



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.

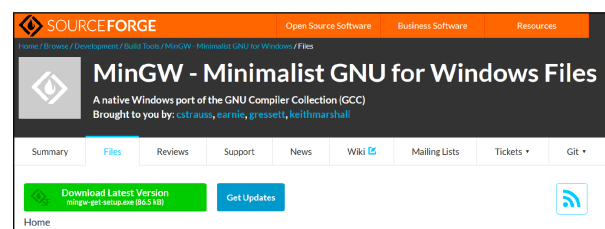
In this section, step-by-step instructions are given to download and install the MinGW compiler.

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.

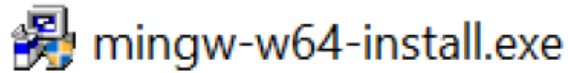


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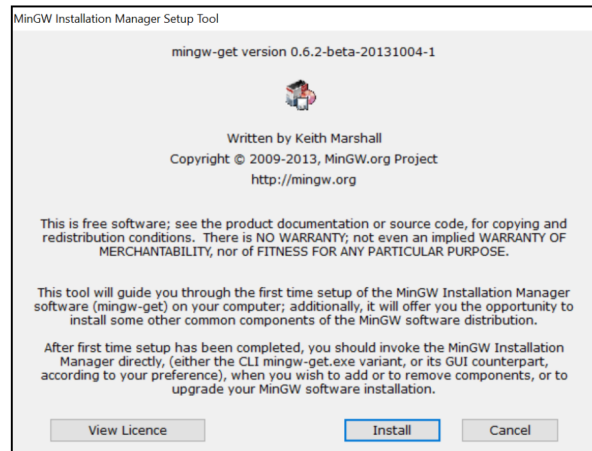


Step 3: (Move to the Folder where the file is downloaded)
The file should appear as:



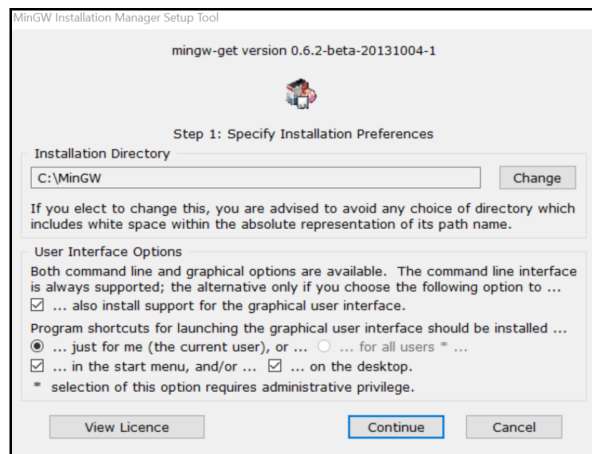
Install Compiler

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.



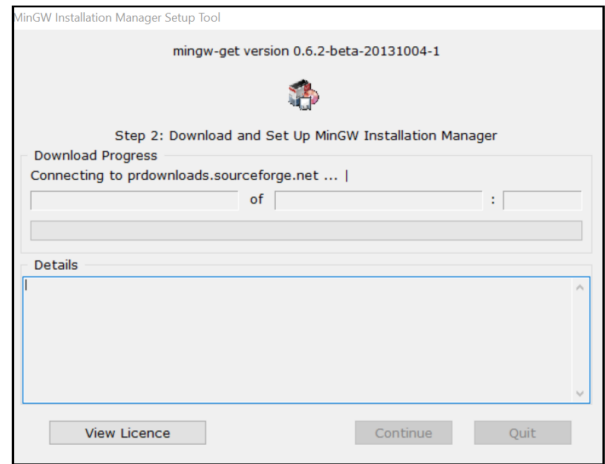
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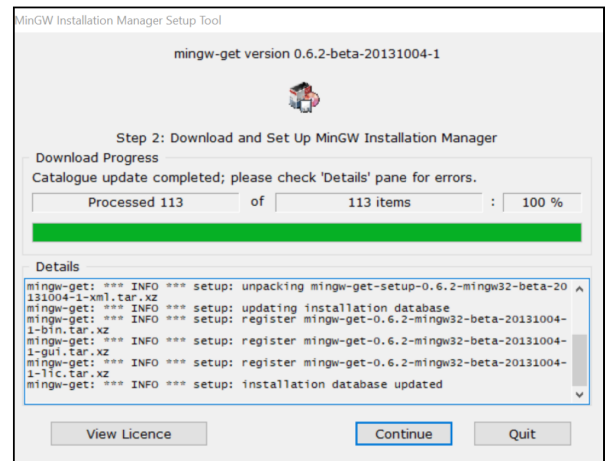


Step 3: Click Continue

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



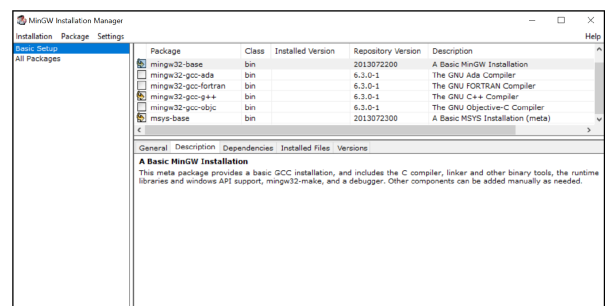
After about a minute, it should appear as follows.



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.



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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

Action Requires Confirmation



You have marked packages for installation, upgrade, or removal, but you have not yet committed these changes; if you quit without committing these changes, they will be discarded, and you may need to reschedule them.

You are advised to review your marked changes, before you quit; (you may select the "Review Changes" option button below), or alternatively, you may simply discard the changes, unseen, or you may cancel this request to quit.

Review Changes

Discard Changes

Cancel Request

Step 6: Click the Review Changes

The following pop-up window should appear

Schedule of Pending Actions

Okay to proceed?

The package changes itemised below will be implemented when you choose "Apply"

Apply

Defer

Discard

0 installed packages will be removed

0 installed packages will be upgraded

58 new/upgraded packages will be installed

11b1conv-1.14-3-mingw32-d11-2.tar
11bpthreadgc-2.10-mingw32-pre-20160821-1-d11-3.tar.xz
mingw32-11bgomp-deps-5.3.0-mingw32-d11.meta
11bgcc-6.3.0-1-mingw32-d11-1.tar.xz
11bintl-0.18.3.2-2-mingw32-d11-8.tar.xz
mingwrt-5.0.2-mingw32-d11.tar.xz

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.

Download Package

Connecting to prdownloads.sourceforge.net ... /

of

Applying Scheduled Changes

All changes were applied successfully; you may now close this dialogue.

☐ Close dialogue automatically, when activity is complete.

Close

Details

install: dos2unix-7.4.0-1-msys-1.0.19-bin.tar.lzma
installing dos2unix-7.4.0-1-msys-1.0.19-bin.tar.lzma
install: coreutils-5.97-3-msys-1.0.13-bin.tar.lzma
installing coreutils-5.97-3-msys-1.0.13-bin.tar.lzma
install: zlib-1.2.7-1-msys-1.0.17-d11.tar.lzma
installing zlib-1.2.7-1-msys-1.0.17-d11.tar.lzma
install: msysCORE-1.0.19-1-msys-1.0.19-bin.tar.xz
installing msysCORE-1.0.19-1-msys-1.0.19-bin.tar.xz
install: termcap-0.20050421-1-2-msys-1.0.13-bin.tar.lzma
installing termcap-0.20050421-1-2-msys-1.0.13-bin.tar.lzma
install: libregex-1.20090805-2-msys-1.0.13-d11-1.tar.lzma
installing libregex-1.20090805-2-msys-1.0.13-d11-1.tar.lzma
install: libtermcap-0.20050421-1-2-msys-1.0.13-d11-0.tar.lzma
installing libtermcap-0.20050421-1-2-msys-1.0.13-d11-0.tar.lzma
install: libbz2-1.0.6-1-msys-1.0.17-d11-1.tar.lzma
installing libbz2-1.0.6-1-msys-1.0.17-d11-1.tar.lzma
install: msysCORE-1.0.19-1-msys-1.0.19-ext.tar.xz
installing msysCORE-1.0.19-1-msys-1.0.19-ext.tar.xz
install: bzip2-1.0.6-1-msys-1.0.17-bin.tar.lzma
installing bzip2-1.0.6-1-msys-1.0.17-bin.tar.lzma
install: bash-3.1.23-1-msys-1.0.18-bin.tar.xz
installing bash-3.1.23-1-msys-1.0.18-bin.tar.xz
install: msys-base-2013072300-msys-bin.meta
installing msys-base-2013072300-msys-bin.meta

Step 8: Click Close

Set Compiler Path in Environment Variables

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



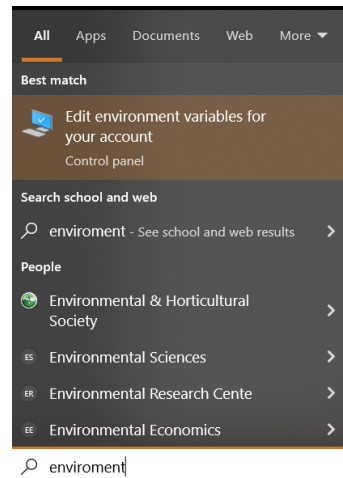
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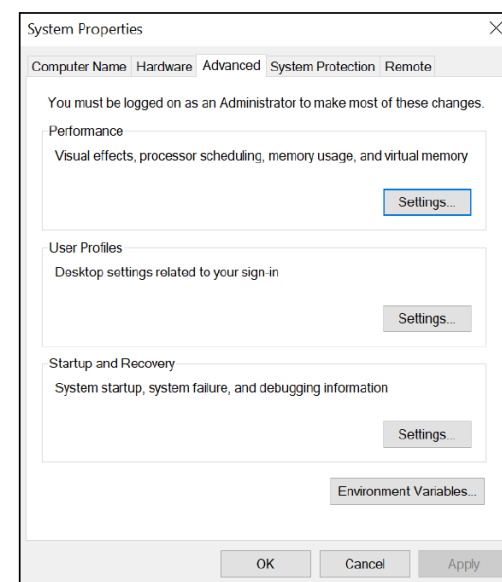
Now, set the Path of the bin folder of MinGW Compiler so that it is accessible in any folder through the command prompt

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.



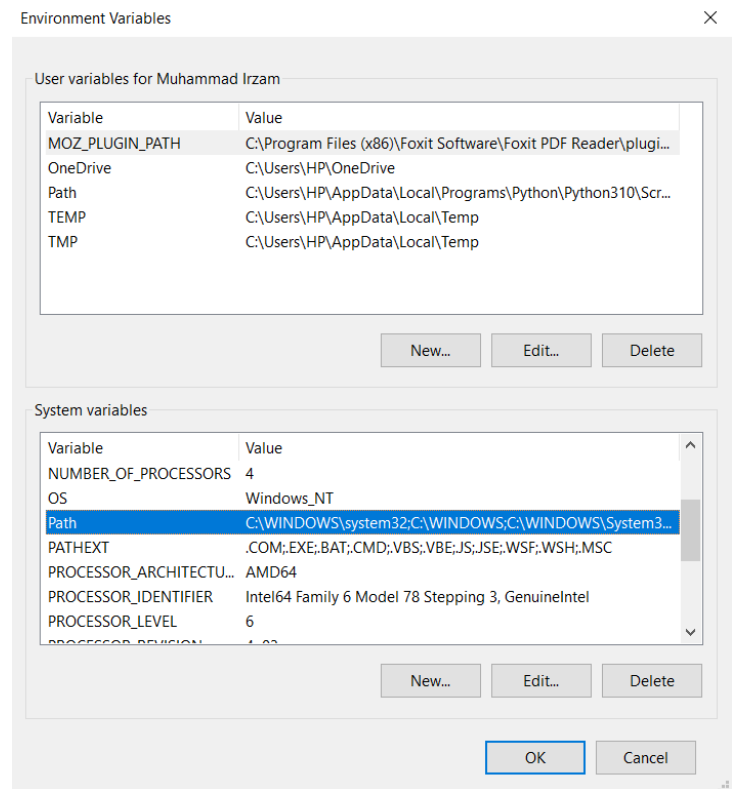
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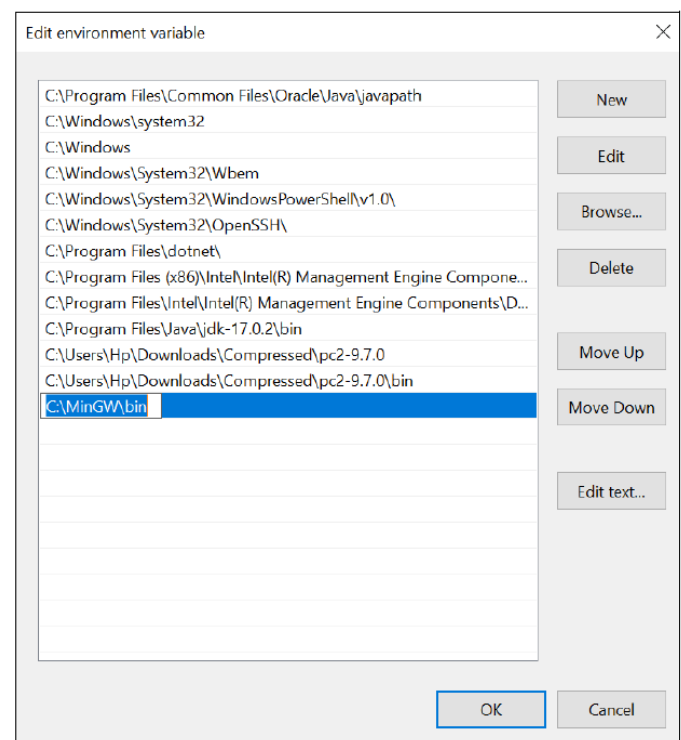
Step 2: Upon Click Environment Variables
The following pop-up window should appear.

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



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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.

```
test.cpp - Notepad
File Edit Format View Help
#include<iostream>
using namespace std;

main()
{
}

Ln 6, Col 1    70%    Windows (CRLF)    UTF-8
```

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



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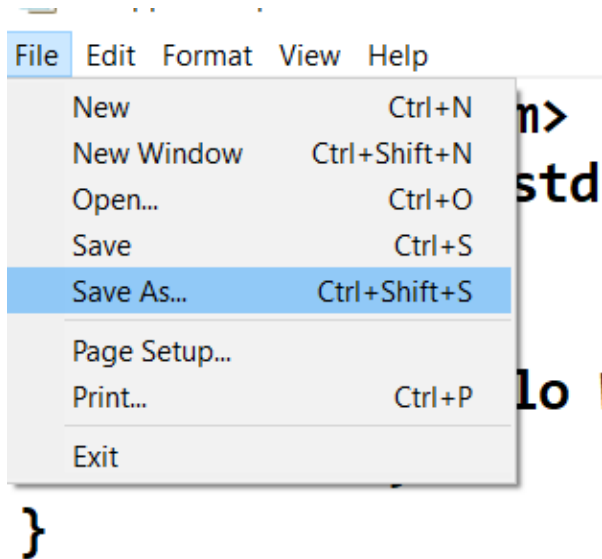
Use the **cout**<< command to print the desired output on the screen.

```
test.cpp - Notepad
File Edit Format View Help
#include<iostream>
using namespace std;

main()
{
    cout << "Hello World!";
}
```

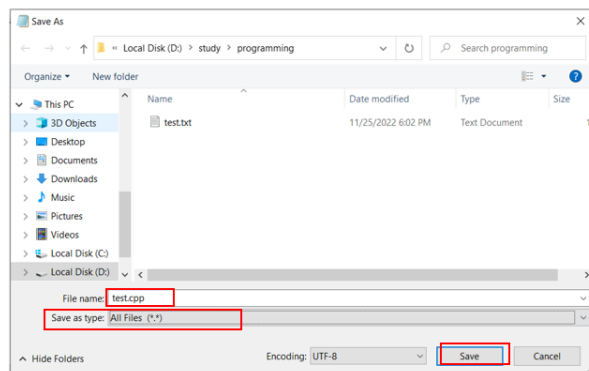
Ln 6, Col 27 70% Windows (CRLF) UTF-8

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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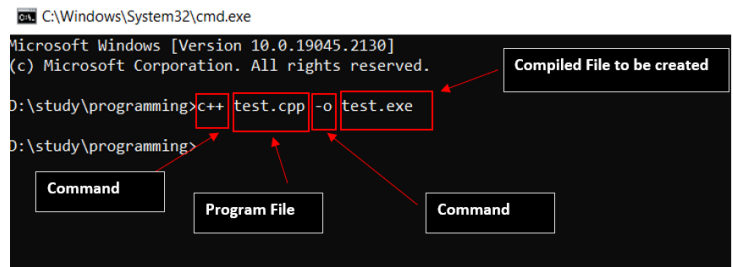
Now, use the previous knowledge to open the **Command Prompt** and **navigate** to the **working directory**.

```
D:\study\programming>
```

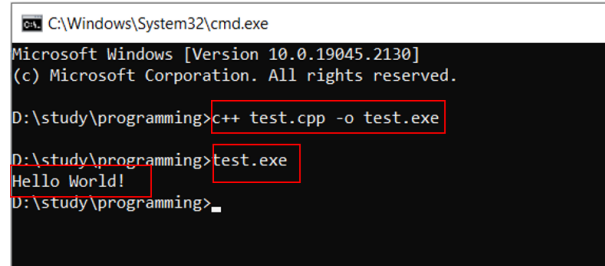
Now, **Compile the file** using the following command.

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
<code>cout << "statement";</code>	Used to print the "statement" on the console
<code>cout << endl;</code>	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.

