

## UNIX LAB ASSIGNMENT NO.5

### PROCESS MANAGEMENT :

**Ps:**

displays information about the processes associated with the current terminal session.

**Ps -a:**

List all processes except session leaders (instances where the process ID is the same as the session ID) and processes not associated with a terminal.

**Ps -e:**

Lists all processes on the entire system, offering a complete overview of running tasks and programs.

**Ps -d:**

Lists all processes except session leaders, providing a filtered view of processes running on the system.

```

File Edit View Search Terminal Help
for more details see ps(1).
lab1003@lab1003-HP-280-G2-MT:~$ clear
lab1003@lab1003-HP-280-G2-MT:~$ ps -a
PID TTY          TIME CMD
902  tty1          00:00:00 gnome-session-b
917  tty1          00:00:00 gnome-shell
988  tty1          00:00:00 Xwayland
1153 tty1          00:00:00ibus-daemon
1156 tty1          00:00:00ibus-dconf
1159 tty1          00:00:00ibus-x11
1283 tty1          00:00:00gsd-xsettings
1287 tty1          00:00:00gsd-ally-settin
1290 tty1          00:00:00gsd-clipboard
1291 tty1          00:00:00gsd-color
1297 tty1          00:00:00gsd-datetime
1298 tty1          00:00:00gsd-housekeepin
1299 tty1          00:00:00gsd-keyboard
1307 tty1          00:00:00gsd-media-keys
1309 tty1          00:00:00gsd-mouse
1315 tty1          00:00:00gsd-power
1319 tty1          00:00:00gsd-print-notif
1323 tty1          00:00:00gsd-rfkill
1328 tty1          00:00:00gsd-screensaver
1331 tty1          00:00:00gsd-sharing
1337 tty1          00:00:00gsd-smartcard
1342 tty1          00:00:00gsd-sound
1347 tty1          00:00:00gsd-wacom
1475 tty1          00:00:00ibus-engine-slm
1633 tty2          00:01:27Xorg
1648 tty2          00:00:00gnome-session-b
1777 tty2          00:01:26gnome-shell
1816 tty2          00:00:00ibus-daemon
1824 tty2          00:00:00ibus-dconf
1830 tty2          00:00:00ibus-x11
1939 tty2          00:00:00gsd-power
1941 tty2          00:00:00gsd-print-notif
1942 tty2          00:00:00gsd-rfkill

```

```

File Edit View Search Terminal Help
lab1003@lab1003-HP-280-G2-MT:~$ ps -e
PID TTY          TIME CMD
1  ?             00:00:00 systemd
2  ?             00:00:00 kthreadd
3  ?             00:00:00 rcu_gp
4  ?             00:00:00 rcu_par_gp
5  ?             00:00:00 kworker/0:0-eve
6  ?             00:00:00 kworker/0:0H-kb
8  ?             00:00:00 mm_percpu_wq
9  ?             00:00:00 ksoftirqd/0
10 ?            00:00:01 rcu_sched
11 ?            00:00:00 migration/0
12 ?            00:00:00 idle_inject/0
14 ?            00:00:00 cpuhp/0
15 ?            00:00:00 cpuhp/1
16 ?            00:00:00 idle_inject/1
17 ?            00:00:00 migration/1
18 ?            00:00:00 ksoftirqd/1
20 ?            00:00:00 kworker/1:0H-kb
21 ?            00:00:00 cpuhp/2
22 ?            00:00:00 idle_inject/2
23 ?            00:00:00 migration/2
24 ?            00:00:00 ksoftirqd/2
26 ?            00:00:00 kworker/2:0H-kb
27 ?            00:00:00 cpuhp/3
28 ?            00:00:00 idle_inject/3
29 ?            00:00:00 migration/3
30 ?            00:00:00 ksoftirqd/3
32 ?            00:00:00 kworker/3:0H-kb
33 ?            00:00:00 kdevtmpfs
34 ?            00:00:00 netns
35 ?            00:00:00 rcu_tasks_kthre
36 ?            00:00:00 kaudltd
37 ?            00:00:00 khungtaskd
38 ?            00:00:00 oom_reaper
39 ?            00:00:00 writeback
40 ?            00:00:00 kcompactd0
41 ?            00:00:00 ksm

```

```

File Edit View Search Terminal Help
3901 tty2          00:00:00 Web Content
3991 pts/0          00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$ ps -d
PID TTY          TIME CMD
2  ?             00:00:00 kthreadd
3  ?             00:00:00 rcu_gp
4  ?             00:00:00 rcu_par_gp
5  ?             00:00:00 kworker/0:0-eve
6  ?             00:00:00 kworker/0:0H-kb
8  ?             00:00:00 mm_percpu_wq
9  ?             00:00:00 ksoftirqd/0
10 ?            00:00:01 rcu_sched
11 ?            00:00:00 migration/0
12 ?            00:00:00 idle_inject/0
14 ?            00:00:00 cpuhp/0
15 ?            00:00:00 cpuhp/1
16 ?            00:00:00 idle_inject/1
17 ?            00:00:00 migration/1
18 ?            00:00:00 ksoftirqd/1
20 ?            00:00:00 kworker/1:0H-kb
21 ?            00:00:00 cpuhp/2
22 ?            00:00:00 idle_inject/2
23 ?            00:00:00 migration/2
24 ?            00:00:00 ksoftirqd/2
26 ?            00:00:00 kworker/2:0H-kb
27 ?            00:00:00 cpuhp/3
28 ?            00:00:00 idle_inject/3
29 ?            00:00:00 migration/3
30 ?            00:00:00 ksoftirqd/3
32 ?            00:00:00 kworker/3:0H-kb
33 ?            00:00:00 kdevtmpfs
34 ?            00:00:00 netns
35 ?            00:00:00 rcu_tasks_kthre
36 ?            00:00:00 kaudltd
37 ?            00:00:00 khungtaskd
38 ?            00:00:00 oom_reaper
39 ?            00:00:00 writeback
40 ?            00:00:00 kcompactd0

```

## Pstree:

Pstree command in Unix that shows the running processes as a tree which is a more convenient way to display the processes hierarchy and makes the output more visually appealing.

```
Mon 10:17
lab1003@lab1003-HP-280-G2-MT: ~$ pstree
systemd
├── ModemManager ── 2*[{ModemManager}]
├── NetworkManager ── dhclient
│   └── accounts-daemon ── 2*[{accounts-daemon}]
├── acpid
├── avahi-daemon ── avahi-daemon
├── boltd ── 2*[{boltd}]
├── colord ── 2*[{colord}]
├── cron
├── cups-browsed ── 2*[{cups-browsed}]
├── cupsd
├── dbus-daemon
├── firefox
│   ├── 4*[{Isolated Web Co} ── 19*[{Isolated Web Co}]
│   ├── 7*[{Isolated Web Co} ── 18*[{Isolated Web Co}]
│   ├── Isolated Web Co ── 23*[{Isolated Web Co}]
│   ├── Isolated Web Co ── 24*[{Isolated Web Co}]
│   ├── Privileged Cont ── 18*[{Privileged Cont}]
│   ├── RDP Process ── 3*[{RDP Process}]
│   ├── Socket Process ── 4*[{Socket Process}]
│   ├── Utility Process ── 3*[{Utility Process}]
│   ├── 2*[{Web Content} ── 10*[{Web Content}]
│   ├── WebExtensions ── 18*[{WebExtensions}]
│   └── 130*[{firefox}]
├── fwupd ── 4*[{fwupd}]
├── gdm3
│   ├── gdm-session-wor
│   ├── gdm-wayland-ses
│   ├── gnome-session-b
│   ├── gnome-shell
│   │   ├── Xwayland ── 12*[{Xwayland}]
│   │   ├── ibus-daemon ── ibus-dconf ── 3*[{ibus-dconf}]
│   │   │   └── ibus-engine-stn ── 2*[{ibus-engine-stn}]
│   │   └── 20*[{gnome-shell}]
│   │       ├── gsd-a11y-settin ── 3*[{gsd-a11y-settin}]
│   │       ├── gsd-clipboard ── 6*[{gsd-clipboard}]
│   │       ├── gsd-color ── 7*[{gsd-color}]
│   │       ├── gsd-datetime ── 2*[{gsd-datetime}]
│   │       ├── gsd-housekeepin ── 2*[{gsd-housekeepin}]
│   │       ├── gsd-keyboard ── 7*[{gsd-keyboard}]
│   │       ├── gsd-media-keys ── 7*[{gsd-media-keys}]
│   │       └── gsd-mouse ── 2*[{gsd-mouse}]
```

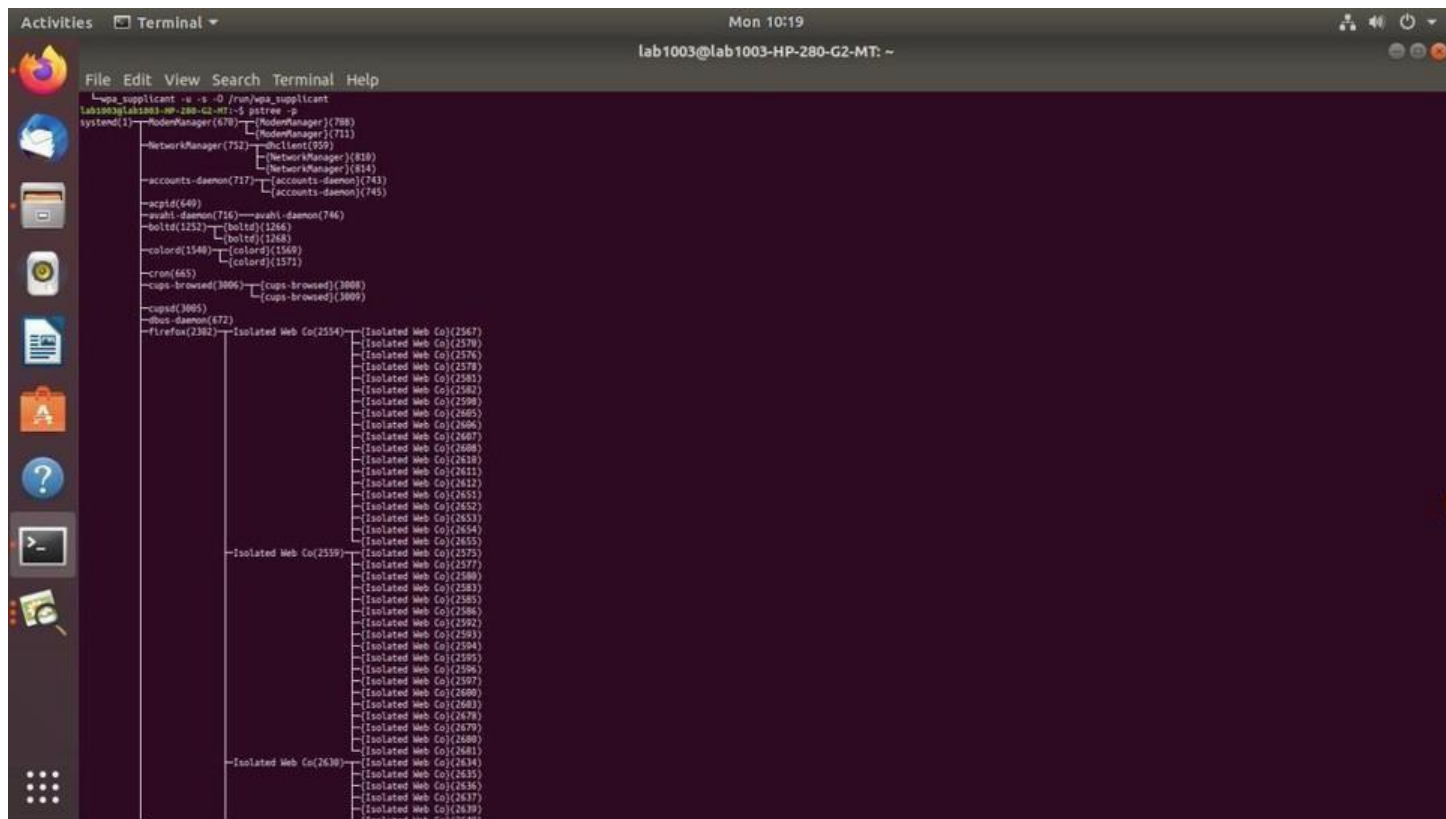
## Pstree -a:

This command now displays command line options for some processes.

```
Mon 10:18
lab1003@lab1003-HP-280-G2-MT: ~$ pstree -a
systemd splash
├── ModemManager --filter-policy=strict
│   └── 2*[{ModemManager}]
├── NetworkManager --no-daemon
│   ├── dhclient -d -q -sf /usr/lib/NetworkManager/nm-dhcp-helper -pf /run/dhclient-enp5s0.pid -lf...
│   └── 2*[{NetworkManager}]
├── accounts-daemon
│   └── 2*[{accounts-daemon}]
├── acpid
├── avahi-daemon
│   └── avahi-daemon
├── boltd
│   └── 2*[{boltd}]
├── colord
│   └── 2*[{colord}]
├── cron -f
├── cups-browsed
│   └── 2*[{cups-browsed}]
├── cupsd -l
├── dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
├── firefox -new-window
│   ├── Isolated Web Co -contentproc -childID 4 -isForBrowser -prefsLen 30158 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 19*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 5 -isForBrowser -prefsLen 30158 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 18*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 6 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 18*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 7 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 26*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 8 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 18*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 9 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 18*[{Isolated Web Co}]
│   ├── Isolated Web Co -contentproc -childID 10 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│   │   └── 18*[{Isolated Web Co}]
│   └── Isolated Web Co -contentproc -childID 11 -isForBrowser -prefsLen 30353 -prefMapSize 234088 -jsInitLen 238780 -parentBuildID2023052213
│       └── 18*[{Isolated Web Co}]
```

*Pstree* -p:

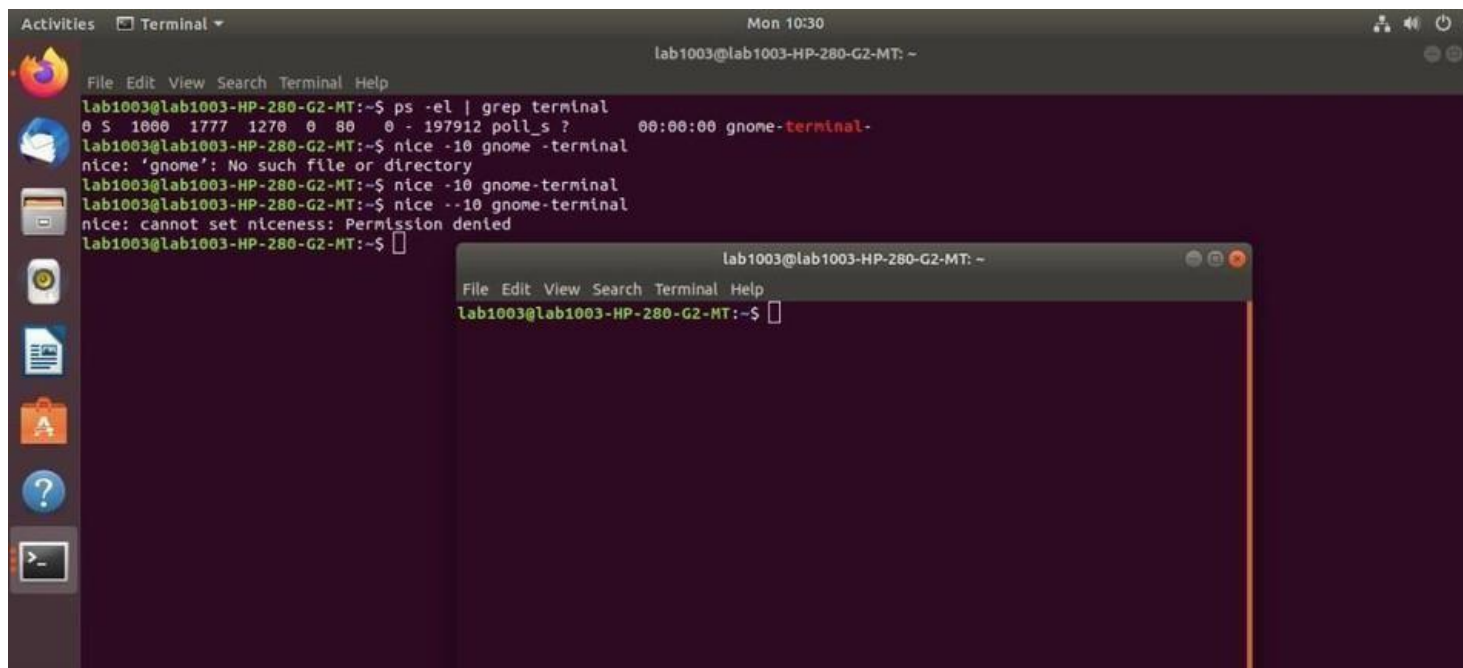
To display PIDs for each process name, we use “-p” option.



***Nice:***

`nice` command in Unix helps in execution of a program/process with modified scheduling priority

`nice -10 gnome-terminal:` To set the priority of a process  
`nice --10 gnome-terminal:` To set the negative priority for a process





### Renice:

the renice command allows you to change and modify the scheduling priority of an already running process.

`sudo renice -n 15 -p 1777` :changing priority of the running process.

`renice -n 10 -g 4`: To change the priority of all programs of a specific group. `sudo renice -n 10 -u 2`: To change the priority of all programs of a specific user.

```
lab1003@lab1003-HP-280-G2-MT:~$ nice
0
lab1003@lab1003-HP-280-G2-MT:~$ ps -l
F S  UID  PID  PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
0 S  1000  1855  1777  0  80   0  -  5645 wait  pts/0    00:00:00 bash
4 R  1000  2779  1855  0  80   0  -  7230 -      pts/0    00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$ sudo renice -n 15 -p 1777
1777 (process ID) old priority 0, new priority 15
lab1003@lab1003-HP-280-G2-MT:~$ sudo renice -n 10 -u 0
0 (user ID) old priority -20, new priority 10
... lab1003@lab1003-HP-280-G2-MT:~$ sudo renice -n 10 -g 5
... renice: failed to get priority for 5 (process group ID): No such process
... lab1003@lab1003-HP-280-G2-MT:~$
```

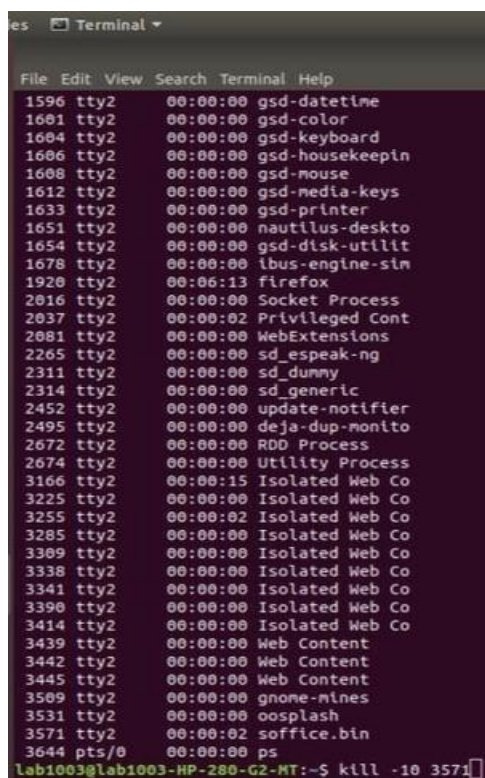
### Kill:

Kill is a built-in command which is used to terminate processes manually. kill command sends a signal to a process that terminates the process.

**kill number PID:** We can specify a signal using a number. For example, we have a PID `1212` and want to send a `SIGKILL` signal to kill this PID.

**kill -SIGTERM PID:**

We can also specify signal using SIG prefix.



```
File Edit View Search Terminal Help
1596 tty2 00:00:00 gsd-datetime
1601 tty2 00:00:00 gsd-color
1604 tty2 00:00:00 gsd-keyboard
1606 tty2 00:00:00 gsd-housekeepin
1608 tty2 00:00:00 gsd-mouse
1612 tty2 00:00:00 gsd-media-keys
1633 tty2 00:00:00 gsd-printer
1651 tty2 00:00:00 nautilus-deskto
1654 tty2 00:00:00 gsd-disk-utillit
1678 tty2 00:00:00 ibus-engine-sim
1920 tty2 00:06:13 firefox
2016 tty2 00:00:00 Socket Process
2037 tty2 00:00:02 Privileged Cont
2081 tty2 00:00:00 WebExtensions
2265 tty2 00:00:00 sd_espeak-ng
2311 tty2 00:00:00 sd_dummy
2314 tty2 00:00:00 sd_generic
2452 tty2 00:00:00 update-notifier
2495 tty2 00:00:00 deja-dup-monito
2672 tty2 00:00:00 RDD Process
2674 tty2 00:00:00 Utility Process
3166 tty2 00:00:15 Isolated Web Co
3225 tty2 00:00:02 Isolated Web Co
3285 tty2 00:00:00 Isolated Web Co
3309 tty2 00:00:00 Isolated Web Co
3338 tty2 00:00:00 Isolated Web Co
3341 tty2 00:00:00 Isolated Web Co
3390 tty2 00:00:00 Isolated Web Co
3414 tty2 00:00:00 Isolated Web Co
3439 tty2 00:00:00 Web Content
3442 tty2 00:00:00 Web Content
3445 tty2 00:00:00 Web Content
3509 tty2 00:00:00 gnome-mines
3531 tty2 00:00:00 oosplash
3571 tty2 00:00:02 soffice.bin
3644 pts/0 00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$ kill -10 3571
```



```
Activities Terminal
File Edit View Search Terminal Help
1594 tty2 00:00:00 gsd-clipboard
1595 tty2 00:00:00 gsd-a11y-settln
1596 tty2 00:00:00 gsd-datetime
1601 tty2 00:00:00 gsd-color
1604 tty2 00:00:00 gsd-keyboard
1606 tty2 00:00:00 gsd-housekeepin
1608 tty2 00:00:00 gsd-mouse
1612 tty2 00:00:00 gsd-media-keys
1633 tty2 00:00:00 gsd-printer
1651 tty2 00:00:00 nautilus-deskto
1654 tty2 00:00:00 gsd-disk-utillit
1678 tty2 00:00:00 ibus-engine-sim
1920 tty2 00:06:18 firefox
2016 tty2 00:00:00 Socket Process
2037 tty2 00:00:02 Privileged Cont
2081 tty2 00:00:00 WebExtensions
2265 tty2 00:00:00 sd_espeak-ng
2311 tty2 00:00:00 sd_dummy
2314 tty2 00:00:00 sd_generic
2452 tty2 00:00:00 update-notifier
2495 tty2 00:00:00 deja-dup-monito
2672 tty2 00:00:00 RDD Process
2674 tty2 00:00:00 Utility Process
3166 tty2 00:00:21 Isolated Web Co
3225 tty2 00:00:00 Isolated Web Co
3255 tty2 00:00:02 Isolated Web Co
3285 tty2 00:00:00 Isolated Web Co
3309 tty2 00:00:00 Isolated Web Co
3338 tty2 00:00:00 Isolated Web Co
3341 tty2 00:00:00 Isolated Web Co
3390 tty2 00:00:00 Isolated Web Co
3414 tty2 00:00:00 Isolated Web Co
3439 tty2 00:00:00 Web Content
3442 tty2 00:00:00 Web Content
3445 tty2 00:00:00 Web Content
3509 tty2 00:00:00 gnome-mines
3653 pts/0 00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$
```

```
Activities Terminal
File Edit View Search Terminal Help
1594 tty2 00:00:00 gsd-clipboard
1595 tty2 00:00:00 gsd-a11y-settin
1596 tty2 00:00:00 gsd-datetime
1601 tty2 00:00:00 gsd-color
1604 tty2 00:00:00 gsd-keyboard
1606 tty2 00:00:00 gsd-housekeepin
1608 tty2 00:00:00 gsd-mouse
1612 tty2 00:00:00 gsd-media-keys
1633 tty2 00:00:00 gsd-printer
1651 tty2 00:00:00 nautilus-deskto
1654 tty2 00:00:00 gsd-disk-utilit
1678 tty2 00:00:00 ibus-engine-sim
1920 tty2 00:06:18 firefox
2016 tty2 00:00:00 Socket Process
2037 tty2 00:00:02 Privileged Cont
2081 tty2 00:00:00 WebExtensions
2265 tty2 00:00:00 sd_espeak-ng
2311 tty2 00:00:00 sd_dummy
2314 tty2 00:00:00 sd_generic
2452 tty2 00:00:00 update-notifier
2495 tty2 00:00:00 deja-dup-monito
2672 tty2 00:00:00 RDD Process
2674 tty2 00:00:00 Utility Process
3166 tty2 00:00:21 Isolated Web Co
3225 tty2 00:00:00 Isolated Web Co
3255 tty2 00:00:02 Isolated Web Co
3285 tty2 00:00:00 Isolated Web Co
3309 tty2 00:00:00 Isolated Web Co
3338 tty2 00:00:00 Isolated Web Co
3341 tty2 00:00:00 Isolated Web Co
3390 tty2 00:00:00 Isolated Web Co
3414 tty2 00:00:00 Isolated Web Co
3439 tty2 00:00:00 Web Content
3442 tty2 00:00:00 Web Content
3445 tty2 00:00:00 Web Content
3509 tty2 00:00:00 gnome-mines
3653 pts/0 00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$ kill -SIGTERM 3442
```

```
Activities Terminal
File Edit View Search Terminal Help
1587 tty2 00:00:00 gsd-wacom
1594 tty2 00:00:00 gsd-clipboard
1595 tty2 00:00:00 gsd-a11y-settin
1596 tty2 00:00:00 gsd-datetime
1601 tty2 00:00:00 gsd-color
1604 tty2 00:00:00 gsd-keyboard
1606 tty2 00:00:00 gsd-housekeepin
1608 tty2 00:00:00 gsd-mouse
1612 tty2 00:00:00 gsd-media-keys
1633 tty2 00:00:00 gsd-printer
1651 tty2 00:00:00 nautilus-deskto
1654 tty2 00:00:00 gsd-disk-utilit
1678 tty2 00:00:00 ibus-engine-sim
1920 tty2 00:06:23 firefox
2016 tty2 00:00:00 Socket Process
2037 tty2 00:00:02 Privileged Cont
2081 tty2 00:00:00 WebExtensions
2265 tty2 00:00:00 sd_espeak-ng
2311 tty2 00:00:00 sd_dummy
2314 tty2 00:00:00 sd_generic
2452 tty2 00:00:00 update-notifier
2495 tty2 00:00:00 deja-dup-monito
2672 tty2 00:00:00 RDD Process
2674 tty2 00:00:00 Utility Process
3166 tty2 00:00:26 Isolated Web Co
3225 tty2 00:00:00 Isolated Web Co
3255 tty2 00:00:02 Isolated Web Co
3285 tty2 00:00:00 Isolated Web Co
3309 tty2 00:00:00 Isolated Web Co
3338 tty2 00:00:00 Isolated Web Co
3341 tty2 00:00:00 Isolated Web Co
3390 tty2 00:00:00 Isolated Web Co
3414 tty2 00:00:00 Isolated Web Co
3439 tty2 00:00:00 Web Content
3445 tty2 00:00:00 Web Content
3509 tty2 00:00:00 gnome-mines
3673 pts/0 00:00:00 ps
lab1003@lab1003-HP-280-G2-MT:~$
```

### Pkill:

The pkill command uses name of the process instead of PID number. Signal can be send to a process either by typing full name or partial name.

**Pkill -n name:**

Kills the process name mentioned

```
lab1003@lab1003-HP-280-G2-MT:~$ pkill -15 firefox
lab1003@lab1003-HP-280-G2-MT:~$
```

### Xlsclients:

This command will show the list of all open windows with the hostname.

### Xkill:

xkill is a command-line utility that can kill the undesired windows on the user's screen. Basically, xkill force the X server to close the connection to the client. This utility kills the programs without providing PID with a command.

For using xkill to kill the open window, just run the xkill command. Then your cursor will turn into an X sign.

Then right-click on the windows which you have to kill.

```
File Edit View Search Terminal Help
lab1003@lab1003-HP-280-G2-MT:~$ xlsclients
lab1003@lab1003-HP-280-G2-MT:~$ gnome-shell
lab1003@lab1003-HP-280-G2-MT:~$ ibus-x11
lab1003@lab1003-HP-280-G2-MT:~$ gsd-power
lab1003@lab1003-HP-280-G2-MT:~$ gsd-xsettings
lab1003@lab1003-HP-280-G2-MT:~$ gsd-wacom
lab1003@lab1003-HP-280-G2-MT:~$ gsd-clipboard
lab1003@lab1003-HP-280-G2-MT:~$ gsd-color
lab1003@lab1003-HP-280-G2-MT:~$ gsd-keyboard
lab1003@lab1003-HP-280-G2-MT:~$ gsd-media-keys
lab1003@lab1003-HP-280-G2-MT:~$ nautilus-desktop
lab1003@lab1003-HP-280-G2-MT:~$ gnome-software
lab1003@lab1003-HP-280-G2-MT:~$ xdg-desktop-portal-gtk
lab1003@lab1003-HP-280-G2-MT:~$ update-notifier
lab1003@lab1003-HP-280-G2-MT:~$ nautilus
lab1003@lab1003-HP-280-G2-MT:~$ gnome-terminal-server
lab1003@lab1003-HP-280-G2-MT:~$ soffice
lab1003@lab1003-HP-280-G2-MT:~$ firefox
lab1003@lab1003-HP-280-G2-MT:~$ gnome-mines
lab1003@lab1003-HP-280-G2-MT:~$ gnome-mahjongg
lab1003@lab1003-HP-280-G2-MT:~$ xkill
lab1003@lab1003-HP-280-G2-MT:~$
Select the window whose client you wish to kill with button 1....
Terminal
```

### Jobs:

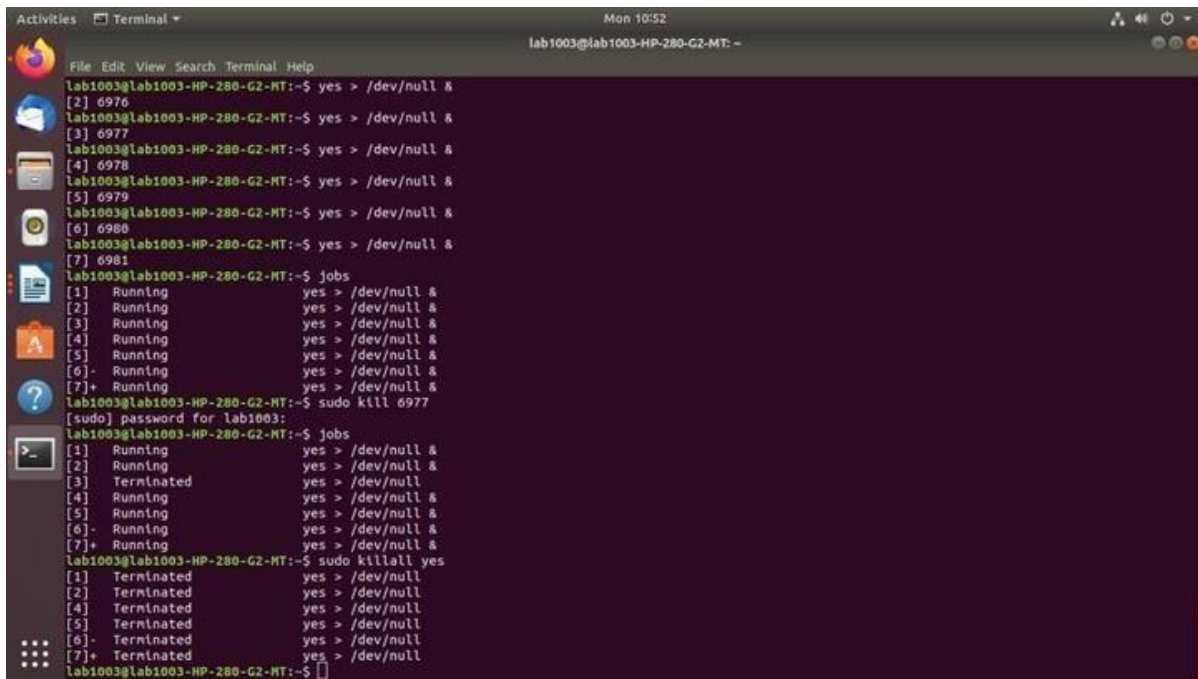
To list all your measures forked from the current shell use “jobs” command *yes > /dev/null &* :

```
Activities Terminal Mon 10:51 lab1003@lab1003-HP-280-G2-MT: ~
File Edit View Search Terminal Help
lab1003@lab1003-HP-280-G2-MT:~$ pkill -15 firefox
lab1003@lab1003-HP-280-G2-MT:~$ pkill -15 libreoffice
lab1003@lab1003-HP-280-G2-MT:~$ pkill -9 libreoffice
lab1003@lab1003-HP-280-G2-MT:~$ pkill -9 -n screen
lab1003@lab1003-HP-280-G2-MT:~$ jobs
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[1] 6937
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[2] 6976
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[3] 6977
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[4] 6978
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[5] 6979
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[6] 6980
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[7] 6981
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1] Running yes > /dev/null &
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6] Running yes > /dev/null &
[7]+ Running yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$ sudo kill 6977
[sudo] password for lab1003:
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1] Running yes > /dev/null &
[2] Running yes > /dev/null &
[3] Terminated yes > /dev/null
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6] Running yes > /dev/null &
[7]+ Running yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$
```

The command will begin the process *yes* and yield its standard output to */dev/null*. The second line contains the accompanying data “[1]” ( work ID ) and “16017” the real PID



**killall name** : Ending each cycle individually can end up being hard and repetitive work. We should see whether we can get some assistance by utilizing killall order and process cycle name

A terminal window titled 'lab1003@lab1003-HP-280-G2-MT: ~' showing a series of commands and their outputs. The user starts by running 'yes > /dev/null &' seven times, which creates seven background jobs. They then use 'jobs' to list them, showing they are all 'Running'. Next, they run 'sudo kill 6977' to kill the first job. Finally, they run 'sudo killall yes' to kill all remaining 'yes' processes. The 'jobs' list shows that jobs 1 through 7 are now 'Terminated'.

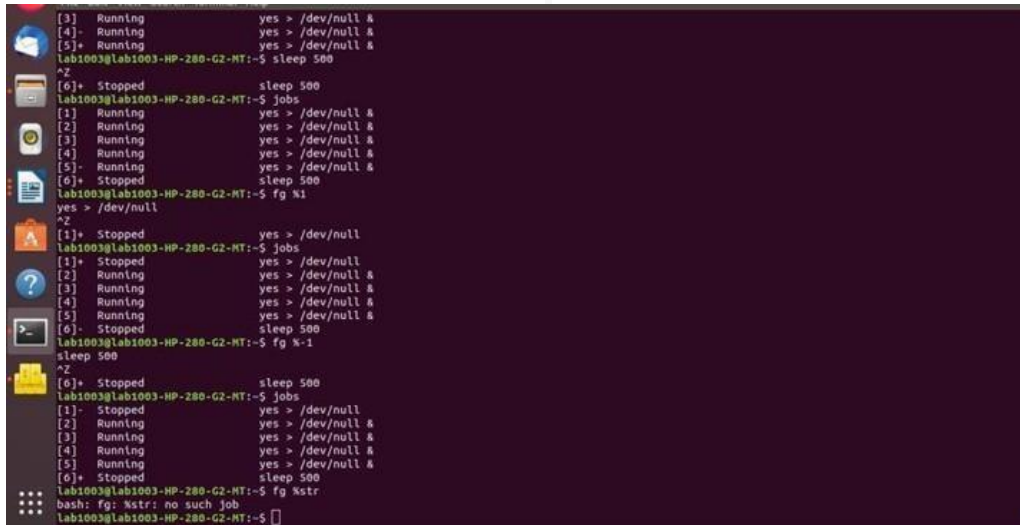
```
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[2] 6976
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[3] 6977
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[4] 6978
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[5] 6979
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[6] 6980
lab1003@lab1003-HP-280-G2-MT:~$ yes > /dev/null &
[7] 6981
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1]  Running      yes > /dev/null &
[2]  Running      yes > /dev/null &
[3]  Running      yes > /dev/null &
[4]  Running      yes > /dev/null &
[5]  Running      yes > /dev/null &
[6]- Running      yes > /dev/null &
[7]+ Running      yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$ sudo kill 6977
[sudo] password for lab1003:
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1]  Running      yes > /dev/null &
[2]  Running      yes > /dev/null &
[3]  Terminated  yes > /dev/null
[4]  Running      yes > /dev/null &
[5]  Running      yes > /dev/null &
[6]- Running      yes > /dev/null &
[7]+ Running      yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$ sudo killall yes
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1]  Terminated  yes > /dev/null
[2]  Terminated  yes > /dev/null
[4]  Terminated  yes > /dev/null
[5]  Terminated  yes > /dev/null
[6]- Terminated  yes > /dev/null
[7]+ Terminated  yes > /dev/null
lab1003@lab1003-HP-280-G2-MT:~$
```

**Fg**: fg command in unix used to put a background job in foreground.

**%n** : Refer to job number n.

**%str** : Refer to a job which was started by a command beginning with str.

`fg -help` : It displays help information



```
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5]+ Running yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$ sleep 500
^Z
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1] Running yes > /dev/null &
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ fg %1
yes > /dev/null
^Z
[1]+ Stopped yes > /dev/null
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1]+ Stopped yes > /dev/null
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ fg %1
sleep 500
^Z
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1] Stopped yes > /dev/null
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ fg %str
bash: fg: %str: no such job
lab1003@lab1003-HP-280-G2-MT:~$
```

**Bg:** The 'bg' command is primarily used when you wish to run a job/process in the background after it has been stopped or paused.

**%n :** Refer to job number n.

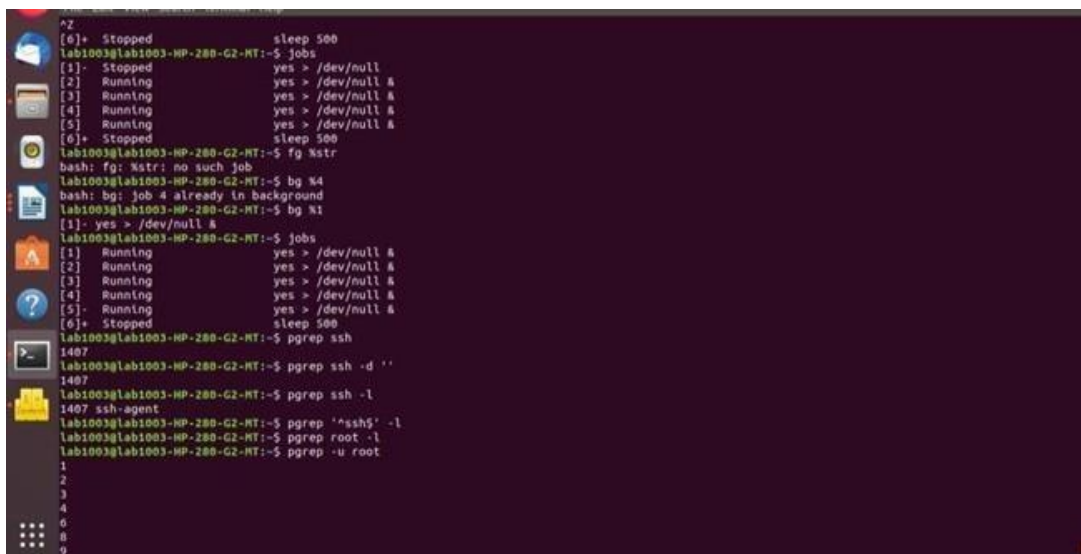
**%str :** Refer to a job which was started by a command beginning with str.

**Pgrep:** The pgrep command is a tool that searches for processes based on their name and other attributes, and returns their PIDs.

**Pgrep ssh:** If there are running processes with names matching "ssh", their PIDs will be displayed on the screen. If no matches are found, the output is empty. `pgrep ssh -d ' '`: The option allows you to specify a different delimiter.

`-pgre` `pgrep ssh -l`: The option tells to show the process name along with its ID `pgrep '^ssh$' -l`: If you want to match only the processes which names are exactly as the search pattern, you would use this command.

`-u pgre` `pgrep -u root`: the option to tell to display processes being run by a given user



```
^Z
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1]- Stopped yes > /dev/null
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ fg %str
bash: fg: %str: no such job
lab1003@lab1003-HP-280-G2-MT:~$ bg %4
bash: bg: job 4 already in background
lab1003@lab1003-HP-280-G2-MT:~$ bg %1
[1]- yes > /dev/null &
lab1003@lab1003-HP-280-G2-MT:~$ jobs
[1] Running yes > /dev/null &
[2] Running yes > /dev/null &
[3] Running yes > /dev/null &
[4] Running yes > /dev/null &
[5] Running yes > /dev/null &
[6]+ Stopped sleep 500
lab1003@lab1003-HP-280-G2-MT:~$ pgrep ssh
1407
lab1003@lab1003-HP-280-G2-MT:~$ pgrep ssh -d ' '
1407
lab1003@lab1003-HP-280-G2-MT:~$ pgrep ssh -l
1407 ssh-agent
lab1003@lab1003-HP-280-G2-MT:~$ pgrep '^ssh$' -l
lab1003@lab1003-HP-280-G2-MT:~$ pgrep root -l
lab1003@lab1003-HP-280-G2-MT:~$ pgrep -u root
1
2
3
4
5
6
7
8
9
```

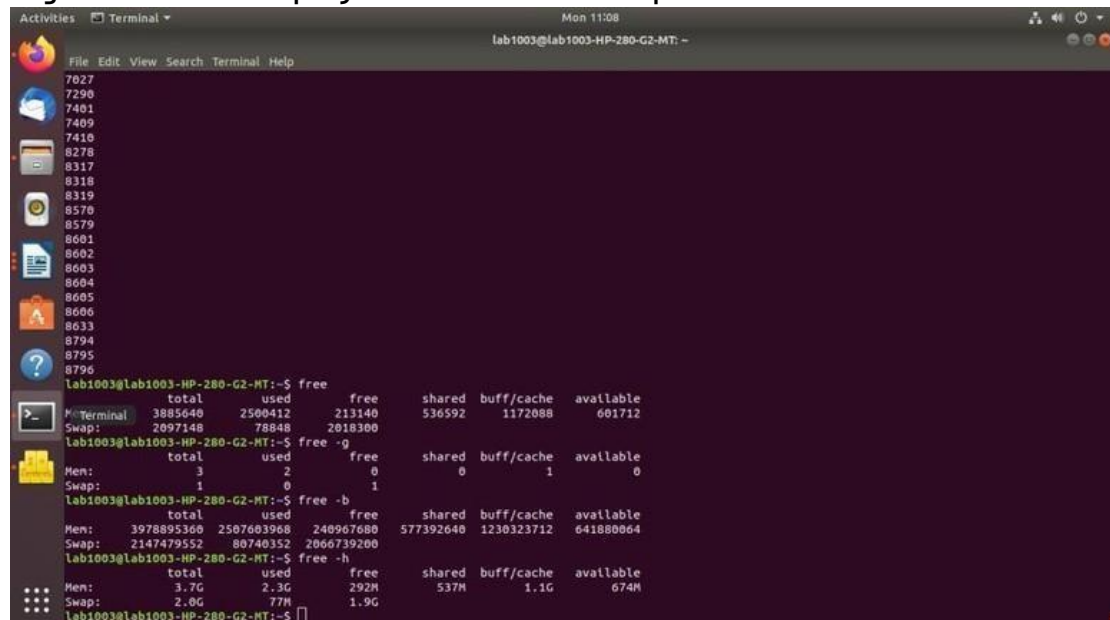


# MEMORY MANAGEMENT :

**Free:** The free command is a Unix command that allows you to check for memory RAM on your system or to check the memory statics of the Unix operating system.

**Free -g:** It displays the amount of memory in gigabytes. **Free -b:** It displays the memory in bytes.

**Free -h:** It shows all output columns automatically scaled to shortest three digit unit and display the units also of print out.



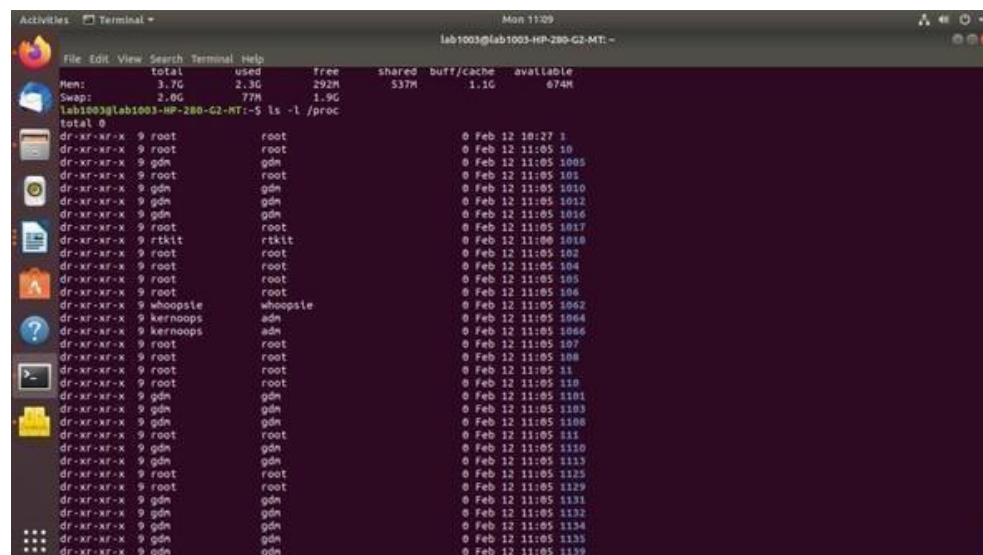
```
lab1003@lab1003-HP-280-G2-MT:~$ free
              total        used        free      shared  buff/cache   available
Mem:          3885640      2500412      213140       536592      1172088      601712
Swap:        2097148         78848       2018300

lab1003@lab1003-HP-280-G2-MT:~$ free -g
              total        used        free      shared  buff/cache   available
Mem:           3.8G         2.5G         0.2G         537M         1.1G           602M
Swap:          2.1G          79M         2.0G

lab1003@lab1003-HP-280-G2-MT:~$ free -b
              total        used        free      shared  buff/cache   available
Mem:    3978895360    2507603008    240967680    577392640    1230323712    641880064
Swap:   2147479552     80740352    2066739200

lab1003@lab1003-HP-280-G2-MT:~$ free -h
              total        used        free      shared  buff/cache   available
Mem:       3.7G         2.3G         292M         537M         1.1G         674M
Swap:      2.0G          77M         1.9G
```

**Proc:** Proc file system (procfs) is a virtual file system created on the fly when the system boots and is dissolved at the time of system shutdown. **ls -l /proc :** This command will list all the files and directories under the `/proc` directory with detailed information like permissions, ownership, size, and time of modifications. **ls -ltr /proc/6311:** gives information about the process with PID 6311.



```
lab1003@lab1003-HP-280-G2-MT:~$ ls -l /proc
total 0
dr-xr-xr-x 9 root root 0 Feb 12 10:27 1
dr-xr-xr-x 9 root root 0 Feb 12 11:05 10
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1005
dr-xr-xr-x 9 root root 0 Feb 12 11:05 101
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1010
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1012
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1016
dr-xr-xr-x 9 root root 0 Feb 12 11:05 1017
dr-xr-xr-x 9 rtkit rtkit 0 Feb 12 11:00 1018
dr-xr-xr-x 9 root root 0 Feb 12 11:05 102
dr-xr-xr-x 9 root root 0 Feb 12 11:05 104
dr-xr-xr-x 9 root root 0 Feb 12 11:05 105
dr-xr-xr-x 9 root root 0 Feb 12 11:05 106
dr-xr-xr-x 9 whoopsie whoopsie 0 Feb 12 11:05 1062
dr-xr-xr-x 9 kernoops kernoops 0 Feb 12 11:05 1064
dr-xr-xr-x 9 kernoops kernoops 0 Feb 12 11:05 1066
dr-xr-xr-x 9 root root 0 Feb 12 11:05 107
dr-xr-xr-x 9 root root 0 Feb 12 11:05 108
dr-xr-xr-x 9 root root 0 Feb 12 11:05 11
dr-xr-xr-x 9 root root 0 Feb 12 11:05 110
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1101
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1103
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1108
dr-xr-xr-x 9 root root 0 Feb 12 11:05 111
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1120
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1133
dr-xr-xr-x 9 root root 0 Feb 12 11:05 1125
dr-xr-xr-x 9 root root 0 Feb 12 11:05 1129
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1131
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1132
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1134
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1135
dr-xr-xr-x 9 gdm gdm 0 Feb 12 11:05 1139
```

```

les Terminal 25 Terminal
File Edit View Search Terminal Help
lab1003@lab1003-HP-280-G2-NT:~$ ls -ltr /proc/6311
total 0
-rw-r--r-- 1 lab1003 lab1003 0 Feb 12 11:00 oom_score_adj
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:05 status
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:05 cmdline
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 stat
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 wchan
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 uid_map
-rw-rw-rw- 1 lab1003 lab1003 0 Feb 12 11:10 timerslack_ns
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 timers
dr-xr-xr-x 21 lab1003 lab1003 0 Feb 12 11:10 task
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 sysctl
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 statm
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 stack
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 snps_rellup
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 snps
dr-xr-xr-x 53 lab1003 lab1003 0 Feb 12 11:10 net
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 sessionid
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 schedstat
-rw-rw-rw- 1 lab1003 lab1003 0 Feb 12 11:10 sched
lrwxrwxrwx 1 lab1003 lab1003 0 Feb 12 11:10 mem -> /proc/6311/meminfo
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 projid_map
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 personality
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 patch_state
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 pagemap
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 oom_score
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 fdinfo
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 numa_maps
dr-xr-xr-x 2 lab1003 lab1003 0 Feb 12 11:10 ns
dr-xr-xr-x 53 lab1003 lab1003 0 Feb 12 11:10 net
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 mountstats
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 mounts
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 mountinfo
-rw-rw-rw- 1 lab1003 lab1003 0 Feb 12 11:10 mem
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 naps
dr-xr-xr-x 2 lab1003 lab1003 0 Feb 12 11:10 fdinfo
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 fd
lrwxrwxrwx 1 lab1003 lab1003 0 Feb 12 11:10 exe -> /usr/lib/firefox/firefox
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 environ
lrwxrwxrwx 1 lab1003 lab1003 0 Feb 12 11:10 cwd -> /usr/lib/firefox/firefox
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 cpuset
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 coredump_filter
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 coredump_filter
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 comm
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 clear_refs
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 cgroup
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 auxv
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 autogroup
dr-xr-xr-x 2 lab1003 lab1003 0 Feb 12 11:10 attr
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 arch_status
lab1003@lab1003-HP-280-G2-NT:~$ ls -ltr /proc/4011/status
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:05 /proc/4011/status
lab1003@lab1003-HP-280-G2-NT:~$ ls -ltr /proc/4011/statm
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:11 /proc/4011/statm
lab1003@lab1003-HP-280-G2-NT:~$ cat /proc/meminfo
MemTotal: 3885640 kB
MemFree: 299988 kB
MemAvailable: 781036 kB
Buffers: 41392 kB
Cached: 1089664 kB
SwapCached: 1032 kB
Active: 2377780 kB
Inactive: 84928 kB
Active(anon): 2071836 kB
Inactive(anon): 570736 kB
Active(file): 385944 kB
Inactive(file): 264192 kB
Unevictable: 79484 kB
Mlocked: 16 kB
SwapTotal: 2097748 kB
SwapFree: 2018388 kB
Dirty: 176 kB
Writeback: 0 kB
AnonPages: 2100564 kB
Mapped: 378184 kB
Shmem: 561120 kB
KReclaimable: 76828 kB
Slab: 160576 kB
SReclaimable: 76828 kB
ShmemSlices: 83748 kB
KernelStack: 18688 kB
PageTables: 63572 kB
NFS_Unstable: 0 kB
Bounce: 0 kB
WritebackTmp: 0 kB
CommitLimit: 4039968 kB
Committed_AS: 8270132 kB
VmallocTotal: 34359738367 kB
VmallocUsed: 33668 kB
VmallocChunk: 0 kB
Percpu: 1872 kB
HardwareCorrupted: 0 kB
AnonHugePages: 0 kB
ShmemHugePages: 0 kB
ShmemPssMssCores: 0 kB

```

/status: To View The status of the process  
 /statm: To View The memory usage of the process

Meminfo: Displays the memory information.  
 cat/proc/meminfo: to determine how much memory the computer has.

```

es Terminal
File Edit View Search Terminal Help
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:10 arch_status
lab1003@lab1003-HP-280-G2-NT:~$ ls -ltr /proc/4011/status
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:05 /proc/4011/status
lab1003@lab1003-HP-280-G2-NT:~$ ls -ltr /proc/4011/statm
-r--r--r-- 1 lab1003 lab1003 0 Feb 12 11:11 /proc/4011/statm
lab1003@lab1003-HP-280-G2-NT:~$ cat /proc/meminfo
MemTotal: 3885640 kB
MemFree: 299988 kB
MemAvailable: 781036 kB
Buffers: 41392 kB
Cached: 1089664 kB
SwapCached: 1032 kB
Active: 2377780 kB
Inactive: 84928 kB
Active(anon): 2071836 kB
Inactive(anon): 570736 kB
Active(file): 385944 kB
Inactive(file): 264192 kB
Unevictable: 79484 kB
Mlocked: 16 kB
SwapTotal: 2097748 kB
SwapFree: 2018388 kB
Dirty: 176 kB
Writeback: 0 kB
AnonPages: 2100564 kB
Mapped: 378184 kB
Shmem: 561120 kB
KReclaimable: 76828 kB
Slab: 160576 kB
SReclaimable: 76828 kB
ShmemSlices: 83748 kB
KernelStack: 18688 kB
PageTables: 63572 kB
NFS_Unstable: 0 kB
Bounce: 0 kB
WritebackTmp: 0 kB
CommitLimit: 4039968 kB
Committed_AS: 8270132 kB
VmallocTotal: 34359738367 kB
VmallocUsed: 33668 kB
VmallocChunk: 0 kB
Percpu: 1872 kB
HardwareCorrupted: 0 kB
AnonHugePages: 0 kB
ShmemHugePages: 0 kB
ShmemPssMssCores: 0 kB

```

**Top -h:** Shows top command syntax

[illegible]



Htop: htop is a useful command-line tool in the Unix environment to determine the cause of load by each process.

Htop -h: Used to display the help message and exit. Htop

-c: Start htop in monochrome mode.

```
lab1003@lab1003-HP-280-G2-MT:~$ sudo apt install htop
Reading package lists... Done
Building dependency tree
Reading state information... Done
htop is already the newest version (2.1.0-3).
0 upgraded, 0 newly installed, 0 to remove and 55 not upgraded.
lab1003@lab1003-HP-280-G2-MT:~$ htop -h
htop 2.1.0 - (C) 2004-2018 Hishan Muhammad
Released under the GNU GPL.

-c --no-color          Use a monochrome color scheme
-d --delay=DELAY       Set the delay between updates, in tenths of seconds
-h --help              Print this help screen
-s --sort-key=COLUMN   Sort by COLUMN (try --sort-key=help for a list)
-u --user=USERNAME     Show only processes of a given user
-p --pid=PID[,PID,PID...] Show only the given PIDs
-v --version           Print version info

Long options may be passed with a single dash.

Press F1 inside htop for online help.
See 'man htop' for more information.
lab1003@lab1003-HP-280-G2-MT:~$ htop -c
lab1003@lab1003-HP-280-G2-MT:~$
```

```
Mon 11:20
lab1003@lab1003-HP-280-G2-MT:~$ htop
Tasks: 170, 749 thr: 4 running
Load average: 5.47 5.97 5.18
Uptime: 00:53:00
Mem: 12.76G/3.71G
87.8%/2.00%

PID USER     PR  NI  VIRT  RES  SHR  S#    %CPU  %MEM     time+ Command
1 root      20   0    476   736   672   R    0.0  13.30  76 yes
8576 lab1003  20   0    476   832   768   R    0.0  12.23  71 yes
8573 lab1003  20   0    476   788   724   R    0.0  13.36  31 yes
8275 lab1003  20   0    476   744   680   R    0.0  13.34  50 yes
10662 lab1003 20   0 31272 456 3796 R    0.1  0.00 00 htop -d 100
1441 lab1003  20   0 40456 3888 5424 S 33.3 10.0 5:18.39 /usr/bin/gnome-shell
1 root      20   0    444   784   0   S    0.0  0.07  0.3 /sbin/init splash
276 root    30  10 91140 10204 4492 S  0.0  0.3  0:00.57 /lib/systemd/systemd-journald
297 root    30  10 40856 4216 2264 S  0.0  0.1  0:00.00 /lib/systemd/systemd-udev
406 systemd-r 20   0 1520 796 544 S  0.0  0.1  0:03.10 /lib/systemd/systemd-resolved
432 systemd-l 20   0 1420 1424 3352 S  0.0  0.1  0:00.00 /lib/systemd/systemd-timesyncd
488 systemd-l 20   0 1420 1424 3352 S  0.0  0.1  0:00.03 /lib/systemd/systemd-timesyncd
698 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.07 /usr/sbin/rsyslogd -s
699 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.00 /usr/sbin/rsyslogd -s
700 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.04 /usr/sbin/rsyslogd -s
641 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.12 /usr/sbin/rsyslogd -s
683 root     30  10 4916 1044 1340 S  0.0  0.2  0:00.00 /usr/lib/utlsk2/utlsk2d
730 root     30  10 4916 1044 1340 S  0.0  0.2  0:00.00 /usr/lib/utlsk2/utlsk2d
814 root     30  10 4916 1044 1340 S  0.0  0.2  0:00.00 /usr/lib/utlsk2/utlsk2d
818 root     30  10 4916 1044 1340 S  0.0  0.2  0:00.00 /usr/lib/utlsk2/utlsk2d
664 root     30  10 4916 1044 1340 S  0.0  0.2  0:00.55 /usr/lib/utlsk2/utlsk2d
695 root     30  10 1070 1176 3668 S  0.0  0.1  0:00.00 /usr/lib/utlsk2/utlsk2d
673 root     30  10 1070 1176 3668 S  0.0  0.1  0:00.14 /usr/sbin/irqbalance -f
675 root     30  10 1324 416 416 S  0.0  0.1  0:00.00 /usr/sbin/cron -f
687 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.00 /usr/lib/nautilus/nautilus
808 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.10 /usr/lib/nautilus/nautilus
809 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.00 /usr/lib/nautilus/nautilus
810 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.17 /usr/lib/nautilus/nautilus
811 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.00 /usr/lib/nautilus/nautilus
832 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.43 /usr/lib/nautilus/nautilus
835 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.11 /usr/lib/nautilus/nautilus
838 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.01 /usr/lib/nautilus/nautilus
868 root     30  10 1598 2158 1756 S  0.0  0.7  0:00.53 /usr/lib/nautilus/nautilus
1063 root    30  10 1598 2158 1756 S  0.0  0.7  0:00.14 /usr/lib/nautilus/nautilus
F1: help F2: quit F3: toggle sort F4: toggle tree F5: toggle refresh F6: toggle update F7: toggle delay F8: toggle auto F9: toggle auto F10: toggle auto
```

```
Mon 11:20
lab1003@lab1003-HP-280-G2-MT:~$ htop
Tasks: 170, 749 thr: 4 running
Load average: 5.71 5.97 5.11
Uptime: 00:53:10
Mem: 12.76G/3.71G
87.8%/2.00%

PID USER     PR  NI  VIRT  RES  SHR  S#    %CPU  %MEM     time+ Command
1 root      20   0    476   736   672   R    0.0  13.30  76 yes
8576 lab1003  20   0    476   832   768   R    0.0  12.46  61 yes
8573 lab1003  20   0    476   788   724   R    0.0  13.43  77 yes
1441 lab1003  20   0 40456 3888 5424 S 33.3 10.0 5:18.44 /usr/bin/gnome-shell
9896 lab1003  20   0 66208 1832 3896 S  1.3  4.8  0:00.86 /usr/lib/firefox/firefox-contentproc -childID 132 -isForBrowser -preflen 29423 -prefMapSize 234535 -jsInitLen 238708 -p
1296 lab1003  20   0 96108 1072 184 S  1.2  1.9  0:00.96 /usr/lib/firefox/firefox-vt2 -displayfd 3 -auth /run/user/1000/gdm/authority -background none -noreset -keeppty -verbose 3
10849 lab1003  20   0 40456 3796 5640 S  0.9  10.0 0:00.16 /usr/bin/gnome-shell
1460 lab1003  -6   0 23270 16168 1828 S  0.5  0.4  1:54.69 /usr/bin/gnome-shell --start --log-target=syslog
1467 lab1003  9   0 23270 16168 1828 S  0.5  0.4  1:55.73 /usr/bin/gnome-shell --start --log-target=syslog
3024 lab1003  20   0 7808 4052 1916 S  0.5  1.1  0:11.09 /usr/lib/gnome-terminal/gnome-terminal-service
2782 lab1003  20   0 8220 4952 580 S  0.2  1.0  0:00.51 /usr/bin/nautilus --gasification-service
5466 lab1003  20   0 17120 7300 1616 S  0.2  19.3 0:14.04 /usr/lib/firefox/firefox -new-window
5499 lab1003  20   0 17120 7300 1616 S  0.2  19.3 0:00.88 /usr/lib/firefox/firefox -new-window
5565 lab1003  20   0 17120 7300 1616 S  0.2  19.3 2:00.70 /usr/lib/firefox/firefox -new-window
5514 lab1003  20   0 17120 7300 1616 S  0.2  19.3 0:40.75 /usr/lib/firefox/firefox -new-window
5011 lab1003  20   0 17120 7300 1616 S  0.2  19.3 1:37.22 /usr/lib/firefox/firefox -new-window
5931 lab1003  20   0 30408 1400 9236 S  0.2  3.7  0:22.28 /usr/lib/firefox/firefox-contentproc -childID 11 -isForBrowser -preflen 29423 -prefMapSize 234535 -jsInitLen 238708 -p
9911 lab1003  20   0 30408 1400 9236 S  0.2  3.7  0:00.57 /usr/lib/firefox/firefox-contentproc -childID 132 -isForBrowser -preflen 29423 -prefMapSize 234535 -jsInitLen 238708 -p
10662 lab1003 20   0 31272 456 3796 S  0.1  0.1  0:00.09 htop -d 100
1308 lab1003  20   0 36308 1072 1164 S  0.1  1.9  0:10.02 /usr/lib/nautilus/nautilus -displayfd 3 -auth /run/user/1000/gdm/authority -background none -noreset -keeppty -verbose 3
1612 lab1003  20   0 17120 7300 1616 S  0.1  0.4  0:00.44 /usr/lib/gnome-settings-daemon/gsd-media-keys
5462 lab1003  20   0 17120 7300 1616 S  0.1  19.3 0:22.84 /usr/lib/firefox/firefox -new-window
5012 lab1003  20   0 17120 7300 1616 S  0.1  19.3 0:07.34 /usr/lib/firefox/firefox -new-window
5013 lab1003  20   0 17120 7300 1616 S  0.1  19.3 1:17.32 /usr/lib/firefox/firefox -new-window
1 root      20   0    444   784   0   S    0.0  0.07  0.3 /sbin/init splash
276 root    30  10 91140 10204 4492 S  0.0  0.3  0:00.57 /lib/systemd/systemd-journald
297 root    30  10 40856 4216 2264 S  0.0  0.1  0:00.00 /lib/systemd/systemd-udev
406 systemd-r 20   0 1520 796 544 S  0.0  0.1  0:03.10 /lib/systemd/systemd-resolved
432 systemd-l 20   0 1420 1424 3352 S  0.0  0.1  0:00.00 /lib/systemd/systemd-timesyncd
488 systemd-l 20   0 1420 1424 3352 S  0.0  0.1  0:00.03 /lib/systemd/systemd-timesyncd
698 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.07 /usr/sbin/rsyslogd -s
699 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.00 /usr/sbin/rsyslogd -s
700 syslog   20   0 2508 876 1868 S  0.0  0.1  0:00.04 /usr/sbin/rsyslogd -s
F1: help F2: quit F3: toggle sort F4: toggle tree F5: toggle refresh F6: toggle update F7: toggle delay F8: toggle auto F9: toggle auto F10: toggle auto
```



**Df:** The df command displays information about total space and available space on a file system. Df -h: Prints sizes in a human-readable format using power of 1024. Filesystem: The name of the mounted storage device (e.g., /dev/sda4). Size: The total size of the filesystem in bytes. Used: The amount of space currently occupied by data in bytes. Avail: The amount of free space available in bytes. Use%: The percentage of the filesystem used. Mounted on: The directory where the filesystem is mounted (e.g., /, /home).

```

lab1003@lab1003-HP-280-G2-MT:~$ df
Filesystem            1K-blocks      used Available Use% Mounted on
udev                  1916756            0 1916756   0% /dev
tmpfs                 388564      1832    386732   1% /run
/dev/sda5             227627468 18664228 205327648   5% /
tmpfs                1942828            0 1942828   0% /dev/shm
tmpfs                 5128            4     5116   1% /run/lock
tmpfs                1942828            0 1942828   0% /sys/fs/cgroup
/dev/loop1             648            0     648 100% /snap/gnome-logs/186
/dev/loop3             564            0     564 100% /snap/gnome-system-monitor/186
/dev/loop1             512            0     512 100% /snap/gnome-characters/795
/dev/loop5            588928      588928            0 100% /snap/gnome-42-2204/141
/dev/loop7             66888        66888            0 100% /snap/gtk-common-themes/1515
/dev/loop6            224256      224256            0 100% /snap/gnome-3-34-1804/72
/dev/loop4            65536       65536            0 100% /snap/core20/2105
/dev/loop6            41472       41472            0 100% /snap/snapd/20671
/dev/loop8             768            0     768 100% /snap/gnome-characters/726
/dev/loop9            2560        2560            0 100% /snap/gnome-calculator/884
/dev/loop12            2304        2304            0 100% /snap/gnome-calculator/955
/dev/loop10           358144      358144            0 100% /snap/gnome-3-38-2004/143
/dev/loop13           223744      223744            0 100% /snap/gnome-3-34-1804/93
/dev/loop15           71904       71904            0 100% /snap/core22/1833
/dev/loop14           57088       57088            0 100% /snap/core18/2812
/dev/loop11           93952       93952            0 100% /snap/gtk-common-themes/1535
/dev/loop17           2560        2560            0 100% /snap/gnome-system-monitor/163
/dev/loop16           247168      247168            0 100% /snap/gnome-3-38-2004/76
/dev/loop18            128            0     128 100% /snap/bare/5
/dev/loop20            896            0     896 100% /snap/gnome-logs/121
/dev/loop19           56832       56832            0 100% /snap/core18/2128
/dev/loop21           63360       63360            0 100% /snap/core20/1881
tmpfs                 388564      16    388548   1% /run/user/1000
lab1003@lab1003-HP-280-G2-MT:~$ df -h database.txt
Filesystem            1K-blocks      used Available Use% Mounted on
/dev/sda5             227627468 18664228 205327584   5% /
lab1003@lab1003-HP-280-G2-MT:~$ df -h
Filesystem            Size      Used Avail Use% Mounted on
/dev/sda5             218G     11G    196G   5% /

```

**Du:** The 'du' command in Unix is used to estimate file and directory space usage. Du -h: If we want to print sizes in human readable format(K, M, G), use -h option

Du -a: Displays disk usage information for all files and directories, including hidden ones.

```

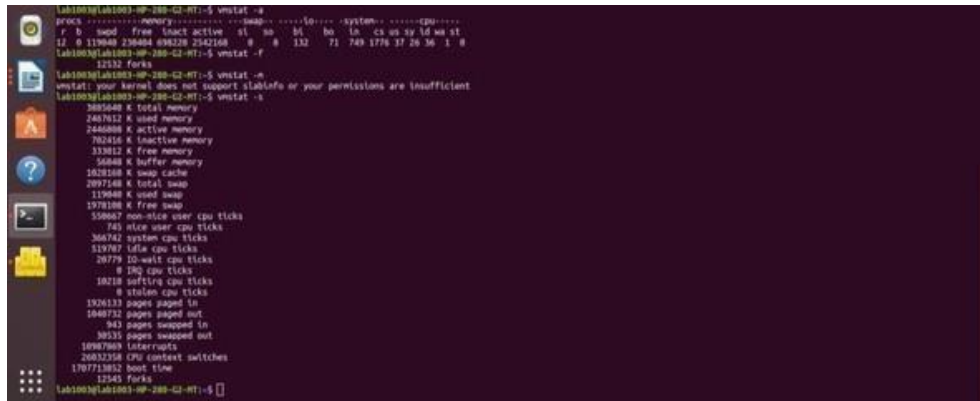
Mon 11:25
lab1003@lab1003-HP-280-G2-MT: ~
File Edit View Search Terminal Help
lab1003@lab1003-HP-280-G2-MT:~$ du /home/lab1003/Videos
4 /home/lab1003/Videos
lab1003@lab1003-HP-280-G2-MT:~$ du /home/lab1003/VedDir/Ved
796 /home/lab1003/VedDir/Ved
lab1003@lab1003-HP-280-G2-MT:~$ du -h /home/lab1003/VedDir/Ved
796K /home/lab1003/VedDir/Ved
lab1003@lab1003-HP-280-G2-MT:~$ du -a /home/lab1003/VedDir/Ved
204 /home/lab1003/VedDir/Ved/chmod.png
208 /home/lab1003/VedDir/Ved/chmod1.png
172 /home/lab1003/VedDir/Ved/c1pe.png
208 /home/lab1003/VedDir/Ved/chmod2.png
796 /home/lab1003/VedDir/Ved
lab1003@lab1003-HP-280-G2-MT:~$

```

**Vmstat:** vmstat command in Unix is a performance monitoring command of the system as it gives the information about processes, memory, paging, block IO, disk, and CPU scheduling.

**Vmstat -f:** It displays the number of forks since boot. Each process is represented by one or more task, depending on thread usage.

**Vmstat -a:** It displays active and inactive memory of the system running. **Vmstat -m:** It displays the number of forks since boot. Each process is represented by one or more task, depending on thread usage. **Vmstat -s:** This command is used to display a table of various event counters and memory statistics.

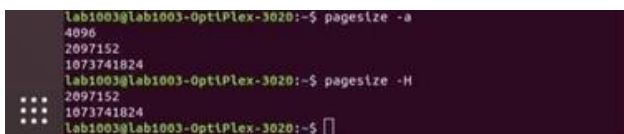


```
Lab1003@Lab1003-OptiPlex-3020:~$ vmstat -s
procs ..... memory ..... swap ..... system ..... cgs .....
r b swpd free tict active si so bi bo in cs us sy id wa st
12 0 119648 236484 636128 2542168 0 0 132 71 749 1776 37 26 36 1 0
Lab1003@Lab1003-OptiPlex-3020:~$ vmstat -f
12532 forks
Lab1003@Lab1003-OptiPlex-3020:~$ vmstat -m
vmstat: your kernel does not support slabinfo or your permissions are insufficient
Lab1003@Lab1003-OptiPlex-3020:~$ vmstat -s
3885648 K total memory
2461912 K used memory
2464808 K active memory
782416 K inactive memory
313012 K free memory
56848 K buffer memory
1618188 K swap cache
2097148 K total swap
119648 K used swap
1978188 K free swap
558647 non-nice user cpu ticks
743 nice user cpu ticks
366742 system cpu ticks
519707 idla cpu ticks
20779 io-wait cpu ticks
0 irq cpu ticks
18218 softirq cpu ticks
0 stelm cpu ticks
1926133 pages paged in
1048752 pages paged out
943 pages swapped in
10635 pages swapped out
18907809 interrupts
2083238 CPU context switches
170723832 boot time
12545 forks
Lab1003@Lab1003-OptiPlex-3020:~$
```

**Pagesize:** The pagesize command prints the size, in bytes, of a page of memory, as returned by the getpagesize subroutine

**Pagesize -a:** Prints all of the page size values (in bytes) supported on the system.

**Pagesize -H:** Shows only huge page size.



```
Lab1003@Lab1003-OptiPlex-3020:~$ pagesize -a
4096
2097152
1073741824
Lab1003@Lab1003-OptiPlex-3020:~$ pagesize -H
2097152
1073741824
Lab1003@Lab1003-OptiPlex-3020:~$
```

Sar: sar (System Activity Report) It can be used to monitor Unix system's resources like CPU usage,

Memory utilization, I/O devices consumption etc. sar -V: Displays The current version. sar -u 2 5: To report CPU details a total of 5 times with the interval of 2 seconds.

sar -r 1 3 :To report about the amount of memory used, amount of memory free, available cache, available buffers total 3 times with the interval of 1 second. sar -F 2 5: To report about file systems mounted on the device total 5 times with the interval of 2 seconds. sar -q 2 5:To report run queue length, number of processes and load average

```
lab1003@lab1003-OptiPlex-3020: ~$ sar -V
sysstat version 11.6.1
(C) Sebastien Godard (sysstat <at> orange.fr)
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:22:38 IST      CPU      %user      %nice      %system      %iowait      %stea
l      %idle
11:22:40 IST      all      1.87      0.00      1.75      0.00      0.0
0      96.38
11:22:42 IST      all      3.77      0.00      1.38      1.01      0.0
0      93.84
11:22:44 IST      all      1.25      0.00      0.88      0.13      0.0
0      97.74
11:22:46 IST      all      0.75      0.00      0.50      0.50      0.0
0      98.24
11:22:48 IST      all      1.13      0.00      0.38      0.00      0.0
0      98.49
Average:      all      1.76      0.00      0.98      0.33      0.0
0      96.94

lab1003@lab1003-OptiPlex-3020: ~$ sar -r 1 3
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:22:59 IST      kbmemfree      kbavall      kbmemused      %memused      kbbuffers      kbcac
hed      kbcommitt      %committ      kbactive      kbinactive      kbdirt
y
11:23:00 IST      290216      885888      3652760      92.64      71968      1168
072      8567536      141.84      2424208      898636      348
11:23:01 IST      292104      887780      3650872      92.59      71968      1166
180      8567536      141.84      2424240      898636      348
11:23:02 IST      292104      887780      3650872      92.59      71968      1166
140      8567536      141.84      2424248      898636      348
Average:      291475      887149      3651501      92.61      71968      116679
7      8567536      141.84      2424232      898636      348

lab1003@lab1003-OptiPlex-3020: ~$ sar -F 2 5
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sar -F 2 5
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:23:30 IST      MBfsfree      MBfsused      %fsused      %ufsused      Ifree      Iu
sed      %iused      FILESYSTEM
11:23:32 IST      402225      10056      2.13      7.22      30585641      199
895      0.65      /dev/sda5
11:23:32 IST      0      1      100.00      100.00      0
450      100.00      /dev/loop0
11:23:32 IST      0      1      100.00      100.00      0
401      100.00      /dev/loop2
11:23:32 IST      0      2      100.00      100.00      0      1
388      100.00      /dev/loop4
11:23:32 IST      0      62      100.00      100.00      0      11
720      100.00      /dev/loop1
11:23:32 IST      0      2      100.00      100.00      0
907      100.00      /dev/loop3
11:23:32 IST      0      56      100.00      100.00      0      10
803      100.00      /dev/loop5
11:23:32 IST      0      64      100.00      100.00      0      12
041      100.00      /dev/loop6
11:23:32 IST      0      219      100.00      100.00      0      18
500      100.00      /dev/loop7
11:23:32 IST      0      2      100.00      100.00      0      1
032      100.00      /dev/loop8
11:23:32 IST      0      218      100.00      100.00      0      18
503      100.00      /dev/loop9
11:23:32 IST      0      0      100.00      100.00      0
241      100.00      /dev/loop10
11:23:32 IST      0      65      100.00      100.00      0      64
986      100.00      /dev/loop11
11:23:32 IST      0      0      100.00      100.00      0
29      100.00      /dev/loop12
11:23:32 IST      0      92      100.00      100.00      0      76
208      100.00      /dev/loop13
11:23:32 IST      0      56      100.00      100.00      0      10
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sar -d 1 3
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:23:56 IST      DEV      tps      rkB/s      wkB/s      areq-sz      aqu
-sz      await      svctm      %util
11:23:57 IST      dev7-0      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-1      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-2      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-3      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-4      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-5      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-6      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-7      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev8-0      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-8      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-9      0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-10     0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-11     0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-12     0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
11:23:57 IST      dev7-13     0.00      0.00      0.00      0.00      0
0.00      0.00      0.00      0.00
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sar -q 2 5
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:24:12 IST      runq-sz      plist-sz      ldavg-1      ldavg-5      ldavg-15      bloc
ked
11:24:14 IST      0      1118      0.14      0.42      0.55
0
11:24:16 IST      0      1118      0.14      0.42      0.55
0
11:24:18 IST      1      1118      0.13      0.41      0.54
0
11:24:20 IST      0      1118      0.13      0.41      0.54
0
11:24:22 IST      0      1118      0.12      0.40      0.54
0
Average:      0      1118      0.13      0.41      0.54

lab1003@lab1003-OptiPlex-3020: ~$ sar -P 1 1 3
Linux 5.4.0-150-generic (lab1003-OptiPlex-3020)      Monday 12 Febr
uary 2024      _x86_64_      (4 CPU)

11:24:40 IST      CPU      %user      %nice      %system      %iowait      %stea
l      %idle
11:24:41 IST      1      0.00      0.00      0.00      0.00      0.0
0      100.00
11:24:42 IST      1      3.00      0.00      1.00      0.00      0.0
0      96.00
11:24:43 IST      1      7.00      0.00      2.00      0.00      0.0
0      91.00
Average:      1      3.34      0.00      1.00      0.00      0.0
0      95.65

lab1003@lab1003-OptiPlex-3020: ~$ ^C
lab1003@lab1003-OptiPlex-3020: ~$ ^C
lab1003@lab1003-OptiPlex-3020: ~$ ^C
lab1003@lab1003-OptiPlex-3020: ~$ ^C
lab1003@lab1003-OptiPlex-3020: ~$
```



Dmicodec: dmidecode also referred as Desktop Management Interface table decoder, record data from DMI table and produce it in human readable format.

Sudo dmicodec | more: Running a simple dmidecode command to get hardware information. Sudo dmicodec -t processor: To get information about Processor. Sudo dmicodec -t bios: To get BIOS information.

```
lab1003@lab1003-OptiPlex-3020: ~$ sudo dmidecode | more
[sudo] password for lab1003:
# dmidecode 3.1
Getting SMBIOS data from sysfs.
SMBIOS 2.7 present.
80 structures occupying 3575 bytes.
Table at 0x000EA390.

Handle 0xDA00, DMI type 218, 251 bytes
OEM-specific Type
Header and Data:
  DA FB 00 DA B2 00 37 4F 1E 36 00 05 00 05 00 03
  00 06 00 06 00 05 00 0F 00 0F 00 00 00 11 00 11
  00 02 00 12 00 12 00 04 00 22 00 22 00 01 00 23
  00 23 00 00 00 28 00 28 00 00 00 29 00 29 00 01
  00 2A 00 2A 00 02 00 2B 00 2B 00 FF FF 2C 00 2C
  00 FF FF 2D 00 2D 00 02 00 2E 00 2E 00 00 00 40
  00 40 00 01 00 41 00 41 00 00 00 42 00 42 00 01
  00 43 00 43 00 00 00 55 00 55 00 00 00 5C 00 5C
  00 01 00 5D 00 5D 00 00 00 60 00 60 00 00 6E 00
  00 6E 00 01 00 5B 00 00 00 61 00 61 00 91 00 00
  00 92 00 92 00 02 00 93 00 93 00 01 00 94 00 94
  00 00 00 9B 00 9B 00 01 00 9D 00 9D 00 01 00 9E
  00 9E 00 00 00 9F 00 9F 00 00 00 A0 00 A0 00 01
  00 A1 00 A1 00 00 00 A2 00 A2 00 00 00 A3 00 A3
  00 01 00 D1 00 D1 00 01 00 D2 00 D2 00 00 00 ED
  00 ED 00 00 00 FF FF FF FF 00 00

Handle 0xDA01, DMI type 218, 251 bytes
OEM-specific Type
Header and Data:
  DA FB 01 DA B2 00 37 4F 1E 36 00 F0 00 F0 00 01
  00 F5 00 F5 00 04 00 F6 00 F6 00 00 00 09 01 09
  01 00 00 17 01 17 01 00 00 18 01 18 01 01 00 19
  01 19 01 00 00 1A 01 1A 01 01 00 1B 01 1B 01 00
  00 1C 01 1C 01 01 00 2B 01 2B 01 01 00 2C 01 2C
  01 00 00 2D 01 2D 01 01 00 2E 01 2E 01 00 00 35
  01 35 01 FF 00 37 01 37 01 00 00 38 01 38 01 01
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sudo dmidecode -t processor
# dmidecode 3.1
Getting SMBIOS data from sysfs.
SMBIOS 2.7 present.

Handle 0x0033, DMI type 4, 42 bytes
Processor Information
  Socket Designation: SOCKET 0
  Type: Central Processor
  Family: Core i5
  Manufacturer: Intel
  ID: C3 06 03 00 FF FB EB BF
  Signature: Type 0, Family 6, Model 60, Stepping 3
  Flags:
    FPU (Floating-point unit on-chip)
    VME (Virtual mode extension)
    DE (Debugging extension)
    PSE (Page size extension)
    TSC (Time stamp counter)
    MSR (Model specific registers)
    PAE (Physical address extension)
    MCE (Machine check exception)
    CX8 (CMPXCHG8 instruction supported)
    APIC (On-chip APIC hardware supported)
    SEP (Fast system call)
    MTRR (Memory type range registers)
    PGE (Page global enable)
    MCA (Machine check architecture)
    CMOV (Conditional move instruction supported)
    PAT (Page attribute table)
    PSE-36 (36-bit page size extension)
    CLFSH (CLFLUSH instruction supported)
    DS (Debug store)
    ACPI (ACPI supported)
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sudo dmidecode -t bios
# dmidecode 3.1
Getting SMBIOS data from sysfs.
SMBIOS 2.7 present.

Handle 0x0000, DMI type 0, 24 bytes
BIOS Information
  Vendor: Dell Inc.
  Version: A02
  Release Date: 01/07/2014
  Address: 0xF0000
  Runtime Size: 64 kB
  ROM Size: 8192 kB
  Characteristics:
    PCI is supported
    PNP is supported
    BIOS is upgradeable
    BIOS shadowing is allowed
    Boot from CD is supported
    Selectable boot is supported
    BIOS ROM is socketed
    EDD is supported
    5.25"/1.2 MB floppy services are supported (Int 13h)
    3.5"/720 kB floppy services are supported (Int 13h)
    3.5"/2.88 MB floppy services are supported (Int 13h)
    Print screen service is supported (Int 5h)
    8042 keyboard services are supported (Int 9h)
    Serial services are supported (Int 14h)
    Printer services are supported (Int 17h)
    ACPI is supported
    USB legacy is supported
    BIOS boot specification is supported
    Function key-initiated network boot is supported
    Targeted content distribution is supported
    UEFI is supported
  BIOS Revision: 4.6
```

```
lab1003@lab1003-OptiPlex-3020: ~$ sudo dmidecode -t bios
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Getting SMBIOS data from sysfs.
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    3.5"/2.88 MB floppy services are supported (Int 13h)
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    8042 keyboard services are supported (Int 9h)
    Serial services are supported (Int 14h)
    Printer services are supported (Int 17h)
    ACPI is supported
    USB legacy is supported
    BIOS boot specification is supported
    Function key-initiated network boot is supported
    Targeted content distribution is supported
    UEFI is supported
  BIOS Revision: 4.6
```