6. Memory Management

Aim:

To perform different memory management commands.

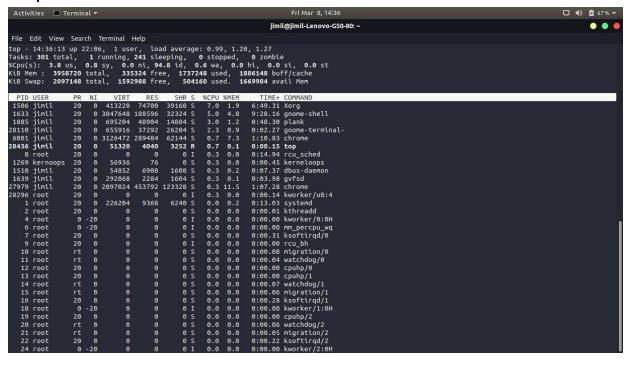## Commands:

1. swapon --summary

```
jimil@jimil-Lenovo-G50-80:~$ swapon --summary
Filename                        Type       Size       Used   Priority
/swapfile                       file       2097148    505184       -2
```

2. /proc/swaps

```
jimil@jimil-Lenovo-G50-80:~$ cat /proc/swaps
Filename                        Type       Size       Used   Priority
/swapfile                       file       2097148    504160       -2
```

3. free -h

```
jimil@jimil-Lenovo-G50-80:~$ free -h
          total       used       free     shared  buff/cache   available
Mem:      3.8G        1.7G       330M       256M        1.8G        1.6G
Swap:     2.0G        492M       1.5G
```
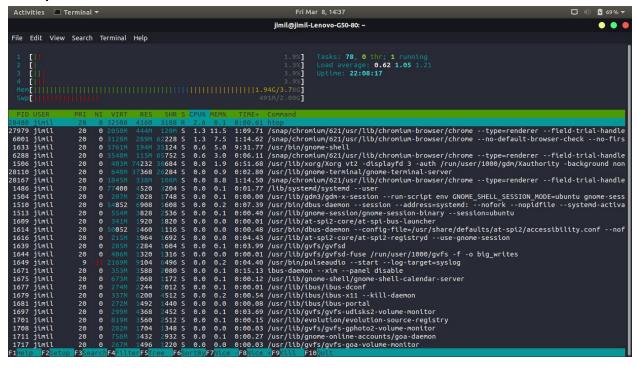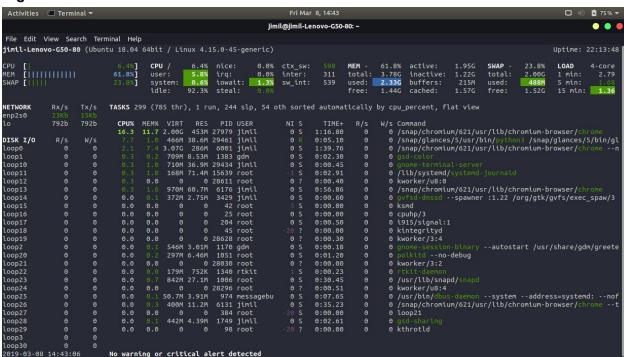
4. top


```
Activities   Terminal ▾                           Fri Mar 8, 14:36                                    □  🔊  🔋 67% ▾
                                       jimil@jimil-Lenovo-G50-80: ~                                        ● ● ●
File  Edit  View  Search  Terminal  Help
top - 14:36:13 up 22:06,  1 user,  load average: 0.99, 1.20, 1.27
Tasks: 301 total,   1 running, 241 sleeping,   0 stopped,   0 zombie
%Cpu(s):  3.8 us,  0.8 sy,  0.0 ni, 94.8 id,  0.6 wa,  0.0 hi,  0.0 si,  0.0 st
KiB Mem :  3958720 total,   335324 free,  1737248 used,  1886148 buff/cache
KiB Swap:  2097148 total,  1592988 free,   504160 used.  1669984 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU %MEM     TIME+ COMMAND
 1506 jimil     20   0  413220  74700  39168 S   7.0  1.9   6:49.31 Xorg
 1633 jimil     20   0 3847648 188596  32324 S   5.0  4.8   9:28.16 gnome-shell
 1885 jimil     20   0  695204  48904  14884 S   3.0  1.2   0:48.30 plank
28110 jimil     20   0  655916  37292  26284 S   2.3  0.9   0:02.27 gnome-terminal-
 6001 jimil     20   0 3126472 289484  62144 S   0.7  7.3   1:10.83 chrome
28436 jimil     20   0   51320   4040   3252 R   0.7  0.1   0:00.15 top
    8 root      20   0       0      0      0 I   0.3  0.0   0:14.94 rcu_sched
 1269 kernoops  20   0   56936     76      0 S   0.3  0.0   0:00.45 kerneloops
 1510 jimil     20   0   54852   6908   1608 S   0.3  0.2   0:07.37 dbus-daemon
 1639 jimil     20   0  292068   2284   1604 S   0.3  0.1   0:03.98 gvfsd
27979 jimil     20   0 2097024 453792 123328 S   0.3 11.5   1:07.28 chrome
28296 root      20   0       0      0      0 I   0.3  0.0   0:00.14 kworker/u8:4
    1 root      20   0  226204   9368   6240 S   0.0  0.2   0:13.03 systemd
    2 root      20   0       0      0      0 S   0.0  0.0   0:00.01 kthreadd
    4 root       0 -20       0      0      0 I   0.0  0.0   0:00.00 kworker/0:0H
    6 root       0 -20       0      0      0 I   0.0  0.0   0:00.00 mm_percpu_wq
    7 root      20   0       0      0      0 S   0.0  0.0   0:00.31 ksoftirqd/0
    9 root      20   0       0      0      0 I   0.0  0.0   0:00.00 rcu_bh
   10 root      rt   0       0      0      0 S   0.0  0.0   0:00.08 migration/0
   11 root      rt   0       0      0      0 S   0.0  0.0   0:00.04 watchdog/0
   12 root      20   0       0      0      0 S   0.0  0.0   0:00.00 cpuhp/0
   13 root      20   0       0      0      0 S   0.0  0.0   0:00.00 cpuhp/1
   14 root      rt   0       0      0      0 S   0.0  0.0   0:00.07 watchdog/1
   15 root      rt   0       0      0      0 S   0.0  0.0   0:00.06 migration/1
   16 root      20   0       0      0      0 S   0.0  0.0   0:00.28 ksoftirqd/1
   18 root       0 -20       0      0      0 I   0.0  0.0   0:00.00 kworker/1:0H
   19 root      20   0       0      0      0 S   0.0  0.0   0:00.00 cpuhp/2
   20 root      rt   0       0      0      0 S   0.0  0.0   0:00.06 watchdog/2
   21 root      rt   0       0      0      0 S   0.0  0.0   0:00.05 migration/2
   22 root      20   0       0      0      0 S   0.0  0.0   0:00.22 ksoftirqd/2
   24 root       0 -20       0      0      0 I   0.0  0.0   0:00.00 kworker/2:0H
```

5. atop


```
ATOP - CE-Lab-602-U02         2019/03/08  14:40:18        ------         10s elapsed
PRC | sys      0.12s | user     0.11s | #proc     255 | #zombie     0 | #exit       ? |
CPU | sys        2% | user       2% | irq        0% | idle      396% | wait       0% |
cpu | sys        1% | user       1% | irq        0% | idle       97% | cpu001 w   0% |
cpu | sys        0% | user       0% | irq        0% | idle      100% | cpu000 w   0% |
cpu | sys        0% | user       0% | irq        0% | idle       99% | cpu002 w   1% |
cpu | sys        0% | user       0% | irq        0% | idle      100% | cpu003 w   0% |
CPL | avg1     0.15 | avg5     0.31 | avg15    0.30 | csw      4352 | intr     1698 |
MEM | tot      7.7G | free     4.4G | cache    1.2G | buff   129.0M | slab   135.8M |
SWP | tot      2.0G | free     2.0G |               | vmcom    8.6G | vmlim    5.8G |
DSK |           sda | busy      1% | read        0 | write       5 | avio 10.4 ms |
NET | transport     | tcpi      29 | tcpo       33 | udpi       54 | udpo        4 |
NET | network       | ipi       53 | ipo        38 | ipfrw       0 | deliv      53 |
NET | enp3s0     0% | pcki      69 | pcko       32 | si    5 Kbps | so    3 Kbps |
NET | lo        ---- | pcki       6 | pcko        6 | si    0 Kbps | so    0 Kbps |

  PID  SYSCPU  USRCPU  VGROW  RGROW RUID        THR ST EXC S  CPU  CMD          1/4
 5431   0.04s   0.00s     0K     0K students      4 --    - S   0%  gnome-screensh
 5423   0.03s   0.01s     0K     8K students      1 --    - R   0%  atop
 1730   0.01s   0.02s   -24K    -4K root          2 --    - S   0%  Xorg
 3526   0.00s   0.02s -3072K    32K students     33 --    - S   0%  chrome
 3584   0.00s   0.02s     0K   208K students     12 --    - S   0%  chrome
 4819   0.00s   0.01s     0K    36K students     15 --    - S   0%  chrome
 2621   0.01s   0.00s     0K     0K guest-qk     28 --    - S   0%  mysqld
```

6. htop

7. glances

8. vmstat

```
jimil@jimil-Lenovo-G50-80:~$ vmstat
procs ----------memory---------- ---swap-- -----io---- -system-- ------cpu
 r  b  swpd   free   buff   cache   si   so    bi    bo    in   cs us  sy id
wa st
 0  0 499040 315684 221512 1655204  9   31   306   218   400 1365 17   4 70
8  0
```

Addition of swap space:

1 . Check if system has swap space configured:

```
jimil@jimil-Lenovo-G50-80:~$ swapon --show
NAME        TYPE        SIZE USED PRIO
/dev/sda5 partition    2G   0B   -1
```

2. free -h

```
jimil@jimil-Lenovo-G50-80:~$ free -h
          total        used        free      shared  buff/cache   available
Mem:       7.7G        2.0G        3.9G        312M        1.8G        5.1G
Swap:      2.0G          0B        2.0G
```

3. Check current disk usage: df -h

```
jimil@jimil-Lenovo-G50-80:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            3.9G     0  3.9G   0% /dev
tmpfs           788M  9.8M  779M   2% /run
/dev/sda1       367G   57G  292G  17% /
tmpfs           3.9G   32M  3.9G   1% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           3.9G     0  3.9G   0% /sys/fs/cgroup
/dev/loop1      170M  170M     0 100% /snap/gimp/105
/dev/loop0       91M   91M     0 100% /snap/core/6350
/dev/loop2      288M  288M     0 100% /snap/onlyoffice-desktopeditors/29
/dev/loop3      170M  170M     0 100% /snap/gimp/101
/dev/loop4       92M   92M     0 100% /snap/core/6259
/dev/loop5      156M  156M     0 100% /snap/brave/57
/dev/loop6       54M   54M     0 100% /snap/core18/594
/dev/loop7       90M   90M     0 100% /snap/core/6130
/dev/loop8       54M   54M     0 100% /snap/core18/536
/dev/loop9      225M  225M     0 100% /snap/polarr/9
/dev/loop10     170M  170M     0 100% /snap/gimp/110
```

```
/dev/loop11      35M   35M    0 100% /snap/gtk-common-themes/818
/dev/loop13      54M   54M    0 100% /snap/core18/677
/dev/loop12     125M  125M    0 100% /snap/vscode/75
tmpfs           788M   68K  788M   1% /run/user/1001
```

4. Creating swap file:

```
jimil@jimil-Lenovo-G50-80:~$ sudo dd if=/dev/zero of=/swapfile bs=2M
count=1
1+0 records in
1+0 records out
2097152 bytes (2.1 MB, 2.0 MiB) copied, 0.00431001 s, 487 MB/s
```

Prepare swapfile:

```
jimil@jimil-Lenovo-G50-80:~$ sudo chmod 600 /swapfile
jimil@jimil-Lenovo-G50-80:~$ sudo mkswap /swapfile
Setting up swapspace version 1, size = 2 MiB (2093056 bytes)
no label, UUID=a7774ce6-951e-47b0-b5d8-191899648001
```

Enable the swapfile:

```
jimil@jimil-Lenovo-G50-80:~$ sudo swapon /swapfile
```

Check addition of swap space:

```
jimil@jimil-Lenovo-G50-80:~$ sudo swapon -s
Filename                Type        Size    Used    Priority
/dev/sda5               partition   2095100 0         -1
/swapfile               file        2044    0         -2
```

Remove and deactivate swapfile:

1. First, deactivate the swap using the following command:

```
jimil@jimil-Lenovo-G50-80:~$ sudo swapoff -v /swapfile
swapoff /swapfile
```

2. Delete the swap file:

```
jimil@jimil-Lenovo-G50-80:~$ sudo rm /swapfile
```

3. Check if system resumed to original state:

```
jimil@jimil-Lenovo-G50-80:~$ sudo swapon -s
Filename                        Type      Size     Used    Priority
/dev/sda5                       partition 2095100    0     -1
```

Conclusion:

Thus, through this experiment, I studied and implemented swap space management using Linux commands.