

Lab 1: Introduction to Linux -

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Exercise 1:

Q1 What is /etc/apt/sources.list.d directory stands for? How can you use it? Provide an example:

Using the directory you can easily add new repositories without the need to edit the central /etc/apt/sources.list file. That is, you can just put a file with a unique name and the same format as /etc/apt/sources.list into this folder and it is used by apt.

For example - to install chef (from opscode), what we do is create and open a file named opscode.list: \$ sudo vim /etc/apt/sources.list.d/opscode.list

Add the required line and save the file: deb http://apt.opscode.com/ oneiric main

The above steps can be combined to make a single command: \$ sudo /bin/sh -c 'echo "deb http://apt.opscode.com/ oneiric main" > /etc/apt/sources.list.d/opscode.list'

Q2 How can you add/delete 3rd party repositories to install required software? Provide an example.

- Add

1. Open the /etc/apt/sources.list file in any editor: \$ sudo nano /etc/apt/sources.list
2. Add the VirtualBox repository in the file: deb
<http://download.virtualbox.org/virtualbox/debian> stretch contrib
3. Save and close the file.

You can also add a repository from the terminal, follow the below steps -

1. Open your terminal by **ctrl+alt+t**
2. Add a repository - \$ sudo add-apt-repository repository_url
For example - \$ sudo add-apt-repository ppa:danielrichter2007/grub-customizer
3. After adding the repository in the /etc/apt/sources.list file, run the \$ sudo apt update command to make the system aware of the added repository. The repository is now added to the system. You can install the software from the source.

- Remove

1. Open /etc/apt/source.list with a text editor: \$ sudo nano /etc/apt/source.list

2. To remove a repo add “#” before the link, change deb

http://download.virtualbox.org/virtualbox/debian stretch contrib to #deb

http://download.virtualbox.org/virtualbox/debian stretch contrib

3. Now save the file and exit from the text editor.

To remove a repository from the terminal, use the following command – \$ sudo

add-apt-repository -r repository_url

For example: \$ sudo add-apt-repository -r ppa:danielrichter2007/grub-customizer

Q3 When do you need to get a public key for the usage of the remote repo? Provide an example.

- a. The public key can be used to encrypt messages that only the private key can decrypt. This property is employed as a way of authenticating using the key pair.
- b. It is uploaded to a remote server that you want to be able to log into with SSH.
- c. It is needed to import and export packages

Exercise 2:

Q1 Describe how “top” works. Explain all important fields in its output based on your system resources:

- a. The upper half of the output contains statistics on processes and resource usage. At the very top left of the screen the top displays the current time. This is followed by the system uptime, which tells us the time for which the system has been running.
- b. Next comes the number of active user sessions, These sessions may be either made on a PTY or TTY.
- c. The “memory” section shows information regarding the memory usage of the system. The lines marked “Mem” and “Swap” show information about RAM and swap space respectively, where The “avail mem” value is the amount of memory that can be allocated to processes without causing more swapping.
- d. The “Tasks” section shows statistics regarding the processes running on your system. While the lower half contains a list of the currently running processes. You can use the arrow keys and Page Up/Down keys to browse through the list.

PID: Shows task's unique process id.

PR: Stands for priority of the task.

SHR: Represents the amount of shared memory used by a task.

VIRT: Total virtual memory used by the task.

USER: User name of owner of task.

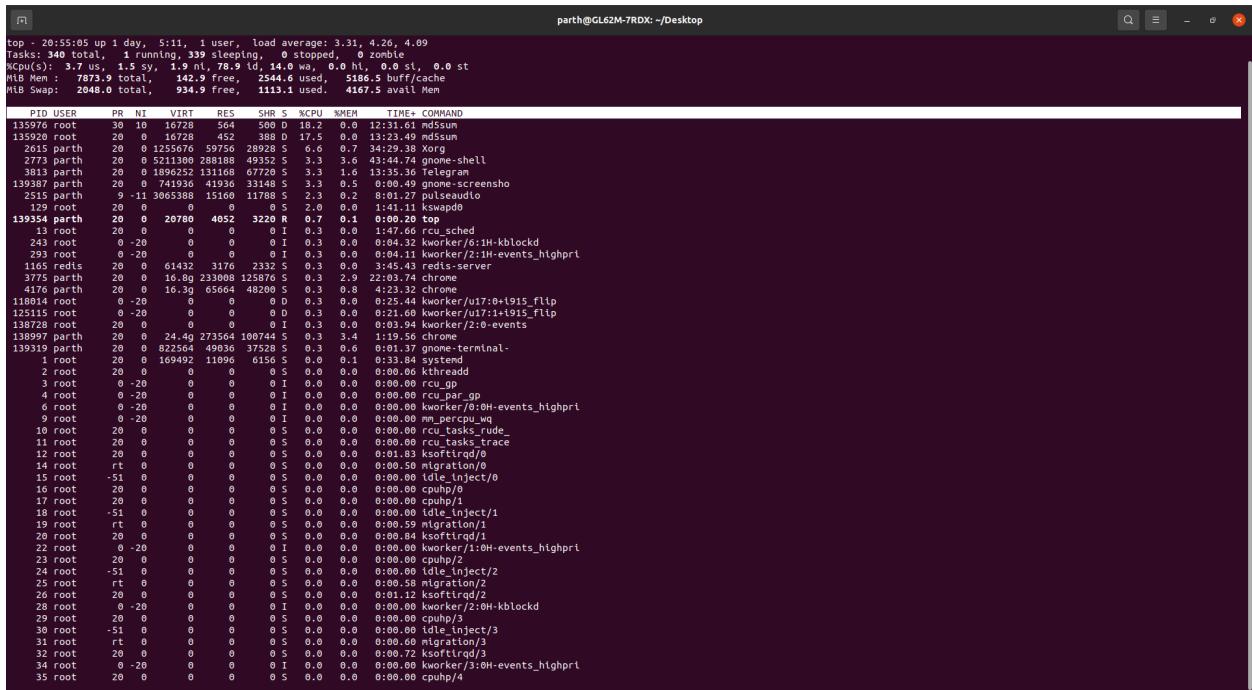
%CPU: Represents the CPU usage.

TIME+: CPU Time, the same as ‘TIME’, but reflecting more granularity through hundredths of a second.

NI: Represents a Nice Value of task. A Negative nice value implies higher priority, and positive Nice value means lower priority.

%MEM: Shows the Memory usage of tasks.

Q2 Explain briefly each process state from the output of the “top” command:



The screenshot shows the terminal output of the 'top' command. The header information includes:

```
top - 20:55:05 up 1 day, 5:11, 1 running, 339 sleeping, 0 stopped, 0 zombie
Tasks: 240 total, 1 running, 339 sleeping, 0 stopped, 0 zombie
CPU(s): 3.7 us, 1.5 sy, 1.9 nt, 78.9 id, 14.0 wa, 0.0 hl, 0.0 sl, 0.0 st
Mem Mem : 7873.9 total, 142.9 free, 2544.6 used, 5186.5 buff/cache
Mib Swap: 2048.0 total, 934.9 free, 1113.1 used. 4167.5 avail Mem
```

The main table lists processes with columns: PID, USER, PR, NI, VIRT, RES, SHR, S, %CPU, %MEM, TIME+, COMMAND. Key observations from the table:

- Root Process (PID 135976):** Priority 30, nice 0, VIRT 16728, %CPU 18.2, %MEM 0.0, TIME+ 12:21:51.61. It is running and using a significant amount of CPU.
- Systemd Services:** Processes like mdssum (PID 135926), Xorg (PID 2615), gnome-shell (PID 2773), Telegram (PID 3813), and gnome-screensho (PID 139387) are listed.
- Background Tasks:** Processes like kswapd0 (PID 129), ksoftirqd (PID 143), and rcu_sched (PID 243) are shown.
- Idle and Migration:** Processes like idle_inject/0 (PID 16) and migration/1 (PID 19) are listed.
- Memory Usage:** The table includes columns for SHR (Shared Memory), %CPU, and %MEM.

There are many processes, but i'm gonna choose the first one to explain:

It's unique process is 135976, and **root** is the user of it. It has priority of 30, which is one among the highest since we got priority 0 and even negative for some of the processes. It uses pretty much memory, as well as virtual memory. It uses 18.2% of my CPU. NI is 0 which indicates the nice value, hence it has neutral priority.

- Runnable (R): A process in this state is either executing on the CPU, or it is present on the run queue, ready to be executed.
- Interruptible sleep (S): Processes in this state are waiting for an event to complete.
- Uninterruptible sleep (D): In this case, a process is waiting for an I/O operation to complete.
- Stopped (T): These processes have been stopped by a job control signal (such as by pressing Ctrl+Z) or because they are being traced.
- Zombie (Z): The kernel maintains various data structures in memory to keep track of processes. A process may create a number of child processes, and they may exit while the parent is still around. However, these data structures must be kept around until the parent obtains the status of the child processes. Such terminated processes whose data structures are still around are called zombies.

Q3 What happens to a child process that dies and has no parent process to wait for it and what's bad about this?

- A process whose parent process no longer exists i.e. either finished or terminated without waiting for its child process to terminate is called an orphan process.
- Orphan processes take resources while they are in the system, and can potentially leave a server starved for resources.
- Having too many Orphan processes will overload the init process and can hang-up a Linux system.

Q4 How to know which process ID is used by an application?

- The easiest way to know the pid of a running program is using: `pidof <application name>`

Q5 What is a zombie process and what could be the cause of it? How to find and kill the zombie process?

- Zombie processes are when a parent starts a child process and the child process ends, but the parent doesn't pick up the child's exit code. The process object has to stay around until this happens - it consumes no resources and is dead, but it still exists - hence, 'zombie'.
- A zombie is already dead, so you cannot kill it. To clean up a zombie, it must be waited on by its parent, so killing the parent should work to eliminate the zombie. After the parent dies, the zombie will be inherited by process id 1, which will wait on it and clear its entry in the process table.
- Zombie processes can be found easily with the `$ ps` command. Within the ps output there is a STAT column which will show the processes current status, a zombie

process will have Z as the status. In addition to the STAT column zombies commonly have the words <defunct> in the CMD column as well.

- d. In order to kill a Zombie process, we need to identify it first. The following command can be used to find zombie processes: `$ ps aux | egrep "Z|defunct"`
- e. Now practically you can't kill a Zombie because it is already dead! What can be done is to notify its parent process explicitly so that it can retry to read the child (dead) process's status and eventually clean them from the process table. This can be done by sending a **SIGCHLD** signal to the parent process. The following command can be used to find the parent process ID (PID): `$ ps -o ppid= <Child PID>`
- f. Once you have the Zombie's parent process ID, you can use the following command to send a **SIGCHLD** signal to the parent process: `$ kill -s SIGCHLD <Parent PID>`
- g. However, if this does not help clearing out the Zombie process, you will have to kill or restart its parent process or in case of a huge surge in Zombie processes causing or heading towards system outage, you will have no choice but to go for a system reboot. The following command can be used to kill its parent process: `$ kill -9 <Parent PID>`
- h. **Note:** Killing a parent process will affect all of its child processes, so a quick double check will be helpful to be safe. Alternatively, if a few lying zombie processes are not consuming much CPU/Memory, it's better to kill the parent process or reboot the system in the next scheduled system maintenance.

Or alternatively, just the command - `$ kill -9 $(ps -A -ostat,ppid | grep -e '[zZ]' | awk '{ print $2 }')`

Lab exercises screenshots:

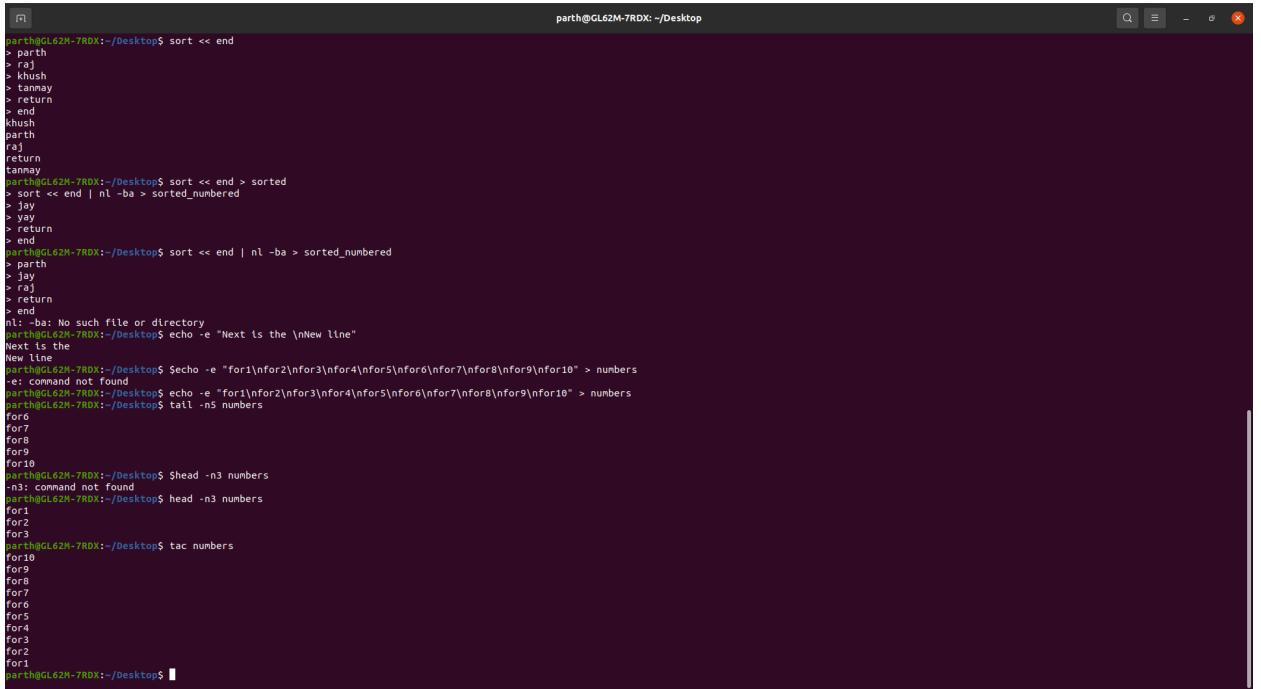
Exercise 1 -

1. Part - echo pipes and quotes

```
parth@GL62M-7RDX:~/Desktop$ touch fragmented.txt
parth@GL62M-7RDX:~/Desktop$ echo fragmented.txt
fragmented.txt
parth@GL62M-7RDX:~/Desktop$ cat fragmented.txt
Hello
My
name
is
Parth
parth@GL62M-7RDX:~/Desktop$ nl < fragmented.txt
      1 Hello
      2 My
      3 name
      4 is
      5 Parth
parth@GL62M-7RDX:~/Desktop$ nl fragmented.txt
      1 Hello
      2 My
      3 name
      4 is
      5 Parth
parth@GL62M-7RDX:~/Desktop$ nl
say
    1 yay
^C
parth@GL62M-7RDX:~/Desktop$ sort << end
> parth
> raj
> Krish
> tannay
> return
> end
khush
parth
raj
return
tannay
parth@GL62M-7RDX:~/Desktop$ sort << end > sorted
> sort << end | nl -ba > sorted_numbered
> jay
> yay
> return
> end
parth@GL62M-7RDX:~/Desktop$ sort << end | nl -ba > sorted_numbered
> parth
> jay
> raij
> Krish
> return
> end
nl: -ba: No such file or directory
parth@GL62M-7RDX:~/Desktop$ echo -e "Next is the \nNew line"
Next is the
New line
parth@GL62M-7RDX:~/Desktop$
```

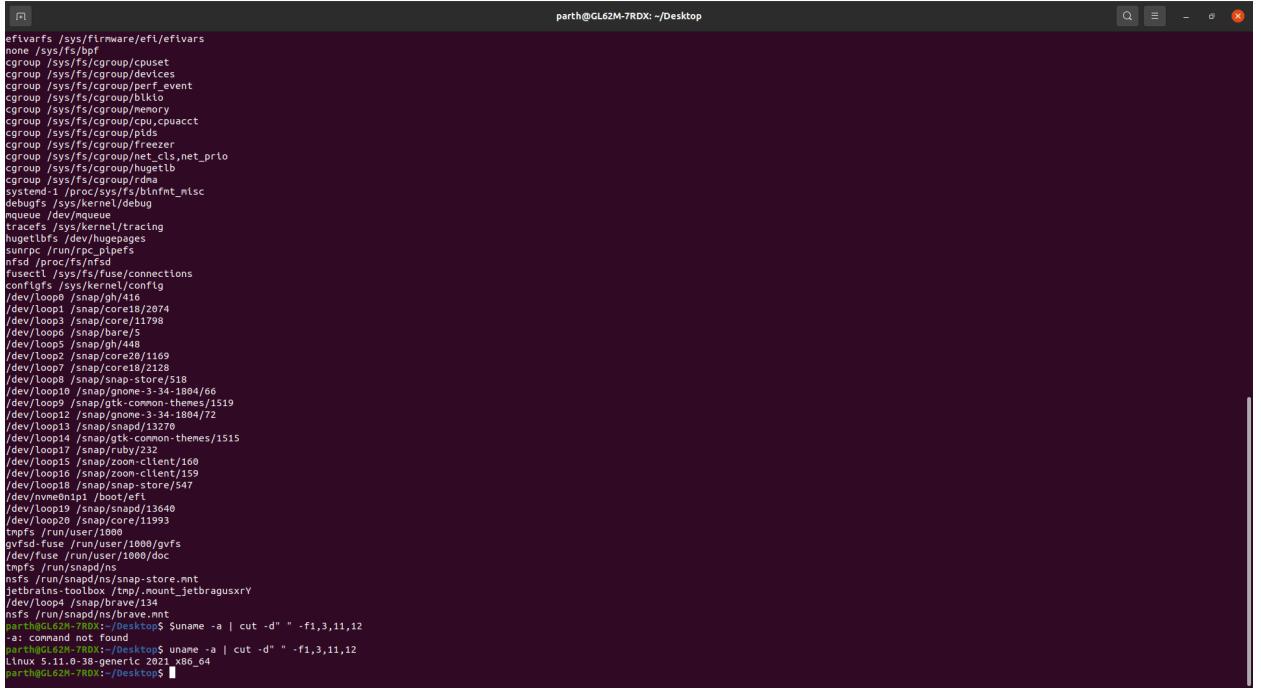
```
parth@GL62M-7RDX:~/Desktop$ pwd
/home/parth/Desktop
parth@GL62M-7RDX:~/Desktop$ mkdir mydocs
parth@GL62M-7RDX:~/Desktop$ cd mydocs
parth@GL62M-7RDX:~/Desktop/mydocs$ touch textproc
parth@GL62M-7RDX:~/Desktop$ ls -la
total 8
drwxrwxr-x 2 parth parth 4096 Oct 25 18:42 .
drwxr-xr-x 5 parth parth 4096 Oct 25 17:33 ..
-rw-rw-r-- 1 parth parth 0 Oct 25 18:42 textproc
parth@GL62M-7RDX:~/Desktop$ cp /home/parth/textproc -
parth@GL62M-7RDX:~/Desktop$ echo "My name is $USER and my home directory is $HOME" > simple_echo
parth@GL62M-7RDX:~/Desktop$ cat simple_echo
My name is parth and my home directory is /home/parth
parth@GL62M-7RDX:~/Desktop$ echo "My name is $USER and my home directory is $HOME" > simple_echo
parth@GL62M-7RDX:~/Desktop$ cat simple_echo
My name is parth and my home directory is /home/parth
parth@GL62M-7RDX:~/Desktop$ echo "My salary is $100" >> simple_echo
parth@GL62M-7RDX:~/Desktop$ cat simple_echo
My salary is 100
My salary is 100
parth@GL62M-7RDX:~/Desktop$ cat simple_echo > new_echo
parth@GL62M-7RDX:~/Desktop$ cat new_echo
cat: nofile: No such file or directory
parth@GL62M-7RDX:~/Desktop$ cat nofile 2> error_out
parth@GL62M-7RDX:~/Desktop$ cat nofile > allout 2>&1
parth@GL62M-7RDX:~/Desktop$ cat <<fooobar
> Hello foobar
> foobar
Hello foobar
parth@GL62M-7RDX:~/Desktop$ gnl < fragmented.txt
bash: fragmented.txt: No such file or directory
parth@GL62M-7RDX:~/Desktop$ nl < fragmented.txt
bash: fragmented.txt: No such file or directory
parth@GL62M-7RDX:~/Desktop$ touch fragmented.txt
parth@GL62M-7RDX:~/Desktop$ echo fragmented.txt
fragmented.txt
parth@GL62M-7RDX:~/Desktop$ touch fragmented.txt
parth@GL62M-7RDX:~/Desktop$ echo fragmented.txt
fragmented.txt
parth@GL62M-7RDX:~/Desktop$ cat fragmented.txt
Hello
My
name
is
```

2. Part - Heads and tails, cat and tac



```
parth@GL62M-7RDX:~/Desktop$ sort << end
> parth
> raj
> khush
> tannay
> return
> end
khush
parth
raj
return
tannay
parth@GL62M-7RDX:~/Desktop$ sort << end > sorted
> sort << end | nl -ba > sorted_numbered
> jay
> yay
> return
> end
parth@GL62M-7RDX:~/Desktop$ sort << end | nl -ba > sorted_numbered
> parth
> jay
> raj
> return
> end
als: ba: No such file or directory
parth@GL62M-7RDX:~/Desktop$ echo -e "Next is the \nNew line"
Next is the
New line
parth@GL62M-7RDX:~/Desktop$ Secho -e "for1\nfor2\nfor3\nfor4\nfor5\nfor6\nfor7\nfor8\nfor9\nfor10" > numbers
: command not found
parth@GL62M-7RDX:~/Desktop$ echo -e "for1\nfor2\nfor3\nfor4\nfor5\nfor6\nfor7\nfor8\nfor9\nfor10" > numbers
parth@GL62M-7RDX:~/Desktop$ tail -n5 numbers
for6
for7
for8
for9
for10
parth@GL62M-7RDX:~/Desktop$ head -n3 numbers
-n3: command not found
parth@GL62M-7RDX:~/Desktop$ head -n3 numbers
for1
for2
for3
parth@GL62M-7RDX:~/Desktop$ tac numbers
for10
for9
for8
for7
for6
for5
for4
for3
for2
for1
parth@GL62M-7RDX:~/Desktop$
```

Part - Cutting comments



```
parth@GL62M-7RDX:~/Desktop$ cat /proc/mounts
none /sys/firmware/efi/efivars
none /sys/fs/cgroup
cgroup /sys/fs/cgroup/cpuset
cgroup /sys/fs/cgroup/devices
cgroup /sys/fs/cgroup/perf_event
cgroup /sys/fs/cgroup/bllio
cgroup /sys/fs/cgroup/memory
cgroup /sys/fs/cgroup/cpu_cpaacct
cgroup /sys/fs/cgroup/freezer
cgroup /sys/fs/cgroup/net_cls.net_prio
cgroup /sys/fs/cgroup/hugetlb
cgroup /sys/fs/cgroup/rdma
systemd- /proc/sys/fs/binfmt_misc
debugfs /sys/kernel/debug
queueing /dev/queueing
tracefs /sys/kernel/tracing
hugetlbfs /dev/hugepages
sunrpc /run/rpc_pipefs
nfsd /proc/fs/nfsd
socket /sys/fs/kernl/connections
configfs /sys/kernel/config
/dev/loop0 /snap/gh/416
/dev/loop1 /snap/core18/2074
/dev/loop3 /snap/core/11798
/dev/loop4 /snap/gh/448
/dev/loop5 /snap/gh/448
/dev/loop2 /snap/core20/1169
/dev/loop7 /snap/core18/2128
/dev/loop8 /snap/snap-store/518
/dev/loop10 /snap/gnome-3-34-1804/66
/dev/loop9 /snap/gtk-common-themes/1519
/dev/loop11 /snap/gnome-3-34-1804/72
/dev/loop13 /snap/snapd/13270
/dev/loop14 /snap/gtk-common-themes/1515
/dev/loop17 /snap/ruby/232
/dev/loop15 /snap/zoom-client/100
/dev/loop16 /snap/zoom-client/159
/dev/loop10 /snap/snap-store/547
/dev/loop11 /boot/efi
/dev/loop19 /snap/snapd/13640
/dev/loop20 /snap/core/11993
tmpfs /run/user/1000
gvfsd-fuse /run/user/1000/gvfs
devel /run/user/1000/doc
tmpfs /run/snapd/ns
nsfs /run/snapd/ns/snap-store.mnt
jetbrains-toolbox /tmp/.mount_jetbragusxr
/dev/loop4 /snap/brave/134
nsfs /run/snapd/ns/brave.mnt
parth@GL62M-7RDX:~/Desktop$ Suname -a | cut -d" " -f1,3,11,12
: command not found
parth@GL62M-7RDX:~/Desktop$ uname -a | cut -d" " -f1,3,11,12
Linux 5.11.0-38-generic 2021 x86_64
parth@GL62M-7RDX:~/Desktop$
```

```
parth@GL62M-7RDX:~/Desktop$ cut -d " " -f1,2 /etc/mtab
sysfs /sys
proc /proc
dev /dev
devpts /dev/pts
tmpfs /run
/dev/sda1 /
securityfs /sys/kernel/security
tmpfs /dev/shm
tmpfs /dev/kmem
tmpfs /sys/fs/cgroup
cgroup2 /sys/fs/cgroup/unified
cgroup /sys/fs/cgroup/systemd
pstree /sys/fs/pstree
efivarfs /sys/firmware/efi/efivars
nonexistent /run/systemd/nonexistent
cgroup /sys/fs/cgroup/cpuset
cgroup /sys/fs/cgroup/devices
cgroup /sys/fs/cgroup/perf_event
cgroup /sys/fs/cgroup/blio
cgroup /sys/fs/cgroup/memory
cgroup /sys/fs/cgroup/cpuacct
cgroup /sys/fs/cgroup/pids
cgroup /sys/fs/cgroup/freezer
cgroup /sys/fs/cgroup/net_cls.net_prio
cgroup /sys/fs/cgroup/hugetlb
cgroup /sys/fs/cgroup/rdm
cgroup /sys/fs/cgroup/debug
systemd- /proc/sys/fs/binfmt_misc
debugfs /sys/kernel/debug
nqueue /dev/nqueue
tracefs /sys/kernel/tracing
hugetlbfs /dev/hugepages
sunrpc /run/rpc_pipefs
perf /sys/kernel/perf
fusectl /sys/fs/fuse/connections
configfs /sys/kernel/config
/dev/loop0 /snap/gb/416
/dev/loop1 /snap/core18/204
/dev/loop3 /snap/core18/11798
/dev/loop4 /snap/gnome-shell/106
/dev/loop5 /snap/gb/448
/dev/loop2 /snap/core20/1169
/dev/loop7 /snap/core18/2128
/dev/loop8 /snap/snap-store/518
/dev/loop11 /snap/gnome-3-34-1804/66
/dev/loop10 /snap/gtk-common-themes/1519
/dev/loop12 /snap/gnome-3-34-1804/72
/dev/loop13 /snap/stadp/13270
/dev/loop14 /snap/gtk-common-themes/1515
/dev/loop17 /snap/ruby/232
/dev/loop15 /snap/zoom-client/160
/dev/loop16 /snap/zoom-client/159
/dev/loop18 /snap/snap-store/547
/dev/nvme0n1p1 /boot/efi
/dev/loop19 /snap/snapd/13648
/dev/loop20 /snap/core/11993
```

```
parth@GL62M-7RDX:~/Desktop$ Scut -d: -f1,4,5 /etc/passwd
-d: command not found
parth@GL62M-7RDX:~/Desktop$ cut -d: -f1,4,5 /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:65533:games:/var/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/var/spool/proxy:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/bin/nologin
backup:x:43:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:gnats Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:99:99:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/:/home/syslog:/usr/sbin/nologin
polkit:x:105:105:PolicyKit Daemon,,,:/var/lib/polkit:/usr/sbin/nologin
tss:x:106:111:TPM Software Stack,,,:/var/lib/tss:/bin/false
uuldd:x:107:114::/run/uuldd:/usr/sbin/nologin
tcpdump:x:108:115::/nonexistent:/usr/sbin/nologin
avahi-autopid:x:109:116:avahi autor daemon,,,:/var/lib/avahi-autopid:/usr/sbin/nologin
usbnx:x:110:46:usbmon,,,:/var/lib/usbmon:/usr/sbin/nologin
xrdp:x:111:111:Windows Remote Desktop,,,:/var/lib/xrdp:/bin/false
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
avahi:x:115:121:Avahi MDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
kerneoops:x:116:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin
sandisk-pn:x:118:124:Netgear KManager Daemon,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colorfd:x:121:126:colorfd colour management daemon,,,:/var/lib/colorfd:/usr/sbin/nologin
geoclue:x:122:127:/var/lib/geoclue:/usr/sbin/nologin
polkit-gobject:x:123:128:PolicyKit Gobject,,,:/var/lib/polkit-gobject:/usr/sbin/nologin
gnome-initial-setup:x:124:65534:/run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm:/bin/false
parth:x:1000:1000:Parth Kalkar,,,:/home/parth:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper,,,:/usr/sbin/nologin
flatpak:x:126:133:flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin
redshift:x:127:134:redshift,,,:/var/lib/redshift:/bin/false
rpcx:x:128:65534:/:/run/rpcbind:/usr/sbin/nologin
statd:x:129:65534:/var/lib/nfs:/usr/sbin/nologin
parth@GL62M-7RDX:~/Desktop$ cut -d " " -f1,2 /etc/mtab
nusfc /sys
```

3. Part - Unique lines extraction, sorting and filtering

```
parth@GL62M-7RDX: ~/Desktop
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
newsx:x:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:www-data:/var/www:/usr/sbin/nologin
buildd:x:14:buildd:/var/lib/buildomatic/buildd:/usr/sbin/nologin
listx:18:38:Mailng List Manager:/var/list:/usr/sbin/nologin
ircx:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/noneexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:102:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebusx:103:106:/noneexistent:/usr/sbin/nologin
syslog:x:104:110:/:/home/syslog:/usr/sbin/nologin
_aptx:x:105:65534:/noneexistent:/usr/sbin/nologin
tss:x:106:tss:TPM software stack:/var/lib/tss:/bin/false
udisksd:x:107:108:UDisks Daemon:/var/lib/udisksd:/usr/sbin/nologin
tcpdump:x:108:115:/noneexistent:avahi autopid daemon,,,:/var/lib/avahi-autopid:/usr/sbin/nologin
usbmuxd:x:109:116:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
rtkitx:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
cups-pk-helper:x:113:113:cups-pk-helper,,,:/var/lib/cups-pk-helper:/usr/sbin/nologin
speexd:x:114:114:Speex Dectchanger,,,:/var/lib/speexd:/bin/false
avahi-x:115:121:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
kernoops:x:116:65534:Kernel Ooops Tracking Daemon,,,:/usr/sbin/nologin
saned:x:117:123:/var/lib/saned:/usr/sbin/nologin
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
polip:x:119:125:polip,,,:/var/lib/polip:/bin/false
phonon-backend:x:120:125:/noneexistent:/bin/false
colorld:x:121:126:colorl colour management daemon,,,:/var/lib/colorld:/usr/sbin/nologin
geoclue:x:122:127:/var/lib/geoclue:/usr/sbin/nologin
pulsex:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534:/:/run/gnome-initial-setup:/bin/false
gnome-session:x:125:126:GNOME Session Manager,,,:/var/lib/gnome-session:/bin/false
parth:x:1000:1000:Parth Kalkar:/home/partk/Blu
systemd-coresdump:x:999:999:system Core Dumper,,,:/usr/sbin/nologin
_flatpak:x:126:133:flatpak:system-wide installation helper,,,:/noneexistent:/usr/sbin/nologin
Redis:x:127:134:/var/lib/redis:/usr/sbin/nologin
_rpcx:x:128:65534:/:/run/rpcbind:/usr/sbin/nologin
statd:x:129:65534:/:/var/lib/nfs/statd:/usr/sbin/nologin
sed:x:130:131:sed : sed 2.3 d' unique
sed: can't read unique: No such file or directory
parth@GL62M-7RDX:~/Desktop$ sed '2,3 d' unique.txt
This line occurs only once.
This line occurs three times.
This line occurs three times.
This line occurs three times.

parth@GL62M-7RDX:~/Desktop$ sed '/^This/ d' unique.txt
parth@GL62M-7RDX:~/Desktop$ grep -w root /etc/passwd | awk -F: '{print $3}'
0
parth@GL62M-7RDX:~/Desktop$
```

```
parth@GL62M-7RDX:~/Desktop$ cp /etc/fstab -
parth@GL62M-7RDX:~/Desktop$ cp /etc/passwd -
parth@GL62M-7RDX:~/Desktop$ sed '/efi/ s/sda/hda/g' fstab
sed: can't read fstab: No such file or directory
parth@GL62M-7RDX:~/Desktop$ sed '/root/ s/:/:/g' passwd
sed: can't read passwd: No such file or directory
parth@GL62M-7RDX:~/Desktop$ sed '2,3 d' unique
sed: can't read unique: No such file or directory
parth@GL62M-7RDX:~/Desktop$ sed '/efi/ s/sda/hda/g' fstab
sed: -e expression #1, char 5: missing command
parth@GL62M-7RDX:~/Desktop$ sed '/efi/ s/sda/hda/g' fstab
sed: can't read fstab: No such file or directory
parth@GL62M-7RDX:~/Desktop$ cat fstab
cat: fstab: No such file or directory
parth@GL62M-7RDX:~/Desktop$ cd fstab
bash: cd: fstab: No such file or directory
parth@GL62M-7RDX:~/Desktop$ cp /etc/fstab -
parth@GL62M-7RDX:~/Desktop$ cp /etc/fstab -
parth@GL62M-7RDX:~/Desktop$ sed '/efi/ s/sda/hda/g' fstab
sed: can't read fstab: No such file or directory
parth@GL62M-7RDX:~/Desktop$ sed '/efi/ s/sda/hda/g' fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUIDs as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options> <dump> <pass>
# was on /dev/sda1 during installation
UUID=01234567-89ab-49cd-99de-123456789012 /          ext4    errors=remount-ro 0      1
# /boot/efi was on /dev/nvme0n1p1 during installation
UUID=0221-AB3E  /boot/efi   vfat   umask=0077  0      1
/swappfile
swapfile           none   swap   sw      0      0
parth@GL62M-7RDX:~/Desktop$ sed '/root/ s/:/:/g' passwd
root:x:0:root:/root:/bin/bash
daemon:x:1:daemon:/sbin/nologin
bin:x:2:bin:/bin:/usr/sbin/nologin
sysc:x:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lxd:x:999:lxd:/var/lib/lxd:/usr/sbin/nologin
newsx:x:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:www-data:/var/www:/usr/sbin/nologin
buildd:x:14:buildd:/var/lib/buildomatic/buildd:/usr/sbin/nologin
listx:18:38:Mailng List Manager:/var/list:/usr/sbin/nologin
ircx:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/noneexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:102:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebusx:103:106:/noneexistent:/usr/sbin/nologin
```

```
parth@GL62M-7RDX: ~/Desktop
usbmux:x:110:46:usbmux daemon...:/var/lib/usbmux:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
uuidd:x:107:107::/run/uuidd:/usr/sbin/nologin
whoopsie:x:109:109::/run/whoopsie:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
parth@GL62M-7RDX:~/Desktop$ sort -t: -k1 /etc/passwd
_apt:x:105:65534:/:/noneexistent:/usr/sbin/nologin
avahi-autopid:x:109:116:avahi autopd daemon...:/var/lib/avahi-autopd:/usr/sbin/nologin
avahi:x:115:121:Avahi mDNS daemon...:/var/run/avahi-daemon:/usr/sbin/nologin
background:x:120:120::/bin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
colorld:x:121:126:colorld colour management daemon...:/var/lib/colorld:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service...:/home/cups-pk-helper:/usr/sbin/nologin
daemon:x:11:1:daemon:/usr/sbin:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq...:/var/lib/misc:/usr/sbin/nologin
_flatpak:x:126:133:flatpak system-wide instantiation helper...:/noneexistent:/usr/sbin/nologin
games:x:5:60:games:/usr/games:/usr/sbin/nologin
gdm:x:125:130:GNOME Display Manager:/var/lib/gdm3:/bin/false
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
gnats:x:41:41:gnats:Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
gnome-initial-setup:x:124:65534:/:/run/gnome-initial-setup:/bin/false
hplip:x:119:HPLIP printer driver...:/run/hplip:/bin/false
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
kernoops:x:116:65534:Kernel Ooops Tracking Daemon...:/usr/sbin/nologin
listx:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
messager:x:9:9:news:/var/spool/news:/usr/sbin/nologin
messegebus:x:103:106::/noneexistent:/usr/sbin/nologin
newsx:x:9:9:news:/var/spool/news:/usr/sbin/nologin
nm-openvpn:x:118:124:NetworkManager OpenVPN...:/var/lib/openvpn/chroot:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/noneexistent:/usr/sbin/nologin
parth:x:1000:1000:Parth Kalikar...:/home/parth:/bin/bash
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
pulse:x:123:128:Pulseaudio daemon...:/var/run/pulse:/usr/sbin/nologin
redis:x:127:134::/var/lib/redis:/usr/sbin/nologin
root:x:0:root:/root:/bin/bash
_rpc:x:128:65534:/:/run/rpcbind:/usr/sbin/nologin
rtkit:x:117:123:RealtimeKit...:/proc:/usr/sbin/nologin
sane:x:107:107::/var/lib/sane:/usr/sbin/nologin
sync:x:105:65534:sync:/bin/sync
syslog:x:104:111:/:/var/syslog:/usr/sbin/nologin
systemd-coredump:x:999:999:systemd Core Dumper...:/usr/sbin/nologin
systemd-network:x:109:109:systemd Network Management...:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization...:/run/systemd:/usr/sbin/nologin
sysfs:x:3:3:sys:/dev:/usr/sbin/nologin
tcpdump:x:108:115::/noneexistent:/usr/sbin/nologin
fss:x:106:111:TPM software stack...:/var/lib/fms:/bin/false
```

```
parth@GL62M-7RDX:~/Desktop$ uniq -c unique.txt
 1 This line occurs only once.
 2 This line occurs twice.
 2 This line occurs three times.
 1 This line occurs three times.
 1 This line occurs only once.
This line occurs three times.

parth@GL62M-7RDX:~/Desktop$ uniq -u unique.txt
This line occurs only once.

parth@GL62M-7RDX:~/Desktop$ sort /etc/passwd
_apt:x:105:65534:/:/noneexistent:/usr/sbin/nologin
avahi-autopid:x:109:116:avahi autopd daemon...:/var/lib/avahi-autopd:/usr/sbin/nologin
avahi:x:115:121:Avahi mDNS daemon...:/var/run/avahi-daemon:/usr/sbin/nologin
background:x:120:120::/bin:/usr/sbin/nologin
colorld:x:121:126:colorld colour management daemon...:/var/lib/colorld:/usr/sbin/nologin
cups-pk-helper:x:113:120:user for cups-pk-helper service...:/home/cups-pk-helper:/usr/sbin/nologin
daemon:x:11:1:daemon:/usr/sbin:/usr/sbin/nologin
dnsmasq:x:112:65534:dnsmasq...:/var/lib/misc:/usr/sbin/nologin
_flatpak:x:126:133:flatpak system-wide instantiation helper...:/noneexistent:/usr/sbin/nologin
games:x:5:60:games:/usr/games:/usr/sbin/nologin
gdm:x:125:130:GNOME Display Manager:/var/lib/gdm3:/bin/false
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
gnats:x:41:41:gnats:Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
gnome-initial-setup:x:124:65534:/:/run/gnome-initial-setup:/bin/false
hplip:x:119:HPLIP printer driver...:/run/hplip:/bin/false
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
kernoops:x:116:65534:Kernel Ooops Tracking Daemon...:/usr/sbin/nologin
listx:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
messager:x:9:9:news:/var/spool/news:/usr/sbin/nologin
nm-openvpn:x:118:124:NetworkManager OpenVPN...:/var/lib/openvpn/chroot:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/noneexistent:/usr/sbin/nologin
parth:x:1000:1000:Parth Kalikar...:/home/parth:/bin/bash
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
pulse:x:123:128:Pulseaudio daemon...:/var/run/pulse:/usr/sbin/nologin
redis:x:127:134::/var/lib/redis:/usr/sbin/nologin
root:x:0:root:/root:/bin/bash
_rpc:x:128:65534:/:/run/rpcbind:/usr/sbin/nologin
rtkit:x:117:123:RealtimeKit...:/proc:/usr/sbin/nologin
sane:x:107:107::/var/lib/sane:/usr/sbin/nologin
sync:x:105:65534:sync:/bin/sync
syslog:x:104:111:/:/var/syslog:/usr/sbin/nologin
systemd-coredump:x:999:999:systemd Core Dumper...:/usr/sbin/nologin
systemd-network:x:109:109:systemd Network Management...:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization...:/run/systemd:/usr/sbin/nologin
sysfs:x:3:3:sys:/dev:/usr/sbin/nologin
tcpdump:x:108:115::/noneexistent:/usr/sbin/nologin
fss:x:106:111:TPM software stack...:/var/lib/fms:/bin/false
```

4. Part - Debian Package Management DPKG

```
[root@GL62M-7RDX: ~]# dpgk --search /usr/bin/passwd
/usr/share/man/zh_CN/man8/userdel.8.gz
/usr/share/man/zh_CN/man8/usermod.8.gz
/usr/share/man/zh_CN/man8/vlpw.8.gz
/usr/share/man/zh_TW
/usr/share/man/zh_TW/man1
/usr/share/man/zh_TW/man1/chfn.1.gz
/usr/share/man/zh_TW/man1/chsh.1.gz
/usr/share/man/zh_TW/man5
/usr/share/man/zh_TW/man5/passwd.5.gz
/usr/share/man/zh_TW/man8
/usr/share/man/zh_TW/man8/chpasswd.8.gz
/usr/share/man/zh_TW/man8/groupadd.8.gz
/usr/share/man/zh_TW/man8/groupdel.8.gz
/usr/share/man/zh_TW/man8/groupmod.8.gz
/usr/share/man/zh_TW/man8/useradd.8.gz
/usr/share/man/zh_TW/man8/userdel.8.gz
/usr/share/man/zh_TW/man8/usermod.8.gz
/usr/sbin/cpgr
/usr/sbin/vigr
/usr/share/man/de/man8/vigr.8.gz
/usr/share/man/de/man8/grpConv.8.gz
/usr/share/man/de/man8/grpUnconv.8.gz
/usr/share/man/de/man8/pwUnconv.8.gz
/usr/share/man/de/man8/vigr.8.gz
/usr/share/man/fr/man8/grpConv.8.gz
/usr/share/man/fr/man8/grpUnconv.8.gz
/usr/share/man/fr/man8/vigr.8.gz
/usr/share/man/it/man8/grpConv.8.gz
/usr/share/man/it/man8/grpUnconv.8.gz
/usr/share/man/it/man8/pwUnconv.8.gz
/usr/share/man/it/man8/vigr.8.gz
/usr/share/man/ja/man8/grpConv.8.gz
/usr/share/man/ja/man8/grpUnconv.8.gz
/usr/share/man/ja/man8/pwUnconv.8.gz
/usr/share/man/ja/man8/vigr.8.gz
/usr/share/man/ko/man8/vigr.8.gz
/usr/share/man/man8/cpgr.8.gz
/usr/share/man/man8/grpConv.8.gz
/usr/share/man/man8/grpUnconv.8.gz
/usr/share/man/man8/pwUnconv.8.gz
/usr/share/man/man8/vigr.8.gz
/usr/share/man/pl/man8/vigr.8.gz
/usr/share/man/ru/man8/grpConv.8.gz
/usr/share/man/ru/man8/grpUnconv.8.gz
/usr/share/man/ru/man8/pwUnconv.8.gz
/usr/share/man/ru/man8/vigr.8.gz
/usr/share/man/zh-CN/man8/grpConv.8.gz
/usr/share/man/zh-CN/man8/grpUnconv.8.gz
/usr/share/man/zh-CN/man8/pwUnconv.8.gz
/usr/share/man/zh-CN/man8/vigr.8.gz
[root@GL62M-7RDX: ~]# dpgk --search /usr/bin/passwd
passwd: /usr/bin/passwd
```

```
[parth@GL62M-7RDX: ~/Desktop]
/usr/share/man/man8/pwunconv.8.gz
/usr/share/man/man8/vigr.8.gz
parth@GL62M-7RDX:~/Desktop$ dpkg --listfiles passwd
/
/etc
/etc/default
/etc/default/useradd
/etc/pan.d
/etc/pan/chfn
/etc/pan/dchpasswd
/etc/pan/dchsh
/etc/pan/dnewusers
/etc/pan/dpasswd
/sbin
/sbin/shadowconfig
/usr
/usr/bin
/usr/bin/chage
/usr/bin/chfn
/usr/bin/chsh
/usr/bin/expiry
/usr/bin/gpasswd
/usr/bin/passwd
/usr/lib
/usr/lib/tmpfiles.d
/usr/lib/tmpfiles.d/passwd.conf
/usr/sbin
/usr/sbin/chpasswd
/usr/sbin/cpawd
/usr/sbin/groupadd
/usr/sbin/groupdel
/usr/sbin/groupmod
/usr/sbin/grouprem
/usr/sbin/grpcck
/usr/sbin/grpcnvc
/usr/sbin/grpconv
/usr/sbin/groupconv
/usr/sbin/newusers
/usr/sbin/pwd
/usr/sbin/pwconv
/usr/sbin/pwunconv
/usr/sbin/useradd
/usr/sbin/userdel
/usr/sbin/usermod
/usr/share
/usr/share/doc
/usr/share/doc/passwd
/usr/share/doc/passwd/NEWS.Debian.gz
/usr/share/doc/passwd/README.Debian
/usr/share/doc/passwd/TODO.Debian
/usr/share/doc/passwd/VERSION.changelog.Debian.gz
/usr/share/doc/passwd/config
/usr/share/doc/passwd/examples
/usr/share/doc/passwd/examples/passwd_expire.cron
/usr/share/fntlist
```

```
parth@GL62M-7RDX: ~/Desktop
shadow passwords are supported. See /usr/share/doc/pwd/README.Debian
Homepage: https://github.com/shadow/maint/shadow
Original-Maintainer: Shadow package maintainers <pkg-shadow-devel@lists.alioth.debian.org>
parth@GL62M-7RDX: ~/Desktop$ dpkg -l | grep passwd
/,+
/etc
/etc/default
/etc/pam.d
/etc/pam.d/chfn
/etc/pam.d/chpassw
/etc/pam.d/chsh
/etc/pam.d/newusers
/etc/pam.d/passwd
/sbin
/sbin/shadowconfig
/usr
/usr/bin
/usr/bin/chage
/usr/bin/chfn
/usr/bin/chsh
/usr/bin/expiry
/usr/bin/gpasswd
/usr/bin/passwd
/usr/bin/rpasswd
/usr/bin/uuidd
/usr/lib/tmpfiles.d
/usr/lib/tmpfiles.d/passwd.conf
/usr/sbin
/usr/sbin/chpasswd
/usr/sbin/chpassw
/usr/sbin/cppow
/usr/sbin/groupadd
/usr/sbin/groupdel
/usr/sbin/groupm
/usr/sbin/groupmod
/usr/sbin/grpack
/usr/sbin/griconv
/usr/sbin/pwconv
/usr/sbin/pwnewconv
/usr/sbin/newusers
/usr/sbin/pwck
/usr/sbin/pwconv
/usr/sbin/pwunconv
/usr/sbin/useradd
/usr/sbin/userdel
/usr/sbin/usermod
/usr/sbin/vtpw
/usr/share
/usr/share/doc
/usr/share/doc/pwd
/usr/share/doc/pwd/NEWS.Debian.gz
/usr/share/doc/pwd/README.Debian
/usr/share/doc/pwd/TODO.Debian
/usr/share/doc/pwd/changelog.Debian.gz
/usr/share/doc/pwd/copyright
/usr/share/doc/pwd/examples
```

```
parth@GL62M-7RDX: ~/Desktop$ dpkg --list
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/half-inst/trig-aWait/Trig-pend
/|| Err?=(none)/Reinst-required (Status,Err: uppercase-bad)
||/ Name          Version
***=====
ii accountservice          0.6.55-0ubuntu12~20.04.4
ii acl                      2.2.53-6
ii acpi-support              0.14+18.04.32~ubuntu1
ii acpid                     3.118ubuntu2
ii addressbook               3.118ubuntu1
ii adwaita-icon-theme        3.36.1~2ubuntu0.20.04.2
ii alsa-base                 1.0.25+dfsg-0ubuntu5
ii alsa-topology-conf        1.2.2+1
ii alsa-ucm-conf             1.2.2+1ubuntu1.11
ii alsa-ucm-libs              1.2.2+1ubuntu1.1
ii alsa-ucm-microcode        3.20191218.ubuntu1
ii anacron                   2.3~29
ii apt                      2.2.3.4
ii app-install-data-partner   19.04
ii apparmor                  2.13.3~7ubuntu5.1
ii apport                     2.20.11~27.20
ii apport-gtk                 2.20.11~27.20
ii apport-symptoms            0.23
ii apportstream                0.12.10-2
lines 2-24
dpkg -l | grep passwd
ii  base-passwd               3.5.47
ii  base-passwd               114.8.1-1ubuntu5.20.04.1
ii  base-passwd               3.5.47
ii  base-passwd               1:4.8.1-1ubuntu5.20.04.1
parth@GL62M-7RDX: ~/Desktop$ dpkg --list | grep passwd
ii  base-passwd               3.5.47
ii  base-passwd               1:4.8.1-1ubuntu5.20.04.1
parth@GL62M-7RDX: ~/Desktop$ dpkg --status passwd
Package: passwd
Status: Install ok Installed
Priority: required
Section: admin
Installed-Size: 2668
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>
Architecture: amd64
Multi-Arch: foreign
Source: shadow
Version: 114.8.1-1ubuntu5.20.04.1
Replaces: nanpages-tr (<= 1.0.5), nanpages-zh (<< 1.5.1-1)
Depends: liblbaudi1 (>= 1:2.2.1), liblc6 (>= 2.14), libcrypt1 (>= 1:4.1.0), libpam0g (>= 0.99.7.1), libselinux1 (>= 2.1.9), libsemanage1 (>= 2.0.3), libpam-modules (>= 1:2.1.1)
Default-Path: /etc/default/username
/etc/pam.d/chfn 559e87e86add1cb4b7f760a6f691d5150
/etc/pam.d/chpassw 4d466e0ba348ba26139664d795e8afa
/etc/pam.d/chsh 9900720554cb4ee98b7da29e2d183cb2
/etc/pam.d/chsh 6e69b589e0009334ff0d30dd91290a6
/etc/pam.d/newusers 1454e29fbfa9f2a1083d53e76939ceca5
/etc/pam.d/passwd 1454e29fbfa9f2a1083d53e76939ceca5
Description: Change and administer password and group data
This package includes passwd, chsh, chfn, and many other programs to
maintain password and group data.
```

5. Part - Using APT

```

parth@GL62M-7RDX: ~/Desktop
$ standard security updates
Need to get 13.0 MB of archives.
After this operation, 574 kB disk space will be freed.
Do you want to continue? [y/n] y
Get:1 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-problem-report all 2.20.11~Ubuntu27.21 [9,896 B]
Get:2 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-apport all 2.20.11~Ubuntu27.21 [55.9 kB]
Get:3 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 apport all 2.20.11~Ubuntu27.21 [129 kB]
Get:4 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 apport-gtk all 2.20.11~Ubuntu27.21 [9,732 B]
Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:20.10.3-0~ubuntu-focal [7,922 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 libmysqclient21 amd64 8.0.27~Ubuntu0.20.04.1 [1,291 kB]
Get:7 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-scan-plugin amd64 8.0.9~ubuntu-focal [3,518 kB]
Fetched 210 kB in 0s (13.0 kB/s)
(Reading database ... 210857 files and directories currently installed.)
Preparing to unpack .../python3-problem-report_2.20.11~Ubuntu27.21_all.deb ...
Unpacking python3-problem-report (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../python3-apport_2.20.11~Ubuntu27.21_all.deb ...
Unpacking python3-apport (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../apport-gtk_2.20.11~Ubuntu27.21_all.deb ...
Unpacking apport-gtk (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../docker-ce-rootless-extras_5:20.10.3-0~ubuntu-focal_amd64.deb ...
Unpacking docker-ce-rootless-extras (5:20.10.3-0~ubuntu-focal) over (5:20.10.3-0~ubuntu-focal) ...
Preparing to unpack .../python3-distro-info_0.9.4~ubuntu-focal_all.deb ...
Unpacking python3-distro-info (0.9.4~ubuntu-focal) over (0.8.0~ubuntu-focal) ...
Preparing to unpack .../_libmysqclient21_8.0.27~Ubuntu0.20.04.1_all.deb ...
Unpacking libmysqclient21:amd64 (8.0.27~Ubuntu0.20.04.1) over (8.0.26~Ubuntu0.20.04.3) ...
Setting up libmysqclient21:amd64 (8.0.27~Ubuntu0.20.04.1) ...
Setting up python3-problem-report (2.20.11~Ubuntu27.21) ...
Setting up python3-apport (2.20.11~Ubuntu27.21) ...
Setting up docker-ce-rootless-extras (5:20.10.3-0~ubuntu-focal) ...
Setting up apport (2.20.11~Ubuntu27.21) ...
apport-autoreport.service is a disabled or a static unit, not starting it.
Setting up apport-gtk (2.20.11~Ubuntu27.21) ...
Processing triggers for libc-bin (2.31~Ubuntu9.2) ...
Processing triggers for libgcrypt20 (2.31~Ubuntu9.2) ...
Processing triggers for gnome-menus (3.36.0~ubuntu1) ...
Processing triggers for libcroco3 (0.6.16~Ubuntu9.2) ...
Processing triggers for liblouis-data (0.24~ubuntu3) ...
Processing triggers for desktop-file-utils (0.24~ubuntu3) ...
Processing triggers for mime-support (3.66~ubuntu3) ...
Processing triggers for menu-db (2.9.1-1) ...
Processing triggers for desktop-file-utils (0.24~ubuntu3) ...
Processing triggers for mime-support (3.66~ubuntu3) ...
parth@GL62M-7RDX: ~/Desktop$ sudo apt-get dist-upgrade
E: Could not open lock file /var/lib/dpkg/lock-frontend - open (13: Permission denied)
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), are you root?
parth@GL62M-7RDX: ~/Desktop$ sudo apt-get dist-upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  docker-ce-rootless-extras docker-scan-plugin slirp4netns
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
parth@GL62M-7RDX: ~/Desktop$ 

```

```

parth@GL62M-7RDX: ~/Desktop$ sudo apt-get upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages were automatically installed and are no longer required:
  docker-ce-rootless-extras docker-scan-plugin slirp4netns
Use 'sudo apt autoremove' to remove them.
The following packages will be upgraded:
  apport apport-gtk docker-ce-rootless-extras docker-scan-plugin
  libmysqclient21 python3-apport python3-problem-report
7 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
[!] Standard security updates
Need to get 13.0 MB of archives.
After this operation, 574 kB disk space will be freed.
Do you want to continue? [y/n] y
Get:1 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-problem-report all 2.20.11~Ubuntu27.21 [9,896 B]
Get:2 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-apport all 2.20.11~Ubuntu27.21 [55.9 kB]
Get:3 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 apport all 2.20.11~Ubuntu27.21 [129 kB]
Get:4 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 apport-gtk all 2.20.11~Ubuntu27.21 [9,732 B]
Get:5 https://download.docker.com/linux/ubuntu focal/stable amd64 docker-ce-rootless-extras amd64 5:20.10.3-0~ubuntu-focal [7,922 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/main amd64 libmysqclient21 amd64 8.0.27~Ubuntu0.20.04.1 [1,291 kB]
Fetched 210 kB in 0s (13.0 kB/s)
(Reading database ... 210857 files and directories currently installed.)
Preparing to unpack .../python3-problem-report_2.20.11~Ubuntu27.21_all.deb ...
Unpacking python3-problem-report (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../python3-apport_2.20.11~Ubuntu27.21_all.deb ...
Unpacking python3-apport (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../apport-gtk_2.20.11~Ubuntu27.21_all.deb ...
Unpacking apport-gtk (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../3-apport-gtk_2.20.11~Ubuntu27.21_all.deb ...
Unpacking apport-gtk (2.20.11~Ubuntu27.21) over (2.20.11~Ubuntu27.20) ...
Preparing to unpack .../_libmysqclient21_8.0.27~Ubuntu0.20.04.1_all.deb ...
Unpacking libmysqclient21:amd64 (8.0.27~Ubuntu0.20.04.1) over (8.0.26~Ubuntu0.20.04.3) ...
Setting up libmysqclient21:amd64 (8.0.27~Ubuntu0.20.04.1) ...
Setting up python3-problem-report (2.20.11~Ubuntu27.21) ...
Setting up apport (2.20.11~Ubuntu27.21) ...
Setting up apport-gtk (2.20.11~Ubuntu27.21) ...
Processing triggers for libc-bin (2.31~Ubuntu9.2) ...
Processing triggers for libgcrypt20 (2.31~Ubuntu9.2) ...
Processing triggers for gnome-menus (3.36.0~ubuntu1) ...
Processing triggers for libcroco3 (0.6.16~Ubuntu9.2) ...
Processing triggers for liblouis-data (0.24~ubuntu3) ...
Processing triggers for desktop-file-utils (0.24~ubuntu3) ...
Processing triggers for mime-support (3.66~ubuntu3) ...
Processing triggers for desktop-file-utils (0.24~ubuntu3) ...
Processing triggers for mime-support (3.66~ubuntu3) ...
parth@GL62M-7RDX: ~/Desktop$ sudo apt-get dist-upgrade
E: Could not open lock file /var/lib/dpkg/lock-frontend - open (13: Permission denied)

```

```

part#GL62M-7RD:~/Desktop$ sudo apt-get update
[sudo] password for part:
Get:1 http://ru.archive.ubuntu.com/ubuntu focal InRelease [114 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:3 http://ru.archive.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:4 http://security.ubuntu.com/ubuntu focal-security InRelease [10.4 kB]
Get:5 http://packages.microsoft.com/repos/code stable InRelease [57.7 kB]
Get:6 https://download.docker.com/linux/ubuntu focal InRelease [52.6 kB]
Get:7 https://download.docker.com/linux/ubuntu focal-security InRelease [1.284 kB]
Get:8 http://packages.microsoft.com/repos/code/stable/main arm64 Packages [52.6 kB]
Get:9 http://ru.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [558 kB]
Get:10 http://ru.archive.ubuntu.com/ubuntu focal-stable/main amd64 Packages [12.3 kB]
Get:11 https://download.docker.com/linux/ubuntu focal/stable/amd64 Packages [51.7 kB]
Get:12 http://packages.microsoft.com/repos/code/stable/main armhf Packages [52.6 kB]
Get:13 http://packages.microsoft.com/repos/code/stable/main armhf Packages [52.6 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [283 kB]
Get:15 http://security.ubuntu.com/ubuntu focal-security/main l386 Packages [297 kB]
Get:16 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [14.4 kB]
Get:17 http://ru.archive.ubuntu.com/ubuntu focal-updates/universe l386 Packages [642 kB]
Get:18 http://ru.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [866 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [945 kB]
Get:20 http://security.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [362 kB]
Get:21 http://ru.archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [19.3 kB]
Get:22 http://ru.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [940 B]
Get:23 http://ru.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10.4 kB]
Get:24 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [29.0 kB]
Get:25 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [18.844 kB]
Get:26 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [601 kB]
Get:27 http://security.ubuntu.com/ubuntu focal-security/universe l386 Packages [512 kB]
Get:28 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [63.6 kB]
Get:29 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [12.7 kB]
Get:30 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2,464 kB]
Fetched 7,128 kB in 3s (2,297 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-ce-rootless-extras docker-scan-plugin slrp4netsnmp
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 0 newly installed, 0 to remove and 7 not upgraded.
Need to get 0 B/6,016 kB of additional disk space will be used.
After this operation, 6,016 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ru.archive.ubuntu.com/ubuntu focal/main amd64 ncurses-term all 6.2-0ubuntu2 [249 kB]
Get:2 http://ru.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-server amd64 1:8.2p1-4ubuntu0.3 [51.5 kB]

```

Exercise 2 -

1. Part - Processes id and jobs

```
parth@GL62M-7RDX: ~/Desktop$ top
top - 19:31:28 up 1 day, 3:14:7, 1 user, load average: 1.12, 1.91, 1.43
Tasks: 333 total, 2 running, 330 sleeping, 1 stopped, 0 zombie
%Cpu(s): 1.0 us, 0.5 sy, 0.0 ni, 98.5 id, 0.0 wa, 0.0 hi, 0.0 st
Mem: 7873.9 total, 196.7 free, 2372.4 used, 5394.8 buff/cache
Swap: 2048.0 total, 1059.1 free, 988.9 used. 4675.2 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR   %CPU   %MEM     TIME+ COMMAND
 2515 parth    9 -11 2803244 15312 12820 5.0  0.2 0:26.38 pulseaudio
126526 parth    20  0 28.5g 317128 116988 5  5.0  3.9 6:05.51 chrome
4672 parth    20  0 16.8g 31876 30792 5  1.7  0.4 1:47.98 chrome
2617 parth    20  0 1242084 31816 31816 5  0.7  0.8 28:51.26 Xorg
131125 parth    20  0 98.0g 232176 232176 5  0.7  0.7 0:00:59.99 gnome-terminal-
2773 parth    20  0 5200608 290356 56100 R  0.3  1.6 36:29.80 gnome-shell
6080 parth    20  0 24.4g 134416 83152 5  0.3  1.7 1:25.20 chrome
135433 parth    20  0 20780 4084 3256 R  0.3  0.1 0:00.11 top
 1 root    20  0 169492 12120 7180 S  0.0  0.2 0:33.50 systemd
 2 root    20  0 0 0 0 S  0.0  0.0 0:00.00 kthreadd
 3 root    20  0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/0
 4 root    20  0 0 0 0 I  0.0  0.0 0:00.00 rcu_par_gp
 6 root    20  0 0 0 0 I  0.0  0.0 0:00.00 kworker/0:0H-events_highpri
 9 root    20  0 0 0 0 I  0.0  0.0 0:00.00 mn_percpu_wq
10 root    20  0 0 0 0 S  0.0  0.0 0:00.00 rcu_tasks_rude_
11 root    20  0 0 0 0 S  0.0  0.0 0:00.00 rdtasks_trace
12 root    20  0 0 0 0 S  0.0  0.0 0:00.00 ksoftirqd/0
13 root    20  0 0 0 0 I  0.0  0.0 1:39.25 rCU_sched
14 root    rt  0 0 0 0 S  0.0  0.0 0:00.48 migration/0
15 root    -51 0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/0
16 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/0
17 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/1
18 root    20  0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/1
19 root    rt  0 0 0 0 I  0.0  0.0 0:00.57 migration/1
20 root    20  0 0 0 0 S  0.0  0.0 0:00.74 ksoftirqd/1
22 root    0 -20 0 0 0 I  0.0  0.0 0:00.00 kworker/1:0H-events_highpri
23 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/2
24 root    51 0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/2
25 root    rt  0 0 0 0 S  0.0  0.0 0:00.56 migration/2
26 root    20  0 0 0 0 S  0.0  0.0 0:00.83 ksoftirqd/2
28 root    0 -20 0 0 0 I  0.0  0.0 0:00.00 kworker/2:0H-kblockd
29 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/3
30 root    -51 0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/3
31 root    rt  0 0 0 0 S  0.0  0.0 0:00.58 migration/3
32 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/4
34 root    0 -20 0 0 0 I  0.0  0.0 0:00.00 kworker/3:0H-events_highpri
35 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/4
36 root    -51 0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/4
37 root    rt  0 0 0 0 S  0.0  0.0 0:00.58 migration/4
38 root    20  0 0 0 0 S  0.0  0.0 0:00.42 ksoftirqd/4
40 root    0 -20 0 0 0 S  0.0  0.0 0:00.00 kworker/4:0H-events_highpri
41 root    20  0 0 0 0 S  0.0  0.0 0:00.00 cpuhp/5
42 root    -51 0 0 0 0 S  0.0  0.0 0:00.00 idle_inject/5
43 root    rt  0 0 0 0 S  0.0  0.0 0:00.57 migration/5
44 root    20  0 0 0 0 I  0.0  0.0 0:00.92 ksoftirqd/5
46 root    0 -20 0 0 0 S  0.0  0.0 0:00.00 kworker/5:0H-events_highpri
17 tasks
```



```
parth@GL62M-7RDX: ~/Desktop$ ps -ef | grep bash
parth 131133 131125 0 19:19 pts/0 00:00:00 bash
parth 135428 131133 0 19:30 pts/0 00:00:00 grep --color=auto bash
parth@GL62M-7RDX: ~/Desktop$ pstree -p
systemd(1) └─ModemManager(109) └─{ModemManager}(1146)
                  └─NetworkManager(964) └─{NetworkManager}(972)
                      └─{NetworkManager}(984)
                  └─accounts-daemon(957) └─{accounts-daemon}(969)
                      └─{accounts-daemon}(1080)
                  └─acpid(958)
                  └─avahi-daemon(960) └─avahi-daemon(1084)
                  └─blkmpd(372)
                  └─bluetoothd(961)
                  └─colorfd(1088) └─{colorfd}(1129)
                      └─{colorfd}(1131)
                  └─contalnerd(27199) └─{contalnerd}(27200)
                      └─{contalnerd}(27201)
                      └─{contalnerd}(27202)
                      └─{contalnerd}(27203)
                      └─{contalnerd}(27204)
                      └─{contalnerd}(27205)
                      └─{contalnerd}(27206)
                      └─{contalnerd}(27207)
                      └─{contalnerd}(27208)
                      └─{contalnerd}(27209)
                      └─{contalnerd}(27210)
                      └─{contalnerd}(27211)
                      └─{contalnerd}(27212)
                      └─{contalnerd}(27214)
                      └─{contalnerd}(27215)
                      └─{contalnerd}(27216)
                      └─{contalnerd}(28945)
                      └─{contalnerd}(29136)
                      └─{contalnerd}(32621)
                      └─{contalnerd}(46083)
                      └─{contalnerd}(46656)
                      └─{contalnerd}(46657)
                      └─{contalnerd}(65588)
                  └─cron(1006)
                  └─cups-browsed(77660) └─{cups-browsed}(77705)
                  └─cupsd(77688)
                  └─dbus-daemon(963)
                  └─dockerd(28992) └─{dockerd}(28993)
                      └─{dockerd}(28994)
                      └─{dockerd}(28995)
                      └─{dockerd}(28996)
                      └─{dockerd}(28997)
                      └─{dockerd}(28998)
                      └─{dockerd}(28999)
                      └─{dockerd}(29000)
                      └─{dockerd}(29001)
                      └─{dockerd}(29002)
                      └─{dockerd}(29003)
                      └─{dockerd}(29004)
```

```

parth@GL62M-7RDX:~/Desktop$ kill 135256
parth@GL62M-7RDX:~/Desktop$ kill -9 135256
bash: kill: (135256) - No such process
[2]- Terminated                  yes > /dev/null
parth@GL62M-7RDX:~/Desktop$ ps -ef
UID      PID  PPID  C STIME TTY          TIME CMD
root      1  0 0 Oct24 ?    00:00:33 /sbin/init splash
root      2  0 0 Oct24 ?    00:00:00 [kthreadd]
root      3  2 0 Oct24 ?    00:00:00 [rcu_gp]
root      4  2 0 Oct24 ?    00:00:00 [rcu_par_gp]
root      6  2 0 Oct24 ?    00:00:00 [rcu_tasks_kick_wq]
root      9  2 0 Oct24 ?    00:00:00 [rcu_tasks_rude]
root     10  2 0 Oct24 ?    00:00:00 [rcu_tasks_trace]
root     11  2 0 Oct24 ?    00:00:00 [rcu_tasks_starvation]
root     12  2 0 Oct24 ?    00:00:01 [ksoftirqd/0]
root     13  2 0 Oct24 ?    00:01:39 [rcu_sched]
root     14  2 0 Oct24 ?    00:00:00 [idle_inject/0]
root     15  2 0 Oct24 ?    00:00:00 [idle_inject/0]
root     16  2 0 Oct24 ?    00:00:00 [cpuhp/0]
root     17  2 0 Oct24 ?    00:00:00 [cpuhp/1]
root     18  2 0 Oct24 ?    00:00:00 [idle_inject/1]
root     19  2 0 Oct24 ?    00:00:00 [migration/1]
root     20  2 0 Oct24 ?    00:00:00 [idle_inject/2]
root     22  2 0 Oct24 ?    00:00:00 [kworker/1:0H-events_highpri]
root     23  2 0 Oct24 ?    00:00:00 [cpuhp/2]
root     24  2 0 Oct24 ?    00:00:00 [idle_inject/2]
root     25  2 0 Oct24 ?    00:00:00 [migration/2]
root     26  2 0 Oct24 ?    00:00:00 [ksoftirqd/2]
root     28  2 0 Oct24 ?    00:00:00 [idle_inject/20H-kblockd]
root     29  2 0 Oct24 ?    00:00:00 [cpuhp/3]
root     30  2 0 Oct24 ?    00:00:00 [idle_inject/3]
root     31  2 0 Oct24 ?    00:00:00 [migration/3]
root     32  2 0 Oct24 ?    00:00:00 [ksoftirqd/3]
root     34  2 0 Oct24 ?    00:00:00 [kworker/3:0H-events_highpri]
root     35  2 0 Oct24 ?    00:00:00 [idle_inject/4]
root     36  2 0 Oct24 ?    00:00:00 [migration/4]
root     37  2 0 Oct24 ?    00:00:00 [ksoftirqd/4]
root     38  2 0 Oct24 ?    00:00:00 [kworker/4:0H-events_highpri]
root     40  2 0 Oct24 ?    00:00:00 [cpuhp/5]
root     42  2 0 Oct24 ?    00:00:00 [idle_inject/5]
root     43  2 0 Oct24 ?    00:00:00 [migration/5]
root     44  2 0 Oct24 ?    00:00:00 [ksoftirqd/5]
root     46  2 0 Oct24 ?    00:00:00 [kworker/5:0H-events_highpri]
root     47  2 0 Oct24 ?    00:00:00 [cpuhp/6]
root     48  2 0 Oct24 ?    00:00:00 [idle_inject/6]
root     49  2 0 Oct24 ?    00:00:00 [migration/6]
root     50  2 0 Oct24 ?    00:00:00 [ksoftirqd/6]
root     52  2 0 Oct24 ?    00:00:00 [kworker/6:0H-events_highpri]
root     53  2 0 Oct24 ?    00:00:00 [cpuhp/7]
root     54  2 0 Oct24 ?    00:00:00 [idle_inject/7]
root     55  2 0 Oct24 ?    00:00:00 [migration/7]
root     56  2 0 Oct24 ?    00:00:00 [idle_inject/8]
root     58  2 0 Oct24 ?    00:00:00 [kworker/7:0H-events_highpri]
root     59  2 0 Oct24 ?    00:00:00 [kdevtmpfs]
root     60  2 0 Oct24 ?    00:00:00 [kdevtmpfs]

parth@GL62M-7RDX:~/Desktop$
```

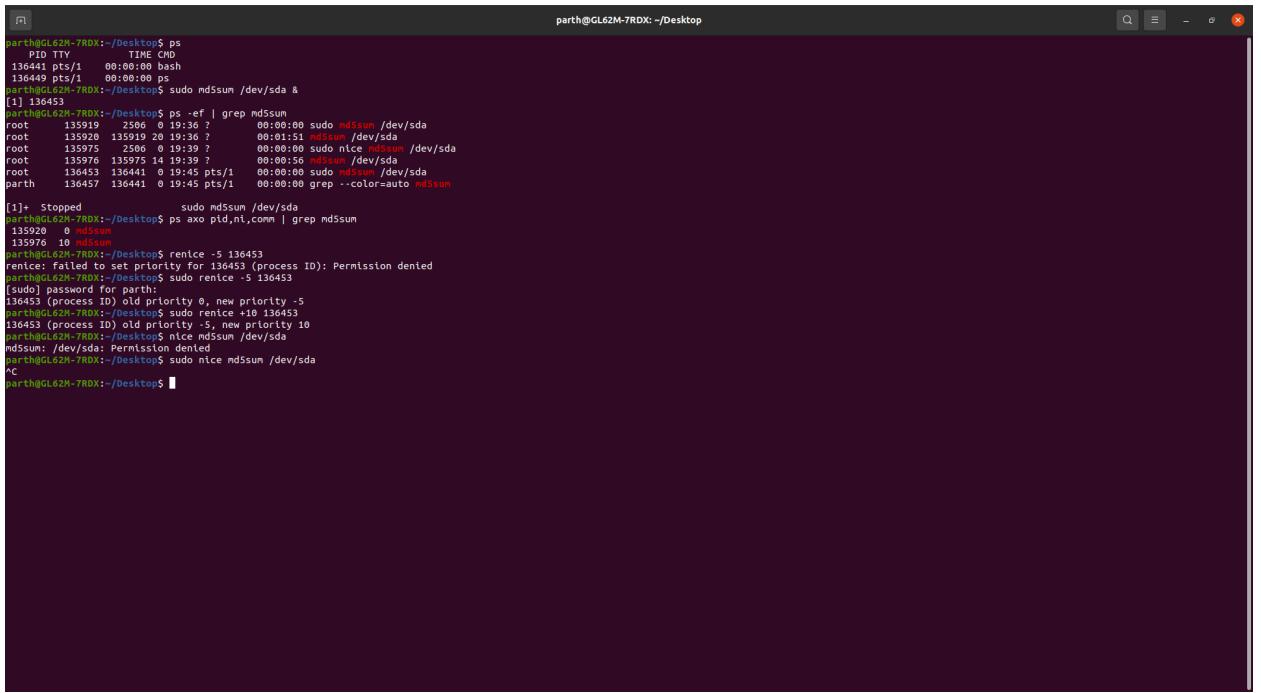
```

parth@GL62M-7RDX:~/Desktop$ top &
[1] 135237
parth@GL62M-7RDX:~/Desktop$ yes > /dev/null &
[2] 135256

[1]+ Stopped                  top
parth@GL62M-7RDX:~/Desktop$ mdssum /dev/sda
mdssum: /dev/sda: Permission denied
parth@GL62M-7RDX:~/Desktop$ sudo mdssum /dev/sda
[2]+ Stopped                  sudo mdssum /dev/sda
[3]+ Stopped                  sudo mdssum /dev/sda &
parth@GL62M-7RDX:~/Desktop$ bg 3
[3]+ sudo mdssum /dev/sda &
parth@GL62M-7RDX:~/Desktop$ jobs
[1]+ Stopped                  top
[2]+ Running                  yes > /dev/null &
[3]+ Stopped                  sudo mdssum /dev/sda &
parth@GL62M-7RDX:~/Desktop$ fg 3
sudo mdssum /dev/sda
^C
parth@GL62M-7RDX:~/Desktop$ ps
UID      PID  PPID  C STIME TTY          TIME CMD
131133 pts/0    00:00:00 bash
132559 pts/0    00:00:00 top
135256 pts/0    00:04:24 yes
135369 pts/0    00:00:00 ps
parth@GL62M-7RDX:~/Desktop$ kill -l
1) SIGABRT   2) SIGI(SIGQUIT 3) SIGQUIT 4) SIGILL 5) SIGTRAP
6) SIGABRT 7) SIGBUS 8) SIGFPE 9) SIGKILL 10) SIGUSR1
11) SIGPOLL 12) SIGPOLLCE 13) SIGPOLLIN 14) SIGPOLLNORM
16) SIGSTKFLT 17) SIGCHLD 18) SIGCONT 19) SIGSTOP 20) SIGSTP
21) SIGTIN 22) SIGTOU 23) SIGURG 24) SIGXCPU 25) SIGXFSZ
26) SIGTALRM 27) SIGPROF 28) SIGWINCH 29) SIGIO 30) SIGPWR
31) SIGSYS 34) SIGRTMIN 35) SIGRTMIN+1 36) SIGRTMIN+2 37) SIGRTMIN+3
38) SIGRTMIN+4 39) SIGRTMIN+5 40) SIGRTMIN+6 41) SIGRTMIN+7 42) SIGRTMIN+8
43) SIGRTMIN+9 44) SIGRTMIN+10 45) SIGRTMIN+11 46) SIGRTMIN+12 47) SIGRTMIN+13
48) SIGRTMIN+14 49) SIGRTMIN+15 50) SIGRTMAX+14 51) SIGRTMAX+15 52) SIGRTMAX+12
53) SIGRTMAX+11 54) SIGRTMAX+10 55) SIGRTMAX+9 56) SIGRTMAX+8 57) SIGRTMAX+7
58) SIGRTMAX+6 59) SIGRTMAX+5 60) SIGRTMAX+4 61) SIGRTMAX+3 62) SIGRTMAX+2
63) SIGRTMAX+1 64) SIGRTMAX

parth@GL62M-7RDX:~/Desktop$ kill 27522
bash: kill: (27522) - No such process
parth@GL62M-7RDX:~/Desktop$ kill -9 27522
bash: kill: (27522) - No such process
parth@GL62M-7RDX:~/Desktop$ kill 135256
parth@GL62M-7RDX:~/Desktop$ kill -9 135256
bash: kill: (135256) - No such process
[2]- Terminated                  yes > /dev/null
parth@GL62M-7RDX:~/Desktop$ ps -ef
UID      PID  PPID  C STIME TTY          TIME CMD
root      1  0 0 Oct24 ?    00:00:33 /sbin/init splash
root      2  0 0 Oct24 ?    00:00:00 [kthreadd]
```

2. Part - Nice and Renice



```
parth@GL62M-7RDX:~/Desktop$ ps
  PID TTY      TIME CMD
136441 pts/1    00:00:00 bash
136449 pts/1    00:00:00 ps
parth@GL62M-7RDX:~/Desktop$ sudo md5sum /dev/sda &
[1]+ 136453 Stopped                  sudo md5sum /dev/sda
parth@GL62M-7RDX:~/Desktop$ ps -ef | grep md5sum
root  135919  2586  0 19:36 ?        00:00:00 sudo md5sum /dev/sda
root  135920 135919 20 19:36 ?        00:01:51 md5sum /dev/sda
root  135975  2506  0 19:39 ?        00:00:00 sudo nice md5sum /dev/sda
root  135976 135975 14 19:39 ?        00:00:56 md5sum /dev/sda
root  136453 136441  0 19:45 pts/1    00:00:00 sudo md5sum /dev/sda
root  136457 136441  0 19:45 pts/1    00:00:00 grep --color=auto md5sum
[1]+  Stopped                  sudo md5sum /dev/sda
parth@GL62M-7RDX:~/Desktop$ ps axo pid,nt,comm | grep md5sum
135920  0 md5sum
135976  0 md5sum
parth@GL62M-7RDX:~/Desktop$ renice -5 136453
renice: failed to set priority for 136453 (process ID): Permission denied
parth@GL62M-7RDX:~/Desktop$ sudo renice -5 136453
[sudo] password for parth:
136453 (process ID) old priority 0, new priority -5
parth@GL62M-7RDX:~/Desktop$ sudo renice 10 136453
136453 (process ID) old priority 0, new priority 10
parth@GL62M-7RDX:~/Desktop$ nice md5sum /dev/sda
md5sum: /dev/sda: Permission denied
parth@GL62M-7RDX:~/Desktop$ sudo nice md5sum /dev/sda
^C
parth@GL62M-7RDX:~/Desktop$
```