1. Learn Basic Linux Commands – Navigation (ls, cd, pwd), file management (cp, mv, rm).

pwd - Show the current directory

ls - List files and directories

- ls -l → Long format (detailed info)
- ls -a → Show hidden files (files starting with .)
- ls -lh → Human-readable file sizes
- ls -lt → Sort by modification time

cd <dir> -Change directory

- cd /home/user → Go to /home/user directory
- cd .. → Move up one directory (parent)
- cd ~ → Go to the home directory
- cd - → Go to the previous directory

cp <file> <dest> -Copy file

mv <file> <dest> -Move/Rename file

rm <file> -Remove file

rm -r <dir> -Remove directory

2. Understand User & Permission Management – Create users/groups, modify permissions (chmod, chown).

useradd -m username	Create a new user
passwd username	Set or change user password
userdel -r username	Delete a user and home directory
groupadd groupname	Create a new group

usermod -aG groupname username Add a user to a group

gpasswd -d username groupname Remove a user from a group

groupdel groupname Delete a group

ls -l filename View file permissions

chmod 755 filename Change file permissions

chown new_owner filename Change file owner

chown :new_group filename Change file group

chown new_owner:new_group filename Change both owner and group

Understanding Permission Levels

Each file has three types of users with different permission levels:

- **Owner (u)** – The user who owns the file.
- **Group (g)** – The group assigned to the file.
- **Others (o)** – All other users.

r	Read	4
w	Write	2
x	Execute	1

chmod modifies permissions.

chmod 764 filename

Owner (7) → Read (4) + Write (2) + Execute (1) = 7

Group (6) → Read (4) + Write (2) = 6

Others (4) → Read (4) = 4

-rwx------	Only the owner can read, write, and execute
-rw-r--r--	Owner can read/write, group and others can only read

-rwxr-xr-x	Owner can read/write/execute, group and others can read/execute
-rw-rw-r--	Owner and group can read/write, others can only read

Master Package Management – Install/update software (apt, yum, dnf).

3.Managing Packages with APT (Debian-based Systems)

Update Package Lists

Before installing new software, update the package list to get the latest versions.

- sudo apt update

Upgrade Installed Packages

Upgrade all installed packages to their latest versions.

- sudo apt upgrade

Install a Package

To install software, use:

- sudo apt install package-name

Remove a Package

To uninstall a package, use:

- sudo apt remove package-name

Remove Unused Dependencies

To remove unnecessary packages:

- sudo apt autoremove

Search for a Package

Find available packages:

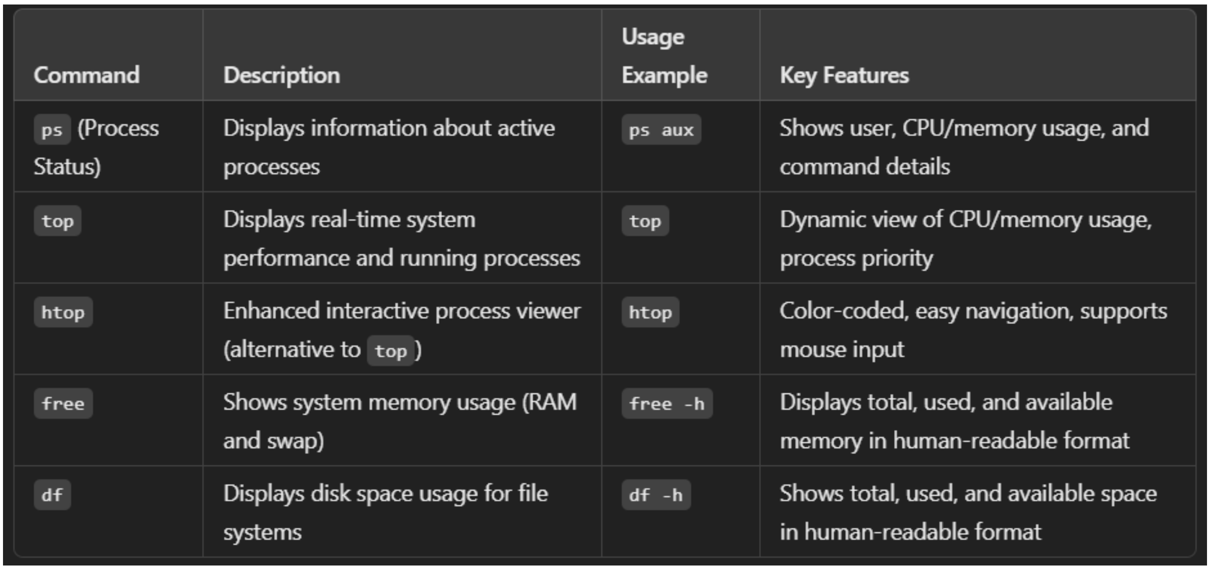
- apt search package-name

Show Package Details

To check details like version and description:

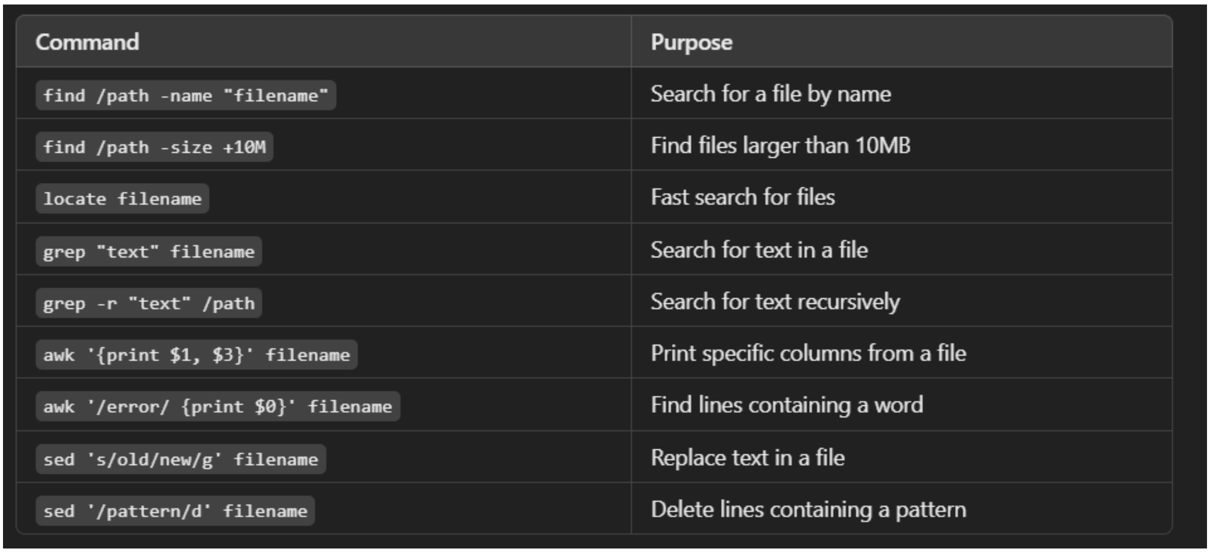
- apt show package-name

4.Monitor Processes & System Performance – Use ps, top, htop, free, df to track resources.



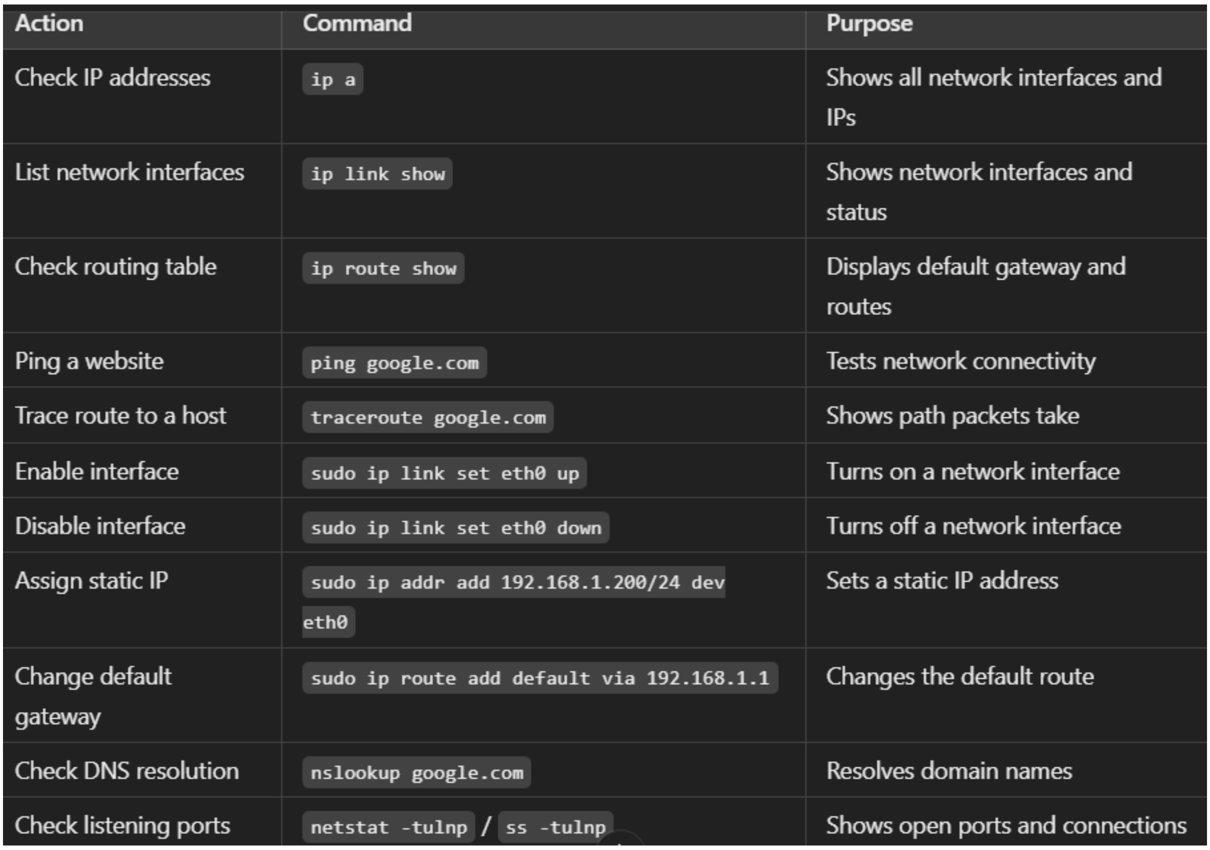
Command	Description	Usage Example	Key Features
`ps` (Process Status)	Displays information about active processes	`ps aux`	Shows user, CPU/memory usage, and command details
`top`	Displays real-time system performance and running processes	`top`	Dynamic view of CPU/memory usage, process priority
`htop`	Enhanced interactive process viewer (alternative to `top`)	`htop`	Color-coded, easy navigation, supports mouse input
`free`	Shows system memory usage (RAM and swap)	`free -h`	Displays total, used, and available memory in human-readable format
`df`	Displays disk space usage for file systems	`df -h`	Shows total, used, and available space in human-readable format

5.File Searching & Text Processing – Search for files (find, locate) and analyze content (grep, awk, sed).



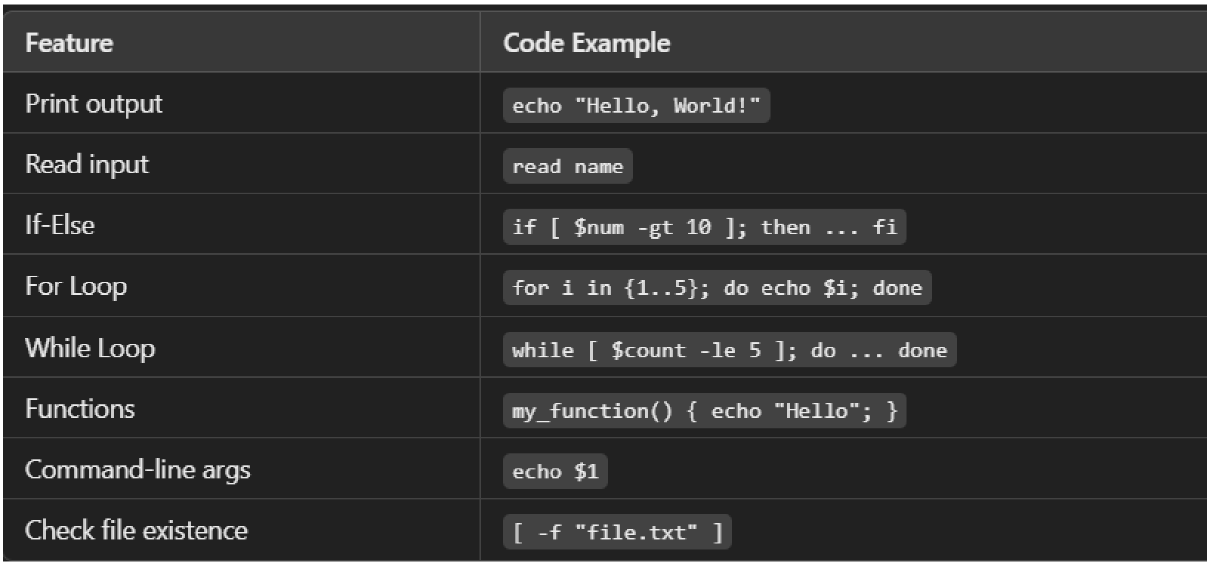
Command	Purpose
`find /path -name "filename"`	Search for a file by name
`find /path -size +10M`	Find files larger than 10MB
`locate filename`	Fast search for files
`grep "text" filename`	Search for text in a file
`grep -r "text" /path`	Search for text recursively
`awk '{print $1, $3}' filename`	Print specific columns from a file
`awk '/error/ {print $0}' filename`	Find lines containing a word
`sed 's/old/new/g' filename`	Replace text in a file
`sed '/pattern/d' filename`	Delete lines containing a pattern

6.Networking & Connectivity – Check IPs (ip a), test network (ping, traceroute), manage network settings.



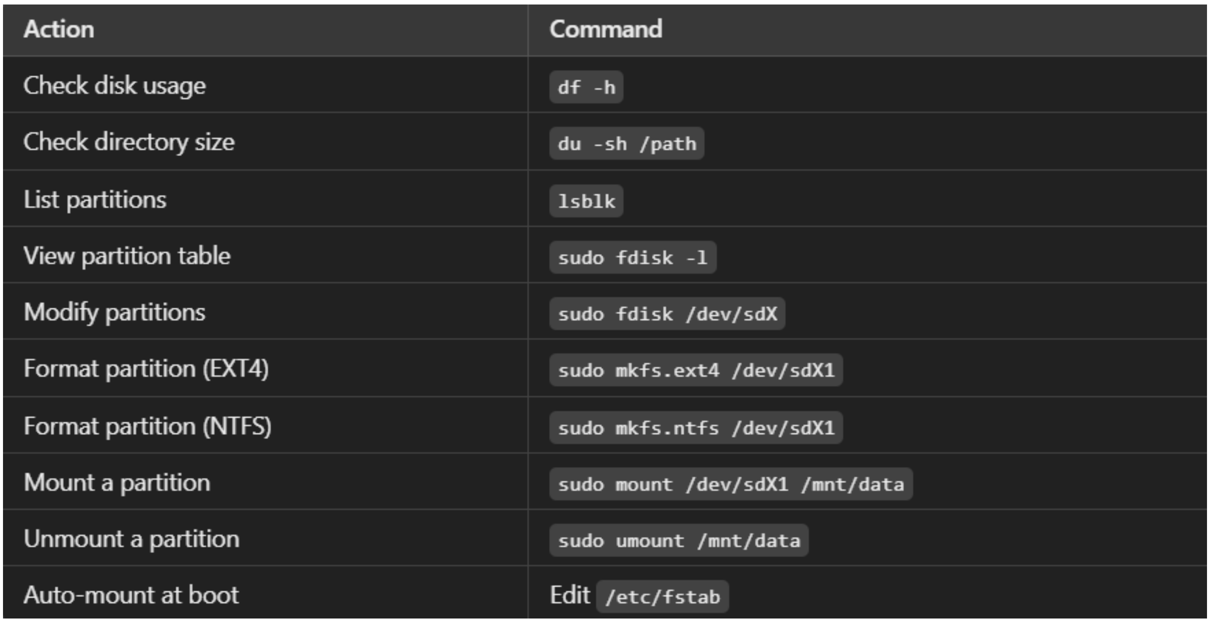
Action	Command	Purpose
Check IP addresses	`ip a`	Shows all network interfaces and IPs
List network interfaces	`ip link show`	Shows network interfaces and status
Check routing table	`ip route show`	Displays default gateway and routes
Ping a website	`ping google.com`	Tests network connectivity
Trace route to a host	`traceroute google.com`	Shows path packets take
Enable interface	`sudo ip link set eth0 up`	Turns on a network interface
Disable interface	`sudo ip link set eth0 down`	Turns off a network interface
Assign static IP	`sudo ip addr add 192.168.1.200/24 dev eth0`	Sets a static IP address
Change default gateway	`sudo ip route add default via 192.168.1.1`	Changes the default route
Check DNS resolution	`nslookup google.com`	Resolves domain names
Check listening ports	`netstat -tulnp` / `ss -tulnp`	Shows open ports and connections

7.Write Basic Shell Scripts – Automate tasks with bash, use loops, conditions, and variables.



Feature	Code Example
Print output	`echo "Hello, World!"`
Read input	`read name`
If-Else	`if [ $num -gt 10 ]; then ... fi`
For Loop	`for i in {1..5}; do echo $i; done`
While Loop	`while [ $count -le 5 ]; do ... done`
Functions	`my_function() { echo "Hello"; }`
Command-line args	`echo $1`
Check file existence	`[ -f "file.txt" ]`

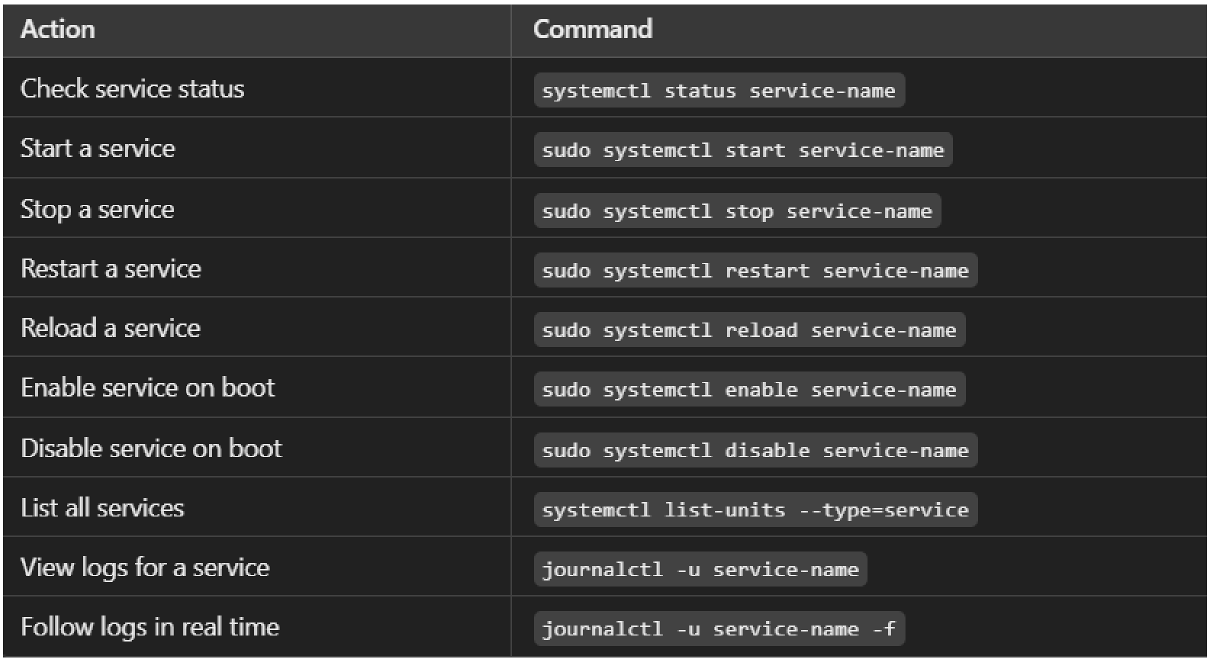
8.Manage Disk & Storage – Check disk space (df -h), format/mount partitions (fdisk, mount).



Action	Command
Check disk usage	`df -h`
Check directory size	`du -sh /path`
List partitions	`lsblk`
View partition table	`sudo fdisk -l`
Modify partitions	`sudo fdisk /dev/sdX`
Format partition (EXT4)	`sudo mkfs.ext4 /dev/sdX1`
Format partition (NTFS)	`sudo mkfs.ntfs /dev/sdX1`
Mount a partition	`sudo mount /dev/sdX1 /mnt/data`
Unmount a partition	`sudo umount /mnt/data`
Auto-mount at boot	Edit `/etc/fstab`

9.Work with Services & Systemd – Start/stop services (systemctl start/stop), enable them on boot.

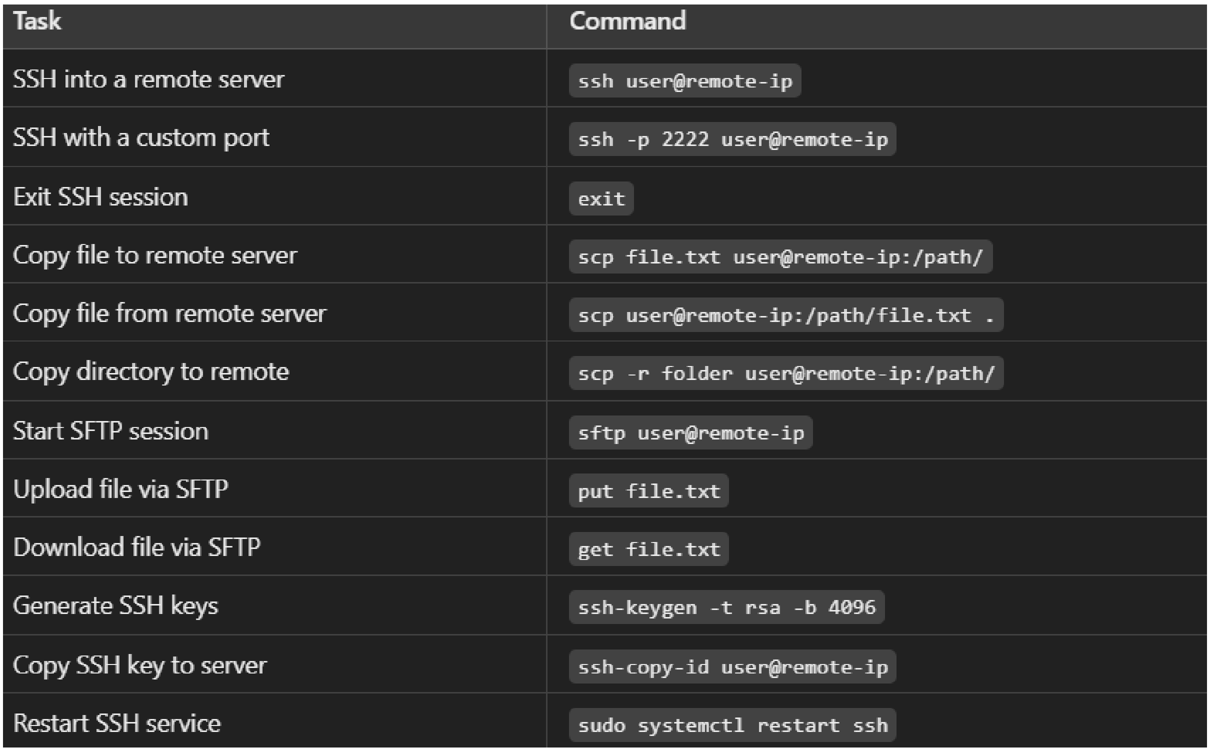
systemd is the system and service manager used in modern Linux distributions. It manages system startup, processes, and background services (daemons). The systemctl command is used to interact with systemd.



Action	Command
Check service status	`systemctl status service-name`
Start a service	`sudo systemctl start service-name`
Stop a service	`sudo systemctl stop service-name`
Restart a service	`sudo systemctl restart service-name`
Reload a service	`sudo systemctl reload service-name`
Enable service on boot	`sudo systemctl enable service-name`
Disable service on boot	`sudo systemctl disable service-name`
List all services	`systemctl list-units --type=service`
View logs for a service	`journalctl -u service-name`
Follow logs in real time	`journalctl -u service-name -f`

10.Use SSH for Remote Access – Securely connect to remote systems (ssh), transfer files (scp, sftp).

SSH (Secure Shell) is a protocol that allows secure remote access to Linux systems. It encrypts all communications, making it safer than traditional remote login methods.



Task	Command
SSH into a remote server	`ssh user@remote-ip`
SSH with a custom port	`ssh -p 2222 user@remote-ip`
Exit SSH session	`exit`
Copy file to remote server	`scp file.txt user@remote-ip:/path/`
Copy file from remote server	`scp user@remote-ip:/path/file.txt .`
Copy directory to remote	`scp -r folder user@remote-ip:/path/`
Start SFTP session	`sftp user@remote-ip`
Upload file via SFTP	`put file.txt`
Download file via SFTP	`get file.txt`
Generate SSH keys	`ssh-keygen -t rsa -b 4096`
Copy SSH key to server	`ssh-copy-id user@remote-ip`
Restart SSH service	`sudo systemctl restart ssh`