**🔹 Basic Linux Commands and File System Navigation**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| ls | List directory contents | ls -l – long listing format |
| cd | Change directory | cd /etc or cd ../Documents |
| pwd | Show current directory | pwd – outputs /home/user |
| mkdir | Create directory | mkdir new\_folder |
| rm | Remove file or directory | rm file.txt or rm -r old\_folder |
| cp | Copy file or directory | cp file.txt backup.txt or cp -r dir1 dir2 |
| mv | Move or rename file | mv old.txt new.txt or mv file.txt /tmp/ |
| touch | Create empty file | touch newfile.txt |
| find | Search for files | find /home -name "\*.txt" |
| tree | Visualize directory tree | tree /var/log |

**🔹 Viewing and Searching Files**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| cat | View file content | cat file.txt |
| less | View paginated file | less file.txt – use space to scroll |
| more | Similar to less | more file.txt |
| head | First 10 lines | head file.txt or head -n 5 file.txt |
| tail | Last 10 lines | tail file.txt or tail -f logfile.log |
| grep | Search in text | grep "error" logfile.log |
| wc | Count lines, words | wc -l file.txt |

**🔹 User and Group Management**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| adduser | Add user with prompts | sudo adduser alice |
| useradd | Add user (non-interactive) | sudo useradd -m bob |
| usermod | Modify user info | sudo usermod -aG sudo bob |
| deluser | Delete user | sudo deluser alice |
| userdel | Delete user (alternative) | sudo userdel -r bob |
| passwd | Set password | sudo passwd alice |
| groupadd | Create group | sudo groupadd developers |
| groupmod | Rename group | sudo groupmod -n dev developers |
| groupdel | Delete group | sudo groupdel dev |
| id | User's UID/GID | id alice |
| groups | Groups user belongs to | groups bob |
| gpasswd | Add user to group | sudo gpasswd -a alice developers |
| chage | Account expiry info | sudo chage -l alice |

**✅ Break Reminder for Learners**

Please take a 10-minute break to stretch, hydrate, and walk around. Movement helps you retain more information and stay focused. See you back in a bit!

**🔹 Package Management and System Administration**

**Debian/Ubuntu (APT)**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| apt update | Refresh package list | sudo apt update |
| apt upgrade | Upgrade installed packages | sudo apt upgrade |
| apt install | Install a package | sudo apt install nginx |
| apt remove | Remove a package | sudo apt remove nginx |
| dpkg -i | Manual .deb install | sudo dpkg -i package.deb |

**RHEL/CentOS (YUM/DNF)**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| yum install | Install package | sudo yum install httpd |
| dnf install | Modern yum | sudo dnf install htop |
| dnf update | System-wide update | sudo dnf update |

**Systemd Services**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| systemctl start | Start service | sudo systemctl start nginx |
| systemctl stop | Stop service | sudo systemctl stop nginx |
| systemctl status | Service status | systemctl status nginx |
| systemctl enable | Start at boot | sudo systemctl enable nginx |
| systemctl disable | Don't start at boot | sudo systemctl disable nginx |

**🔹 File Permissions and Ownership**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| chmod | Change permissions | chmod 755 script.sh |
| chown | Change owner | chown alice file.txt |
| chown user:group | Change owner & group | chown bob:staff file.txt |
| chgrp | Change group only | chgrp dev file.txt |
| ls -l | Show permission | ls -l – -rw-r--r-- style |
| umask | Set default permissions | umask 022 |

**Permission shortcut (octal format):**

* r = 4, w = 2, x = 1
* chmod 755 → Owner (7), Group (5), Others (5)

**🔹 Disk Space Management**

| **Command** | **Description** | **Example** |
| --- | --- | --- |
| df -h | Show file system space | df -h |
| du -sh \* | Directory sizes | du -sh \* |
| `du -ah | sort -rh | head -n 10` |
| ls -lhS | Sort files by size | ls -lhS |
| ncdu | Visual disk usage analyzer | sudo apt install ncdu && ncdu |