

OS LAB 1

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Linux Commands

ls: list files and directory in cwd

```
→ lab-1 git:(master) X ls -al
total 44
drwxr-xr-x. 2 sahil sahil 4096 Jan  5 16:19 .
drwxr-xr-x. 3 sahil sahil 4096 Jan  5 16:02 ..
-rw-r--r--. 1 sahil sahil 5733 Jan  5 16:19 info.txt
-rw-r--r--. 1 sahil sahil 27677 Jan  5 16:01 questions.pdf
→ lab-1 git:(master) X █
```

date: Displays current timestamp

```
→ lab-1 git:(master) X date
Tue 05 Jan 2021 04:11:37 PM IST
→ lab-1 git:(master) X █
```

help: display information about commands

```
$help help
help: help [-dms] [pattern...]
    Display information about builtin commands.

    Displays brief summaries of builtin commands. If PATTERN IS
    specified, gives detailed help on all commands matching PATTERN,
    otherwise the list of help topics is printed.

    Options:
      -d      output short description for each topic
      -m      display usage in pseudo-manpage format
      -s      output only a short usage synopsis for each topic matching
              PATTERN

    Arguments:
      PATTERN  Pattern specifying a help topic

    Exit Status:
      Returns success unless PATTERN is not found or an invalid option is given.
```

info: shows documentation for commands.

Next: dir invocation, Up: Directory listing

10.1 'ls': List directory contents

=====

The 'ls' program lists information about files (of any type, including directories). Options and file arguments can be intermixed arbitrarily, as usual.

For non-option command-line arguments that are directories, by default 'ls' lists the contents of directories, not recursively, and omitting files with names beginning with '.'. For other non-option arguments, by default 'ls' lists just the file name. If no non-option argument is specified, 'ls' operates on the current directory, acting as if it had been invoked with a single argument of '.'.

By default, the output is sorted alphabetically, according to the locale settings in effect.(1) If standard output is a terminal, the output is in columns (sorted vertically) and control characters are output as question marks; otherwise, the output is listed one per line and control characters are output as-is.

Because 'ls' is such a fundamental program, it has accumulated many options over the years. They are described in the subsections below; within each section, options are listed alphabetically (ignoring case). The division of options into the subsections is not absolute, since some options affect more than one aspect of 'ls''s operation.

Running info for ls

man: Shows manual for commands

```
GREP(1) User Commands GREP(1)
NAME
    grep, egrep, fgrep - print lines that match patterns
SYNOPSIS
    grep [OPTION...] PATTERNS [FILE...]
    grep [OPTION...] -e PATTERNS ... [FILE...]
    grep [OPTION...] -f PATTERN_FILE ... [FILE...]
DESCRIPTION
    grep searches for PATTERNS in each FILE. PATTERNS is one or patterns separated by newLine characters, and grep prints each line that matches a pattern.
    A FILE of "-" stands for standard input. If no FILE is given, recursive searches examine the working directory, and nonrecursive searches read standard input.
    In addition, the variant programs egrep and fgrep are the same as grep -E and grep -F, respectively. These variants are deprecated, but are provided for backward compatibility.
OPTIONS
    Generic Program Information
    --help Output a usage message and exit.
    -V, --version Output the version number of grep and exit.
    Matcher Selection
    -E, --extended-regexp Interpret PATTERNS as extended regular expressions (EREs, see below).
    -F, --fixed-strings Interpret PATTERNS as fixed strings, not regular expressions.
    -G, --basic-regexp Interpret PATTERNS as basic regular expressions (BREs, see below). This is the default.
Manual page grep(1) line 1 (press h for help or q to quit)
```

who: Print information about users who are currently logged in.

```
→ lab-1 git:(master) X who
sahil :0 2021-01-05 08:45 (:0)
→ lab-1 git:(master) X
```

pwd: Print present working directory

```
→ lab-1 git:(master) X pwd
/home/sahil/code/github.com/godcrampy/college-notes/os/lab-1
→ lab-1 git:(master) X
```

cat: print file to stdout

```
→ lab-1 git:(master) ✗ cat info.txt
# grep

Matches patterns in input text.
Supports simple patterns and regular expressions.

- Search for a pattern within a file:

  grep search_pattern path/to/file

- Search for an exact string:

  grep -F exact_string path/to/file
```

more: A file perusal filter for CRT viewing.

```
# grep

Matches patterns in input text.
Supports simple patterns and regular expressions.

- Search for a pattern within a file:

  grep search_pattern path/to/file

- Search for an exact string:

  grep -F exact_string path/to/file
```

mv: move files to given location

```
→ lab-1 git:(master) X ls
info.txt  questions.pdf  samples
→ lab-1 git:(master) X mv info.txt samples
→ lab-1 git:(master) X ls
questions.pdf  samples
→ lab-1 git:(master) X ls samples
info.txt
→ lab-1 git:(master) X █
```

rm: delete files

```
→ lab-1 git:(master) X ls
bad.txt  questions.pdf  samples
→ lab-1 git:(master) X rm bad.txt
→ lab-1 git:(master) X ls
questions.pdf  samples
→ lab-1 git:(master) X █
```

chmod: change permissions of files

```

→ lab-1 git:(master) X ls -al
total 40
drwxr-xr-x. 3 sahil sahil 4096 Jan  5 16:27 .
drwxr-xr-x. 3 sahil sahil 4096 Jan  5 16:02 ..
-rw-r--r--. 1 sahil sahil 27677 Jan  5 16:01 questions.pdf
drwxr-xr-x. 2 sahil sahil 4096 Jan  5 16:25 samples
-rw-r--r--. 1 sahil sahil    0 Jan  5 16:27 script.sh
→ lab-1 git:(master) X chmod +x script.sh
→ lab-1 git:(master) X ls -al
total 40
drwxr-xr-x. 3 sahil sahil 4096 Jan  5 16:27 .
drwxr-xr-x. 3 sahil sahil 4096 Jan  5 16:02 ..
-rw-r--r--. 1 sahil sahil 27677 Jan  5 16:01 questions.pdf
drwxr-xr-x. 2 sahil sahil 4096 Jan  5 16:25 samples
-rwxr-xr-x. 1 sahil sahil    0 Jan  5 16:27 script.sh
→ lab-1 git:(master) X █

```

whoami: print username of current user

```

→ lab-1 git:(master) X whoami
sahil

```

logout: logout off current user

wc: Display lines words and characters of stdin

```

→ lab-1 git:(master) X cat samples/info.txt | wc
    39    131   5733
→ lab-1 git:(master) X █

```

grep: search in files

```

→ lab-1 git:(master) X cat samples/info.txt | grep "the"
- Search for a pattern [R]ecursively in the current directory, showing
- Print file name with the corresponding line number for each match:
- Use the standard input instead of a file:
→ lab-1 git:(master) X █

```

sort: sort words


```
→ lab-1 git:(master) X cat words
india
england
australia
egypt
bangladesh
→ lab-1 git:(master) X cat words | sort
australia
bangladesh
egypt
england
india
→ lab-1 git:(master) X █
```

mkdir: make new directory

```
→ lab-1 git:(master) X ls
info.txt  questions.pdf
→ lab-1 git:(master) X mkdir samples
→ lab-1 git:(master) X ls
info.txt  questions.pdf  samples
→ lab-1 git:(master) X █
```

rmdir: remove empty directory

```
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  temp  words
→ lab-1 git:(master) X rmdir temp
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  words
→ lab-1 git:(master) X █
```

cd: change working directory

```
→ lab-1 git:(master) X pwd
/home/sahil/code/github.com/godcrampy/college-notes/os/lab-1
→ lab-1 git:(master) X cd samples
→ samples git:(master) X pwd
/home/sahil/code/github.com/godcrampy/college-notes/os/lab-1/samples
→ samples git:(master) X █
```

tail: print last 10 lines of file

```
→ samples git:(master) X tail --help | tail
With --follow (-f), tail defaults to following the file descriptor, which
means that even if a tail'ed file is renamed, tail will continue to track
its end. This default behavior is not desirable when you really want to
track the actual name of the file, not the file descriptor (e.g., log
rotation). Use --follow=name in that case. That causes tail to track the
named file in a way that accommodates renaming, removal and creation.

GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
Full documentation <https://www.gnu.org/software/coreutils/tail>
or available locally via: info '(coreutils) tail invocation'
→ samples git:(master) X █
```

cmp: compare files byte by byte

```
→ lab-1 git:(master) X cmp words sorted-words
words sorted-words differ: byte 1, line 1
→ lab-1 git:(master) X █
```

diff: compare files line by line


```
→ lab-1 git:(master) X diff words sorted-words
1,2d0
< india
< england
4d1
< egypt
5a3,5
> egypt
> england
> india
→ lab-1 git:(master) X
```

cp: copy files to location

```
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  sorted-words  words
→ lab-1 git:(master) X cp words samples
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  sorted-words  words
→ lab-1 git:(master) X ls samples
info.txt  words
→ lab-1 git:(master) X
```

clear: clear terminal

```
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  sorted-words  words
→ lab-1 git:(master) X cp words samples
→ lab-1 git:(master) X ls
questions.pdf  samples  script.sh  sorted-words  words
→ lab-1 git:(master) X ls samples
info.txt  words
→ lab-1 git:(master) X clear
```

```
→ lab-1 git:(master) X
```

df: display filesystems and usage

```
→ lab-1 git:(master) X df
```

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
devtmpfs	8125804	0	8125804	0%	/dev
tmpfs	8151844	710960	7440884	9%	/dev/shm
tmpfs	8151844	2000	8149844	1%	/run
/dev/mapper/fedora_localhost--live-root	71724152	20064816	47972936	30%	/
tmpfs	8151844	22648	8129196	1%	/tmp
/dev/loop1	31872	31872	0	100%	/var/lib/snapd/s
/dev/loop0	56832	56832	0	100%	/var/lib/snapd/s
/dev/sdb5	999320	287924	642584	31%	/boot
/dev/mapper/fedora_localhost--live-home	235974536	64544884	159373076	29%	/home
/dev/sdb1	98304	46359	51945	48%	/boot/efi
tmpfs	1630368	128	1630240	1%	/run/user/1000

```
→ lab-1 git:(master) X
```

du: Summarize disk usage of the set of FILES, recursively for directories.

```
→ quote-service du -d 1
```

8	./public
19140	./node_modules
8	./routes
16	./.idea
8	./models
8	./services
8	./config
19284	.

```
→ quote-service
```

uname: print system information

```

→ quote-service uname -a
Linux localhost.localdomain 5.9.16-100.fc32.x86_64 #1 SMP Mon Dec 21 14:
10:00 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
→ quote-service █

```

apt-get: Package manager for Ubuntu

```

→ quote-service sudo dnf list | head
Last metadata expiration check: 0:09:26 ago on Tue 05 Jan 2021 04:37:50
PM IST.
Installed Packages
GConf2.x86_64
    3.2.6-27.fc31 @ana
conda
LibRaw.x86_64
    0.19.5-4.fc32 @upd
ates
ModemManager.x86_64
    1.12.8-1.fc32 @ana
conda
ModemManager-glib.x86_64
    1.12.8-1.fc32 @ana
conda
NetworkManager.x86_64
    1:1.22.16-1.fc32 @upd
ates
NetworkManager-adsl.x86_64
    1:1.22.16-1.fc32 @upd
ates
NetworkManager-bluetooth.x86_64
    1:1.22.16-1.fc32 @upd
ates
NetworkManager-config-connectivity-fedora.noarch
    1:1.22.16-1.fc32 @upd
ates
→ quote-service █

```

find: Find files by patterns

```

→ lab-1 git:(master) X find . -name "*.txt"
./samples/info.txt
→ lab-1 git:(master) X █

```

wget: Retrieve files over network

```

→ lab-1 git:(master) X wget https://raw.githubusercontent.com/godcrampy/site/master/package.json
--2021-01-05 16:53:10-- https://raw.githubusercontent.com/godcrampy/site/master/package.json
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 199.232.56.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)[199.232.56.133]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1031 (1.0K) [text/plain]
Saving to: 'package.json'

package.json          100%[=====] 1.01K

2021-01-05 16:53:11 (68.7 MB/s) - 'package.json' saved [1031/1031]

→ lab-1 git:(master) X ls
package.json  questions.pdf  samples  script.sh  sorted-words  words
→ lab-1 git:(master) X

```

top: Display real time dynamic information of running processes

```

top - 16:54:03 up 8:08, 1 user, load average: 1.84, 1.97, 1.97
Tasks: 373 total, 2 running, 371 sleeping, 0 stopped, 0 zombie
%Cpu(s): 13.3 us, 3.7 sy, 0.0 ni, 81.6 id, 0.0 wa, 1.0 hi, 0.3 si, 0.0 st
MiB Mem : 15921.6 total, 1534.7 free, 6326.8 used, 8060.0 buff/cache
MiB Swap: 8028.0 total, 8004.5 free, 23.5 used. 7895.4 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
 140935 sahil    20   0   18.9g   269224 117792 S   83.4   1.7   39:05.42 chrome
   4007 sahil     9  -11  2280820 13788   10160 S   19.5   0.1   54:08.02 pulseaudio
   3836 sahil    20   0   1220684 97772   46820 R    9.3   0.6   44:03.22 Xorg
   6120 sahil    20   0   1314104 63312   50556 S    8.9   0.4   25:50.95 chrome
   4026 sahil    20   0   5616824 279640 112248 S    6.3   1.7   23:35.28 gnome-shell
   5706 sahil    20   0   1286820 229368 129944 S    3.3   1.4   58:18.45 chrome
   5246 sahil    20   0   2003500 723476 425856 S    3.0   4.4   38:05.34 chrome
  16235 sahil    20   0    665096 59200   42596 S    3.0   0.4   11:56.49 gnome-system-mo
   5711 sahil    20   0    633264 123984 66972 S    1.3   0.8   15:58.10 chrome
 148760 sahil    20   0   9185520 234760 100576 S    1.3   1.4    0:30.31 chrome
   2387 mongod   20   0   1492688 81916   26540 S    0.7   0.5    2:49.41 mongod
  17355 sahil    20   0    740656 94056   45060 S    0.7   0.6    1:31.25 terminator
 140988 sahil    20   0   4841868 95032   67856 S    0.7   0.6    0:19.86 chrome
 157292 sahil    20   0    228840 5056    4108 R    0.7   0.0    0:00.09 top
    11 root     20   0         0      0         0 I    0.3   0.0    0:44.72 rcu_sched
   3807 sahil    20   0   2401220 1.0g   237516 S    0.3   6.6    2:58.58 kited
   4091 sahil    20   0    528504 9588    6568 S    0.3   0.1    2:20.84 ibus-daemon
   4096 sahil    20   0    479908 32016   18856 S    0.3   0.2    0:41.56 ibus-extension-
   4111 sahil    20   0    160832 7716    6952 S    0.3   0.0    0:07.93 at-spi2-registr
   5907 sahil    20   0   4836036 93036   66828 S    0.3   0.6    0:35.25 chrome
  27780 sahil    20   0   4836036 89192   70760 S    0.3   0.5    0:07.02 chrome
  55520 sahil    20   0    14.8g  277204 106144 S    0.3   1.7    3:36.67 code
 100046 root     20   0         0      0         0 I    0.3   0.0    0:01.96 kworker/6:0-mm_percpu_wq
 140602 sahil    20   0    14.8g  239864 106000 S    0.3   1.5    0:50.87 code

```

mpstate: Display CPU information

```

→ lab-1 git:(master) X mpstat 2
Linux 5.9.16-100.fc32.x86_64 (localhost.localdomain) 01/05/2021 _x86_64_ (8 CPU)

04:55:28 PM CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest  %gnice   %idle
04:55:30 PM all     9.50    0.00    3.65    2.96    0.75    0.31    0.00    0.00    0.00   82.83
04:55:32 PM all     9.01    0.00    3.27    0.06    0.94    0.31    0.00    0.00    0.00   86.40
04:55:34 PM all     8.19    0.00    3.91    0.00    0.88    0.38    0.00    0.00    0.00   86.64
^CAverage:   all     8.90    0.00    3.61    1.01    0.86    0.34    0.00    0.00    0.00   85.29
→ lab-1 git:(master) X

```

netstat: Display port information

```

→ lab-1 git:(master) X netstat -l | head
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:27017          0.0.0.0:*               LISTEN
tcp        0      0 localhost.locald:domain 0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp            0.0.0.0:*               LISTEN
tcp        0      0 localhost:46624          0.0.0.0:*               LISTEN
tcp6       0      0 localhost:ipp            [::]:*                  LISTEN
udp        0      0 0.0.0.0:40511           0.0.0.0:*               *
udp        0      0 localhost.locald:domain 0.0.0.0:*               *
udp        0      0 0.0.0.0:bootps          0.0.0.0:*               *
→ lab-1 git:(master) X █

```

sar: Monitor performance of various Linux subsystems.

```

→ lab-1 git:(master) X sar -b 1 | head
Linux 5.9.16-100.fc32.x86_64 (localhost.localdomain)    01/05/2021    _x86_64_

04:58:07 PM      tps      rtps      wtps      dtps    bread/s    bwrtn/s    bdsd/s
04:58:08 PM      0.00      0.00      0.00      0.00      0.00      0.00      0.00
04:58:09 PM      3.00      0.00      3.00      0.00      0.00     56.00      0.00
04:58:10 PM     62.00      0.00     62.00      0.00      0.00    1048.00      0.00
04:58:11 PM      0.00      0.00      0.00      0.00      0.00      0.00      0.00
04:58:12 PM     17.00      0.00     17.00      0.00      0.00     592.00      0.00
04:58:13 PM      1.00      0.00      1.00      0.00      0.00      8.00      0.00
04:58:14 PM      2.00      0.00      2.00      0.00      0.00     16.00      0.00
→ lab-1 git:(master) X █

```

ps: Display Running processes

```

→ lab-1 git:(master) X ps aux | head
USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1  0.0  0.1 176560 19520 ?        Ss   08:45   0:10 /usr/lib/systemd/systemd
root         2  0.0  0.0      0     0 ?        S    08:45   0:00 [kthreadd]
root         3  0.0  0.0      0     0 ?        I<   08:45   0:00 [rcu_gp]
root         4  0.0  0.0      0     0 ?        I<   08:45   0:00 [rcu_par_gp]
root         6  0.0  0.0      0     0 ?        I<   08:45   0:00 [kworker/0:0H-kblockd]
root         9  0.0  0.0      0     0 ?        I<   08:45   0:00 [mm_percpu_wq]
root        10  0.0  0.0      0     0 ?        S    08:45   0:00 [ksoftirqd/0]
root        11  0.1  0.0      0     0 ?        I    08:45   0:45 [rcu_sched]
root        12  0.0  0.0      0     0 ?        S    08:45   0:00 [migration/0]
→ lab-1 git:(master) X █

```

kill: Stop Process

```

→ ~ kill 160257
→ ~ █

```



```
[1] + 160257 terminated ping www.google.com  
→ lab-1 git:(master) X
```

bg: resume suspended jobs

```
→ lab-1 git:(master) X bg  
[1] + 161124 continued ping www.google.com
```