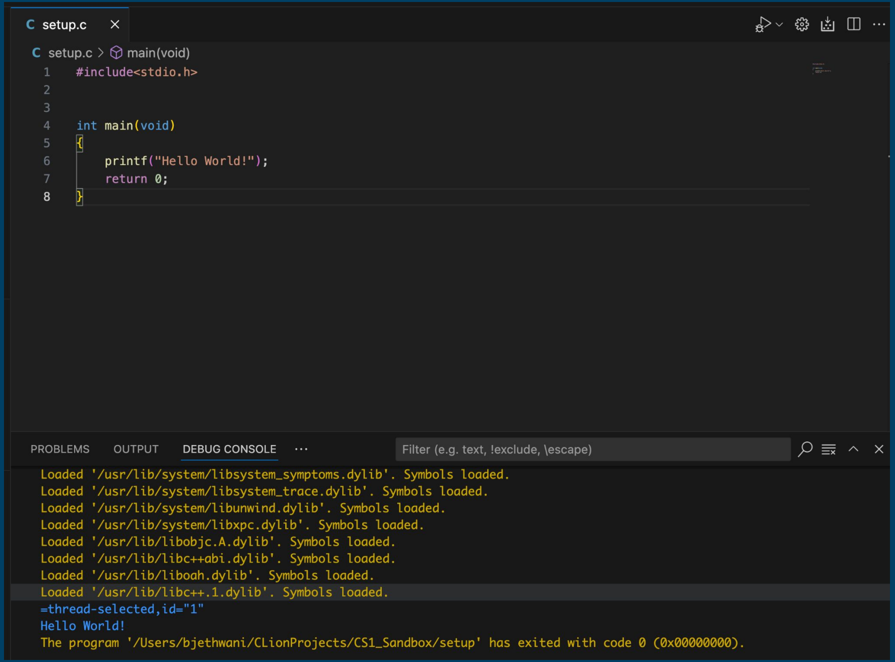
How to set up and use GCC compiler on Visual Studio Code (Windows Only)



```c
#include<stdio.h>


int main(void)
{
    printf("Hello World!");
    return 0;
}
```

```
Loaded '/usr/lib/system/libsystem_symptoms.dylib'. Symbols loaded.
Loaded '/usr/lib/system/libsystem_trace.dylib'. Symbols loaded.
Loaded '/usr/lib/system/libunwind.dylib'. Symbols loaded.
Loaded '/usr/lib/system/libxpc.dylib'. Symbols loaded.
Loaded '/usr/lib/libobjc.A.dylib'. Symbols loaded.
Loaded '/usr/lib/libc++abi.dylib'. Symbols loaded.
Loaded '/usr/lib/liboah.dylib'. Symbols loaded.
Loaded '/usr/lib/libc++.1.dylib'. Symbols loaded.
=thread-selected,id="1"
Hello World!
The program '/Users/bjethwani/CLionProjects/CS1_Sandbox/setup' has exited with code 0 (0x00000000).
```

Tutorial Introduction/Overview

Goals/Objectives

- Show the steps to download a GCC compiler on VS Code.
- Show how to use the GCC compiler on VS Code.
- Show additional tools that come with the installation

Requirements/Tools Needed

- Windows 8+ Device required
- VS Code Installed
- Google Chrome/Browser to install resources

Table of Contents

GCC History

- GCC stands for the GNU Compiler Collection.
- GNU was the first free compiler created by non-profit open source methods.

1984

GNU project is started

Richard Stallman starts the project to create the first ever free C compiler.

1987

First beta of GCC is released

GCC is finished for C and is extended to compile C++ as well later in the year.

1997

EGCS project is initiated

With GCC's success and wide use, a project is initiated to improve it's development.

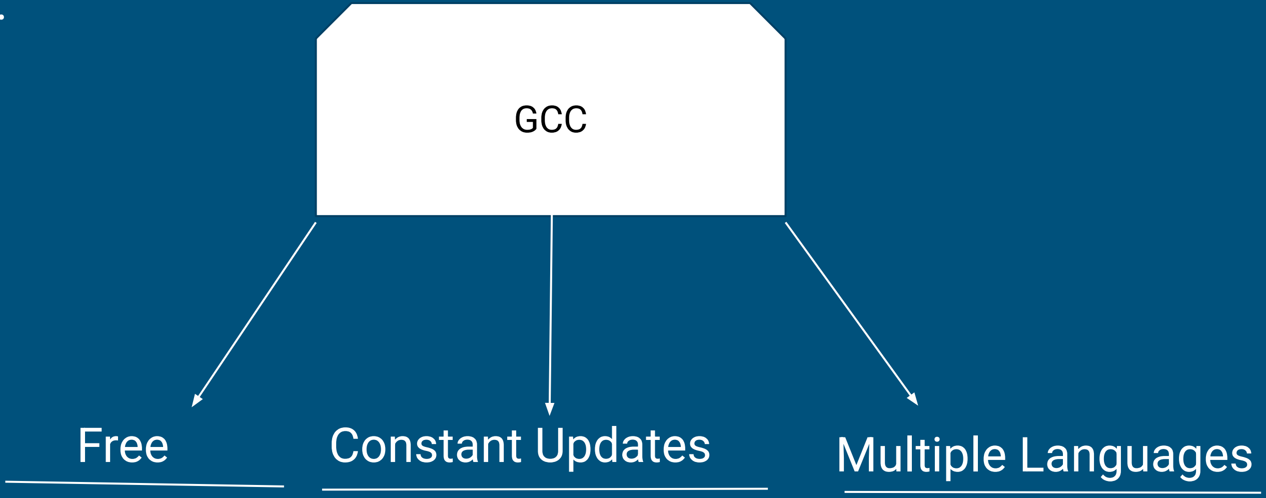
2001-Present

GCC receives constant updates

As new languages and frameworks release, GCC is updated with them frequently.

Why should you download the GCC compiler?

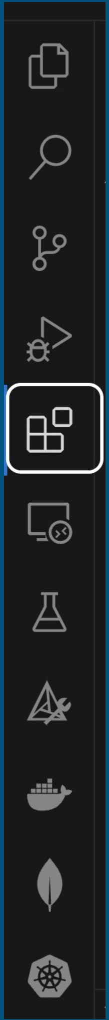
1. Without a compiler the code you type on a file cannot be processed.
2. GCC offers an easy to use debugger called GDB which allows you to debug your code.



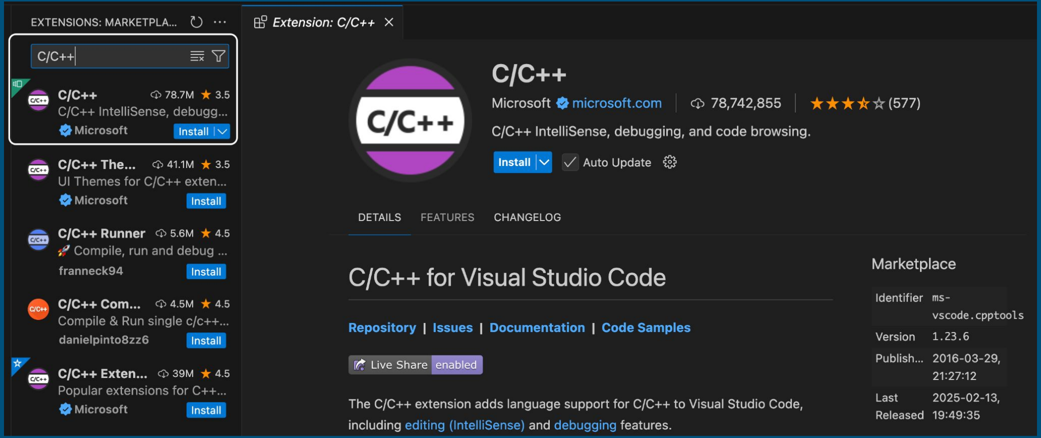
Installing C/C++ extension

1.

On Visual Studio Code Navigate to Extensions



2. In the search bar type and select "C/C++" and click install



EXTENSIONS: MARKETPLA...

C/C++

C/C++ 78.7M ★ 3.5
C/C++ IntelliSense, debugg...
Microsoft Install

C/C++ The... 41.1M ★ 3.5
UI Themes for C/C++ exten...
Microsoft Install

C/C++ Runner 5.6M ★ 4.5
🚀 Compile, run and debug ...
franneck94 Install

C/C++ Com... 4.5M ★ 4.5
Compile & Run single c/c++...
danielpinto8zz6 Install

C/C++ Exten... 39M ★ 4.5
Popular extensions for C++...
Microsoft Install

Extension: C/C++

C/C++
Microsoft microsoft.com 78,742,855 ★★★★☆ (577)
C/C++ IntelliSense, debugging, and code browsing.
Install | Auto Update

DETAILS FEATURES CHANGELOG

C/C++ for Visual Studio Code

Repository | Issues | Documentation | Code Samples

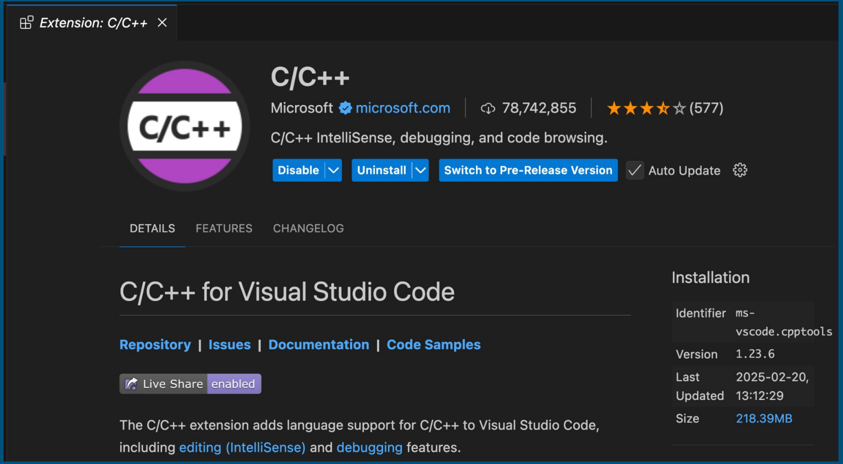
Live Share enabled

The C/C++ extension adds language support for C/C++ to Visual Studio Code, including editing (IntelliSense) and debugging features.

Marketplace

Identifier	ms-vscode.cpptools
Version	1.23.6
Publish...	2016-03-29, 21:27:12
Last Released	2025-02-13, 19:49:35

3. After installing your extension page should look like this



Extension: C/C++

C/C++
Microsoft microsoft.com 78,742,855 ★★★★☆ (577)
C/C++ IntelliSense, debugging, and code browsing.
Disable | Uninstall | Switch to Pre-Release Version | Auto Update

DETAILS FEATURES CHANGELOG

C/C++ for Visual Studio Code

Repository | Issues | Documentation | Code Samples

Live Share enabled

The C/C++ extension adds language support for C/C++ to Visual Studio Code, including editing (IntelliSense) and debugging features.

Installation

Identifier	ms-vscode.cpptools
Version	1.23.6
Last Updated	2025-02-20, 13:12:29
Size	218.39MB

Installing the GCC Compiler

Note:
We will be downloading the GCC Compiler from MSYS2

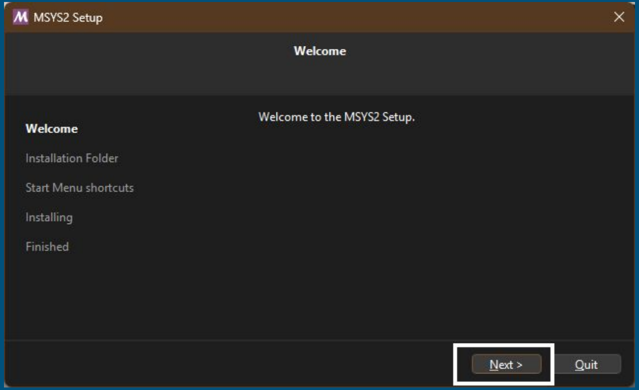
1. Download the link below

https://github.com/msys2/msys2-installer/releases/download/2025-02-21/msys2-x86_64-20250221.exe

Note: This link will download the MinGW, which is a toolchain that contains GCC and various other tools/software. For more information visit this link:

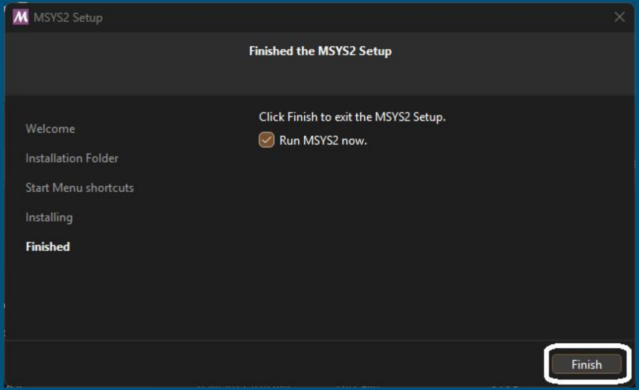
https://www.msys2.org/

2. Run the installer and click next till finished



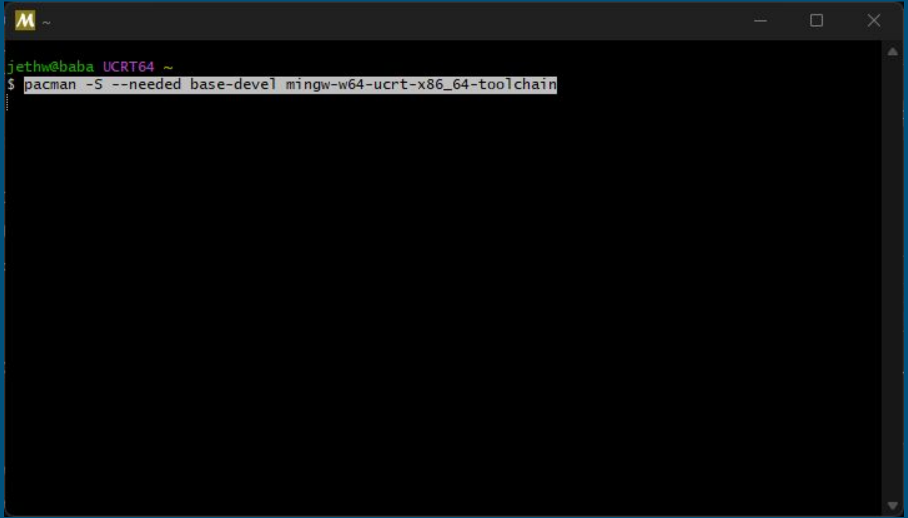
Accept default settings unless you want manual settings

3. Click CMD and execute the following command



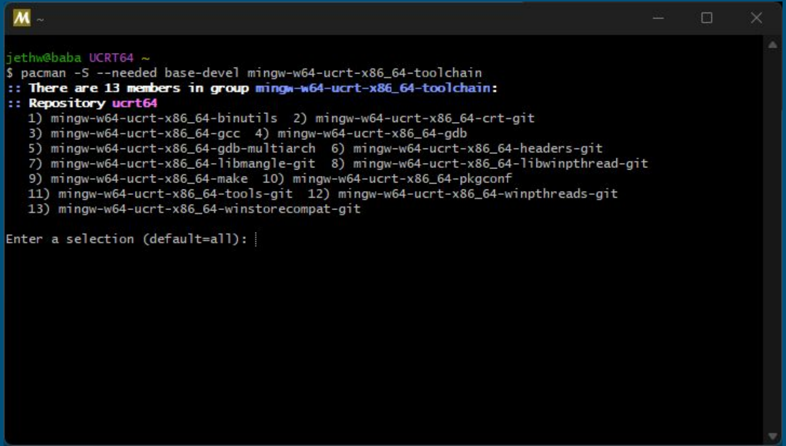
Setting up GCC compiler

1. Copy and paste the following command:
pacman -S --needed base-devel mingw-w64-ucrt-x86_64-toolchain



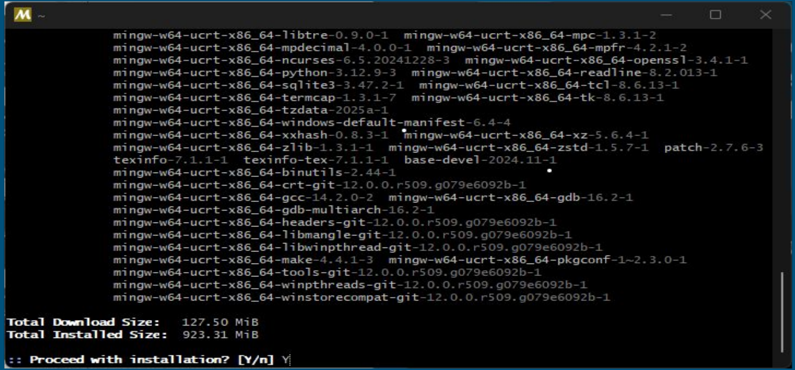
```
jethw@baba UCRT64 ~
$ pacman -S --needed base-devel mingw-w64-ucrt-x86_64-toolchain
```

2. Hit enter to download all default tools



```
jethw@baba UCRT64 ~
$ pacman -S --needed base-devel mingw-w64-ucrt-x86_64-toolchain
:: There are 13 members in group mingw-w64-ucrt-x86_64-toolchain:
:: Repository ucrt64
   1) mingw-w64-ucrt-x86_64-binutils  2) mingw-w64-ucrt-x86_64-crt-git
   3) mingw-w64-ucrt-x86_64-gcc  4) mingw-w64-ucrt-x86_64-gdb
   5) mingw-w64-ucrt-x86_64-gdb-multiarch  6) mingw-w64-ucrt-x86_64-headers-git
   7) mingw-w64-ucrt-x86_64-libmangle-git  8) mingw-w64-ucrt-x86_64-libwinpthread-git
   9) mingw-w64-ucrt-x86_64-make  10) mingw-w64-ucrt-x86_64-pkgconf
   11) mingw-w64-ucrt-x86_64-tools-git  12) mingw-w64-ucrt-x86_64-winpthreads-git
   13) mingw-w64-ucrt-x86_64-winstorecompat-git

Enter a selection (default=all):
```

3. Type Y to proceed with installation



```
              mingw-w64-ucrt-x86_64-libtre-0.9.0-1  mingw-w64-ucrt-x86_64-mpc-1.3.1-2
              mingw-w64-ucrt-x86_64-mpdecimal-4.0.0-1  mingw-w64-ucrt-x86_64-mpfr-4.2.1-2
              mingw-w64-ucrt-x86_64-ncurses-6.5.20241228-3  mingw-w64-ucrt-x86_64-openssl-3.4.1-1
              mingw-w64-ucrt-x86_64-python-3.12.9-3  mingw-w64-ucrt-x86_64-readline-8.2.013-1
              mingw-w64-ucrt-x86_64-sqlite3-3.47.2-1  mingw-w64-ucrt-x86_64-tcl-8.6.13-1
              mingw-w64-ucrt-x86_64-termcap-1.3.1-7  mingw-w64-ucrt-x86_64-tk-8.6.13-1
              mingw-w64-ucrt-x86_64-tzdata-2025a-1
              mingw-w64-ucrt-x86_64-windows-default-manifest-6.4-4
              mingw-w64-ucrt-x86_64-xxhash-0.8.3-1  mingw-w64-ucrt-x86_64-xz-5.6.4-1
              mingw-w64-ucrt-x86_64-zlib-1.3.1-1  mingw-w64-ucrt-x86_64-zstd-1.5.7-1  patch-2.7.6-3
              texinfo-7.1.1-1  texinfo-tex-7.1.1-1  base-devel-2024.11-1
              mingw-w64-ucrt-x86_64-binutils-2.44-1
              mingw-w64-ucrt-x86_64-crt-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-gcc-14.2.0-2  mingw-w64-ucrt-x86_64-gdb-16.2-1
              mingw-w64-ucrt-x86_64-gdb-multiarch-16.2-1
              mingw-w64-ucrt-x86_64-headers-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-libmangle-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-libwinpthread-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-make-4.4.1-3  mingw-w64-ucrt-x86_64-pkgconf-1~2.3.0-1
              mingw-w64-ucrt-x86_64-tools-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-winpthreads-git-12.0.0.r509.g079e6092b-1
              mingw-w64-ucrt-x86_64-winstorecompat-git-12.0.0.r509.g079e6092b-1

Total Download Size:   127.50 MiB
Total Installed Size:  923.31 MiB

:: Proceed with installation? [Y/n] Y
```

Finalizing GCC Installation Part 1

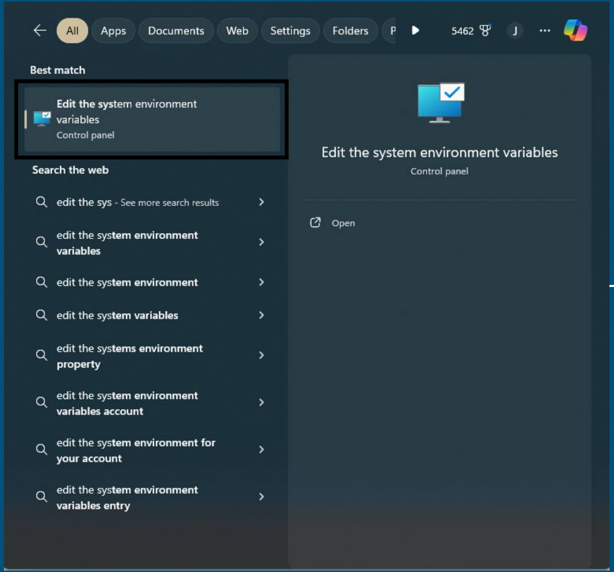
Now that all necessary components have been downloaded we need to make our system can find and recognize our compiler. We will do this by completing the first part:

Note: Changing user path changes for user rather than system. Changes won't apply for other users.

1. In your windows search, type: "Edit the system environment variables"

2. Click on the selection and then click on the option environment variables.

3. Find the variable Path under user and click edit.



Best match

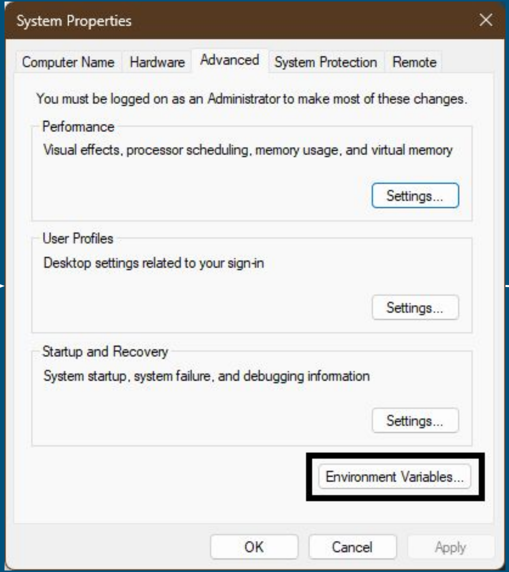
Edit the system environment variables
Control panel

Search the web

- edit the sys - See more search results
- edit the system environment variables
- edit the system environment
- edit the system variables
- edit the systems environment property
- edit the system environment variables account
- edit the system environment for your account
- edit the system environment variables entry

Edit the system environment variables
Control panel

Open



You must be logged on as an Administrator to make most of these changes.

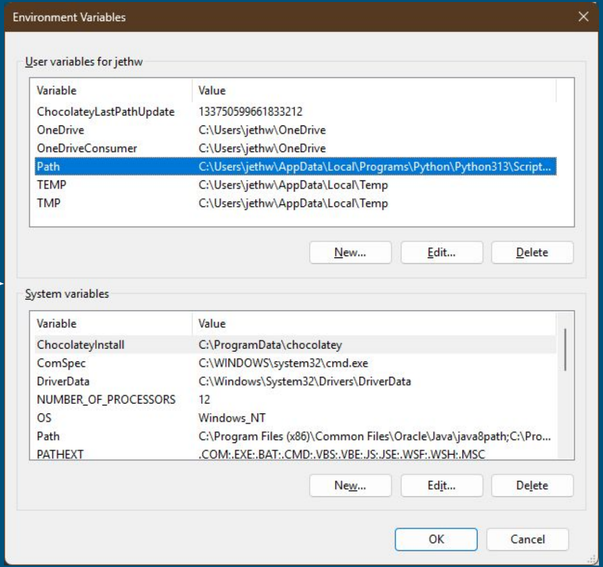
Performance
Visual effects, processor scheduling, memory usage, and virtual memory
Settings...

User Profiles
Desktop settings related to your sign-in
Settings...

Startup and Recovery
System startup, system failure, and debugging information
Settings...

Environment Variables...

OK | Cancel | Apply



User variables for jethw

Variable	Value
ChocolateyLastPathUpdate	133750599661833212
OneDrive	C:\Users\jethw\OneDrive
OneDriveConsumer	C:\Users\jethw\OneDrive
Path	C:\Users\jethw\AppData\Local\Programs\Python\Python313\Script...
TEMP	C:\Users\jethw\AppData\Local\Temp
TMP	C:\Users\jethw\AppData\Local\Temp

New... | Edit... | Delete

System variables

Variable	Value
ChocolateyInstall	C:\ProgramData\chocolatey
ComSpec	C:\WINDOWS\system32\cmd.exe
DriverData	C:\Windows\System32\Drivers\DriverData
NUMBER_OF_PROCESSORS	12
OS	Windows_NT
Path	C:\Program Files (x86)\Common Files\Oracle\Java\java8path;C:\Pro...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC

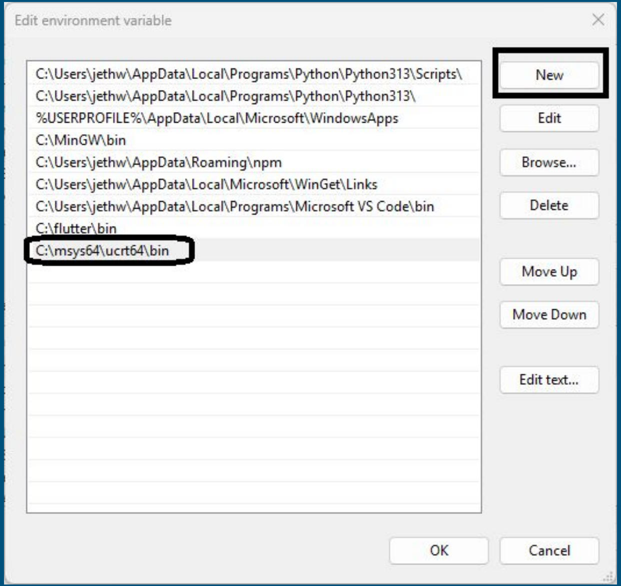
New... | Edit... | Delete

OK | Cancel

Finalizing GCC Installation Part 2

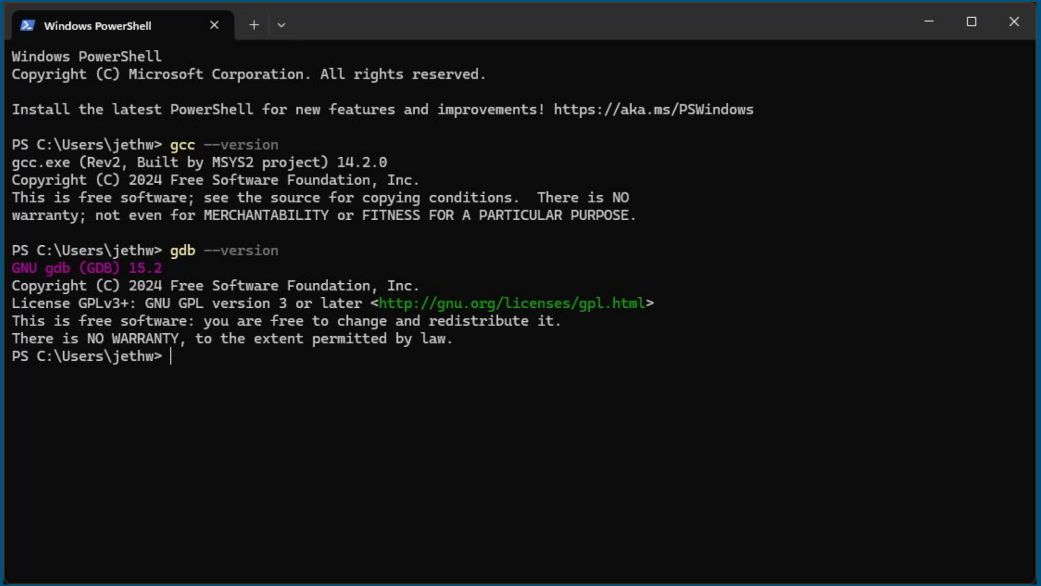
We will configure our $PATH variable to detect the bin folder of our MinGW download which contains our GCC Compiler. To do this we have to edit our PATH environment variable.

1. Click New and type the following path if you accepted all default settings on installation: C:\mysys64\ucrt64\bin. Otherwise, type in the relative path of the directory you saved it too.



```
C:\Users\jethw\AppData\Local\Programs\Python\Python313\Scripts\
C:\Users\jethw\AppData\Local\Programs\Python\Python313\
%USERPROFILE%\AppData\Local\Microsoft\WindowsApps
C:\MinGW\bin
C:\Users\jethw\AppData\Roaming\npm
C:\Users\jethw\AppData\Local\Microsoft\WinGet\Links
C:\Users\jethw\AppData\Local\Programs\Microsoft VS Code\bin
C:\flutter\bin
C:\msys64\ucrt64\bin
```

2. Click OK until you exit the control panel. Now to make sure that the tools are downloaded correctly and your system can detect them, run the following commands in your command prompt:

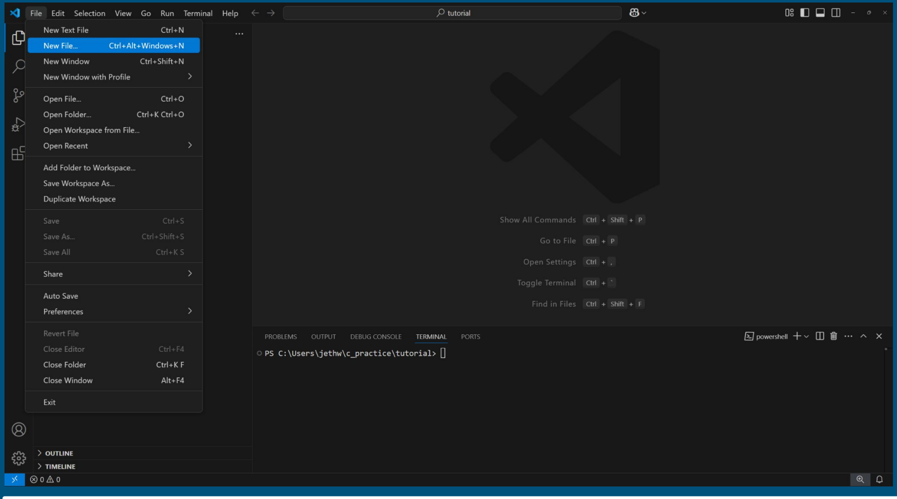


```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\jethw> gcc --version
gcc.exe (Rev2, Built by MSYS2 project) 14.2.0
Copyright (C) 2024 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.

PS C:\Users\jethw> gdb --version
GNU gdb (GDB) 15.2
Copyright (C) 2024 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
PS C:\Users\jethw>
```

Using GCC with Visual Studio Code Part 1

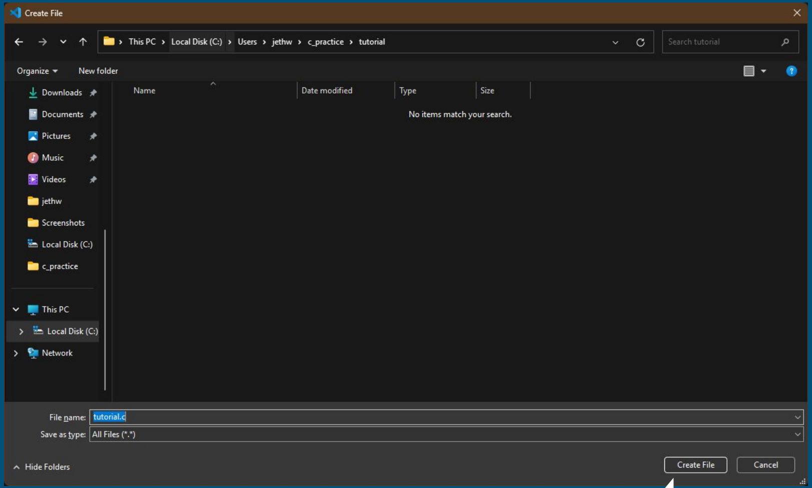
Now that we have verified our installation of GCC on our system, we can now use it on our desired platform VS Code. Let's create a C file!

1. In VS Code click file and click the new file option and name it “insert name here”.c



```
PS C:\Users\jethw\c_practice\tutorial>
```

2. Now choose a location for where you want to save the file and click create file.



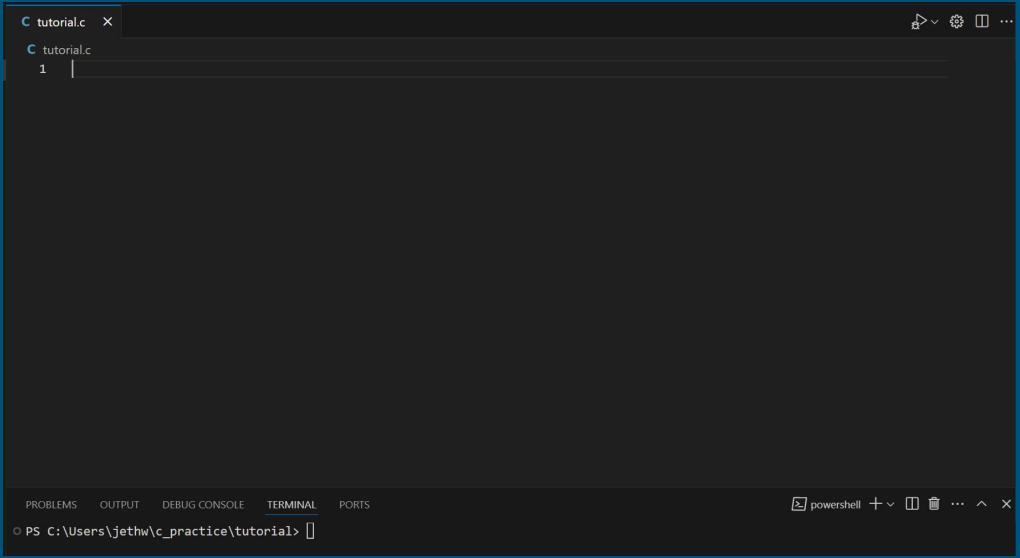
File name: tutorial.c
Save as type: All Files (*.*)

Note: Do not include the quotation marks around your chosen name

Using GCC with Visual Studio Code Part 2

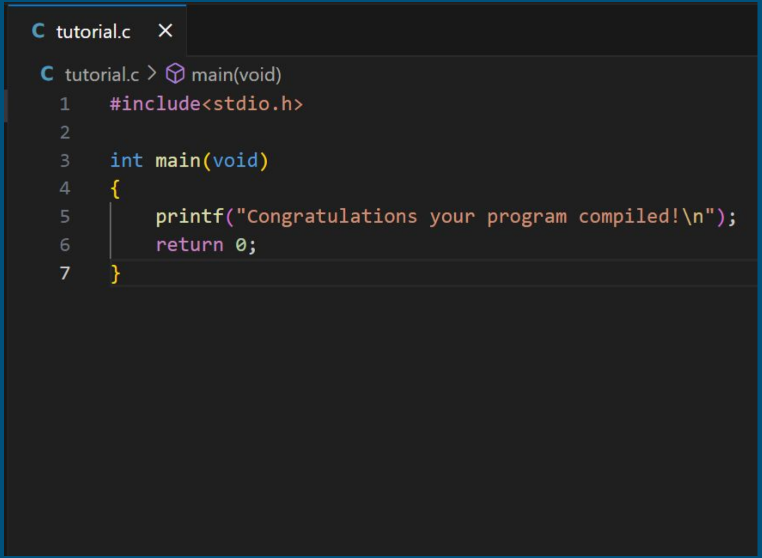
Now we will actually write some sample code on the new file which you created. Make sure to type the code letter for letter!

1. After creating the file, you should be brought to a screen which has the file open in the VS code editor.



```
PS C:\Users\jethw\c_practice\tutorial>
```

2. Now type the following program code in the file.

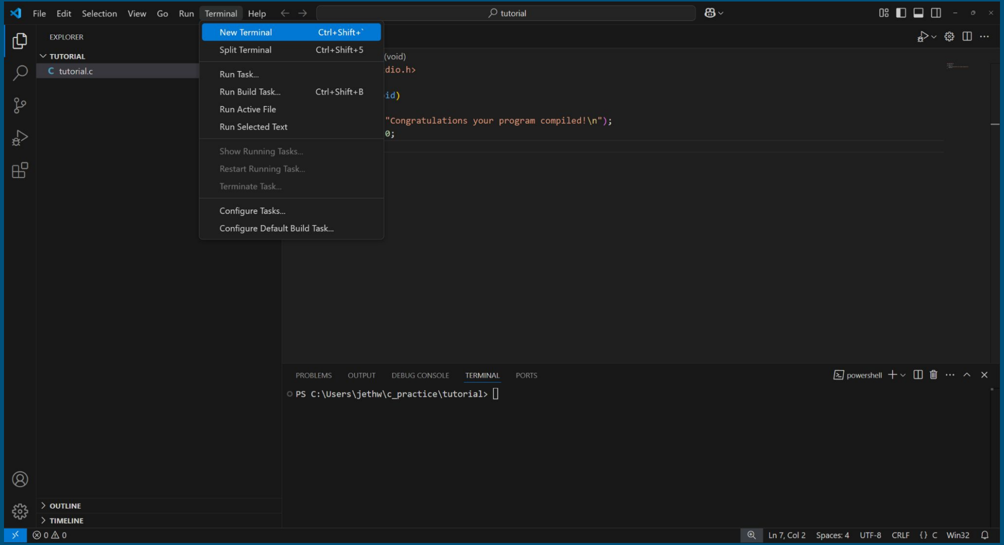


```
#include<stdio.h>

int main(void)
{
    printf("Congratulations your program compiled!\n");
    return 0;
}
```

Using GCC with Visual Studio Code Part 3

At last, we will now compile our C file which has executable code on it!

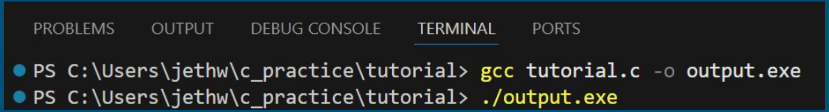
1. Select the terminal tab on the bottom of your screen. If it's not there by default then click terminal on the top of your screen, and click new terminal.



```
(void)
dio.h>
id)
"Congratulations your program compiled!\n");
0;
```

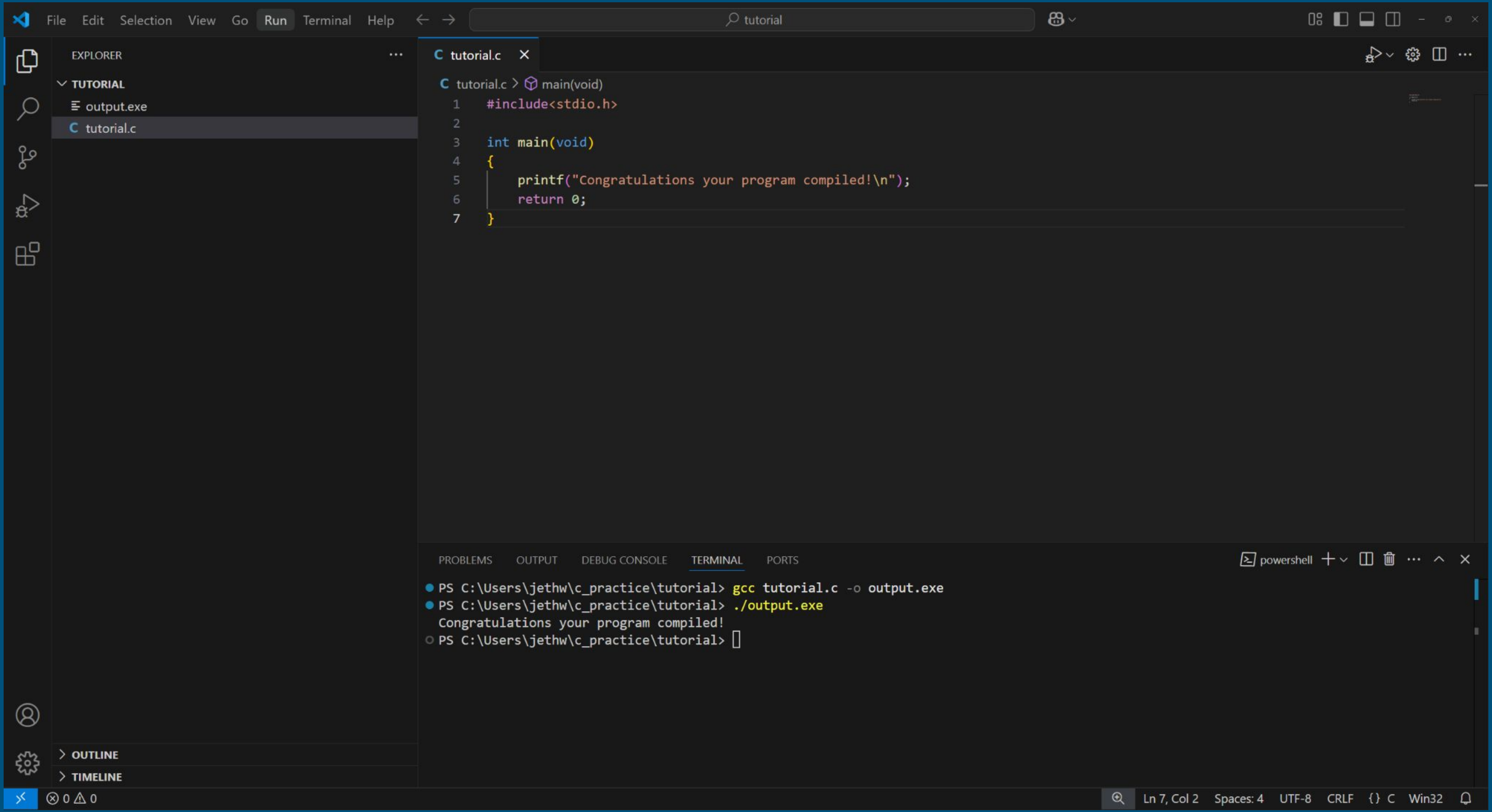
```
PS C:\Users\jethw\c_practice\tutorial> 
```

2. Now type the following commands in the terminal to compile and execute your file.



```
PS C:\Users\jethw\c_practice\tutorial> gcc tutorial.c -o output.exe
PS C:\Users\jethw\c_practice\tutorial> ./output.exe
```

Note: After gcc make sure to put your "file name".c and not tutorial.c if you haven't named your file that.


File Edit Selection View Go Run Terminal Help
tutorial
EXPLORER
TUTORIAL
output.exe
tutorial.c
tutorial.c > main(void)
OUTLINE
TIMELINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell
Ln 7, Col 2 Spaces: 4 UTF-8 CRLF {} C Win32

```c
#include<stdio.h>

int main(void)
{
    printf("Congratulations your program compiled!\n");
    return 0;
}
```

```
PS C:\Users\jethw\c_practice\tutorial> gcc tutorial.c -o output.exe
PS C:\Users\jethw\c_practice\tutorial> ./output.exe
Congratulations your program compiled!
PS C:\Users\jethw\c_practice\tutorial>
```

Finally, your screen should look like this!

Note: Your program output is placed right under the terminal commands.

Glossary

Compiler: Software which translates a programming language/code into machine code understandable by the computer.

CMD(Command Prompt): Interface/program which allows you to interact with the operating system using specific commands.

Debugger: Software tool which allows programmers to track and see the state of their program and it’s variables.

$PATH: A variable in your system which contains the paths for different applications “bins”. These paths tell the operating system where to execute the application files.

DIRECTORY: A folder on your system located in a specific location in your operating system. Used for storing files, both for applications and personal use.

BIN: Directory which contains the files to be executed by the operating system so that the application can be run.

What you learned and more

In this tutorial you were able to do the following:

- Download GCC and set it up with VS code.
- Create a C file in VS code for compilation.
- Write a C program and compile it successfully.

Additional resources:

- https://www.gnu.org/home.en.html
- https://gcc.gnu.org/
- https://github.com/gcc-mirror/gcc