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Class: SE Comps

Batch: C

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Experiment No 7

Aim:

To implement memory management using linux commands.

Theory:

Memory management is an essential aspect of every System Administrator to improve the performance of a Linux system. It is always a good practice to monitor swap space usage in Linux to ensure that your system operates relative to its memory demands.

What is Swap space?

Swap space is a restricted amount of physical memory that is allocated for use by the operating system when available memory has been fully utilized. It is memory management that involves swapping sections of memory to and from physical storage.
On most distributions of Linux, it is recommended that you set swap space when installing the operating system. The amount of swap space you can set for your Linux system may depend on the architecture and kernel version.

1. Using the swapon Command

This command helps you to specify the devices on which paging and swapping will be done and we shall look at few important options.

To view all devices marked as swap in the /etc/fstab file you can use the **--all** option. Though devices that are already working as swap space are skipped.

```
# swapon --all
```

If you want to view a summary of swap space usage by device, use the **--summary** option as follows.

```
# swapon --summary

Filename                                Type            Size    Used
        Priority
/dev/sda10                              partition       8282108 0       -1
```

Use `--help` option to view help information or open the manpage for more usage options.

2. Using /proc/swaps which is equivalent to swapon

The /proc filesystem is a very special virtual filesystem in Linux. It is also referred to as a process information pseudo-file system.
It actually does not contain 'real' files but runtime system information, for example system memory, devices mounted, hardware configuration and many more. Therefore you can also refer to it as a control and information base for the kernel.

To check swap usage information, you can view the /proc/swaps file using the cat utility.

```
# cat /proc/swaps

Filename                                Type            Size    Used
        Priority
/dev/sda10                              partition       8282108 0       -1
```

3. Using 'free' Command

The free command is used to display the amount of free and used system memory. Using the free command with -h option, which displays output in a human readable format.

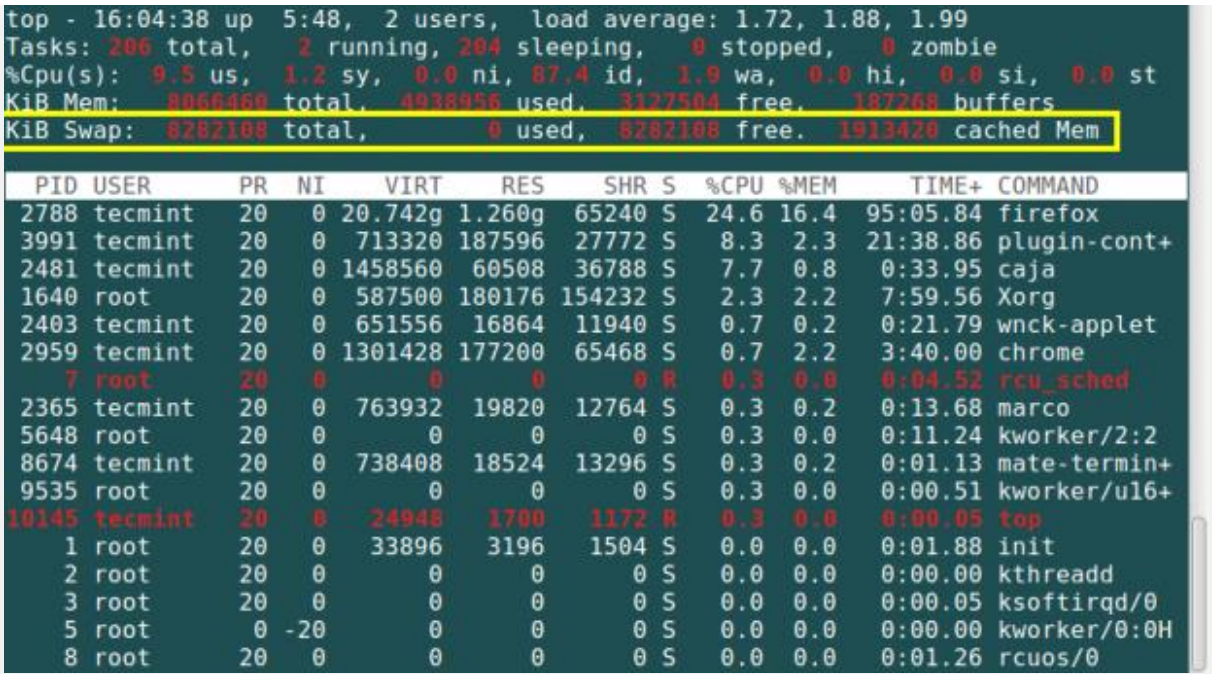
```
# free -h

             total       used       free     shared    buffers     cached
Mem:          7.7G       4.7G       3.0G       408M       182M       1.8G
-/+ buffers/cache:       2.7G       5.0G
Swap:         7.9G         0B       7.9G
```

From the output above, you can see that the last line provides information about the system swap space.

4. Using top Command

The top command displays processor activity of your Linux system, tasks managed by kernel in real-time.

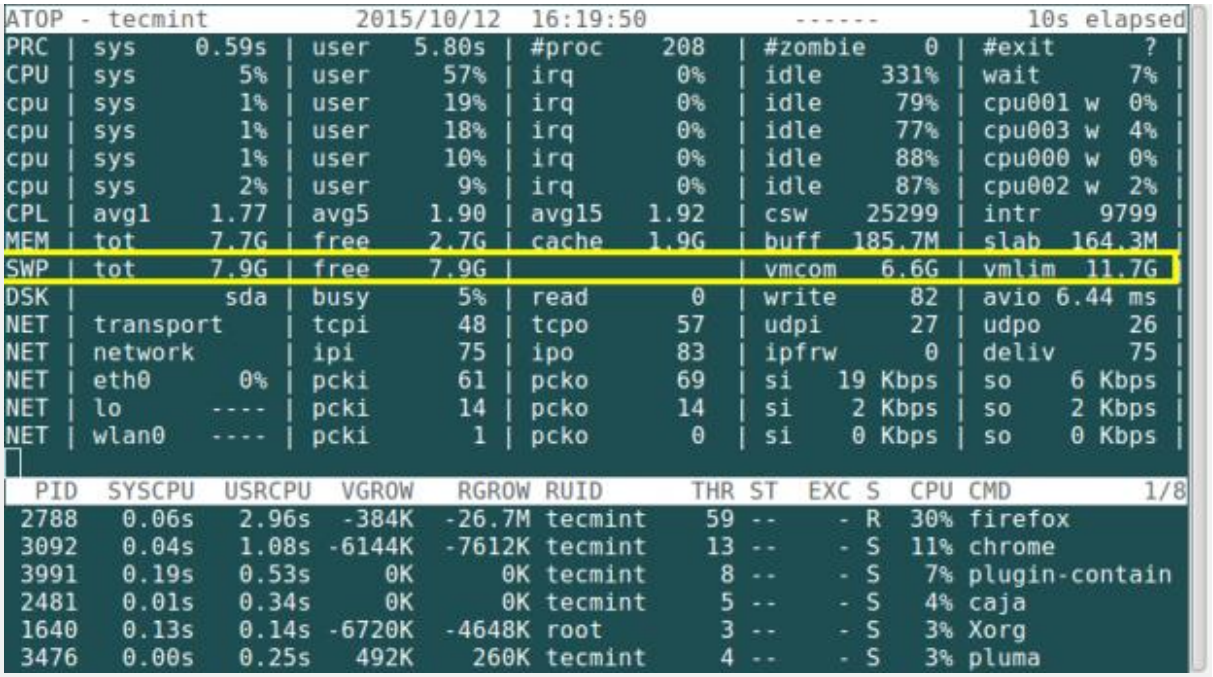
```
# top
```



5. Using atop Command

The atop command is a system monitor that reports about activities of various processes. But importantly it also shows information about free and used memory space.

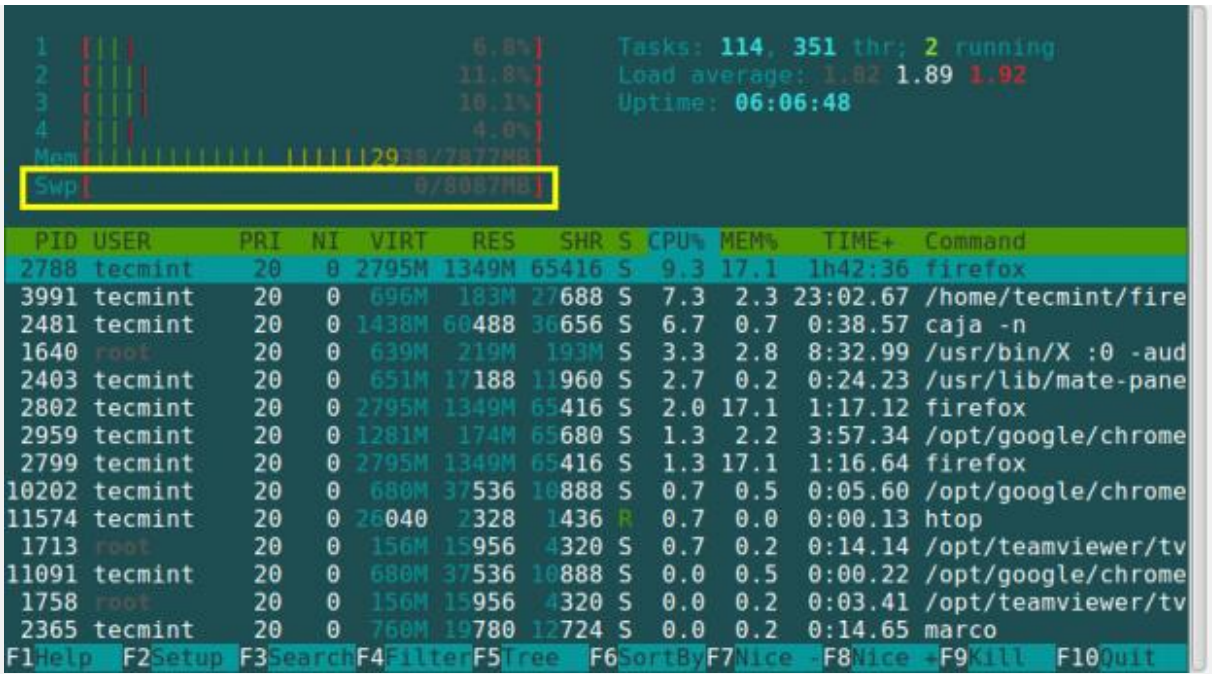
```
# atop
```



6. Using htop Command

The htop command is used to view processes in an interactive mode and also displays information about memory usage.

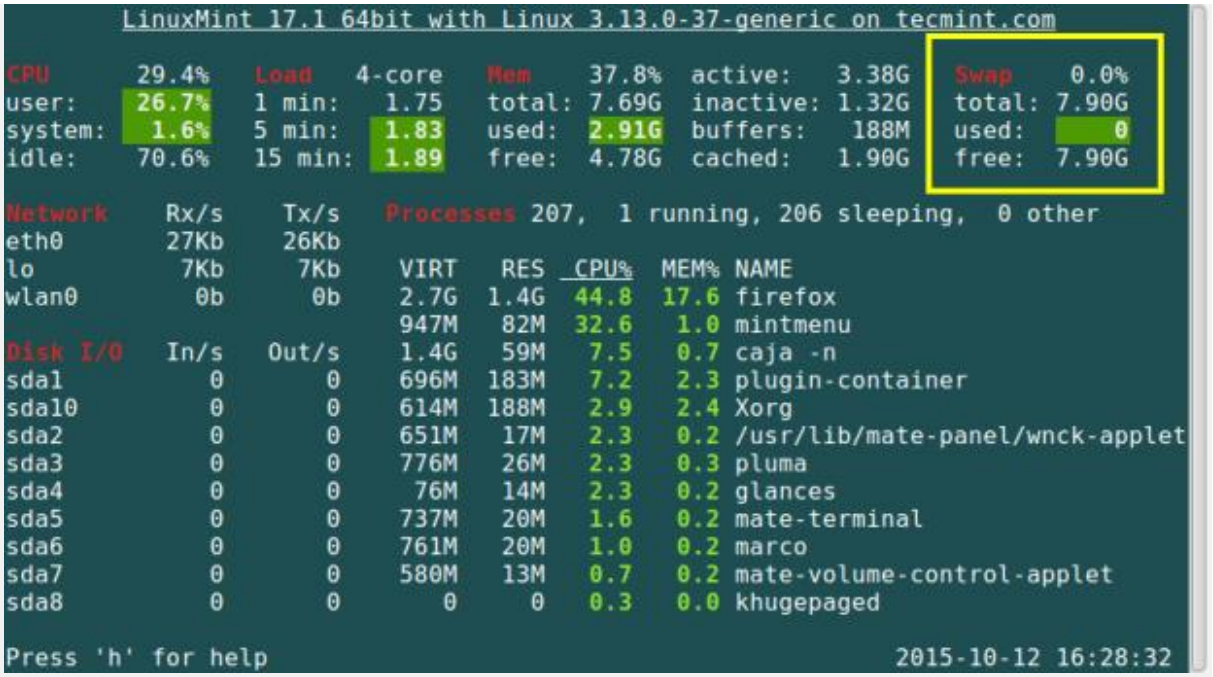
```
# htop
```



7. Using the Glances Command

This is a cross-platform system monitoring tool that displays information about running processes, cpu load, storage space usage, memory usage, swap space usage and many more.

```
# glances
```



8. Using the vmstat Command

This command is used to display information about virtual memory statistics. To install vmstat on your Linux system, you can read the article below and see more usage examples:

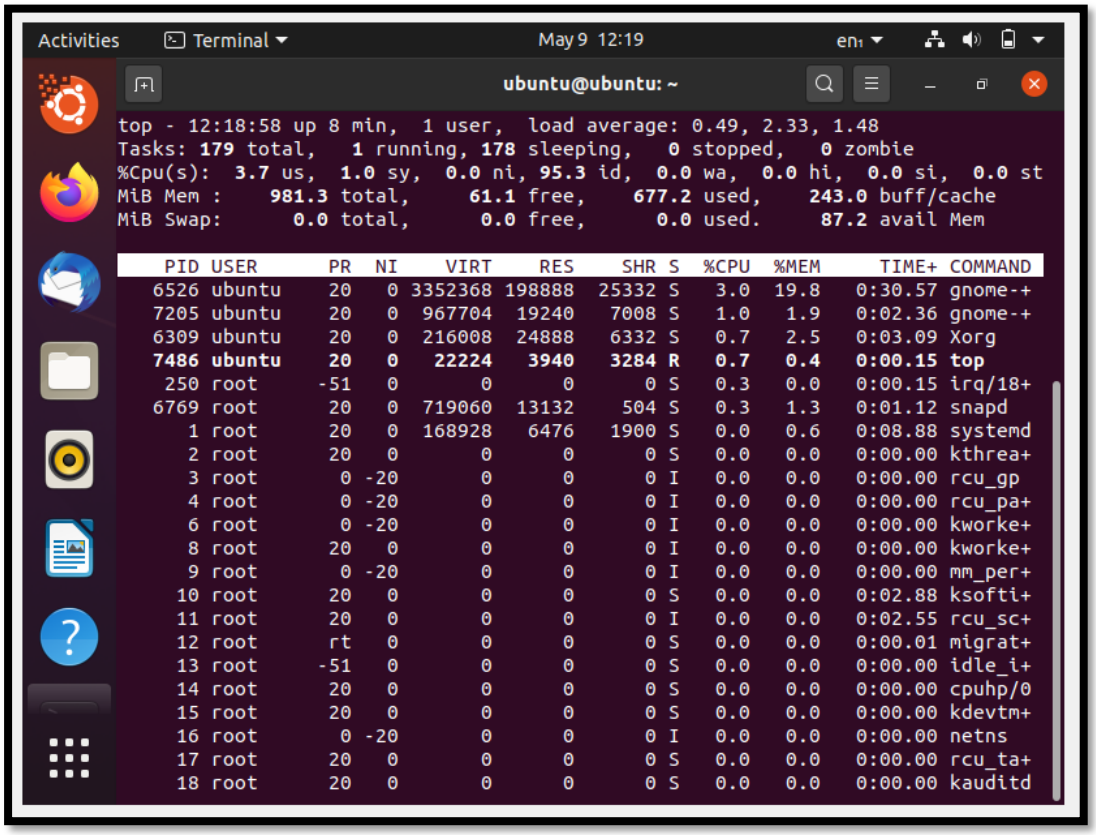
Linux Performance Monitoring with Vmstat

```
# vmstat
```

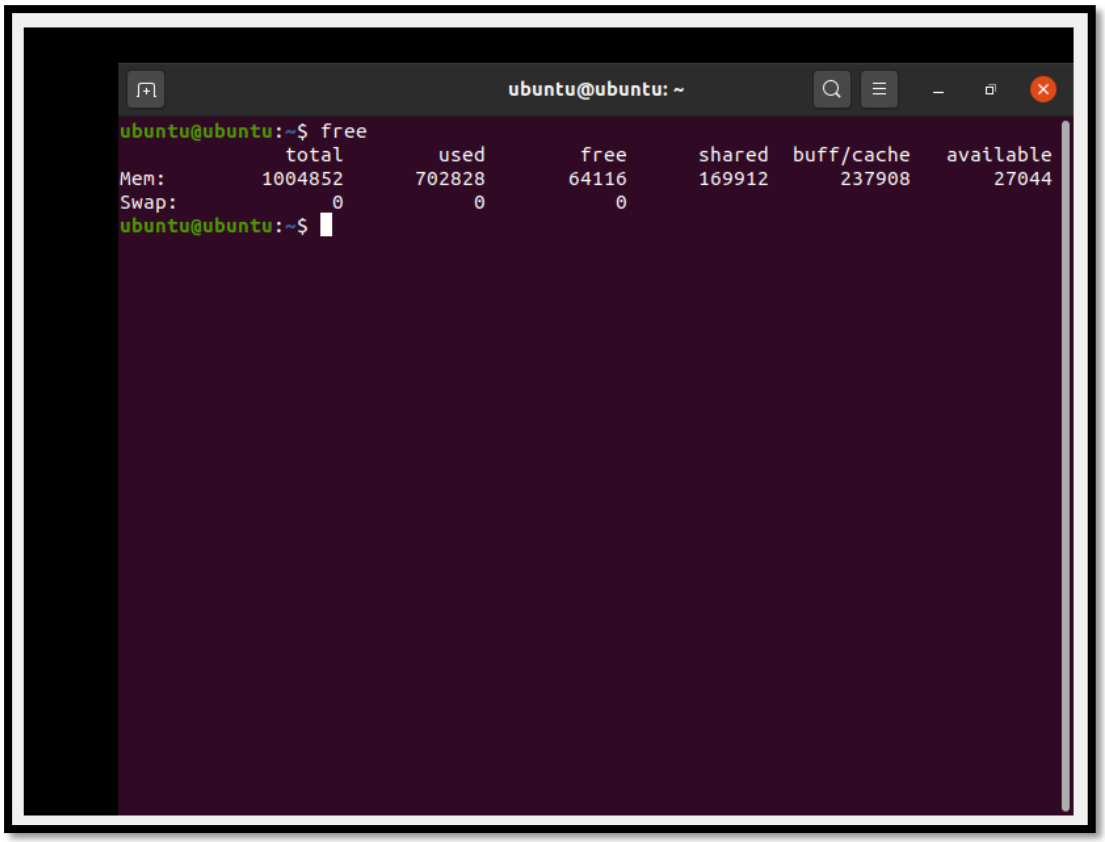
```
tecmint ~ vmstat
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 2  0      0 2848452 193296 1989676    0    0    44   217  566 1011 25  4 69  1
0
tecmint ~ vmstat 2 6
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 1  0      0 2867304 193304 1990160    0    0    44   217  566 1011 25  4 69  1
0
 1  0      0 2864540 193304 1990088    0    0     0     0 1653 2983 12  1 87  0
0
 0  0      0 2855288 193304 1990088    0    0     0     0  532 1840  7  1 92  1
0
 0  0      0 2850824 193324 1990072    0    0     0   284  419 1283  5  1 91  4
0
 0  0      0 2870372 193324 1990088    0    0     0     0  475 1280  9  1 90  1
0
 0  0      0 2867692 193324 1990088    0    0     2     0 2120 2143 11  1 87  1
0
tecmint ~
```

Commands:

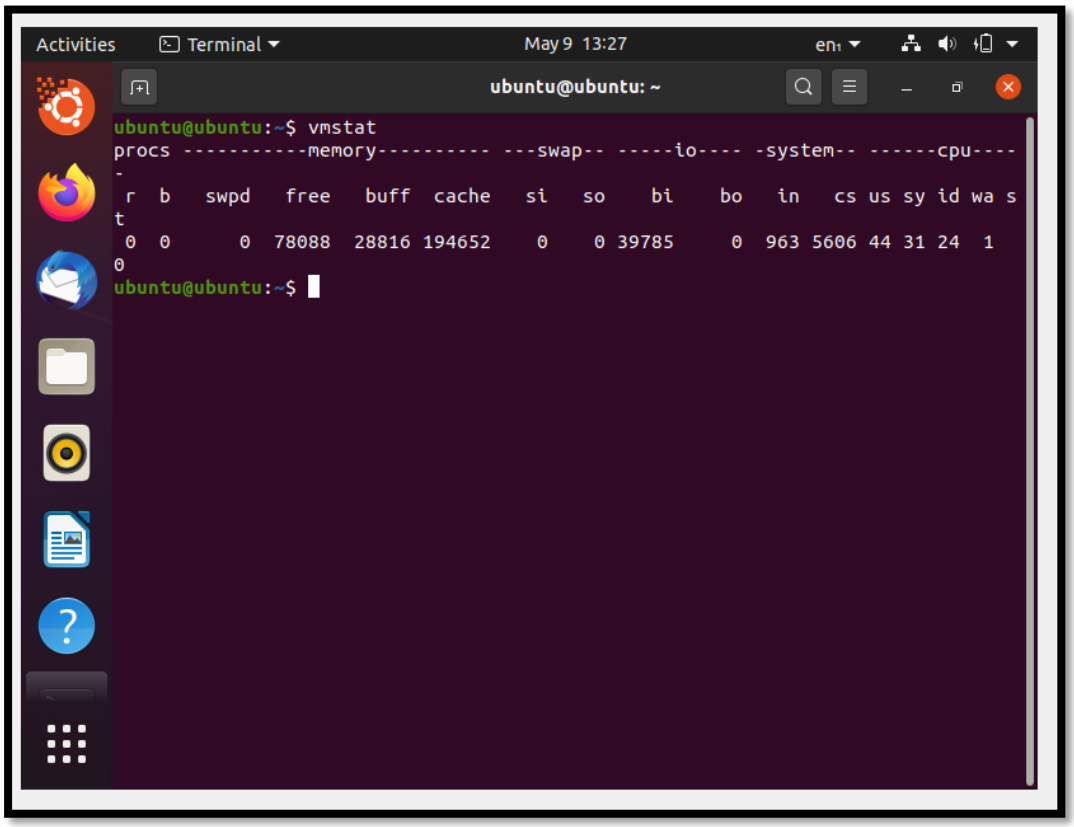
Top



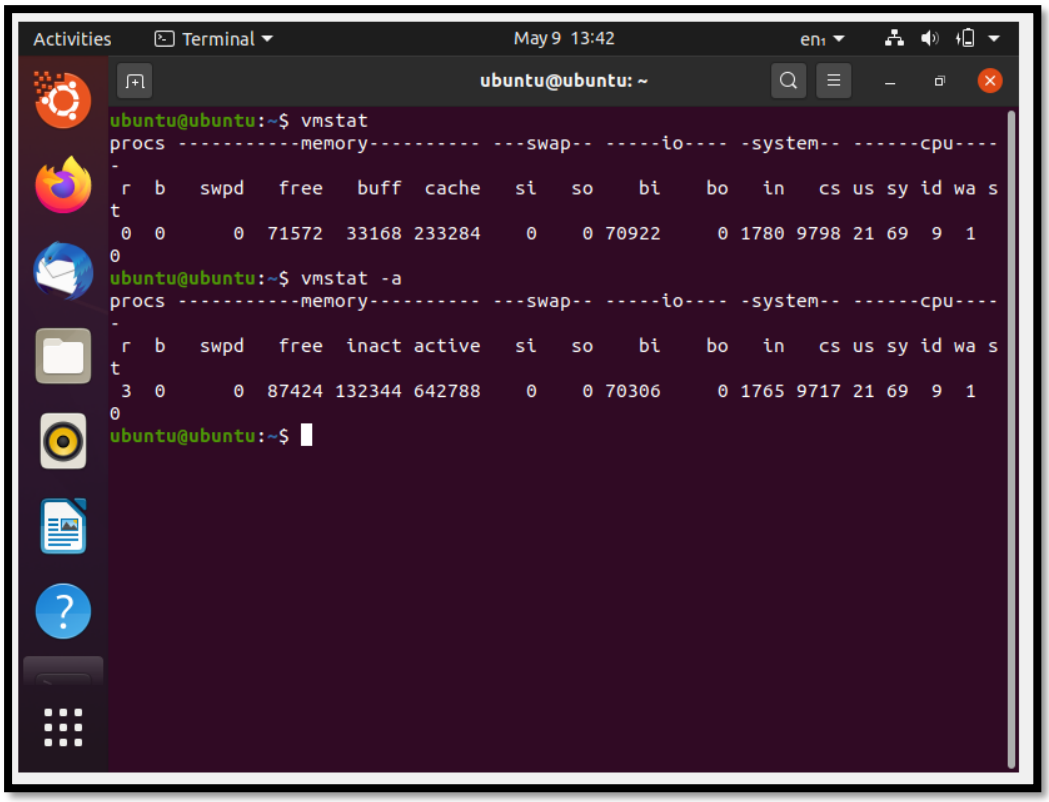
Free


ubuntu@ubuntu: ~
ubuntu@ubuntu:~$ free
total used free shared buff/cache available
Mem: 1004852 702828 64116 169912 237908 27044
Swap: 0 0 0
ubuntu@ubuntu:~$

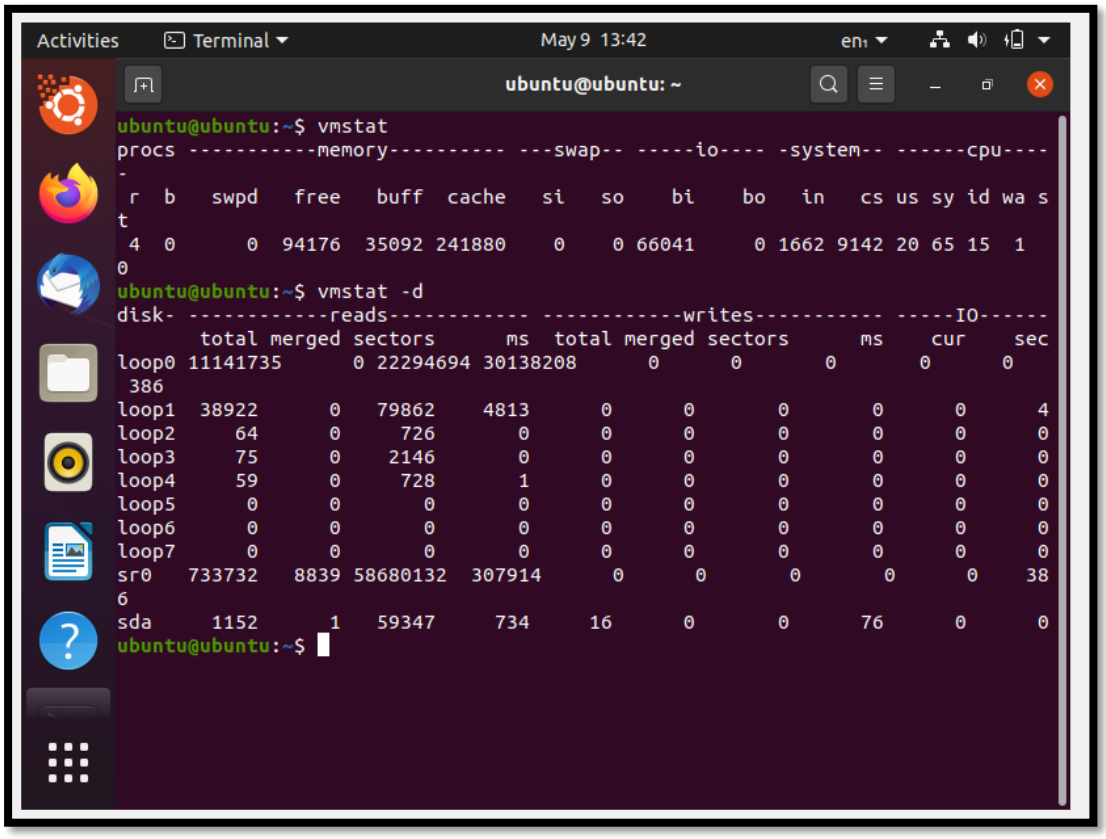
Vmstat


Activities
Terminal
May 9 13:27
ubuntu@ubuntu: ~
ubuntu@ubuntu:~$ 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 0 78088 28816 194652 0 0 39785 0 963 5606 44 31 24 1 0
ubuntu@ubuntu:~$

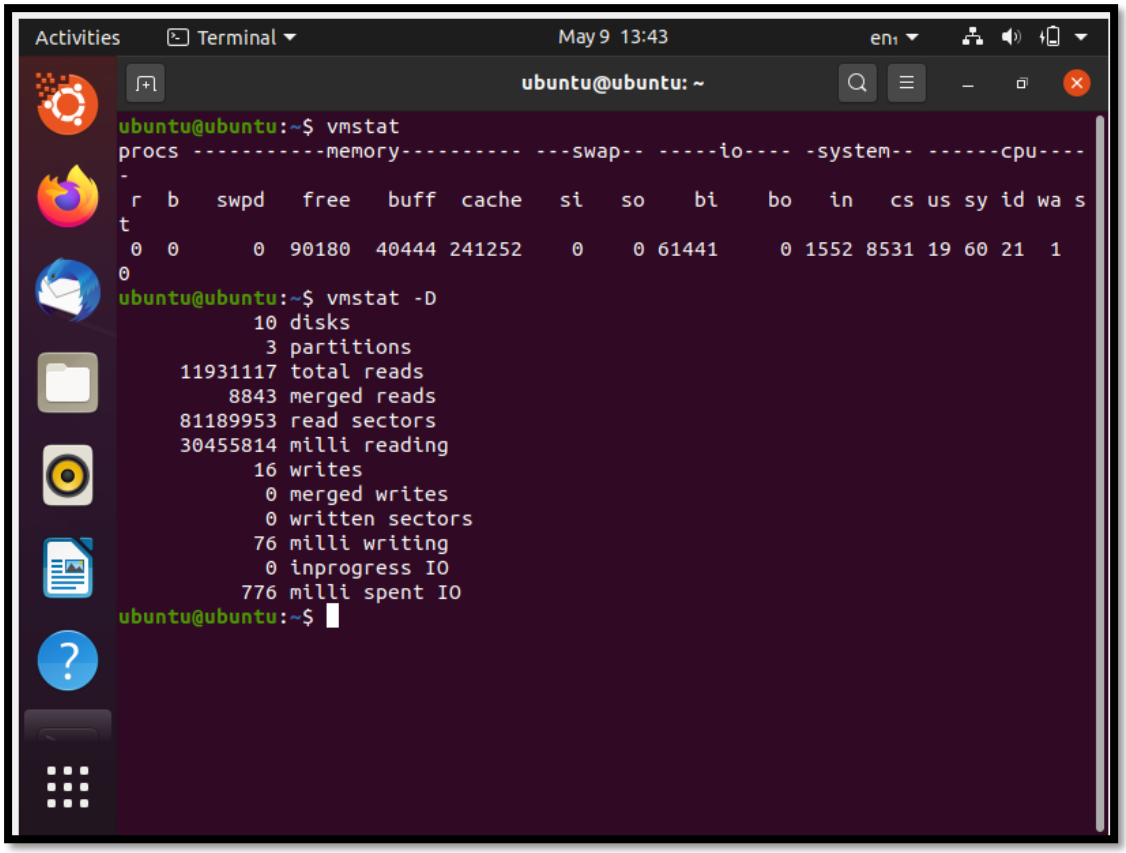
Vmstat -a



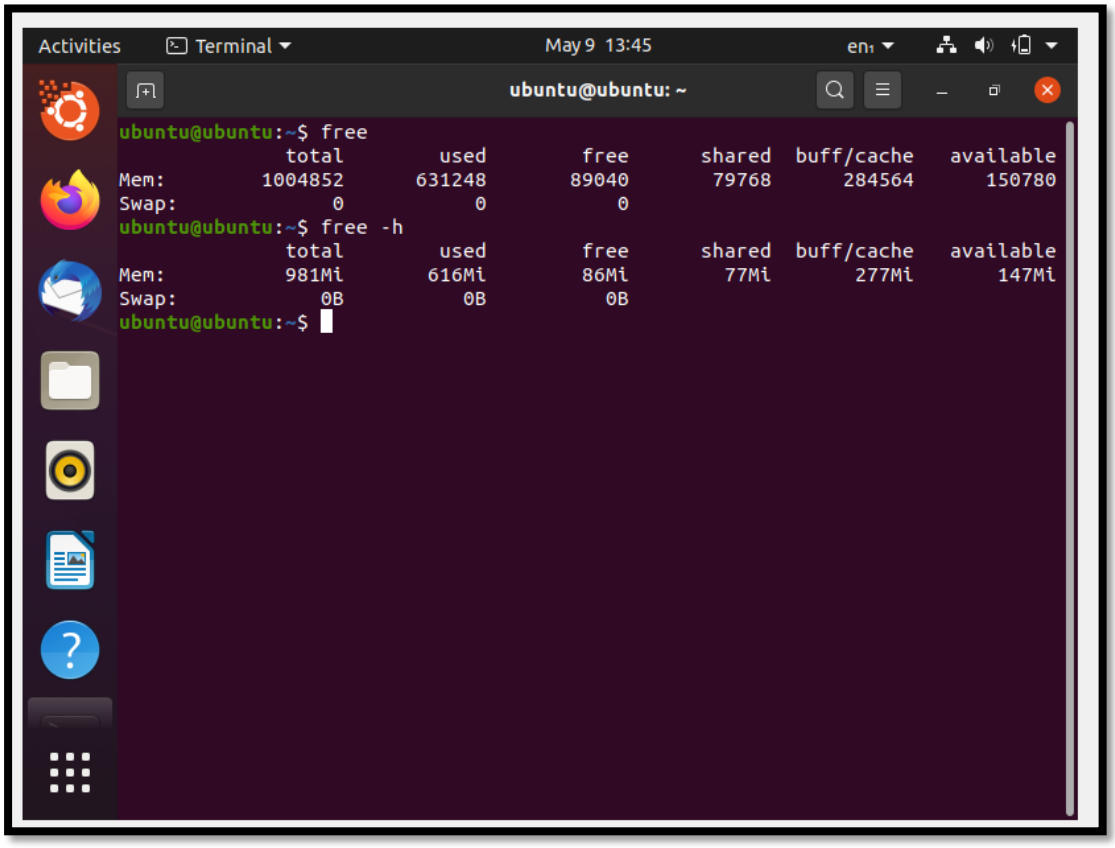
Vmstat -d



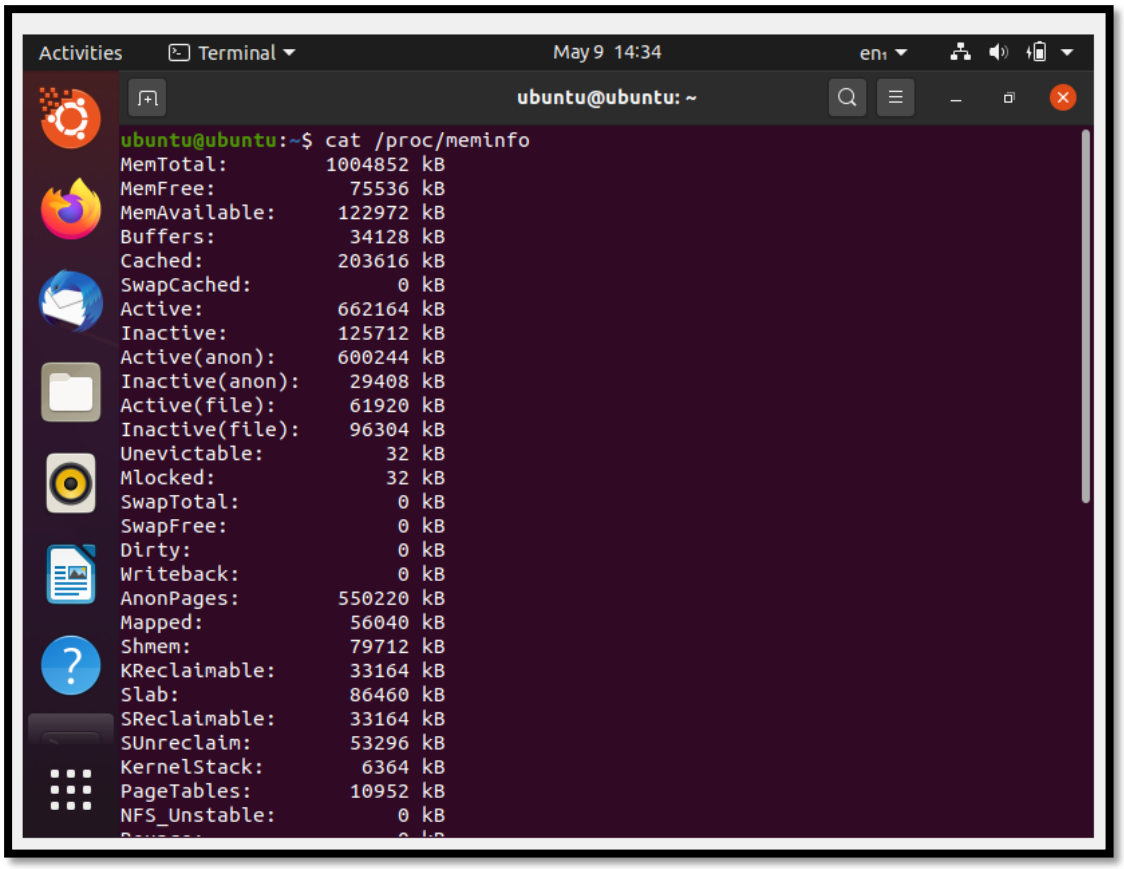
Vmstat -D

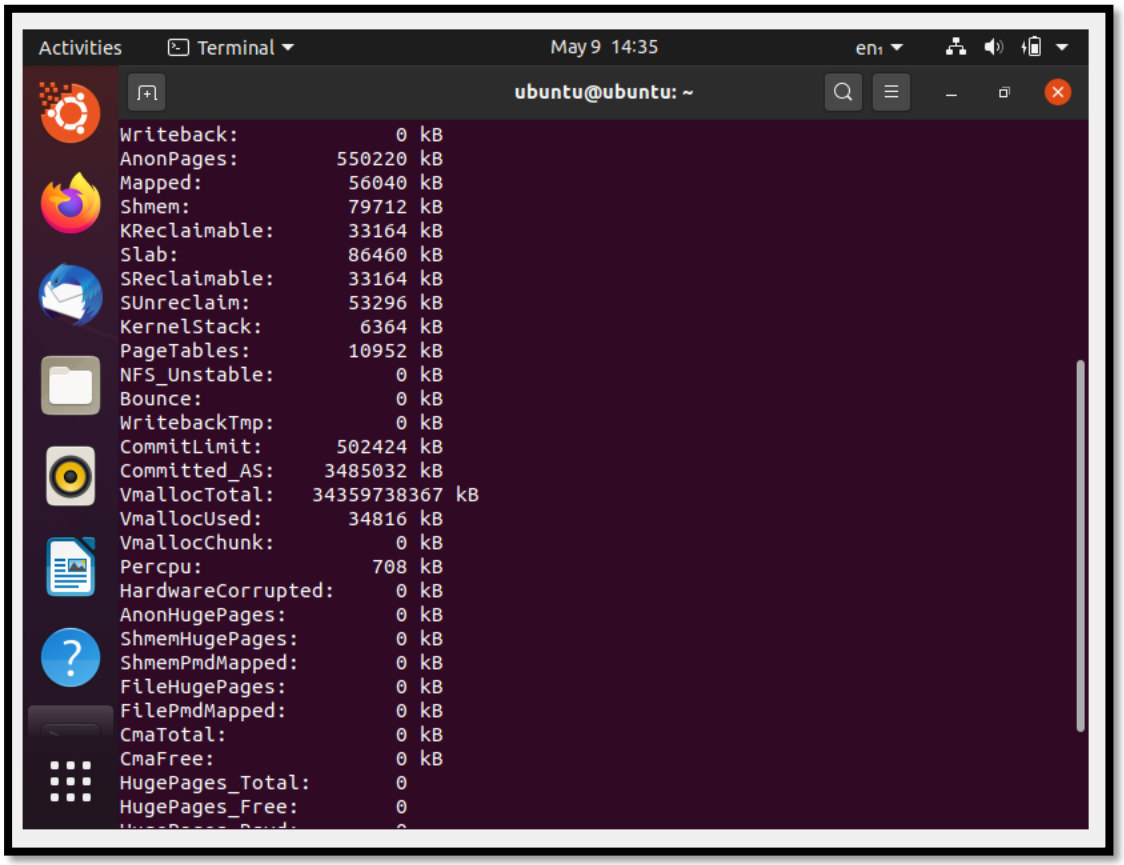


Free/free -h

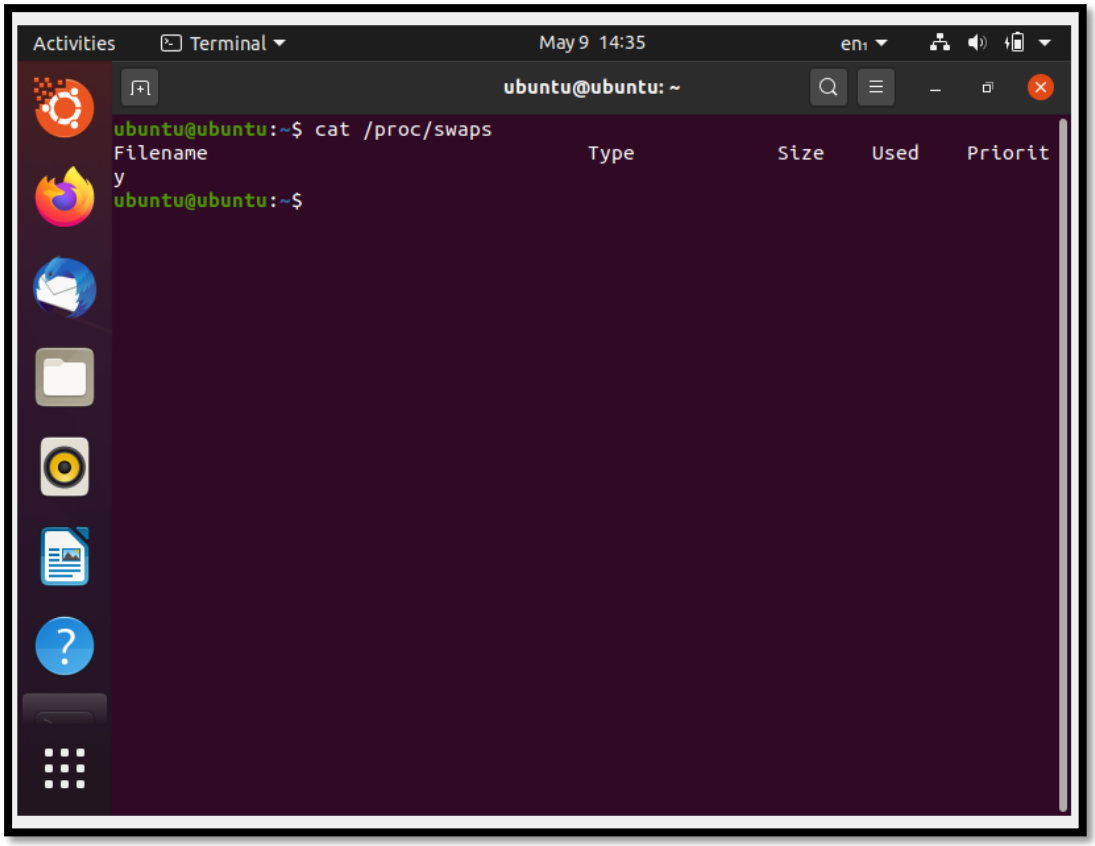


Cat /proc/meminfo





Cat /proc/swaps



Conclusion:

Thus, From above experiments, I learn about various linux commands related to memory management.