Linux Key Characteristics

1. **Open Source**: Source code is freely available for modification.
2. **Portability**: Runs on various hardware platforms.
3. **Security**: Strong permissions and user controls.
4. **Multi-user & Multi-tasking**: Allows multiple users and tasks simultaneously.
5. **Memory Management**:
   - **Temporary**: Data in RAM.
   - **Permanent**: Stored in storage.
   - **Swap Space**: Moves inactive processes to disk when RAM is full.

OS Key Components

1. **Hardware**: Physical devices (CPU, RAM, etc.).
2. **Hypervisor**: Allows running multiple OSes.
3. **BIOS**: Initial hardware boot setup.
4. **MBR**: Boot sector for partition info.
5. **Boot Loader**: Loads the kernel.
6. **Kernel**: Core of the OS, manages resources.
7. **Init**: Starts necessary processes and services.

WSL (Windows Subsystem for Linux)

1. **Commands**:
   - `wsl -l`: Lists installed distros.
   - `wsl -l -v`: Shows versions.
   - `wsl -d ubuntu`: Start Ubuntu.
   - `wsl -d ubuntu -u root`: Login as root.

Directory Navigation (`cd`)

Command	Description	Example
`cd ..`	Move to parent directory.	`/home/user → /home`
`cd ./`	Stay in current directory.	Test current location.
`cd ../sys`	Go up one level, then to `sys`.	`/home/user → /home/sys`

Special Files

1. **/dev/null**:
   - Acts like a black hole (discards data).
   - Example: `echo "Hello" > /dev/null`.

Key Directories

1. **/etc**: Config files (e.g., `resolve.conf` for DNS).
2. **/mnt**: Mount points.
3. **/opt**: Optional software installations.
4. **/tmp**: Temporary files (auto-deletes).
5. **/usr**: User programs.
6. **/proc**: Information about running processes.

File Commands

1. **Permissions**:
   - `chmod`: Change file permissions.
   - Numeric codes:
     - `4`: Read,
     - `2`: Write,
     - `1`: Execute.
2. **File Operations**:
   - `mkdir test`: Create a directory.
   - `rmdir`: Remove a directory.
   - `ls *a`: Files ending with `a`.
   - `ls file?.txt`: Matches files like `file1.txt`.

Editing and Searching in Vim

Command	Description
dw	Delete a word (incl. space).
dd	Delete a line.
u	Undo changes.
yy	Copy a line.
yw	Copy a word.
p	Paste copied content.
/word	Search forward for a word.
?word	Search backward for a word.

Other Useful Commands

1. **Shutdown**: `sudo shutdown now`.
2. **Path Variables**:
   - `echo $PATH`: Display executable path.

- o `$HOME` or `cd ~`: Go to home directory.
3. **Wildcards**:
   - o `*`: Matches multiple characters.
   - o `?`: Matches a single character.