SHEET -10 – PROCESS MANAGEMENT

1. Use the ps cmd to list down all the processes ,pipe it to more or less for paging
   a. ps -e

```
[siddharrth@siddharrth ~]$ ps -e
    PID TTY          TIME CMD
      1 ?        00:00:01 systemd
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00 pool_workqueue_
  37472 ?        00:00:00 ibus-portal
  37491 ?        00:00:00 kworker/u517:2
  37506 ?        00:00:00 xdg-desktop-por
  37527 ?        00:00:00 ibus-engine-sim
  37566 ?        00:00:00 gvfsd-metadata
  37574 ?        00:00:00 fwupd
  37592 ?        00:00:00 kworker/u513:4-events_unbound
  37638 ?        00:00:02 gnome-terminal-
  37656 pts/0    00:00:00 bash
  37770 ?        00:00:00 kworker/u514:1+events_unbound
  37772 ?        00:00:00 kworker/2:1-rcu_par_gp
  37861 ?        00:00:00 kworker/u513:1-events_unbound
  37862 ?        00:00:00 kworker/3:1-events_freezable_pwr_ef
  37868 ?        00:00:00 kworker/1:0-cgwb_release
  37881 ?        00:00:00 kworker/2:0-rcu_gp
  37882 ?        00:00:00 kworker/1:1-events_power_efficient
  37895 ?        00:00:00 kworker/u516:2
  37903 pts/1    00:00:00 bash
  37933 pts/1    00:00:00 man
  37947 pts/1    00:00:00 less
  37952 ?        00:00:00 kworker/3:2-ata_sff
  37954 ?        00:00:00 kworker/2:3-mm_percpu_wq
  37955 pts/0    00:00:00 ps
[siddharrth@siddharrth ~]$
```

   b. ps -ef

```
[siddharrth@siddharrth ~]$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1       0  0 15:05 ?        00:00:01 /usr/lib/systemd/syste
root           2       0  0 15:05 ?        00:00:00 [kthreadd]
siddhar+   37466   37448  0 15:06 ?        00:00:00 /usr/libexec/ibus-dcon
siddhar+   37467   37448  0 15:06 ?        00:00:01 /usr/libexec/ibus-exte
siddhar+   37469   36855  0 15:06 ?        00:00:00 /usr/libexec/ibus-x11
siddhar+   37472   36855  0 15:06 ?        00:00:00 /usr/libexec/ibus-port
root       37491       2  0 15:06 ?        00:00:00 [kworker/u517:2]
siddhar+   37506   36855  0 15:06 ?        00:00:00 /usr/libexec/xdg-deskt
siddhar+   37527   37448  0 15:06 ?        00:00:00 /usr/libexec/ibus-engi
siddhar+   37566   36855  0 15:06 ?        00:00:00 /usr/libexec/gvfsd-met
root       37574       1  0 15:06 ?        00:00:00 /usr/libexec/fwupd/fwu
root       37592       2  0 15:07 ?        00:00:00 [kworker/u513:4-events
siddhar+   37638   36855  0 15:07 ?        00:00:01 /usr/libexec/gnome-ter
siddhar+   37656   37638  0 15:07 pts/0    00:00:00 bash
root       37769       2  0 15:10 ?        00:00:00 [kworker/3:2-ata_sff]
root       37770       2  0 15:12 ?        00:00:00 [kworker/u514:1-events
root       37772       2  0 15:12 ?        00:00:00 [kworker/2:1-rcu_par_g
root       37861       2  0 15:17 ?        00:00:00 [kworker/u513:1+events
root       37862       2  0 15:17 ?        00:00:00 [kworker/3:1-mm_percpu
root       37868       2  0 15:20 ?        00:00:00 [kworker/1:0-cgwb_rele
root       37881       2  0 15:20 ?        00:00:00 [kworker/2:0-mm_percpu
root       37882       2  0 15:20 ?        00:00:00 [kworker/1:1-events_po
siddhar+   37887   37656  0 15:22 pts/0    00:00:00 ps -ef
[siddharrth@siddharrth ~]$
```

c. ps -f

```
[siddharrth@siddharrth ~]$ ps -f
UID          PID    PPID  C STIME TTY          TIME CMD
siddhar+   37656   37638  0 15:07 pts/0    00:00:00 bash
siddhar+   37960   37656  0 15:25 pts/0    00:00:00 ps -f
[siddharrth@siddharrth ~]$
```

d. ps -aux

```
[siddharrth@siddharrth ~]$ ps -aux
siddhar+   37506  0.0  1.6 591552 28928 ?        Ssl  15:06   0:00 /usr/libexec/xdg-desktop-
siddhar+   37527  0.0  0.3 375240  6656 ?        Sl   15:06   0:00 /usr/libexec/ibus-engine-
siddhar+   37566  0.0  0.4 374828  7800 ?        Ssl  15:06   0:00 /usr/libexec/gvfsd-metada
root       37574  0.0  1.6 566468 29296 ?        Ssl  15:06   0:00 /usr/libexec/fwupd/fwupd
root       37592  0.0  0.0      0     0 ?        I    15:07   0:00 [kworker/u513:4-events_un
siddhar+   37638  0.2  3.0 767064 54796 ?        Rsl  15:07   0:02 /usr/libexec/gnome-termin
siddhar+   37656  0.0  0.3 224244  5376 pts/0    Ss   15:07   0:00 bash
root       37770  0.0  0.0      0     0 ?        I    15:12   0:00 [kworker/u514:1-events_un
root       37772  0.0  0.0      0     0 ?        I    15:12   0:00 [kworker/2:1-rcu_par_gp]
root       37861  0.0  0.0      0     0 ?        I    15:17   0:00 [kworker/u513:1-events_un
root       37862  0.0  0.0      0     0 ?        I    15:17   0:00 [kworker/3:1-events]
root       37868  0.0  0.0      0     0 ?        I    15:20   0:00 [kworker/1:0-cgwb_release
root       37881  0.0  0.0      0     0 ?        I    15:20   0:00 [kworker/2:0-rcu_gp]
root       37882  0.0  0.0      0     0 ?        I    15:20   0:00 [kworker/1:1-events_freez
root       37895  0.0  0.0      0     0 ?        I<   15:22   0:00 [kworker/u516:2]
siddhar+   37903  0.0  0.2 224112  5248 pts/1    Ss   15:22   0:00 bash
siddhar+   37933  0.0  0.1 222216  3328 pts/1    S+   15:22   0:00 man ps
siddhar+   37947  0.0  0.1 221328  2560 pts/1    S+   15:22   0:00 less
root       37952  0.0  0.0      0     0 ?        I    15:22   0:00 [kworker/3:2-ata_sff]
root       37954  0.0  0.0      0     0 ?        I    15:23   0:00 [kworker/2:3-mm_percpu_wq
siddhar+   37966  0.0  0.3 234776  6528 pts/0    R+   15:25   0:00 ps -aux
[siddharrth@siddharrth ~]$
```

e. ps -u username

i. ps -u root

```
[siddharrth@siddharrth ~]$ ps -u root
    PID TTY          TIME CMD
      1 ?        00:00:01 systemd
      2 ?        00:00:00 kthreadd
      3 ?        00:00:00 pool_workqueue_
      4 ?        00:00:00 kworker/R-rcu_g
      5 ?        00:00:00 kworker/R-rcu_p
      6 ?        00:00:00 kworker/R-slub_
      7 ?        00:00:00 kworker/R-netns
      9 ?        00:00:00 kworker/0:0H-events_highpri
     10 ?        00:00:00 kworker/u512:0-events_unbound
     11 ?        00:00:00 kworker/R-mm_pe
     12 ?        00:00:00 kworker/u512:1-netns
     13 ?        00:00:00 rcu_tasks_kthre
     14 ?        00:00:00 rcu_tasks_rude_
     15 ?        00:00:00 rcu_tasks_trace
```

ii. ps -u yourname

```
[siddharrth@siddharrth ~]$ ps -u siddharrth
    PID TTY          TIME CMD
  36855 ?        00:00:00 systemd
  36857 ?        00:00:00 (sd-pam)
  36873 ?        00:00:00 gnome-keyring-d
  36878 tty2     00:00:00 gdm-wayland-ses
  36880 ?        00:00:00 dbus-broker-lau
  36883 ?        00:00:00 dbus-broker
  36887 tty2     00:00:00 gnome-session-b
  36920 ?        00:00:00 gnome-session-c
  36922 ?        00:00:00 gnome-session-b
  36938 ?        00:00:22 gnome-shell
  36955 ?        00:00:00 gvfsd
  36960 ?        00:00:00 gvfsd-fuse
  36969 ?        00:00:00 at-spi-bus-laun
  36974 ?        00:00:00 dbus-broker-lau
  36975 ?        00:00:00 dbus-broker
  36992 ?        00:00:00 xdg-permission-
```

2. find the pid of bash
    a. pidof bash

```
[siddharrth@siddharrth ~]$ pidof bash
37903 37656
```

    b. run ps -f (pidofbash)

```
[siddharrth@siddharrth ~]$ ps -f 37656
UID          PID    PPID  C STIME TTY      STAT   TIME CMD
siddhar+   37656   37638  0 15:07 pts/0    Ss     0:00 bash
```

    c. pgrep bash / pgrep -l bash

```
[siddharrth@siddharrth ~]$ pgrep bash
37656
37903
[siddharrth@siddharrth ~]$ pgrep -l bash
37656 bash
37903 bash
```

3. run cat > processfile
    a. input some text and suspend or stop the process using ctrl +z

```
[siddharrth@siddharrth ~]$ cat
This is cat^Z
[2]+  Stopped                 cat
```

    b. get the pid of cat using pidof or pgrep cmd

```
[siddharrth@siddharrth ~]$ pidof cat
38105 38097
[siddharrth@siddharrth ~]$ pgrep cat
38097
38105
```

c. list the process details using ps -f (pidofcat)

```
[siddharrth@siddharrth ~]$ ps -f 38105
UID          PID    PPID  C STIME TTY      STAT   TIME CMD
siddhar+   38105   37656  0 15:48 pts/0    T      0:00 cat
```

d. Now start the cat process using fg cmd

```
[siddharrth@siddharrth ~]$ fg
cat
^Z
[2]+  Stopped                 cat
```

e. Check bg jobs if any using jobs cmd.

```
[siddharrth@siddharrth ~]$ bg
[2]+ cat &

[2]+  Stopped                 cat
```

4. Use vi to create a little text file. Suspend vi in background.

```
[siddharrth@siddharrth ~]$ vi texteditor.txt

[3]+  Stopped                 vi texteditor.txt
```

5. Verify with jobs that vi is suspended in background.

```
[siddharrth@siddharrth ~]$ jobs
[1]   Stopped                 cat
[2]-  Stopped                 cat
[3]+  Stopped                 vi texteditor.txt
```

6. Start sleep 100 process, suspend or terminate before it finishes
   a. Get the details of sleep process using ps -f pidsleep

```
[siddharrth@siddharrth ~]$ sleep 100
^Z
[4]+  Stopped                 sleep 100
[siddharrth@siddharrth ~]$ pidof sleep
38269
[siddharrth@siddharrth ~]$ ps -f 38269
UID          PID    PPID  C STIME TTY      STAT   TIME CMD
siddhar+   38269   37656  0 16:03 pts/0    T      0:00 sleep 100
```

   b. Start the sleep cmd in bg.

```
[siddharrth@siddharrth ~]$ sleep 100 &
[5] 38314
[4]   Done                    sleep 100
```

7. Start two long sleep processes in background.

```
[siddharrth@linux ~]$ sleep 300 &
[1] 3252
[siddharrth@linux ~]$ sleep 400 &
[2] 3269
```

8. Display all jobs in background

```
[siddharrth@linux ~]$ jobs
[1]-  Running                 sleep 300 &
[2]+  Running                 sleep 400 &
```

9. Use pstree cmd to lists all process of bash – pstree pidofbash

```
[siddharrth@siddharrth ~]$ pidof bash
37903 37656
[siddharrth@siddharrth ~]$ pstree 37656
bash─┬─2*[cat]
     ├─pstree
     ├─2*[sleep]
     └─vim
```

10. Customise the output columns of ps cmd using
    a. ps -eo user,uid,pcpu,pmem,cmd

```
[siddharrth@siddharrth ~]$ ps -eo user,uid,pcpu,pmem,cmd | tail -5
siddhar+  1000  0.0  0.0 sleep 300
siddhar+  1000  0.0  0.0 sleep 400
root         0  0.0  0.0 [kworker/3:2-ata_sff]
siddhar+  1000  0.0  0.1 ps -eo user,uid,pcpu,pmem,cmd
siddhar+  1000  0.0  0.1 tail -5
```

    b. ps -eo user=username,uid=userid,pcpu=cpu,pmem=mem,cmd=command

```
[siddharrth@siddharrth ~]$ ps -eo user=username,uid=userid,pcpu=cpu,pmem=mem,cmd=command
username userid  cpu  mem command
root          0  0.0  1.0 /usr/lib/systemd/systemd rhgb --switched-root --system --deseriali
root          0  0.0  0.0 [kthreadd]
root          0  0.0  0.0 [pool_workqueue_]
root          0  0.0  0.0 [kworker/R-rcu_g]
root          0  0.0  0.0 [kworker/R-rcu_p]
```

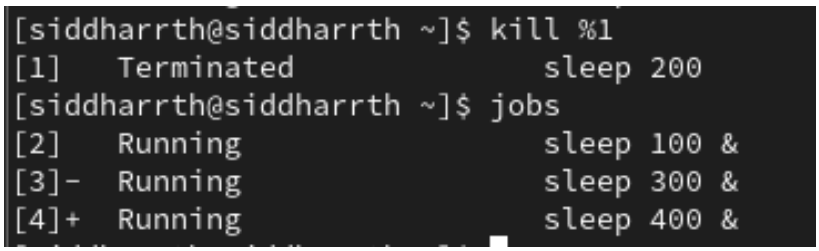
    c. ps axo user,uid,cmd,stat,pid,ppid

```
[siddharrth@siddharrth ~]$ ps axo user,uid,cmd,stat,pid,ppid
USER       UID CMD                         STAT     PID    PPID
root         0 /usr/lib/systemd/systemd rh Ss         1       0
root         0 [kthreadd]                  S          2       0
root         0 [pool_workqueue_]           S          3       2
root         0 [kworker/R-rcu_g]           I<         4       2
root         0 [kworker/R-rcu_p]           I<         5       2
root         0 [kworker/R-slub_]           I<         6       2
root         0 [kworker/R-netns]           I<         7       2
root         0 [kworker/0:0H-events_highpr I<         9       2
root         0 [kworker/u512:0-events_unbo I        10       2
root         0 [kworker/R-mm_pe]           I<        11       2
root         0 [kworker/u512:1-netns]      I         12       2
root         0 [rcu_tasks_kthre]           I         13       2
root         0 [rcu_tasks_rude_]           I         14       2
root         0 [rcu_tasks_trace]           I         15       2
root         0 [ksoftirqd/0]               S         16       2
root         0 [rcu_preempt]               I         17       2
root         0 [migration/0]               S         18       2
root         0 [idle_inject/0]             S         19       2
```

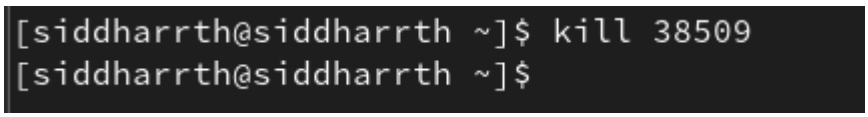
11. Put one of the sleep process in foreground

```
[siddharrth@siddharrth ~]$ sleep 100
```

12. Kill one of the sleep process
    a. Use job id to kill sleep process – kill %[jobid]

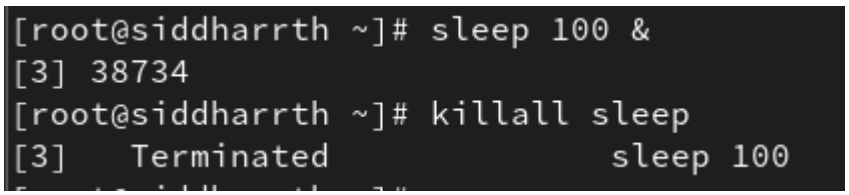


    b. Use pid of sleep – kill pid

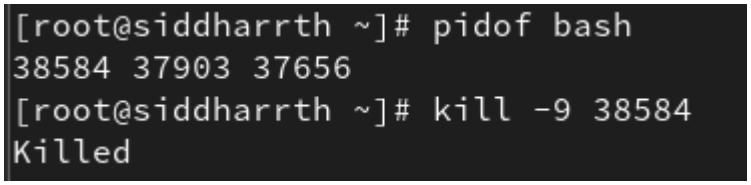


13. Kill the vi process using pkill cmd

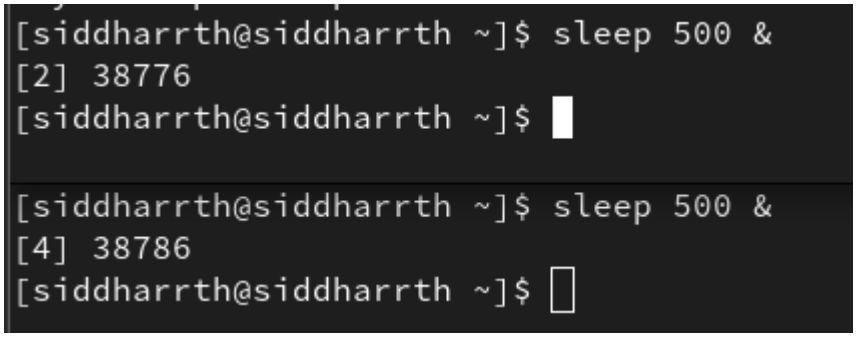
14. Use killall to kill all sleep process



15. Use kill -9 to kill the bash process



16. Open 2 terminals and start 2 long sleep processes. (provide screen shots for grep cmd alone in both cases)
    a.Put them in bg



    b. Check the jobs in bg

```
[siddharrth@siddharrth ~]$ jobs
[1]+  Stopped                 sleep 500
[2]-  Running                 sleep 500 &
[siddharrth@siddharrth ~]$
```

```
[siddharrth@siddharrth ~]$ jobs
[1]   Stopped                 cat
[2]-  Stopped                 cat
[3]+  Stopped                 sleep 500
[4]   Running                 sleep 500 &
```

c. In 1st terminal run -> ps -ef | grep sleep and observe

```
[siddharrth@siddharrth ~]$ ps -ef | grep sleep
siddhar+   38763   37903  0 16:44 pts/1    00:00:00 sleep 500
siddhar+   38764   37656  0 16:44 pts/0    00:00:00 sleep 500
siddhar+   38776   37903  0 16:45 pts/1    00:00:00 sleep 500
siddhar+   38786   37656  0 16:45 pts/0    00:00:00 sleep 500
siddhar+   38801   37656  0 16:48 pts/0    00:00:00 grep --color=auto sleep
[siddharrth@siddharrth ~]$
```

d. Now close the second terminal and run grep cmd again to check and understand.

```
[siddharrth@siddharrth ~]$ ps -ef | grep sleep
siddhar+   38764   37656  0 16:44 pts/0    00:00:00 sleep 500
siddhar+   38786   37656  0 16:45 pts/0    00:00:00 sleep 500
siddhar+   38823   37656  0 16:49 pts/0    00:00:00 grep --color=auto sleep
```

e. Inorder to run a process without a terminal we use nohup (hangup cmd)

i. Start sleep process with nohup sleep 100 &

```
[siddharrth@siddharrth ~]$ nohup sleep 100 &
[5] 38828
[siddharrth@siddharrth ~]$ nohup: ignoring input and appending output to 'nohup.out'
```

ii. In 1st terminal run -> ps -ef | grep sleep and observe

```
[siddharrth@siddharrth ~]$ ps -ef | grep sleep
siddhar+   38764   37656  0 16:44 pts/0    00:00:00 sleep 500
siddhar+   38786   37656  0 16:45 pts/0    00:00:00 sleep 500
siddhar+   38828   37656  0 16:50 pts/0    00:00:00 sleep 100
siddhar+   38866   37656  0 16:51 pts/0    00:00:00 grep --color=auto sleep
```

iii. Now close the second terminal and run grep cmd again to check and understand.

```
[siddharrth@siddharrth ~]$ ps -ef | grep sleep
siddhar+   38764   37656  0 16:44 pts/0    00:00:00 sleep 500
siddhar+   38786   37656  0 16:45 pts/0    00:00:00 sleep 500
siddhar+   38909   36855  0 16:52 ?        00:00:00 sleep 100
siddhar+   38915   37656  0 16:52 pts/0    00:00:00 grep --color=auto sleep
[5]   Done                    nohup sleep 100
[siddharrth@siddharrth ~]$
```

f. Observe a new file nohup.out is created cat and chk

```
[4]   Done                    sleep 500
```