free, top, vmstat, htop mem related - free, vmstat, top, htop
Disc related - df, du

(Memory Usages)

* Linux Memory / Disk Utilities Related Command :-

In Linux there are many cmd to check & manage disk utilities. The cmd would check what partitions there on each disk & other details like the total size, used up space & file system etc. It is very common to have to examine disk we to determine where there is a free space, where the disk may be nearing full & where you may need to add disk or move files

① free :-

The free cmd gives info about used & unused memory usage & swap memory of the system. By default it displays in Kb
Memory mainly consists of RAM & swap memory. Swap memory is the part of hard disk drive that acts like a Virtual RAM.

$ free

o/p :- here the o/p column will displays as

total - Total RAM amount available as Sys
used - Memory currently in use by processes
free - unused memory
Shared - Memory shared by multiple processes

buff/cache - memory is in use by the kernel
available - Estimated mem amount available for starting new appl", excluding swap

free gathers info by parsing `/proc/meminfo` file

There are different ways to use free cmd

(i) $ free → outputs the info about memory & swap, expressed in Kb (Kilobytes)

(ii) $ free -h ⇒ Outputs the mem usage in human readable format

(iii) $ free -b → Display info in bytes

(iv) $ free -m → Display info in Megabytes

(v) $ free -g → Display info in Gigabytes

(vi) $ free -t → Display total memory

② Vmstat :- (Virtual Memory statistics) :-

The cmd is used to obtain info about memory, sys processes, block I/O, disk & CPU scheduling. Display the memory related stastical information (detailed)

$ vmstat

The basic o/p of the vmstat cmd displays info in six sections

① proc → process statistics
- r → Active process count
- b → sleeping process count

② memory → memory statistics
- swapd → Total virtual memory
- free → Total free memory
- buff → Total mem temp used as a ~~data buffer~~
- cache → Total cache memory

③ swap → swap space statistics
- si → The rate of swapping-in mem from disk
- so → The rate of swapping-out mem to disk

④ io → Input/output statistics
- bi → Blocks recieved from a block device/second
- bo → Block sents to a block device per second

⑤ System → Scheduling statistics
- in → The no of sys interrupts
- cs → The no of context switches per second

⑥ cpu → CPU statistics
- us → The % of CPU time spent on non-kernel pr
- sy → The % of CPU time spent on kernel processes
- id → The % of idle CPU
- wa → The % of CPU time spent waiting for i/o
- st → The % of CPU time stolen by a virtual m/c

③ top :- (Table of Processes) :-

Linux top cmd is a performance monitoring program to monitor the performance. The top cmd is used to display all the running & active real-time processes in ordered list & updates it regularly. It displays CPU usage, memory usage, swap memory, cache size, Buffer size, process PID, user, commands & much more. It also shows high mem & cpu utilization of running processes. The top cmd is very useful for sys Admin to monitor & take correct action when required

$ top [options]

$ top

It's o/p is explained here

Q - How to calculate load avg
→ TOP

① Line 1
- Time, how long system is running, how many users are logged in, & load average

② Line 2
- Total no of tasks, No of running tasks, No of sleeping tasks, No of stopped tasks, & No of zombie tasks

③ Line 3 - It shows CPU usage in percentage for
- users, systems, low priority processes, idle processes, io wait, hlw interrupts, slw interrupts, steal time.

④ Line 4 - It shows mem usage in Kb for
- Total memory, used memory, free memory, buffered memory

⑤ Line 5 - It shows swap mem usage in Kb for.
- Total mem, used mem, free memory, cached memory

The 2nd part of the o/p is table listing all the running processes. Here is a explanation

Kill process using top → press 'k'
change nice value using top → press 'r'

Q- What is a process states lifecycle?

- PID :- The process id of the process
- USER :- User Name of owner of task
- PR :- Process Priority
- NI :- process Nice Value
- VIRT :- Virtual memory used
- RES :- Resident memory (physical mem) used
- SHR :- Shared mem used by processes
- S :- process states. It can of 5 types
  - D - Uninterruptible sleep
  - R - Running
  - S - Sleeping
  - T - Stopped
  - Z - Zombie
- %CPU :- CPU used percentage
- %MEM :- percentange of physical mem used
- TIME+ :- Total CPU time used (in miliseconds)
- COMMAND :- The name of the cmd that started the process.

* Top cmd examples -

① If the process list is long scroll throug UP & DOWN arrows. To quit top press 'q'

② Send Signal / Kill process -

We can use top cmd to send any signal to a running process. Press 'k' & enter the process PID. It is used to kill the process by PID.

fork()
execl()
wait()

(or press 'u' key while running is top

③ $top -u username

The -u option allows you to display all user-specific processes. Press 'u' key while top is running

④ To see the full cmd line instead of the process name, press 'c' key. To toggle back press 'c' again

⑤ To show the active tasks press 'I' key. To filter the o/p & show only active tasks.

⑥ Press the 'n' key to limit the process number in the o/p. It will prompt you to enter the no of processes you want to see.

⑦ The top cmd allows you to changing the process priority (nice value)
- press the 'r' key
- Enter the process ID & enter press Enter
- pgm prompt for new nice value. Enter the new value & press enter.

8. How to check the CPU utilization
9. How to check server load average?
$top

9. how to check the process states?
$ top

④ htop :-

The info by htop cmd provides is similar to top cmd, but o/p display in GUI style. The real advantage of htop cmd is its user-friendly enviornment & improved controls

$ htop

If 'command htop not found' msg display, we will need to install htop first

$ sudo apt install htop.

⑤ /proc/meminfo -

This is the virtual file that reports the amount of available & used memory. It contains a realtime info about the sys. mem usage as well as buffers & shared mem used by the kernel

$ cat /proc/meminfo

⑥ stat -

$ stat filename
$ stat -f filename

du - file & dir
df - filesystem

Note -

Memory Usage Commands

① free ② vmstat ③ top ④ htop

Disk Usage/space commands

① df ② du

* Linux Disk Usage / Disk space Commands

There are many ways of checking Linux sys disk space. By using CLI df & du cmd are used to check/monitor disk spaces. If we want to see how much of the disk is being used & what part of it lies free.

① du (disk Usage) :-

Linux du cmd reports the disk space used by specified files & directories
Du cmd calculates the amount of disk space consumed by files & directories & subdirectory
The du cmd displays disk usage in the command line. without any option it display disk usage of every dir & sub-dir recrusively.

$ du [option] [file]

· $du filename

options

① show disk size in Human Readable format

$ du -h filename

② show only the size of the directory

$ du -s filename

$ du -sh filename

③ we can pass multiple files & dir as argument

$ du -sh ~/Documents ~/pictures ~/work

④ To display the sizes of the directory files

$ du -ah filename

* How to find biggest subdirectory using du cmd

$ du -h --max-depth=1 filename | sort -rh

Imp

Q- To show only size of dir, not subdir or files size

$ du -sh Documents

Q. To display the sizes of dir & subdirectory

$ du -h Documents

filesystem types → Ext, Ext2, Ext3, Ext4, XFS, UFS, JFS

② df :- (Disk Free) (Disk filesystem) -

Df cmd will olp the entire list of file system in Linux setup. In Linux OS we can we df command to get a detailed report on the system's disk space wage. It is used to display the info related to file systems about total space & available space.

$ df [options] [file]

$ df

If no filename given, it displays the space available on all currently mounted filesystems

① Show disk space wage in Human Readable format - (df -h)

$ df -h

ii To display the filesystem type wise

$ df -T

ex - Ext, Ext2, Ext3, Ext4, XFS, UFS, JFS etc

iii To display filesystem type in human readable format

$ df -Th

(iv) Display the specific file system types

```
$df -t ext4
$df -th ext3
$df -th tmpfs
```

(v) Display the inode no of specific file sys type

```
$df -it tmpfs
$df -it ext4
```