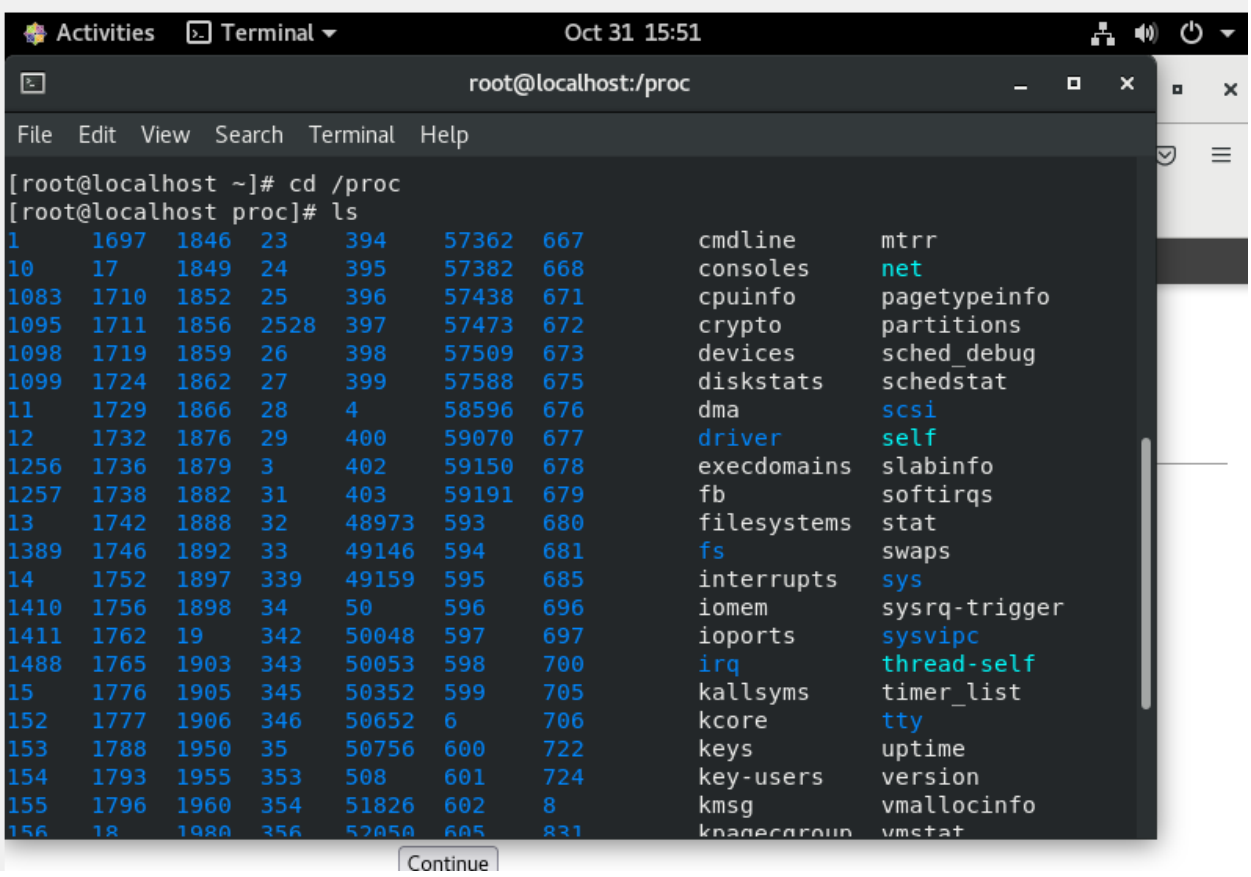
Module:-COSA(Concept Of Operating System And Administration)
Date:- 31/10/2022
Assignment :- 05 **Name:- Prauthviraj Nikam**

1. **/proc :-** It is filesystem acts as an interface to internal data structures in the kernel. It can be used to obtain information about the system and to change certain kernel parameters at runtime(sysctl). or we can say It is a temporary file system which stores the CPU or processor data. Below data what we shown in pic. is volatile as the system shutdown it lost. When the system running proc file system generated and use the data.

   → How to Check load on CPU and I/O overtime

```
[root@localhost ~]# glances
[root@localhost ~]# cat /proc/loadavg
0.08 0.32 0.22 3/611 59098
```

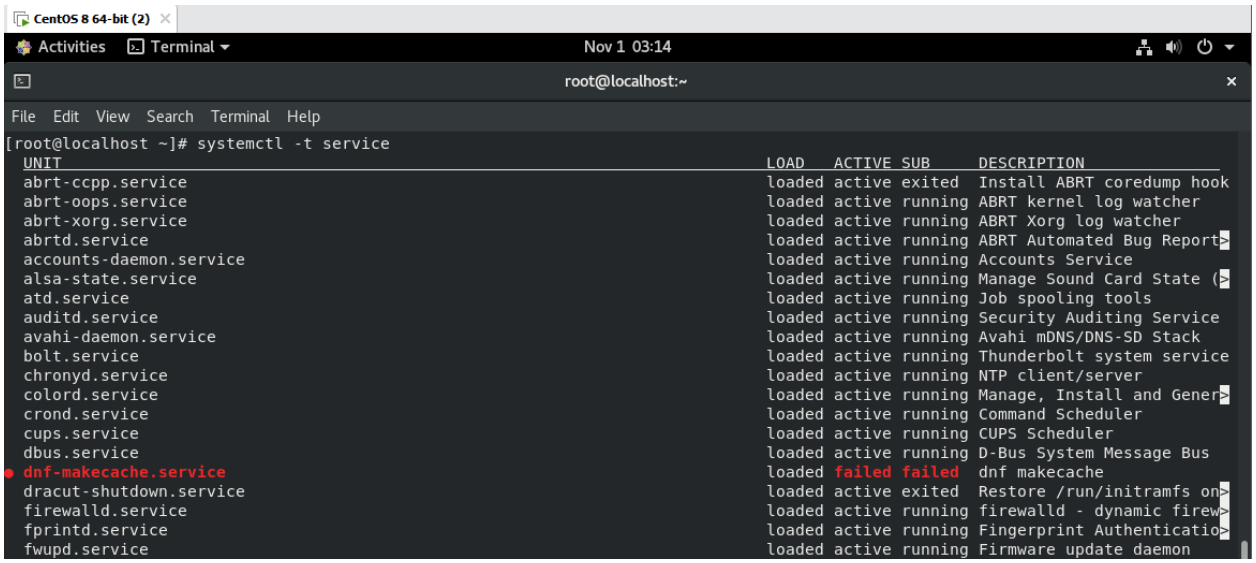


2. **systemctl :-** “systemctl” cmd is used to run, execute and find error .
    - How many System Run
    - How many system active
    - How many system show error

→ It’s possible to display services’ status like follows:-

CMD:-

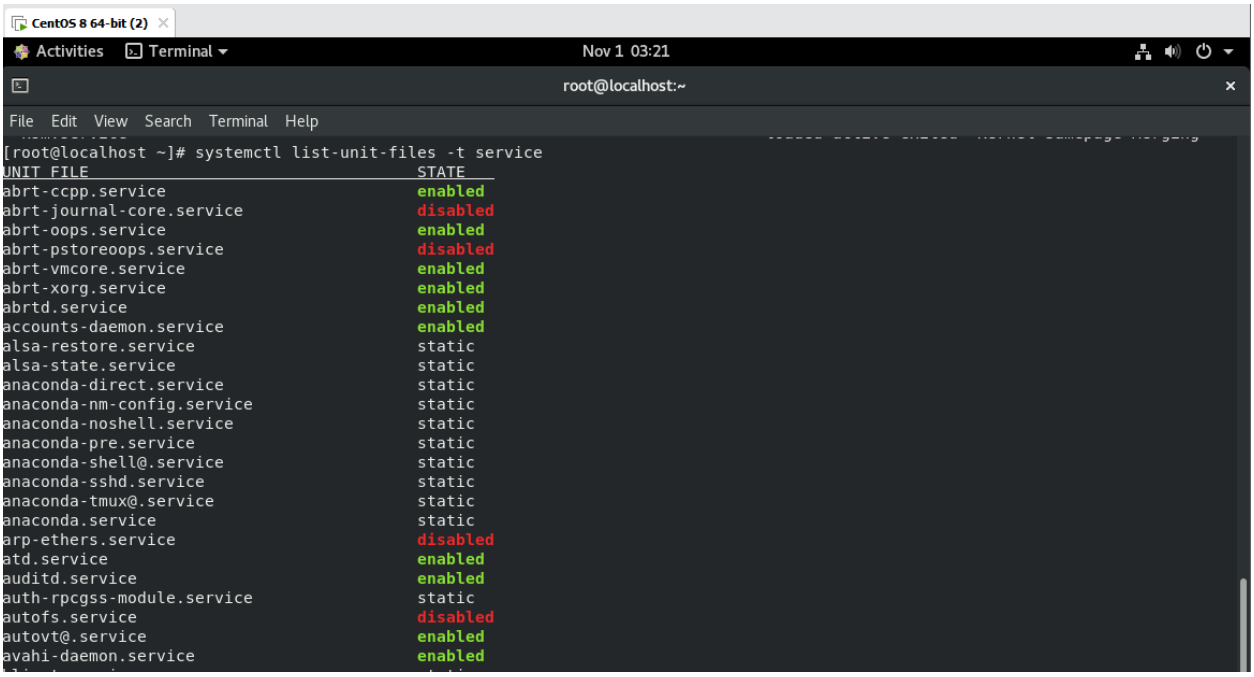
#systemctl -t service



→ List of all services

CMD:-

systemctl list-unit-files -t service



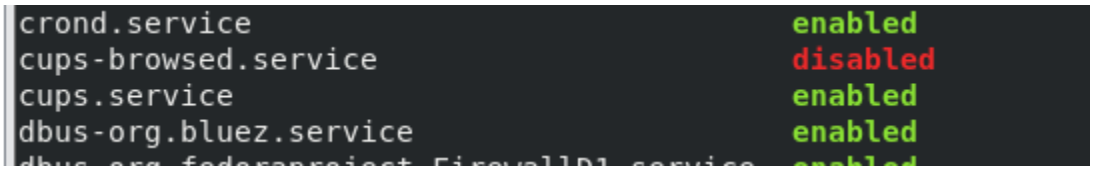
→ Stop and turn OFF auto-start setting a service if you donot need it

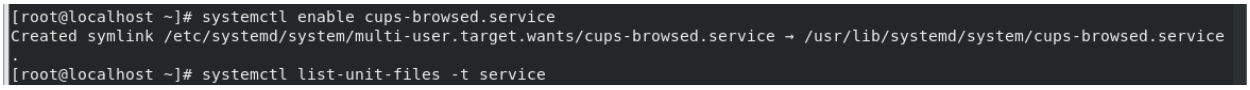
CMD:-

systemctl stop Service_Name

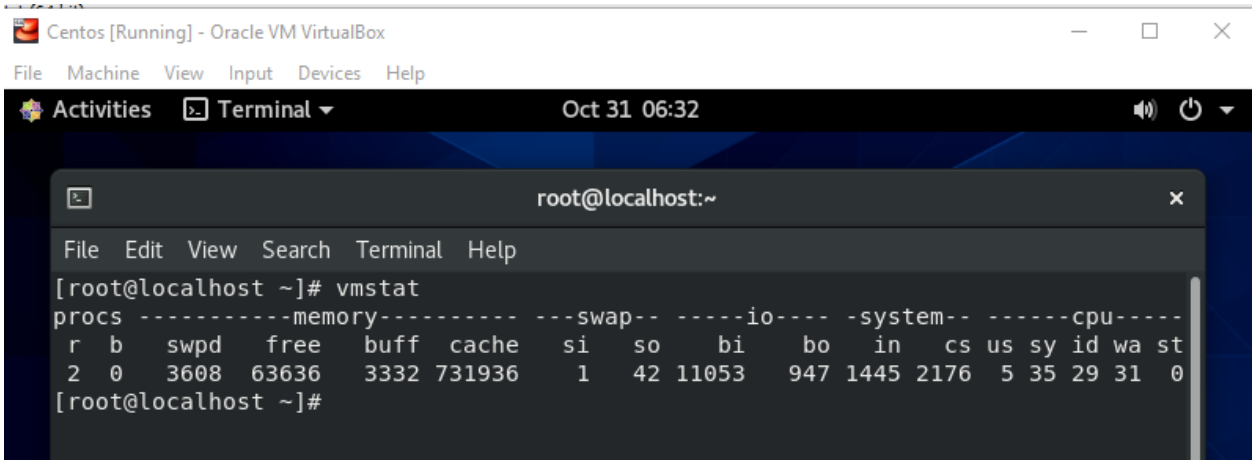
systemctl disable Service_Name

systemctl enable Service_Name





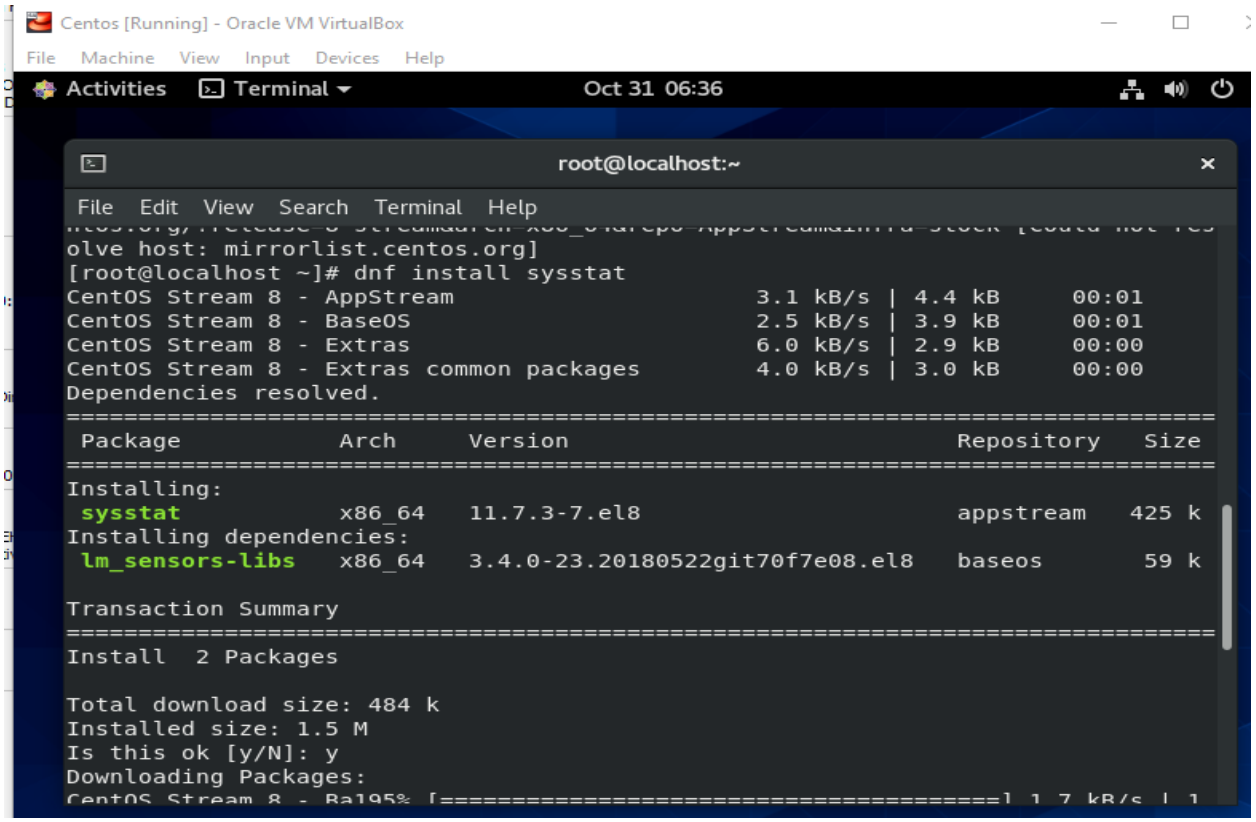
3.vmstat :- It show status of virtual memory.



4.sysstat:- System Activity Report (sar) The sysstat utilities are a collection of performance monitoring tools for Linux. It also include sar, sadf, mpstat, iostat, tapestat, pidstat, cifsiostat and sa tools.

CMD:-**System Activity Report (sar)**

dnf install systat



→To show the version of sysstat utility

CMD :-

mpstat –V

→ mpstat command without using any flags or options will display the global average activites by All CPUs.

```
[root@localhost ~]# mpstat
Linux 4.18.0-383.el8.x86_64 (localhost.localdomain)     10/31/2022      _x86_64_
(1 CPU)

06:36:52 AM  CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest
  %gnice   %idle
06:36:52 AM  all    2.31    0.02    6.89    9.83    9.66    3.33    0.00    0.00
    0.00   67.97
```

→ Using mpstat with option '-P' (Indicate Processor Number) and 'ALL', will display statistics about all CPUs one by one starting from 0

CMD:-

mpstat –P ALL

```
[root@localhost ~]# mpstat -P ALL
Linux 4.18.0-383.el8.x86_64 (localhost.localdomain)     10/31/2022      _x86_64_
(1 CPU)

06:38:55 AM  CPU    %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest
  %gnice   %idle
06:38:55 AM  all    1.76    0.02    6.40    7.28   11.41    5.56    0.00    0.00
    0.00   67.57
06:38:55 AM    0    1.76    0.02    6.40    7.28   11.41    5.56    0.00    0.00
    0.00   67.57
[root@localhost ~]#
```

5.sar(System Activity Reporter):- "sar" helps to get the reports about whole system's

→ To check run queue length, total number of processes and load average

CMD :-

sar -q 2 5

↓ ↓

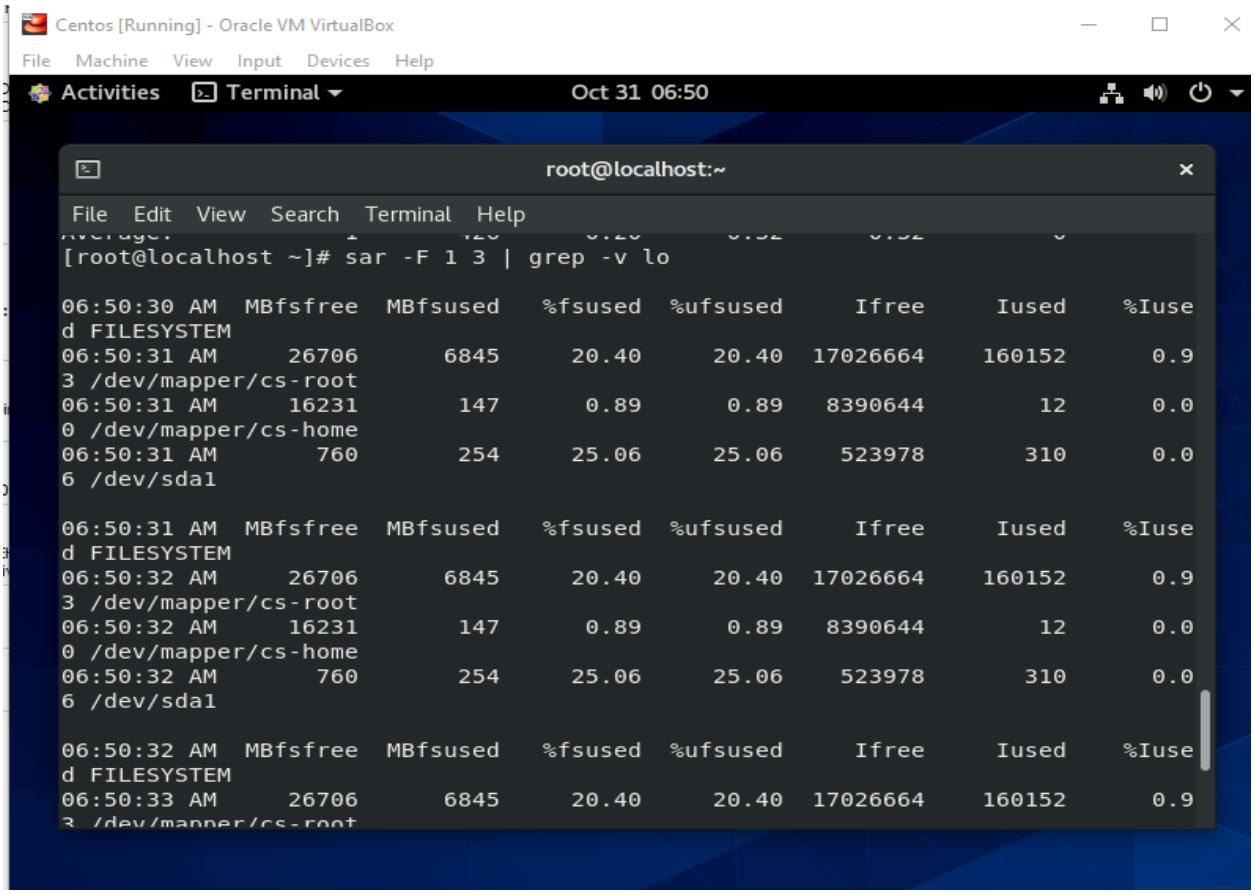
Load Avg. total no of Process

```
[root@localhost ~]# sar -q 2 5
Linux 4.18.0-383.el8.x86_64 (localhost.localdomain)     10/31/2022      _x86_64_
(1 CPU)

06:43:49 AM   runq-sz  plist-sz   ldavg-1   ldavg-5  ldavg-15   blocked
06:43:51 AM         2       426      0.08      0.30      0.31         0
06:43:53 AM         3       426      0.24      0.33      0.32         0
06:43:55 AM         1       426      0.24      0.33      0.32         0
06:43:57 AM         0       426      0.22      0.32      0.32         0
06:43:59 AM         1       426      0.22      0.32      0.32         0
Average:            1       426      0.20      0.32      0.32         0
[root@localhost ~]#
```

→ To check statistics about the mounted file systems using –F

CMD:-

sar -F 1 3 | egrep -v lo



→ To print memory statistics use -r option

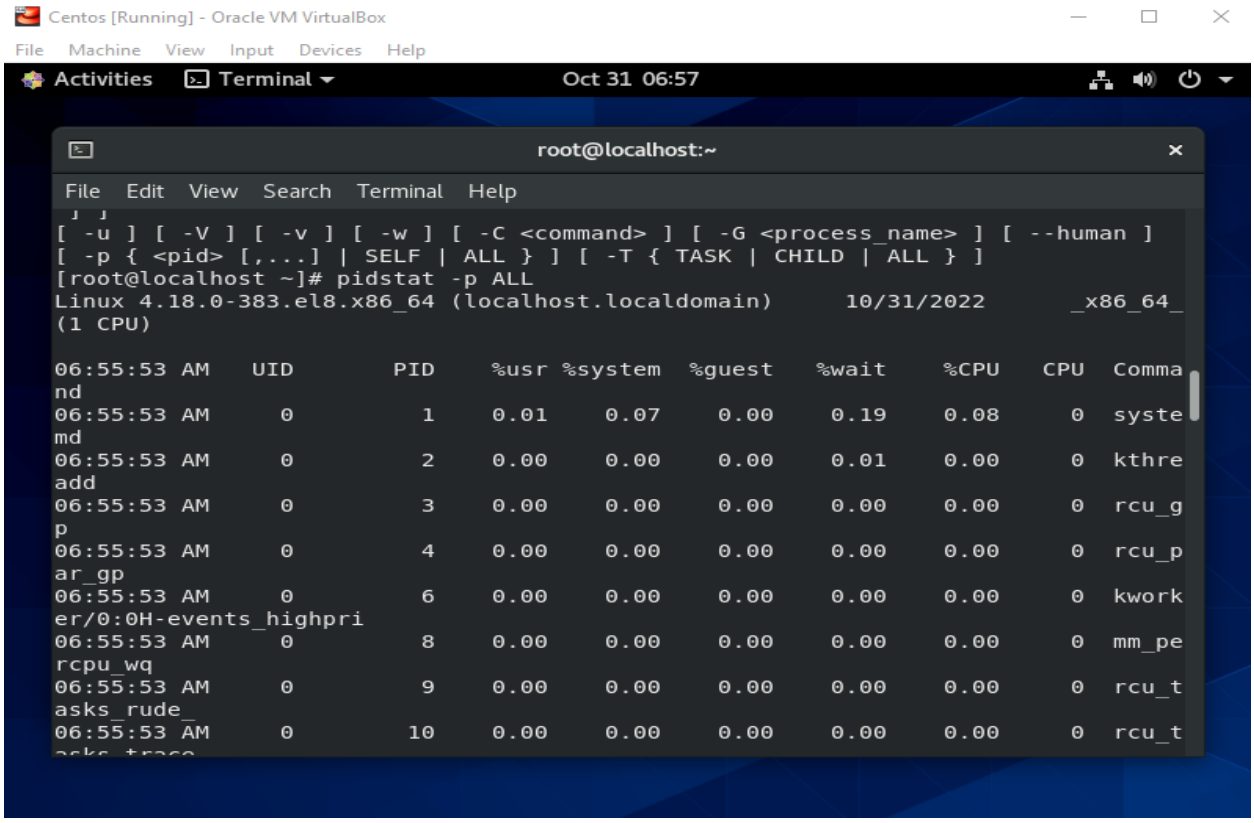
```
[root@localhost ~]# sar -r 1 3
Linux 4.18.0-383.el8.x86_64 (localhost.localdomain)     10/31/2022      _x86_64_
(1 CPU)

06:52:11 AM kbmemfree   kbavail kbmemused  %memused kbbuffers  kbcached  kbcommi
t   %commit  kbactive   kbinact   kbdirty
06:52:12 AM     78468    864640   1777832     95.77         4    886608   333164
4     83.07    649804    872124         0
06:52:13 AM     78348    864628   1777952     95.78         4    886716   333164
4     83.07    649912    872128         0
06:52:14 AM     78288    864568   1778012     95.78         4    886716   333164
4     83.07    649912    872156         0
Average:        78368    864612   1777932     95.78         4    886680   333164
4     83.07    649876    872136         0
[root@localhost ~]#
```

6.pidstat:- It is used for process monitoring and current threads, which are being managed by kernel. pidstat can also check the status about child processes and threads.

⟶ To print all active and non-active tasks use the option '-p' (processes).

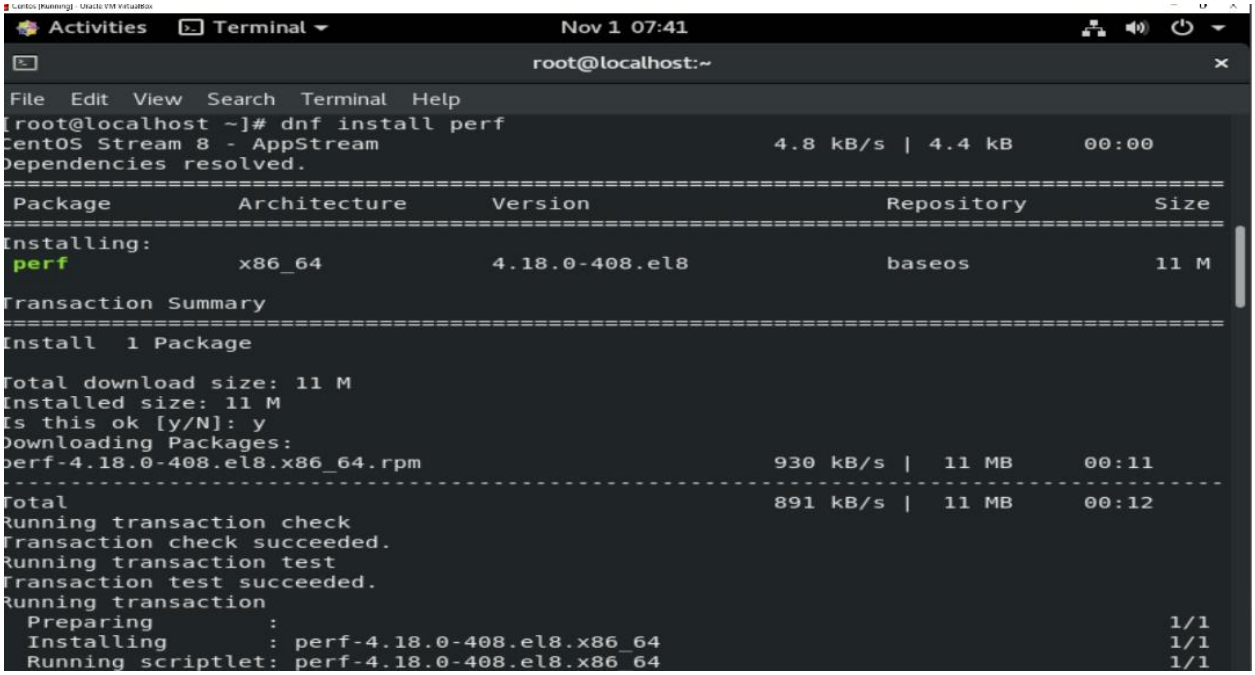
CMD:-

pidstat –p ALL

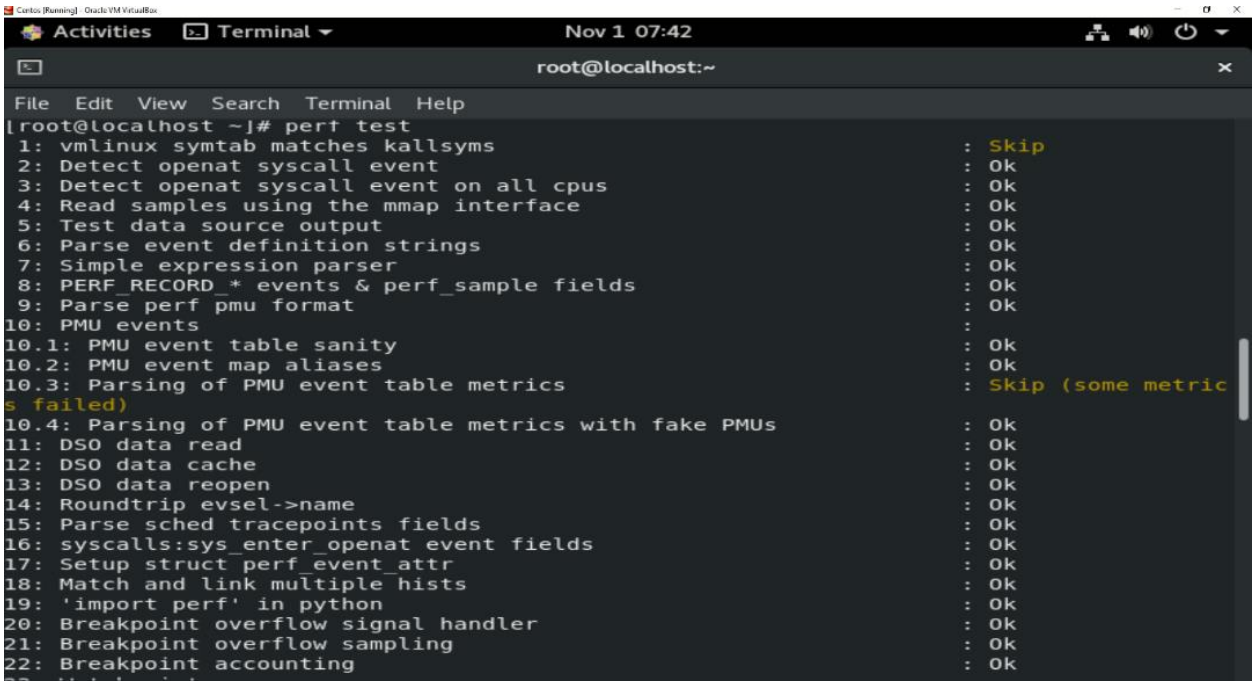


→ Using pidstat command with '-d 2' option, we can get I/O statistics within 2 seconds interval to get refreshed statistics. This option can be handy in situation, where your system is undergoing heavy I/O and you want to get clues about the processes consuming high resources.
CMD :-
pidstat -d 2 n z

7.perf:- Performance monitoring for the Linux Kernel. It gives report which parameters passed or failed or skipped those parameters which is not applicable for the systems.
CMD:-
dnf install perf



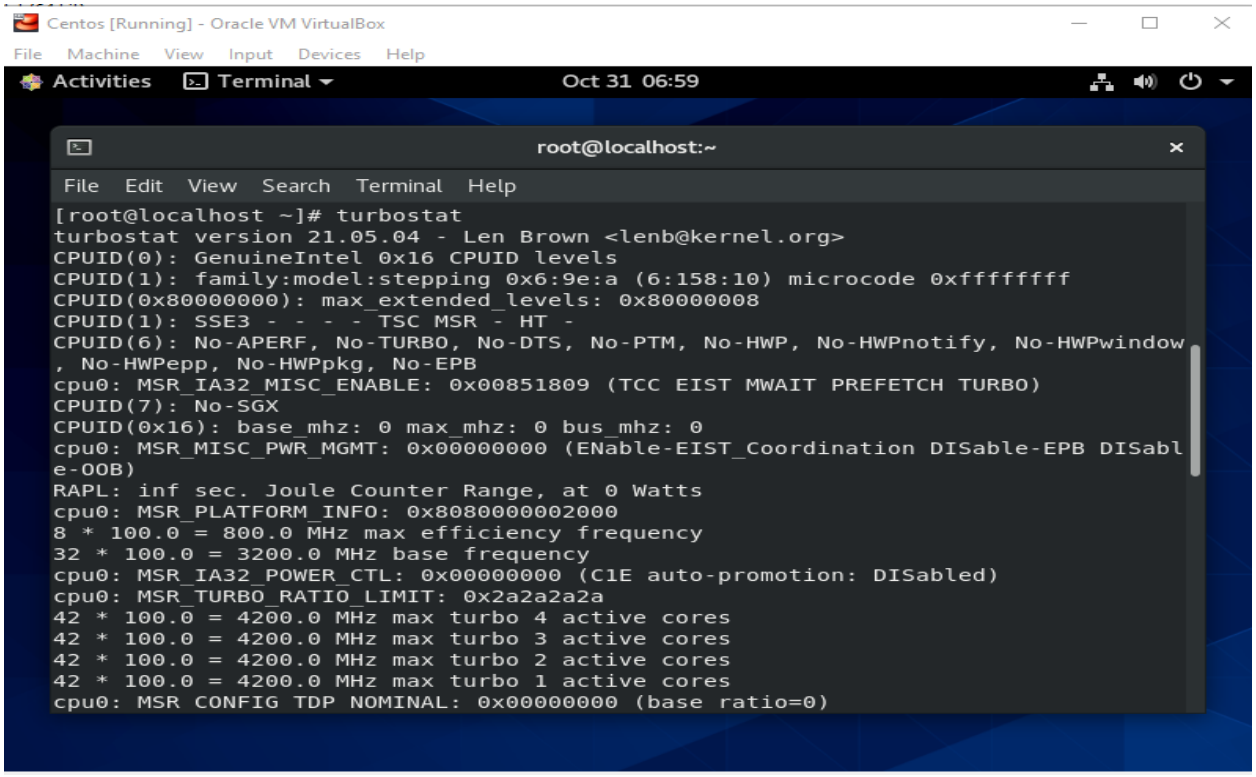
→ To perform sanity test in the system
CMD :-
perf test



8. turbostat:- Report processor frequency and idle statistics. It gives the report about the processor performance.

CMD :-

turbostat



9. iostat:- Report central processing unit (CPU) statistics and input/output statistics for devices and partitions.-

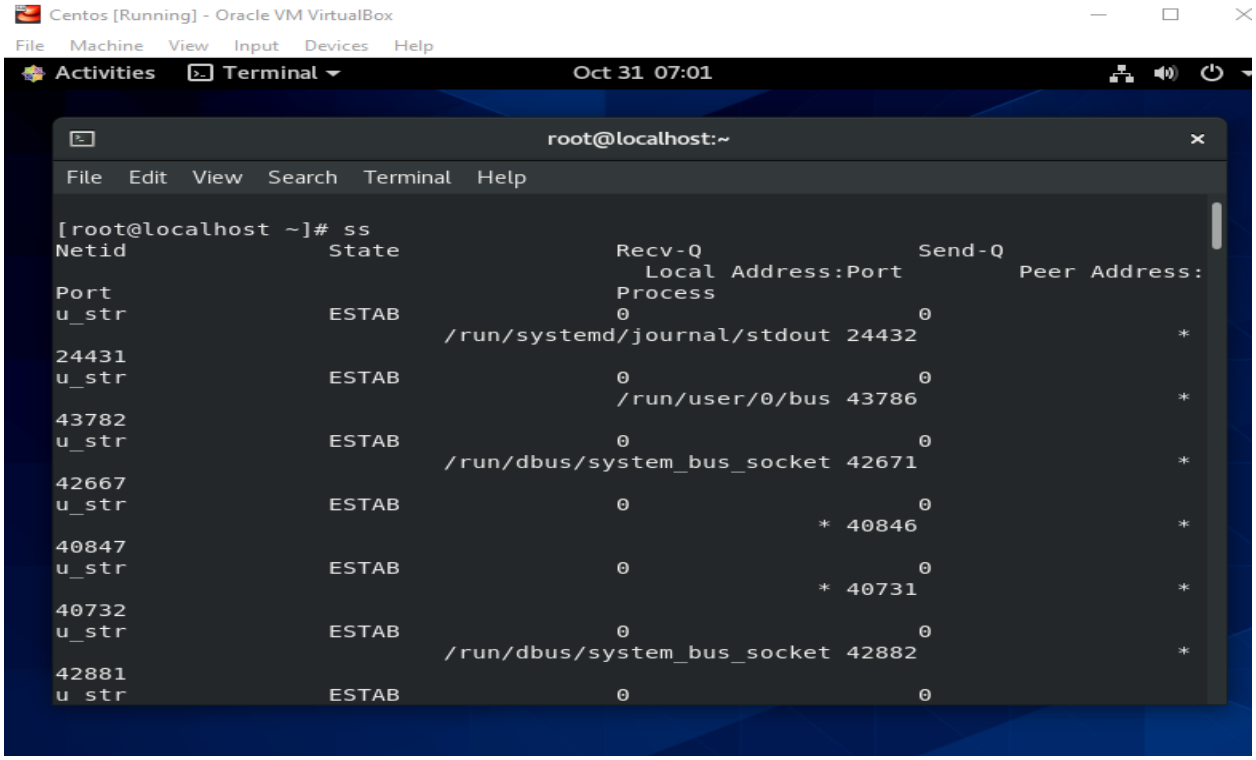
```
[root@localhost ~]# iostat
Linux 4.18.0-383.el8.x86_64 (localhost.localdomain)     11/01/2022      _x86_64_      (
1 CPU)

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           0.26    0.00    1.96    0.60    0.00   97.17

Device             tps    kB_read/s    kB_wrtn/s    kB_read    kB_wrtn
sda               4.12       132.22        65.06   12052268    5930057
scd0              0.00         0.00         0.00          2          0
dm-0              1.88       116.14        24.46   10586533    2229236
dm-1             14.00        15.48        40.56    1411252    3696668
dm-2              0.00         0.03         0.02       2545       2068
```

10. irqbalance:- It distribute hardware interrupts across processors on multiprocessor system in order to increase performance. It will find a balance between power savings and optimal performance. It work is invisible to us. The daemon balances savings in power consumption with performance. The irqbalance configuration file is /etc/sysconfig/irqbalance allows the selection of which CPU's which may be assigned which interrupts.

11. ss:- It is a Network tool which is used for displaying network socket related information on a Linux system. The tool displays more detailed information that the "netstat" command which is used for displaying active socket connections

CMD :-

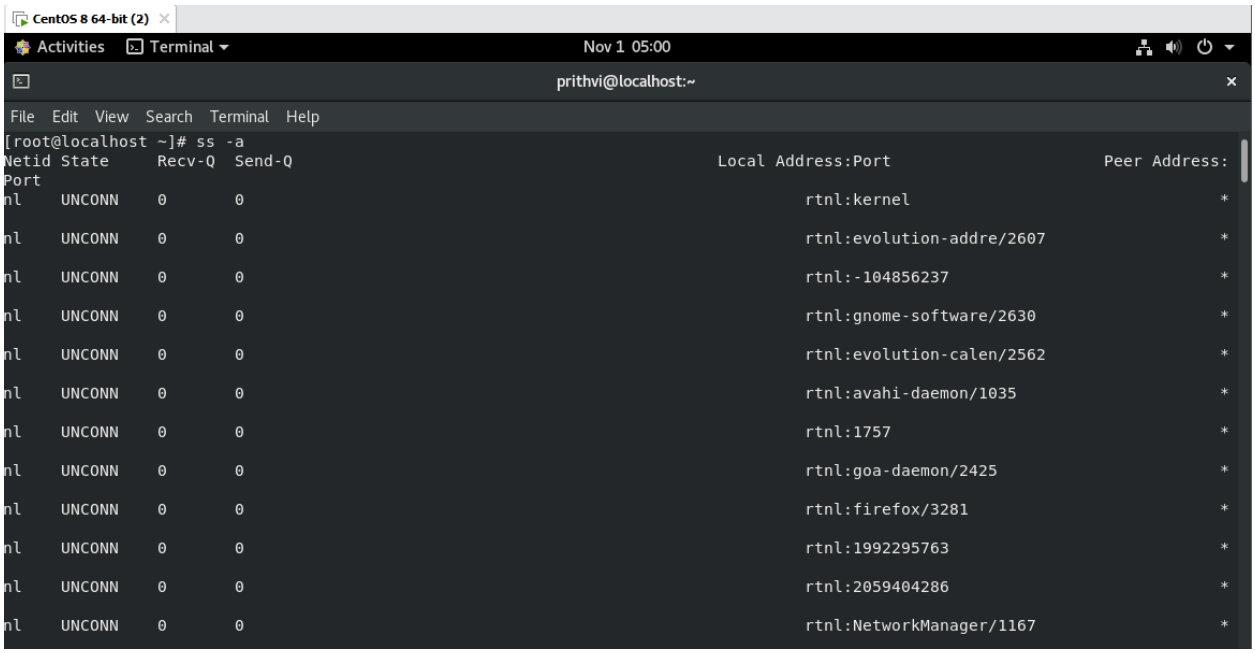
ss



→ To retrieve a list of both listening and non-listening ports using the –a

CMD:-

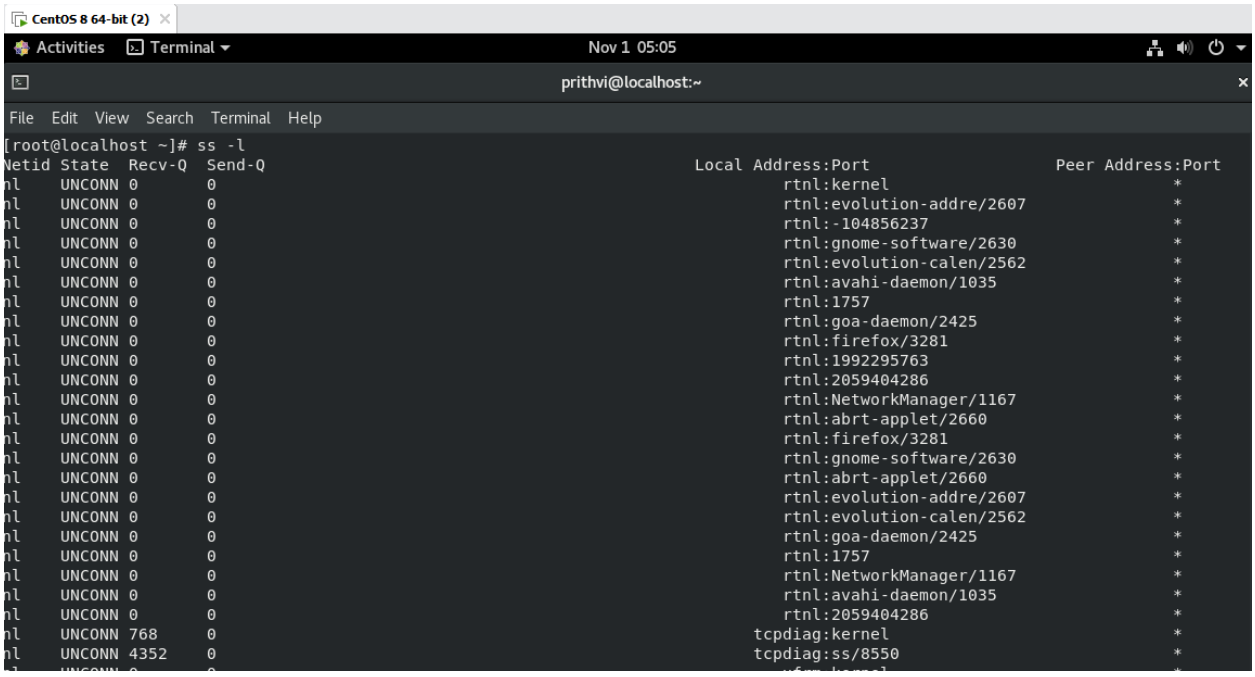
ss –a



→To display listening sockets only, use the "-l" flag

CMD:-

ss –l



→To display all TCP connection, use the –t

CMD :-

ss –t

```
[root@localhost ~]# ss -t
State          Recv-Q          Send-Q                    Local Address:Port                     Peer Address:Port
ESTAB          0               0                       192.168.213.129:45602                  34.120.158.37:https
ESTAB          0               0                       192.168.213.129:49002                  52.35.225.239:https
ESTAB          0               0                       192.168.213.129:42132                  142.251.42.37:https
ESTAB          0               0                       192.168.213.129:58264                 142.250.193.165:https
ESTAB          0               0                       192.168.213.129:37710                  172.217.166.67:https
ESTAB          0               0                       192.168.213.129:49450                  142.251.42.14:https
ESTAB          0               0                       192.168.213.129:42134                  142.251.42.37:https
ESTAB          0               0                       192.168.213.129:44034                 142.250.183.106:https
[root@localhost ~]#
```

→To view all the listening TCP socket connection use the “-lt”

CMD:-

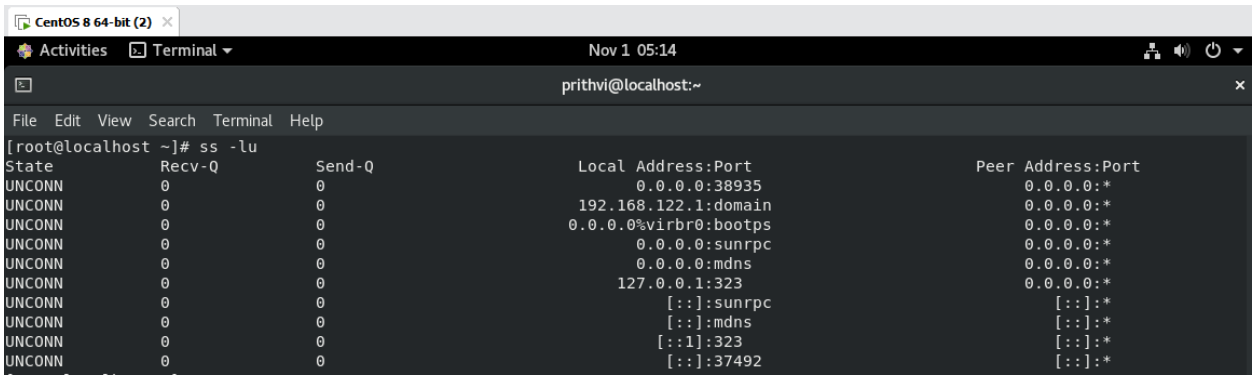
ss -lt

```
[root@localhost ~]# ss -lt
State          Recv-Q          Send-Q                    Local Address:Port                     Peer Address:Port
LISTEN         0               128                             0.0.0.0:sunrpc                        0.0.0.0:*
LISTEN         0               32                        192.168.122.1:domain                       0.0.0.0:*
LISTEN         0               128                             0.0.0.0:ssh                           0.0.0.0:*
LISTEN         0               5                             127.0.0.1:ipp                           0.0.0.0:*
LISTEN         0               128                                [::]:sunrpc                           [::]:*
LISTEN         0               128                                [::]:ssh                              [::]:*
LISTEN         0               5                                 [::1]:ipp                              [::]:*
```

→To list listening UDP connection use “-lu” option.

CMD:-

ss –lu



→To display the process IDs related to socket connections, use the -p flag as shown

CMD:-

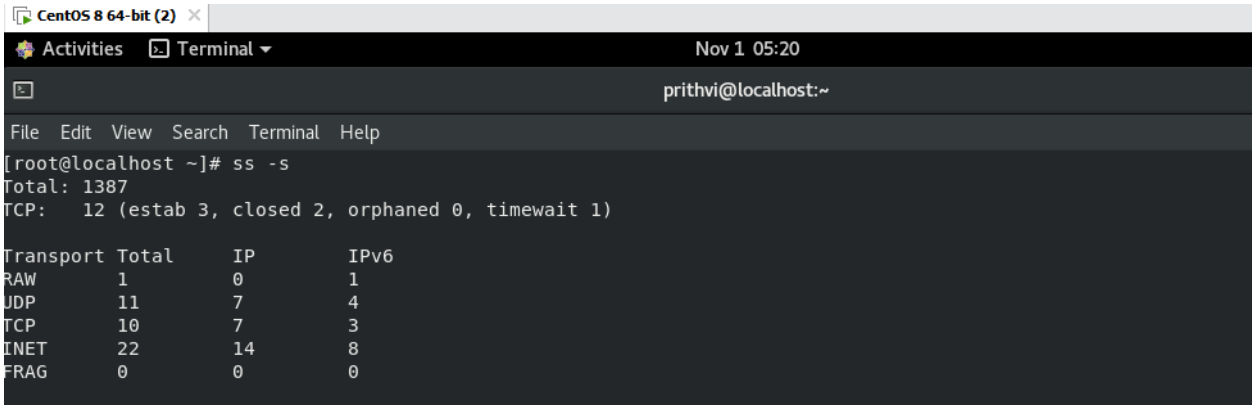
ss –p

```
[root@localhost ~]# ss -p
Netid  State   Recv-Q  Send-Q                                      Local Address:Port            Peer Address:Port

u_seq  ESTAB   0       0                                                       * 103371                     * 0
 users:(("firefox",pid=3281,fd=255))
u_str  ESTAB   0       0                                                       * 51004                      * 51005
 users:(("gsd-media-keys",pid=2508,fd=8))
u_str  ESTAB   0       0                                                       * 43242                      * 43244
 users:(("gsd-screensaver",pid=2047,fd=1))
u_str  ESTAB   0       0                                                       * 43011                      * 43013
 users:(("gsd-media-keys",pid=2026,fd=1))
u_str  ESTAB   0       0                                                       * 29020                      * 29019
 users:(("auditd",pid=972,fd=9))
u_str  ESTAB   0       0                                                       * 48542                      * 48543
 users:(("ibus-x11",pid=2381,fd=5))
u_str  ESTAB   0       0                                 /run/dbus/system_bus_socket 46861                  * 46860
 users:(("dbus-daemon",pid=1040,fd=30))
u_str  ESTAB   0       0                                           /run/user/0/bus 46850                    * 46767
 users:(("dbus-daemon",pid=2238,fd=14))
u_str  ESTAB   0       0                                                       * 42212                      * 42213
 users:(("upowerd",pid=1981,fd=5))
u_str  ESTAB   0       0                                 /run/systemd/journal/stdout 50049                  * 50046
 users:(("systemd-journal",pid=598,fd=151),("systemd",pid=1,fd=169))
u_str  ESTAB   0       0                                 /run/dbus/system_bus_socket 45950                  * 45949
 users:(("dbus-daemon",pid=1040,fd=28))
```

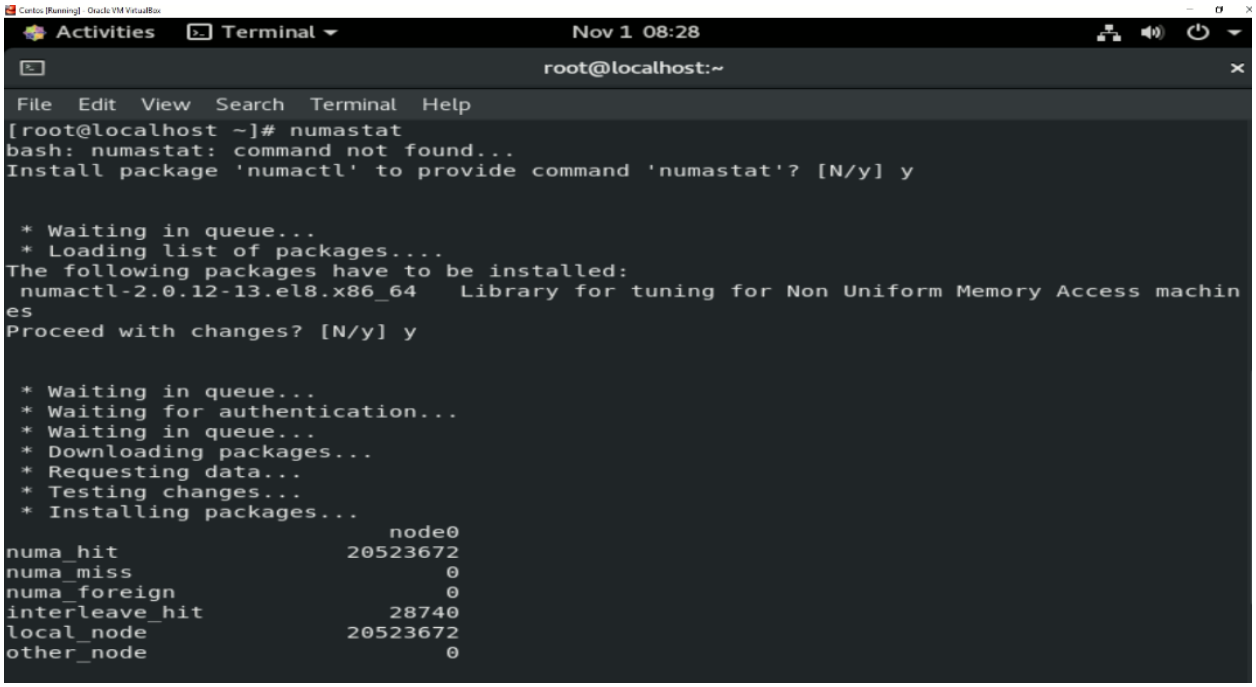
→ To display summary statistics, using the "-s" option.

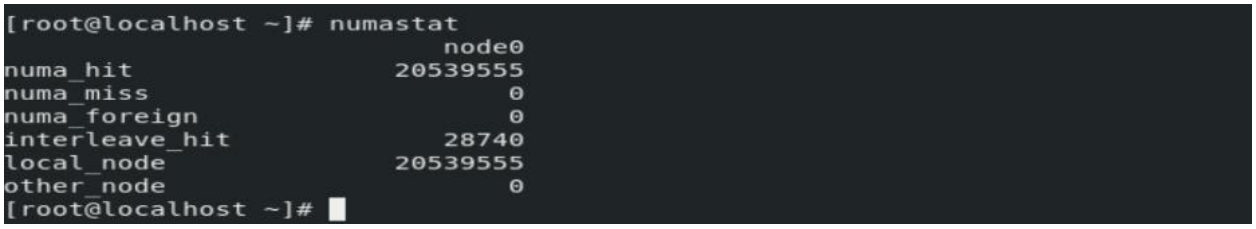
CMD:-

ss –s

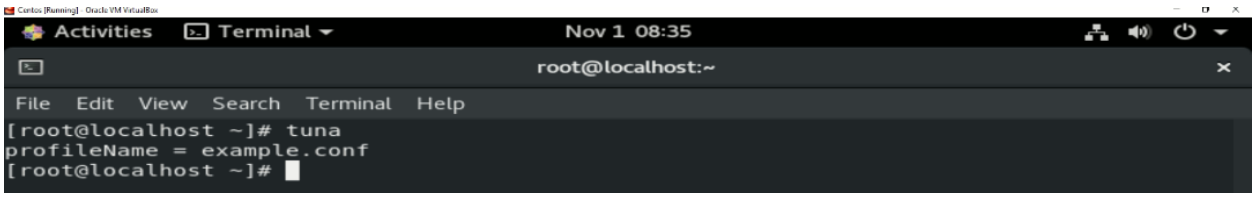


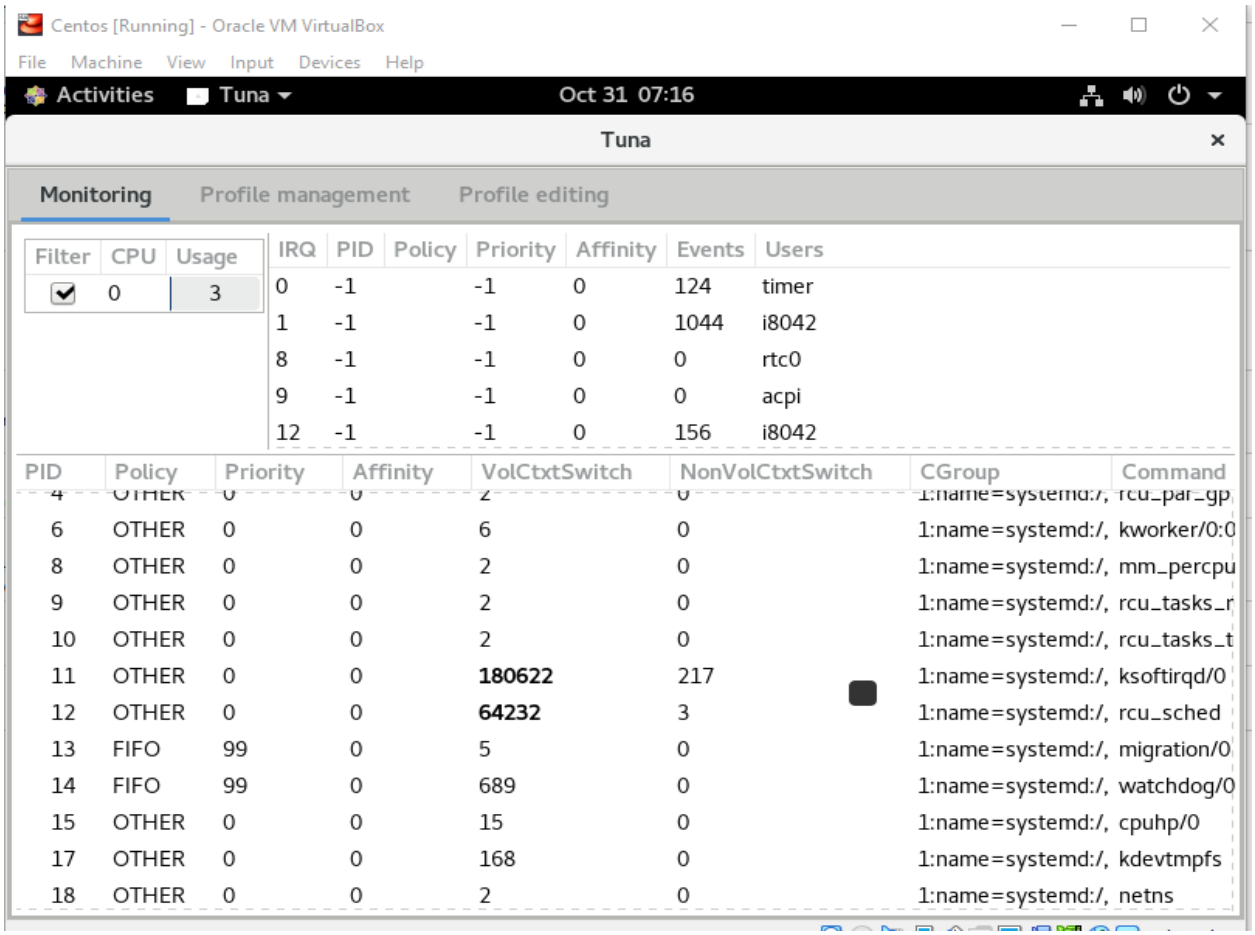
12.numastat:- The "numastat" tool is used to display node memory statistics of processes and operating systems from the kernel memory allocator. Eache NUMA has different memory policies.





13.tuna:- It is a tool that can be used to adjust scheduler tunables such as such as schedulaer policy, RT priority and CPU affinity. It also allows the user to see the results of these changes. Most Tuna operations can be performed on either the command line or in the GUI.



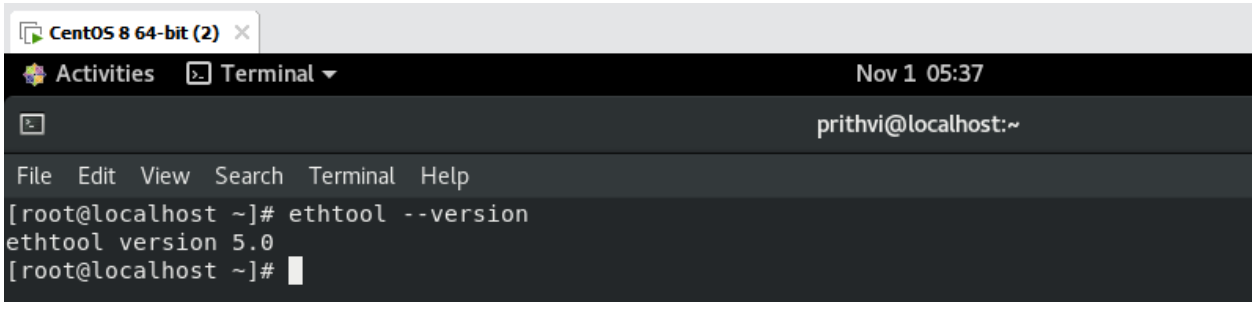


14.ethtool:- It is a networking utility on Linux. It is used to configure Ethernet devices on Linux. ethtool can also be used to find a lot of information about connected Ethernet devices on your Linux computer.

→To show the version of ethtool

CMD :-

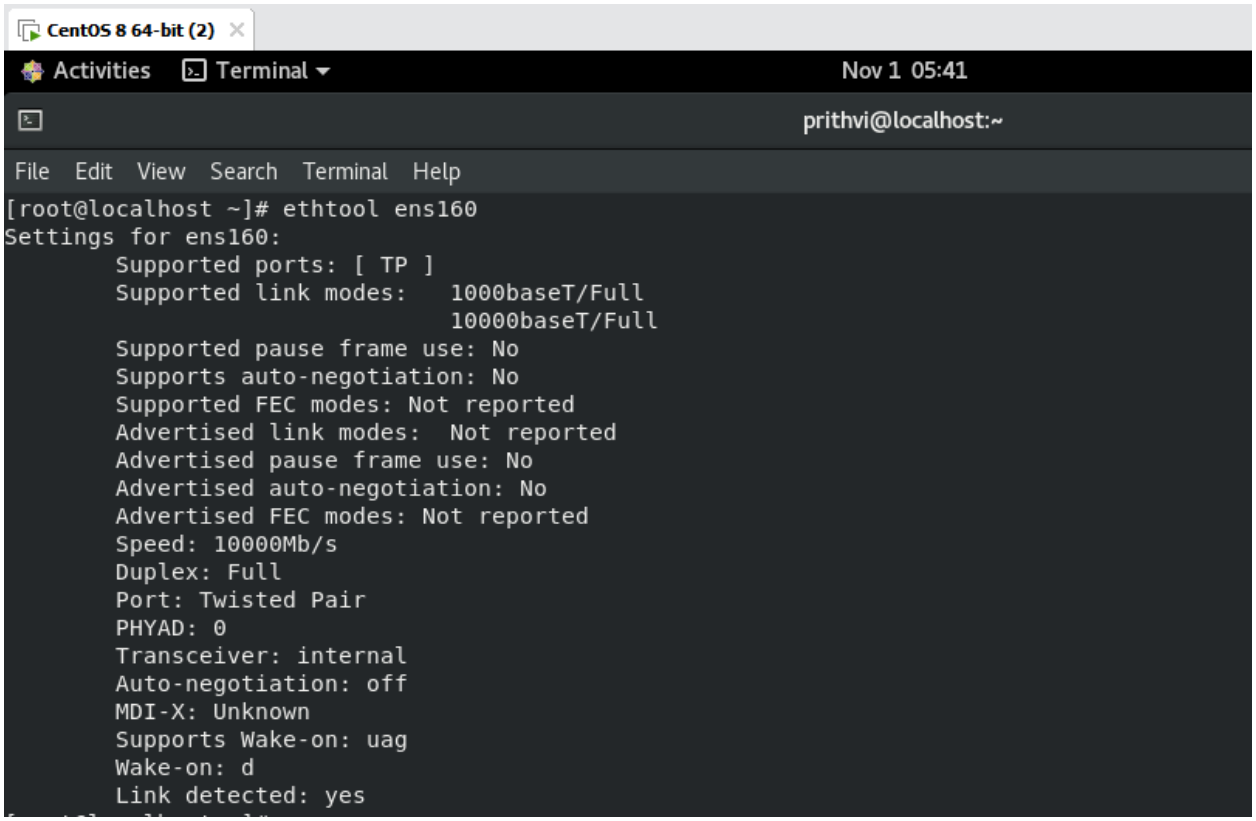
ethtool –version



→ To display the information about a NIC (Network Interface Card)

CMD :-

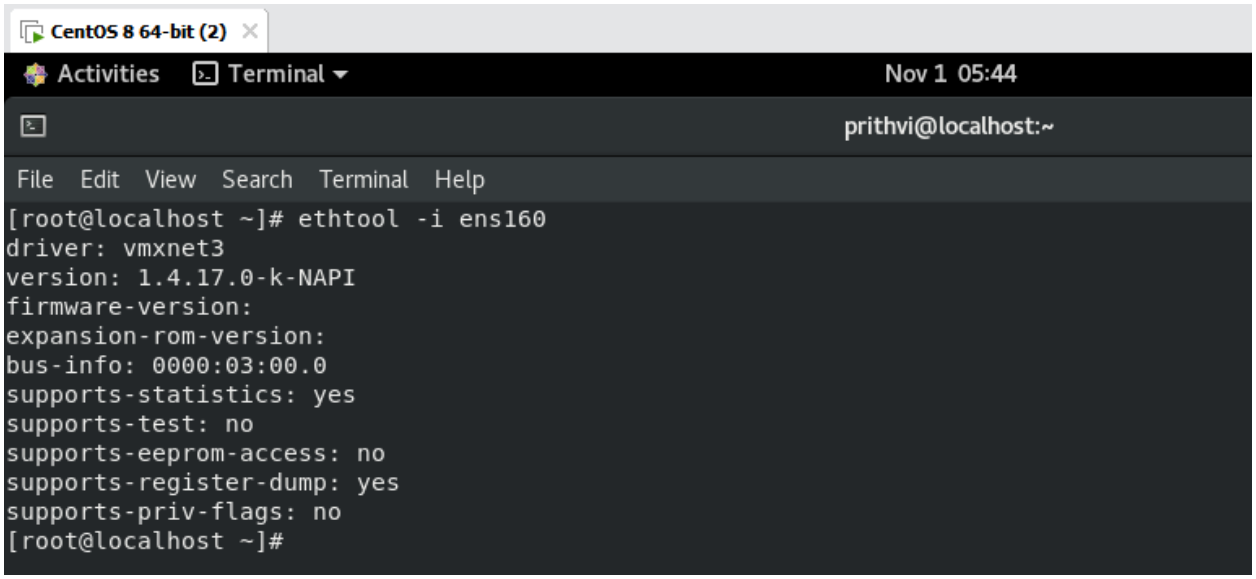
ethtool enp0s3



→To check for the driver used

CMD :-

ethtool -i enp0s3



15.ip :- This commands is used to show or manipulate routing, devices and tunnels. It is similar to ifconfig command.

→ To find the assigned names of all the available network interfaces of your computer

CMD:-

ip link show