Programming Fundamentals

Week 02 - Lab Manual

Introduction

Welcome to your favorite programming Lab. In this lab manual, we shall work together to learn and implement new programming concepts.
We need to set up a compiler that would compile the high-level (C++) into low-level code that would become understandable by the computer.
Let's set up the MinGW Compiler for C++.
We will learn how to write the basic structure of a C++ program. In addition, we will learn to print the desired text on the console screen.

Skills to be learned:

- Installing MinGW compiler for converting High Level Language Code into Binary Code.
- Writing, compiling, and executing a program to print the output on the screen.
- Using special directives to control output on the screen

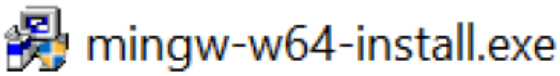
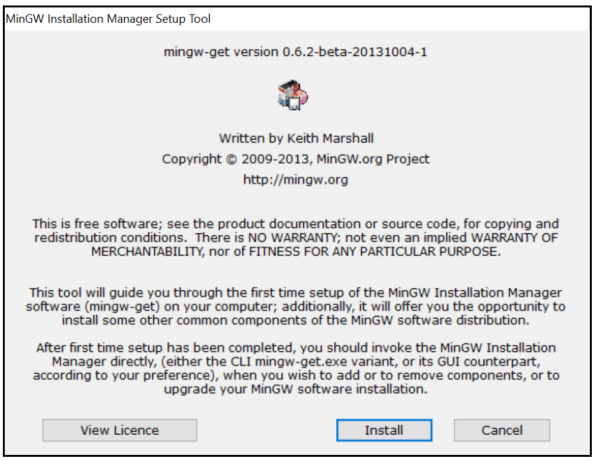
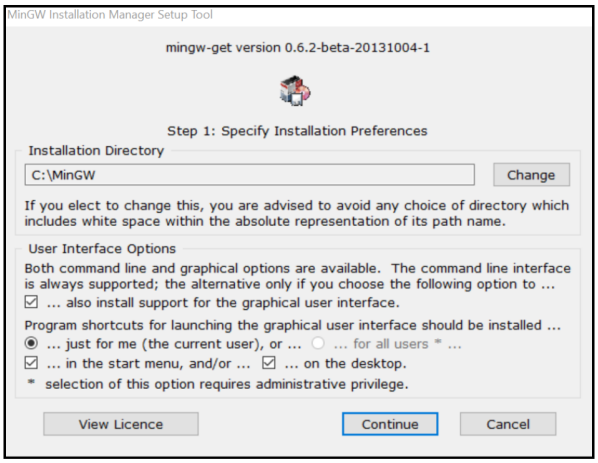
MinGW C++ Compiler Download and Installation Guide

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. The 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.

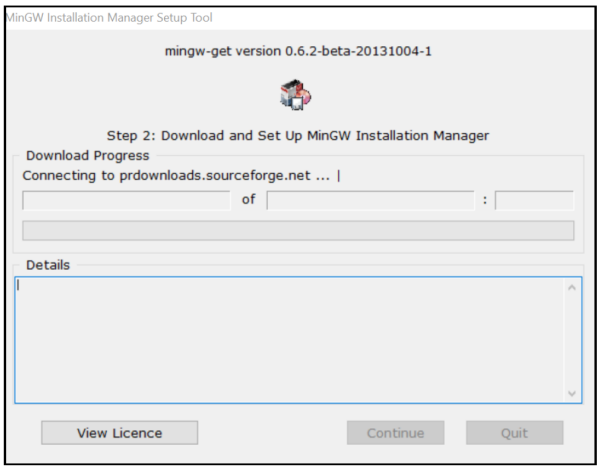
Let's Download the Compiler	
Step 1: (Open the link) https://sourceforge.net/projects/mingw/files/ The following page will appear in the browser (from the SourceForge website).	
Step 2: (Click the Download mingw-get-setup.exe (86.5 kB) link) This file should start downloading in your standard download folder. This file is only 85KB so it should download very quickly.	

Skill: Writing, compiling, and executing a program to print the output on the screen.

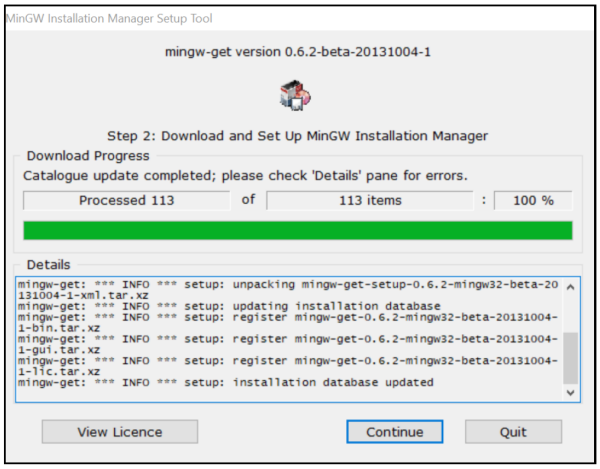
Step 3: (Move to the Folder where the file is downloaded) The file should appear as:	
Install Compiler	
Step 1: Run the minGW setup Double click the mingw-w64-install.exe file. The following pop-up window will appear.	
Step 2: Click Install The following pop-up window will appear. **NOTE:** You can install this software anywhere, but we recommend installing it in the default directory: C:\MinGW	

Skill: Writing, compiling, and executing a program to print the output on the screen.

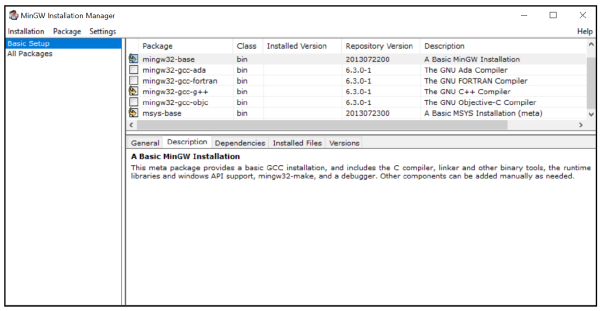
Step 3: Click Continue
The following pop-up window will appear, showing the downloading progress.



After about a minute, it should appear as follows.

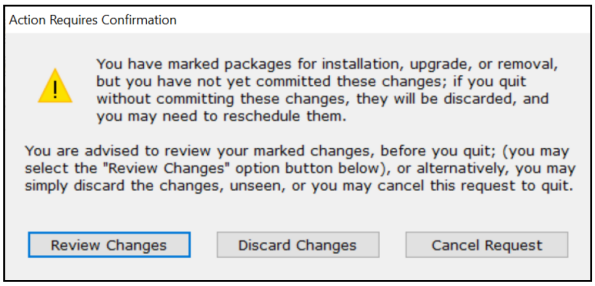
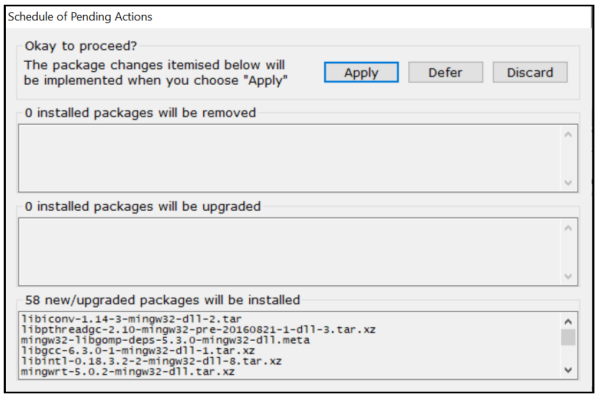
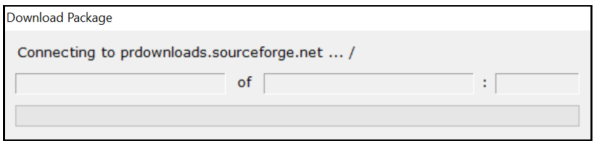
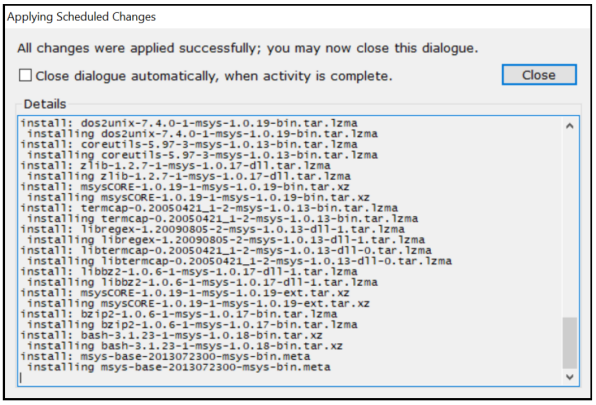


Step 4: Click Continue
The following pop-up window will appear.



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.

Skill: Writing, compiling, and executing a program to print the output on the screen.

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	
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: Writing, compiling, and executing a program to print the output on the screen.

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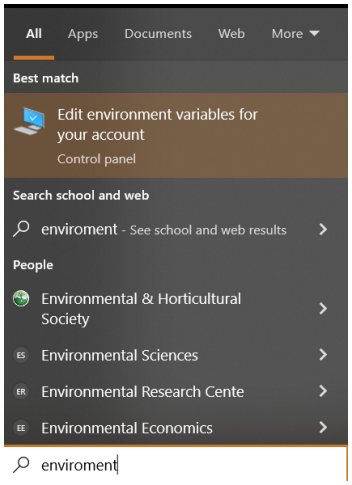
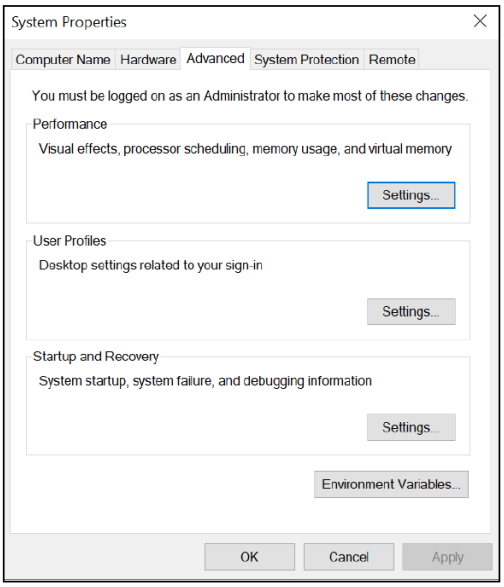
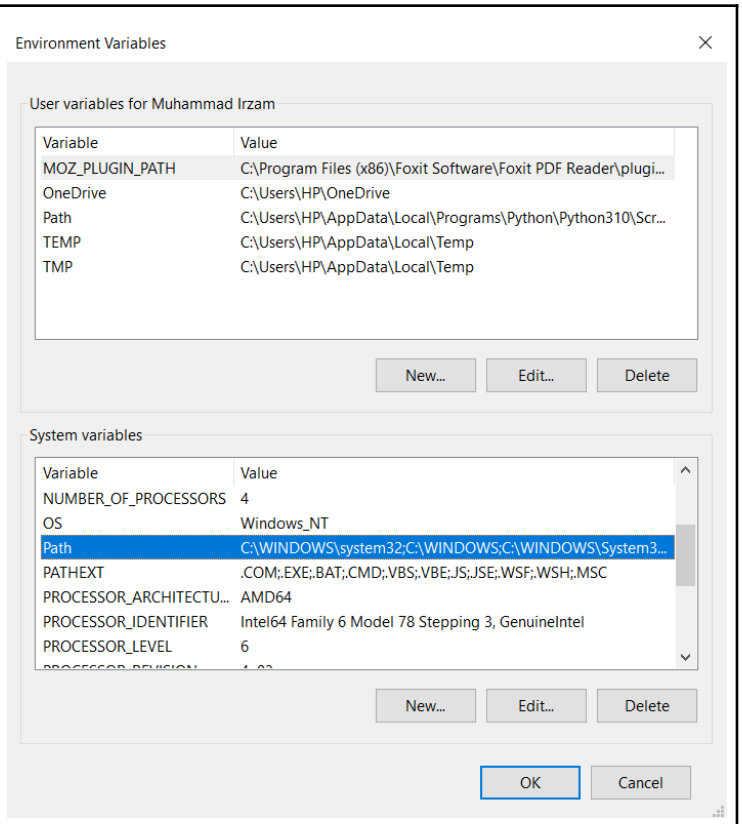
Now, set the Path of the bin folder of MinGW Compiler so that it is accessible in any folder through the command prompt **Step 1:** Search Environment Variables in the search bar	
The following pop-up window should appear. **Click Environment Variables**	

Skill: Writing, compiling, and executing a program to print the output on the screen.

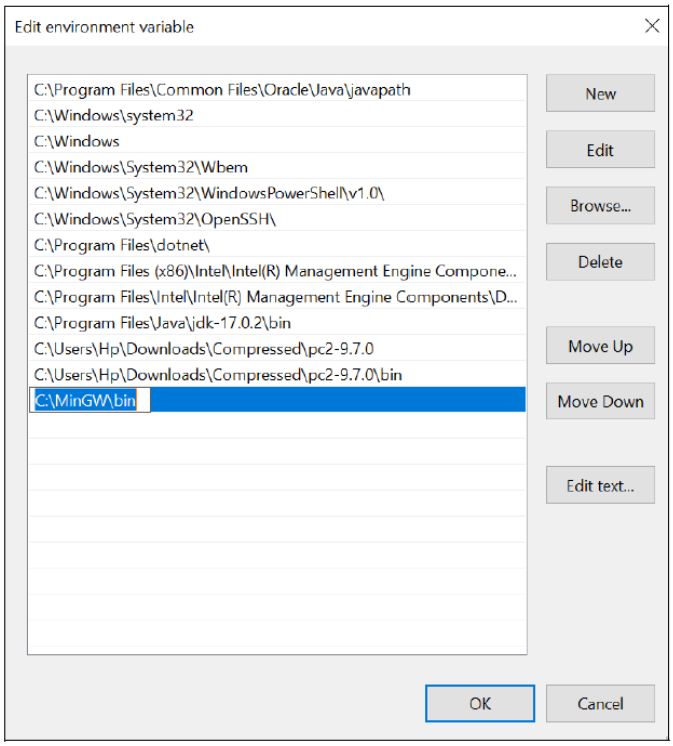
Step 2: Upon Click Environment Variables
The following pop-up window should appear.

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: Writing, compiling, and executing a program to print the output on the screen.

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.
```

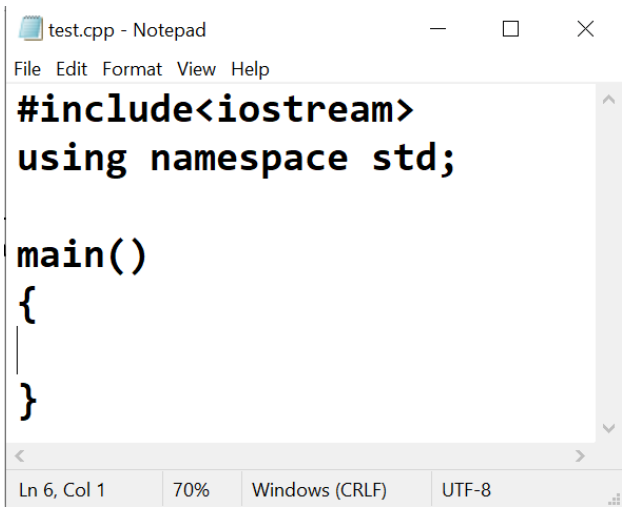
You can compile your files in any directory where you have saved your .cpp file.

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

Let's do some coding.

Skill: Writing, compiling, and executing a program to print the output on the screen.

Task 01(WP): Write, Compile and Execute a C++ Program to Print Hello World on Screen.

01: Create a new Text Document. 02: Rename the file as **test.** 03: Write down the **Basic structure** of the C++ program.	

Skill: Writing, compiling, and executing a program to print the output on the screen.

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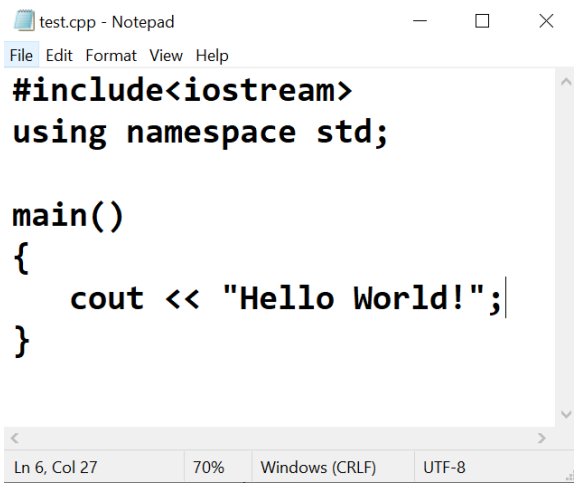
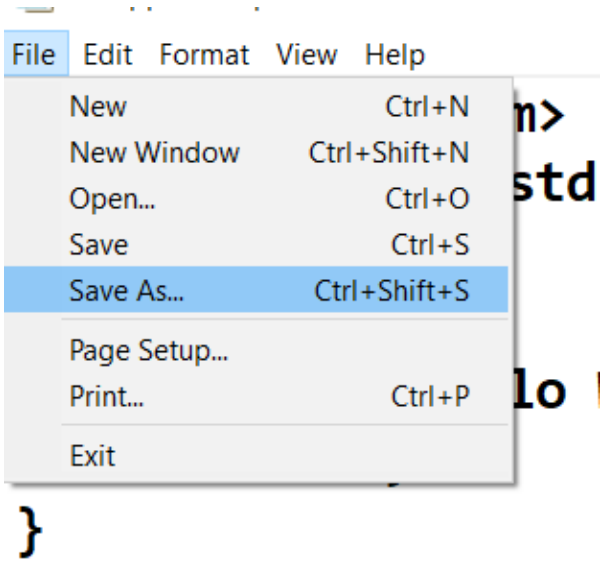
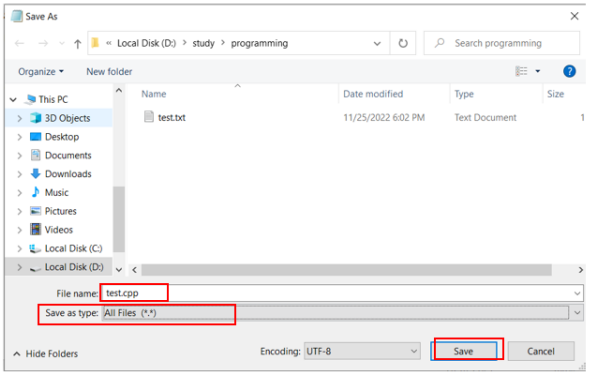
Use the **cout<<** command to print the desired output on the screen.	
Click on **File** > **Save As.**	
Change the file extension to **.cpp** Change the save as type **All Files(“.”)** Choose the **Save** from the bottom buttons.	

Skill: Writing, compiling, and executing a program to print the output on the screen.

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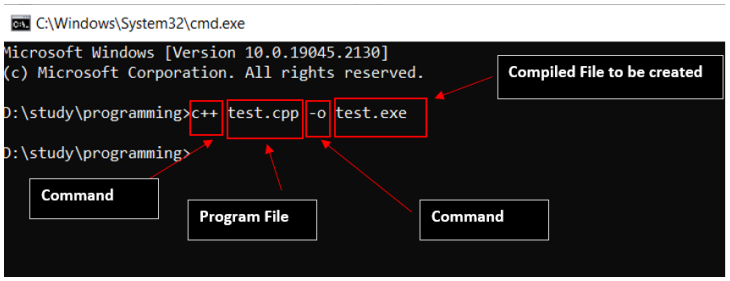
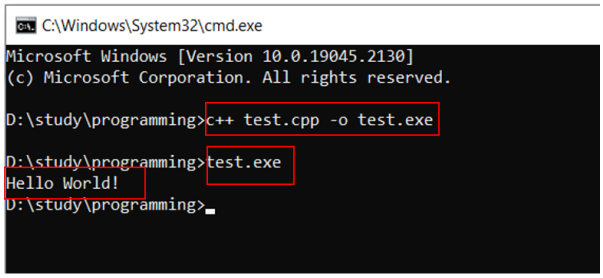
Now, use the previous knowledge to open the **Command Prompt** and **navigate** to the **working directory**.	
Now, **Compile the file** using the following command. Syntax: **c++ file.cpp -o compiledfile.exe**	
Write the name of the created **object file** to **execute** it.	
Congratulations !! You have conquered the Task by Compiling and Executing your First C++ Program.	

Conclusion

Command	Description
cout << "statement";	Used to print the "statement" on the console
cout << endl;	It is used to take the cursor to the next line.

Skill: Writing, compiling, and executing a program to print the output on the screen.

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Skill: Using special directives to control output on the screen.

In the last section, you learned how to print the desired output on the screen. Let's put that skill into action now. Consider the tasks mentioned below:

Task 01(WP): Write and Execute a Program to Print a Line of Asterisks.

Sample Output:

```
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 2\Class Tasks>c++ line.cpp -o line.exe

G:\Semesters\Programming Fundamentals (Fall 2023)\Week 2\Class Tasks>line.exe
**********************************
G:\Semesters\Programming Fundamentals (Fall 2023)\Week 2\Class Tasks>
```

Solution

line.cpp - Notepad

File Edit Format View Help

```
#include<iostream>
using namespace std;

main()
{
   cout << "**********************************";
}
```

Task 02(CL): Write and Execute a Program to Print Geometric Shapes

- **Square**
- **Triangle**
- **Circle**
- **Parallelogram**
- **Hexagon**

Sample Output

Skill: Using special directives to control output on the screen.

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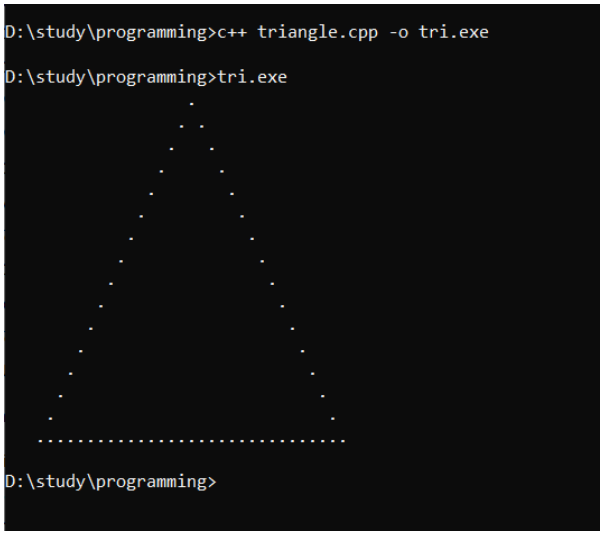

Good Luck and Best Wishes !!

Happy Coding ahead :)

Skill: Using special directives to control output on the screen.