

Linux Command Line Primer

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Preface

The purpose of this guide is to introduce the Linux command line to a new user. This guide simply covers the basics and the main high points to help a new user get acquainted with the command line. Only the most important commands with their most useful flags are documented in this guide – information regarding additional flags and additional commands can be found elsewhere.

The information in this guide is not guaranteed to be correct, complete, or up-to-date. Some of the information in this guide has been obtained from other sources, and hence, the correctness of this guide is not guaranteed. In addition, commands and their flags can vary from distribution to distribution, version to version, etc.

Most, if not all, of the commands listed in this guide should also work in Apple's Mac OS X. *Caution:* In Mac OS X, when working with the commands that are irreversible, it is recommended that you double-check with another reference to guarantee the intended results.

General Filesystem Background Information

- / considered the “root” of the filesystem. All files and directories on the filesystem are in this directory or one of its subdirectories.
- . the current directory
- .. the parent directory
- /home where user home directories are stored, with the exception of the root user.
- /root home directory location for the root user.
- ~ expands to your home directory path
Example: ~/Desktop is the same as /home/scottm/Desktop
- \$PATH the PATH variable, which is a part of the shell environment. Any directory included in the PATH variable is searched when a command is executed and a path is not specified.

General Filesystem Commands

df

Display free disk space.

- a Show all filesystems.
- h Displays sizes in human-readable form (e.g. K, M)
- l Only show locally-mounted filesystems.

mount

Mounts the specified device node at the specified mount point.

Note: If no arguments are given, the current mounts are outputted to the screen.

- r Mount the filesystem read-only.
- t Performs the mount using the specified filesystem.
- v Be verbose.

umount

Unmount the specified mountpoint.

- v Be verbose.

Working with Files and Directories

`pwd`

Prints the present working directory.

`ls`

Lists the contents of the specified directory, by default the present working directory.

- a Shows all files, including hidden ones.
- l Lists contents with details, in a column format.
- h Used with -l, displays file sizes in human-readable form (e.g. K, M)
- t Sort by time modified (most recently modified first) before sorting in lexicographical order.
- X Sort listing by file extension.

`mkdir`

Creates a directory with the specified name.

- p Creates any parent directories if they do not exist.

`cd`

Change the current director to the one specified.

Note: “`cd`” Changes to the user home directory.

Note: “`cd -`” Changes to the previous directory, which allows moving back and forth between two directories easily.

`cp`

Copy the specified file or directory to the specified location.

- R Copy recursively (in essence, copy a folder and its contents).
- f Overwriting an existing files without asking.
- i Prompt before overwriting an existing file.
- n Do not overwrite existing files.
- v Be verbose – show files as they are copied.

`mv`

Move the specified file to a new location. `mv` can also be used to rename files.

- f Overwriting an existing file without asking.
- i Prompt before overwriting an existing file.
- n Do not overwrite an existing file.
- v Be verbose – show files after they are moved.

rm

Delete the specified file or directory. This **CANNOT BE UNDONE**, so be careful when using rm (especially when using wildcards).

- f Force deletion.
- i Prompt for confirmation before deletion of each file.
- r Delete recursively, such as when deleting a directory.
- v Be verbose – show files as they are deleted.

du

Gives the size of the specified file(s).

- h Displays sizes in human-readable form (e.g. K, M)
- c Display a grand total.

Working with File Contents

cat

Output the contents of one or more specified files to the screen.

Note: Several files can be printed with “cat file1 file2 file3 ...”

- n Number the output lines, starting at 1.

head

Output the first lines of the specified file to the screen. The default number of lines outputted is 10.

- n Output the number of lines specified, instead of the default of 10.

tail

Output the last lines of the specified file to the screen. The default number of lines outputted is 10.

- n Output the number of lines specified, instead of the default of 10.
- f Causes tail to not terminate when the end of the file is reached and to continue outputting additional data as it is appended to the file. *This is a useful trick for monitoring output to log files and the like.*

less

Display the contents of the specified file to the screen, one screen at a time.

Useful keys are:

d Move up. By default, moves $\frac{1}{2}$ the screen size at a time.
u Move down. By default, moves $\frac{1}{2}$ the screen size at a time.
Space Move down 1 screen.
Rt rn. Move down 1 line.
/ Perform a search.
n Move down to the next search result.
q Quit.

pico (or nano)

A basic text editor. Edits the specified file, or creates a new file if no filename is specified. Basic key commands are displayed on screen.

vi (or vim)

A more-complicated, more-advanced text editor (over pico or nano). Explaining how to use vi (or vim) is beyond the scope of this document.

touch

Sets the modification and access times of the specified files to the current time of day. If the file doesn't exist, it is created with default permissions. *This second use provides to be a useful trick for creating (empty) files.*

Manipulating Permissions

chown

Change the owner of the specified files. chown can also change group permissions, but this is out of the scope of this document.

-R Run recursively.
-v Be verbose. Print out file names as their ownership is changed.

chgrp

Change the group of the specified files.

-R Run recursively.
-v Be verbose. Print out file names as their group is changed.

chmod

Change the permissions of the specified files. For more information on Linux filesystem permissions, please see another reference – Linux filesystem permissions are beyond the scope of this document.

- R Run recursively.
- v Be verbose. Print out file names as their permissions are changed.

Working in the Shell – Managing Input and Output

clear (*technically not a shell command*)

Clear the screen.

>

Redirects output to STDOUT to a specified file.

Example: `ls -l > filelist` saves a listing of the contents of the current directory into the file `filelist`.

<

Redirects input from a file to STDIN.

>>

Similar to >, but appends instead of writes to the specified file.

Example: `cat file2 >> file1` copies the contents of `file2` of `file1`.

| (a pipe)

Creates a connection between two processes, by sending the output (STDOUT) of one to the input (STDIN) of another.

Searching

grep

Uses the specified pattern to search through the specified file(s). In reality, `grep` is a very powerful search tool that harnesses the power of regular expressions.

- c Suppress standard output, and simply print out the number of matching lines.
- H Print out the filename for each match.
- i Ignore case in the search pattern.
- n Print out the line number for each match.
- r Search recursively.
- v Invert search results.

locate

Uses the specified pattern to search the filesystem. Searches quickly because results are pulled from a database, rather than the filesystem in real-time. The consequence is that recent changes to the disk are not correctly represented in search results.

find

Searches the filesystem in real-time. The features and use of this program are beyond the scope of this document.

One simple example, which performs a case-insensitive filename search using the search pattern PATTERN on the entire filesystem is:

```
find / -iname PATTERN
```

which

Locate the specified program in the user's path, and print the result.

whereis

Locate the specified program in the standard binary directories, and print the result.

Process Management

top

Display a dynamic, sorted list of currently running processes, along with other CPU and RAM consumption information.

ps

Print process status.

- a Display information about other users' processes as well as your own.
- r Sort by CPU usage, instead of by PID (process ID).
- u Display additional fields of information, and sort by CPU usage.
- x Display information about processes without controlling terminals.
- w Use 132 columns to display information, instead of the default, which is the window size. If -w is specified more than once, use as many columns as necessary.

kill

Terminate or signal the process given by the specified PID (process ID). The default signal given is TERM.

killall

Terminate or signal all processes of the current user with the specified name. The root user may kill processes of any user. The default signal given is TERM.

-v Be verbose.

System Information and Management

top

Provides information regarding CPU and RAM consumption. For more information about top, see the top entry in the **Process Management** section of this document.

uname

Print information regarding the operating system/kernel.

-a Output all information.

cat /proc/cpuinfo

Output information, using cat, regarding the CPU(s). For more information about cat, see the cat entry in the **Working with File Contents** section of this document.

cat /proc/meminfo

Output information, using cat, regarding the RAM. For more information about cat, see the cat entry in the **Working with File Contents** section of this document.

ifconfig

Display network interface configuration. For more information about ifconfig, see the ifconfig entry in the **Network Tools** section of this document.

ssh

Establish a secure connection and provide a remote login to the specified machine.

-l Use the specified login name instead of that of the current local user.

-v Be verbose/print debugging messages. Multiple -v flags increases verbosity.

reboot

Safely reboot the system (immediately).

poweroff

Safely halt and power off the system (immediately).

Network Tools

ping

Network ping the specified host.

-c Stop after the specified number of pings.

nslookup

Query the DNS (domain name system) servers for a result of the specified name or IP address

tracert

Print the network route taken to the specified host.

-n Display results with IP addresses instead of names.

ifconfig

Display (and configure) IP information for the network interfaces on the system. A complete explanation of `ifconfig` is beyond the scope of this document.

-a Display information for all interfaces on the system.

route

Display (and configure) the network routing tables for the system.

-n Display output with IP addresses instead of symbolic names.

Key Commands

ctrl-c

Terminate the current process.

Tab (*two times*)

Auto-complete the current command in the shell..

Getting Help

man

View the specified `man` (help/documentation) page, which normally will provide a description, usage information, and flag/argument listing. See the `less` entry in the **Working with File Contents** section of this document for more information on the navigation keys to use while viewing `man` pages.

If `man` pages are insufficient, consider searching online for more assistance.

References

A handout provided by the California Polytechnic State University Computer Science Department (www.csc.calpoly.edu), written by the Cal Poly Linux Users Group (www.cplug.org).

The man pages in Apple's Mac OS X 10.4.10 and CentOS Linux 5.