

# Programming Fundamentals Lab



Lab # 03

MinGW Installation and Getting Started with Code

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## Contents

Programming: .....	3
Programming Language:.....	3
C Introduction: .....	3
Why learn C?.....	3
GCC Compiler: .....	3
MinGW: .....	3
MinGW Installation: .....	3
Compile and Run your First C program .....	10
Structure of a Basic C Program .....	11
The printf() in C .....	11
Escape Sequences in C.....	12
References:.....	14

## **Programming:**

*Programming is a way to “instruct the computer to perform various tasks”.*

## **Programming Language:**

A programming language provides a way for a programmer to express a task so that it can be understood and executed by a computer.

## **C Introduction:**

C is a **high-level and general-purpose computer programming language**. It was created in the 1970s by Dennis Ritchie and remains very widely used and influential. It is mainly used to develop many applications and operating systems such as Windows, Linux and other complicated programs such as the Oracle database, drivers, Python interpreter, and games. It is considered a programming foundation in learning any other programming language. That is why it is also called as the **mother of all programming languages**.

## **Why learn C?**

- It is one of the most popular programming languages in the world
- If you know C, you will have no problem learning other popular programming languages such as Java, Python, C++, C#, etc., as the syntax is similar
- C is very fast, compared to other programming languages, like Java and Python

## **GCC Compiler:**

GCC stands for GNU Compiler Collection. It is used to compile programs written in C, C++, Java, ada, and Fortran, etc.

## **MinGW:**

MinGW (Minimalist GNU for Windows) is a software development environment for creating Microsoft Windows applications. It contains everything needed for linking and running your code on windows. MinGW includes a port of the GNU Compiler Collection (GCC), assembler, linker, etc. MinGW is a compiler system based on the GNU GCC and Binutils projects that compiles and links code to be run on Windows. It provides C, C++, Fortran compilers, and other related tools.

## **MinGW Installation:**

Go to <https://sourceforge.net/projects/mingw/>

Click on the **Download** Button.

Home / Browse / Development / Build Tools / MinGW - Minimalist GNU for Windows



# MinGW - Minimalist GNU for Windows

A native Windows port of the GNU Compiler Collection (GCC)  
Brought to you by: [cstrauss](#), [earnie](#), [gressett](#), [keithmarshall](#)



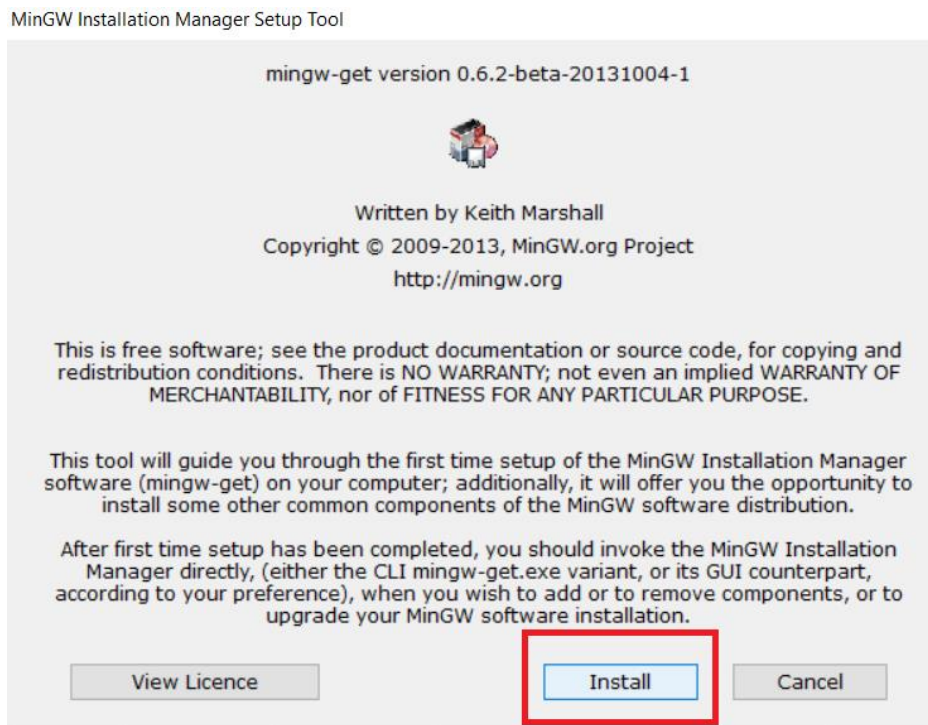
★★★★★ 163 Reviews      Downloads: 5,446,698 This Week      Last Update: 2021-09-05

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Windows


When the download is complete, click the **.exe** file. Then click on **Install**.



The default installation directory is **C:\MinGW**. You can click on **Change** to change the installation directory. Then click on **Continue**.

MinGW Installation Manager Setup Tool

mingw-get version 0.6.2-beta-20131004-1



Step 1: Specify Installation Preferences

Installation Directory

C:\MinGW Change

If you elect to change this, you are advised to avoid any choice of directory which includes white space within the absolute representation of its path name.

User Interface Options

Both command line and graphical options are available. The command line interface is always supported; the alternative only if you choose the following option to ...

☒ ... also install support for the graphical user interface.

Program shortcuts for launching the graphical user interface should be installed ...

☒ ... just for me (the current user), or ... ☐ ... for all users \* ...

☒ ... in the start menu, and/or ... ☒ ... on the desktop.


\* selection of this option requires administrative privilege.

View Licence Continue Cancel

When the MinGW installation is complete, click on **Continue**.

MinGW Installation Manager Setup Tool

mingw-get version 0.6.2-beta-20131004-1



Step 2: Download and Set Up MinGW Installation Manager

Download Progress

Catalogue update completed; please check 'Details' pane for errors.

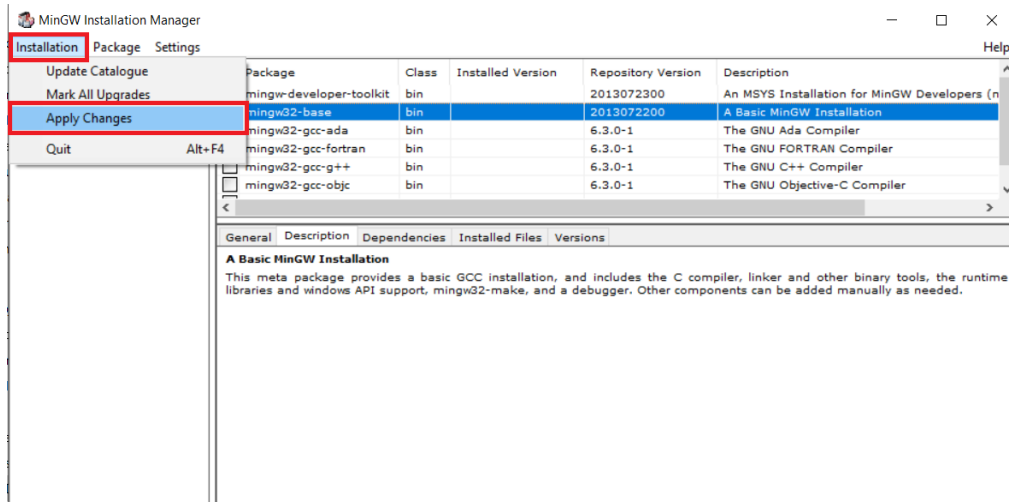
Processed 113 of 113 items : 100 %

Details

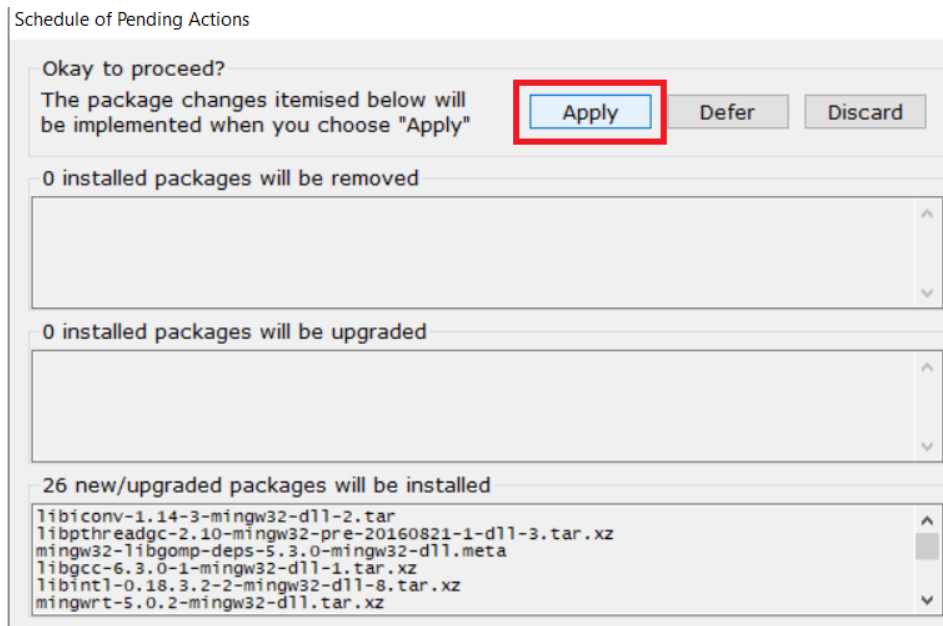
```
mingw-get: *** INFO *** setup: unpacking mingw-get-setup-0.6.2-mingw32-beta-20131004-1-xml.tar.xz
mingw-get: *** INFO *** setup: updating installation database
mingw-get: *** INFO *** setup: register mingw-get-0.6.2-mingw32-beta-20131004-1-bin.tar.xz
mingw-get: *** INFO *** setup: register mingw-get-0.6.2-mingw32-beta-20131004-1-gui.tar.xz
mingw-get: *** INFO *** setup: register mingw-get-0.6.2-mingw32-beta-20131004-1-lic.tar.xz
mingw-get: *** INFO *** setup: installation database updated
```

View Licence Continue Quit

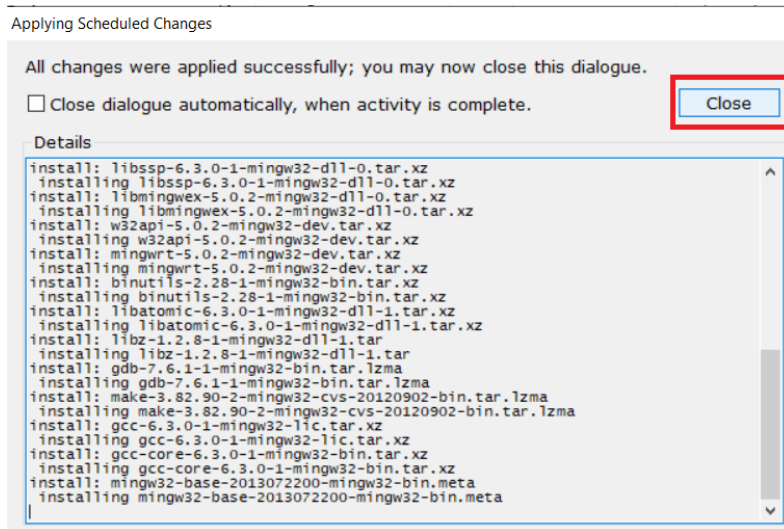
Now we will install the basic GCC Compiler for C by clicking on the **mingwn-base** checkbox and clicking on **mark for installation**. Then click on **installation** and click **Apply Changes**.



Click on **Apply**.

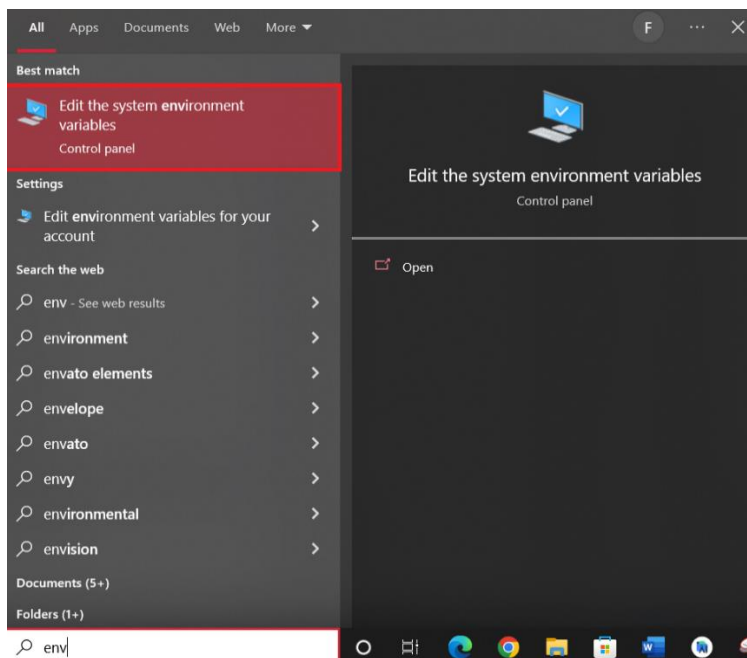


When the installation is complete, click on **Close**.

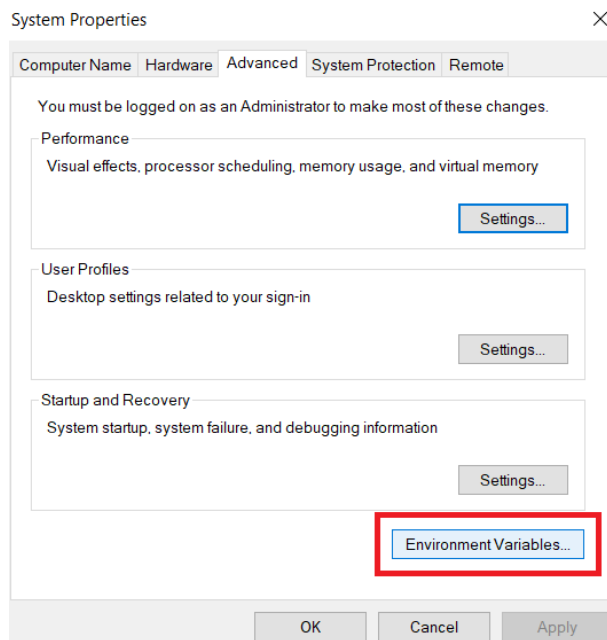


Now we will add the path to MinGW to system environment variables so that we don't have to give the full path to the GCC compiler when we run the compiler from the command prompt. Use the following steps to add the path to MinGW to system environment variables:

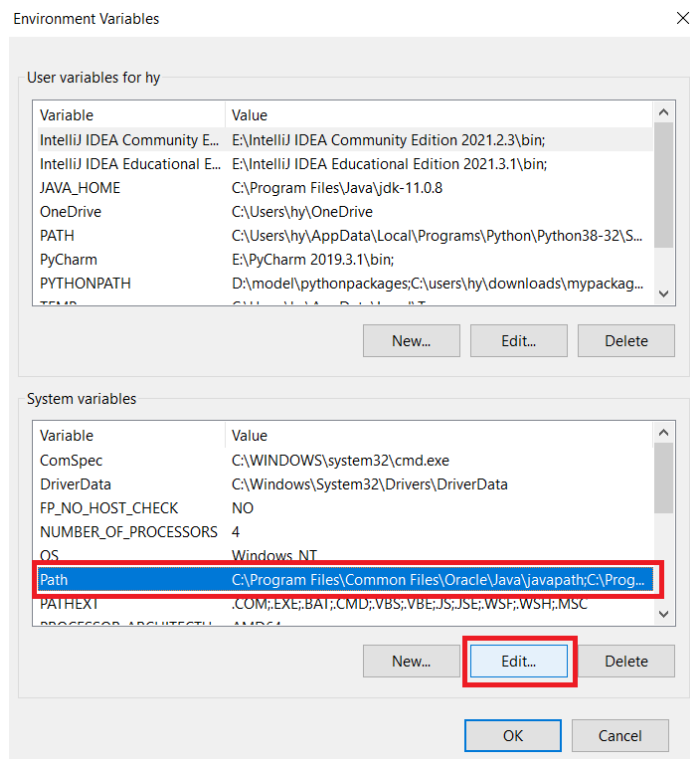
Type **environment variables** in the search bar of Windows and click on **edit the system environment variables**.



Click on the **environment variables**.

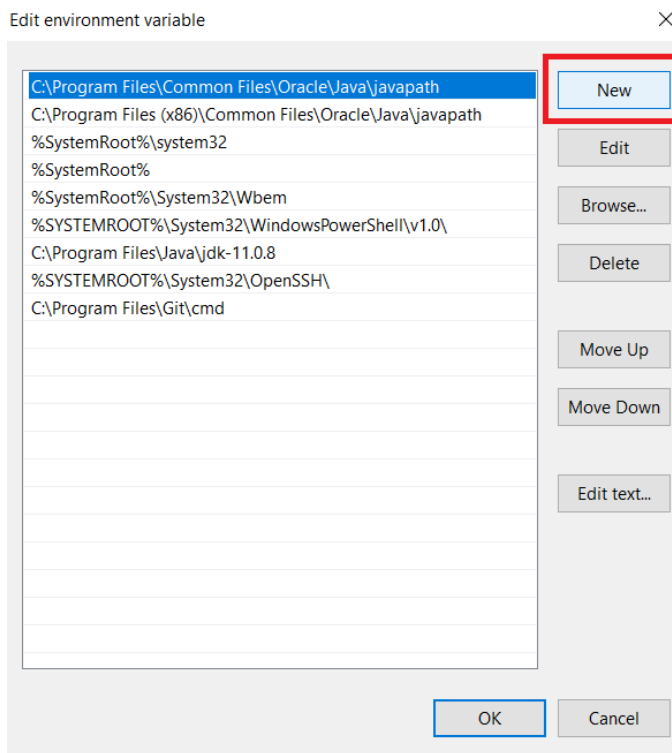


From the **system, variables** click on the **Path** and select **Edit**.

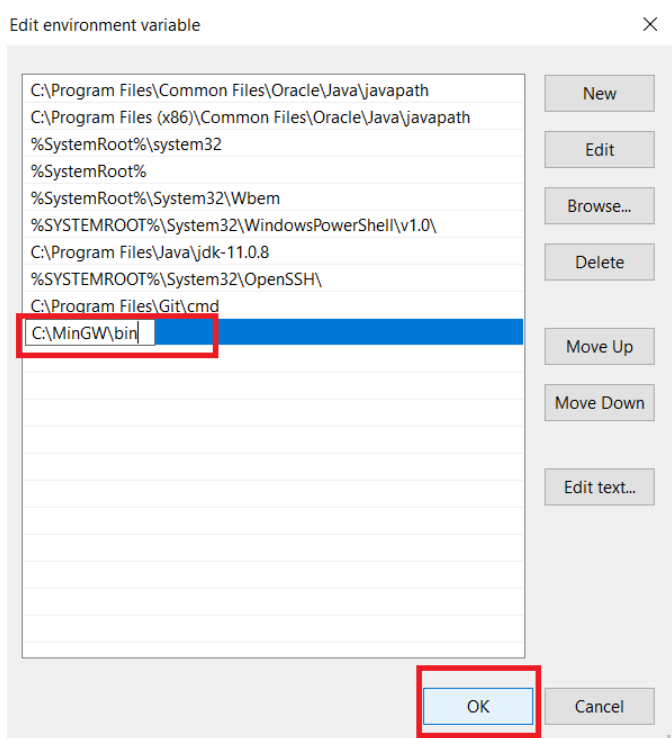




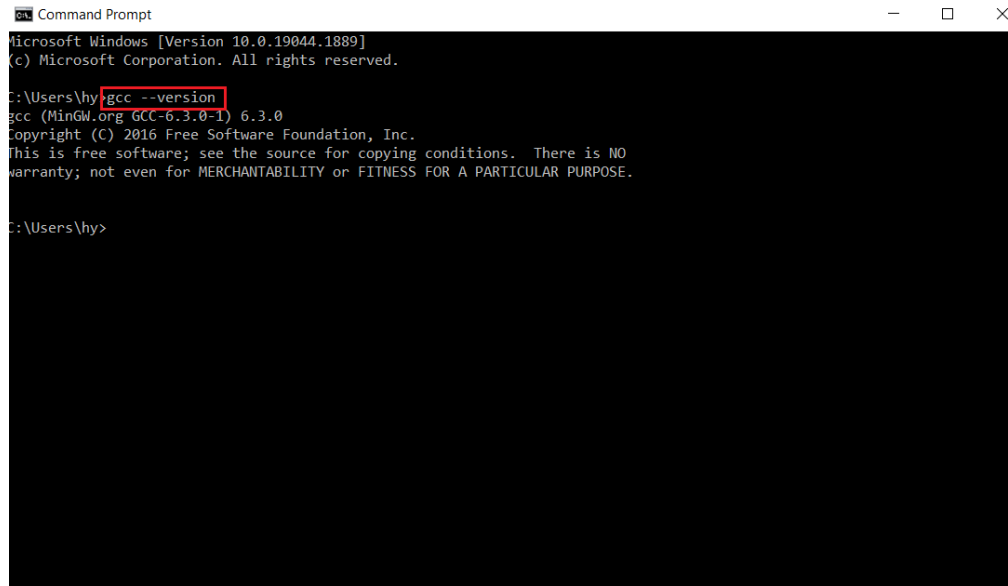
Click on **New** to add a new path.



Paste the path to the **bin folder** where your GCC compiler is located.



Open the command prompt and type **gcc --version** to check if the GCC is successfully installed and working.



```
Command Prompt
Microsoft Windows [Version 10.0.19044.1889]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hy>gcc --version
gcc (MinGW.org GCC-6.3.0-1) 6.3.0
Copyright (C) 2016 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\hy>
```

## Compile and Run your First C program

- Open notepad and paste the following code:

```
#include <stdio.h>

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

- Save your file as **program.c** (or anyname followed by the **.c**).
- Open cmd and go to the directory where your C program is located. In case the program is located on desktop type:

**cd desktop**

- To compile your C program using the GCC compiler type the following command in cmd.

**gcc source\_file\_name.c -o object\_file\_name**

- Where the object file name is the name you wish to name the exe file after compiling your program.
- In our case, we will write:

**gcc program.c -o program**

- This command will compile your program and create an object file (.exe file).
- To run the executable file simply type the name of the object file and hit enter.

```

C:\Users\hy\Desktop>gcc program.c -o program

C:\Users\hy\Desktop>program
Hello, World!
C:\Users\hy\Desktop>

```

## Structure of a Basic C Program

Structure of C Program	
Header	#include <stdio.h>
main()	int main() {
Variable declaration	int a = 10;
Body	printf( "%d ", a );
Return	return 0; }

## The printf() in C

In C programming language, printf() function is **used to print the (“character, string, float, integer, octal and hexadecimal values”)** onto the output screen. It is defined in stdio.h.

Example Code:

```
#include <stdio.h>
int main()
{
    printf("#####\n");
    printf("#\n");
    printf("#\n");
    printf("#####\n");
    printf("#\n");
    printf("#\n");
    printf("#\n");
    return(0);
}
```

Output:

```
#####
#
#
#####
#
#
#
```

## Escape Sequences in C

They are primarily used to put nonprintable characters in character and string literals. For example, you can use escape sequences to put such characters as tab, carriage return, and backspace into an output stream.

Constant	Meaning
\a	Alert
\b	Backspace
\f	Form feed
\n	New line
\r	Carriage Return
\t	Horizontal tab
\v	Vertical tab
\'	Single quote
\"	Double quote
\?	Question mark
\\	Backslash
\0	Null

Escape sequence	Description	Example	Output
\n	New line	<code>printf("Hello \n World");</code>	Hello World
\t	Horizontal tab	<code>printf("Hello \t World");</code>	Hello    World
\'	Single quote	<code>printf("Hello \'World\' ");</code>	Hello 'World'
\"	Double quote	<code>printf("Hello \"World\" ");</code>	Hello "World"
\\	Backslash	<code>printf("Hello \\World");</code>	Hello \World

## **References:**

<https://hackr.io/blog/what-is-programming>

<https://www.futurelearn.com/info/courses/programming-101/0/steps/43783>

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