THE UNIVERSITY OF UTAH
ASIA CAMPUS
SOUTH KOREA

Department of Electrical and Computer Engineering

Spring 2022

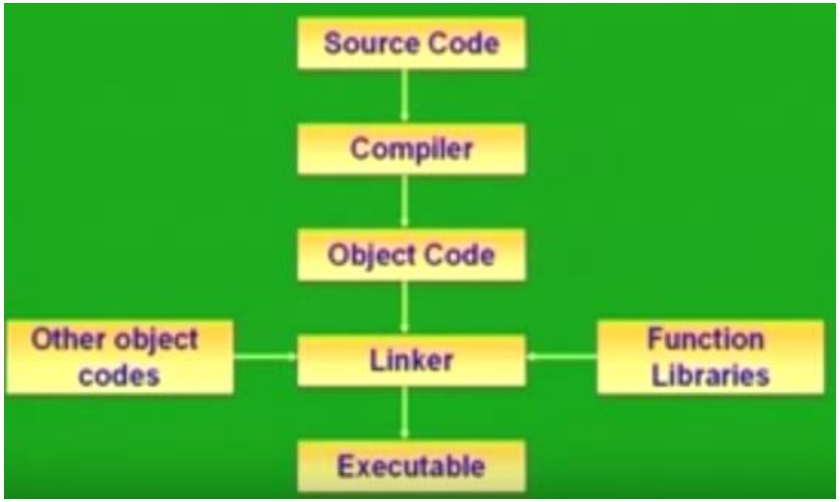
Accelerated Object Oriented Programming (CS 1420)

1.1 Programming Environment Setup

Habtamu Minassie
Habtamu.aycheh@Utah.edu

Getting Started

- Recap
  - Creating and Running Programs



- Before starting writing programming (E.g. C++), the requirements are:
  - Source code editor and
  - C++ compiler
    - ✓ IDE

Integrated Development Environment (IDE)

- IDE is a programming environment that has integrated into software application and provides a GUI builder such that
  - Code editor
  - Compiler, Linker and Loader
- Examples

https://docs.microsoft.com/en-us/visualstudio/?view=vs-2022

Visual Studio

Code:: Blocks
http://www.codeblocks.org/

Eclipse CDT

https://www.eclipse.org/cdt/

Xcode

https://developer.apple.com/xcode/

Visual Studio Code

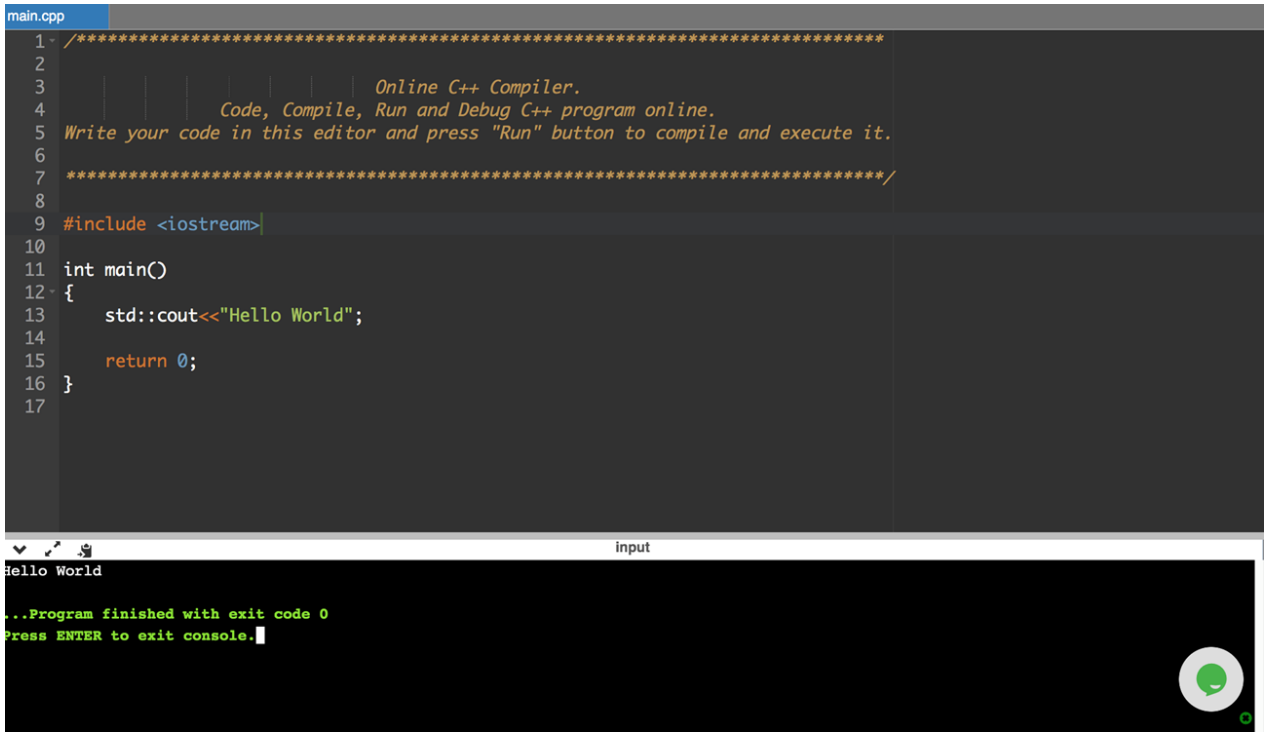
https://code.visualstudio.com/

Dev C++

https://www.bloodshed.net/

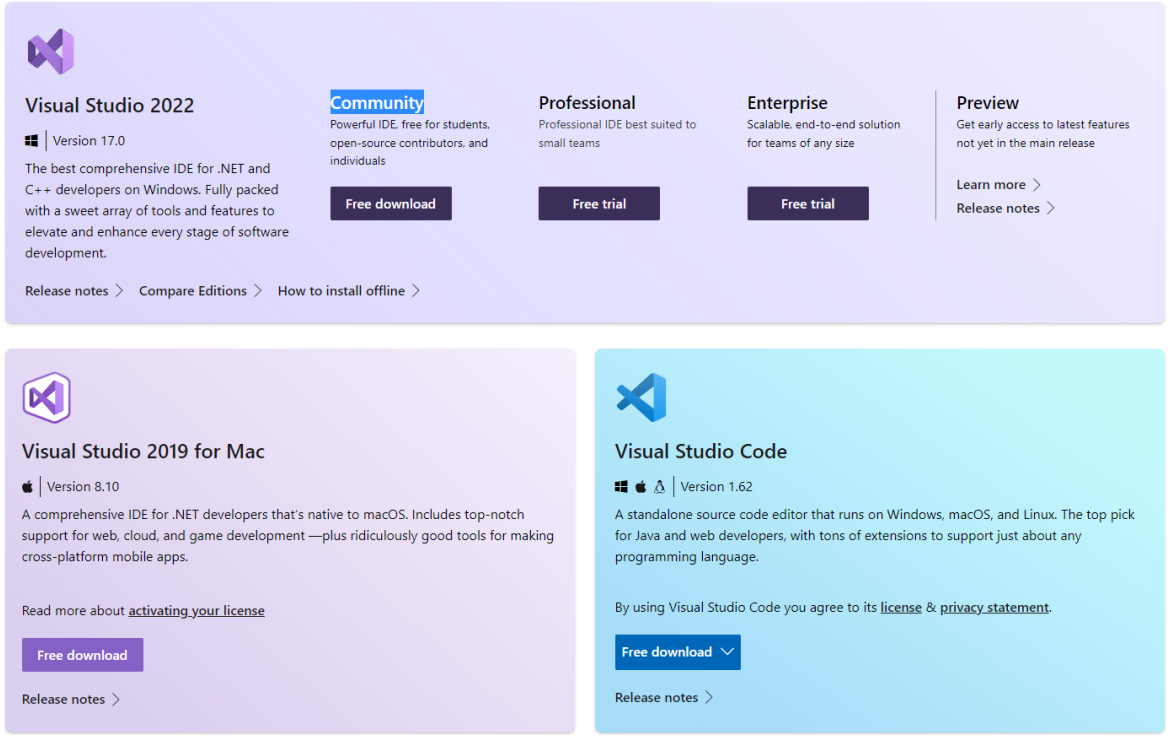
There are also online C++ Editors

https://www.onlinegdb.com/online_c++_compiler

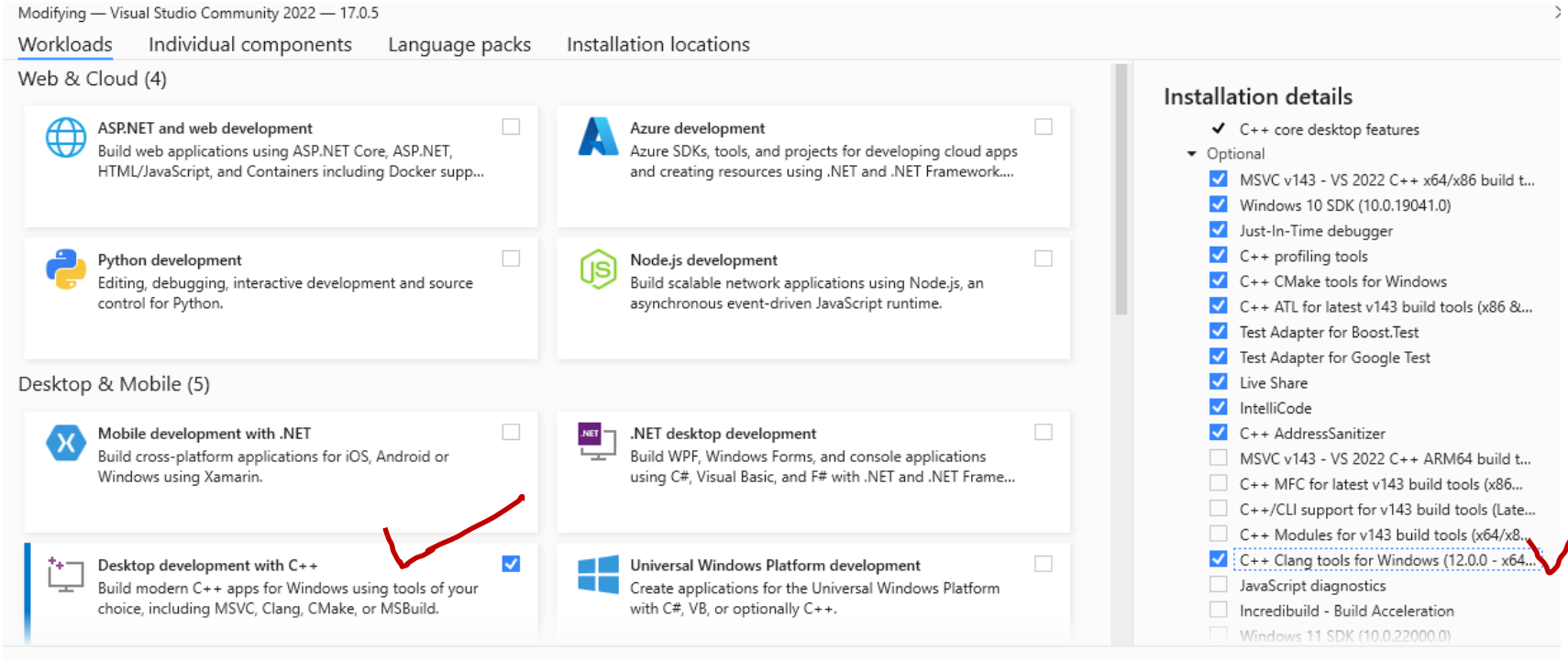


Install Visual Studio

- Step 1: Download the Software (Community Edition)
  - https://docs.microsoft.com/en-us/visualstudio/?view=vs-2022

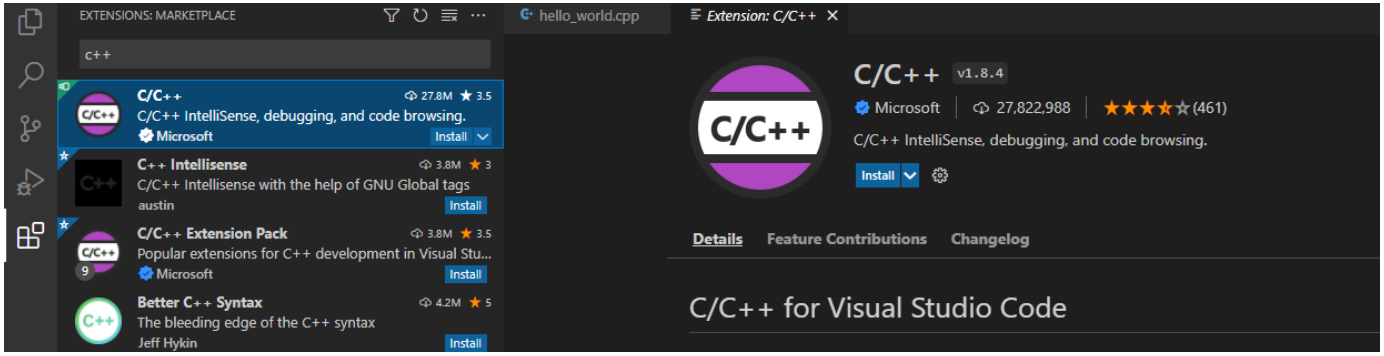


Choose workloads



Install Visual Studio Code

- https://code.visualstudio.com/Download
- Install the C/C++ extension for VS Code
  - install the C/C++ extension by searching for 'c++' in the Extensions view (Ctrl+Shift+X).
    1. Open VS Code.
    2. Select the Extensions view icon on the Activity bar or use the keyboard shortcut (Ctrl+Shift+X).
    3. Search for 'C++'.
    4. Select Install.



Install the C++ compiler

- Step 1: Download MinGW
  - MinGW is a compiler system based on the GNU GCC and Binutils projects that compiles and links code to be run on Win32 (Windows) systems. It provides C, C++ and Fortran compilers plus other related tools. 'MinGW' refers to the "Minimalist GNU for Windows" project
  - **https://nuwen.net/mingw.html**

Download

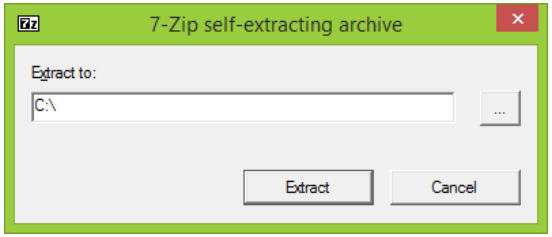
My MinGW distribution ("distro") is **x64-native** and currently contains **GCC 11.2.0** and **Boost 1.77.0**.

mingw-18.0.exe (96.9 MB) : This is a self-extracting archive. It's incredibly easy to install; see How To Install below.

mingw-18.0-without-git.exe (49.3 MB) : This is smaller, if you've already installed git.

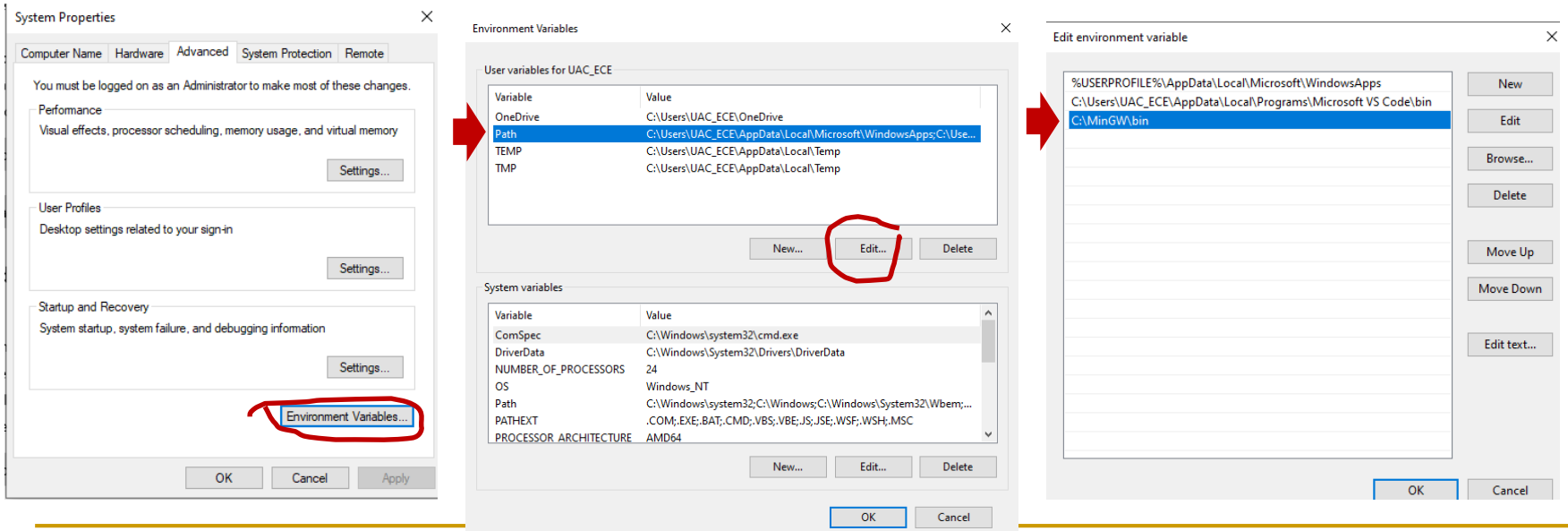
My build scripts are available on GitHub, and they're also stored within the distro itself.

- **Step 2: How to Install**
  - **Run the self-extracting archive, for instance it'll create C:\MinGW**



Set Environmental path

- Add the path to your Mingw bin folder to the Windows PATH environment variable by using the following steps:
  1. In the Windows search bar, type 'settings' to open your Windows Settings.
  2. Search for Edit environment variables for your account.
  3. Choose the Path variable in your User variables and then select Edit.
  4. Select New and add the Mingw destination folder path to the system path. The exact path depends on where you installed it.
     - Add this to the path: C:\mingw\bin.
  5. Select OK to save the updated PATH. You will need to reopen any console windows for the new PATH location to be available



Check your MinGW installation

- Open a new Command Prompt and type:

```
g++ --version
gdb --version
```

- If you don't see the expected output or g++ or gdb is not a recognized command, make sure your PATH entry matches the MinGW binary location

```
C:\Users\UAC_ECE>g++ --version
g++ (GCC) 11.2.0
Copyright (C) 2021 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.
```

```
C:\Users\UAC_ECE>g++ --version
g++ (GCC) 11.2.0
Copyright (C) 2021 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.
```

Utah CADE Machines

- All of you should have access to CADE servers
  - If not, go apply for one at: https://www.cade.utah.edu/
- CADE machines have all the facilities we need
  - Domain: labX-Y.eng.utah.edu
  - X = 1, 2, 3, … (# of lab space)
  - Y = 1, 2, 3, 4, 5, … (machine # of each lab space)
  - For example, lab2-20.eng.utah.edu
  - Account: your uID
  - Password: your uID login password
- Remote login using ssh (the easiest way)
  - ssh -x u6024634@lab2-20.eng.utah.edu

Compilation and Linking Demo: Lab 1

- Use g++ or clang compiler :

Developer Command Prompt for VS 2022

```
 Directory of D:\CPP

02/04/2022  04:59 PM    <DIR>          .
02/04/2022  04:59 PM    <DIR>          ..
02/04/2022  12:07 PM               351 hello_world.cpp
               1 File(s)            351 bytes
               2 Dir(s)  155,738,972,160 bytes free

D:\CPP>clang -c -o hello_world.obj hello_world.cpp

D:\CPP>clang -o hello_world.exe hello_world.obj

D:\CPP>hello_world.exe
Hello C++
D:\CPP>dir
 Volume in drive D is Data
 Volume Serial Number is A8AC-BCB9

 Directory of D:\CPP

02/04/2022  05:01 PM    <DIR>          .
02/04/2022  05:01 PM    <DIR>          ..
02/04/2022  12:07 PM               351 hello_world.cpp
02/04/2022  05:01 PM           181,760 hello_world.exe
02/04/2022  05:00 PM            62,314 hello_world.obj
               3 File(s)        244,425 bytes
               2 Dir(s)  155,738,722,304 bytes free

D:\CPP>
```

Command Prompt

```
               2 Dir(s)  155,738,722,304 bytes free

D:\CPP>g++ --version
g++ (GCC) 11.2.0
Copyright (C) 2021 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.


D:\CPP>g++ -c -o hello_world.obj hello_world.cpp

D:\CPP>g++  -o hello_world.exe hello_world.obj

D:\CPP>hello_world
Hello C++
D:\CPP>dir
 Volume in drive D is Data
 Volume Serial Number is A8AC-BCB9

 Directory of D:\CPP

02/04/2022  05:10 PM    <DIR>          .
02/04/2022  05:10 PM    <DIR>          ..
02/04/2022  12:07 PM               351 hello_world.cpp
02/04/2022  05:10 PM         2,965,139 hello_world.exe
02/04/2022  05:10 PM             1,839 hello_world.obj
               3 File(s)      2,967,329 bytes
               2 Dir(s)  155,735,752,704 bytes free
```

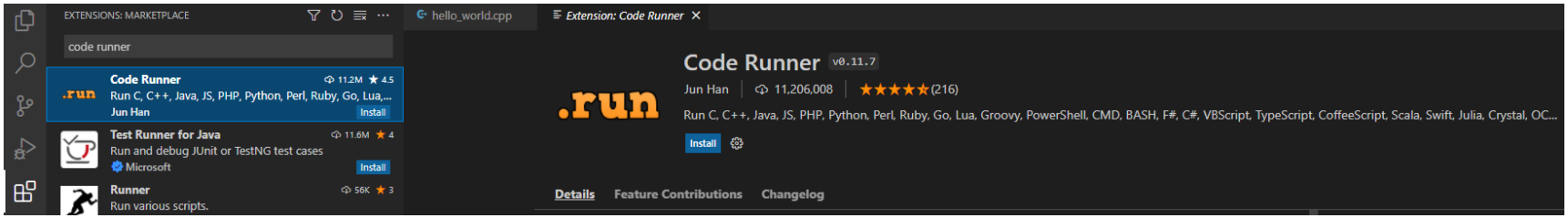
Windows PowerShell

```
PS D:\CPP>
PS D:\CPP> g++ -c -o hello_world.obj hello_world.cpp
PS D:\CPP> g++ -o hello_world  hello_world.obj
PS D:\CPP> ./hello_world
Hello World
PS D:\CPP>
```

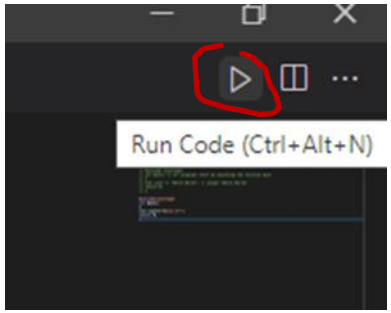
g++ Linux man page
https://linux.die.net/man/1/g++

Installing code runner in VS Code

- Install the Code Runner extension by searching for 'Code Runner' in the Extensions view (Ctrl+Shift+X).

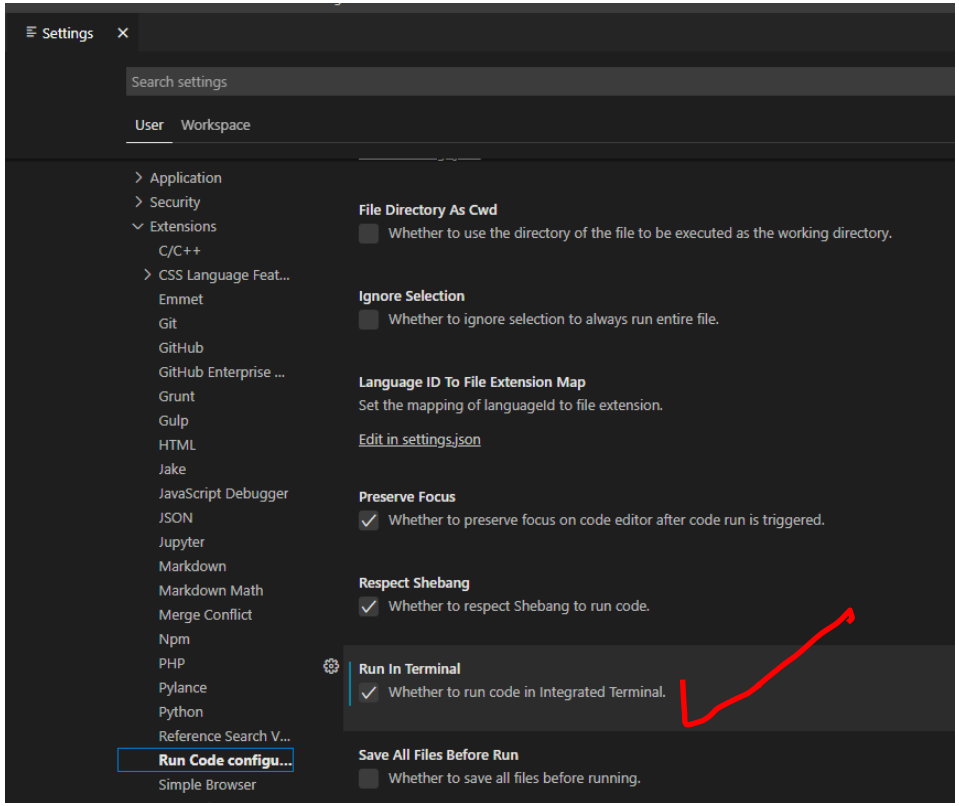


- After installation you will get code runner :



For command line input

- Enable Run in Terminal in settings
  - Select File/preferences/settings
  - From settings select extensions/code Runner configuration/ check run in terminal

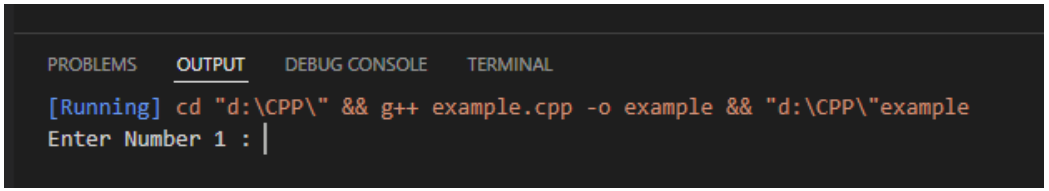


Example

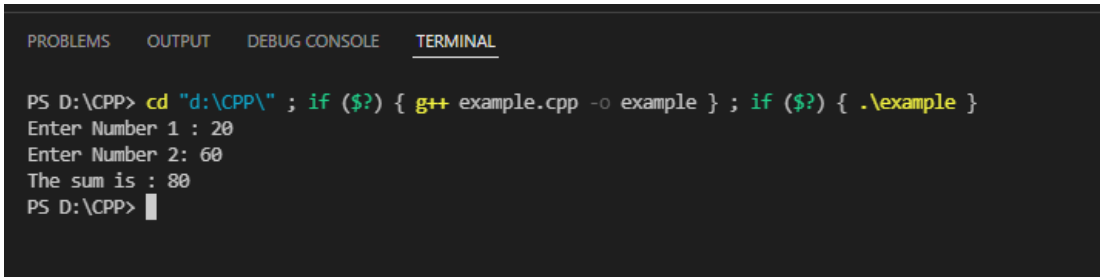
example.cpp > ...

```cpp

#include<iostream>

int main()

{
    int num1,num2;
    std::cout<< "Enter Number 1 : ";
    std::cin>>num1;
    std::cout<< "Enter Number 2: ";
    std::cin>>num2;
    std::cout<<"The sum is : "<<num1 + num2;

}
```

If Run in Terminal not enabled



After Run in Terminal Is enabled



Visual Studio Code on macOS

- https://code.visualstudio.com/docs/setup/mac

Compilation and Linking Demo (Lab 1)

Write the following code in the editor:

Use g++ or clang compiler

Command Prompt

```
               2 Dir(s)  155,738,722,304 bytes free

D:\CPP>g++ --version
g++ (GCC) 11.2.0
Copyright (C) 2021 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.


D:\CPP>g++ -c -o hello_world.obj hello_world.cpp

D:\CPP>g++  -o hello_world.exe hello_world.obj

D:\CPP>hello_world
Hello C++
D:\CPP>dir
 Volume in drive D is Data
 Volume Serial Number is A8AC-BCB9

 Directory of D:\CPP

02/04/2022  05:10 PM    <DIR>          .
02/04/2022  05:10 PM    <DIR>          ..
02/04/2022  12:07 PM               351 hello_world.cpp
02/04/2022  05:10 PM         2,965,139 hello_world.exe
02/04/2022  05:10 PM             1,839 hello_world.obj
               3 File(s)      2,967,329 bytes
               2 Dir(s)  155,735,752,704 bytes free
```

Developer Command Prompt for VS 2022

```
D:\CPP>clang --version
clang version 12.0.0
Target: i686-pc-windows-msvc
Thread model: posix
InstalledDir: C:\Program Files\Microsoft Visual Studio\2022\Community\VC\Tools\Llvm\bin

D:\CPP>clang -c -o hello_world.obj hello_world.cpp

D:\CPP>clang  -o hello_world.exe hello_world.obj

D:\CPP>hello_world.exe
Hello C++
D:\CPP>dir
 Volume in drive D is Data
 Volume Serial Number is A8AC-BCB9

 Directory of D:\CPP

02/10/2022  04:12 PM    <DIR>          .
02/10/2022  04:12 PM    <DIR>          ..
02/09/2022  05:36 PM               351 hello_world.cpp
02/10/2022  04:12 PM           181,760 hello_world.exe
02/10/2022  04:12 PM            62,314 hello_world.obj
               3 File(s)        244,425 bytes
               2 Dir(s)  155,707,822,080 bytes free

D:\CPP>
```

```
PS D:\CPP>
PS D:\CPP> g++ -c -o hello_world.obj hello_world.cpp
PS D:\CPP> g++ -o hello_world  hello_world.obj
PS D:\CPP> ./hello_world
Hello World
PS D:\CPP>
```