

5.MEMORY MANAGEMENT

AIM : To study process and memory management commands in unix.

THEORY: Process Management: Process management in Unix involves creating, scheduling, and terminating processes. Unix allows multiple processes to run concurrently, and it ensures they don't interfere with each other.

The free command in Linux displays information about available and used memory, including RAM and swap space.

```
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$ free
              total        used        free      shared  buff/cache   available
Mem:           3878212      2151424      270532        653904        1456256         821200
Swap:          9764860       15628      9749232
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$
```

```
Activities  Terminal  Thu 15:33
lab1003@lab1003-HP-280-G2-MT: ~/Pratham_63
-r--r--r-- 1 root      root      0 Feb 27 15:32 vmstat
-r--r--r-- 1 root      root      0 Feb 27 15:32 zoneinfo
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$ top
top - 15:33:28 up 49 min, 1 user, load average: 2.69, 1.55, 0.87
Tasks: 314 total, 1 running, 253 sleeping, 0 stopped, 0 zombie
%Cpu(s): 4.4 us, 2.1 sy, 0.0 ni, 71.4 id, 21.2 wa, 0.0 hi, 0.8 si, 0.0 st
KiB Mem : 3878212 total, 308744 free, 2640168 used, 929300 buff/cache
KiB Swap: 9764860 total, 9692144 free, 72716 used, 402252 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM     TIME+ COMMAND
 4699 lab1003   20   0 3781240 394916 192968 S   9.6 10.2   2:54.42 firefox
 2206 lab1003    9 -11 2645388 14064   9816 S   5.6  0.4   0:01.79 pulseaudio
 8830 lab1003   20   0 2722620 209924 112776 S   4.0  5.4   0:09.64 Isolated Web Co
 4888 lab1003   20   0 3512320 729928 105764 S   3.3 18.8   4:58.07 Isolated Web Co
11949 lab1003   20   0 44324    4336   3472 R   1.3  0.1   0:00.13 top
 233 root        20   0      0      0      0 D   0.7  0.0   0:00.56 jbd2/sda7-8
 2036 lab1003   20   0 900012   45748  26108 S   0.7  1.2   0:57.43 Xorg
 2180 lab1003   20   0 4128528 213612 78832 S   0.7  5.5   1:26.20 gnome-shell
 2500 lab1003   20   0 793348   28404  18416 S   0.7  0.7   0:08.01 gnome-terminal-
11838 lab1003   20   0 2722092 137248 92476 S   0.7  3.5   0:02.68 Isolated Web Co
11838 lab1003   20   0 2571484 91552   79668 S   0.7  2.4   0:00.15 Isolated Web Co
 786 message+  20   0   51692   5564   3552 S   0.3  0.1   0:01.61 dbus-daemon
 801 root        20   0   45600   4180   3296 S   0.3  0.1   0:00.20 wpa_supplicant
1021 gdm         20   0 3902792 132104 73800 S   0.3  3.4   0:06.51 gnome-shell
 4870 root        20   0      0      0      0 I   0.3  0.0   0:00.94 kworker/u8:2-ev
11314 lab1003   20   0 2575332 95464   81684 S   0.3  2.5   0:00.27 Isolated Web Co
11364 lab1003   20   0 2574308 92852   80436 S   0.3  2.4   0:00.33 Isolated Web Co
11508 lab1003   20   0 2573284 92824   80436 S   0.3  2.4   0:00.26 Isolated Web Co
11840 lab1003   20   0 2571208 91520   79608 S   0.3  2.4   0:00.14 Isolated Web Co
    1 root        20   0 225484    6732   4764 S   0.0  0.2   0:03.67 systemd
    2 root        20   0      0      0      0 S   0.0  0.0   0:00.01 kthreadd
    3 root        20  -20      0      0      0 I   0.0  0.0   0:00.00 rcu_gp
    4 root        20  -20      0      0      0 I   0.0  0.0   0:00.00 rcu_par_gp
    6 root        20  -20      0      0      0 I   0.0  0.0   0:00.00 kworker/0:0H
    8 root        20  -20      0      0      0 I   0.0  0.0   0:00.00 mm_percpu_wq
    9 root        20   0      0      0      0 S   0.0  0.0   0:00.07 ksoftirqd/0
   10 root        20   0      0      0      0 I   0.0  0.0   0:01.99 rcu_sched
```

Displays disk space usage, which indirectly helps monitor memory usage related to disk I/O.

```
Activities Terminal Thu 15:36
lab1003@lab1003-HP-280-G2-MT: ~/Pratham_63$ df
Filesystem 1K-blocks      Used Available Use% Mounted on
udev        1913040         0    1913040   0% /dev
tmpfs       387824         1848    385976   1% /run
/dev/sda7   186056968 11124196 165408804   7% /
tmpfs       1939104         0    1939104   0% /dev/shm
tmpfs       5120           4      5116    1% /run/lock
tmpfs       1939104         0    1939104   0% /sys/fs/cgroup
/dev/loop0  56704         56704         0 100% /snap/core18/2855
/dev/loop2  45440         45440         0 100% /snap/snapd/23258
/dev/loop1  45568         45568         0 100% /snap/snapd/23545
/dev/loop4   512           512         0 100% /snap/gnome-characters/795
/dev/loop3   2560         2560         0 100% /snap/gnome-system-monitor/163
/dev/loop7   2560         2560         0 100% /snap/gnome-calculator/884
/dev/loop5   1664         1664         0 100% /snap/gnome-system-monitor/186
/dev/loop8  247168       247168         0 100% /snap/gnome-3-38-2004/70
/dev/loop6  508928       508928         0 100% /snap/gnome-42-2204/141
/dev/loop10  93952        93952         0 100% /snap/gtk-common-themes/1535
/dev/loop9   65280        65280         0 100% /snap/core20/2496
Screenshots  896          896         0 100% /snap/gnome-logs/123
/dev/loop12  128          128         0 100% /snap/bare/5
/dev/loop13  56704        56704         0 100% /snap/core18/2846
/dev/loop14 224256       224256         0 100% /snap/gnome-3-34-1804/72
/dev/loop16   896          896         0 100% /snap/gnome-logs/121
/dev/loop15  75648       75648         0 100% /snap/core22/1663
/dev/loop17  2304        2304         0 100% /snap/gnome-calculator/955
/dev/loop24   640          640         0 100% /snap/gnome-characters/797
/dev/loop19  65280        65280         0 100% /snap/core20/2434
/dev/loop22 516352       516352         0 100% /snap/gnome-42-2204/172
/dev/loop23  75776       75776         0 100% /snap/core22/1748
/dev/loop18  66688       66688         0 100% /snap/gtk-common-themes/1515
/dev/loop20 223744       223744         0 100% /snap/gnome-3-34-1804/93
/dev/loop21 358144       358144         0 100% /snap/gnome-3-38-2004/143
/dev/sda6   4720160     126348    4333360   3% /boot
tmpfs       387820        16    387804   1% /run/user/121
tmpfs       387820        68    387752   1% /run/user/1000
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$
```

Reports information about processes, memory, paging, block IO, and CPU activity.

```
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$ vmstat
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 137216 238120 29692 995772 0 11 133 305 234 669 6 2 89 3 0
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$
```

dmidecode is a command-line tool used on Linux systems to decode and display hardware information stored in the Desktop Management Interface (DMI) table

```
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$ dmidecode
# dmidecode 3.1
/sys/firmware/dmi/tables/smbios_entry_point: Permission denied
Scanning /dev/mem for entry point.
/dev/mem: Permission denied
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$
```

Collects, reports, and saves system activity information, including memory

```
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$ sar -v
Cannot open /var/log/sysstat/sa27: No such file or directory
Please check if data collecting is enabled
[1]+  Done                  sleep 1000
lab1003@lab1003-HP-280-G2-MT:~/Pratham_63$
```

Returns the size of a memory page in the system.

```
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ pagesize
4096
```

```
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ sleep 100 &
[1] 4657
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ jobs
[1]+  Running                  sleep 100 &
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ bg %1
bash: bg: job 1 already in background
```

Changes the priority (nice value) of running processes.

```
For more details see ps(1).
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ ps -o pid,ni,comm -p $(pgrep sleep)
  PID  NI  COMMAND
  4682   0  sleep
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$ renice -n 10 -p 4682
4682 (process ID) old priority 0, new priority 10
Lab1003@Lab1003-HP-280-G2-MT:~/Pratham_63$
```

Estimates file and directory space usage on disk.

```
/home/pratham10/.hushlogin file.
pratham10@DESKTOP-K9GVHM1:~$ du
0      ./cache
0      ./landscape
0      ./local/share/nano
0      ./local/share
0      ./local
0      ./NS2
0      ./Pratham
16     .
```