

# Getting Started with the Department Computer Laboratory

Dear Students,

Welcome to the Department of Mathematics Computer Laboratory.

This document describes the basic steps required to start using the laboratory computers. Please read the instructions carefully before using the system.

All computers in the laboratory use Ubuntu Linux (currently version 26.04) as the operating system. Some of you may not be familiar with Linux, so this guide begins with the basic login procedure.

## Section A : Logging In

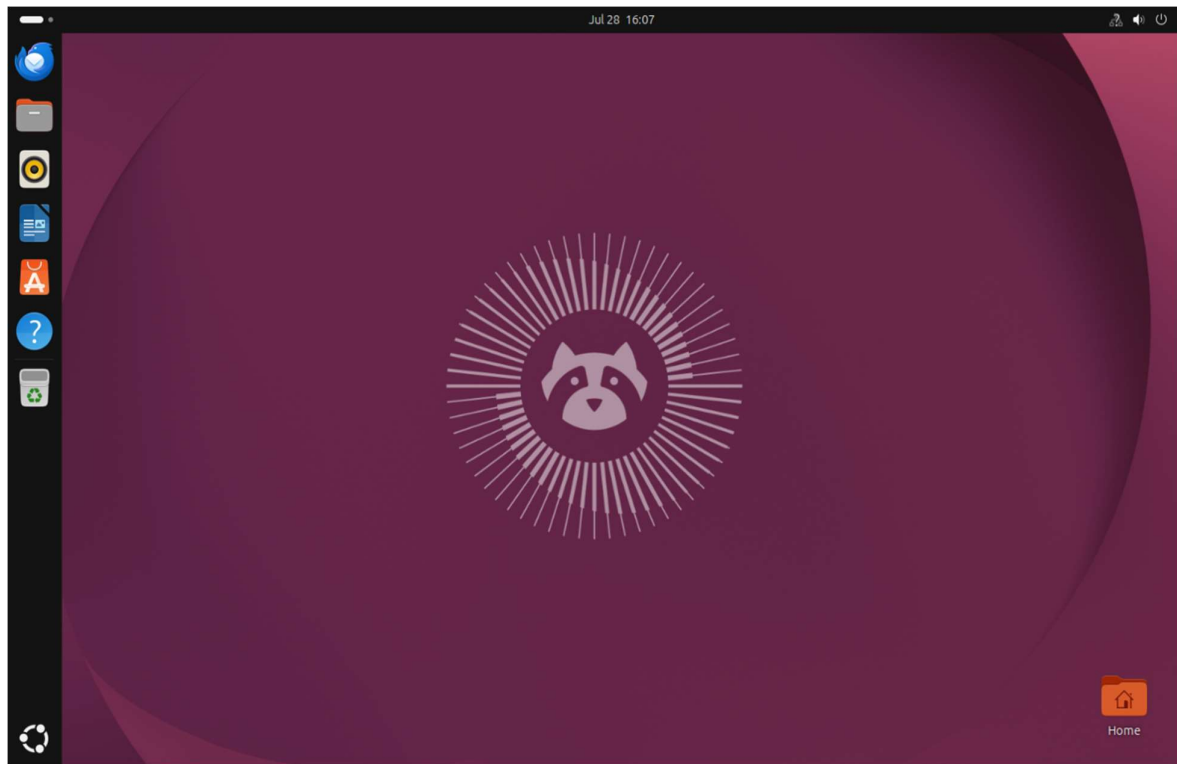
After switching on the computer, the login screen shown below will appear within a few seconds.



**Figure 1:** Ubuntu 26.04 login screen

1. Click on your username (**to be provided by the department**).
2. Enter your password (**to be provided by the department**).
3. Press **Enter** to log in.

After successful authentication, the Ubuntu desktop shown below will appear.



**Figure 2:** Ubuntu 26.04 desktop

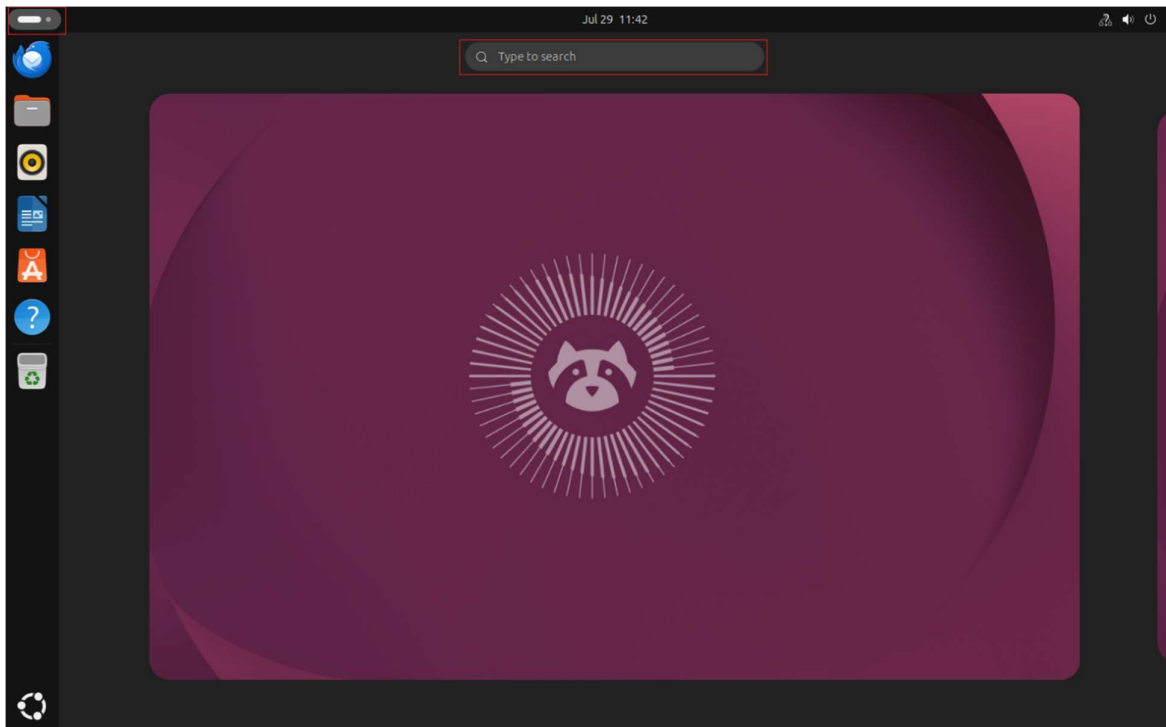
## Section B : Opening the Terminal

A terminal is a command-line interface that allows users to interact directly with the Linux operating system. It is similar to the Command Prompt in Microsoft Windows, but it is considerably more powerful because it enables users to perform a wide variety of administrative and programming tasks.

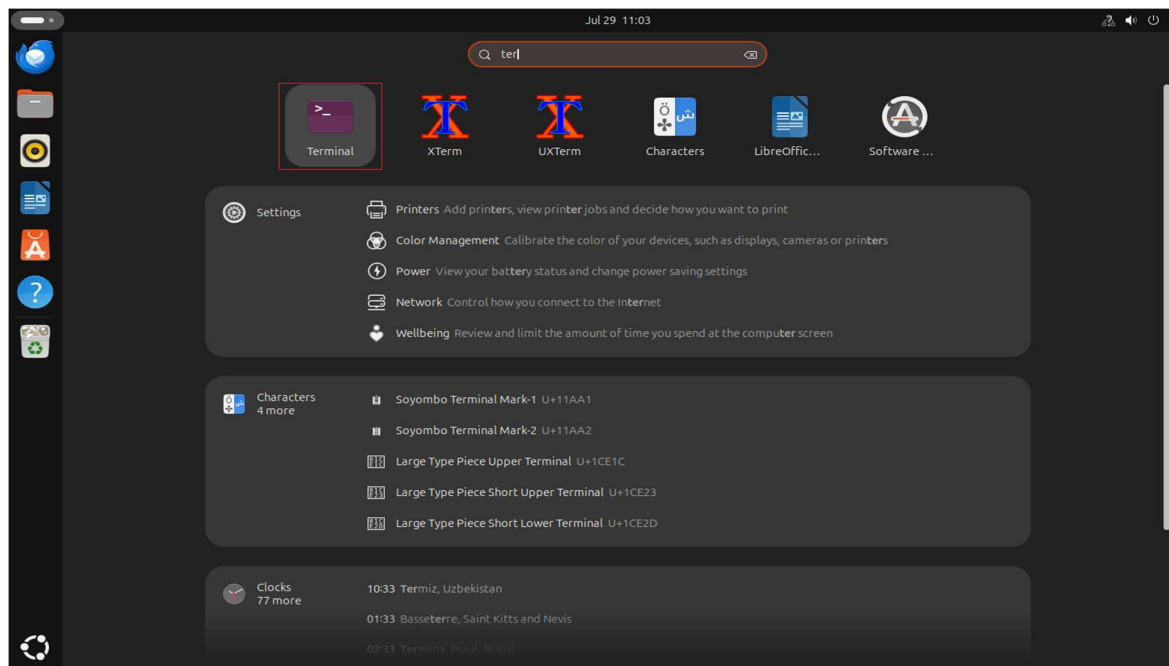
To open the terminal, follow the steps below:

1. Click the **Workspace Indicator** icon (the first icon at the top of the sidebar).
2. Click the **Type to Search** box.
3. Type **terminal**.
4. Click the **Terminal** icon.
- 5.

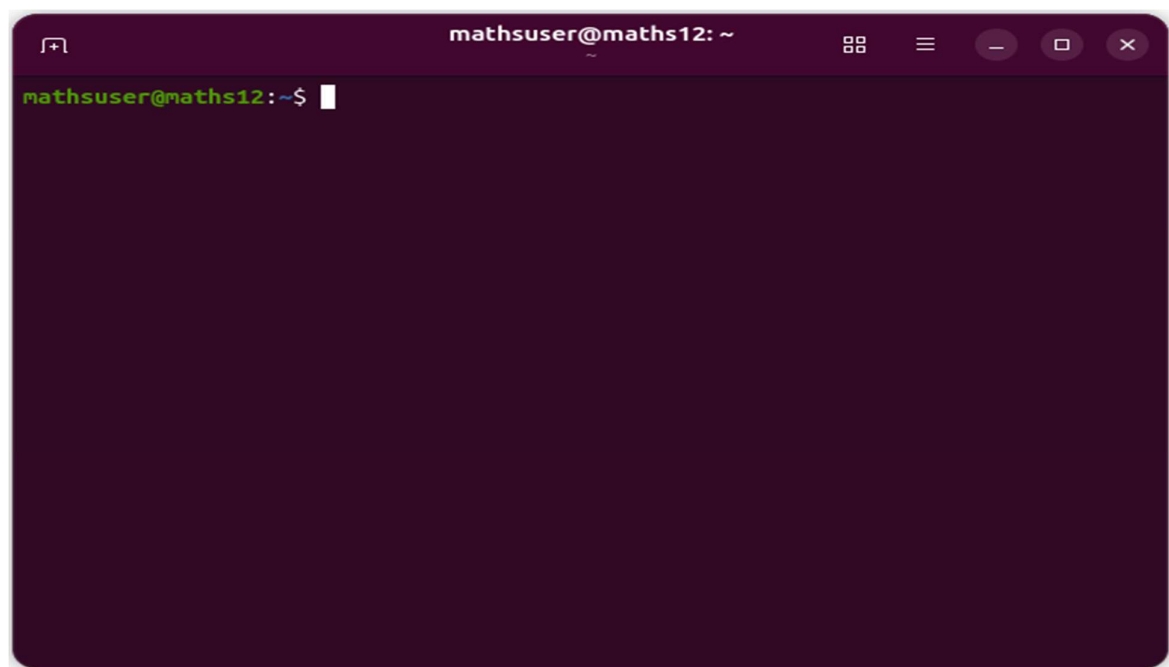
You can also open the terminal by pressing the keyboard shortcut **Ctrl + Alt + t**.



**Figure 3:** Workspace Indicator



**Figure 4:** Opening the terminal



**Figure 5:** Terminal window

## Section C : Logging In to the Server Using SSH

Our department provides access to several servers that can be used for programming, printing, assignment submission, file transfer, and data storage.

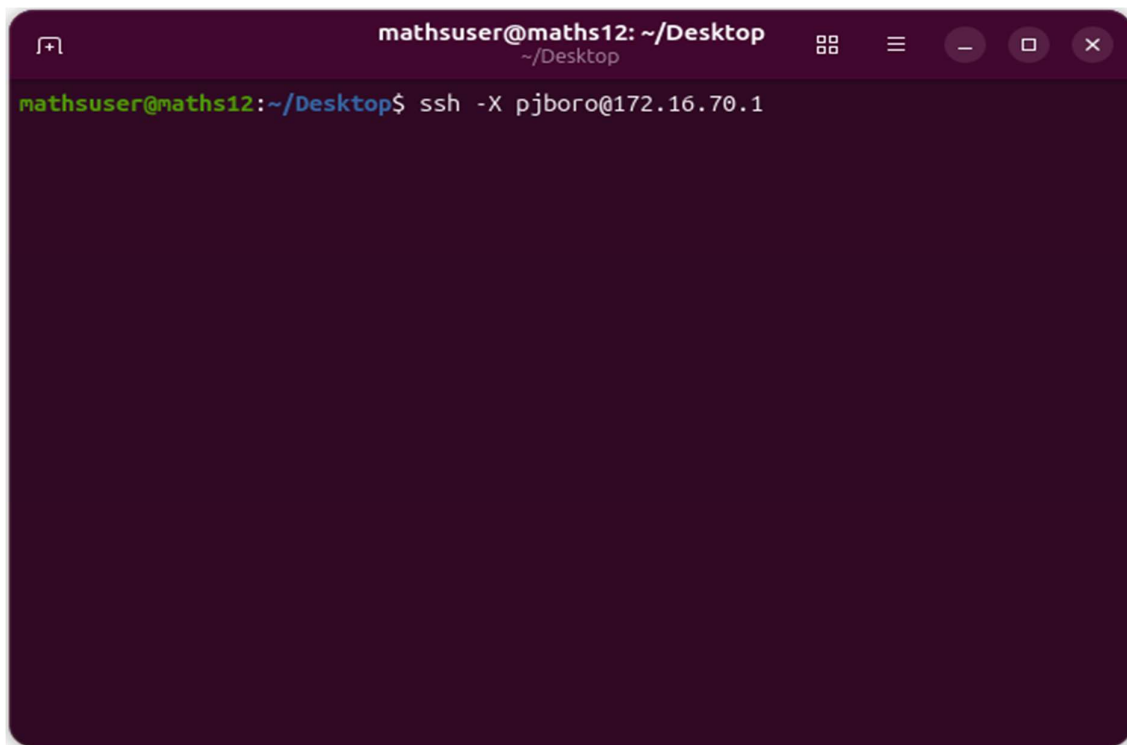
The **mathcloud** server (IP address: **172.16.70.1**) is used primarily for assignment submission, printing, and storing files.

To connect to the server, open a terminal window and enter the following command:

```
ssh -X username@172.16.70.1
```

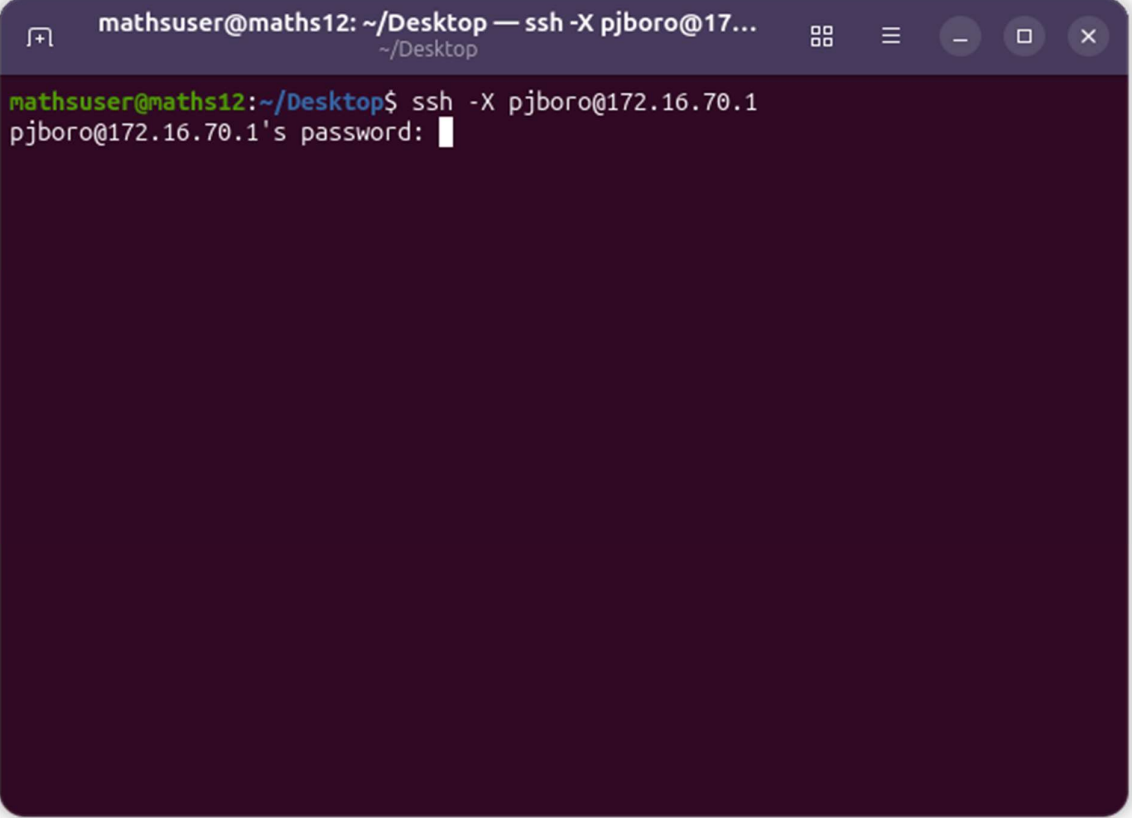
Replace **username** with the username assigned to you by the department. The **X** in the command must be written in uppercase.

**Note:** Your username and password will be provided by the laboratory administrator after you receive your official email account from the Computer Centre.



**Figure 6:** Logging in to the server from the terminal

After entering the command, press **Enter**. The system will then ask you to enter your password.

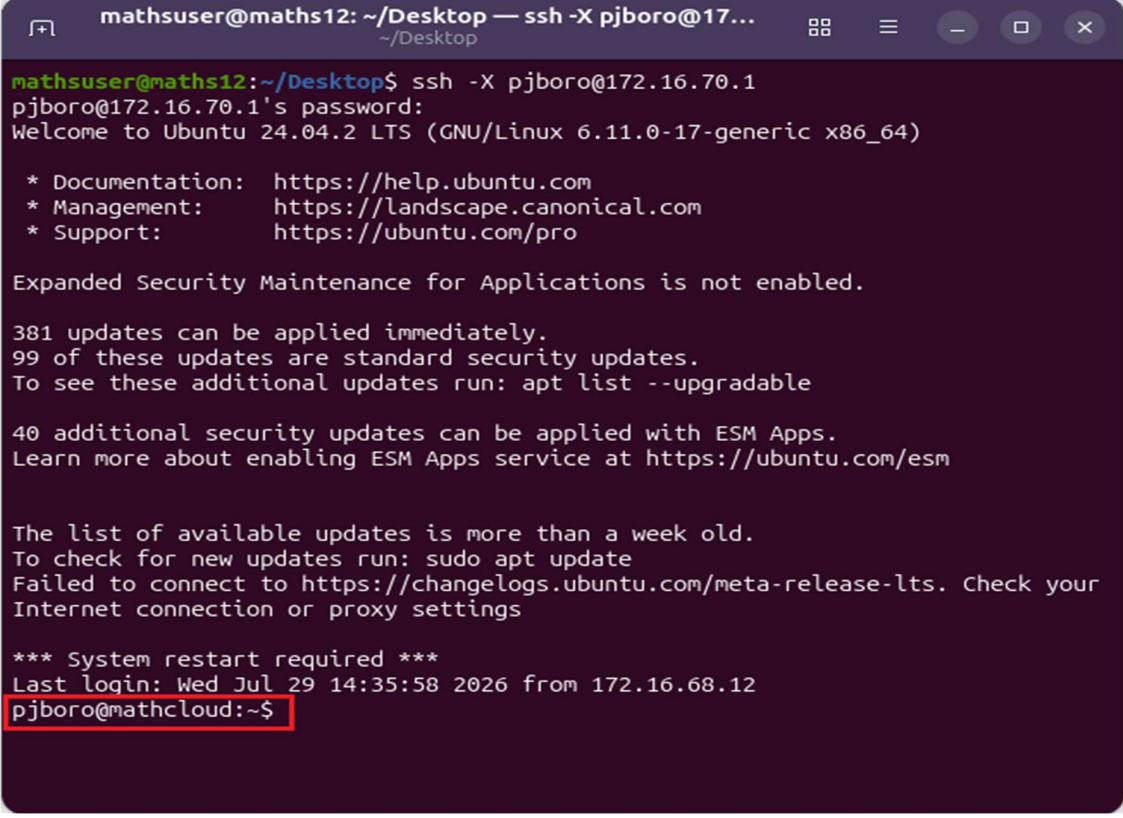
A terminal window with a dark purple background. The title bar at the top reads "mathsuser@maths12: ~/Desktop — ssh -X pjboro@17...". Below the title bar, the prompt "mathsuser@maths12:~/Desktop\$" is followed by the command "ssh -X pjboro@172.16.70.1". The next line shows the output "pjboro@172.16.70.1's password:" followed by a white cursor block, indicating where the user should enter their password.

```
mathsuser@maths12: ~/Desktop — ssh -X pjboro@17...  
~/Desktop  
mathsuser@maths12:~/Desktop$ ssh -X pjboro@172.16.70.1  
pjboro@172.16.70.1's password: 
```

**Figure 7:** Password prompt

**Important:** While entering your password, no characters (not even asterisks) will appear on the screen. This is normal behaviour in Linux. Carefully type the password and press **Enter**.

If the login is successful, a terminal window similar to the one shown below will appear.

A terminal window titled 'mathsuser@maths12: ~/Desktop — ssh -X pjboro@17...' showing the process of logging into a server. The user 'mathsuser' runs 'ssh -X pjboro@172.16.70.1'. The terminal displays the password prompt, a welcome message for Ubuntu 24.04.2 LTS, and system update information. At the bottom, the prompt 'pjboro@mathcloud:~\$' is highlighted with a red box.

```
mathsuser@maths12: ~/Desktop — ssh -X pjboro@17...
~/Desktop
mathsuser@maths12:~/Desktop$ ssh -X pjboro@172.16.70.1
pjboro@172.16.70.1's password:
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.11.0-17-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

381 updates can be applied immediately.
99 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

40 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at https://ubuntu.com/esm

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your
Internet connection or proxy settings

*** System restart required ***
Last login: Wed Jul 29 14:35:58 2026 from 172.16.68.12
pjboro@mathcloud:~$
```

**Figure 8:** Successful login

If you see a prompt similar to the following example, it indicates that you have successfully logged in to the server:

```
username@mathcloud:~$
```

In this example, **username** represents your user ID, while **mathcloud** is the name of the server.

## Section D : Changing Your Password

The following procedure applies to both your **laboratory computer account** and your **server account**.

- For a **laboratory computer account**, first open a terminal window (Section B).
- For a **server account**, log in to the server using SSH (Section C). Since you are already working in a terminal session, no additional terminal window is required.

For security reasons, you should change your password immediately after logging in for the first time.

### Step 1: Execute the Password Change Command

Enter the following command and press **Enter**:

```
passwd
```

**Figure 9:** Executing the passwd command

### Step 2: Enter Your Current Password

The system will ask you to enter your current password.

Current password:

Type your current password and press **Enter**.

**Note:** No characters (not even asterisks) will be displayed while you type the password. This is normal behaviour in Linux.

**Figure 10:** Entering the current password

### Step 3: Enter a New Password

The system will ask you to enter a new password.

New password:

**Figure 11:** Entering the new password

### Step 4: Confirm the New Password

Re-enter the new password when prompted.

Retype new password:

If the password change is successful, you will see the following message:

```
passwd: password updated successfully
```

**Figure 12:** Password updated successfully

## Section E : Some Common Linux Commands

The following commands are frequently used while working in the terminal. Students are encouraged to become familiar with these commands because they are useful for programming assignments, file management, and general system administration tasks.

### 1. `vim` – Create, View, or Edit a File

The `vim` command opens the **Vim text editor**, which allows you to create a new text file or modify an existing one.

#### Syntax

```
vim filename
```

#### Example

```
vim test.c
```

This command opens the file **test.c**. If the file does not exist, Vim creates a new file with that name.

### 2. `mkdir` – Create a Directory

The `mkdir` command creates a new directory (folder).

#### Syntax

```
mkdir foldername
```

#### Example

```
mkdir assignment1
```

This command creates a new directory named **assignment1**.

### 3. `cd` – Change the Current Directory

The `cd` command changes the current working directory.

#### Syntax

```
cd foldername
```

#### Example

```
cd assignment1
```

This command moves the user from the current directory to the **assignment1** directory.

You can also use the following commands:

```
cd ..
```

Moves to the parent directory.

```
cd ~
```

Moves to the user's home directory.

## 4. `cp` – Copy Files

The `cp` command copies a file from one location to another.

### Syntax

```
cp source_filename destination_path
```

### Example

```
cp program.c backup/
```

This command copies **program.c** into the **backup** directory.

## 5. `mv` – Move or Rename Files

The `mv` command is used to move files from one location to another. It can also be used to rename files.

### Syntax

```
mv source_filename destination_path
```

### Examples

Move a file:

```
mv report.pdf documents/
```

Rename a file:

```
mv file1.txt file2.txt
```

## 6. `rm` – Delete Files

The `rm` command removes files from the system.

### Syntax

```
rm filename
```

### Example

```
rm test.c
```

This command deletes the file **test.c**.

To delete a directory and all its contents, use the following command:

```
rm -r foldername
```

**Warning:** Use this command carefully because deleted files are not easily recovered.

## 7. `ls` – Display Files and Directories

The `ls` command displays the contents of the current directory.

### **Syntax**

```
ls
```

### **Example**

```
ls
```

The output may look like this:

```
assignment1  documents  notes.txt
```

Useful options:

```
ls -l
```

Displays detailed information about files and directories.

```
ls -a
```

Displays all files, including hidden files.

## 8. `pwd` – Display the Current Directory

The `pwd` command shows the complete path of the current working directory.

### **Syntax**

```
pwd
```

### **Example**

```
pwd
```

Example output:

```
/home/username/assignment1
```

## Important Notes

- Use the `man` command to read the manual page of any command.

For example:

```
man ls
```

## Section F: Editors for Writing Programs

Several text editors are available in Ubuntu, including **vi**, **vim**, **nano**, **gedit**, and **GNOME Text Editor**. These editors are used to create and modify source code files, scripts, and text files.

Among these editors, **vi** is the traditional editor available on almost all Linux systems. Although it may appear difficult to use at first, it is a powerful editor that provides many advanced features.

### 1. The Vim Editor

To open the Vim editor, enter the following command in the terminal:

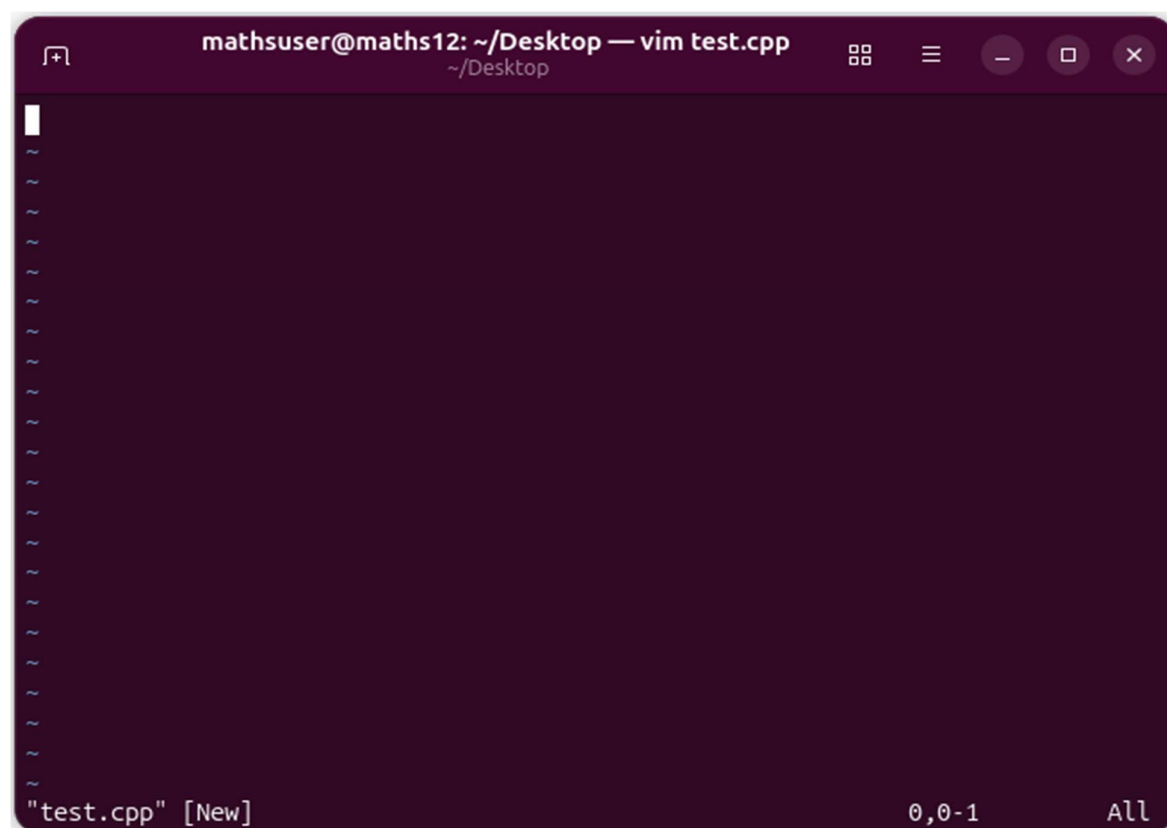
#### Syntax

```
vim filename
```

#### Example

```
vim test.cpp
```

If the specified file does not exist, Vim creates a new file automatically.



**Figure 13:** Vim editor

## Modes of Operation in Vim

Vim mainly operates in three different modes.

### *(a) Command Mode*

When Vim starts, it opens in command mode. In this mode, the keyboard is used to execute commands rather than enter text.

Some common commands are listed below.

| Key | Function                |
|-----|-------------------------|
| i   | Enter insert mode       |
| Esc | Return to command mode  |
| dd  | Delete the current line |
| yy  | Copy the current line   |
| p   | Paste the copied text   |
| u   | Undo the last operation |

### *(b) Insert Mode*

Insert mode allows the user to enter and edit text.

To enter insert mode, press the following key:

i

You can then begin typing.

### *(c) Last-Line Mode*

To save or exit a file, press **Esc**, type a colon (:), and then enter the appropriate command.

| Command | Description                 |
|---------|-----------------------------|
| :w      | Save the file               |
| :q      | Quit the editor             |
| :wq     | Save the file and quit      |
| :q!     | Quit without saving changes |

### **Example**

```
:wq
```

This command saves the file and closes the editor.

## Getting Help

The `man` command displays the manual page for a command.

### **Example**

```
man vi
```

This command displays the complete manual for the **vi** editor.

## 2. The Nano Editor

The Nano editor is simpler than Vim and is often preferred by beginners.

To open Nano, type the following command:

```
nano filename
```

### Example

```
nano test.cpp
```



**Figure 14:** Nano editor

The available keyboard shortcuts are displayed at the bottom of the Nano window.

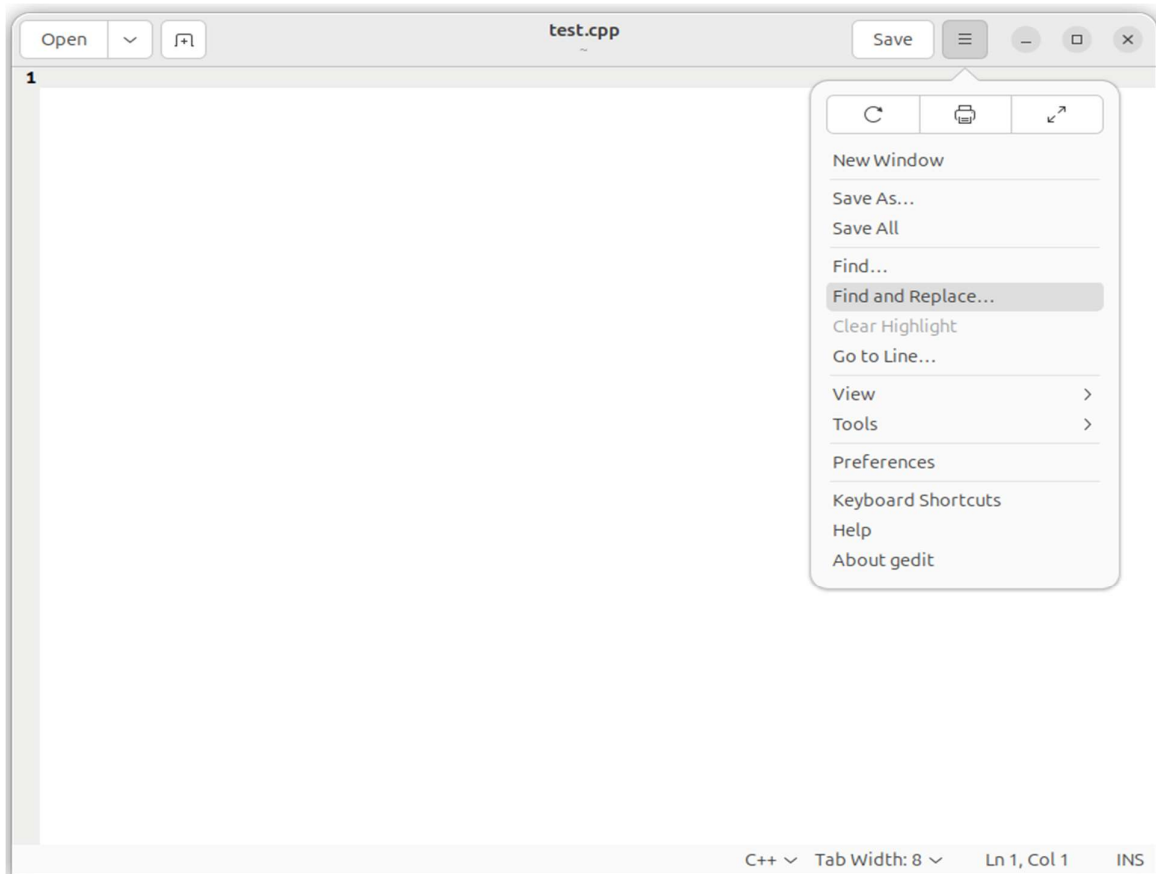
### 3. The Gedit Editor

The Gedit editor provides a graphical user interface similar to Microsoft Notepad.

To open Gedit, click the **Workspace Indicator** icon and search for **gedit**.

You can also open it from the terminal by typing the following command:

```
gedit filename
```



**Figure 15:** Gedit editor

After editing the file, click the **Save** button or press **Ctrl + S** to save your work.

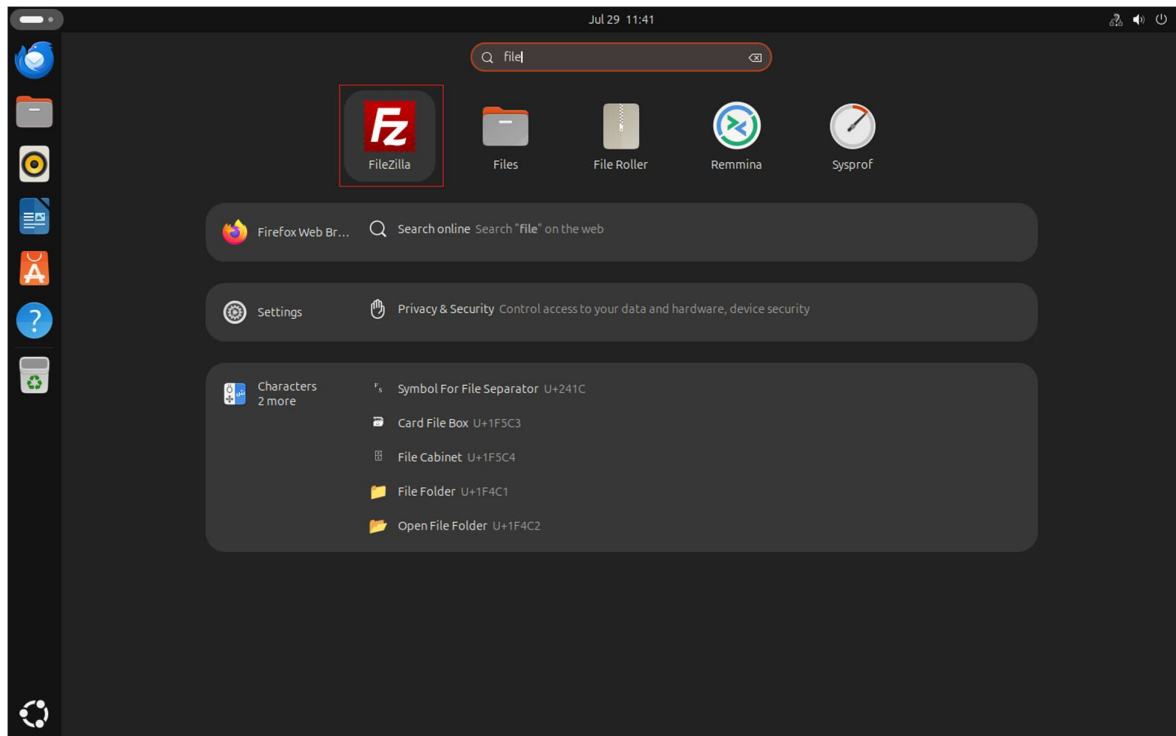
## Section G : Transferring Files to and from the Server Using FileZilla

FileZilla is an application used to transfer files between a local computer and a remote server. It provides a graphical interface, making file transfers much easier than using command-line tools.

### Step 1: Opening FileZilla

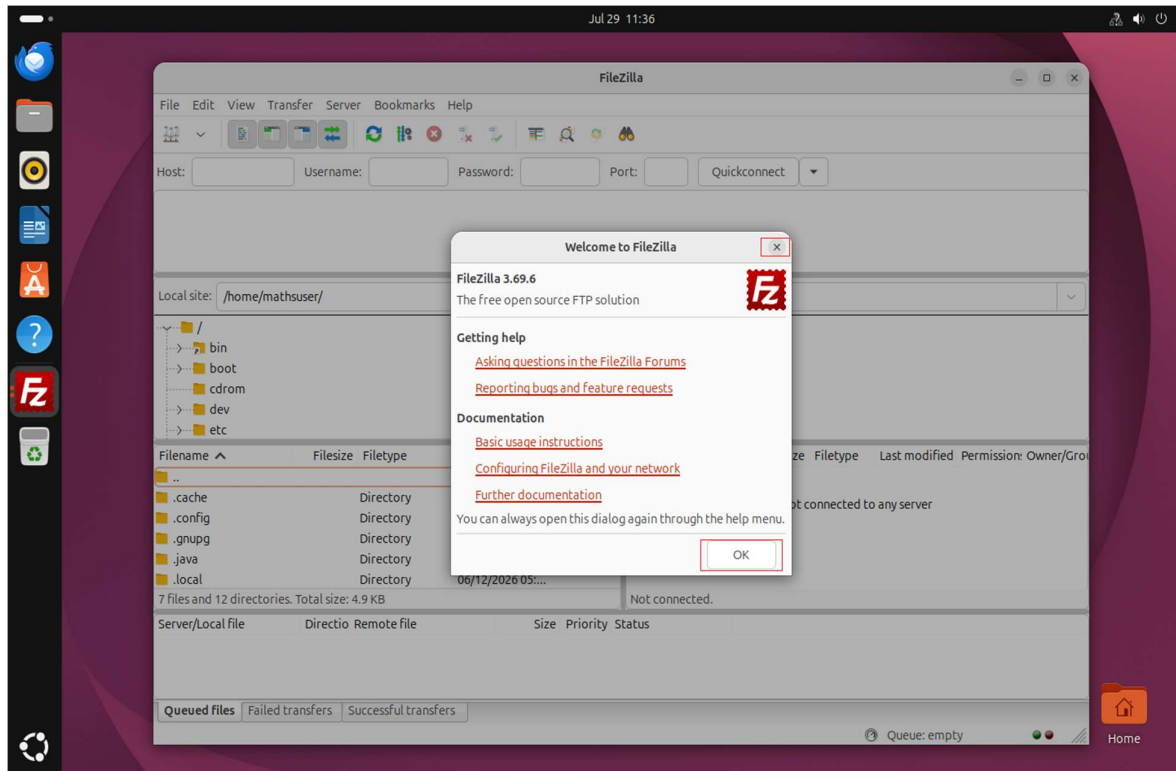
To open FileZilla, follow these steps:

1. Click the **Workspace Indicator** icon (refer to Figure 3).
2. Type **FileZilla** in the search box.
3. Click the **FileZilla** icon.



**Figure 16:** FileZilla open

When FileZilla starts, the welcome screen shown below will appear.

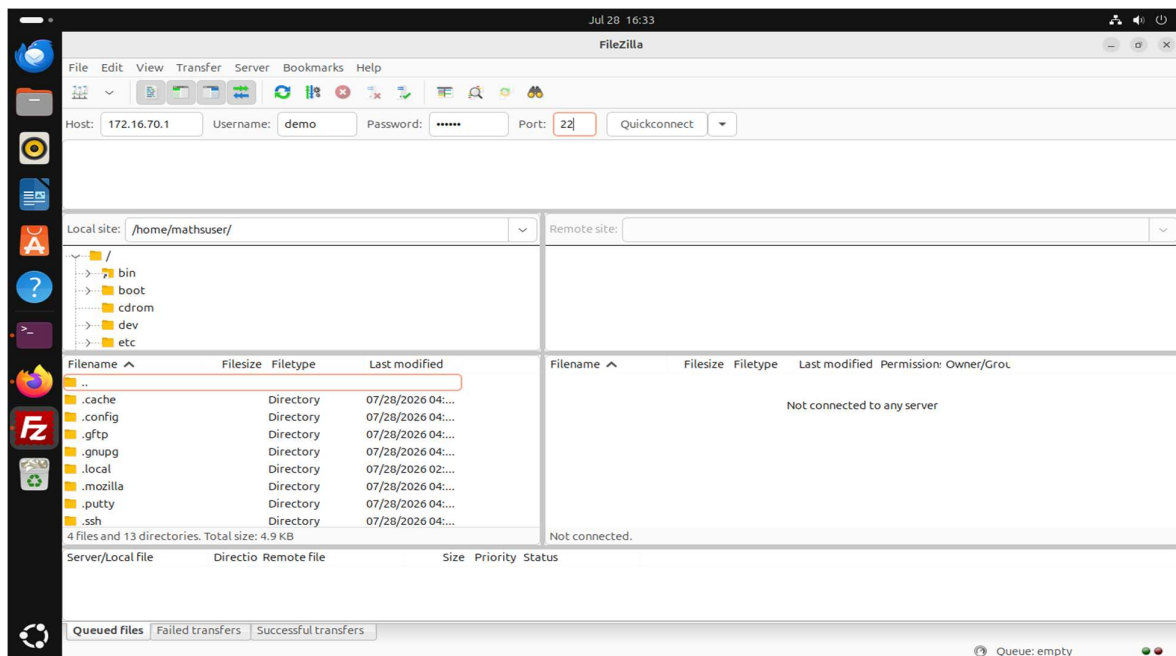


**Figure 17: FileZilla welcome screen**

Click **OK** or close the window by clicking the **X** button.

## Step 2: Connecting to the Server

Enter the following information in the FileZilla window.



**Figure 18: FileZilla login screen**

1. Enter the server IP address in the **Host** field.

Example:

172.16.70.1

2. Enter your username in the **Username** field.

The username is your IITG email address without the **@iitg.ac.in** part.

For example, if your email address is:

demo@iitg.ac.in

then your username is:

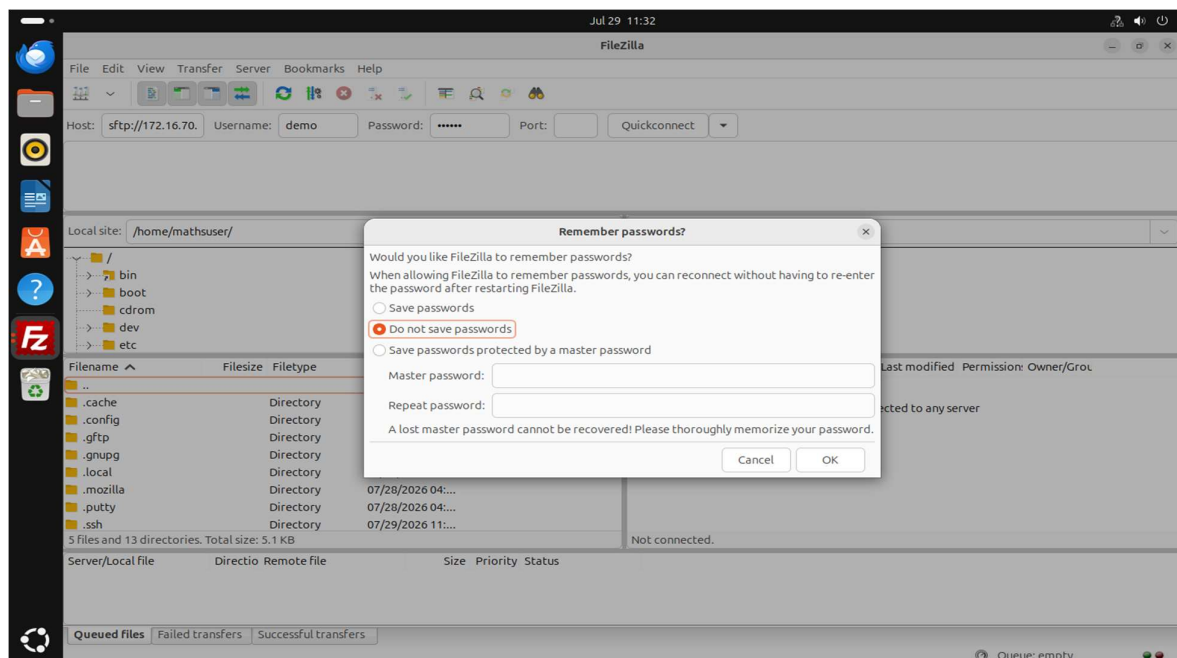
demo

3. Enter your password in the **Password** field.
4. Enter **22** in the **Port** field.
5. Click **Quickconnect** or press **Enter**.

**Note:** Do not leave the port field empty, and do not use any port number other than **22**.

### Step 3: Handling the Password Prompt

You may see a message asking whether the password should be stored.



**Figure 19:** Remember passwords window

Select **Do not save passwords** and click **OK**.

## Step 4: Accepting the Host Key

During the first connection, a security warning similar to the one shown below will appear.

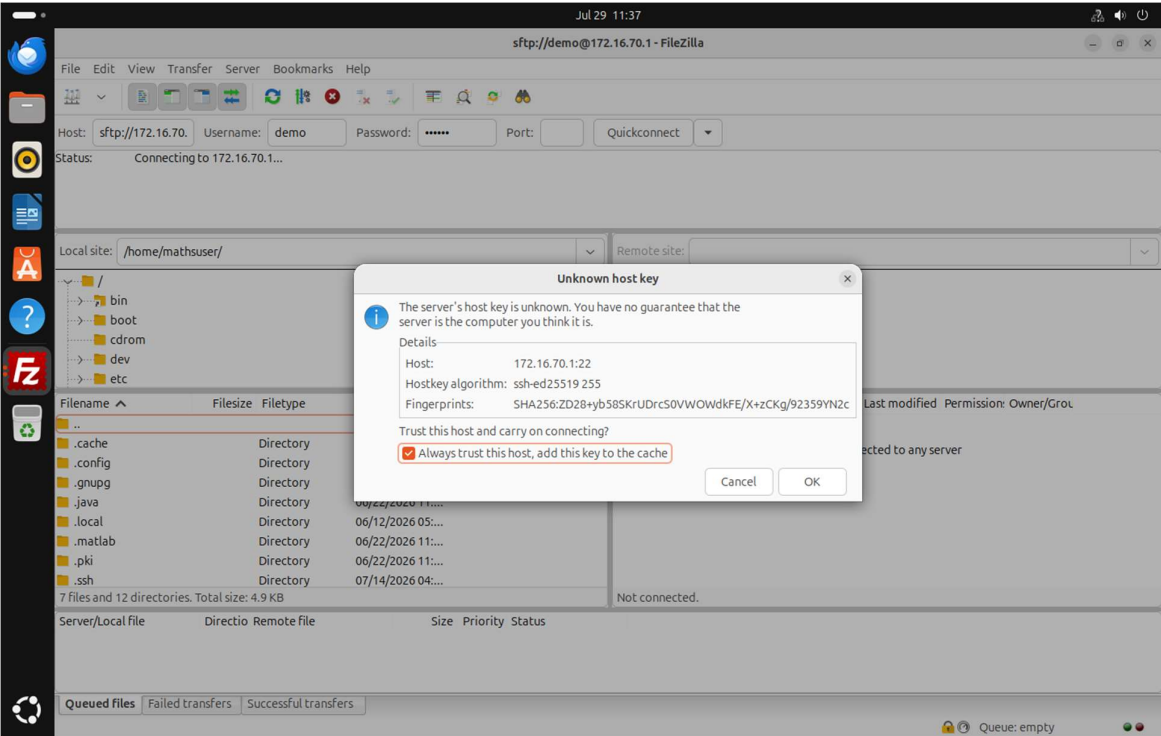
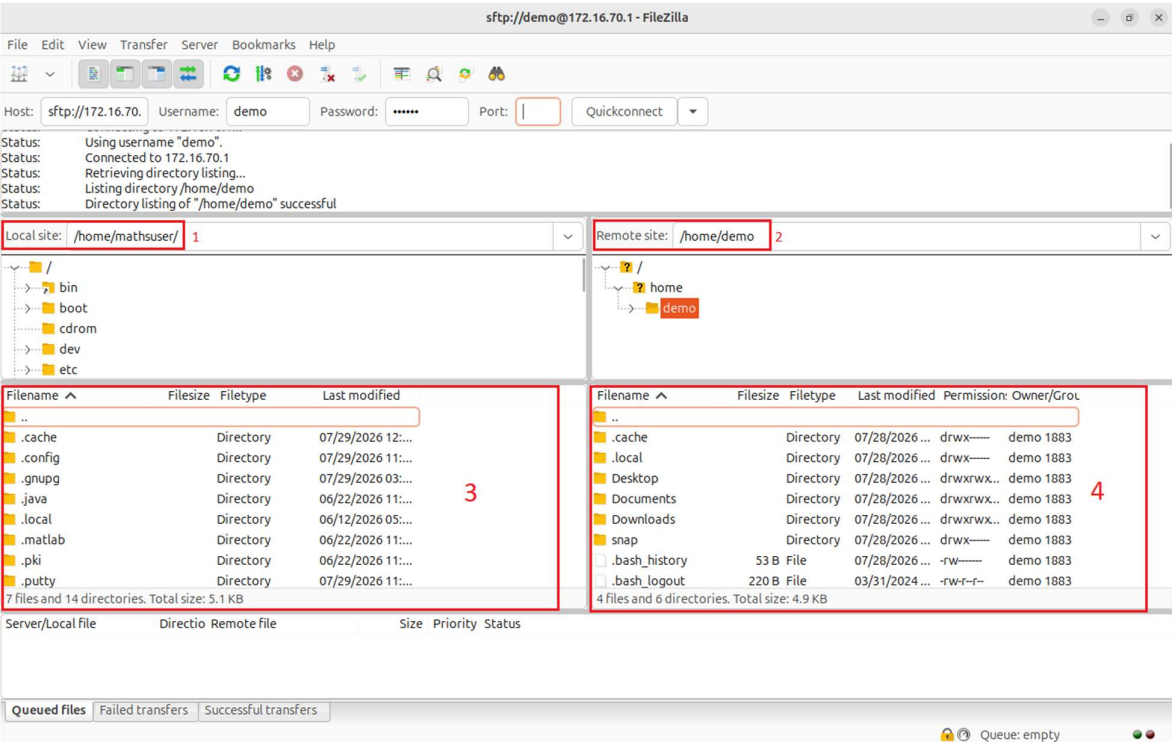


Figure 20: Unknown host key window

Select **Always trust this host, add this key to the cache**, and click **OK**.

## Step 5: Understanding the FileZilla Window

After the connection is established, the FileZilla window will appear.



**Figure 21:** FileZilla connected to the server

The window is divided into two sections.

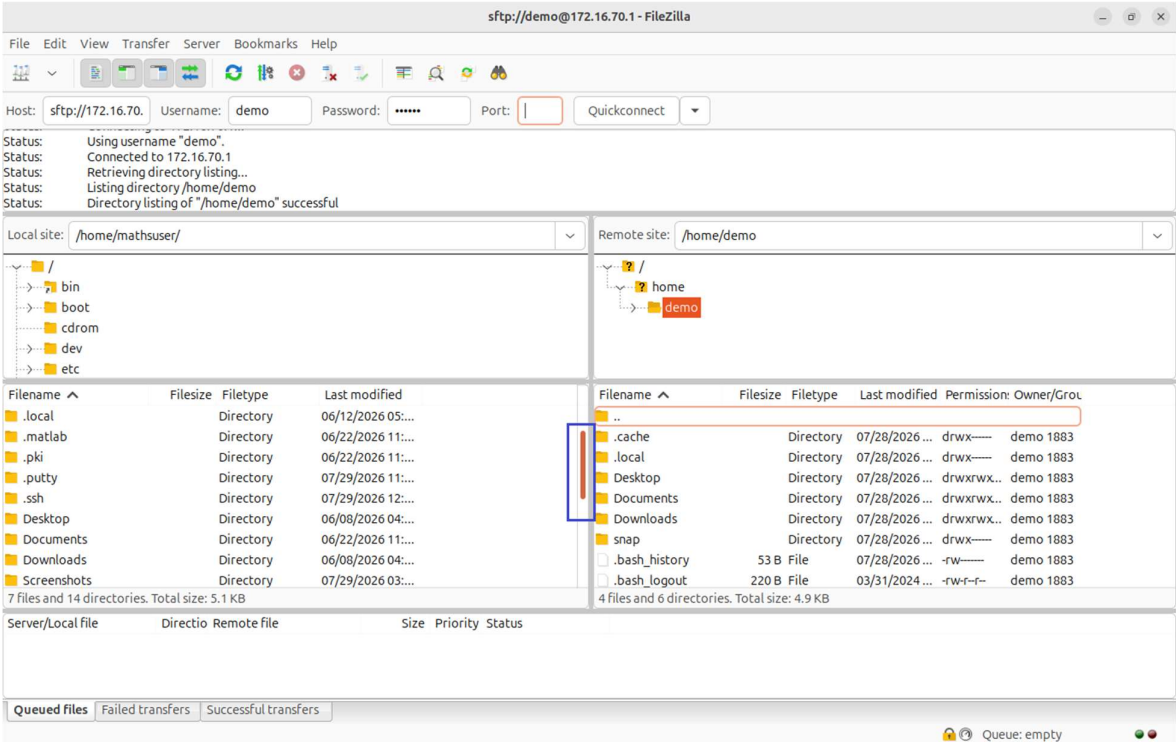
*Local Site*

The local site refers to the computer currently being used.

For example:

/home/mathsuser/

All files and directories stored on the local computer are displayed in the left panel.



**Figure 22:** Local site

*Remote Site*

The remote site refers to the server.

For example:

/home/demo/

All files and directories stored on the server are displayed in the right panel.

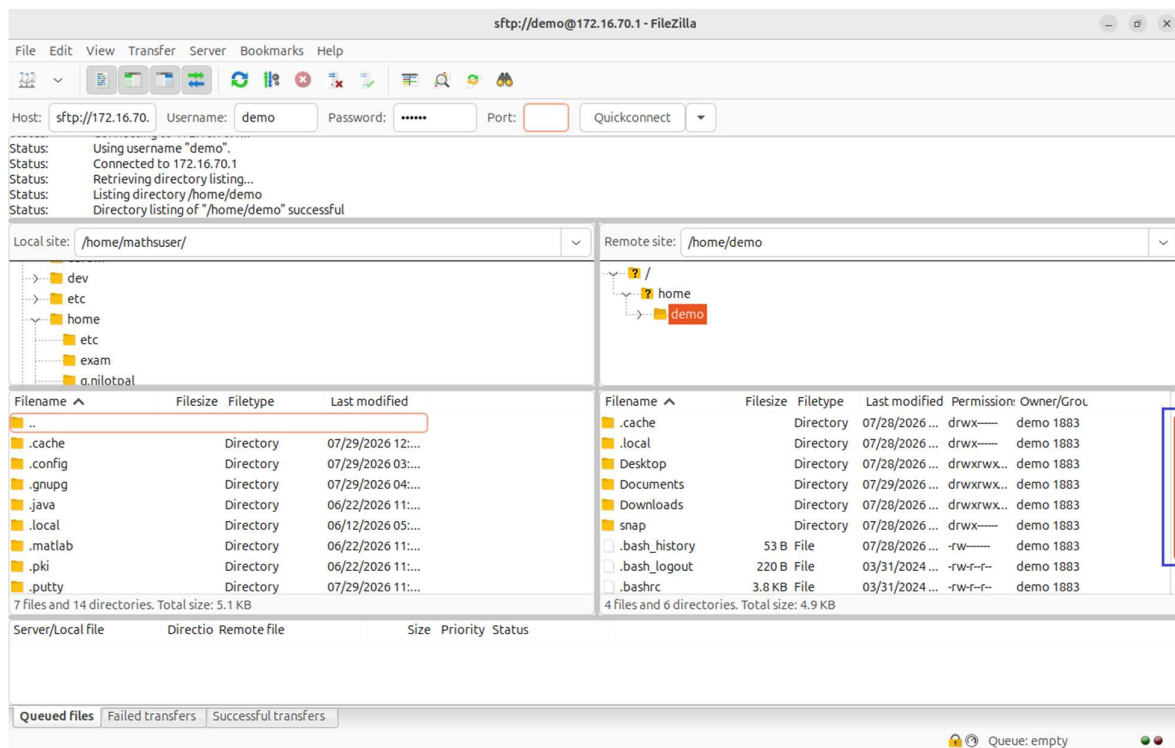


Figure 23: Remote site

## Step 6: Uploading Files

Suppose you want to upload a file named **This is a file.txt** from the **Documents** directory on the local computer to the **Documents** directory on the server.

Follow these steps:

1. Open the **Documents** directory in the local site panel.
2. Open the **Documents** directory in the remote site panel.
3. Right-click the file.
4. Click **Upload**.

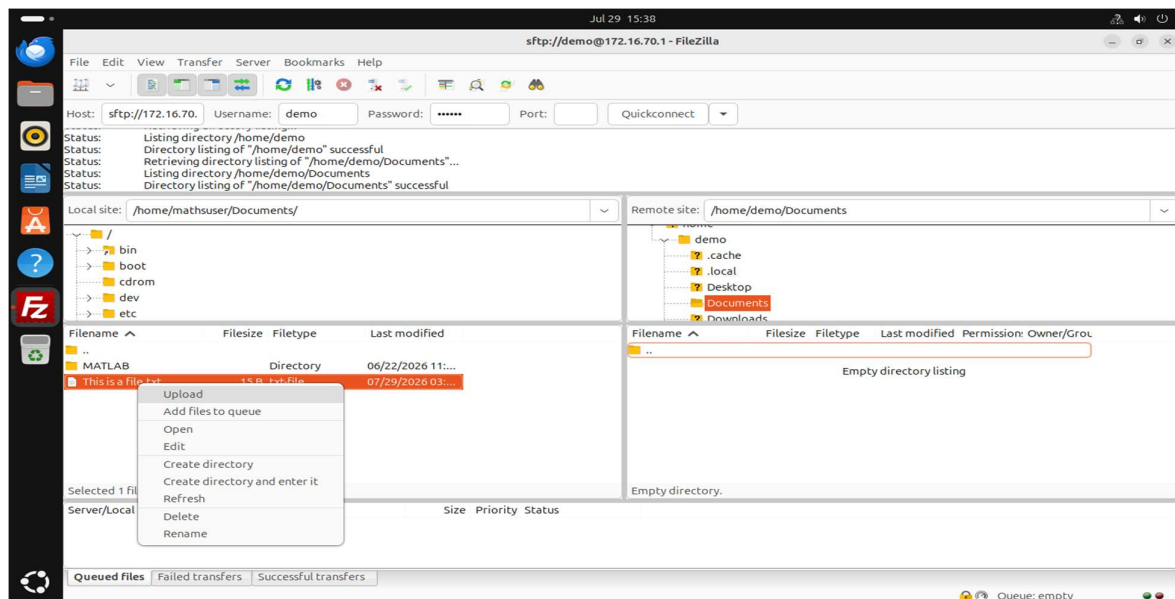
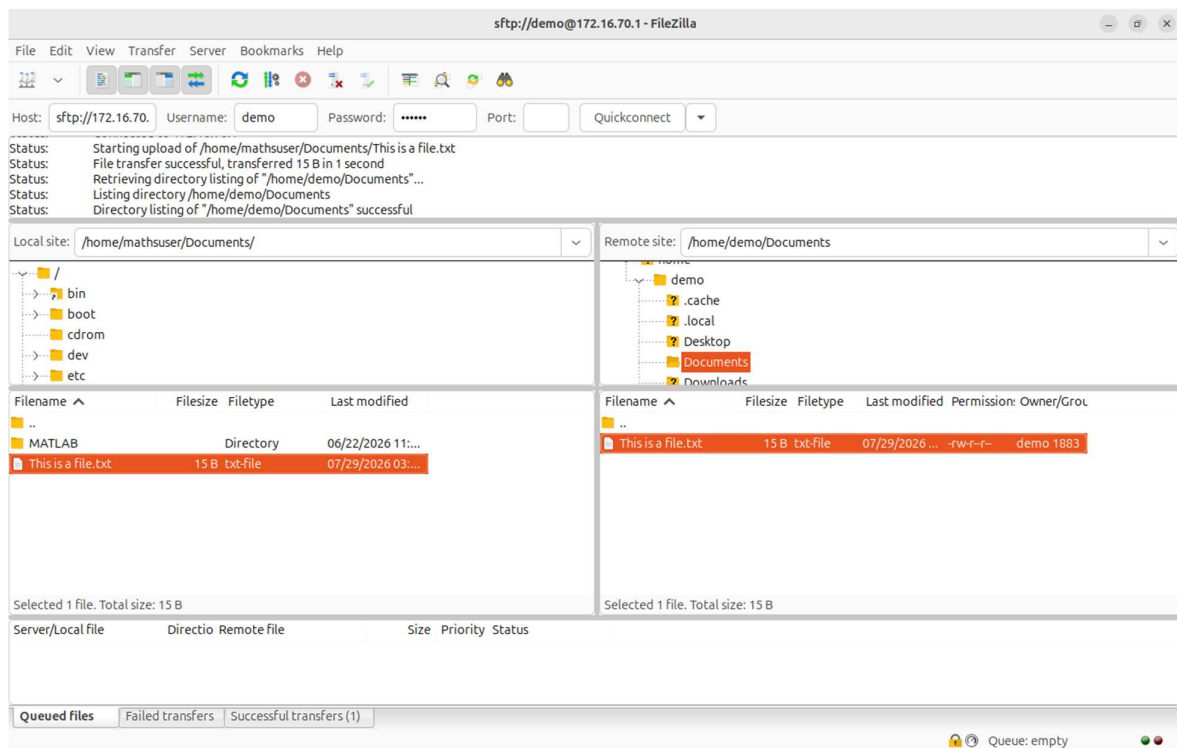


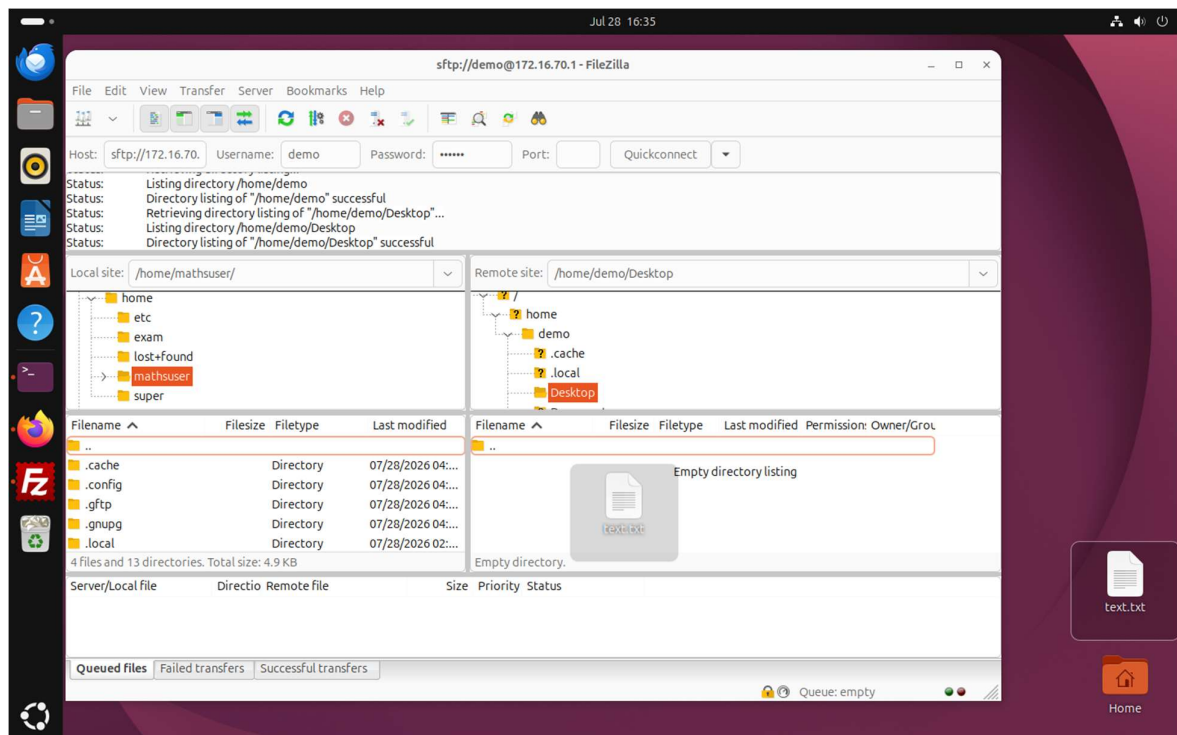
Figure 24: Uploading a file



**Figure 25:** File transfer completed

## Step 7: Transferring Files Using Drag and Drop

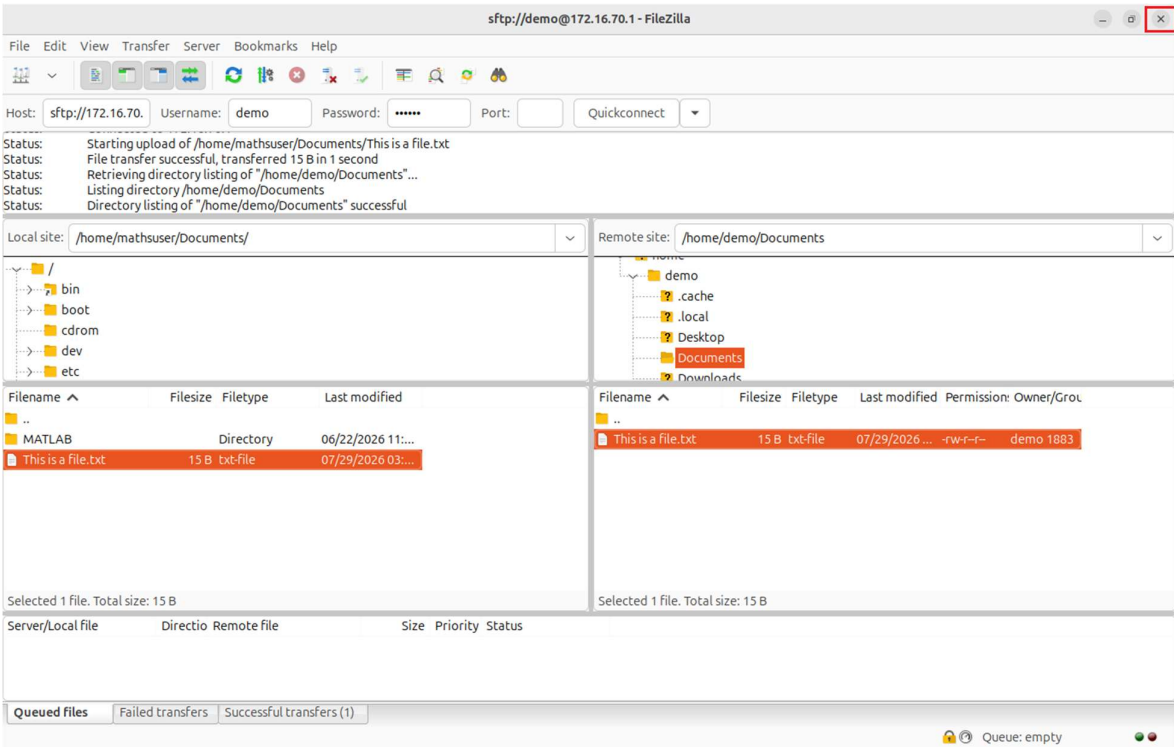
You can also transfer files by dragging them from the local computer and dropping them into the destination folder on the server.



**Figure 26:** Drag-and-drop file transfer

## Step 8: Closing FileZilla

After completing your work, close FileZilla by clicking the **X** button.



**Figure 27:** Closing FileZilla