**Resource Management and Storage Management in the servers**

**CPU Management & Monitoring**

top

htop (More user friendly)

**Check CPU information**

lscpu

cat /proc/cpuinfo

**Memory Management**

**Check RAM usage**

free -h

vmstat

**Detailed memory usage**

top

htop

**Disk Management**

**Check disk usage**

df -h

du -sh /path/to/directory

**List block devices**

Lsblk

**Network Management**

**Check network interfaces and IPs**

ip a

ifconfig (older, may not be installed by default)

**Monitor network traffic**

iftop

nload

netstat -tuln

ss -tuln

**Process Management**

**List processes**

ps aux

top

htop

**Kill a process**

kill <pid>

kill -9 <pid> # force kill

**Nice / Renice a process (change priority)**

nice -n 10 command

renice -n 5 -p <pid>

**Services and Daemons**

**List services**

systemctl list-units --type=service

**Start/Stop/Restart a service**

sudo systemctl start service\_name

sudo systemctl stop service\_name

sudo systemctl restart service\_name

**System Resource Monitoring Tools**

**htop – Interactive process viewer.**

**glances – Monitor CPU, load, memory, disk I/O, processes, network, etc. (sudo apt install glances)**

**atop – Advanced monitor for logs and real-time.**

**nmon – Performance monitor (sudo apt install nmon)**

**Log Files for Resource Issues**

sudo tail -f /var/log/syslog

sudo dmesg | less

journalctl -xe

**Scenario A: CPU Spike Diagnosis**

1. Run yes > /dev/null & a few times.
2. Use top or htop to:
   * Identify high-CPU processes.
   * Use renice to lower the priority.
   * Kill one with kill.

**Scenario B: Memory Monitoring**

1. Run multiple apps or stress to use RAM.
2. Use free -h, vmstat, htop, or glances to analyze:
   * Used vs. available memory.
   * Cache usage.
   * Swap usage (if enabled).

**Scenario C: Disk Space Management**

1. Fill up space with dd or fallocate.
2. Use:
   * df -h to view space.
   * du -sh \* to locate large files/directories.
   * lsblk to inspect partitions.

**Scenario D: Network Troubleshooting**

1. Download a file using wget in one terminal.
2. In another terminal, use:
   * iftop to see active connections.
   * ss -tuln to list open ports.
   * nload to observe bandwidth usage.

**What CPU/Memory/Disk resources are assigned to which process (role)?**

ps aux --sort=-%mem | head -n 15

**Shows top memory-using processes.**

**Columns show user (role), %CPU, %MEM, and command.**

**What users (roles) are consuming resources?**

ps -eo user,%cpu,%mem,cmd --sort=-%mem | head -n 20

**Shows which users/roles (under user) are using CPU and memory.**

top -u username

**Filter live resource usage by user.**

**What processes are using network resources?**

sudo lsof -i -nP | grep ESTABLISHED

**Lists all network connections, showing which process owns them.**

sudo netstat -tulpn

**Shows which processes are listening on which ports and protocols.**

sudo ss -tulpn

**Modern replacement for netstat, includes PID and role.**

**What processes or users are using disk I/O?**

iotop

**Shows real-time disk I/O by process and user.**

sudo lsof / | less

**Lists all open files (including disk and device usage), sorted by process.**

**Server Storage**

**View Total Disk Usage**

df -h

**df = Disk Free**

**-h = human-readable (e.g., GB/MB)**

**Shows used, available space, mount points**

**View Disk Usage of Folders**

du -sh /\*

**du = Disk Usage**

**-s = summary**

**-h = human-readable**

**Shows how much space each top-level directory is using.**

**View Disk Partitions**

lsblk

**Lists block devices, shows mount points and partitions.**

**View Disk I/O and Activity**

iostat -x 1

**Shows disk I/O statistics (install with: sudo apt install sysstat)**

**View Mounted Filesystems**

mount | column -t

**or**

cat /etc/mtab

**Check Inodes (if running out of space but not disk)**

df -i

**Script to See Server Storage Summary**

#!/bin/bash

echo "===== Disk Usage ====="

df -h

echo -e "\n===== Disk Usage by Folder (/root) ====="

du -sh /root/\*

echo -e "\n===== Block Devices ====="

lsblk

**Save as check\_storage.sh**

chmod +x check\_storage.sh

./check\_storage.sh

**1. du – Disk Usage (Directory/Files Size)**

**📌 Common Parameters:**

| **Flag** | **Meaning** |
| --- | --- |
| **-h** | **Human-readable (e.g., KB, MB, GB)** |
| **-s** | **Summary (don’t list subdirectories)** |
| **-a** | **Include individual file sizes** |
| **-d N** | **Show depth levels (e.g., -d 1 = first level subdirs only)** |
| **--max-depth=N** | **Same as -d (sometimes more compatible)** |

**Show size of all files and folders inside /var (depth 1)**

du -h --max-depth=1 /var

**Show size of all files inside /home recursively**

du -ah /home

**Total size of /home only**

du -sh /home

**2. ls – List Files and Directories**

**📌 Common Parameters:**

| **Flag** | **Meaning** |
| --- | --- |
| **-l** | **Long listing (permissions, size, owner)** |
| **-a** | **Include hidden files (.filename)** |
| **-h** | **Human-readable sizes (when used with -l)** |
| **-R** | **Recursively list subdirectories** |
| **-S** | **Sort by size** |
| **-t** | **Sort by modification time** |
| **-r** | **Reverse order** |

**Long list of current directory**

ls -lh

**List all (including hidden files)**

ls -lha

**Recursively list files in /etc**

ls -lR /etc

**3.tree – Visualize Folder Hierarchy**

tree /etc

**Common Flags:**

* **-L N = show depth level (e.g., -L 2 for 2 levels deep)**
* **-a = show hidden files**
* **-h = show sizes**

**4. df – Disk Free Space**

**📌 Common Flags:**

**Flag Meaning**

**-h Human-readable**

**-T Show filesystem type**

**-i Show inode usage**

**View a File in Another Directory**

cat /path/to/file.txt

**List Files in Another Directory**

ls /path/to/directory

**Delete a File in Another Directory**

rm /path/to/file.txt

**Delete a Directory and Its Contents**

rm -r /path/to/directory/

**or**

sudo rm -rf /path/to/directory/