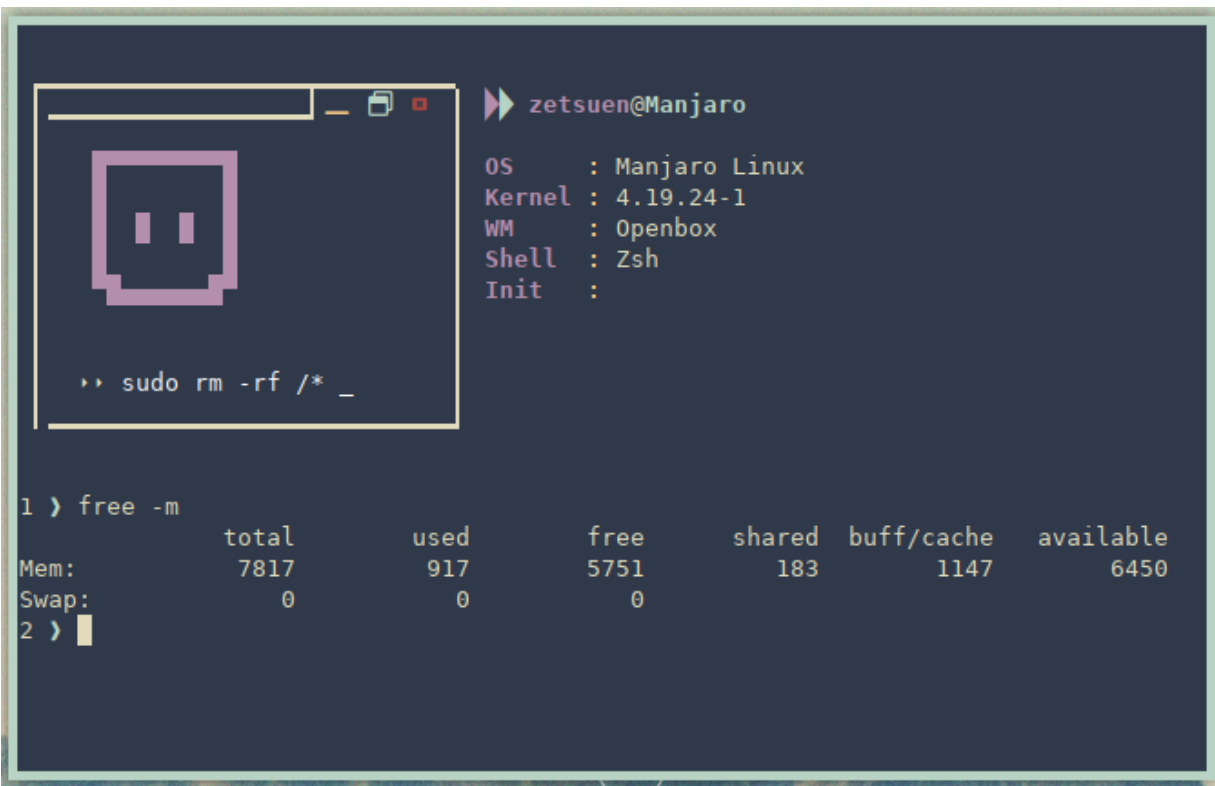


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## Memory Management

### 1. free -m

the free command is used to show total amount of free and used physical memory, total amount of swap memory in the system and display buffers and caches used by kernel. And -m command is used to display size in megabyte. here's the example of this command



The screenshot shows a terminal window with a dark blue background. At the top left, there is a window icon and a title bar. Below it, a small window displays a pixelated face icon and the command `sudo rm -rf /* _`. To the right of the terminal, system information is displayed in a light blue font:

```
OS      : Manjaro Linux
Kernel : 4.19.24-1
WM      : Openbox
Shell   : Zsh
Init    :
```

Below this, the output of the `free -m` command is shown. The first line indicates the command was executed. The subsequent lines show the memory usage statistics in megabytes:

```
1 > free -m
Mem:      total      used      free      shared  buff/cache  available
Swap:      0          0          0          183       1147       6450
2 >
```

2. /proc/meminfo/

we can check memory usage by reading meminfo file with cat /proc/meminfo/.  
here's example of this command

```
2 > cat /proc/meminfo
MemTotal:      8004852 kB
MemFree:       4894136 kB
MemAvailable:  6161432 kB
Buffers:       129528 kB
Cached:        1659720 kB
SwapCached:    0 kB
Active:        1465928 kB
Inactive:      1318716 kB
Active(anon):  1011728 kB
Inactive(anon): 330744 kB
Active(file):  454200 kB
Inactive(file): 987972 kB
Unevictable:   96 kB
Mlocked:       96 kB
SwapTotal:     0 kB
SwapFree:      0 kB
Dirty:         64 kB
Writeback:     0 kB
AnonPages:     995516 kB
Mapped:        602264 kB
Shmem:         347080 kB
Slab:          184160 kB
SReclaimable:  100244 kB
SUnreclaim:    83916 kB
KernelStack:   11088 kB
PageTables:    26908 kB
NFS_Unstable:  0 kB
Bounce:        0 kB
WritebackTmp:  0 kB
CommitLimit:   4002424 kB
Committed_AS:  6690324 kB
VmallocTotal:  34359738367 kB
VmallocUsed:    0 kB
VmallocChunk:   0 kB
Percpu:        5248 kB
HardwareCorrupted: 0 kB
AnonHugePages: 0 kB
ShmemHugePages: 0 kB
ShmemPmdMapped: 0 kB
HugePages_Total: 0
HugePages_Free: 0
HugePages_Rsvd: 0
HugePages_Surp: 0
Hugepagesize:  2048 kB
Hugetlb:       0 kB
DirectMap4k:   196108 kB
DirectMap2M:   5935104 kB
DirectMap1G:   2097152 kB
3 >
```

3. vmstat -s

vmstat command with -s option is used to display the memory usage statistic much like the above command. here's the example for this command

```
8 > vmstat -s
 8004852 K total memory
1169596 K used memory
1464448 K active memory
1260936 K inactive memory
4954884 K free memory
 130832 K buffer memory
1749540 K swap cache
   0 K total swap
   0 K used swap
   0 K free swap
 43437 non-nice user cpu ticks
   89 nice user cpu ticks
 15746 system cpu ticks
3206868 idle cpu ticks
 52864 IO-wait cpu ticks
 19074 IRQ cpu ticks
 2547 softirq cpu ticks
   0 stolen cpu ticks
1349014 pages paged in
 691793 pages paged out
   0 pages swapped in
   0 pages swapped out
4290780 interrupts
7445075 CPU context switches
1551401301 boot time
   8145 forks
9 > █
```

#### 4. Top

Top command is task manager alike application to show not only memory usage but also display cpu usage and program that running in the background. here's the example

```
top - 08:49:27 up 1:01, 1 user, load average: 0,89, 1,02, 0,75
Tasks: 271 total, 1 running, 270 sleeping, 0 stopped, 0 zombie
%Cpu0 :  0,0 us,  0,7 sy,  0,0 ni, 97,3 id,  1,3 wa,  0,0 hi,  0,7 si,  0,0 st
%Cpu1 :  1,0 us,  0,3 sy,  0,0 ni, 98,7 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu2 :  0,3 us,  1,0 sy,  0,0 ni, 96,3 id,  0,0 wa,  2,3 hi,  0,0 si,  0,0 st
%Cpu3 :  1,7 us,  0,3 sy,  0,0 ni, 98,0 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu4 :  0,3 us,  1,0 sy,  0,0 ni, 98,7 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu5 :  3,6 us,  0,7 sy,  0,0 ni, 95,7 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu6 :  2,0 us,  0,7 sy,  0,0 ni, 97,3 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu7 :  1,3 us,  0,7 sy,  0,0 ni, 98,0 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu8 :  2,3 us,  0,7 sy,  0,0 ni, 96,4 id,  0,0 wa,  0,3 hi,  0,3 si,  0,0 st
%Cpu9 :  1,3 us,  1,7 sy,  0,0 ni, 97,0 id,  0,0 wa,  0,0 hi,  0,0 si,  0,0 st
%Cpu10 : 2,0 us,  0,7 sy,  0,0 ni, 96,0 id,  0,0 wa,  1,3 hi,  0,0 si,  0,0 st
%Cpu11 : 0,7 us,  0,3 sy,  0,0 ni, 98,7 id,  0,0 wa,  0,0 hi,  0,3 si,  0,0 st
KiB Mem : 8004852 total, 4958280 free, 1090264 used, 1956308 buff/cache
KiB Swap:  0 total,  0 free,  0 used. 6335936 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
9657	zetsuen	20		736088	127760	84352	S	9,3	1,6	0:05.95	/usr/lib/c+
2880	zetsuen	20		1305956	274776	157012	S	5,0	3,4	1:36.38	/usr/lib/c+
2910	zetsuen	20		475408	122344	99144	S	4,0	1,5	0:28.35	/usr/lib/c+
723	root	20		715308	120360	103092	S	3,7	1,5	1:31.58	/usr/lib/X+
291	root	20		108292	49948	48696	S	1,3	0,6	1:06.96	/usr/lib/s+
423	root	-51					S	1,0		0:37.21	[irq/125-C+

## 5. htop

htop command is almost the same as top command but htop is more comprehensive compared to top. here's the example of this command

```

1  [|      0.5%]  4  [|      1.1%]  7  [|      1.1%]  10 [|      1.1%]
2  [|      1.1%]  5  [|      2.7%]  8  [|      1.6%]  11 [|      4.9%]
3  [|      7.0%]  6  [|      1.6%]  9  [|      2.2%]  12 [|      1.1%]
Mem[|||||||||] 1.40G/7.63G Tasks: 83, 367 thr; 1 running
Swp[          ] 0K/0K Load average: 0.93 0.94 0.79
Uptime: 01:07:33

  PID USER      PRI  NI  VIRT   RES   SHR  S  CPU% MEM%   TIME+  Command
    1 root        20   0  187M  10328  7720  S   0.0  0.1    0:01.66 /sbin/init
  291 root        20   0  121M  64228  62976  S   2.2  0.8    1:16.38 /usr/lib/systemd/s
  297 root        20   0  78280  1148   1016  S   0.0  0.0    0:00.00 /usr/bin/lvmetag -
  307 root        20   0  44192  8616   6396  S   0.0  0.1    0:00.42 /usr/lib/systemd/s
  636 systemd-t  20   0  102M  7000   6092  S   0.0  0.1    0:00.13 /usr/lib/systemd/s
  639 systemd-t  20   0  102M  7000   6092  S   0.0  0.1    0:00.02 /usr/lib/systemd/s
  640 root        20   0  8432  2756   2196  S   0.0  0.0    0:00.00 /usr/bin/crond -n
  641 dbus        20   0  11352  4732   3476  S   0.0  0.1    0:01.36 /usr/bin/dbus-daem
  642 root        20   0  2752   768    676  S   0.0  0.0    0:00.00 /usr/bin/ckb-next-
  644 root        20   0  482M  18916  15756  S   0.0  0.2    0:01.50 /usr/bin/NetworkMa
  645 root        20   0  15124  4552   4020  S   0.0  0.1    0:00.02 /usr/bin/bumblebee
  646 root        20   0  12484  5276   4708  S   0.0  0.1    0:00.04 /usr/lib/bluetooth
  647 avahi       20   0  10756  3956   3408  S   0.0  0.0    0:04.25 avahi-daemon: runn
  648 root        20   0  30476  6968   6036  S   0.0  0.1    0:00.30 /usr/lib/systemd/s
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice - F8Nice + F9Kill F10Quit

```