Linux :

1. **What is Linux? How is it different from Windows?**

Ans. Linux is an open-source operating system and available free while windows is paid. Linux is mainly used in servers and IT environments where as windows used for personal work

1. **What are the different Linux distributions?**

Ans. Most common names are Ubuntu, Centos, RHEL (Red Hat Enterprise Linux)

Explain the Linux file system hierarchy.

1. **Explain the Linux file system hierarchy.**

Ans. Its tree like structure. /root at the top . Key directories ->

/home 🡪 user files /var 🡪 logs /tmp 🡪 temporary files

/etc 🡪 config files /bin 🡪 binary files

1. **What are the basic Linux file permissions?**

**Ans.** Three types: Read (r), Write (w), Execute (x). Permissions are set for Owner, Group, and Others

1. **How do you check the current working directory?**

Ans. Pwd

1. **What command is used to list files and directories?**

Ans. Ls

1. **How do you create, delete, move, and rename files in Linux?**

**Ans.** Create: touch file.txt, Delete: rm file.txt, Move: mv file.txt /path/, Rename: mv oldname.txt newname.txt

1. **How do you view the contents of a file?**

Ans. cat file.txt (for small files), less file.txt (for large files)

1. **What is the difference between absolute and relative paths?**

Ans. Absolute path: Full path from root (/home/user/file.txt).

Relative path: Path from the current directory (./file.txt).

1. **How do you check disk space usage in Linux?**

**Ans** . du -sh , df -kh

1. What is the difference between rm, rmdir, and rm -rf?

Ans. rm -> remove file, rmdir -> remove directory and rm -rf -> remove files and all content

1. **How do you create a new user and group in Linux?**

**Ans.** user -> sudo useradd username

Group -> sudo groupadd groupname

1. **What is the purpose of the passwd command?**

**Ans.** passwd username

1. **How do you change file ownership in Linux?**

Ans. chown user:group file.txt

1. **What is the purpose of the chmod command?**

**Ans.** chmod 755 file.txt

1. **What are hard links and soft links?**

**Ans.** A hard link is a duplicate of the original file. Even if you erase one name, the document still exists. A soft link (or symlink) is like a **shortcut** pointing to another file. If you delete the real document, the shortcut becomes useless (broken link).

1. **What is the difference between cron and at?**

Ans. **cron**: Schedules recurring tasks **at**: Runs a task **once** at a specific time.

1. **How do you schedule a cron job?**

Ans. Use crontab -e

\* \* \* \* \* command\_to\_run

│ │ │ │ │

│ │ │ │ └──── Day of week (0 - 7) (Sunday=0 or 7)

│ │ │ └────── Month (1 - 12)

│ │ └──────── Day of month (1 - 31)

│ └────────── Hour (0 - 23)

└──────────── Minute (0 - 59)

1. **What is the /etc/passwd file?**

**Ans.** Stores user account information (username, UID, home directory, etc.)

1. **What is the /etc/shadow file?**

**Ans.** Stores encrypted passwords and password policies.

1. **How do you check system uptime?**

**Ans**. uptime

1. **What are Linux runlevels?**

**Ans.** Halt (0) , single user mode (1) , multi user mode (3) , GUI mode(5), Reboot(6)

1. **How do you check the system's hostname?**

Ans. hostname

1. **How do you find a file in Linux?**

Ans find /path -name "file.txt" (/path can be replaced by . if checking in current or subdirectory)

1. **What is the grep command used for?**

**Ans.** Searches for a specific pattern in a file.

1. **How do you search for a specific word in a file?**

Ans. grep "word" filename

1. **How do you count the number of lines in a file?**

Ans. wc -l filename

1. **What is the difference between find and locate?**

Ans. find searches in **real-time**, while locate uses a **database** for faster results.

1. **How do you check currently running processes?**

Ans. top

1. W**hat is the difference between nice and renice?**

Ans **nice** sets priority when starting a process.  
 **renice** changes priority of an already running process.

1. **How do you check CPU and memory usage?**

**Ans.** top or htop (interactive)  
free -h (memory usage)

1. **How do you change a process's priority in Linux?’**

**Ans.** nice -n [priority] command (Eg: nice -n 10 my\_script.sh start with lower priority 10)

1. **How do you check CPU and memory usage?**

**Ans.** top

1. **How do you check open ports in Linux?**

**Ans.** netstat -tulnp

1. **What is the difference between df and du commands?**

**Ans.** df -h : disk free , du -sh : disk usage

1. **How do you monitor real-time logs in Linux?**

**Ans.** tail -f of file name

1. **How do you find which process is using a particular port?**

**Ans.** netstat -tulnp | grep <port>

1. **How do you check system logs in Linux?**

**Ans.** cat /var/log/syslog

1. **What is the dmesg command used for?**

**Ans.** Displays kernel messages, useful for debugging hardware issues.

dmesg | grep "error"

1. **What is the difference between ps, top, and htop?**

**Ans.** ps : show about running process ,

top used for show real time CPU and memory usage ,

htop similar to top with better UI

1. **What are the different types of process states in Linux?**

**Ans.** R (Running) – Actively executing.

S (Sleeping) – Waiting for an event.

D (Uninterruptible Sleep) – Waiting for I/O.

T (Stopped) – Paused process.

Z (Zombie) – Completed but not removed from process table.

1. **How do you check environment variables in Linux?**

**Ans.** printenv

1. **How do you permanently set an environment variable?**

**Ans**. echo "export VAR\_NAME=value" >> ~/.bashrc

source ~/.bashrc

1. **What is the purpose of the /etc/fstab file?**

**Ans.** The /etc/fstab file contains information about disk partitions and how they should be mounted at boot.

1. **What is LVM (Logical Volume Manager) in Linux?**

**Ans.** LVM is a system for managing disk space dynamically. It allows:

1. **How do you check free memory and swap space?**

**Ans.** free -h

1. How do you clear swap space?

Ans. **swapoff -a && swapon -a**

1. **What is the difference between sed and awk?**

**Ans.** sed – *Stream Editor*

* Think of sed as a find and replace tool for text.
* It processes text line by line and can edit, substitute, or delete parts of it.

Eg : replace apple with orange sed 's/apple/orange/' file.txt

Awk: ***Pattern scanning and processing language***

* awk is used to **analyze** and **manipulate structured text**, especially when data is in **columns** (like CSV, logs, etc.).
* It’s great for **filtering** and **printing** specific fields.

🧠 **Example**: Print the second column from a file

awk '{print $2}' file.txt

1. **How do you extract specific columns from a file?**

**Ans.** awk '{print $1, $3}' file.txt

1. **What is the difference between TCP and UDP?**

**Ans.** TCP – Transmission Control Protocol

* Connection-oriented: Like a phone call – it sets up a connection first, then transfers data.
* Reliable: Guarantees delivery. If data gets lost, it’s resent.
* Ordered: Data arrives in the exact order it was sent.
* Slower than UDP, but safe and accurate.

Used for:

* Web browsing (HTTP/HTTPS)
* Emails (SMTP, IMAP)
* File transfers (FTP)

UDP – User Datagram Protocol

* Connectionless: Like sending a letter – no handshake, just send it.
* Unreliable: No guarantee it’ll arrive, or arrive in order.
* Faster than TCP because there’s less overhead.
* Lightweight and good for real-time applications.

Used for:

* Video streaming
* Online gaming

1. **How do you check network connectivity using Linux commands?**

**Ans.** Check internet access: ping -c 4 google.com

Check if a port is open: nc -zv google.com 80

Trace network route: traceroute google.com

1. **How do you view the routing table in Linux?**

**Ans**. ip route show

1. **What is iptables, and how is it used in Linux?**

**Ans.** iptables is a firewall utility used to configure packet filtering rules in Linux.

List current rules : sudo iptables -L -v -n

Allow SSH (port 22): sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT

Block an IP: sudo iptables -A INPUT -s 192.168.1.100 -j DROP

1. **What is the ufw firewall, and how do you configure it?**

**Ans.** ufw (Uncomplicated Firewall) is a simpler firewall tool than iptables.

Enable UFW: sudo ufw enable

Allow SSH: sudo ufw allow ssh

Check status: sudo ufw status

1. **What is SSH, and how do you use it?**

**Ans.** SSH (Secure Shell) is a protocol for secure remote access to servers**.**

Connect to a remote server: ssh user@remote\_ip

1. **How do you set up passwordless SSH login?**

**Ans.** Generate SSH key : ssh-keygen -t rsa

Copy key to remote server: ssh-copy-id user@remote\_ip

Now login without a password: ssh user@remote\_ip

1. **How do you check disk partitions in Linux?**

**Ans.** df -h

1. What is the purpose of chroot?

Ans. chroot changes the root directory for a process, creating an isolated environment

**sudo chroot /mnt/myroot**

1. **How do you create a swap file in Linux?**

**Ans.** sudo fallocate -l 2G /swapfile

sudo chmod 600 /swapfile

sudo mkswap /swapfile

sudo swapon /swapfile

echo "/swapfile none swap sw 0 0" | sudo tee -a /etc/fstab

1. **What is the difference between /dev/sda1 and /dev/sdb1?**

**Ans.** /dev/sda1: First partition of the first disk

/dev/sdb1: First partition of the second disk

1. **What is the difference between systemctl and service commands?**

**Ans.** systemctl (for systemd systems):

systemctl start nginx

systemctl status nginx

service (older systems using **SysVinit**):

service nginx start

1. **How do you start, stop, and restart a service in Linux?**

**Ans.** systemctl start nginx

systemctl status nginx

systemctl stop nginx

systemctl restart nginx

1. **How do you check which services are enabled on startup?**

Ans. sudo systemctl list-unit-files --type=service | grep enabled

1. **How do you extract specific lines from a file?**

**Ans.** sed -n '5,10p' file.txt # Extract lines 5 to 10

1. **What is the purpose of the journalctl command?**

**Ans.** It checks logs from systemd services.

journalctl -u nginx --since "1 hour ago"

1. **What is the difference between /proc, /sys, and /dev directories?**

Ans.

| **Directory** | **Purpose** |
| --- | --- |
| /proc | Virtual filesystem for process info (e.g., /proc/cpuinfo) |
| /sys | Kernel-related info (e.g., /sys/block/) |
| /dev | Contains device files (e.g., /dev/sda) |

1. **What are inodes in Linux?**

**Ans.** An inode stores metadata about a file (permissions, size, timestamps, etc.), but not its name or data.

Check inode of a file: ls -i file.txt

1. **What is the difference between nohup, screen, and tmux?**

Ans. **nohup** – *No Hang Up ,* ***screen*** *– Virtual terminal manager,* ***tmux*** *– Terminal multiplexer*

| **Command** | **Purpose** |
| --- | --- |
| nohup | Runs a command even after logout (nohup command &) |
| screen | Creates persistent terminal sessions (screen -S mysession) |
| tmux | Advanced terminal multiplexer (better than screen) |

1. **How do you copy an entire directory in Linux?**

**Ans.** cp -r source\_directory/ destination\_directory/ (r means recursively)

1. **What is the purpose of the rsync command?**

**Ans.** rsync is a fast and efficient command-line tool used to copy or sync files and directories between:

* Local to local
* Local to remote
* Remote to local

It’s smart – it only transfers the differences (changed parts), saving time and bandwidth.

How do you set up a simple web server using Python?

Ans. python3 -m http.server 8080

1. **Difference between /bin, /sbin, and /usr/bin:**

Ans. /bin: Essential binaries for all users

/sbin: System binaries for root/admin (e.g., fsck, reboot)

/usr/bin: Non-essential user binaries

1. **How do you kill multiple processes matching a pattern?**

Ans. pkill -f "pattern"

1. **What is a zombie process in Linux?**

**Ans.** A zombie is a terminated process whose parent hasn't read its exit status via wait(). It's in the process table as <defunct>.

1. **How do you check if a user has sudo privileges?**

**Ans.** sudo -l -U username -> groups username

1. **What is the purpose of the /etc/hosts file?**

**Ans** It maps hostnames to IP addresses locally (before DNS is queried).

1. **How do you update all installed packages in Linux?**

**Ans.** sudo apt update && sudo apt upgrade -y

1. **How do you list all installed packages on a Linux system?**

Ans. dpkg -l

1. **Difference between rpm, yum, dnf, and apt:**

**Ans.** rpm: Low-level package tool for RHEL-based systems.

* yum: High-level package manager (deprecated in RHEL 8+).
* dnf: Modern replacement for yum.
* apt: Used on Debian-based systems (Ubuntu).

1. **How do you check the Linux kernel version?**

Ans. uname -r

1. **How do you upgrade the Linux kernel?**

Ans. sudo apt install --install-recommends linux-generic

1. **How do you rollback a package update in Linux?**

**Ans.** sudo apt install package=old\_version

1. **How do you create a new systemd service in Linux?**
2. Ans. **Create service file /etc/systemd/system/myapp.service**

[Unit]

Description=My App

[Service]

ExecStart=/path/to/command

Restart=always

[Install]

WantedBy=multi-user.target

1. **Enable and start it:**

sudo systemctl daemon-reexec

sudo systemctl enable myapp

sudo systemctl start myapp

1. **What is the purpose of the /var/log directory?**

**Ans.** It stores system logs (e.g., syslog, auth.log, dmesg, kern.log) used for troubleshooting.

1. **How do you check which Linux distribution you are using?**

**Ans** cat /etc/os-release

1. **How do you secure an SSH server?**

* Ans. Disable root login (PermitRootLogin no in /etc/ssh/sshd\_config).
* Change the SSH port (Port 2222 in /etc/ssh/sshd\_config).
* Use SSH key-based authentication.
* Allow only specific users (AllowUsers username).
* Enable firewall rules (ufw allow 2222/tcp).

1. **What is SELinux, and how does it work?**

**Ans.** SELinux (Security-Enhanced Linux) enforces mandatory access controls (MAC) on Linux systems. Check status: sestatus

1. **What is AppArmor, and how does it compare to SELinux?**

**Ans.** AppArmor: Profile-based security (easier to manage).

* SELinux: Label-based security (more fine-grained but complex).

1. **What is the purpose of the /etc/resolv.conf file?**

Ans. It configures **DNS** resolution for a Linux system.

Example: nameserver 8.8.8.8

1. **How do you configure a static IP in Linux?**

**Ans.** ubuntu : Edit /etc/network/interfaces

1. **How do you enable IP forwarding in Linux?**

**Ans.** Check current status: sysctl net.ipv4.ip\_forward

Enable it: sudo sysctl -w net.ipv4.ip\_forward=1

1. **What is a kernel panic, and how do you troubleshoot it?**

**Ans.** A kernel panic happens when the Linux kernel encounters a critical error and cannot recover.

Troubleshooting:

* Check logs: journalctl -xe or /var/log/kern.log
* Reboot into rescue mode
* Check hardware issues
* Disable faulty kernel modules

1. **What is the difference between ext3, ext4, and XFS filesystems?**

**Ans. ext3**: Journaling, slower performance.

**ext4**: Improved journaling, supports larger files.

**XFS**: High-performance, best for large-scale storage.

1. **How do you perform a filesystem check in Linux?**

**Ans**. Unmount the partition:sudo umount /dev/sdX

Run fsck:sudo fsck -y /dev/sdX