, except for **-L**, which is unique to **rshd**.

#### Option

##### **-L**

Log all successful connections and failed attempts via **syslogd**.

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**rstat** *host*

TCP/IP command. Summarize *host's* system status: the current time, uptime, and load averages—the average number of jobs in the run queue. Queries the remote host's **rstat\_svc** daemon.

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**sleep** *amount*[*units*]

Wait a specified *amount* of time before executing another command. The default for *units* is seconds.

Time	Units
<i>s</i>	seconds
<i>m</i>	minutes
<i>h</i>	hours
<i>d</i>	days

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### sort [*options*] [*files*]

Sort the lines of the named *files*. Compare specified fields for each pair of lines, or, if no fields are specified, compare them by byte, in machine collating sequence. See also **uniq**, **comm**, and **join**.

#### Options

##### **-b**

Ignore leading spaces and tabs.

##### **-c**

Check whether *files* are already sorted, and, if so, produce no output.

##### **-d**

Sort in dictionary order.

##### **-f**

Fold—ignore uppercase/lowercase differences.

##### **--help**

Print a help message and then exit.

##### **-i**

Ignore nonprinting characters (those outside ASCII range 040-176).

##### **-m**

Merge (i.e., sort as a group) input files.

##### **-n**

Sort in arithmetic order.

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#### **-o** *file*

Put output in *file*.

#### **-r**

Reverse the order of the sort.

#### **-tc**

Separate fields with *c* (default is a tab).

#### **-u**

Identical lines in input file appear only one (unique) time in output.

#### **-z** *recsz*

Provide *recsz* bytes for any one line in the file. This option prevents abnormal termination of **sort** in certain cases.

#### **+n** [*-m*]

Skip *n* fields before sorting, and sort up to field position *m*. If *m* is missing, sort to end of line. Positions take the form *a.b*, which means character *b* of field *a*. If *.b* is missing, sort at the first character of the field.

#### **-k** *n[,m]*

Similar to **+**. Skip *n-1* fields and stop at *m-1* fields (i.e., start sorting at the *n*th field, where the fields are numbered beginning with 1).

#### **--version**

Print version information and then exit.

#### **-M**

Attempt to treat the first three characters as a month designation (JAN, FEB, etc.). In comparisons, treat JAN < FEB and any valid month as less than an invalid name for a month.

#### **-T** *tempdir*

Directory pathname to be used for temporary files.

### Examples

List files by decreasing number of lines:

```
wc -l * | sort -r
```

Alphabetize a list of words, remove duplicates, and print the frequency of each word:

```
sort -fd wordlist | uniq -c
```

Sort the password file numerically by the third field (user ID):

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```
sort +2n -t: /etc/passwd
```

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**split** [*option*] [*infile*] [*outfile*]

Split *infile* into equal-sized segments. *infile* remains unchanged, and the results are written to *outfileaa*, *outfileab*, and so on. (default is **xaa**, **xab**, etc.). If *infile* is - (or missing), standard input is read. See also **csplit**.

### Options

**-n, -l *n*, --lines=*n***

Split *infile* into *n*-line segments (default is 1000).

**-b *n*[*bkm*], --bytes=*n*[*bkm*]**

Split *infile* into *n*-byte segments. Alternate blocksizes may be specified:

**b**

512 bytes

**k**

1 kilobyte

**m**

1 megabyte

**-C *bytes*[*bkm*], --line-bytes=*bytes*[*bkm*]**

Put a maximum of *bytes* into file; insist on adding complete lines.

**--help**

Print a help message and then exit.

**--verbose**

Print a message for each output file.



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**--version**

Print version information and then exit.

-

Take input from the standard input.

**Examples**

Break *bigfile* into 1000-line segments:

```
split bigfile
```

Join four files, then split them into 10-line files named *new.aa*, *new.ab*, and so on. Note that without the -, **new.** would be treated as a nonexistent input file:

```
cat list[1-4] | split -10 - new.
```

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**stat** *filename* [*filenames* . . . ]

Print out the contents of an inode as they appear to the **stat** system call in a human-readable format. The error messages "Can't stat file" or "Can't lstat file" usually mean the file doesn't exist. "Can't readlink file" generally indicates that something is wrong with a symbolic link.

### Output

Sample output from the command:

```
stat /
File: "/"
Size: 1024           Filetype: Directory
```

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```
Mode: (0755/drwxr-xr-x)  Uid: (  0/  root) Gid: (  0/  system)
Device: 3,3    Inode: 2          Links: 21
Access: Tue Apr 11 04:02:01 2000(00000.11:47:35)
Modify: Wed Nov 17 11:46:38 1999(00146.03:02:58)
Change: Wed Nov 17 11:46:38 1999(00146.03:02:58)
```

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**strace** [*options*] *command* [*arguments*]

Trace the system calls and signals for *command* and *arguments*. **strace** shows you how data is passed between the program and the system kernel. With no options, **strace** prints a line to **stderr** for each system call. It shows the call name, arguments given, the return value, and any error messages generated. A signal is printed with both its signal symbol and a descriptive string.

### Options

**-a** *n*

Align the return values in column *n*.

**-c**

Count all calls and signals and create a summary report when the program has ended.

**-d**

Debug mode. Print debugging information for **strace** on **stderr**.

**-e** *keyword*[*=[!]values*]

Pass an expression to **strace** to limit the types of calls or signals that are traced or change how they are displayed. The values for these expressions can be given as a comma-separated list. Preceding the list with an exclamation mark (!) negates the list. The special *values* of **all** and **none** are valid, as are the *values* listed with the following *keywords*.

**abbrev**=*names*

Abbreviate output from large structures for system calls listed in *names*.

**read**=*descriptors*

Print all data read from the given file *descriptors*.



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Trace the listed signal *symbols* (for example, **signal**=SIGIO,SIGHUP).

**trace=values**

Trace the listed *values*. *values* may be a list of system call names or one of the following sets of system calls:

<b>file</b>	Calls that take a filename as an argument
<b>ipc</b>	Interprocess communication
<b>network</b>	Network-related
<b>process</b>	Process management
<b>signal</b>	Signal-related

**verbose=names**

Unabbreviate structures for the given system call *names*. Default is **none**.

**write=descriptors**

Print all data written to the given file *descriptors*.

**-f**

Trace forked processes.

**-ff**

Write system calls for forked processes to separate files named *filename.pid* when using the **-o** option.

**-h**

Print help and exit.

**-i**

Print instruction pointer with each system call.

**-o filename**

Write output to *filename* instead of **stderr**. If *filename* starts with the pipe symbol `|`, treat the rest of the name as a command to which output should be piped.

**-O n**

Override **strace**'s built-in timing estimates, and just subtract *n* microseconds from the timing of each system call to adjust for the time it takes to measure the `strentry>` call.

**-p pid**

Attach to the given process ID and begin tracking. **strace** can track more than one process if more than one option **-p** is given. Type Ctrl-c to end the trace.

**-q**

Quiet mode. Suppress attach and detach messages from **strace**.

**-r**

Relative timestamp. Print time in microseconds between system calls.

**-s n**

Print only the first *n* characters of a string. Default value is 32.

**-S value**

Sort output of **-c** option by the given *value*. *value* may be **calls**, **name**, **time**, or **nothing**. By default it is sorted by **time**.

**-T**

Print time spent in each system call.

**-t**

Print time of day on each line of output.

**-tt**

Print time of day with microseconds on each line of output.

**-ttt**

Print timestamp on each line as number of seconds since the Epoch.

**-u username**

Run command as *username*. Needed when tracing **setuid** and **setgid** programs.

**-V**

Print version and exit.

**-v**

Verbose. Do not abbreviate structure information.

**-x**

Print all non-ASCII strings in hexadecimal.

**-xx**

Print all strings in hexadecimal.

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**strfile** [*options*] *input\_file* [*output\_file*]

**unstr** [**-c** *delimiter*] *input\_file*[*.ext*] [*output\_file*]

**strfile** creates a random-access file for storing strings. The input file should be a file containing groups of lines separated by a line containing a single percent sign (or other specified delimiter character). **strfile** creates an output file that contains a header structure and a table of file offsets for each group of lines, allowing random access of the strings. The output file, if not specified on the command line, is named *sourcefile.dat*. **unstr** undoes the work of **strfile**, printing out the strings contained in the input file in the order that they are listed in the header file data. If no output file is specified, **unstr** prints to standard output; otherwise, it prints to the file specified. **unstr** can also globally change the delimiter character in a strings file.

### Options

Of the following options, only **-c** can be used with **unstr**. All other options apply to **strfile** alone.

#### **-c** *delimiter*

Change the delimiting character from the percent sign to *delimiter*. Valid for both **strfile** and **unstr**.

#### **-i**

Ignore case when ordering the strings.

#### **-o**

Order the strings alphabetically.

#### **-r**

Randomize access to the strings.

#### **-s**

Run silently; don't give a summary message when finished.

**-x**

Set the STR\_ROTATED bit in the header *str\_flags* field.

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### strings [options] files

Search each *file* specified and print any printable character strings found that are at least four characters long and followed by an unprintable character.

#### Options

##### **-a, --all**

Scan entire object files; default is to scan only the initialized and loaded sections for object files.

##### **-f, --print-file-name**

Print the name of the file before each string.

##### **-min-len, -n min-len, --bytes=min-len**

Print only strings that are at least *min-len* characters.

##### **-t base, --radix=base**

Print the offset within the file before each string, in the format specified by *base*:

**d**

Decimal

**o**

Octal

**x**

Hexadecimal

##### **--target=format**

Specify an alternative object code format to the system default.

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**-o**

Same as **-t o**.

**--help**

Print help message and then exit.

**-v, --version**

Print version information and then exit.

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### strip [options] files

Remove symbols from object *files*, thereby reducing file sizes and freeing disk space.

#### Options

**-F format, --target=format**

Expect the input file to be in the format *format*.

**-O format, --output-target=format**

Write output file in *format*.

**-R section, --remove-section=section**

Delete *section*.

**-s, --strip-all**

Strip all symbols.

**-S, -g, --strip-debug**

Strip debugging symbols.

**-x, --discard-all**

Strip nonglobal symbols.

**-X, --discard-locals**

Strip local symbols that were generated by the compiler.

**-v, --verbose**

Verbose mode.

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**stty** [*options*] [*modes*]

Set terminal I/O options for the current standard input device. Without options, **stty** reports the terminal settings that differ from those set by running **stty sane**, where a ^ indicates the Ctrl key and ^\ indicates a null value. Most modes can be negated using an optional - (shown in brackets). The corresponding description is also shown in brackets. Some arguments use non-POSIX extensions; these are marked with a \*.

### Options

**-a, --all**

Report all option settings.

**-g**

Report settings in hex.

### Control modes

*n*

Set terminal baud rate to *n* (e.g., 2400).

**[-]clocal**

[Enable] disable modem control.

**[-]cread**

[Disable] enable the receiver.

**csbits**

Set character size to *bits*, which must be 5, 6, 7, or 8.

**[-]cstopb**

[1] 2 stop bits per character.

### **[-]hup**

[Do not] hang up connection on last close.

### **[-]hupcl**

Same as previous.

### **ispeed *n***

Set terminal input baud rate to *n*.

### **ospeed *n***

Set terminal output baud rate to *n*.

### **[-]parenb**

[Disable] enable parity generation and detection.

### **[-]parodd**

Use [even] odd parity.

### **[-]crtcts\***

[Disable]enable RTS/CTS handshaking.

## **Flow control modes**

The following flow control modes are available by combining the *ortsfl*, *ctsflow*, and *rtsflow* flags:

Flag Settings	Flow Control Mode
<i>ortsfl rtsflow ctsflow</i>	Enable unidirectional flow control.
<i>ortsfl rtsflow -ctsflow</i>	Assert RTS when ready to send.
<i>ortsfl -rtsflow ctsflow</i>	No effect.
<i>ortsfl -rtsflow -ctsflow</i>	Enable bidirectional flow control.
<i>-ortsfl rtsflow ctsflow</i>	Enable bidirectional flow control.
<i>-ortsfl rtsflow -ctsflow</i>	No effect.
<i>-ortsfl -rtsflow ctsflow</i>	Stop transmission when CTS drops.
<i>-ortsfl -rtsflow -ctsflow</i>	Disable hardware flow control.

## **Input modes**

### **[-]brkint**

[Do not] signal INTR on break.

### **[-]icrnl**

[Do not] map CR to NL on input.

### **[-]ignbrk**

[Do not] ignore break on input.

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### **[-]igncr**

[Do not] ignore CR on input.

### **[-]ignpar**

[Do not] ignore parity errors.

### **[-]inlcr**

[Do not] map NL to CR on input.

### **[-]inpck**

[Disable] enable input parity checking.

### **[-]istrip**

[Do not] strip input characters to 7 bits.

### **[-]iuclc\***

[Do not] map uppercase to lowercase on input.

### **[-]ixany\***

Allow [XON] any character to restart output.

### **[-]ixoff [-]tandem**

[Do not] send START/STOP characters when queue is nearly empty/full.

### **[-]ixon**

[Disable] enable START/STOP output control.

### **[-]parmrk**

[Do not] mark parity errors.

### **[-]imaxbel\***

When input buffer is too full to accept a new character, [flush the input buffer] beep without flushing the input buffer.

## **Output modes**

### **bsn**

Select style of delay for backspaces (0 or 1).

### **crn**

Select style of delay for carriage returns (0-3).

### **ffn**

Select style of delay for formfeeds (0 or 1).

**nl**

Select style of delay for linefeeds (0 or 1).

**tabn**

Select style of delay for horizontal tabs (0-3).

**vtn**

Select style of delay for vertical tabs (0 or 1).

**[-]ocrnl\***

[Do not] map CR to NL on output.

**[-]ofdel\***

Set fill character to [NULL] DEL.

**[-]ofill\***

Delay output with [timing] fill characters.

**[-]olcuc\***

[Do not] map lowercase to uppercase on output.

**[-]onlcr\***

[Do not] map NL to CR-NL on output.

**[-]onlret\***

On the terminal, NL performs [does not perform] the CR function.

**[-]onocr\***

Do not [do] output CRs at column 0.

**[-]opost**

[Do not] postprocess output.

**Local modes**

**[-]echo**

[Do not] echo every character typed.

**[-]echoe, [-]crterase**

[Do not] echo ERASE character as BS-space-BS string.

**[-]echok**

[Do not] echo NL after KILL character.

**[-]echonl**



[Do not] echo NL.

### **[-]icanon**

[Disable] enable canonical input (ERASE, KILL, WERASE, and RPRINT processing).

### **[-]ixten**

[Disable] enable extended functions for input data.

### **[-]isig**

[Disable] enable checking of characters against INTR, SUSPEND, and QUIT.

### **[-]noflsh**

[Enable] disable flush after INTR or QUIT.

### **[-]tostop\***

[Do not] send SIGTTOU when background processes write to the terminal.

### **[-]xcase\***

[Do not] change case on local output.

### **[-]echoprt, [-]prterase\***

When erasing characters, echo them backward, enclosed in \ and /.

### **[-]echoctl. [-]ctlecho\***

Do not echo control characters literally. Use hat notation (e.g., **^Z**).

### **[-]echoke [-]crtkill\***

Erase characters as specified by the **echoprt** and **echoe** settings (default is **echoctl** and **echok** settings).

## **Control assignments**

### *ctrl-char c*

Set control character to *c*. *ctrl-char* is **dsusp** (flush input and then send stop), **eof**, **eol**, **eol2** (alternate end-of-line), **erase**, **intr**, **lnext** (treat next character literally), **kill**, **rprnt** (redraw line), **quit**, **start**, **stop**, **susp**, **swtch**, or **werase** (erase previous word). *c* can be a literal control character, a character in hat notation (e.g., **^Z**), in hex (must begin with 0x), in octal (must begin with 0), or in decimal. Disable the control character with values of **^-** or **undef**.

### **min n**

Set the minimum number of characters that will satisfy a read until the time value has expired when **-icanon** is set.

### **time *n***

Set the number of tenths of a second before reads time out if the **min** number of characters have not been read when **-icanon** is set.

### **line *i***

Set line discipline to *i* (1-126).

## **Combination modes**

### **cooked**

Same as **-raw**.

### **[-]evenp [-]parity**

Same as [-]parenb and cs[8]7.

### **[-]parity**

Same as [-]parenb and cs[8]7.

### **ek**

Reset ERASE and KILL characters to Ctrl-h and Ctrl-u, their defaults.

### **[-]lcase**

[Un] set **xcase**, **iucl**, and **olcuc**.

### **[-]LCASE**

Same as [-]lcase.

### **[-]nl**

[Un] set **icrnl** and **onlcr**. **-nl** also unsets **inlcr**, **igncr**, **ocrnl**, and **onlret**, **icrnl**, **onlcr**.

### **[-]oddp**

Same as [-]parenb, [-]parodd, and cs7[8].

### **[-]raw**

[Disable] enable raw input and output (no ERASE, KILL, INTR, QUIT, EOT, SWITCH, or output postprocessing).

### **sane**

Reset all modes to reasonable values.

### **[-]tabs\***

[Expand to spaces] preserve output tabs.

### **[-]cbreak**

Same as **-icanon**.

### **[*-*]pass8**

Same as **-parenb -istrip cs8**.

### **[*-*]litout**

Same as **-parenb -istrip cs8**.

### **[*-*]decctlq\***

Same as **-ixany**.

### **crt**

Same as **echoe echoctl echoke**.

### **dec**

Same as **echoe echoctl echoke -ixany**. Additionally, set INTERRUPT to ^C, ERASE to DEL, and KILL to ^U.

## **Special settings**

### **ispeed** *speed*

Specify input speed.

### **ospeed** *speed*

Specify output speed.

### **rows** *rows\**

Specify number of rows.

### **cols** *columns, columns columns\**

Specify number of columns.

### **size\***

Display current row and column settings.

### **line** *discipline\**

Specify line discipline.

### **speed**

Display terminal speed.

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**su** [*option*] [*user*] [*shell\_args*]

Create a shell with the effective user-ID *user*. If no *user* is specified, create a shell for a privileged user (that is, become a superuser). Enter *EOF* to terminate. You can run the shell with particular options by passing them as *shell\_args* (e.g., if the shell runs **sh**, you can specify **-c command** to execute *command* via **sh** or **-r** to create a restricted shell).

### Options

**-, -l, --login**

Go through the entire login sequence (i.e., change to *user's* environment).

**-c command, --command=command**

Execute *command* in the new shell and then exit immediately. If *command* is more than one word, it should be enclosed in quotes—for example:

```
su -c 'find / -name \*.c -print' nobody
```

**-f, --fast**

Start shell with **-f** option. In **csh** and **tcsh**, this suppresses the reading of the *.cshrc* file. In **bash**, this suppresses filename pattern expansion.

**-m, -p, --preserve-environment**

Do not reset environment variables.

**-s shell, --shell=shell**

Execute *shell*, not the shell specified in */etc/passwd*, unless *shell* is restricted.

**--help**

Print a help message and then exit.

**--version**

Print version information and then exit.

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**sum** [*options*] *files*

Calculate and print a checksum and the number of (1KB) blocks for *file*. Useful for verifying data transmission.

### Options

**-r**

The default setting. Use the BSD checksum algorithm.

**-s, --sysv**

Use alternate checksum algorithm as used on System V. The blocksize is 512 bytes.

**--help**

Print a help message and then exit.

**--version**

Print the version number and then exit.

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**swapdev** [*option*] [*image* [*swapdevice* [*offset*]]]

System administration command. If no arguments are given, display usage information about the swap device. If just the location of the kernel *image* is specified, print the information found there. To change that information, specify the new *swapdevice*. You may also specify the *offset* in the kernel image to change. Note that **rdev -s** is a synonym for **swapdev**.

### Option

**-o** *offset*

Synonymous to specifying an *offset* as an argument.

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### swapoff -a | *device* ...

System administration command. Stop making the listed *devices* available for swapping and paging.

#### Option

**-a**

Consult */etc/fstab* for devices marked **sw**. Use those in place of the *device* argument.

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System administration command. Make the listed *devices* available for swapping and paging.

### Options

**-a**

Consult */etc/fstab* for devices marked **sw**. Use those in place of the *device* argument.

**-p** *priority*

Specify a *priority* for the swap area. Higher priority areas will be used up before lower priority areas are used.

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System administration command. Write filesystem buffers to disk. **sync** executes the **sync()** system call. If the system is to be stopped, **sync** must be called to ensure filesystem integrity. Note that **shutdown** automatically calls **sync** before shutting down the system. **sync** may take several seconds to complete, so the system should be told to **sleep** briefly if you are about to manually call **halt** or **reboot**. Note that **shutdown** is the preferred way to halt or reboot your system, since it takes care of **sync**-ing and other housekeeping for you.

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### syslogd

System administration command. **syslogd**, the Linux program that provides **syslogd** functionality, behaves exactly like the BSD version of **syslogd**. The difference should be completely transparent to the user. However, **syslogd** is coded very differently and supports a slightly extended syntax. It is invoked as **syslogd**. See also **klogd**.

#### Options

##### **-d**

Turn on debugging.

##### **-f configfile**

Specify alternate configuration file.

##### **-h**

Forward messages from remote hosts to forwarding hosts.

##### **-l hostlist**

Specify hostnames that should be logged with just their hostname, not their fully qualified domain name. Multiple hosts should be separated with a colon (:).

##### **-m markinterval**

Select number of minutes between mark messages.

##### **-n**

Avoid autobackgrounding. This is needed when starting **syslogd** from **init**.

##### **-p socket**

Send log to *socket* instead of */dev/log*.

**-r**

Receive messages from the network using an Internet domain socket with the **syslog** service.

**-s** *domainlist*

Strip off domain names specified in *domainlist* before logging. Multiple domain names should be separated by a colon (:).

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### syslogd

TCP/IP command. Log system messages into a set of files described by the configuration file `/etc/syslog.conf`. Each message is one line. A message can contain a priority code, marked by a number in angle braces at the beginning of the line. Priorities are defined in `<sys/syslog.h>`. **syslogd** reads from an Internet domain socket specified in `/etc/services`. To bring **syslogd** down, send it a terminate signal.

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### systat [*options*] *host*

System administration command. Get information about the network or system status of a remote host by querying its **netstat**, **systat**, or **daytime** service.

#### Options

##### **-n, --netstat**

Specifically query the host's **netstat** service.

##### **-p port, --port port**

Specify port to query.

##### **-s, --systat**

Specifically query the host's **systat** service.

##### **-t, --time**

Specifically query the host's **daytime** service.

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**tac** [*options*] [*file*]

Named for the common command **cat**, **tac** prints files in reverse. Without a filename or with -, it reads from standard input. By default, it reverses the order of the lines, printing the last line first.

### Options

**-b, --before**

Print separator (by default a newline) before string that it delimits.

**-r, --regex**

Expect separator to be a regular expression.

**-s string, --separator=string**

Specify alternate separator (default is newline).

**--help**

Print a help message and then exit.

**--version**

Print version information and then exit.

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**tail** [*options*] [*file*]

Print the last 10 lines of the named *file* (or standard input if - is specified) on standard output.

### Options

**-n[k]**

Begin printing at *n*th item from end-of-file. *k* specifies the item to count: **l** (lines, the default), **b** (blocks), or **c** (characters).

**-k**

Same as **-n**, but use the default count of 10.

**+n[k]**

Like **-n**, but start at *n*th item from beginning of file.

**+k**

Like **-k**, but count from beginning of file.

**-c num{bkm}, --bytes num{bkm}**

Print last *num* bytes. An alternate blocksize may be specified:

**b**

512 bytes

**k**

1 kilobyte

**m**

1 megabyte

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**-f**

Don't quit at the end of file; "follow" file as it grows. End when user presses Ctrl-C.

**-n num, --lines num**

Print last *num* lines.

**-q, --quiet, --silent**

Suppress filename headers.

**--version**

Print version information and then exit.

**Examples**

Show the last 20 lines containing instances of **.Ah**:

```
grep '\.Ah ' file | tail -20
```

Show the last 10 characters of variable **name**:

```
echo "$name" | tail -c
```

Print the last two blocks of **bigfile**:

```
tail -2b bigfile
```

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### talk *person* [*ttyname*]

Talk to another user. *person* is either the login name of someone on your own machine or *user@host* on another host. To talk to a user who is logged in more than once, use *ttyname* to indicate the appropriate terminal name. Once communication has been established, the two parties may type simultaneously, with their output appearing in separate windows. To redraw the screen, type Ctrl-L. To exit, type your interrupt character; **talk** then moves the cursor to the bottom of the screen and restores the terminal.

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### talkd [option]

TCP/IP command. Remote user communication server. **talkd** notifies a user that somebody else wants to initiate a conversation. A **talk** client initiates a rendezvous by sending a CTL\_MSG of type LOOK\_UP to the server. This causes the server to search its invitation tables for an existing invitation for the client. If the lookup fails, the caller sends an ANNOUNCE message, causing the server to broadcast an announcement on the callee's login ports requesting contact. When the callee responds, the local server responds with the rendezvous address, and a stream connection is established through which the conversation takes place.

### Option

#### -d

Write debugging information to the **syslogd** log file.

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**tar** [*options*] [*tarfile*] [*other-files*]

Copy *files* to or restore *files* from an archive medium. If any *files* are directories, **tar** acts on the entire subtree. Options need not be preceded by - (though they may be). The exception to this rule is when you are using a long-style option (such as **--modification-time**). In that case, the exact syntax is:

```
tar --long-option -function-options files
```

For example:

```
tar --modification-time -xvf tarfile.tar
```

### Function options

You must use exactly one of these, and it must come before any other options:

#### **-c, --create**

Create a new archive.

#### **-d, --compare**

Compare the files stored in *tarfile* with *other-files*. Report any differences: missing files, different sizes, different file attributes (such as permissions or modification time).

#### **-r, --append**

Append *other-files* to the end of an existing archive.

#### **-t, --list**

Print the names of *other-files* if they are stored on the archive (if *other-files* are not specified, print names of all files).

#### **-u, --update**

Add files if not in the archive or if modified.

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**-x, --extract, --get**

Extract *other-files* from an archive (if *other-files* are not specified, extract all files).

**-A, --catenate, --concatenate**

Concatenate a second tar file on to the end of the first.

**Options**

*n*

Select device *n*, where *n* is 0,...,9999. The default is found in */etc/default/tar*.

*[drive][density]*

Set drive (0-7) and storage density (**l**, **m**, or **h**, corresponding to low, medium, or high).

**--atime-preserve**

Preserve original access time on extracted files.

**-b, --block-size=*n***

Set block size to *n* x 512 bytes.

**--checkpoint**

List directory names encountered.

**--exclude=*file***

Remove *file* from any list of files.

**-f *arch*, --file=*filename***

Store files in or extract files from archive *arch*. Note that *filename* may take the form *hostname:filename*.

**--force-local**

Interpret filenames in the form *hostname:filename* as local files.

**-g, --listed-incremental**

Create new-style incremental backup.

**-h, --dereference**

Dereference symbolic links.

**-i, --ignore-zeros**

Ignore zero-sized blocks (i.e., EOFs).

**--ignore-failed-read**

Ignore unreadable files to be archived. Default behavior is to exit when encountering these.

**-k, --keep-old-files**

When extracting files, do not overwrite files with similar names. Instead, print an error message.

**-l, --one-file-system**

Do not archive files from other file systems.

**-m, --modification-time**

Do not restore file modification times; update them to the time of extraction.

**--null**

Allow filenames to be null-terminated with **-T**. Override **-C**.

**--old, --portability, --preserve**

Equivalent to invoking both the **-p** and **-s** options.

**-p, --same-permissions, --preserve-permissions**

Keep ownership of extracted files same as that of original permissions.

**--remove-files**

Remove originals after inclusion in archive.

**--rsh-command=*command***

Do not connect to remote host with **rsh**; instead, use *command*.

**-s, --same-order, --preserve-order**

When extracting, sort filenames to correspond to the order in the archive.

**--totals**

Print byte totals.

**--use-compress-program=*program***

Compress archived files with *program*, or uncompress extracted files with *program*.

**-v, --verbose**

Verbose. Print filenames as they are added or extracted.

**-w, --interactive**

Wait for user confirmation (**y**) before taking any actions.

**-z, --gzip, --ungzip**

Compress files with **gzip** before archiving them, or uncompress them with **gunzip** before extracting them.

**-C, --directory=directory**

**cd** to *directory* before beginning **tar** operation.

**-F, --info-script, --new-volume-script=script**

Implies **-M** (multiple archive files). Run *script* at the end of each file.

**-G, --incremental**

Create old-style incremental backup.

**-K file, --starting-file file**

Begin **tar** operation at file *file* in archive.

**-L, --tape-length=length**

Write a maximum of *length* x 1024 bytes to each tape.

**-M, --multivolume**

Expect archive to multivolume. With **-c**, create such an archive.

**-N date, --after-date date**

Ignore files older than *date*.

**-O, --to-stdout**

Print extracted files on standard out.

**-P, --absolute-paths**

Do not remove initial slashes (/) from input filenames.

**-R, --record-number**

Display archive's record number.

**-S, --sparse**

Treat short file specially and more efficiently.

**-T filename, --files-from filename**

Consult *filename* for files to extract or create.

**-V name, --label=name**

Name this volume *name*.

**-W, --verify**

Check archive for corruption after creation.

**-X file, --exclude file**

Consult *file* for list of files to exclude.

**-Z, --compress, --uncompress**

Compress files with **compress** before archiving them, or uncompress them with **uncompress** before extracting them.

## Examples

Create an archive of */bin* and */usr/bin* (**c**), show the command working (**v**), and store on the tape in */dev/rmt0*:

```
tar cvf /dev/rmt0 /bin /usr/bin
```

List the tape's contents in a format like **ls -l**:

```
tar tvf /dev/rmt0
```

Extract the */bin* directory:

```
tar xvf /dev/rmt0 /bin
```

Create an archive of the current directory and store it in a file *backup.tar*:

```
tar cvf - `find . -print` > backup.tar
```

(The **-** tells **tar** to store the archive on standard output, which is then redirected.)

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## tcpd

TCP/IP command. Monitor incoming TCP/IP requests (such as those for **telnet**, **ftp**, **finger**, **exec**, **rlogin**). Provide checking and logging services; then pass the request to the appropriate daemon.

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### tcpdchk [options]

TCP/IP command. Consult the TCP wrapper configuration (in */etc/hosts.allow* and */etc/hosts.deny*); display a list of all possible problems with it; attempt to suggest possible fixes.

#### Options

##### -a

Include a list of rules; do not require an ALLOW keyword before allowing sites to access the local host.

##### -d

Consult *./hosts.allow* and *./hosts.deny* instead of */etc/hosts.allow* and */etc/hosts.deny*.

##### -i *conf-file*

Specify location of *inetd.conf* or *tliid.conf* file. These are files that **tcpdchk** automatically uses in its evaluation of TCP wrapper files.

##### -v

Verbose mode.

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### tcpdmatch [*options*] *daemon client*

TCP/IP command. Predict the TCP wrapper's response to a specific request. You must specify which *daemon* the request is made to (the syntax may be *daemon@host* for requests to remote machines) and the *client* from which the request originates (the syntax may be *user@client* for a specific user or a wildcard). Consult */etc/hosts.allow* and */etc/hosts.deny* to determine the TCP wrapper's actions.

### Options

#### -d

Consult *./hosts.allow* and *./hosts.deny* instead of */etc/hosts.allow* and */etc/hosts.deny*.

#### -i *conf-file*

Specify location of *inetd.conf* or *tlid.conf* file. These are files that **tcpdmatch** automatically uses in its evaluation of TCP wrapper files.

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**tcsh** [*options*] [*file* [*arguments*]]

An extended version of the C shell, a command interpreter into which all other commands are entered. For more information, see Chapter 8.

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### tee [*options*] *files*

Accept output from another command and send it both to the standard output and to *files* (like a T or fork in a road).

#### Options

##### **-a, --append**

Append to *files*; do not overwrite.

##### **-i, --ignore-interrupts**

Ignore interrupt signals.

##### **--help**

Print a help message and then exit.

##### **--version**

Print version information and then exit.

#### Example

```
ls -l | tee savefile
```

*View listing and save for later*

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System administration command. Signal **init** to change the system's runlevel. **telinit** is actually just a link to **init**, the ancestor of all processes.

**Option****-t** *seconds*

Send SIGKILL *seconds* after SIGTERM. Default is 20.

**Runlevels**

The default runlevels vary from distribution to distribution, but these are standard:

**0**

Halt the system.

**1, s, S**

Single user.

**6**

Reboot the system.

**a, b, c**

Process only entries in */etc/inittab* that are marked with run level **a**, **b**, or **c**.

**q, Q**

Reread */etc/inittab*.

Check the */etc/inittab* file for runlevels on your system.



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**telnet** [*options*] [*host* [*port* ]]

Access remote systems. **telnet** is the user interface that communicates with another host using the Telnet protocol. If **telnet** is invoked without *host*, it enters command mode, indicated by its prompt, **telnet**>, and accepts and executes the commands listed after the following options. If invoked with arguments, **telnet** performs an **open** command (shown in the following list) with those arguments. *host* indicates the host's official name. *port* indicates a port number (default is the Telnet port).

### Options

**-a**

Automatic login into the remote system.

**-d**

Turn on socket-level debugging.

**-e** [*escape\_char*]

Set initial **telnet** escape character to *escape\_char*. If *escape\_char* is omitted, there will be no predefined escape character.

**-l** *user*

When connecting to remote system and if remote system understands ENVIRON, send *user* to the remote system as the value for variable USER.

**-n** *tracefile*

Open *tracefile* for recording the trace information.

**-r**

Emulate **rlogin**: the default escape character is a tilde (~); an escape character followed by a dot causes **telnet** to disconnect from the remote

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host; a ^Z instead of a dot suspends **telnet**; and a ] (the default **telnet** escape character) generates a normal **telnet** prompt. These codes are accepted only at the beginning of a line.

**-8**

Request 8-bit operation.

**-E**

Disable the escape character functionality.

**-L**

Specify an 8-bit data path on output.

**-S tos**Set the IP type-of-service (TOS) option for the Telnet connection to the value *tos*.**Commands****CTRL-Z**Suspend **telnet**.**! [command]**Execute a single command in a subshell on the local system. If *command* is omitted, an interactive subshell will be invoked.**? [command]**

Get help. With no arguments, print a help summary. If a command is specified, print the help information for just that command.

**close**

Close a Telnet session and return to command mode.

**display argument ...**Display all, or some, of the **set** and **toggle** values.**environ [arguments [...]]**Manipulate variables that may be sent through the TELNET ENVIRON option. Valid arguments for **environ** are:**?**Get help for the **environ** command.**define variable value**Define *variable* to have a value of *value*.**undefine variable**

Remove *variable* from the list of environment variables.

### **export** *variable*

Mark *variable* to have its value exported to the remote side.

### **unexport** *variable*

Mark *variable* to not be exported unless explicitly requested by the remote side.

### **list**

Display current variable values.

### **logout**

If the remote host supports the **logout** command, close the **telnet** session.

### **mode** [*type*]

Depending on state of Telnet session, *type* is one of several options:

#### **?**

Print out help information for the **mode** command.

### **character**

Disable TELNET LINEMODE option, or, if remote side does not understand the option, enter "character-at-a-time" mode.

### **[-]edit**

Attempt to [disable] enable the EDIT mode of the TELNET LINEMODE option.

### **[-]isig**

Attempt to [disable]enable the TRAPSIG mode of the LINEMODE option.

### **line**

Enable LINEMODE option, or, if remote side does not understand the option, attempt to enter "old line-by-line" mode.

### **[-]softtabs**

Attempt to [disable] enable the SOFT\_TAB mode of the LINEMODE option.

### **[-]litecho**

[Disable]enable LIT\_ECHO mode.

### **open**[-*l user*] *host* [*port*]

Open a connection to the named *host*. If no *port* number is specified, attempt to contact a Telnet server at the default port.

### **quit**

Close any open Telnet session and then exit **telnet**.

### **status**

Show current status of **telnet**. This includes the peer one is connected to as well as the current mode.

### **send arguments**

Send one or more special character sequences to the remote host. Following are the arguments that may be specified:

#### **?**

Print out help information for **send** command.

#### **abort**

Send Telnet ABORT sequence.

#### **ao**

Send Telnet AO sequence, which should cause the remote system to flush all output from the remote system to the user's terminal.

#### **ayt**

Send Telnet AYT (Are You There) sequence.

#### **brk**

Send Telnet BRK (Break) sequence.

#### **do cmd**

#### **dont cmd**

#### **will cmd**

#### **wont cmd**

Send Telnet DO *cmd* sequence, where *cmd* is a number between 0 and 255 or a symbolic name for a specific **telnet** command. If *cmd* is **?** or **help**, this command prints out help (including a list of symbolic names).

#### **ec**

Send Telnet EC (Erase Character) sequence, which causes the remote system to erase the last character entered.

#### **el**

Send Telnet EL (Erase Line) sequence, which causes the remote system to erase the last line entered.

### **eof**

Send Telnet EOF (End Of File) sequence.

### **eor**

Send Telnet EOR (End Of Record) sequence.

### **escape**

Send current Telnet escape character (initially ^).

### **ga**

Send Telnet GA (Go Ahead) sequence.

### **getstatus**

If the remote side supports the Telnet STATUS command, **getstatus** sends the subnegotiation request that the server send its current option status.

### **ip**

Send Telnet IP (Interrupt process) sequence, which causes the remote system to abort the currently running process.

### **nop**

Send Telnet NOP (No operation) sequence.

### **susp**

Send Telnet SUSP (Suspend process) sequence.

### **synch**

Send Telnet SYNCH sequence, which causes the remote system to discard all previously typed (but not read) input.

### **set** *argument value*

### **unset** *argument value*

Set any one of a number of **telnet** variables to a specific value or to **TRUE**. The special value **off** disables the function associated with the variable. **unset** disables any of the specified functions. The values of variables may be interrogated with the aid of the **display** command. The variables that may be specified are:

### **?**

Display legal **set** and **unset** commands.

### **ayt**

If **telnet** is in LOCALCHARS mode, this character is taken to be the alternate AYT character.

### **echo**

This is the value (initially **^E**) which, when in "line-by-line" mode, toggles between doing local echoing of entered characters and suppressing echoing of entered characters.

### **eof**

If **telnet** is operating in LINEMODE or in the old "line-by-line" mode, entering this character as the first character on a line will cause the character to be sent to the remote system.

### **erase**

If **telnet** is in LOCALCHARS mode and operating in the "character-at-a-time" mode, then when this character is entered, a Telnet EC sequence will be sent to the remote system.

### **escape**

This is the Telnet escape character (initially **^[]**), which causes entry into the Telnet command mode when connected to a remote system.

### **flushoutput**

If **telnet** is in LOCALCHARS mode and the **flushoutput** character is entered, a Telnet AO sequence is sent to the remote host.

### **forw1**

If Telnet is in LOCALCHARS mode, this character is taken to be an alternate end-of-line character.

### **forw2**

If Telnet is in LOCALCHARS mode, this character is taken to be an alternate end-of-line character.

### **interrupt**

If Telnet AO is in LOCALCHARS mode and the **interrupt** character is entered, a Telnet IP sequence is sent to the remote host.

### **kill**

If Telnet IP is in LOCALCHARS mode and operating in the "character-at-a-time" mode, then when this character is entered, a Telnet EL sequence is sent to the remote system.

### **lnext**

If Telnet EL is in LINEMODE or in the old "line-by-line" mode, then this character is taken to be the terminal's **lnext** character.

### **quit**

If Telnet EL is in LOCALCHARS mode and the **quit** character is



entered, a Telnet BRK sequence is sent to the remote host.

### **reprint**

If Telnet BRK is in LINEMODE or in the old "line-by-line" mode, this character is taken to be the terminal's **reprint** character.

### **rlogin**

Enable **rlogin** mode. Same as using **-r** command-line option.

### **start**

If the Telnet TOGGLE-FLOW-CONTROL option has been enabled, this character is taken to be the terminal's **start** character.

### **stop**

If the Telnet TOGGLE-FLOW-CONTROL option has been enabled, this character is taken to be the terminal's **stop** character.

### **susp**

If Telnet is in LOCALCHARS mode, or if the LINEMODE is enabled and the **suspend** character is entered, a Telnet SUSP sequence is sent to the remote host.

### **tracefile**

File to which output generated by **netdata** is written.

### **worderase**

If Telnet BRK is in LINEMODE or in the old "line-by-line" mode, this character is taken to be the terminal's **worderase** character. Defaults for these are the terminal's defaults.

### **slc** [*state*]

Set state of special characters when Telnet LINEMODE option has been enabled.

### **?**

List help on the **slc** command.

### **check**

Verify current settings for current special characters. If discrepancies are discovered, convert local settings to match remote ones.

### **export**

Switch to local defaults for the special characters.

### **import**

Switch to remote defaults for the special characters.

### **toggle arguments [...]**

Toggle various flags that control how Telnet responds to events. The flags may be set explicitly to **true** or **false** using the **set** and **unset** commands listed previously. The valid arguments are:

**?**

Display legal **toggle** commands.

### **autoflush**

If **autoflush** and LOCALCHARS are both **true**, then when the **ao** or **quit** characters are recognized, Telnet refuses to display any data on the user's terminal until the remote system acknowledges that it has processed those Telnet sequences.

### **autosynch**

If **autosynch** and LOCALCHARS are both **true**, then when the **intr** or **quit** character is entered, the resulting Telnet sequence sent is followed by the Telnet SYNCH sequence. Initial value for this **toggle** is **false**.

### **binary**

Enable or disable the Telnet BINARY option on both the input and the output.

### **inbinary**

Enable or disable the Telnet BINARY option on the input.

### **outbinary**

Enable or disable the Telnet BINARY option on the output.

### **crlf**

If this **toggle** value is **true**, carriage returns are sent as **CR-LF**. If **false**, carriage returns are sent as **CR-NUL**. Initial value is **false**.

### **crmod**

Toggle carriage return mode. Initial value is **false**.

### **debug**

Toggle socket level debugging mode. Initial value is **false**.

### **localchars**

If the value is **true**, **flush**, **interrupt**, **quit**, **erase**, and **kill** characters are recognized locally, then transformed into appropriate Telnet control sequences. Initial value is **true**.

### **netdata**

Toggle display of all network data. Initial value is **false**.

### **options**

Toggle display of some internal **telnet** protocol processing pertaining to Telnet options. Initial value is **false**.

### **prettydump**

When **netdata** is enabled, and if **prettydump** is enabled, the output from the **netdata** command is reorganized into a more user-friendly format, spaces are put between each character in the output, and an asterisk precedes any Telnet escape sequence.

### **skiprc**

Toggle whether to process `~/.telnetrc` file. Initial value is **false**, meaning the file is processed.

### **termdata**

Toggle printing of hexadecimal terminal data. Initial value is **false**.

### **z**

Suspend **telnet**; works only for the **cs**.

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### telnetd [options]

TCP/IP command. Telnet protocol server. **telnetd** is invoked by the Internet server for requests to connect to the Telnet port (port 23 by default). **telnetd** allocates a pseudoterminal device for a client, thereby creating a login process that has the slave side of the pseudoterminal serving as **stdin**, **stdout**, and **stderr**. **telnetd** manipulates the master side of the pseudoterminal by implementing the Telnet protocol and by passing characters between the remote client and the login process.

### Options

#### **-debug** [port]

Start **telnetd** manually instead of through **inetd**. *port* may be specified as an alternate TCP port number on which to run **telnetd**.

#### **-D** modifier(s)

Debugging mode. This allows **telnet** to print out debugging information to the connection, enabling the user to see what **telnet** is doing. Several modifiers are available for the debugging mode:

#### **exercise**

Has not been implemented yet.

#### **netdata**

Display data stream received by **telnetd**.

#### **options**

Print information about the negotiation of the Telnet options.

#### **ptydata**

Display data written to the pseudo terminal device.

## report

Print **options** information, as well as some additional information about what processing is going on.

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Also exists as a built-in in most shells.

Evaluate an *expression* and, if its value is **true**, return a zero exit status; otherwise, return a nonzero exit status. In shell scripts, you can use the alternate form [*expression*]. This command is generally used with conditional constructs in shell programs.

**File testers**

The syntax for all of these options is **test option file**. If the specified file does not exist, they return **false**. Otherwise, they will test the file as specified in the option description.

**-b**

Is the file block special?

**-c**

Is the file character special?

**-d**

Is the file a directory?

**-e**

Does the file exist?

**-f**

Is the file a regular file?

**-g**

Does the file have the set-group-ID bit set?

**-k**

Does the file have the sticky bit set?

**-L**

Is the file a symbolic link?

**-p**

Is the file a named pipe?

**-r**

Is the file readable by the current user?

**-s**

Is the file nonempty?

**-S**

Is the file a socket?

**-t** [*file-descriptor*]

Is the file associated with *file-descriptor* (or 1, standard output, by default) connected to a terminal?

**-u**

Does the file have the set-user-ID bit set?

**-w**

Is the file writable by the current user?

**-x**

Is the file executable?

**-O**

Is the file owned by the process's effective user ID?

**-G**

Is the file owned by the process's effective group ID?

### File comparisons

The syntax for file comparisons is **test** *file1* *option* *file2*. A string by itself, without options, returns **true** if it's at least one character long.

**-nt**

Is *file1* newer than *file2*? Check modification, not creation, date.

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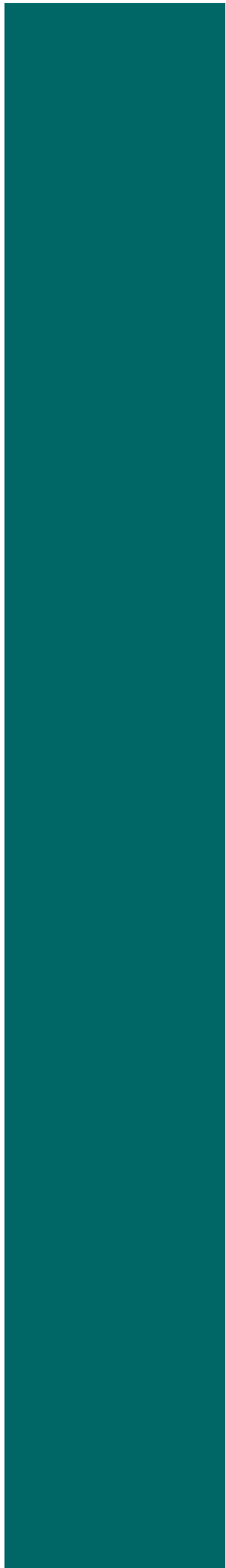
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**-ot**

Is *file1* older than *file2*? Check modification, not creation, date.

**-ef**

Do the files have identical device and inode numbers?

**String tests**

The syntax for string tests is **test** *option string*.

**-z**

Is the string 0 characters long?

**-n**

Is the string at least 1 character long?

**= string**

Are the two strings equal?

**!= string**

Are the strings unequal?

**Expression tests**

Note that an expression can consist of any of the previous tests.

**! expression**

Is the expression false?

**expression -a expression**

Are the expressions both true?

**expression -o expression**

Is either expression true?

**Integer tests**

The syntax for integer tests is **test** *integer1 option integer2*. You may substitute **-l string** for an integer; this evaluates to *string*'s length.

**-eq**

Are the two integers equal?

**-ne**

Are the two integers unequal?

**-lt**

Is *integer1* less than *integer2*?

**-le**

Is *integer1* less than or equal to *integer2*?

**-gt**

Is *integer1* greater than *integer2*?

**-ge**

Is *integer1* greater than or equal to *integer2*?

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### tftp [*host* [*port*]]

User interface to the TFTP (Trivial File Transfer Protocol), which allows users to transfer files to and from a remote machine. The remote *host* may be specified, in which case **tftp** uses *host* as the default host for future transfers.

### Commands

Once **tftp** is running, it issues the prompt:

```
tftp>
```

and recognizes the following commands:

**? [*command-name...*]**

Print help information.

**ascii**

Shorthand for **mode ASCII**.

**binary**

Shorthand for **mode binary**.

**connect *hostname* [*port*]**

Set the *hostname*, and optionally the *port*, for transfers.

**get *filename***

**get *remotename localname***

**get *filename1 filename2 filename3...filenameN***

Get a file or set of files from the specified remote sources.

**mode *transfer-mode***

Set the mode for transfers. *transfer-mode* may be **ASCII** or **binary**. The

default is **ASCII**.

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**put** *filename*

**put** *localfile remotefile*

**put** *filename1 filename2...filenameN remote-directory*

Transfer a file or set of files to the specified remote file or directory.

**quit**

Exit **tftp**.

**rexmt** *retransmission-timeout*

Set the per-packet retransmission timeout, in seconds.

**status**

Print status information: whether **tftp** is connected to a remote host (i.e., whether a host has been specified for the next connection), the current mode, whether verbose and tracing modes are on, and the values for **retransmission timeout** and **total transmission timeout**.

**timeout** *total-transmission-timeout*

Set the total transmission timeout, in seconds.

**trace**

Toggle packet tracing.

**verbose**

Toggle verbose mode.

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### tftpd [*homedir*]

TCP/IP command. Trivial File Transfer Protocol server. **tftpd** is normally started by **inetd** and operates at the port indicated in the **tftp** Internet service description in the */etc/inetd.conf* file. By default, the entry for **tftpd** in */etc/inetd.conf* is commented out; the comment character must be deleted to make **tftpd** operational. Before responding to a request, the server attempts to change its current directory to *homedir*; the default value is **tftpboot**.

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**tload** [*options*] [*tty*]

Display system load average in graph format. If *tty* is specified, print it to that *tty*.

### Options

**-d** *delay*

Specify the delay, in seconds, between updates.

**-s** *scale*

Specify scale (number of characters between each graph tick). A smaller number results in a larger scale.

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### top [options]

Provide information (frequently refreshed) about the most CPU-intensive processes currently running. See **ps** for explanations of the field descriptors.

#### Options

##### -b

Run in batch mode; don't accept command-line input. Useful for sending output to another command or to a file.

##### -c

Show command line in display instead of just command name.

##### -d *delay*

Specify delay between refreshes.

##### -i

Suppress display of idle and zombie processes.

##### -n *num*

Update display *num* times, then exit.

##### -p *pid*

Monitor only processes with the specified process ID.

##### -q

Refresh without any delay. If user is privileged, run with highest priority.

##### -s

Secure mode. Disable some (dangerous) interactive commands.

**-S**

Cumulative mode. Print total CPU time of each process, including dead child processes.

### Interactive commands

**space**

Update display immediately.

**c**

Toggle display of command name or full command line.

**f, F**

Add fields to display or remove fields from the display.

**h, ?**

Display help about commands and the status of secure and cumulative modes.

**k**

Prompt for process ID to kill and signal to send (default is 15) to kill it.

**i**

Toggle suppression of idle and zombie processes.

**l**

Toggle display of load average and uptime information.

**m**

Toggle display of memory information.

**n, #**

Prompt for number of processes to show. If 0 is entered, show as many as will fit on the screen (default).

**o, O**

Change order of displayed fields.

**q**

Exit.

**r**

Apply **renice** to a process. Prompt for PID and **renice** value. Suppressed in secure mode.

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**s**

Change delay between refreshes. Prompt for new delay time, which should be in seconds. Suppressed in secure mode.

**t**

Toggle display of processes and CPU states information.

**A**

Sort by age, with newest first.

**^L**

Redraw screen.

**M**

Sort tasks by resident memory usage.

**N**

Sort numerically by process ID.

**P**

Sort tasks by CPU usage (default).

**S**

Toggle cumulative mode. (See the **-S** option.)

**T**

Sort tasks by time/cumulative time.

**W**

Write current setup to `~/toprc`. This is the recommended way to write a **top** configuration file.

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**usermod** [*options*] *user*

System administration command. Modify *user* account information.

### Options

**-c** *comment*

Comment field.

**-d** *dir*

Home directory.

**-e** *date*

Account expiration *date*. *date* is in the format MM/DD/YYYY. Two-digit year fields are also accepted, but the value is stored as the number of days since January 1, 1970. This option requires the use of shadow passwords.

**-f** *days*

Permanently disable account this many *days* after the password has expired. A value of -1 disables this feature. This option requires the use of shadow passwords.

**-g** *group*

Initial *group* name or number.

**-G** *groups*

Supplementary *groups* given by name or number in a comma-separated list with no whitespace. *user* will be removed from any groups to which they currently belong that are not included in *groups*.

**-l** *name*

Login *name*. This cannot be changed while the user is logged in.

**-o**

Override. Accept a nonunique *uid* with the **-u** option.

**-s** *shell*

Login *shell*.

**-u** *uid*

Numerical user ID. The value must be unique unless the **-o** option is used. Any files owned by *user* in the user's home directory will have their user ID changed automatically. Files outside of the home directory will not be changed. *user* should not be executing any processes while this is changed.

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### users [*file*]

Print a space-separated list of each login session on the host. Note that this may include the same user multiple times. Consult *file* or, by default, */etc/utmp*.

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Sleep some number of microseconds (default is 1).

**Options****--help**

Print help information and then exit.

**--usage**

Print usage message and then exit.

**-v, --version**

Print version information.

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### uuencode [-o *outfile*] [*file*]

Read a uuencoded file and re-create the original file with the permissions and name set in the file (see **uuencode**). The **-o** option specifies an alternate output file.

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## **uuencode** [-m] [*file*] *name*

Encode a binary *file*. The encoding uses only printable ASCII characters and includes the permissions and *name* of the file. When *file* is reconverted via **uudecode**, the output is saved as *name*. If the *file* argument is omitted, **uuencode** can take standard input, so a single argument is taken as the name to be given to the file when it is decoded. With the **-m** option, base64 encoding is used.

## Example

It's common to encode a file and save it with an identifying extension, such as *.uue*. This example encodes the binary file *flower12.jpg*, names it *rose.jpg*, and saves it to a *.uue* file:

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```
% uuencode flower12.jpg rose.jpg > rose.uue
```

Encode *flower12.jpg* and mail it:

```
% uuencode flower12.jpg flower12.jpg | mail ellen@oreilly.com
```

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### vacation

**vacation** [*options*] [*user*]

Automatically return a mail message to the sender announcing that you are on vacation.

Use **vacation** with no options to initialize the vacation mechanism. The process performs several steps.

0. Creates a *.forward* file in your home directory. The *.forward* file contains:

```
\user, "|/usr/bin/vacation user"
```

*user* is your login name. The action of this file is to actually deliver the mail to *user* (i.e., you) and to run the incoming mail through **vacation**.



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1. Creates the *.vacation.pag* and *.vacation.dir* files. These files keep track of who has sent you messages, so that they receive only one "I'm on vacation" message from you per week.
2. Starts an editor to edit the contents of *.vacation.msg*. The contents of this file are mailed back to whomever sends you mail. Within its body, **\$subject** is replaced with the contents of the incoming message's **Subject** line.

Remove or rename the *.forward* file to disable vacation processing.

## Options

The **-a** and **-r** options are used within a *.forward* file; see the example.

### **-a** *alias*

Mail addressed to *alias* is actually mail for the *user* and should produce an automatic reply.

### **-i**

Reinitialize the *.vacation.pag* and *.vacation.dir* files. Use this right before leaving for your next vacation.

### **-r** *interval*

By default, no more than one message per week is sent to any sender. This option changes that interval. *interval* is a number with a trailing **s**, **m**, **h**, **d**, or **w** indicating seconds, minutes, hours, days, or weeks, respectively. If *interval* is **infinite**, only one reply is sent to each sender.

## Example

Send no more than one reply every three weeks to any given sender:

```
$ cd
```

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```
$ vacation -I
```

```
$ cat .forward
```

```
\jp, "|/usr/bin/vacation -r3w jp"
```

```
$ cat .vacation.msg
```

```
From: jp@wizard-corp.com (J. Programmer, via the vacation program)
```

```
Subject: I'm out of the office ...
```

Hi. I'm off on a well-deserved vacation after finishing up whizprog 1.0. I will read and reply to your mail regarding "\$SUBJECT" when I return.

Have a nice day.

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**vi** [*options*] [*files*]

A screen-oriented text editor based on **ex**. For more information on **vi**, see Chapter 11.

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**vidmode** [*option*] *image* [*mode* [*offset*]]

System administration command. Sets the video mode for a kernel *image*. If no arguments are specified, print current *mode* value. *mode* is a 1-byte value located at offset 506 in a kernel image. You may change the *mode* by specifying the kernel *image* to change, the new *mode*, and the byte offset at which to place the new information (the default is 506). Note that **rdev -v** is a synonym for **vidmode**. If **LILO** is used, **vidmode** is not needed. The video mode can be set from the LILO prompt during a boot.

### Modes

- 3**  
Prompt
- 2**  
Extended VGA
- 1**  
Normal VGA
- 0**  
Same as entering **0** at the prompt
- 1**  
Same as entering **1** at the prompt
- 2**  
Same as entering **2** at the prompt
- 3**  
Same as entering **3** at the prompt



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**n**

Same as entering **n** at the prompt

**Option**

**-o** *offset*

Same as specifying an *offset* as an argument.

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**w** [*options*] [*user*]

Print summaries of system usage, currently logged-in users, and what they are doing. **w** is essentially a combination of **uptime**, **who**, and **ps -a**. Display output for one user by specifying *user*.

### Options

**-f**

Toggle printing the from (remote hostname) field.

**-h**

Suppress headings and **uptime** information.

**-s**

Use the short format.

**-u**

Ignore the username while figuring out the current process and CPU times.

**-v**

Display version information.

### File

*/var/run/utmp*

List of users currently logged on.

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### wall [*file*]

System administration command. Write to all users. **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..." If *file* is specified, read input from that, rather than from standard input.

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**wc** [*options*] [*files*]

Print character, word, and line counts for each file. Print a total line for multiple *files*. If no *files* are given, read standard input. See other examples under **ls** and **sort**.

### Options

**-c, -bytes, --chars**

Print character count only.

**-l, --lines**

Print line count only.

**-w, --words**

Print word count only.

**--help**

Print help message and then exit.

**--version**

Print the version number and then exit.

### Examples

Count the number of users logged in:

```
who | wc -l
```

Count the words in three essay files:

```
wc -w essay.[123]
```

Count lines in the file named by variable **\$file** (don't display filename):

```
wc -l < $file
```

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### *whatis* keywords

Search the short manual page descriptions in the *whatis* database for each *keyword* and print a one-line description to standard output for each match. Like **apropos**, except that it only searches for complete words. Equivalent to **man -f**.

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### whereis [options] files

Locate the binary, source, and manual page files for specified commands/files. The supplied filenames are first stripped of leading pathname components and any (single) trailing extension of the form *.ext* (for example, *.c*). Prefixes of *s.* resulting from use of source code control are also dealt with. **whereis** then attempts to locate the desired program in a list of standard Linux directories (e.g., */bin*, */etc*, */usr/bin*, */usr/local/bin*, etc.).

### Options

#### **-b**

Search only for binaries.

#### **-f**

Terminate the last directory list and signal the start of filenames; required when any of the **-B**, **-M**, or **-S** options are used.

#### **-m**

Search only for manual sections.

#### **-s**

Search only for sources.

#### **-u**

Search for unusual entries, that is, files that do not have one entry of each requested type. Thus, the command **whereis -m -u \*** asks for those files in the current directory that have no documentation.

#### **-B directories**

Change or otherwise limit the directories to search for binaries.

#### **-M directory**

Change or otherwise limit the directories to search for manual sections.

***-S directory***

Change or otherwise limit the directories to search for sources.

**Example**

Find all files in `/usr/bin` that are not documented in `/usr/man/man1` but that have source in `/usr/src`:

```
% cd /usr/bin
% whereis -u -M /usr/man/man1 -S /usr/src -f *
```

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**which** [*options*] [--] [*command*] [...]

List the full pathnames of the files that would be executed if the named *commands* had been run. **which** searches the user's \$PATH environment variable. The C shell and **tcsh** have a built-in **which** command that has no options. To use the options, specify the full pathname (e.g., */usr/bin/which*).

### Options

**-a, --all**

Print all matches, not just the first.

**-i, --read-alias**

Read aliases from standard input and write matches to standard output. Useful for using an alias for **which**.

**--skip-alias**

Ignore **--read-alias** if present. Useful for finding normal binaries while using **--read-alias** in an alias for **which**.

**--skip-dot**

Skip directories that start with a dot.

**--skip-tilde**

Skip directories that start with a tilde (~) and executables in \$HOME.

**--show-dot**

If a matching command is found in a directory that starts with a dot, print *./cmdname* instead of the full pathname.

**--show-tilde**

Print a tilde (~) to indicate the user's home directory. Ignored if the user

is root.

**--tty-only**

Stop processing options on the right if not on a tty.

**-v, -V, --version**

Print version information and then exit.

**Example**

```
$ which cc ls
/usr/bin/cc
ls:          aliased to ls -sFC
```

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Show who is logged in to the system. With no options, list the names of users currently logged in, their terminal, the time they have been logged in, and the name of the host from which they have logged on. An optional system *file* (default is */etc/utmp*) can be supplied to give additional information.

**Options****am i**

Print the username of the invoking user.

**--help**

Print a help message and then exit.

**-i, -u, --idle**

Include idle times. An idle time of . indicates activity within the last minute; one of **old** indicates no activity in more than a day.

**-l, --lookup**

Attempt to include canonical hostnames via DNS.

**-m**

Same as **who am i**.

**-q, --count**

"Quick." Display only the usernames and total number of users.

**--version**

Print version information and then exit.

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**-w, -T, --mesg, --message, --writable**

Include user's message status:

+

**mesg y** (write messages allowed)

-

**mesg n** (write messages refused)

?

Cannot find terminal device

**-H, --heading**

Print headings.

**Example**

This sample output was produced at 8 a.m. on April 17:

```
$ who -uH
NAME      LINE    TIME           IDLE    PID  COMMENTS
Earvin    tty3    Apr 16 08:14   16:25   2240
Larry     tty0    Apr 17 07:33    .    15182
```

Since Earvin has been idle since yesterday afternoon (16 hours), it appears that he isn't at work yet. He simply left himself logged in. Larry's terminal is currently in use.

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### whoami

Print current user ID. Equivalent to **id -un**.

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Initiate or respond to an interactive conversation with *user*. A **write** session is terminated with *EOF*. If the user is logged in to more than one terminal, specify a *tty* number. See also **talk**; use **mesg** to keep other users from writing to your terminal.

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**xargs** [*options*] [*command*]

Execute *command* (with any initial arguments), but read remaining arguments from standard input instead of specifying them directly. **xargs** passes these arguments in several bundles to *command*, allowing *command* to process more arguments than it could normally handle at once. The arguments are typically a long list of filenames (generated by **ls** or **find**, for example) that get passed to **xargs** via a pipe.

### Options

**-0, --null**

Expect filenames to be terminated by NULL instead of whitespace. Do not treat quotes or backslashes specially.

**-e[*string*], --eof[=*string*]**

Set EOF to `_` or, if specified, to *string*.

**--help**

Print a summary of the options to **xargs** and then exit.

**-i[*string*], --replace[=*string*]**

Edit all occurrences of `,` or *string*, to the names read in on standard input. Unquoted blanks are not considered argument terminators. Implies **-x** and **-I 1**.

**-l[*lines*], --max-lines[=*lines*]**

Allow no more than 1, or *lines*, nonblank input lines on the command line. Implies **-x**.

**-n *args*, --max-args=*args***

Allow no more than *args* arguments on the command line. May be overridden by **-s**.

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Prompt for confirmation before running each command line. Implies **-t**.

**-P max, --max-procs=max**

Allow no more than *max* processes to run at once. The default is 1. A maximum of 0 allows as many as possible to run at once.

**-r, --no-run-if-empty**

Do not run command if standard input contains only blanks.

**-s max, --max-chars=max**

Allow no more than *max* characters per command line.

**-t, --verbose**

Verbose mode. Print command line on standard error before executing.

**-x, --exit**

If the maximum size (as specified by **-s**) is exceeded, exit.

**--version**

Print the version number of **xargs** and then exit.

**Examples**

**grep** for *pattern* in all files on the system:

```
find / -print | xargs grep pattern > out &
```

Run **diff** on file pairs (e.g., **f1.a** and **f1.b**, **f2.a** and **f2.b** ...):

```
echo $* | xargs -n2 diff
```

The previous line would be invoked as a shell script, specifying filenames as arguments. Display *file*, one word per line (same as **deroff -w**):

```
cat file | xargs -n1
```

Move files in *olddir* to *newdir*, showing each command:

```
ls olddir | xargs -i -t mv olddir/ newdir/
```

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### yacc [options] file

Given a *file* containing context-free grammar, convert *file* into tables for subsequent parsing and send output to *y.tab.c*. This command name stands for **yet another compiler-compiler**. See also **flex**, **bison**, and *lex & yacc* by John Levine, Tony Mason, and Doug Brown.

#### Options

##### -b prefix

Prepend *prefix*, instead of *y*, to the output file.

##### -d

Generate *y.tab.h*, producing **#define** statements that relate **yacc**'s token codes to the token names declared by the user.

##### -l

Exclude **#line** constructs from code produced in *y.tab.c*. (Use after debugging is complete.)

##### -t

Compile runtime debugging code.

##### -v

Generate *y.output*, a file containing diagnostics and notes about the parsing tables.

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**yes** [*strings*]

**yes** [*option*]

Print the command-line arguments, separated by spaces and followed by a newline, until killed. If no arguments are given, print **y** followed by a newline until killed. Useful in scripts and in the background; its output can be piped to a program that issues prompts.

### Options

#### **--help**

Print a help message and then exit.

#### **--version**

Print version information and then exit.

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### ypbind [options]

NFS/NIS command. NIS binder process. **ypbind** is a daemon process typically activated at system startup time. Its function is to remember information that lets client processes on a single node communicate with some **ypserv** process. The information **ypbind** remembers is called a *binding*—the association of a domain name with the Internet address of the NIS server and the port on that host at which the **ypserv** process is listening for service requests. This information is cached in the file `/var/yp/bindings/domainname.version`.

### Options

#### **-ypset**

May be used to change the binding. This option is very dangerous and should be used only for debugging the network from a remote machine.

#### **-ypsetme**

**ypset** requests may be issued from this machine only. Security is based on IP address checking, which can be defeated on networks on which untrusted individuals may inject packets. This option is not recommended.

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### ypcat [*options*] *mname*

NFS/NIS command. Print values in an NIS database specified by *mname*, which may be either a map name or a map nickname.

#### Options

**-d** *domain*

Specify *domain* other than default domain.

**-k**

Display keys for maps in which values are null or key is not part of value.

**-t**

Do not translate *mname* to map name.

**-x**

Display map nickname table listing the nicknames (*mnames*) known and map name associated with each nickname. Do not require an *mname* argument.

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### ypchfn *[option]* *[user]*

NFS/NIS command. Change your information stored in */etc/passwd* and displayed when you are fingered; distribute the change over NIS. Without options, **ypchfn** enters interactive mode and prompts for changes. To make a field blank, enter the keyword **none**. The superuser can change the information for any *user*. See also **yppasswd** and **ypchsh**.

#### Options

**-f**Behave like **ypchfn** (default).**-l**Behave like **ypchsh**.**-p**Behave like **yppasswd**.

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**ypchsh** [*option*] [*user*]

NFS/NIS command. Change your login shell and distribute this information over NIS. Warn if *shell* does not exist in */etc/shells*. The superuser can change the shell for any *user*. See also **yppasswd** and **ypchfn**.

### Options

**-f**

Behave like **ypchfn**.

**-l**

Behave like **ypchsh** (default).

**-p**

Behave like **yppasswd**.

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### ypinit [options]

NFS/NIS command. Build and install an NIS database on an NIS server. **ypinit** can be used to set up a master or a slave server or slave copier. Only a privileged user can run **ypinit**.

### Options

#### **-c** *master\_name*

Set up a slave copier database. *master\_name* should be the hostname of an NIS server, either the master server for all the maps or a server on which the database is up-to-date and stable.

#### **-m**

Indicates that the local host is to be the NIS server.

#### **-s** *master\_name*

Set up a slave server database. *master\_name* should be the hostname of an NIS server, either the master server for all the maps or a server on which the database is up-to-date and stable.

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**ypmatch** [*options*] *key...mname*

NFS/NIS command. Print value of one or more *keys* from an NIS map specified by *mname*. *mname* may be either a map name or a map nickname.

### Options

**-d** *domain*

Specify *domain* other than default domain.

**-k**

Before printing value of a key, print key itself, followed by a colon (:).

**-t**

Do not translate nickname to map name.

**-x**

Display map nickname table listing the nicknames (*mnames*) known, and map name associated with each nickname. Do not require an *mname* argument.

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**yppasswd** [*option*] [*name*]

NFS/NIS command. Change login password in Network Information Service. Create or change your password, and distribute the new password over NIS. The superuser can change the password for any *user*. See also **ypchfn** and **ypchsh**.

### Options

**-f**

Behave like **ypchfn**.

**-l**

Behave like **ypchsh**.

**-p**

Behave like **yppasswd** (default).

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### rpc.yppasswdd [*option*]

NFS/NIS command. Server for modifying the NIS password file. **yppasswdd** handles password change requests from **yppasswd**. It changes a password entry only if the password represented by **yppasswd** matches the encrypted password of that entry and if the user ID and group ID match those in the server's */etc/passwd* file. Then it updates */etc/passwd* and the password maps on the local server.

### Option

**-s**

Support shadow password functions.

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**yppoll** [*options*] *mapname*

NFS/NIS command. Determine version of NIS map at NIS server. **yppoll** asks a **ypserv** process for the order number and the hostname of the master NIS server for the named map.

### Options

**-h** *host*

Ask the **ypserv** process at *host* about the map parameters. If *host* is not specified, the hostname of the NIS server for the local host (the one returned by **ypwhich**) is used.

**-d** *domain*

Use *domain* instead of the default domain.

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### yppush [options] mapnames

NFS/NIS command. Force propagation of changed NIS map. **yppush** copies a new version of an NIS map, *mapname*, from the master NIS server to the slave NIS servers. It first constructs a list of NIS server hosts by reading the NIS map **ypservers** with the **-d** option's *domain* argument. Keys within this map are the ASCII names of the machines on which the NIS servers run. A "transfer map" request is sent to the NIS server at each host, along with the information needed by the transfer agent to call back the **yppush**. When the attempt has been completed and the transfer agent has sent **yppush** a status message, the results may be printed to **stdout**. Normally invoked by */var/yp/Makefile*.

### Options

#### **-d** *domain*

Specify a *domain*.

#### **-v**

Verbose—print message when each server is called and for each response.

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### ypserv [options]

NFS/NIS command. NIS server process. **ypserv** is a daemon process typically activated at system startup time. It runs only on NIS server machines with a complete NIS database. Its primary function is to look up information in its local database of NIS maps. The operations performed by **ypserv** are defined for the implementor by the NIS protocol specification and for the programmer by the header file `<rpcvc/yp_prot.h>`. Communication to and from **ypserv** is by means of RPC calls.

### Options

#### **-d**

NIS service should go to the DNS for more host information.

#### **-localonly**

Indicates **ypserv** should not respond to outside requests.

### Files and directories

`/var/yp/[domainname]/`

Location of NIS databases.

`/var/yp/Makefile`

Makefile that is responsible for creating NIS databases.

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### ypset [*options*] *server*

NFS/NIS command. Point **ypbind** at a particular server. **ypset** tells **ypbind** to get NIS services for the specified domain from the **ypserv** process running on *server*. *server* indicates the NIS server to bind to and can be specified as a name or an IP address.

#### Options

**-d** *domain*

Use *domain* instead of the default domain.

**-h** *host*

Set **ypbind**'s binding on *host*, instead of locally. *host* can be specified as a name or an IP address.

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### ypwhich [*options*] [*host*]

NFS/NIS command. Return hostname of NIS server or map master. Without arguments, **ypwhich** cites the NIS server for the local machine. If *host* is specified, that machine is queried to find out which NIS master it is using.

#### Options

##### **-d** *domain*

Use *domain* instead of the default domain.

##### **-m** *map*

Find master NIS server for a map. No host can be specified with **-m**. *map* may be a map name or a nickname for a map.

##### **-t** *mapname*

Inhibit nickname translation.

##### **-x**

Display map nickname table. Do not allow any other options.

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Copy *file1* to *file2*, or copy one or more *files* to the same names under *directory*. If the destination is an existing file, the file is overwritten; if the destination is an existing directory, the file is copied into the directory (the directory is *not* overwritten).

### Options

**-a, --archive**

Preserve attributes of original files where possible. Same as **-dpR**.

**-b, --backup**

Back up files that would otherwise be overwritten.

**-d, --no-dereference**

Do not dereference symbolic links; preserve hard link relationships between source and copy.

**-f, --force**

Remove existing files in the destination.

**-i, --interactive**

Prompt before overwriting destination files.

**-l, --link**

Make hard links, not copies, of nondirectories.

**-p, --preserve**

Preserve all information, including owner, group, permissions, and

timestamps.

### **-P, --parents**

Preserve intermediate directories in source. The last argument must be the name of an existing directory. For example, the command:

```
cp --parents jphekman/book/ch1 newdir
```

copies the file *jphekman/book/ch1* to the file *newdir/jphekman/book/ch1*, creating intermediate directories as necessary.

### **-r, -R, --recursive**

Copy directories recursively.

### **-S backup-suffix, --suffix=backup-suffix**

Set suffix to be appended to backup files. This may also be set with the `SIMPLE_BACKUP_SUFFIX` environment variable. The default is `~`. You need to explicitly include a period if you want one before the suffix (e.g., specify *.bak*, not *bak*).

### **-s, --symbolic-link**

Make symbolic links instead of copying. Source filenames must be absolute.

### **-u, --update**

Do not copy a file to an existing destination with the same or newer modification time.

### **-v, --verbose**

Before copying, print the name of each file.

### **-V type, --version-control=type**

Set the type of backups made. You may also use the `VERSION_CONTROL` environment variable. The default is **existing**. Valid arguments are:

#### **t, numbered**

Always make numbered backups.

#### **nil, existing**

Make numbered backups of files that already have them; otherwise, make simple backups.

#### **never, simple**

Always make simple backups.

### **-x, --one-file-system**

Ignore subdirectories on other filesystems.

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### cpio flags [options]

Copy file archives in from or out to tape or disk, or to another location on the local machine. Each of the three flags **-i**, **-o**, or **-p** accepts different options.

#### Flags

##### **-i, --extract** [options] [patterns]

Copy in (extract) from an archive files whose names match selected *patterns*. Each pattern can include Bourne shell filename metacharacters. (Patterns should be quoted or escaped so they are interpreted by **cpio**, not by the shell.) If *pattern* is omitted, all files are copied in. Existing files are not overwritten by older versions from the archive unless **-u** is specified.

##### **-o, --create** [options]

Copy out to an archive a list of files whose names are given on the standard input.

##### **-p, --pass-through** [options] *directory*

Copy (pass) files to another directory on the same system. Destination pathnames are interpreted relative to the named *directory*.

#### Comparison of valid options

Options available to the **-i**, **-o**, and **-p** flags are shown here. (The **-** is omitted for clarity):

```
i:  bcdf mnrtsuv B SVCEHMR IF
o:  0a c          vABL VC HM O F
p:  0a d lm      uv L V   R
```

#### Options

##### **-0, --null**

Expect list of filenames to be terminated with null, not newline. This allows files with a newline in their names to be included.

**-a, --reset-access-time**

Reset access times of input files after reading them.

**-A, --append**

Append files to an existing archive, which must be a disk file. Specify this archive with **-O** or **-F**.

**-b, --swap**

Swap bytes and half-words to convert between big-endian and little-endian 32-bit integers.

**-B**

Block input or output using 5120 bytes per record (default is 512 bytes per record).

**--blocksize=size**

Set input or output blocksize to *size* x 512 bytes.

**-c**

Read or write header information as ASCII characters; useful when source and destination machines are different types.

**-C n, --io-size=n**

Like **-B**, but blocksize can be any positive integer *n*.

**-d, --make-directories**

Create directories as needed.

**-E file, --pattern-file=file**

Extract filenames from the archives that match patterns in *file*.

**-f, --nonmatching**

Reverse the sense of copying; copy all files *except* those that match *patterns*.

**-F file, --file=file**

Use *file* as the archive, not **stdin** or **stdout**. *file* can reside on another machine, if given in the form *user@hostname:file* (where *user@* is optional).

**--force-local**

Assume that *file* (provided by **-F**, **-I**, or **-O**) is a local file, even if it contains a colon (:) indicating a remote file.

**-H type, --format=type**

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Use *type* format. Default for copy-out is **bin**; for copy-in the default is autodetection of the format. Valid formats (all caps also accepted) are:

**bin**

Binary

**odc**

Old (POSIX.1) portable format

**newc**

New (SVR4) portable format

**crc**

New (SVR4) portable format with checksum added

**tar**

Tar

**ustar**

POSIX.1 tar (also recognizes GNU tar archives)

**hpbinary**

HP-UX's binary (obsolete)

**hpodc**

HP-UX's portable format

**-I file**

Read *file* as an input archive. May be on a remote machine (see **-F**).

**-k**

Ignored. For backward compatibility.

**-l, --link**

Link files instead of copying.

**-L, --dereference**

Follow symbolic links.

**-m, --preserve-modification-time**

Retain previous file modification time.

**-M msg, --message=msg**

Print *msg* when switching media, as a prompt before switching to new

media. Use variable **%d** in the message as a numeric ID for the next medium. **-M** is valid only with **-I** or **-O**.

**-n, --numeric-uid-gid**

When verbosely listing contents, show user ID and group ID numerically.

**--no-absolute-filenames**

Create all copied-in files relative to the current directory.

**--no-preserve-owner**

Make all copied files owned by yourself, instead of the owner of the original. Useful only if you are a privileged user.

**-O file**

Archive the output to *file*, which may be a file on another machine (see **-F**).

**--only-verify-crc**

For a CRC-format archive, verify the CRC of each file; don't actually copy the files in.

**--quiet**

Don't print the number of blocks copied.

**-r**

Rename files interactively.

**-R [user][:group], --owner [user][:group]**

Reassign file ownership and group information to the user's login ID (privileged users only).

**-s, --swap-bytes**

Swap bytes of each two-byte half-word.

**-S, --swap-half-words**

Swap half-words of each four-byte word.

**--sparse**

For copy-out and copy-pass, write files that have large blocks of zeros as sparse files.

**-t, --list**

Print a table of contents of the input (create no files). When used with the **-v** option, resembles output of **ls -l**.

**-u, --unconditional**

Unconditional copy; old files can overwrite new ones.

**-v, --verbose**

Print a list of filenames processed.

**-V, --dot**

Print a dot for each file read or written (this shows **cpio** at work without cluttering the screen).

**--version**

Print version number and then exit.

## Examples

Generate a list of files whose names end in *.old* using **find**; use list as input to **cpio**:

```
find . -name "*.old" -print | cpio -ocBv > /dev/rst8
```

Restore from a tape drive all files whose names contain **save** (subdirectories are created if needed):

```
cpio -icdv "*save*" < /dev/rst8
```

Move a directory tree:

```
find . -depth -print | cpio -padm /mydir
```

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System administration command. Normally started in a system startup file. Execute commands at scheduled times, as specified in users' files in */var/cron/tabs*. Each file shares its name with the user who owns it. The files are controlled via the command **crontab**.

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### **crontab** [*options*] [*file*]

View, install, or uninstall your current *crontab* file. A privileged user can run **crontab** for another user by supplying **-u user**. A *crontab* file is a list of commands, one per line, that will execute automatically at a given time. Numbers are supplied before each command to specify the execution time. The numbers appear in five fields, as follows:

*Minute*

0-59

*Hour*

0-23

*Day of month*

1-31

*Month*

1-12

Jan, Feb, Mar, ...

0-6, with 0 = Sunday

Sun, Mon, Tue, ...

Use a comma between multiple values, a hyphen to indicate a range, and an asterisk to indicate all possible values. For example, assuming these *crontab* entries:

```
59 3 * * 5    find / -print | backup_program
0 0 1,15 * *  echo "Timesheets due" | mail user
```

The first command backs up the system files every Friday at 3:59 a.m., and the second command mails a reminder on the 1st and 15th of each month.

The superuser can always issue the **crontab** command. Other users must be listed in the file */etc/cron.allow* if it exists; otherwise, they must not be listed in */etc/cron.deny*. If neither file exists, only the superuser can issue the command.

### Options

The **-e**, **-l**, and **-r** options are not valid if any *files* are specified.

#### **-e**

Edit the user's current *crontab* file (or create one).

#### **-l**

Display the user's *crontab* file on standard output.

#### **-r**

Delete the user's *crontab* file.

#### **-u user**

Indicates which *user's crontab* file will be acted upon.

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C shell, a command interpreter into which all other commands are entered. For more information, see Chapter 8.

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### **csplit** [*options*] *file arguments*

Separate *file* into context-based sections and place sections in files named *xx00* through *xxn* ( $n < 100$ ), breaking *file* at each pattern specified in *arguments*. See also **split**.

#### Options

-

Read from standard input.

**-b** *suffix*, **--suffix-format=***suffix*

Append *suffix* to output filename. This option causes **-n** to be ignored. *suffix* must specify how to convert the binary integer to readable form by including exactly one of the following: **%d**, **%i**, **%u**, **%o**, **%x**, or **%X**. The value of *suffix* determines the format for numbers as follows:

**%d**

Signed decimal

**%i**Same as **%d****%u**

Unsigned decimal

**%o**

Octal

**%x**

Hexadecimal

**%X**

Same as %x.

**-f prefix, --prefix=prefix**Name new files *prefix00* through *prefixn* (default is **xx00** through **xxn**).**-k, --keep-files**Keep newly created files, even when an error occurs (which would normally remove these files). This is useful when you need to specify an arbitrarily large repeat argument, *{n}*, and you don't want an out-of-range error to cause removal of the new files.**-n num, --digits=num**Use output filenames with numbers *num* digits long. The default is 2.**-s, -q, --silent, --quiet**

Suppress all character counts.

**-z, --elide-empty-files**

Do not create empty output files. However, number as if those files had been created.

## Arguments

Any one or a combination of the following expressions may be specified as arguments. Arguments containing blanks or other special characters should be surrounded by single quotes.

*/expr/[offset]*Create file from the current line up to the line containing the regular expression *expr*. *offset* should be of the form *+n* or *-n*, where *n* is the number of lines below or above *expr*.**%expr%[offset]**Same as */expr/* except no file is created for lines previous to line containing *expr*.*num*Create file from current line up to (but not including) line number *num*. When followed by a repeat count (number inside *{}*), put the next *num* lines of input into another output file.**{n}**Repeat argument *n* times. May follow any of the preceding arguments. Files will split at instances of *expr* or in blocks of *num* lines. If *\** is given instead of *n*, repeat argument until input is exhausted.

## Examples

Create up to 20 chapter files from the file *novel*:

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```
csplit -k -f chap. novel '/CHAPTER/' '{20}'
```

Create up to 100 address files (xx00 through xx99), each four lines long, from a database named *address\_list*:

```
csplit -k address_list 4 {99}
```

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### ctags [options] files

Create a list of function and macro names that are defined in the specified C, C++, FORTRAN, Java, Perl, **yacc**, or other source *files*. The output list (named *tags* by default) contains lines of the form:

```
name      file      context
```

where *name* is the function or macro name, *file* is the source file in which *name* is defined, and *context* is a search pattern that shows the line of code containing *name*. After the list of tags is created, you can invoke **vi** on any file and type:

```
:set tags= tagsfile
:tag name
```

This switches the **vi** editor to the source file associated with the *name* listed in *tagsfile* (which you specify with **-t**).

**etags** produces an equivalent file for tags to be used with Emacs.

### Options

#### **-a, --append**

Append tag output to existing list of tags.

#### **-d, --defines**

Include tag entries for C preprocessor definitions.

#### **-i file, --include=file**

Add a note to the tags file that *file* should be consulted in addition to the normal input file.

#### **-l language, --language=language**

Consider the files that follow this option to be written in *language*. Use the **-h** option for a list of languages and their default filename

extensions.

**-o file, --output=file**

Write to *file*.

**-rregexp, --regex=regexp**

Include a tag for each line that matches *regexp* in the files following this option.

**-R, --no-regex**

Don't include tags based on regular-expression matching for the files that follow this option.

**-t, --typedefs**

Include tag entries for **typedefs**.

**-u, --update**

Update tags file to reflect new locations of functions (e.g., when functions are moved to a different source file). Old tags are deleted; new tags are appended.

**-v, --vgrind**

Print to standard output a listing (index) of each function, source file, and page number (1 page = 64 lines).

**-w, --no-warn**

Suppress warning messages.

**-x, --cxref**

Produce a listing of each function, and its line number, source file, and context.

**-B, --backward-search**

Search for tags backward through files.

**-C, --c++**

Expect *.c* and *.h* files to contain C++, not C, code.

**-H, -h, --help**

Print usage information and exit.

**-S, --ignore-indentation**

Normally **ctags** uses indentation to parse the tag file; this option tells it to rely on it less.

**-T, --typedefs-and-c++**

Include tag entries for typedefs, structs, enums, unions, and C++

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member functions.

**-V, --version**

Print the version number and exit.

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### **gated** [*options*]

TCP/IP command. Gateway routing daemon. **gated** handles multiple routing protocols and replaces **routed** and any routing daemons that speak the Hello, EGP, or BGP routing protocols. **gated** currently handles the RIP, BGP, EGP, Hello, and OSPF routing protocols and can be configured to perform all or any combination of the five.

### Options

#### **-c**

Parse configuration file for syntax errors, then exit **gated**, leaving a dump file in `/usr/tmp/gated_dump`.

#### **-f** *config\_file*

Use alternate configuration file, *config\_file*. Default is `/etc/gated.conf`.

#### **-n**

Do not modify kernel's routing table.

#### **-t** [*trace\_options*]

Start **gated** with the specified tracing options enabled. If no flags are specified, assume **general**. The trace flags are:

#### **adv**

Management of policy blocks.

#### **all**

Includes **normal**, **policy**, **route**, **state**, **task**, and **timer**.

#### **general**

Includes **normal** and **route**.

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**iflist**

The kernel interface list.

**normal**

Normal protocols instances.

**parse**

Lexical analyzer and parser.

**policy**

Instances in which policy is applied to imported and exported routes.

**route**

Any changes to routing table.

**state**

State machine transitions.

**symbols**

Symbols read from kernel—note that they are read before the configuration file is parsed, so this option must be specified on the command line.

**task**

System tasks and interfaces.

**timer**

Timer usage.

**-C**

Parse configuration file for errors and set exit code to indicate if there were any (1) or not (0), then exit.

**-N**

Do not daemonize.

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**gawk** [*options*] *`script'* [*var=value...*] [*files*]

**gawk** [*options*] **-f** *scriptfile* [*var=value...*] [*files*]

The GNU version of **awk**, a program that does pattern matching, record processing, and other forms of text manipulation. For more information, see Chapter 13.

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### gcc [options] files

Compile one or more C source files (*file.c*), assembler source files (*file.s*), or preprocessed C source files (*file.i*). If the file suffix is not recognizable, assume that the file is an object file or library. **gcc** automatically invokes the link editor **ld** (unless **-c**, **-S**, or **-E** is supplied). In some cases, **gcc** generates an object file having a *.o* suffix and a corresponding root name. By default, output is placed in *a.out*. **gcc** accepts many system-specific options not covered here.

Note: **gcc** is the GNU form of **cc**; on most Linux systems, the command **cc** will invoke **gcc**. The command **g++** will invoke **gcc** with the appropriate options for interpreting C++.

### Options

#### **-a**

Provide profile information for basic blocks.

#### **-ansi**

Enforce full ANSI conformance.

#### **-b machine**

Compile for use on *machine* type.

#### **-c**

Create linkable object file for each source file, but do not call linker.

#### **-dD**

Print **#defines**.

#### **-dM**

Suppress normal output. Print series of **#defines** that are in effect at the end of preprocessing.

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**-dN**

Print **#defines** with macro names only, not arguments or values.

**-fno-asm**

Do not recognize **asm**, **inline**, or **typeof** as keywords. Implied by **-ansi**.

**-fno-builtin**

Do not recognize built-in functions unless they begin with two underscores.

**-fno-gnu-keywords**

Do not recognize **classof**, **headof**, **signature**, **sigof**, or **typeof** as keywords.

**-fno-ident**

Do not respond to **#ident** commands.

**-fsigned-bitfields**

**-funsigned-bitfields**

**-fno-signed-bitfields**

**-fno-unsigned-bitfields**

Set default control of bitfields to signed or unsigned if not explicitly declared.

**-fsigned-char**

Cause the type **char** to be signed.

**-fsyntax-only**

Check for syntax errors. Do not attempt to actually compile.

**-funsigned-char**

Cause the type **char** to be unsigned.

**-g**

Include debugging information for use with **gdb**.

**-glevel**

Provide *level* amount of debugging information. *level* must be 1, 2, or 3, with 1 providing the least amount of information. The default is 2.

**-idirafter dir**

Include *dir* in the list of directories to search when an include file is not found in the normal include path.

**-include file**

Process *file* before proceeding to the normal input file.

**-imacros** *file*

Process the macros in *file* before proceeding to the normal input file.

**-iprefix** *prefix*

When adding directories with **-iwithprefix**, prepend *prefix* to the directory's name.

**-isystem** *dir*

Add *dir* to the list of directories to be searched when a system file cannot be found in the main include path.

**-iwithprefix** *dir*

Append *dir* to the list of directories to be searched when a header file cannot be found in the main include path. If **-iprefix** has been set, prepend that prefix to the directory's name.

**-l***lib*

Link to *lib*.

**-nostartfiles**

Force linker to ignore standard system startup files.

**-nostdinc**

Search only specified, not standard, directories for header files.

**-nostdinc++**

Suppress searching of directories believed to contain C++-specific header files.

**-nostdlib**

Suppress linking to standard library files.

**-o** *file*

Specify output file as *file*. Default is *a.out*.

**-p**

Provide profile information for use with **prof**.

**-pedantic**

Warn verbosely.

**-pedantic-errors**

Err in every case in which **-pedantic** would have produced a warning.

**-pg**

Provide profile information for use with **gprof**.

### **-pipe**

Transfer information between stages of compiler by pipes instead of temporary files.

### **-s**

Remove all symbol table and relocation information from the executable.

### **-save-temps**

Save temporary files in the current directory when compiling.

### **-static**

Suppress linking to shared libraries.

### **-traditional**

Attempt to behave like a traditional C compiler.

### **-traditional-cpp**

Cause the preprocessor to attempt to behave like a traditional C preprocessor.

### **-trigraphs**

Include trigraph support.

### **-u *symbol***

Force the linker to search libraries for a definition of *symbol* and to link to them, if found.

### **-undef**

Define only those constants required by the language standard, not system-specific constants like **unix**.

### **-v**

Verbose mode. Display commands as they are executed, **gcc** version number, and preprocessor version number.

### **-w**

Suppress warnings.

### **-x *language***

Expect input file to be written in *language*, which may be **c**, **objective-c**, **c-header**, **c++**, **cpp-output**, **assembler**, or **assembler-with-cpp**. If **none** is specified as *language*, guess the language by filename extension.

### **-A*question(answer)***

If the preprocessor encounters a conditional such as **#if** *question*, assert *answer* in response. To turn off standard assertions, use **-A-**.

### **-Bpath**

Specify the *path* directory in which the compiler files are located.

### **-C**

Retain comments during preprocessing. Meaningful only with **-E**.

### **-Dname[=*def*]**

Define *name* with value *def* as if by a **#define**. If no *=def* is given, *name* is defined with value 1. **-D** has lower precedence than **-U**.

### **-E**

Preprocess the source files, but do not compile. Print result to standard output.

### **-Idir**

Include *dir* in list of directories to search for include files. If *dir* is -, search those directories that were specified by **-I** before the **-I** only when **#include "file"** is specified, not **#include <file>**.

### **-Ldir**

Search *dir* in addition to standard directories.

### **-M**

Instead of compiling, print a rule suitable for inclusion in a makefile that describes dependencies of the source file based on its **#include** directives. Implies **-E**.

### **-MD**

Similar to **-M**, but sends dependency information to files ending in *.d* in addition to ordinary compilation.

### **-MG**

Used with **-M** or **-MM**. Suppress error messages if an included file does not exist; useful if the included file is automatically generated by a build.

### **-MMD**

Similar to **-MD**, but record only user header file information, not system header file information.

### **-MM**

Similar to **-M**, but limit the rule to non-standard **#include** files; that is, only files declared through **#include "file"** and not those declared through **#include <file>**.

### **-H**

Print pathnames of included files, one per line, on standard error.

### **-O[level]**

Optimize. *level* should be 1, 2, 3, or 0. The default is 1. 0 turns off optimization; 3 optimizes the most.

### **-P**

Preprocess input without producing line-control information used by next pass of C compiler. Meaningful only with **-E**.

### **-S**

Compile source files into assembler code, but do not assemble.

### **-Uname**

Remove any initial definition of *name*, where *name* is a reserved symbol predefined by the preprocessor or a name defined on a **-D** option. Names predefined by **cpp** are **unix** and **i386**.

### **-V version**

Attempt to run **gcc** version *version*.

### **-W**

Warn more verbosely than normal.

### **-Wl,option**

Invoke linker with *option*, which may be a comma-separated list.

### **-Wa,option**

Call assembler with *option*, which may be a comma-separated list.

### **-Waggregate-return**

Warn if any functions return structures or unions are defined or called.

### **-Wall**

Enable **-W**, **-Wchar-subscripts**, **-Wcomment**, **-Wformat**, **-Wimplicit**, **-Wparentheses**, **-Wreturn-type**, **-Wswitch**, **-Wtemplate-debugging**, **-Wtrigraphs**, **-Wuninitialized**, and **-Wunused**.

### **-Wcast-align**

Warn when encountering instances in which pointers are cast to types that increase the required alignment of the target from its original definition.

### **-Wcast-qual**

Warn when encountering instances in which pointers are cast to types that lack the type qualifier with which the pointer was originally defined.

### **-Wchar-subscripts**



Warn when encountering arrays with subscripts of type **char**.

**-Wcomment**

Warn when encountering the beginning of a nested comment.

**-Wconversion**

Warn in particular cases of type conversions.

**-Werror**

Exit at the first error.

**-Wformat**

Warn about inappropriately formatted **printfs** and **scanf**s.

**-Wimplicit**

Warn when encountering implicit function or parameter declarations.

**-Winline**

Warn about illegal inline functions.

**-Wmissing-declarations**

Warn if a global function is defined without a previous declaration.

**-Wmissing-prototypes**

Warn when encountering global function definitions without previous prototype declarations.

**-Wnested-externs**

Warn if an **extern** declaration is encountered within a function.

**-Wno-import**

Don't warn about use of **#import**.

**-Wp,options**

Pass *options* to the preprocessor. Multiple options are separated by commas. Not a warning parameter.

**-Wparentheses**

Enable more verbose warnings about omitted parentheses.

**-Wpointer-arith**

Warn when encountering code that attempts to determine the size of a function or void.

**-Wredundant-decls**

Warn if anything is declared more than once in the same scope.

### **-Wreturn-type**

Warn about functions defined without return types or with improper return types.

### **-Wshadow**

Warn when a local variable shadows another local variable.

### **-Wstrict-prototypes**

Insist that argument types be specified in function declarations and definitions.

### **-Wswitch**

Warn about switches that skip the index for one of their enumerated types.

### **-Wtemplate-debugging**

Warn if debugging is not available for C++ templates.

### **-Wtraditional**

Warn when encountering code that produces different results in ANSI C and traditional C.

### **-Wtrigraphs**

Warn when encountering trigraphs.

### **-Wuninitialized**

Warn when encountering uninitialized automatic variables.

### **-Wunused**

Warn about unused variables and functions.

### **-Xlinker *option***

Pass an *option* to the linker. A linker option with an argument requires two **-Xs**, the first specifying the option and the second specifying the argument.

## **Pragma directives**

### **#pragma interface** [*header-file*]

Used in header files to force object files to provide definition information via references, instead of including it locally in each file. C++-specific.

### **#pragma implementation** [*header-file*]

Used in main input files to force generation of full output from *header-*

*file* (or, if it is not specified, from the header file with the same base name as the file containing the pragma directive). This information will be globally visible. Normally the specified header file contains a **#pragma interface** directive.

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**gdb** [*options*] [*program* [*core/pid*]]

GDB (GNU DeBugger) allows you to step through C, C++, and Modula-2 programs in order to find the point at which they break. The program to be debugged is normally specified on the command line; you can also specify a core or, if you want to investigate a running program, a process ID.

### Options

**-s file, -symbols=file**

Consult *file* for symbol table. With **-e**, also uses *file* as the executable.

**-e file, -exec=file**

Use *file* as executable, to be read in conjunction with source code. May be used in conjunction with **-s** to read symbol table from the executable.

**-c file, -core=file**

Consult *file* for information provided by a core dump.

**-x file, -command=file**

Read **gdb** commands from *file*.

**-d directory, -directory=directory**

Include *directory* in path that is searched for source files.

**-n, -nx**

Ignore *.gdbinit* file.

**-q, -quiet**

Suppress introductory and copyright messages.

**-batch**

Exit after executing all the commands specified in *.gdbinit* and *-x* files.  
Print no startup messages.

**-cd=directory**

Use *directory* as **gdb**'s working directory.

**-f, -fullname**

Show full filename and line number for each stack frame.

**-b bps**

Set line speed of serial device used by GDB to *bps*.

**-tty=device**

Set standard in and standard out to *device*.

### Common commands

These are just some of the more common **gdb** commands; there are too many commands to list all of them here:

**bt**

Print the current location within the program and a stack trace showing how the current location was reached. (**where** does the same thing.)

**break**

Set a breakpoint in the program.

**cd**

Change the current working directory.

**clear**

Delete the breakpoint where you just stopped.

**commands**

List commands to be executed when breakpoint is hit.

**c**

Continue execution from a breakpoint.

**delete**

Delete a breakpoint or a watchpoint; also used in conjunction with other commands.

**display**

Cause variables or expressions to be displayed when program stops.

**down**

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Move down one stack frame to make another function the current one.

### **frame**

Select a frame for the next **continue** command.

### **info**

Show a variety of information about the program. For instance, **info breakpoints** shows all outstanding breakpoints and watchpoints.

### **jump**

Start execution at another point in the source file.

### **kill**

Abort the process running under **gdb**'s control.

### **list**

List the contents of the source file corresponding to the program being executed.

### **next**

Execute the next source line, executing a function in its entirety.

### **print**

Print the value of a variable or expression.

### **pwd**

Show the current working directory.

### **ptype**

Show the contents of a datatype, such as a structure or C++ class.

### **quit**

Exit **gdb**.

### **reverse-search**

Search backward for a regular expression in the source file.

### **run**

Execute the program.

### **search**

Search for a regular expression in the source file.

### **set variable**

Assign a value to a variable.

### **signal**

Send a signal to the running process.

### **step**

Execute the next source line, stepping into a function if necessary.

### **undisplay**

Reverse the effect of the **display** command; keep expressions from being displayed.

### **until**

Finish the current loop.

### **up**

Move up one stack frame to make another function the current one.

### **watch**

Set a watchpoint (i.e., a data breakpoint) in the program.

### **whatis**

Print the type of a variable or function.

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### **gdc** [*options*] *command*

TCP/IP command. Administer **gated**. Various commands start and stop the daemon, send signals to it, maintain the configuration files, and manage state and core dumps.

#### Options

##### **-c** *size*

Specify maximum core dump size.

##### **-f** *size*

Specify maximum file dump size.

##### **-m** *size*

Specify maximum data segment size.

##### **-n**

Suppress editing of the kernel forwarding table.

##### **-q**

Quiet mode: suppress warnings and log errors to **syslogd** instead of standard error.

##### **-s** *size*

Specify maximum stack size.

##### **-t** *seconds*

Wait *seconds* seconds (default is 10) for **gated** to complete specified operations at start and stop time.

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## BACKOUT

Restore */etc/gated.conf* from */etc/gated.conf-*, whether or not the latter exists.

### backout

Restore */etc/gated.conf* from */etc/gated.conf-*, assuming the latter exists.

### checkconf

Report any syntax errors in */etc/gated.conf*.

### checknew

Report any syntax errors in */etc/gated.conf+*.

## COREDUMP

Force **gated** to core dump and exit.

### createconf

Create an empty */etc/gated.conf+* if one does not already exist, and set it to mode 664, owner **root**, group **gdmaint**.

### dump

Force **gated** to dump to */usr/tmp/gated\_dump* and then continue normal operation.

### interface

Reload interface configuration.

## KILL

Terminate immediately (ungracefully).

### modeconf

Set all configuration files to mode 664, owner **root**, group **gdmaint**.

### newconf

Make sure that */etc/gated.conf+* exists and move it to */etc/gated.conf*. Save the old */etc/gated.conf* as */etc/gated.conf-*.

### reconfig

Reload configuration file.

### restart

Stop and restart **gated**.

### rmcore

Remove any **gated** core files.

## **rmdmp**

Remove any **gated** state dump files.

## **rmparse**

Remove any **gated** files that report on parse errors. These are generated by the **checkconf** and **checknew** commands.

## **running**

Exit with zero status if **gated** is running and nonzero if it is not.

## **start**

Start **gated**, unless it is already running, in which case return an error.

## **stop**

Stop **gated** as gracefully as possible.

## **term**

Terminate gracefully.

## **toggletrace**

Toggle tracing.

## **Files**

*/etc/gcd.conf+*

The test configuration file. Once you're satisfied that it works, you should run *gated newconf* to install it as */etc/gated.conf*.

*/etc/gated.conf-*

A backup of the old configuration file.

*/etc/gated.conf--*

A backup of the backup of the old configuration file.

*/etc/gated.conf*

The actual configuration file.

*/etc/gated.pid*

**gated**'s process ID.

*/usr/tmp/gated\_dump*

The state dump file.

*/usr/tmp/gated\_parse*

A list of the parse errors generated by reading the configuration file.

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### getkeycodes

Print the kernel's scancode-to-keycode mapping table.

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**getty** [*options*] *port* [*speed* [*term* [*lined*]]]

System administration command. Set terminal type, modes, speed, and line discipline. Linux systems may use **agetty** instead, which uses a different syntax. **getty** is invoked by **init**. It is the second process in the series **init-getty-login-shell**, which ultimately connects a user with the Linux system. **getty** reads the user's login name and invokes the **login** command with the user's name as an argument. While reading the name, **getty** attempts to adapt the system to the speed and type of device being used.

You must specify a *port* argument, which **getty** will use to attach itself to the device */dev/port*. **getty** will then scan the defaults file, usually */etc/default/getty*, for runtime values and parameters. These may also be specified, for the most part, on the command line, but the values in the defaults file take precedence. The *speed* argument is used to point to an entry in the file */etc/gettydefs*, which contains the initial baud rate, tty settings, and login prompt and final speed and settings for the connection. The first entry is the default in */etc/gettydefs*. *term* specifies the type of terminal, with *lined* the optional line discipline to use.

### Options

#### **-c file**

Check the *gettydefs* file. *file* is the name of the *gettydefs* file. Produces the files' values and reports parsing errors to standard output.

#### **-d file**

Use a different default file.

#### **-h**

Do not force a hangup on the port when initializing.

#### **-r delay**

Wait for single character from port, then wait *delay* seconds before proceeding.

#### **-t timeout**

If no username is accepted within *timeout* seconds, close connection.

**-w *string***

Wait for *string* characters from port before proceeding.

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### **gprof** [*options*] [*object\_file*]

Display the profile data for an object file. The file's symbol table is compared with the call graph profile file *gmon.out* (previously created by compiling with **gcc -pg**).

#### Options

##### **-a**

Do not display statically declared functions. Since their information might still be relevant, append it to the information about the functions loaded immediately before.

##### **-b**

Do not display information about each field in the profile.

##### **-c**

Consult the object file's text area to attempt to determine the program's static call graph. Display static-only parents and children with call counts of 0.

##### **-e routine**

Do not display entries for *routine* and its descendants.

##### **-f routine**

Print only *routine*, but include time spent in all routines.

##### **-k from to**

Remove arcs between the routines *from* and *to*.

##### **-s**

Summarize profile information in the file *gmon.sum*.

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- v**  
Print version and exit.
  - z**  
Include zero-usage calls.
  - E *routine***  
Do not display entries for *routine* and its descendants or include time spent on them in calculations for total time.
  - F *routine***  
Print only information about *routine*. Do not include time spent in other routines.
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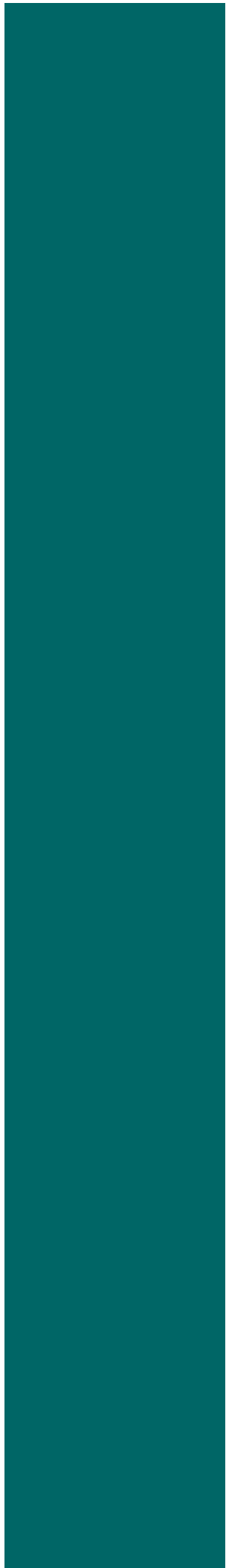
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### killall [options] names

Kill processes by command name. If more than one process is running the specified command, kill all of them. Treat command names that contain a / as files; kill all processes that are executing that file.

#### Options

##### -signal

Send *signal* to process (default is TERM). *signal* may be a name or number.

##### -e

Require an exact match to kill very long names (i.e., longer than 15 characters). Normally, **killall** kills everything that matches within the first 15 characters. With **-e**, such entries are skipped. (Use **-v** to print a message for each skipped entry.)

##### -g

Kill the process group to which the process belongs.

##### -i

Prompt for confirmation before killing processes.

##### -l

List known signal names.

##### -q

Quiet; do not complain of processes not killed.

##### -v

Verbose: after killing process, report success and process ID.

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**-V**

Print version information.

**-w**

Wait for all killed processes to die. Note that **killall** may wait forever if the signal was ignored or had no effect, or if the process stays in zombie state.

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### killall5

The System V equivalent of **killall**, this command kills all processes except those on which it depends.

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### klogd [options]

System administration command. Control which kernel messages are displayed on the console; prioritize all messages, and log them through **syslogd**. On many operating systems, **syslogd** performs all the work of **klogd**, but on Linux the features are separated. Kernel messages are gleaned from the */proc* filesystem and from system calls to **syslogd**. By default, no messages appear on the console. Messages are sorted into 8 levels, 0-7, and the level number is prepended to each message.

#### Priority levels

**0**

Emergency situation (**KERN\_EMERG**).

**1**

A crucial error has occurred (**KERN\_ALERT**).

**2**

A serious error has occurred (**KERN\_CRIT**).

**3**

An error has occurred (**KERN\_ERR**).

**4**

A warning message (**KERN\_WARNING**).

**5**

The situation is normal but should be checked (**KERN\_NOTICE**).

**6**

Information only (**KERN\_INFO**).

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Debugging messages (**KERN\_DEBUG**).

### Options

#### **-c** *level*

Print all messages of a higher priority (lower number) than *level* to the console.

#### **-d**

Debugging mode.

#### **-f** *file*

Print all messages to *file*; suppress normal logging.

#### **-k** *file*

Use *file* as source of kernel symbols.

#### **-n**

Avoid autobackgrounding. This is needed when **klogd** is started from **init**.

#### **-o**

One-shot mode. Prioritize and log all current messages, then immediately exit.

#### **-s**

Suppress reading of messages from the */proc* filesystem.

### Files

*/usr/include/linux/kernel.h*, */usr/include/sys/syslog.h*

Sources for definitions of each logging level

*/proc/kmsg*

A file examined by **klogd** for messages

*/var/run/klogd.pid*

**klogd**'s process ID

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### ksyms [options]

System administration command. Print a list of all exported kernel symbols (name, address, and defining module, if applicable).

#### Options

##### -a

Include symbols from unloaded modules.

##### -h

Suppress header message.

##### -m

Include starting address and size. Useful only for symbols in loaded modules.

#### File

*/proc/ksyms*

Another source of the same information

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### lastlog [*options*]

System administration command. Print the last login times for system accounts. Login information is read from the file `/var/log/lastlog`.

#### Options

**-tn**

Print only logins more recent than *n* days ago.

**-uname**

Print only login information for user *name*.

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### ld [options] objfiles

Combine several *objfiles*, in the specified order, into a single executable object module (*a.out* by default). **ld** is the link editor and is often invoked automatically by compiler commands.

#### Options

##### **-c** file

Consult *file* for commands.

##### **-d, -dc, -dp**

Force the assignment of space to common symbols.

##### **-defsym** symbol=expression

Create the global *symbol* with the value *expression*.

##### **-e** symbol

Set *symbol* as the address of the output file's entry point.

##### **-i**

Produce a linkable output file; attempt to set its magic number to OMAGIC.

##### **-larch**

Include the archive file *arch* in the list of files to link.

##### **-m** linker

Emulate *linker*.

##### **-n**

Make text read-only; attempt to set NMAGIC.

**-noinhibit-exec**

Produce output file even if errors are encountered.

**-o *output***

Place output in *output*, instead of *a.out*.

**-ofORMAT *format***

Specify output format.

**-r**

Produce a linkable output file; attempt to set its magic number to OMAGIC.

**-s**

Do not include any symbol information in output.

**-shared**

Create a shared library.

**-sort-common**

Do not sort global common symbols by size.

**-t**

Announce each input file's name as it is processed.

**-u *symbol***

Force *symbol* to be undefined.

**-v, --version**

Show version number.

**--verbose**

Print information about **ld**; print the names of input files while attempting to open them.

**-warn-common**

Warn when encountering common symbols combined with other constructs.

**-warn-once**

Provide only one warning per undefined symbol.

**-x**

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With **-s** or **-S**, delete all local symbols that begin with **L**.

**-L** *dir*

Search directory *dir* before standard search directories (this option must precede the **-l** option that searches that directory).

**-M**

Display a link map on standard out.

**-Map** *file*

Print a link map to *file*.

**-N**

Allow reading of and writing to both data and text; mark output if it supports Unix magic numbers; do not page-align data.

**-R** *file*

Obtain symbol names and addresses from *file*, but suppress relocation of *file* and its inclusion in output.

**-S**

Do not include debugger symbol information in output.

**-Tbss** *address*

Begin bss segment of output at *address*.

**-Tdata** *address*

Begin data segment of output at *address*.

**-Ttext** *address*

Begin text segment of output at *address*.

**-Ur**

Synonymous with **-r** except when linking C++ programs, where it resolves constructor references.

**-X**

With **-s** or **-S**, delete local symbols beginning with **L**.

**-V**

Show version number and emulation linkers for **-m** option.

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### ldconfig [options] directories

System administration command. Examine the libraries in the given *directories*, */etc/ld.so.conf*, */usr/lib*, and */lib*; update links and cache where necessary. Usually run in startup files or after the installation of new shared libraries.

#### Options

**-D**

Debug. Suppress all normal operations.

**-l**

Library mode. Expect libraries as arguments, not directories. Manually link specified libraries.

**-n**Suppress examination of */usr/lib* and */lib* and reading of */etc/ld.so.conf*; do not cache.**-N**

Do not cache; only link.

**-p**

Print all directories and candidate libraries in the cache. Expects no arguments.

**-v**

Verbose. Include version number, and announce each directory as it is scanned and links as they are created.

**-X**

Do not link; only rebuild cache.



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## Files

*/lib/ld.so*

Linker and loader.

*/etc/ld.so.conf*

List of directories that contain libraries.

*/etc/ld.so.cache*

List of the libraries found in those libraries mentioned in */etc/ld.so.conf*.

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### ldd [options] programs

Display a list of the shared libraries each *program* requires.

#### Options

**-v**

Display **ldd**'s version.

**-V**

Display the linker's version.

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**less** [*options*] [*filename*]

**less** is a program for paging through files or other output. It was written in reaction to the perceived primitiveness of **more** (hence its name). Some commands may be preceded by a number.

### Options

**-[z]num**

Set number of lines to scroll to *num*. Default is one screenful. A negative *num* sets the number to *num* lines less than the current number.

**+[+]command**

Run *command* on startup. If *command* is a number, jump to that line. The option ++ applies this command to each file in the command-line list.

**-?**

Print help screen. Ignore all other options; do not page through file.

**-a**

When searching, begin after last line displayed. (Default is to search from second line displayed.)

**-buffers**

Use *buffers* buffers for each file (default is 10). Buffers are 1 kilobyte in size.

**-c**

Redraw screen from top, not bottom.

**-d**

Suppress dumb-terminal error messages.

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**-e**

Automatically exit after reaching EOF twice.

**-f**

Force opening of directories and devices; do not print warning when opening binaries.

**-g**

Highlight only string found by past search command, not all matching strings.

**-hnum**

Never scroll backward more than *num* lines at once.

**-i**

Make searches case-insensitive, unless the search string contains uppercase letters.

**-jnum**

Position target line on line *num* of screen. Target line can be the result of a search or a jump. Count lines beginning from 1 (top line). A negative *num* is counted back from bottom of screen.

**-kfile**

Read *file* to define special key bindings.

**-m**

Display **more**-like prompt, including percent of file read.

**-n**

Do not calculate line numbers. Affects **-m** and **-M** options and = and v commands (disables passing of line number to editor).

**-ofile**

When input is from a pipe, copy output to *file* as well as to screen. (Prompt for overwrite authority if *file* exists.)

**-ppattern**

At startup, search for first occurrence of *pattern*.

**m**

Set medium prompt (specified by **-m**).

**M**

Set long prompt (specified by **-M**).

=

Set message printed by = command.

**-q**

Disable ringing of bell on attempts to scroll past EOF or before beginning of file. Attempt to use visual bell instead.

**-r**

Display "raw" control characters, instead of using  $\^x$  notation. Sometimes leads to display problems.

**-s**

Print successive blank lines as one line.

**-tag**

Edit file containing *tag*. Consult *./tags* (constructed by **ctags**).

**-u**

Treat backspaces and carriage returns as printable input.

**-w**

Print lines after EOF as blanks instead of tildes (~).

**-xn**

Set tab stops to every *n* characters. Default is 8.

**-yn**

Never scroll forward more than *n* lines at once.

**-B**

Do not automatically allocate buffers for data read from a pipe. If **-b** specifies a number of buffers, allocate that many. If necessary, allow information from previous screens to be lost.

**-C**

Redraw screen by clearing it and then redrawing from top.

**-E**

Automatically exit after reaching EOF once.

**-G**

Never highlight matching search strings.

**-I**



Make searches case-insensitive, even when the search string contains uppercase letters.

### **-M**

Prompt more verbosely than with **-m**, including percentage, line number, and total lines.

### **-N**

Print line number before each line.

### **-Ofile**

Similar to **-o** but does not prompt when overwriting file.

### **-P[m,M,=]prompt**

Set *prompt* (as defined by **-m**, **-M**, or **=**). Default is short prompt (**-m**).

### **-Q**

Never ring terminal bell.

### **-S**

Cut, do not fold, long lines.

### **-Tfile**

With the **-t** option or **:t** command, read *file* instead of *.tags*.

### **-U**

Treat backspaces and carriage returns as control characters.

### **-X**

Do not send initialization and deinitialization strings from termcap to terminal.

## **Commands**

Many commands can be preceded by a numeric argument, referred to as *number* in the command descriptions.

### **SPACE, ^V, f, ^F**

Scroll forward the default number of lines (usually one windowful).

### **z**

Similar to **SPACE** but allows the number of lines to be specified, in which case it resets the default to that number.

### **RETURN, ^N, e, ^E, j, ^J**

Scroll forward. Default is one line. Display all lines, even if the default is more lines than the screen size.

### **d, ^D**

Scroll forward. Default is one-half the screen size. The number of lines may be specified, in which case the default is reset.

### **b, ^B, ESC-v**

Scroll backward. Default is one windowful.

### **w**

Like **b** but allows the number of lines to be specified, in which case it resets the default to that number.

### **y, ^Y, ^P, k, ^K**

Scroll backward. Default is one line. Display all lines, even if the default is more lines than the screen size.

### **u, ^U**

Scroll backward. Default is one-half the screen size. The number of lines may be specified, in which case the default is reset.

### **r, ^R, ^L**

Redraw screen.

### **R**

Like **r** but discard buffered input.

### **F**

Scroll forward. When an EOF is reached, continue trying to find more output, behaving similarly to **tail -f**.

### **g, <, ESC-<**

Skip to a line. Default is 1.

### **G, >, ESC->**

Skip to a line. Default is the last one.

### **p, %**

Skip to a position *number* percent of the way into the file.

### **{**

If the top line on the screen includes a {, find its matching }. If the top line contains multiple {s, use *number* to determine which one to use in finding a match.

### **}**

If the bottom line on the screen includes a }, find its matching {. If the bottom line contains multiple }s, use *number* to determine which one to use in finding a match.

(

If the top line on the screen includes a (, find its matching ). If the top line contains multiple (s, use *number* to determine which one to use in finding a match.

)

If the bottom line on the screen includes a ), find its matching (. If the bottom line contains multiple )s, use *number* to determine which one to use in finding a match.

[

If the top line on the screen includes a [, find its matching ]. If the top line contains multiple [s, use *number* to determine which one to use in finding a match.

]

If the bottom line on the screen includes a ], find its matching [. If the bottom line contains multiple ]s, use *number* to determine which one to use in finding a match.

**ESC-^F**

Behave like { but prompt for two characters, which it substitutes for { and } in its search.

**ESC-^B**

Behave like } but prompt for two characters, which it substitutes for { and } in its search.

**m**

Prompt for a lowercase letter and then use that letter to mark the current position.

**'**

Prompt for a lowercase letter and then go to the position marked by that letter. There are some special characters:

**'**

Return to position before last "large movement."

**^**

Beginning of file.

**\$**

End of file.

**^X^X**

Same as '.

*/pattern*

Find next occurrence of *pattern*, starting at second line displayed. Some special characters can be entered before *pattern*:

!

Find lines that do not contain *pattern*.

\*

If current file does not contain *pattern*, continue through the rest of the files in the command line list.

@

Search from the first line in the first file specified on the command line, no matter what the screen currently displays.

*?pattern*

Search backward, beginning at the line before the top line. Treats !, \*, and @ as special characters when they begin *pattern*, as / does.

**ESC-/*pattern***

Same as /\*.

**ESC-?*pattern***

Same as ?\*.

**n**

Repeat last *pattern* search.

**N**

Repeat last *pattern* search, in the reverse direction.

**ESC-n**

Repeat previous search command but as though it were prefaced by \*.

**ESC-N**

Repeat previous search command but as though it were prefaced by \* and in the opposite direction.

**ESC-u**

Toggle search highlighting.

**:e [filename]**

Read in *filename* and insert it into the command-line list of filenames. Without *filename*, reread the current file. *filename* may contain special characters:

**%**

Name of current file

**#**

Name of previous file

**^X^V, E**

Same as **:e**.

**:n**

Read in next file in command-line list.

**:p**

Read in previous file in command-line list.

**:x**

Read in first file in command-line list.

**:f, =, ^G**

Print filename, position in command-line list, line number on top of window, total lines, byte number, and total bytes.

**-**

Expects to be followed by a command-line option letter. Toggles the value of that option or, if appropriate, prompts for its new value.

**++**

Expects to be followed by a command-line option letter. Resets that option to its default.

**--**

Expects to be followed by a command-line option letter. Resets that option to the opposite of its default, where the opposite can be determined.

**-**

Expects to be followed by a command-line option letter. Display that option's current setting.

**+command**

Execute *command* each time a new file is read in.

**q, :q, :Q, ZZ**

Exit.

**v**

Not valid for all versions. Invoke editor specified by \$VISUAL or \$EDITOR, or **vi** if neither is set.

! [*command*]

Not valid for all versions. Invoke \$SHELL or **sh**. If *command* is given, run it and then exit. Special characters:

%

Name of current file

#

Name of previous file

!!

Last shell command

| *mark-letter* **command**

Not valid for all versions. Pipe fragment of file (from first line on screen to *mark-letter*) to *command*. *mark-letter* may also be:

^

Beginning of file.

\$

End of file.

., **newline**

Current screen is piped.

## Prompts

The prompt interprets certain sequences specially. Those beginning with % are always evaluated. Those beginning with ? are evaluated if certain conditions are true. Some prompts determine the position of particular lines on the screen. These sequences require that a method of determining that line be specified. See the **-P** option and the manpage for more information.

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**ln** [*options*] *sourcename* [*destname*]

**ln** [*options*] *sourcenames* *destdirectory*

Create pseudonyms (links) for files, allowing them to be accessed by different names. In the first form, link *sourcename* to *destname*, where *destname* is usually a new filename, or (by default) the current directory. If *destname* is an existing file, it is overwritten; if *destname* is an existing directory, a link named *sourcename* is created in that directory. In the second form, create links in *destdirectory*, each link having the same name as the file specified.

### Options

#### **-b, --backup**

Back up files before removing the originals.

#### **-d, -F, --directory**

Allow hard links to directories. Available to privileged users.

#### **-f, --force**

Force the link (don't prompt for overwrite permission).

#### **--help**

Print a help message and then exit.

#### **-i, --interactive**

Prompt for permission before removing files.

#### **-n, --no-dereference**

Replace symbolic links to directories instead of dereferencing them. **--force** is useful with this option.

#### **-s, --symbolic**

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Create a symbolic link. This lets you link across filesystems and also see the name of the link when you run **ls -l** (otherwise, there's no way to know the name that a file is linked to).

**-S *suffix*, --suffix *suffix***

Append *suffix* to files when making backups, instead of the default ~.

**-v, --verbose**

Verbose mode.

**--version**

Print version information and then exit.

**-V, --version-control *value***

Control the types of backups made. The acceptable values for version-control are:

**t, numbered**

Numbered.

**nil,existing**

Simple (~) unless a numbered backup exists; then make a numbered backup.

**never, simple**

Simple.

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### locate [*options*] *pattern*

Search database(s) of filenames and print matches. \*, ?, [, and ] are treated specially; / and . are not. Matches include all files that contain *pattern*, unless *pattern* includes metacharacters, in which case **locate** requires an exact match.

#### Options

**-d *path*, --database=*path***

Search databases in *path*. *path* must be a colon- separated list.

**-h, --help**

Print a help message and then exit.

**--version**

Print version information and then exit.

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### lockfile [*options*] *filenames*

Create semaphore file(s), used to limit access to a file. When **lockfile** fails to create some of the specified files, it pauses for 8 seconds and retries the last one on which it failed. The command processes flags as they are encountered (i.e., a flag that is specified after a file will not affect that file).

#### Options

##### **-s** *sleeptime*

Time **lockfile** waits before retrying after a failed creation attempt. Default is 8 seconds.

##### **-!**

Invert return value. Useful in shell scripts.

##### **-l** *lockout\_time*

Time (in seconds) after a lockfile was last modified at which it will be removed by force. See also **-s**.

##### **-ml, -mu**

If the permissions on the system mail spool directory allow it or if **lockfile** is suitably setgid, it can lock and unlock your system mailbox with the options **-ml** and **-mu**, respectively.

##### **-r** *retries*

Stop trying to create *files* after *retries* retries. The default is -1 (never stop trying). When giving up, remove all created files.

##### **-s** *suspend\_time*

After a lockfile has been removed by force (see **-l**), a suspension of 16 seconds takes place by default. (This is intended to prevent the inadvertent immediate removal of any lockfile newly created by another

program.) Use **-s** to change the default 16 seconds.

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### **nohup** *command* [*arguments*]

Run the named *command* with its optional command *arguments*, continuing to run it even after you log out (make *command* immune to hangups; i.e., **no hangup**). TTY output is appended to the file *nohup.out* by default. Modern shells preserve background commands by default; this command is necessary only in the original Bourne shell.

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**nslookup** [-option...] [*host\_to\_find* | - [*server* ]]

TCP/IP command. Query Internet domain name servers. **nslookup** has two modes: interactive and noninteractive. Interactive mode allows the user to query name servers for information about various hosts and domains or to print a list of hosts in a domain. It is entered either when no arguments are given (default name server will be used) or when the first argument is a hyphen and the second argument is the hostname or Internet address of a name server. Noninteractive mode is used to print just the name and requested information for a host or domain. It is used when the name of the host to be looked up is given as the first argument. Any of the *keyword=value* pairs listed under the interactive **set** command can be used as an option on the command line by prefacing the keyword with a -. The optional second argument specifies a name server.

### Options

All of the options under the **set** interactive command can be entered on the command line, with the syntax *-keyword[=value]*.

### Interactive commands

#### **exit**

Exit **nslookup**.

#### **finger** [*name*] [>|>>]*filename*]

Connect with finger server on current host, optionally creating or appending to *filename*.

#### **help, ?**

Print a brief summary of commands.

#### *host* [*server*]

Look up information for *host* using the current default server or using *server* if specified.

#### **ls** -[*ahd*] *domain* [>|>>]*filename*]

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List information available for *domain*, optionally creating or appending to *filename*. The **-a** option lists aliases of hosts in the domain. **-h** lists CPU and operating system information for the domain. **-d** lists all contents of a zone transfer.

**lserver** *domain*

Change the default server to *domain*. Use the initial server to look up information about *domain*.

**root**

Change default server to the server for the root of the domain namespace.

**server** *domain*

Change the default server to *domain*. Use the current default server to look up information about *domain*.

**set** *keyword*[=*value*]

Change state information affecting the lookups. Valid keywords are:

**all**

Print the current values of the frequently used options to **set**.

**class**=*name*

Set query class to IN (Internet), CHAOS, HESIOD, or ANY. Default is IN.

**domain**=*name*

Change default domain name to *name*.

**[no]debug**

Turn debugging mode on or off.

**[no]d2**

Turn exhaustive debugging mode on or off.

**[no]defname**

Append default domain name to every lookup.

**[no]ignoretc**

Ignore truncate error.

**[no]recurse**

Tell name server to query or not query other servers if it does not have the information.

**[no]search**

With *defname*, search for each name in parent domains of current domain.

**[no]vc**

Always use a virtual circuit when sending requests to the server.

**port=port**

Connect to name server using *port*.

**querytype=value**

See **type=value**.

**retry=number**

Set number of retries to *number*.

**root=host**

Change name of root server to *host*.

**srchlist=domain**

Set search list to *domain*.

**timeout=number**

Change timeout interval for waiting for a reply to *number* seconds.

**type=value**

Change type of information returned from a query to one of:

<b>A</b>	Host's Internet address
<b>ANY</b>	Any available information
<b>CNAME</b>	Canonical name for an alias
<b>HINFO</b>	Host CPU and operating system
	type
<b>MD</b>	Mail destination
<b>MG</b>	Mail group member
<b>MINFO</b>	Mailbox or mail list
	information
<b>MR</b>	Mail rename domain name
<b>MX</b>	Mail exchanger
<b>NS</b>	Nameserver for the named zone
<b>PTR</b>	Hostname or pointer to other
	information
<b>SOA</b>	Domain start-of-authority
<b>TXT</b>	Text information
<b>UINFO</b>	User information
<b>WKS</b>	Supported well-known services

*view filename*

Sort and list output of previous **ls** command(s) with **more**.

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### passwd [*user*]

Create or change a password associated with a *user* name. Only the owner or a privileged user may change a password. Owners need not specify their *user* name.

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### paste [options] files

Merge corresponding lines of one or more *files* into tab-separated vertical columns. See also **cut**, **join**, and **pr**.

#### Options

-

Replace a filename with the standard input.

**-dchar, --delimiters=char**

Separate columns with *char* instead of a tab. Note: you can separate columns with different characters by supplying more than one *char*.

**--help**

Print a help message and then exit.

**--version**

Print version information and then exit.

**-s, --serial**

Merge lines from one file at a time.

#### Examples

Create a three-column *file* from files *x*, *y*, and *z*:

```
paste x y z > file
```

List users in two columns:

```
who | paste - -
```

Merge each pair of lines into one line:

```
paste -s -d"\t\n" list
```

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**patch** [*options*] [*original* [*patchfile*]]

Apply the patches specified in *patchfile* to *original*. Replace the original with the new, patched version; move the original to *original.orig* or *original~*.

### Options

**+** [*options*] [*original2*]

Apply patches again, with different options or a different original file.

**-b, --backup**

Back up the original file.

**-z suffix, --suffix=suffix**

Back up the original file in *original.suffix*.

**-B prefix, --prefix=prefix**

Prepend *prefix* to the backup filename.

**-c, --context**

Interpret *patchfile* as a context diff.

**-d dir, --directory=dir**

**cd** to *directory* before beginning **patch** operations.

**-D string, --ifdef=string**

Mark all changes with:

```
#ifdef
```

```
string
```

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#endif

**-e, --ed**Treat the contents of *patchfile* as **ed** commands.**-E, --remove-empty-files**If **patch** creates any empty files, delete them.**-f, --force**

Force all changes, even those that look incorrect. Skip patches if the original file does not exist; force patches for files with the wrong version specified; assume patches are never reversed.

**-i file, --input=file**Read patch from *file* instead of **stdin**.**-t, --batch**

Skip patches if the original file does not exist.

**-F num, --fuzz=num**

Specify the maximum number of lines that may be ignored (fuzzed over) when deciding where to install a hunk of code. The default is 2. Meaningful only with context diffs.

**-l, --ignore-whitespace**

Ignore whitespace while pattern matching.

**-n, --normal**

Interpret patch file as a normal diff.

**-N, --forward**

Ignore patches that appear to be reversed or to have already been applied.

**-o file, --output=file**Print output to *file*.**-p[num], --strip[=num]**Specify how much of preceding pathname to strip. A *num* of 0 strips everything, leaving just the filename. 1 strips the leading */*; each higher number after that strips another directory from the left.**-r file, --reject-file=file**Place rejects (hunks of the patch file that **patch** fails to place within the original file) in *file*. Default is *original.rej*.

[XML](#)

### **-R, --reverse**

Do a reverse patch: attempt to undo the damage done by patching with the old and new files reversed.

### **-s, --silent, --quiet**

Suppress commentary.

### **-u, --unified**

Interpret patch file as a unified context diff.

### **-V *method*, --version-control=*method***

Specify method for creating backup files (overridden by **-B**):

### **t, numbered**

Make numbered backups.

### **nil, existing**

Back up files according to preexisting backup schemes, with simple backups as the default. This is **patch**'s default behavior.

### **never, simple**

Make simple backups.

## **Environment variables**

### **TMPDIR**

Specify the directory for temporary files, */tmp* by default.

### **SIMPLE\_BACKUP\_SUFFIX**

Suffix to append to backup files instead of *.orig* or *~*.

### **VERSION\_CONTROL**

Specify what method to use in naming backups (see **-V**).

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### pathchk [ *option* ] *filenames*

Determine validity and portability of *filenames*. Specifically, determine if all directories within the path are searchable and if the length of the *filenames* is acceptable.

#### Options

##### **-p, --portability**

Check portability for all POSIX systems.

##### **--help**

Print a help message and then exit.

##### **--version**

Print version information and then exit.

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### run-parts [*options*] [*directory*]

System administration command. Run, in lexical order, all scripts found in *directory*. Exclude scripts whose filenames include nonalphanumeric characters (besides underscores and hyphens).

#### Options

--

Interpret all subsequent arguments as filenames, not options.

**--test**

Print information listing which scripts would be run, but suppress actual execution of them.

**--umask=*umask***

Specify *umask*. The default is 022.

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### runlevel

System administration command. Display the previous and current system runlevels.

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### **ruptime** [*options*]

TCP/IP command. Provide information on how long each machine on the local network has been up and which users are logged in to each. If a machine has not reported in for 11 minutes, assume it is down. The listing is sorted by hostname.

#### Options

**-a**

Include users who have been idle for more than one hour.

**-l**

Sort machines by load average.

**-r**

Reverse the normal sort order.

**-t**

Sort machines by uptime.

**-u**

Sort machines by the number of users logged in.

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**rusers** [*options*] [*host*]

TCP/IP command. List the users logged on to *host*, or to all local machines, in **who** format (hostname, usernames).

### Options

**-a**

Include machines with no users logged in.

**-l**

Include more information: tty, date, time, idle time, remote host.

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**rwall** *host* [*file*]

TCP/IP command. Print a message to all users logged on to *host*. If *file* is specified, read the message from it; otherwise, read from standard input.

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### rwho *[option]*

Report who is logged on for all machines on the local network (similar to **who**).

#### Option

##### **-a**

List users even if they've been idle for more than one hour.

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### touch [*options*] *files*

For one or more *files*, update the access time and modification time (and dates) to the current time and date. **touch** is useful in forcing other commands to handle files a certain way; e.g., the operation of **make**, and sometimes **find**, relies on a file's access and modification time. If a file doesn't exist, **touch** creates it with a filesize of 0.

### Options

**-a, --time=atime, --time=access, --time=use**

Update only the access time.

**-c, --no-create**

Do not create any file that doesn't already exist.

**-d *time*, --date *time***

Change the time value to the specified *time* instead of the current time. *time* can use several formats and may contain month names, time zones, a.m. and p.m. strings, as well as others.

**-m, --time=mtime, --time=modify**

Update only the modification time.

**-r *file*, --reference *file***

Change times to be the same as those of the specified *file*, instead of the current time.

**-t *time***

Use the time specified in *time* instead of the current time. This argument must be of the format: `[[cc]yy]mmddhhmm[.ss]`, indicating optional century and year, month, date, hours, minutes, and optional seconds.

**--help**

Print help message and then exit.

**--version**

Print the version number and then exit.

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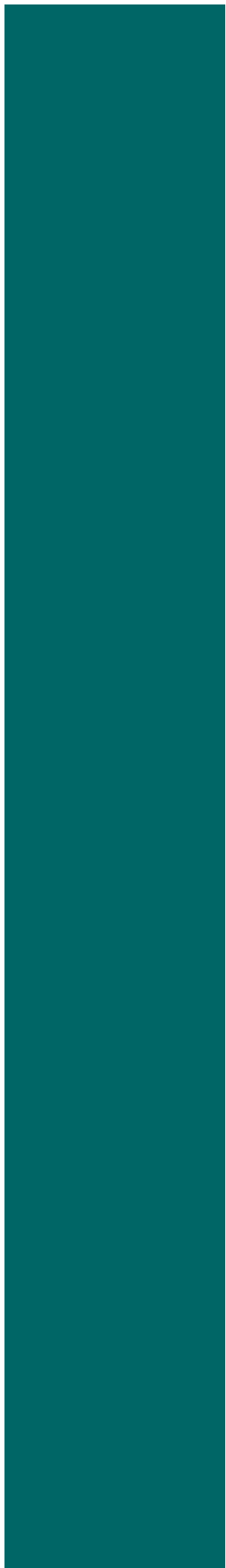
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**tr** [*options*] [*string1* [*string2*]]

Translate characters—copy standard input to standard output, substituting characters from *string1* to *string2* or deleting characters in *string1*.

### Options

#### **-c, --complement**

Complement characters in *string1* with respect to ASCII 001-377.

#### **-d, --delete**

Delete characters in *string1* from output.

#### **-s, --squeeze-repeats**

Squeeze out repeated output characters in *string2*.

#### **-t, --truncate-set1**

Truncate *string1* to the length of *string2* before translating.

#### **--help**

Print help message and then exit.

#### **--version**

Print the version number and then exit.

### Special characters

Include brackets ([ ]) where shown.

**\a**

^G (bell)



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**\b**

^H (backspace)

**\f**

^L (form feed)

**\n**

^J (newline)

**\r**

^M (carriage return)

**\t**

^I (tab)

**\v**

^K (vertical tab)

**\nnn**

Character with octal value *nnn*.

**\\**

Literal backslash.

***char1-char2***

All characters in the range *char1* through *char2*. If *char1* does not sort before *char2*, produce an error.

**[*char1-char2*]**

Same as *char1-char2* if both strings use this.

**[*char\**]**

In *string2*, expand *char* to the length of *string1*.

**[*char\*number*]**

Expand *char* to number occurrences. [**x\*4**] expands to **xxxx**, for instance.

**[*:class:*]**

Expand to all characters in *class*, where *class* can be:

**alnum**

Letters and digits

**alpha**

[XML](#)

Letters

**blank**

Whitespace

**cntrl**

Control characters

**digit**

Digits

**graph**

Printable characters except space

**lower**

Lowercase letters

**print**

Printable characters

**punct**

Punctuation

**space**

Whitespace (horizontal or vertical)

**upper**

Uppercase letters

**xdigit**

Hexadecimal digits

[*=char=*]

The class of characters in which *char* belongs.

**Examples**

Change uppercase to lowercase in a file:

```
cat file | tr 'A-Z' 'a-z'
```

Turn spaces into newlines (ASCII code 012):

```
tr ' ' '\012' < file
```

Strip blank lines from **file** and save in **new.file** (or use **011** to change successive tabs into one tab):

```
cat file | tr -s "" "\012" > new.file
```

Delete colons from **file**; save result in **new.file**:

```
tr -d : < file > new.file
```

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**traceroute** [*options*] *host* [*packetsize*]

TCP/IP command. Trace route taken by packets to reach network host. **traceroute** attempts tracing by launching UDP probe packets with a small TTL (time to live), then listening for an ICMP "time exceeded" reply from a gateway. *host* is the destination hostname or the IP number of host to reach. *packetsize* is the packet size in bytes of the probe datagram. Default is 38 bytes.

### Options

**-d**

Turn on socket-level debugging.

**-g *addr***

Enable the IP LSRR (Loose Source Record Route) option in addition to the TTL tests, to ask how someone at IP address *addr* can reach a particular target.

**-l**

Include the time-to-live value for each packet received.

**-m *max\_ttl***

Set maximum time-to-live used in outgoing probe packets to *max\_ttl* hops. Default is 30 hops.

**-n**

Show numerical addresses; do not look up hostnames. (Useful if DNS is not functioning properly.)

**-p *port***

Set base UDP port number used for probe packets to *port*. Default is (decimal) 33434.

**-q *n***

Set number of probe packets for each time-to-live setting to the value *n*. Default is 3.

**-r**

Bypass normal routing tables and send directly to a host on an attached network.

**-s *src\_addr***

Use *src\_addr* as the IP address that will serve as the source address in outgoing probe packets.

**-t *tos***

Set the type-of-service in probe packets to *tos* (default 0). The value must be a decimal integer in the range 0 to 255.

**-v**

Verbose—received ICMP packets (other than TIME\_EXCEEDED and PORT\_UNREACHABLE) will be listed.

**-w *wait***

Set time to wait for a response to an outgoing probe packet to *wait* seconds (default is 3 seconds).

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### troff

See [groff](#).

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**true**

A null command that returns a successful (0) exit status. See also **false**.

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### tune2fs [options] device

System administration command. Tune the parameters of a Linux Second Extended Filesystem by adjusting various parameters. You must specify the *device* on which the filesystem resides; it must not be mounted read/write when you change its parameters.

#### Options

##### **-c** *mount-counts*

Specify the maximum number of mount counts between two checks on the filesystem.

##### **-e** *behavior*

Specify the kernel's behavior when encountering errors. *behavior* must be one of:

##### **continue**

Continue as usual.

##### **remount-ro**

Remount the offending filesystem in read-only mode.

##### **panic**

Cause a kernel panic.

##### **-g** *group*

Allow *group* (a group ID or name) to use reserved blocks.

##### **-i** *interval*[**d**|**w**|**m**]

Specify the maximum interval between filesystem checks. Units may be in days (**d**), weeks (**w**), or months (**m**). If *interval* is 0, checking will not

be time-dependent.

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**-l**

Display a list of the superbblock's contents.

**-m *percentage***

Specify the percentage of blocks that will be reserved for use by privileged users.

**-r *num***

Specify the number of blocks that will be reserved for use by privileged users.

**-u *user***

Allow *user* (a user ID or name) to use reserved blocks.

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### ypxfr [options] mapname

NFS/NIS command. Transfer an NIS map from the server to the local host by making use of normal NIS services. **ypxfr** creates a temporary map in the directory `/etc/yp/domain` (where *domain* is the default domain for the local host), fills it by enumerating the map's entries, and fetches the map parameters and loads them. If run interactively, **ypxfr** writes its output to the terminal. However, if it is invoked without a controlling terminal, and if the log file `/usr/admin/nislog` exists, it appends all its output to that file.

### Options

#### -b

Preserve the resolver flag in the map during the transfer.

#### -C *tid prog ipadd port*

This option is for use only by **ypserv**. When **ypserv** invokes **ypxfr**, it specifies that **ypxfr** should call back a **yppush** process at the host with IP address *ipadd*, registered as program number *prog*, listening on port *port*, and waiting for a response to transaction *tid*.

#### -c

Do not send a "Clear current map" request to the local **ypserv** process.

#### -d *domain*

Specify a domain other than the default domain.

#### -f

Force the transfer to occur even if the version at the master is older than the local version.

#### -h *host*

Get the map from *host*, regardless of what the map says the master is. If



host is not specified, **ypxfr** asks the NIS service for the name of the master and tries to get the map from there. *host* may be a name or an Internet address in the form *h.h.h.h*.

**-S**

Use only NIS servers running as **root** and using a reserved port.

**-s domain**

Specify a source *domain* from which to transfer a map that should be the same across domains (such as the *services.byname* map).

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**zcat** [*options*] [*files*]

Read one or more *files* that have been compressed with **gzip** or **compress** and write them to standard output. Read standard input if no *files* are specified or if - is specified as one of the files; end input with *EOF*. **zcat** is identical to **gunzip -c** and takes the options **-fhLV** described for **gzip/gunzip**.

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### zcmp [options] files

Read compressed files and pass them, uncompressed, to the **cmp** command, along with any command-line options. If a second file is not specified for comparison, look for a file called *file.gz*.

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### **zdiff** [*options*] *files*

Read compressed files and pass them, uncompressed, to the **diff** command, along with any command-line options. If a second file is not specified for comparison, look for a file called *file.gz*.

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### **zdump** [*options*] [*zones*]

System administration command. Dump a list of all known time zones or, if an argument is provided, a specific zone or list of zones. Include each zone's current time with its name.

#### Options

**-c** *year*

Specify a cutoff year to limit verbose output. Meaningful only with **-v**.

**-v**

Verbose mode. Include additional information about each zone.

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Rename all **gzipped** files to *filename.gz*, unless file already has a **.gz** extension.

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### **zgrep** [*options*] [*files*]

Uncompress files and pass to **grep**, along with any command-line arguments. If no files are provided, read from (and attempt to uncompress) standard input. May be invoked as **zegrep** or **zfgrep** and will in those cases invoke **egrep** or **fgrep**.

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**zic** [*options*] [*files*]

System administration command. Create time conversion information files from the file or files specified. If the specified file is -, read information from standard input.

### Options

**-d** *directory*

Place the newly created files in *directory*. Default is */usr/local/etc/zoneinfo*.

**-l** *timezone*

Specify a *timezone* to use for local time. **zic** links the zone information for *timezone* with the zone **localtime**.

**-p** *timezone*

Set the default rules for handling POSIX-format environment variables to the zone name specified by *timezone*.

**-s**

Store time values only if they are the same when signed as when unsigned.

**-v**

Verbose mode. Include extra error checking and warnings.

**-y** *command*

Check year types with *command*. Default is **yearistype**.

**-L** *file*

Consult *file* for information about leap seconds.

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The source file(s) for **zic** should be formatted as a sequence of rule lines, zone lines, and link lines. An optional file containing leap second rules can be specified on the command line. Rule lines describe how time should be calculated. They describe changes in time, daylight savings time, war time, and any other changes that might affect a particular time zone. Zone lines specify which rules apply to a given zone. Link lines link similar zones together. Leap lines describe the exact time when leap seconds should be added or subtracted. Each of these lines is made up of fields. Fields are separated from one another by any number of whitespace characters. Comment lines are preceded by a **#**. The fields used in each line are listed next.

**Rule line fields**

The format of a rule line is:

```
Rule NAME FROM TO TYPE IN ON AT SAVE LETTERS
```

**NAME**

Name this set of rules.

**FROM**

Specify the first year to which this rule applies. Gregorian calendar dates are assumed. Instead of specifying an actual year, you may specify *minimum* or *maximum* for the minimum or maximum year representable as an integer.

**TO**

Specify the last year to which this rule applies. Syntax is the same as for the FROM field.

**TYPE**

Specify the type of year to which this rule should be applied. The wildcard **-** instructs that all years be included. Any given year's type will be checked with the command given with the **-y** option or the default **yearistype year type**. An exit status of 0 is taken to mean the year is of the given type; an exit status of 1 means that it is not of the given type (see **-y** option).

**IN**

Specify month in which this rule should be applied.

**ON**

Specify day in which this rule should be applied. Whitespace is not allowed. For example:

**1**

The 1st

**firstSun**

The first Sunday

**Sun>=3**

The first Sunday to occur before or on the 3rd

## **AT**

Specify the time after which the rule is in effect. For example, you may use **13**, **13:00**, or **13:00:00** for 1:00 p.m.. You may include one of several suffixes (without whitespace between):

### **s**

Local standard time.

### **u, g, z**

Universal time.

### **w**

Wall clock time (default).

## **SAVE**

Add this amount of time to the local standard time. Formatted like **AT**, without suffixes.

## **LETTERS**

Specify letter or letters to be used in time zone abbreviations (for example, S for EST). For no abbreviation, enter -.

## **Zone line fields**

The format of a zone line is:

```
Zone NAME GMTOFF RULES/SAVE FORMAT [UNTIL]
```

### **NAME**

Time zone name.

### **GMTOFF**

The amount of hours by which this time zone differs from GMT. Formatted like AT. Negative times are subtracted from GMT; by default, times are added to it.

### **RULES/SAVE**

Either the name of the rule to apply to this zone or the amount of time to add to local standard time. To make the zone the same as local standard time, specify -.

### **FORMAT**

How to format time zone abbreviations. Specify the variable part with %s.

### **UNTIL**

Change the rule for the zone at this date. The next line must specify the new zone information and therefore must omit the string "Zone" and the NAME field.

### Link line fields

The format of a link line is:

Link **LINK-FROM LINK-TO**

#### **LINK-FROM**

The name of the zone that is being linked.

#### **LINK-TO**

An alternate name for the zone that was specified as LINK-FROM.

### Leap line fields

The format of a leap line is:

Leap **YEAR MONTH DAY HH:MM:SS CORR R/S**

#### **YEAR MONTH DAY HH:MM:SS**

Specify when the leap second happened.

#### **CORR**

Uses a + or a - to show whether the second was added or skipped.

#### **R/S**

An abbreviation of Rolling or Stationary to describe whether the leap second should be applied to local wall clock time or to GMT.

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### zmore [*files*]

Similar to **more**. Uncompress files and print them, one screenful at a time. Works on files compressed with **compress**, **gzip**, or **pack** and with uncompressed files.

### Commands

#### space

Print next screenful.

#### *i*[*number*]

Print next screenful, or *number* lines. Set *i* to *number* lines.

#### **d**, **^D**

Print next *i*, or 11, lines.

#### *iz*

Print next *i* lines or a screenful.

#### *is*

Skip *i* lines. Print next screenful.

#### *if*

Skip *i* screens. Print next screenful.

#### **q**, **Q**, **:q**, **:Q**

Go to next file, or, if current file is the last, exit **zmore**.

#### **e**, **q**

Exit **zmore** when the prompt "--More--(Next file: *file*)" is displayed.

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**s**

Skip next file and continue.

**=**

Print line number.

***/expr***

Search forward for *ith* occurrence (in all files) of *expr*, which should be a regular expression. Display occurrence, including the two previous lines of context.

**in**

Search forward for the *ith* occurrence of the last regular expression searched for.

**!*command***

Execute *command* in shell. If *command* is not specified, execute last shell command. To invoke a shell without passing it a command, enter \!.

**.**

Repeat the previous command.

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