**✅ Linux System Monitoring and Networking – Class Notes**

**📅 1. Schedule and Manage Tasks Using Cron Jobs & Background Processes**

**🔹 Cron Jobs**

Used to schedule commands to run periodically (e.g., backups, scripts).

**Syntax:**

sql

\* \* \* \* \* /path/to/command

| | | | |

| | | | └─ Day of week (0-6; Sunday=0)

| | | └─── Month (1-12)

| | └───── Day of month (1-31)

| └─────── Hour (0-23)

└───────── Minute (0-59)

**Example:**

# Run a script every day at 2:30 AM

30 2 \* \* \* /home/user/script.sh

**Edit Crontab:**

crontab -e

**List Crontab:**

crontab -l

**🔹 Background Processes**

Run tasks in the background using & or job control.

**Example:**

sleep 300 & # Runs sleep in background

jobs # List background jobs

kill %1 # Kill job number 1

**🛠️ 2. Debug System Issues Related to Memory and CPU Usage**

**🔹 Useful Tools**

| **Tool** | **Use** |
| --- | --- |
| top | Real-time view of CPU/memory usage |
| htop | Enhanced top with navigation |
| free | Memory usage summary |
| vmstat | CPU and I/O performance |
| iostat | Disk I/O performance |

**🔍 Example:**

top

htop

free -h

vmstat 1 5

**⚙️ 3. Manage Linux Processes**

**🔹 Key Commands**

| **Command** | **Use** |
| --- | --- |
| ps aux | Show all running processes |
| ps aux --sort=-%mem | Sort processes by memory usage |
| kill <PID> | Kill a process by PID |
| kill -9 <PID> | Force kill |
| nice, renice | Adjust process priority |

**🔍 Examples:**

ps aux | grep firefox

ps aux --sort=-%mem | head # Top memory consuming processes

kill -15 1234 # Graceful stop

kill -9 1234 # Force kill

nice -n 10 ./myscript.sh # Start with low priority

**🌐 4. Utilize Networking Tools**

**🔹 ping**

Test network connectivity.

ping google.com

ping -s 64 8.8.8.8

# 64-byte data + 8-byte ICMP header = 72 bytes shown

**🔹 ifconfig / ip**

View and configure IP addresses.

ifconfig

ip addr show

ip link set eth0 down

ip link set eth0 up

**🔹 netstat / ss**

Check active network connections and ports.

netstat -tuln # Show listening TCP/UDP ports

ss -tulwn # Modern replacement for netstat

**🔹 traceroute**

Trace the path packets take to a destination.

traceroute google.com

**🧠 Bonus Concepts**

**🔸 ICMP Header Breakdown (used in ping):**

* Type: 1 byte (e.g., 8 = Echo Request, 0 = Echo Reply)
* Code: 1 byte
* Checksum: 2 bytes
* Identifier: 2 bytes
* Sequence Number: 2 bytes

Total: **8 bytes ICMP header**, plus payload.