



Programming Fundamental

Lab 01



Introduction

Welcome to your first programming Lab. In this lab manual, we shall work together to learn and implement new programming concepts including the difference between Graphical User Interface (GUI) and Command Line Interface (CLI), downloading and setting up MinGW (compiler), compiling and executing your first c++ program, and printing desired output on the screen by writing simple programs in NotePad files.

Skills to be learned:

- Creating, Storing, and Location files/directories through windows explorer and CLI

Let's do some coding.

Skill: Creating, Storing, and Location files/directories through windows explorer and CLI

Consider the following scenario.



Hello Guys, I am Ali.

TASK 01(WP):

Ali is a student and he got admission in UET Lahore. He bought a new laptop but he is new in using computers. He does not know how to use the computer properly and manage different stuff.

His University teacher shared different soft copy books and files with him for different subjects. Now he is confused about how to manage different files for different subjects. **Let's help him.**

Skill: Creating, Storing, and Location files/directories through windows explorer and CLI



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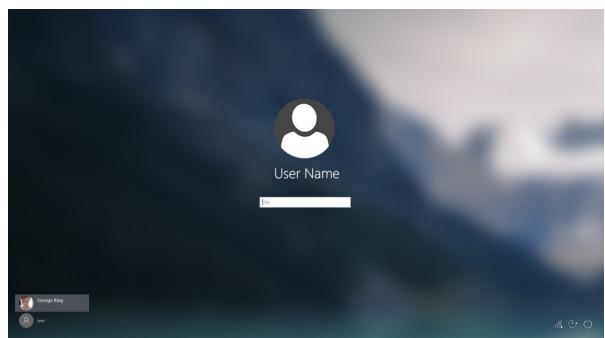


Solution:

First Thing First, Tell Ali to Press the Power Button to Turn on the Computer.

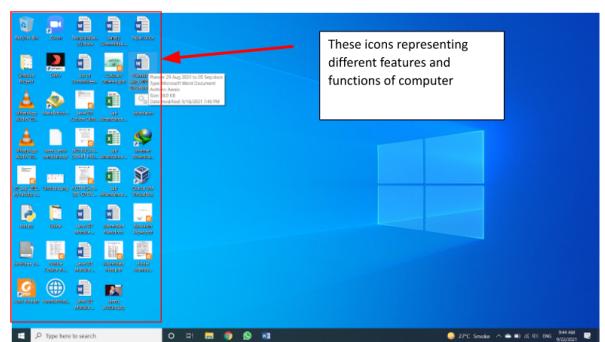


On this Screen,
Ali needs to enter his password and presses the
Enter button from the keyboard.



Welcome to the screen.
It is called the **Desktop Screen**.

You Have Done A Great Job. Ali is Very Excited.
He can see different Files, Folders, and Icons on
the Screen. This is called a Graphical User
Interface.



Let's educate Ali about **different types of interfaces**. There are two kinds of interfaces

- Graphical User Interface (GUI)
- Command Line Interface (CLI)

If you use your computer by interacting with graphics, images, and icons it is called a **Graphical User Interface**. In a graphical user interface, the

Using a computer by writing commands on this black screen is called **command line interface** or CLI.

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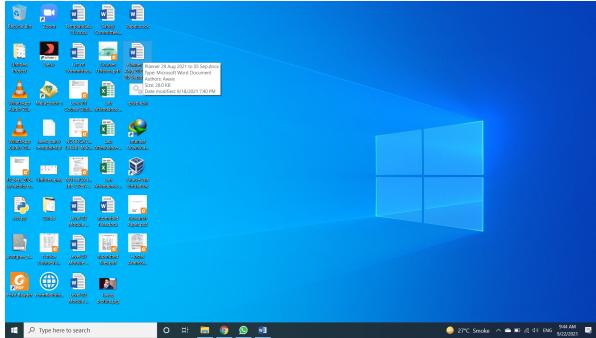


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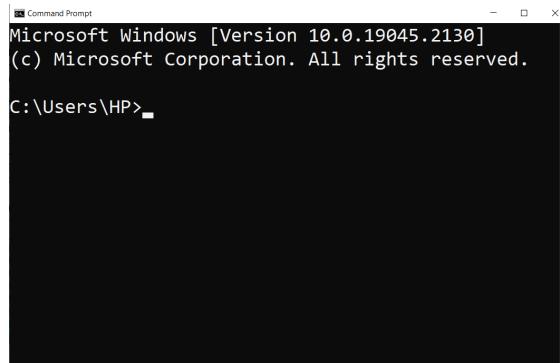
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user can use the computer mouse or Keyboard to click on buttons and icons. For Example,



For example,



Now we will help Ali to use computers with both GUI and CLI.

But Why do we need to learn both interfaces?

Look at their comparison below to develop a better understanding of this.

Graphical User Interface (GUI) is:

- Easy to use
- Slower
- Good for non-technical personnel
- Has limited functionality

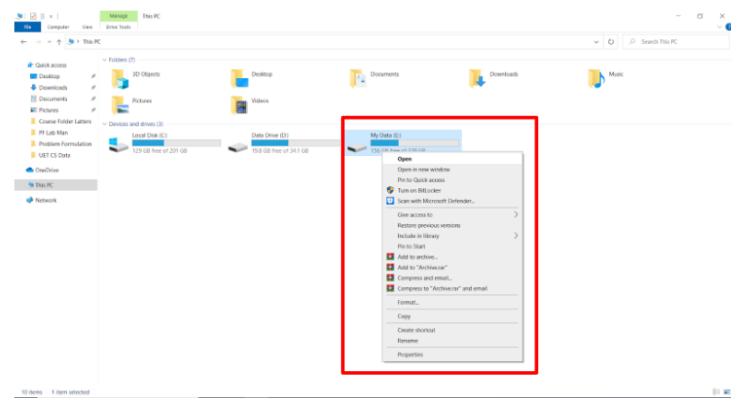
Command Line Interface (CLI) is:

- Hard to use
- Faster
- Good for technical personnel
- Have more feature access

Now Ali has been given some soft copy books by his teacher. Let's help him to manage the files properly.

Let's learn the first step.

To open a drive/folder in GUI (Graphical User Interface) we **double-click** on the drive icon or **right-click** on the icon and select the **open** option from the list.



Let's learn to create a folder

We need to create a **Study folder** that should contain three more folders with the following names

- Programming
- I2C
- English

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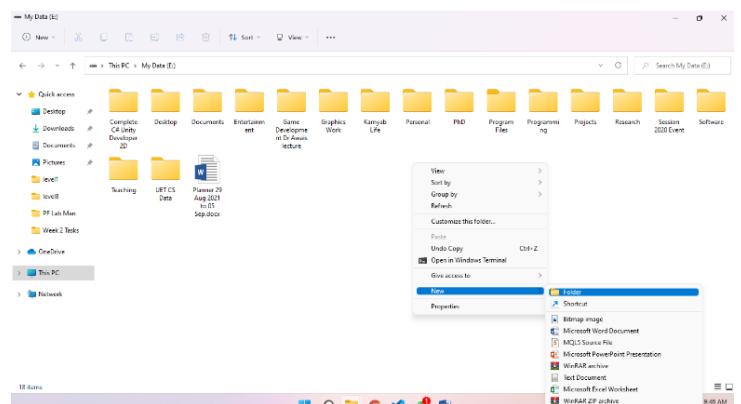
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We are going to create the first folder with the name “**Study**” by following these steps

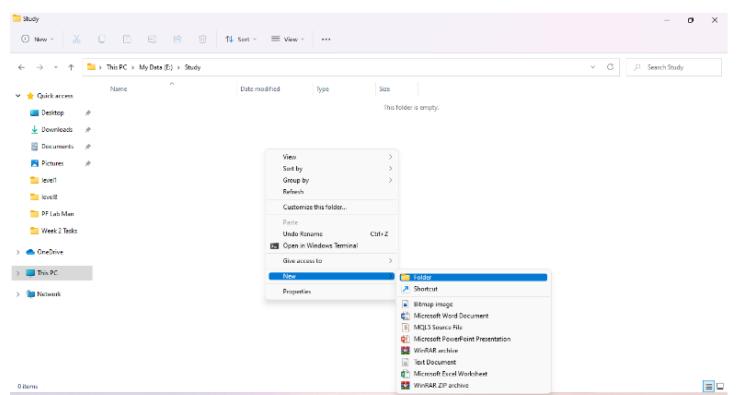
Using GUI

- Right-click on the blank space
- Select the New option from the list
- Click on New Folder
- Name it **Study**

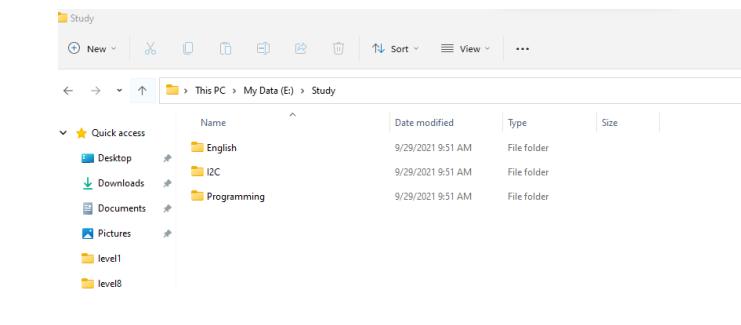


Now, We need to create more three folders inside this folder with the following names

- Programming
- I2C
- English



This image is showing the newly created folders



Great Job Guys, Now Lets Teach Ali about CLI.

Skill: Creating, Storing, and Location files/directories through windows explorer and CLI



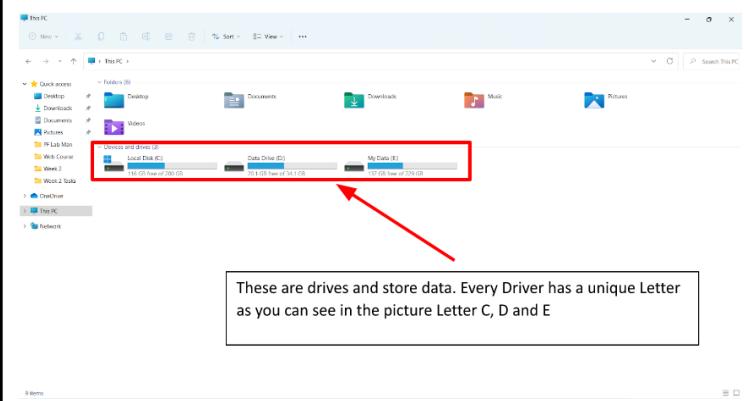
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Let's Teach Ali about using the Command Line Interface.

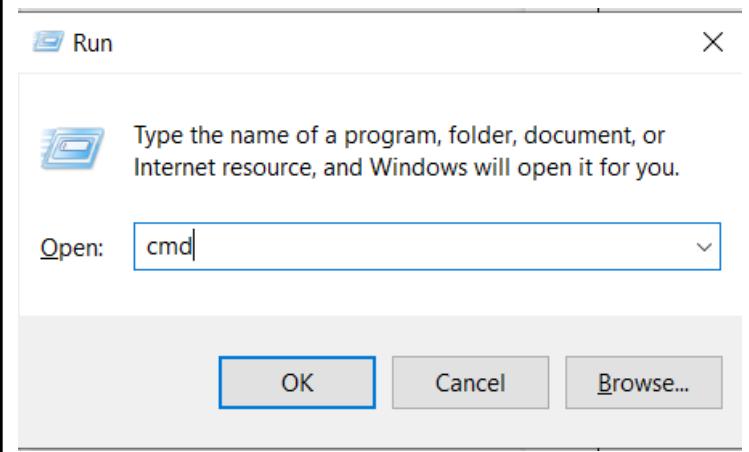
Tell Ali about the drives in the Computer System.



To open the CLI in your computer Press **Widow + R** (It means to keep pressing the window button and then press the **R** button from the keyboard and release the buttons)



Write the **cmd** keyword in the run and **press Ok** or hit **Enter Button** from the keyboard.



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It will appear the CMD on the screen as you can see in the picture

```
Microsoft Windows [Version 10.0.19045.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>
```

Write the Drive letter and Colon and hit the Enter button.

For example, I want to access drive D so I write **D:** and **press enter**.

```
Microsoft Windows [Version 10.0.19045.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>D:

D:\>
```

To see the available files inside any folder or drive use the **dir** command.

Hint: The **dir** command is used to display all the available folders and files inside a folder.

```
Microsoft Windows [Version 10.0.19045.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>D:

D:\>dir
Volume in drive D has no label.
Volume Serial Number is 7CAF-BE14

Directory of D:\

11/08/2022  10:40 AM    <DIR>          Codes
08/10/2022  01:39 PM    <DIR>          iVMS-4200alarmPicture
11/24/2022  09:11 AM    <DIR>          Movies
08/03/2022  10:59 AM    <DIR>          MyData
11/02/2022  01:14 PM    <DIR>          Recordings
09/13/2022  11:30 PM    <DIR>          recovered data
10/26/2022  11:23 PM    <DIR>          Softwares
01/12/2022  08:25 AM    <DIR>          Studies
11/22/2022  02:45 PM    <DIR>          UET Files
                           0 File(s)           0 bytes
                           9 Dir(s)   198,117,728,256 bytes free

D:\>
```

There is too much text on the console screen. Help Ali to remove all this text from the screen.

Hint: To clear all the stuff there is command **cls**. Clear screen.

Write **cls** and **press Enter**. It will clear the CLI screen.

```
D:\>
```

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Before creating your folder first see the location

This Path refers to your location.
If this is D, it means you are currently in D Folder.

Now, tell Ali to create the folder with CLI.

Hint: **mkdir** command is used to create a folder
Syntax: **mkdir Folder name**

```
D:\>mkdir study
```

```
D:\>
```

Great Work, You have created a new Folder using CLI.

Now, navigate to the study folder using the CLI.

Hint: To navigate between folders use the command **cd** stands for change directory.

Syntax: **cd folder name**

You are doing an excellent job teaching Ali about navigating through folders.

See that now we are in folder **study**

```
D:\>mkdir study
```

```
D:\>cd study
```

```
D:\study>
```

```
D:\>mkdir study
```

```
D:\>cd study
```

```
D:\study>
```

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Let's make three folders in this folder using the `mkdir` command.

Write the following commands to create three folders with names mentioned in CLI.

Command Prompt

```
D:\study>mkdir programming  
D:\study>mkdir I2C  
D:\study>mkdir English  
D:\study>
```

Let's use the `dir` command to check the created folders.

```
D:\study>dir  
Volume in drive D has no label.  
Volume Serial Number is 7CAF-BE14  
  
Directory of D:\study  
  
11/25/2022 09:20 AM <DIR> .  
11/25/2022 09:20 AM <DIR> ..  
11/25/2022 09:20 AM <DIR> English  
11/25/2022 09:20 AM <DIR> I2C  
11/25/2022 09:20 AM <DIR> programming  
0 File(s) 0 bytes  
5 Dir(s) 198,117,728,256 bytes free  
  
D:\study>
```

Great Work, You have helped Ali to Open, create, and navigate through folders using both GUI and CLI.

Ali's friend told him they are not studying English this semester. So he does not need an English folder, he wants to **delete it**. Let's Help Ali to delete the folder with both techniques

Skill: Creating, Storing, and Location files/directories through windows explorer and CLI



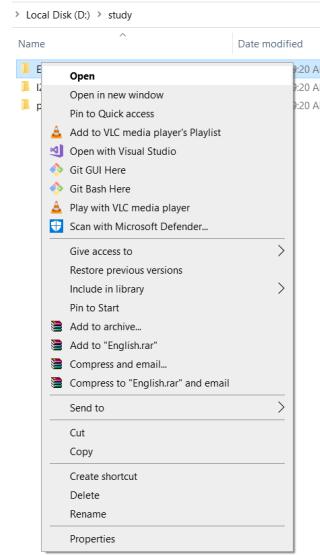
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Right click on the folder you want to delete and choose the **delete** option from the list.

This will delete the folder from the storage.



Let's learn to delete the folder with CLI.

Warning: Before deleting the folder make sure you are in the right folder.

We want to delete the folder that is available in the study folder so make sure the **folder path** is on CLI.

Once you are in the correct folder, delete the folder using CLI.

Hint: **rmdir** command is used to remove/delete the folder.

Syntax: **rmdir Folder name**

```
Microsoft Windows [Version 10.0.19045.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>D:

D:>\cd study

D:\study>
```

```
Microsoft Windows [Version 10.0.19045
(c) Microsoft Corporation. All rights

C:\Users\HP>D:

D:>\cd study

D:\study>rmdir English

D:\study>
```

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Now use the **dir** command to counter-check whether the English folder has been deleted.

```
D:\study>dir
Volume in drive D has no label.
Volume Serial Number is 7CAF-BE14

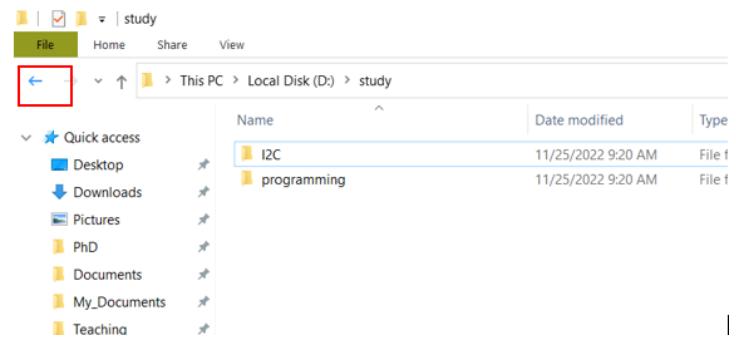
Directory of D:\study

11/25/2022  09:32 AM    <DIR>        .
11/25/2022  09:32 AM    <DIR>        ..
11/25/2022  09:20 AM    <DIR>        I2C
11/25/2022  09:20 AM    <DIR>        programming
                           0 File(s)          0 bytes
                           4 Dir(s)  198,117,728,256 bytes free

D:\study>
```

Great Work People, You have helped Ali in creating and deleting folders.
Let's help him in navigating to the **previous directory** using both methods.

Using the GUI, You can navigate to the previous directory by clicking on the back arrow at the top on Window Explorer.



To go back to the folder in CLI use double dots with the cd command.

Syntax: **cd ..** (it will move you back one step)

```
D:\study>cd ..
```

```
D:\>
```

Ali wants to make notes for every subject inside the computer. He needs a text file for that. Let's help him to create a text file and write some notes.

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Using GUI:

Navigate to the folder where you want to create the file. Ali has a Programming assignment so help him to make a file in the programming folder.

Using your previous knowledge, move to the programming folder and click on black space.

Instruction: Create a new notepad file named as "My Notes".

My Notes.txt

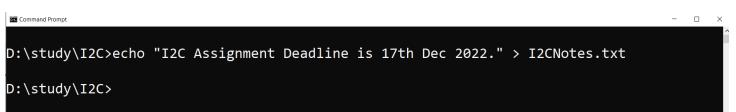
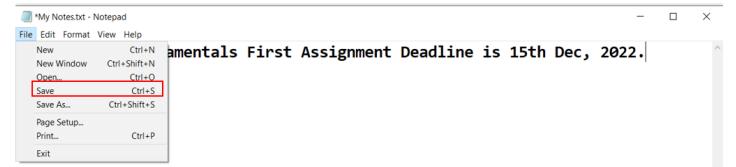
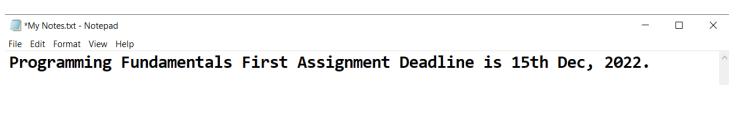
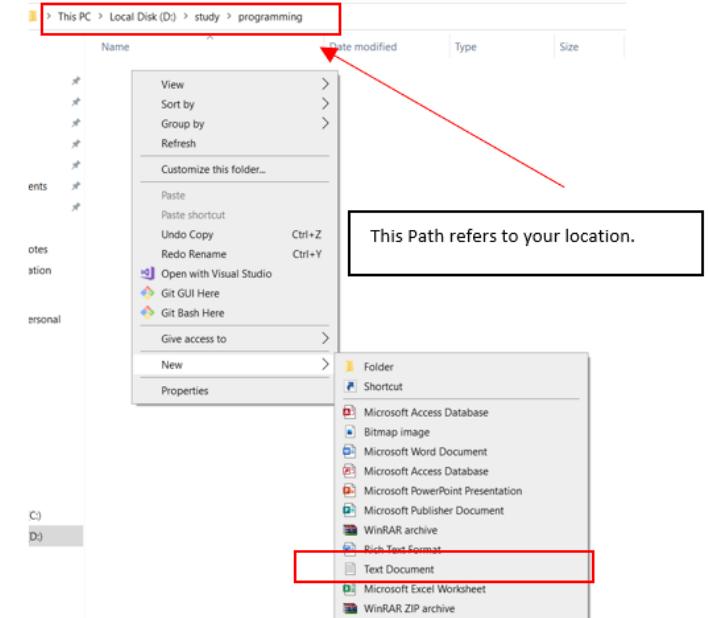
Help Ali in Opening the file by double-clicking on it and writing the desired text in the file.

Save the changes in the file by Selecting **File > Save** or Pressing **Ctrl+S** from the keyboard.

Let's do the same with CLI but in the I2C folder.

Instruction: Use the knowledge learned to navigate to the I2C Folder.

Let's help Ali in Creating and Writing into a NotePad File.



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Hint: **echo** and then write any text you want inside your document. At the end write
>documentname.txt

Syntax: echo "sample text" > filename.txt

Lets counter check if the file has been created with the dir command.

```
D:\study\I2C>dir
Volume in drive D has no label.
Volume Serial Number is 7CAF-BE14

Directory of D:\study\I2C

11/25/2022  10:00 AM    <DIR>      .
11/25/2022  10:00 AM    <DIR>      ..
11/25/2022  10:00 AM           46 I2CNotes.txt
                           1 File(s)   46 bytes
                           2 Dir(s)  198,117,728,256 bytes free

D:\study\I2C>_
```

Let's help Ali in checking the contents of the created file using CLI.

Hint: type filename.txt is used to write the contents of the file to the console screen.

Let's Help Ali in Copying and Moving Files between Directories.

Help Ali to Copy a File My Notes.txt from Programming to I2C Folder.

Hint: **copy** command is used to copy a file from one directory to other.

Syntax: **copy sourcefile DestinationLocation**

```
D:\study\I2C>type I2CNotes.txt
"I2C Assignment Deadline is 17th Dec 2022."
D:\study\I2C>_
```

```
Microsoft Windows [Version 10.0.19045.2130]
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C:\Users\HP>D:
D:\>cd Study
D:\study>cd programming
D:\study\programming>copy "My Notes.txt" D:\study\I2C\
                           1 file(s) copied.

D:\study\programming>_
```

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Now Help Ali to Move the File My Notes.txt from I2C Folder to the root folder (Study).

Hint: **move** command is used to copy a file from one directory to other.

Syntax: **move sourcefile DestinationLocation**

Similarly, you can use both commands by providing the location of source and destination files respectively.

```
Command Prompt
D:\study\programming>cd ...
D:\study>cd I2C
D:\study\I2C>move "My Notes.txt" D:\Study\
               1 file(s) moved.
D:\study\I2C>
```

```
Command Prompt
D:\>move D:\study\I2C\I2CNotes.txt D:\study
               1 file(s) moved.
D:\>-
```

Great Job Guys, You have helped Ali in developing an understanding of Computer Interfaces.

Conclusion:

Command	Description
dir	list all the directories in the current directory
cd ..	go back a directory
cd /	go to the root of the directory
mkdir "newfile.extension"	create a new directory
rmdir "filetoberemoved.extension"	remove a directory
copy sourcefileLocation Target	Copies file from source to target directory
move sourcefileLocation Target	Moves file from source to target directory
move *.txt Target	Moves all txt files from the current directory to Target directory

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<code>move filename newfilename</code>	This will rename the file in the same directory
<code>del filename.fileextension</code>	This will delete the file from the directory
<code>echo This is a sample statement > filename.extension</code>	Creates and Writes to a .txt (NotePad) file
<code>type "filename.extension"</code>	Used to display the contents of a file
<code>exit</code>	It is used to Exit the Command Prompt Window

Task 02(OP):

Lab Task using CLI

1. Using the commands listed above, which you have read out and practiced in the lab.
2. Create the following structure on your home directory. The **Square boxes are folders**, while the **lines represent folders contained inside each one**. As can be seen in the diagram below, the structure looks like a hierarchy and this is what the use of folders provides for – a hierarchy of where data should be saved and stored.

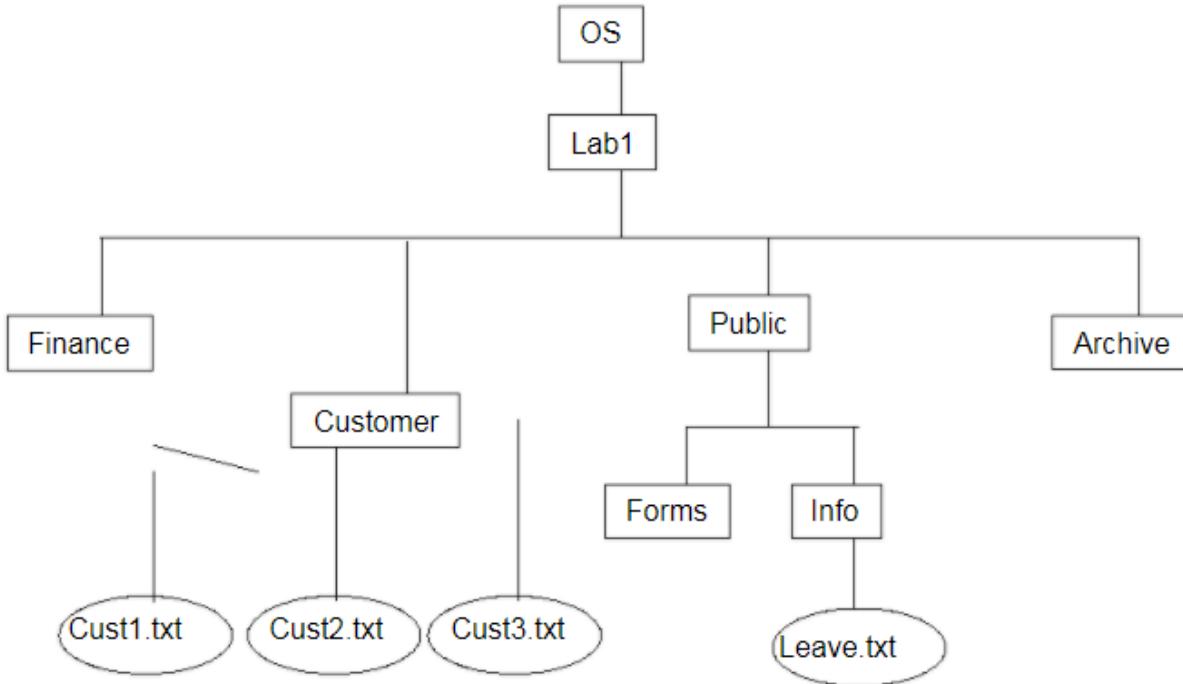
Before you start, using any application you like (e.g. Notepad), **create three text files**: cust1.txt; cust2.txt and cust3.txt and **two documents leave.txt**. These should be created and saved at **the top/root of your home directory**. Now, using the windows command prompt only, implement the following folder structure.

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Now that you have created the directory structure, write the commands that control it in the following ways (3 – 12).

3. Move the **three customer files** to the **Customer directory**.
4. **Copy** the three customer files to the **Archive directory** using a single command.
5. **Move** the file **leave.txt** to the **archive directory** and **rename** it **leave_old.txt**.
6. Place **leave_old.txt** in the **Forms directory**.
7. **Change** to the **Customer directory** and **check** that it contains the three customer files.
8. **Change** to the **Archive directory** and **check** it contains the three customer files that you copied.
9. **Change back** to the **Customer directory** and **delete** the three customer files.
10. **Display the contents** of the text files in the command prompt window **one at a time**.
11. **Clear the screen**.
12. **Exit** the command prompt window.

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Skill: Installation and configuration of compiler

Introduction

We need to set up a compiler that would compile the high-level program into low-level code that would become understandable by the computer.

Let's set up the MinGW Compiler for C++.

MinGW C++ Compiler Download and Installation Guide

Compilers are computer programs that translate (compile) source code written in a high-level language (e.g., C++) into a set of machine-language instructions that can be understood by the CPU of a computer. Compilers are very large programs, with error-checking and other abilities. MinGW compiler is designed to compile applications written in C++ into machine code. MinGW means Minimalist GNU for Windows.

In this section, step-by-step instructions are given to download and install the MinGW compiler.

Let's Download the Compiler

Step 1: (Open the link)

<https://sourceforge.net/projects/mingw/files/>

The following page will appear in the browser (from the SourceForge website).

The screenshot shows the SourceForge website with the URL https://sourceforge.net/projects/mingw/files/. The page title is "MinGW - Minimalist GNU for Windows Files". It features a summary of the project, including a download button for "mingw-get-setup.exe (86.5 kB)". Other links on the page include "Files", "Reviews", "Support", "News", "Wiki", "Mailing Lists", "Tickets", and "Git".

Step 2: (Click the Download mingw-get-setup.exe (86.5 kB) link)

This file should start downloading in your standard download folder. This file is only 85KB so it should download very quickly.

Step 3: (Move to the Folder where the file is downloaded)

The file should appear as:



[mingw-w64-install.exe](#)

Install Compiler

Skill: Installation and configuration of compiler

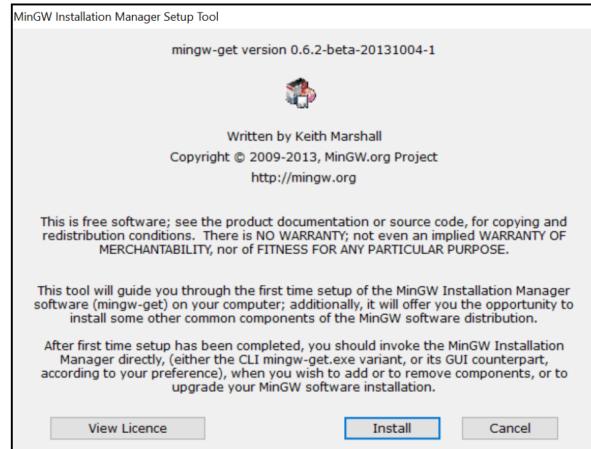


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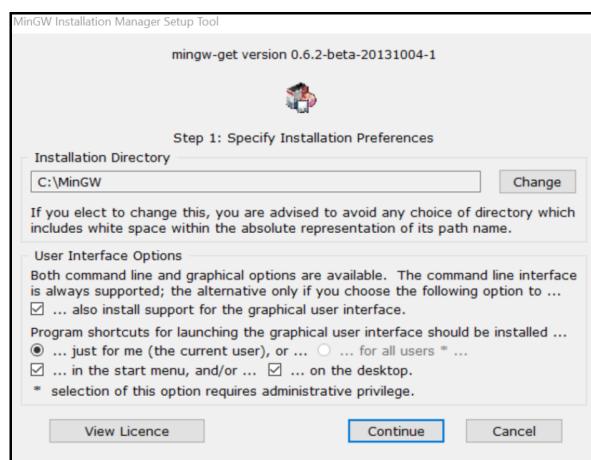
Step 1: Run the minGW setup

Double click the mingw-w64-install.exe file.
The following pop-up window will appear.



Step 2: Click Install

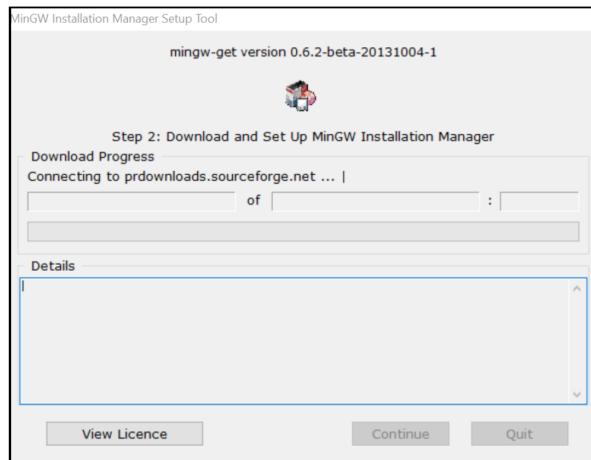
The following pop-up window will appear.



NOTE: You can install this software anywhere, but we recommend installing it in the default directory:
C:\MinGW

Step 3: Click Continue

The following pop-up window will appear, showing the downloading progress.



Skill: Installation and configuration of compiler

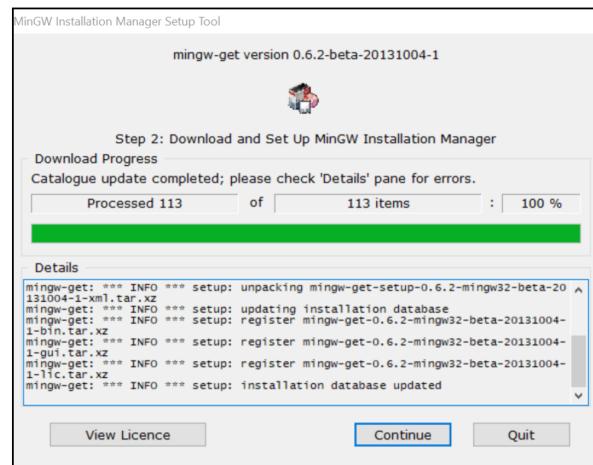


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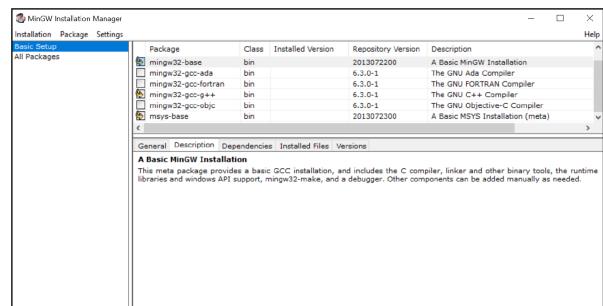


After about a minute, it should appear as follows.



Step 4: Click Continue

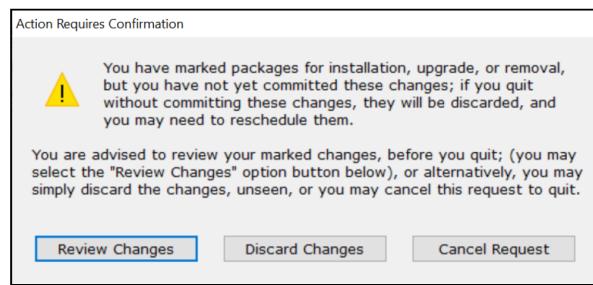
The following pop-up window will appear.



NOTE: Ensure on the left that **Basic Setup** is highlighted. Click the three boxes: **mingw32-base**, **mingw32-gcc=g++**, and **msys-base**. After clicking each, select **Mark** for selection.

Step 5: Click the close (X) button (Terminate the MinGW Installation Manager)

It sounds weird but after clicking the close button, following pop-up window should appear



Skill: Installation and configuration of compiler



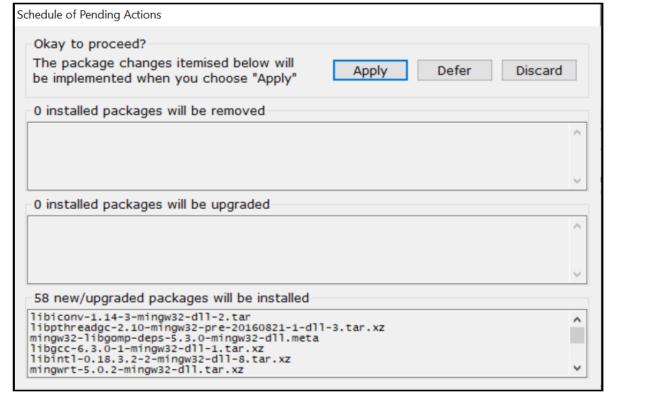
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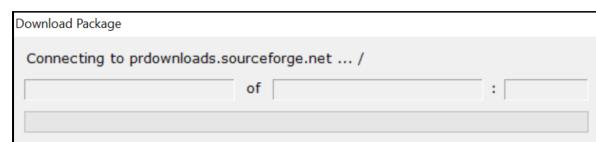
Step 6: Click the Review Changes

The following pop-up window should appear

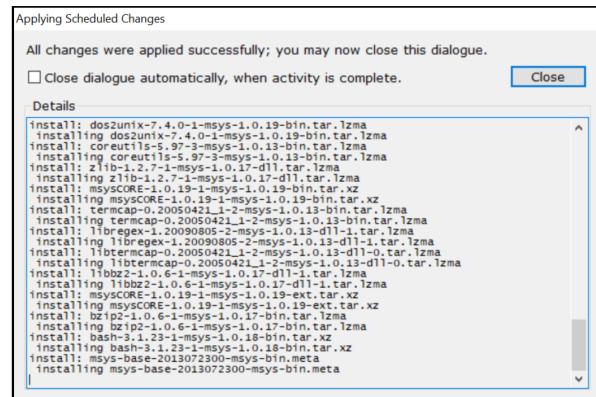


Step 7: Click Apply

The following pop-up window will appear, showing the downloading progress.



NOTE: After a while (seconds, minutes or hours, depending on your download speed), it should start extracting the downloaded files. A few minutes after that, the following pop-up window should appear.



Step 8: Click Close

Set Compiler Path in Environment Variables

Skill: Installation and configuration of compiler



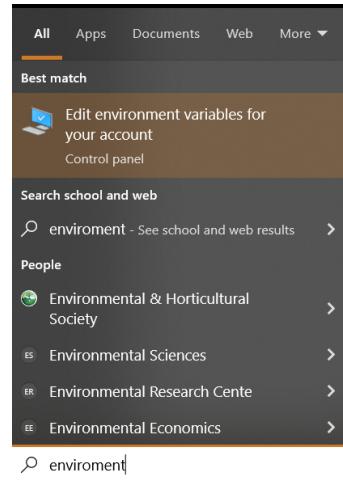
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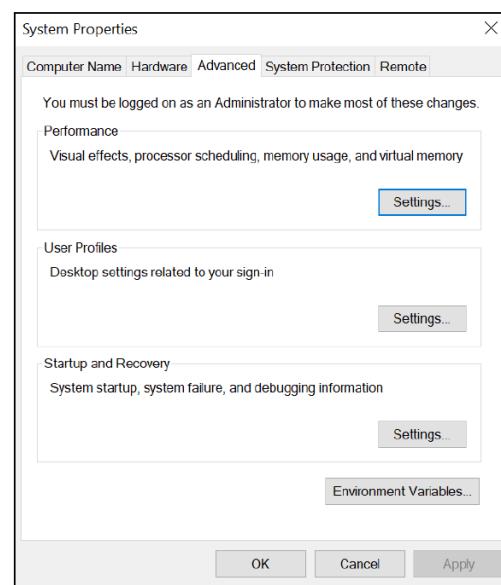
Now, set the Path of the bin folder of MinGW Compiler so that it is accessible in any folder through the command prompt

Step 1: Search Environment Variables in the search bar



The following pop-up window should appear.

Click Environment Variables



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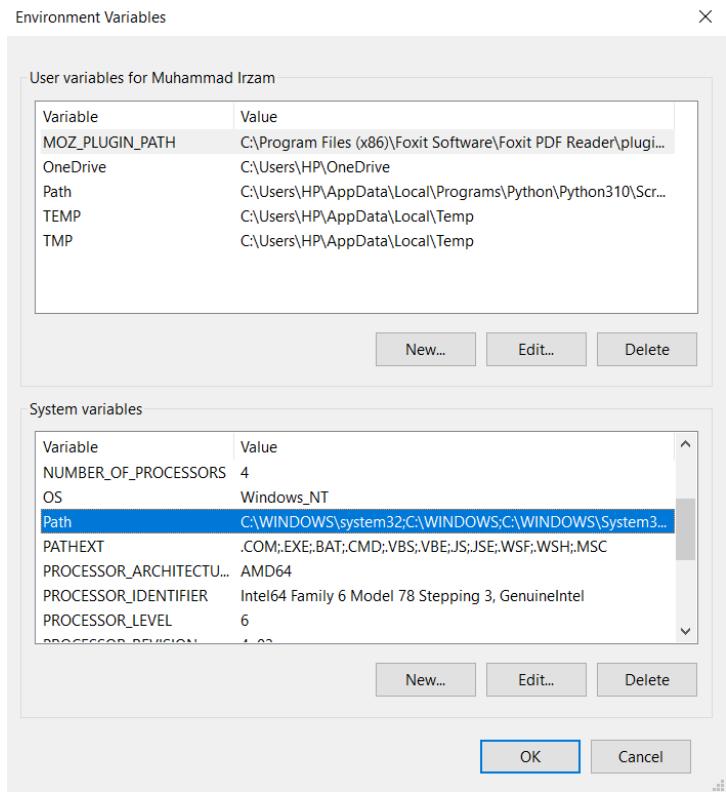
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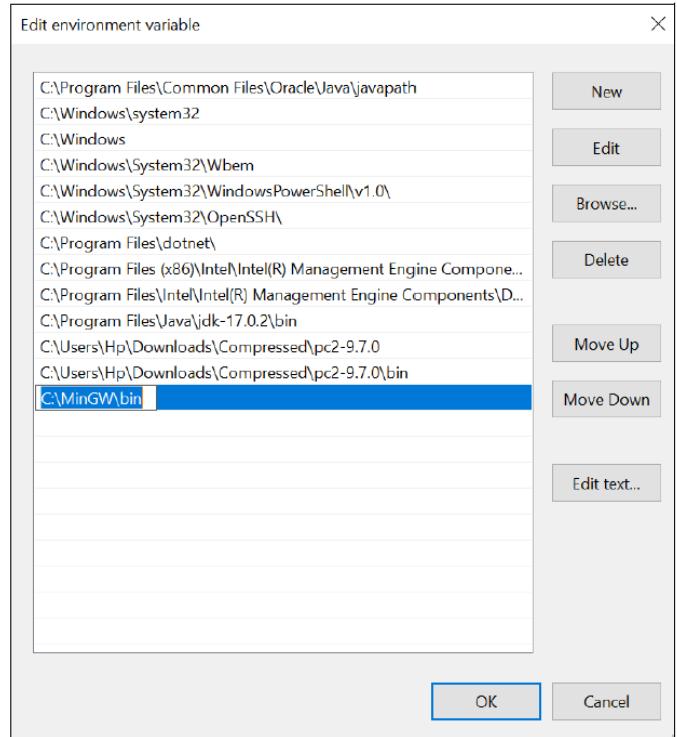
Step 2: Upon Click Environment Variables
The following pop-up window should appear.

Double Click “System variables” Path



Step 3: Upon Double Click System variables Path
The following pop-up window will appear

Click New and Copy C:\MinGW\bin



Skill: Installation and configuration of compiler



Programming Fundamental

Lab 01



Step 4: Upon Click New Button

Copy C:\MinGW\bin (the Absolute path till the bin folder of the MinGW compiler). Paste on the new line.

Step 5: Press OK

MinGW is now installed and the path is set. Now, we can use the command

TASK 01(WP): Open cmd and write the following command to check whether the compiler has been installed and configured.

```
C:\Users\HP>c++ --version
c++ (Rev5, Built by MSYS2 project) 10.3.0
Copyright (C) 2020 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

You can compile your files in any directory where you have saved your .cpp file.

Great Job Guys, You have Successfully Installed and Set Up MinGW on Your Computer.

Good Luck and Best Wishes !!

Happy Coding ahead :)

Skill: Installation and configuration of compiler