✅LAB-0 – Linux Installation and Setup

🌍Navigation commands

> pwd – Print Working Directory

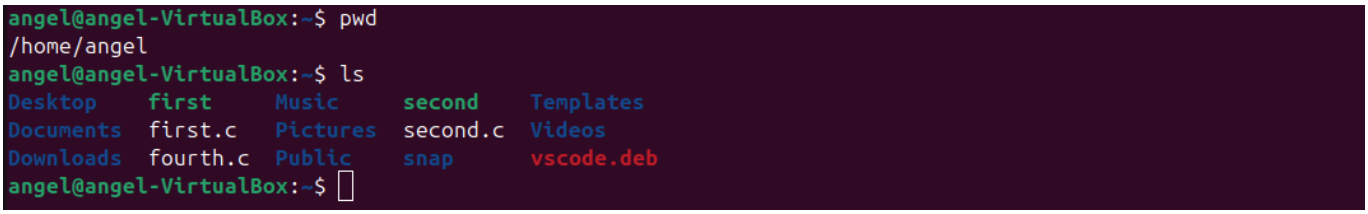
```
Shows the current location in the filesystem.

📌 Output example:

/Users/yourname/projects
```

ls – List Directory Contents

Lists files and folders in the current directory.

- `ls -l → Detailed list (permissions, size, date)`
- `ls -a → Shows hidden files (those starting with .)`
- `ls -la → Combined`

📸Output image of the commands-



cd – Change Directory

Moves into a directory.

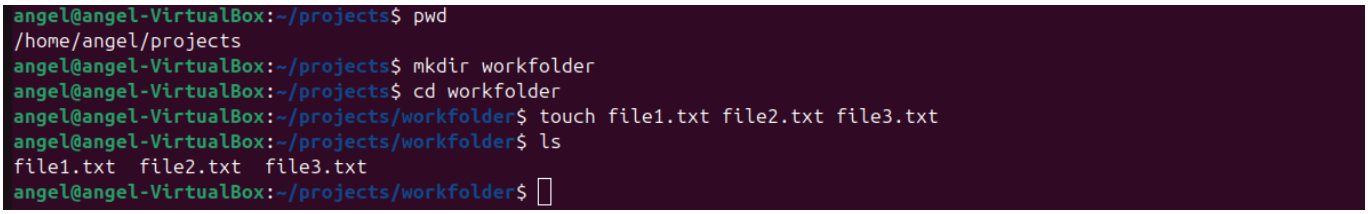
cd folder_name Examples:

cd Documents # Go to Documents cd .. # Go up one level cd / # Go to root cd ~ # Go to home directory

📁2. File and Directory Management

```
mkdir – Make Directory
Creates a new folder.

mkdir new_folder
touch – Create File
Creates an empty file.

touch file.txt
```

📸Output image of the commands-



cp – Copy Files or Directories

```
cp source.txt destination.txt
Copy folder:
cp -r folder1 folder2
```

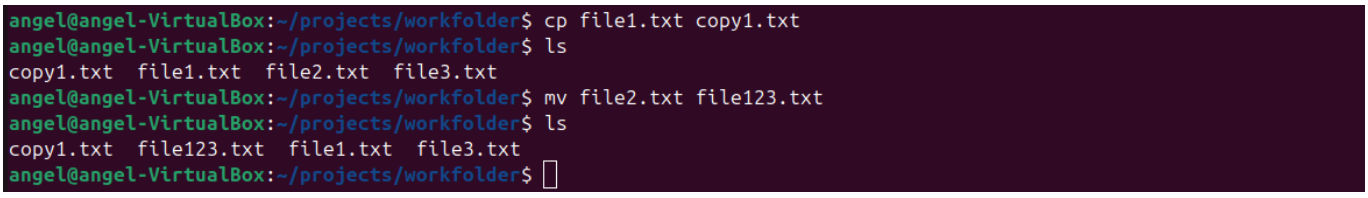
mv – Move or Rename Files

```
mv oldname.txt newname.txt
mv file.txt ~/Documents/     # Move file
```

rm – Remove Files

```
rm file.txt          # Delete file
rm -r folder_name    # Delete folder (recursively)
⚠ Be careful! There is no undo.
```

📸Image : (changing names , removing files using the mv , rm commands)

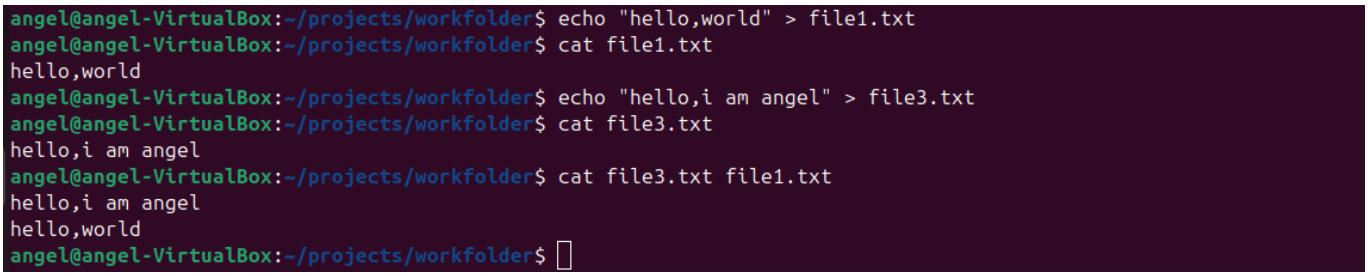


📸3. File Viewing & Editing

```
cat – View File Contents
Displays content in terminal.

cat file.txt
nano – Edit Files in Terminal
```

```
A basic terminal-based text editor.

nano file.txt
Use arrows to move
CTRL + O to save
CTRL + X to exit
clear – Clears the Terminal
clear
Shortcut: CTRL + L
```

📸Output image of the commands-



✅File Permissions with chmod and chown

🚀1. Understanding File Permissions in Linux

Each file/directory in Linux has:

- **Owner** → The user who created the file.
- **Group** → A group of users who may share access.
- **Others** → Everyone else.

📍Permission Types

- **r** → Read (4 in numeric)
- **w** → Write (2 in numeric)
- **x** → Execute (1 in numeric)

📍Permission Layout

Example from `ls -l`:

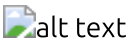
```
-rwxr-xr--
```

Breakdown:

- `-` → Regular file (`d` = directory, `l` = symlink, etc.)
- `rwx` → Owner has read, write, execute

- `r-x` → Group has read, execute
- `r--` → Others have read only

📸Output image of the commands-


alt text

🚀2. `chmod` – Change File Permissions

Syntax

```
chmod [options] mode filename
```

Modes can be set in **numeric (octal)** or **symbolic** form.

📍(A) Numeric (Octal) Method

Each permission is represented as a number:

- Read = 4
- Write = 2
- Execute = 1

Add them up:

- `7 = rwx`
- `6 = rw-`
- `5 = r-x`
- `4 = r--`
- `0 = ---`

Example:

```
chmod 755 script.sh
```

Meaning:

- Owner: 7 → `rwx`
- Group: 5 → `r-x`
- Others: 5 → `r-x`

📍(B) Symbolic Method

Use `u` (user/owner), `g` (group), `o` (others), `a` (all). Operators:

- `+` → Add permission
- `-` → Remove permission
- `=` → Assign exact permission

Examples:

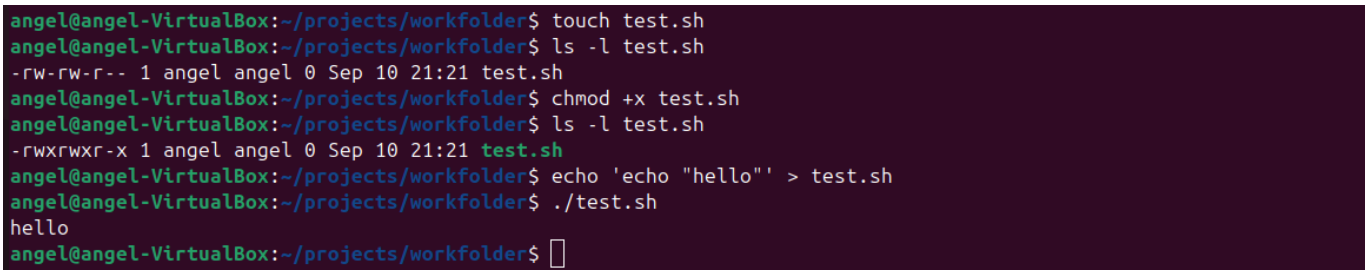
```
chmod u+x script.sh     # Add execute for owner
chmod g-w notes.txt     # Remove write from group
chmod o=r file.txt      # Set others to read only
chmod a+r report.txt    # Everyone gets read access
```

📍(C) Recursive Changes

```
chmod -R 755 /mydir
```

- `-R` → applies changes recursively to all files/subdirectories.

📸Output image of chmod commands-



🚀3. chown – Change File Ownership

Syntax

```
chown [options] new_owner:new_group filename
```

Examples:

```
chown angel file.txt           # Change owner to user 'angel'
chown angel:dev file.txt       # Change owner to 'angel' and group to 'dev'
chown :dev file.txt            # Change only group to 'dev'
chown -R angel:dev /project    # Recursive ownership change
```

🚀4. Putting It All Together

Example Scenario

```
touch project.sh
ls -l project.sh
```

Output:

```
-rw-r--r-- 1 angel dev 0 Aug 19 12:00 project.sh
```

Now:

```
chmod 700 project.sh       # Only owner has rwx
chmod u+x,g-w project.sh   # Add execute for user, remove write for group
chown root:admin project.sh # Change owner to root and group to admin
```

🚀5. Quick Reference Table

Numeric	Permission	Meaning
0	---	No access
1	--x	Execute only
2	-w-	Write only
3	-wx	Write + Exec
4	r--	Read only
5	r-x	Read + Exec
6	rw-	Read + Write
7	rwx	Full access

✅ **Key Tip**: Use **numeric for quick settings** (e.g., 755, 644) and **symbolic for fine adjustments** (`u+x`, `g-w`).

📌Extra questions -

Q1 Difference Between `chmod` and `chown` ?

In Unix-based operating systems (Linux, macOS), `chmod` and `chown` are two important commands used to manage files and directories. While both are related to permissions and ownership, they serve different

purposes.

`chmod` - Change Mode

The `chmod` command is used to change the **permissions** of a file or directory. Permissions define who can read, write, or execute a file.

Permissions:

- **Read (r)**: Permission to view the contents of a file.
- **Write (w)**: Permission to modify or delete the file.
- **Execute (x)**: Permission to run the file as a program (for executable files or scripts).

Example Usage:

1. `chmod 755 myfile`
   Grants:
   - Read, write, and execute permissions to the **owner**.
   - Read and execute permissions to the **group** and **others**.
2. `chmod u+x script.sh`
   Adds execute permission to the **owner** of `script.sh`.
3. `chmod 644 myfile.txt`
   Grants:
   - Read and write permissions to the **owner**.
   - Read permission to the **group** and **others**.

`chown` - Change Owner

The `chown` command is used to change the **ownership** of a file or directory. This includes both the **user owner** and the **group owner**.

- `[user]` specifies the new owner of the file.
- `[group]` specifies the new group of the file (optional).

Example Usage:

1. `chown alice:admins file.txt`
   Changes the **owner** of `file.txt` to `alice` and the **group** to `admins`.
2. `chown bob file.txt`
   Changes the **owner** of `file.txt` to `bob`, while keeping the existing group unchanged.
3. `chown :staff file.txt`
   Changes the **group** of `file.txt` to `staff` (no change to the owner).

Summary of Differences:

Command	Purpose	Example Usage
`chmod`	Changes **permissions** of files	`chmod 755 myfile` (Set read, write, execute)
`chown`	Changes **ownership** of files	`chown alice:admins file.txt` (Change owner and group)

Understanding the difference between `chmod` and `chown` is crucial for managing file access and ownership in a secure environment. Use `chmod` to modify what users can do with a file, and `chown` to modify who owns the file and its associated group.

Q2 How do you check current directory and user ?

Checking the Current Directory and Current User

In Unix-based systems (Linux, macOS), you can easily check your **current directory** and **current user** using simple terminal commands.

Check the Current Directory

To check your **current directory**, use the `pwd` command:

```
pwd
```

Checking the Current Directory and Current User

In Unix-based systems (Linux, macOS), you can easily check your **current directory** and **current user** using simple terminal commands.

1. Check the Current Directory

To check your **current directory**, use the `pwd` command:

```
pwd

$ pwd
/home/alice/projects
```

Checking the Current User

In Unix-based systems (Linux, macOS), you can check the **current user** using the `whoami` command.

Command

To find out the current user, use the following command in the terminal:

```
whoami
```