Programming Fundamentals Lab

Lab # 03

MinGW Installation and Getting Started with Code

Instructor: Fariba Laiq

Email: fariba.laiq@nu.edu.pk

Course Code: CL1002

Semester Fall 2022

Department of Computer Science,

National University of Computer and Emerging Sciences FAST Peshawar Campus

Contents

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:

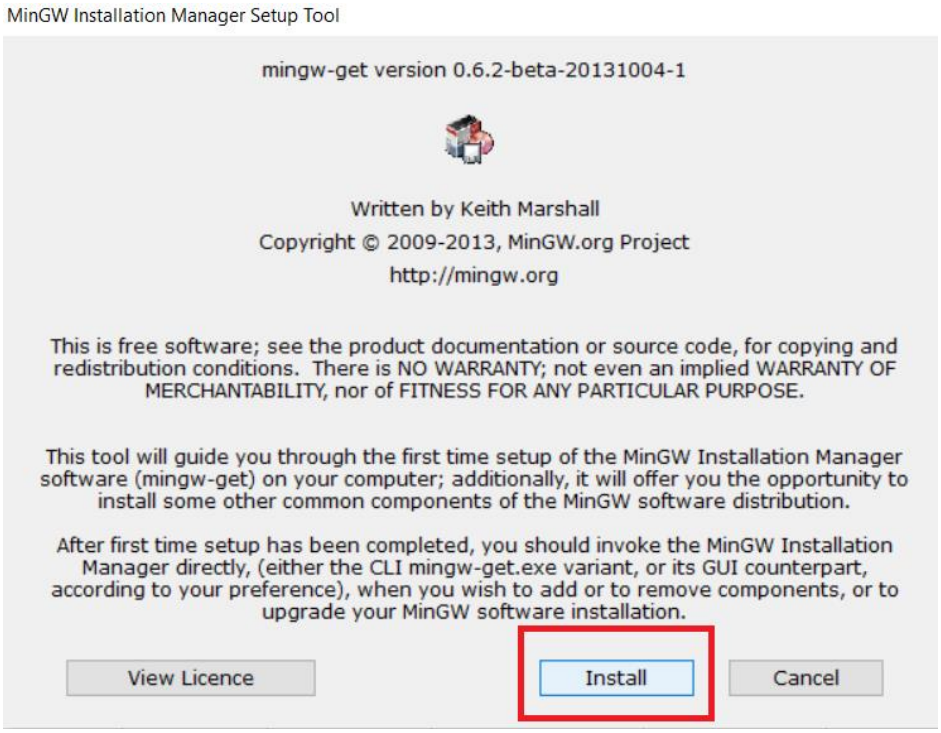
MinGW (Minimalist GNU for Windows) is a software development environment for creating Microsoft Windows applications. It contains everything needed for linking and running your code on windows. MinGW includes a port of the GNU Compiler Collection (GCC), assembler, linker, etc. MinGW is a compiler system 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:

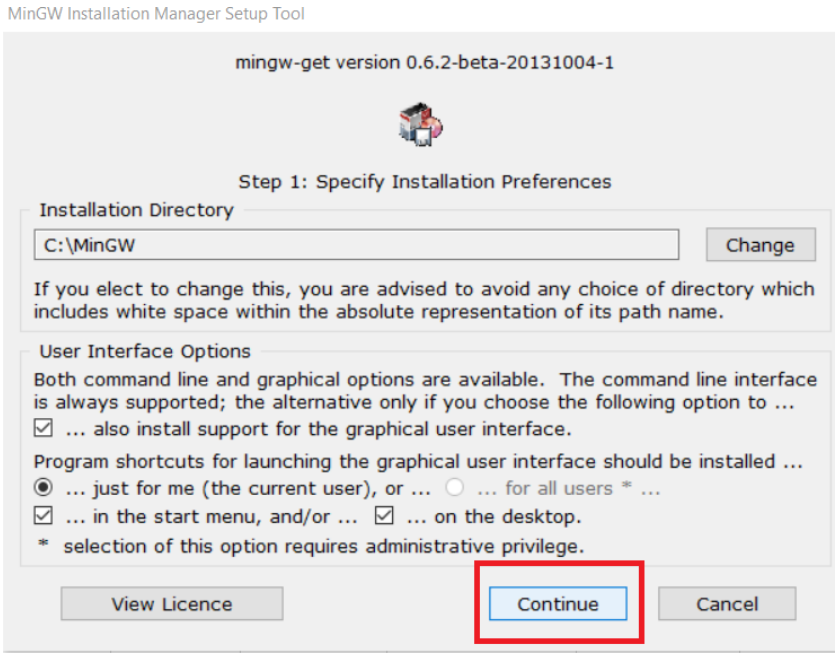
Go to https://sourceforge.net/projects/mingw/

Click on the **Download** Button.

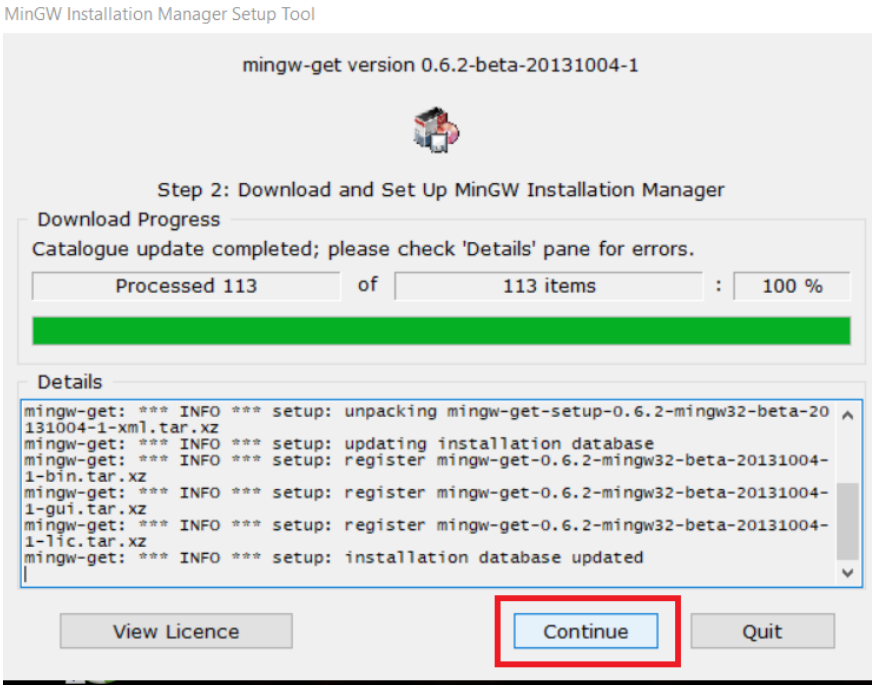
When the download is complete, click the **.exe** file. Then click on **Install**.



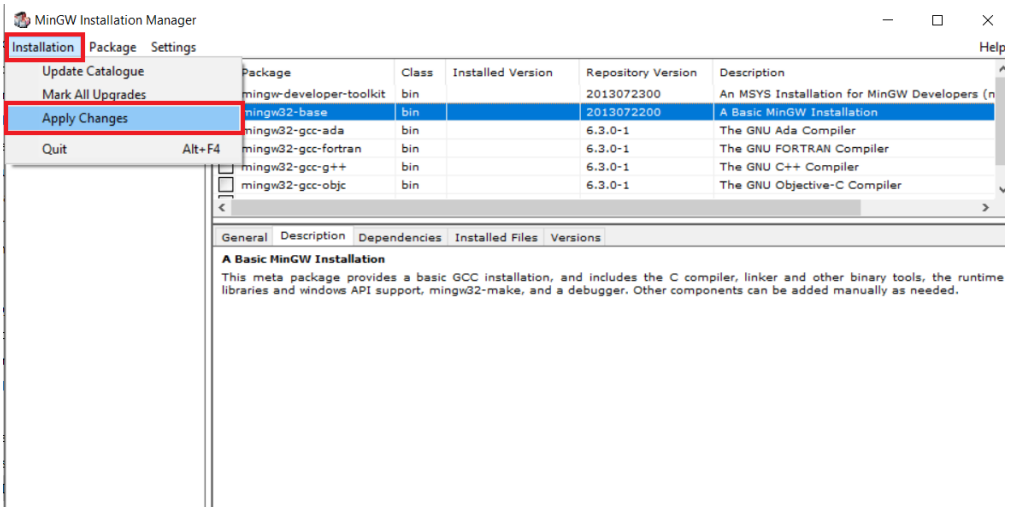
The default installation directory is **C:\MinGW**. You can click on Change to change the installation directory. Then click on **Continue**.



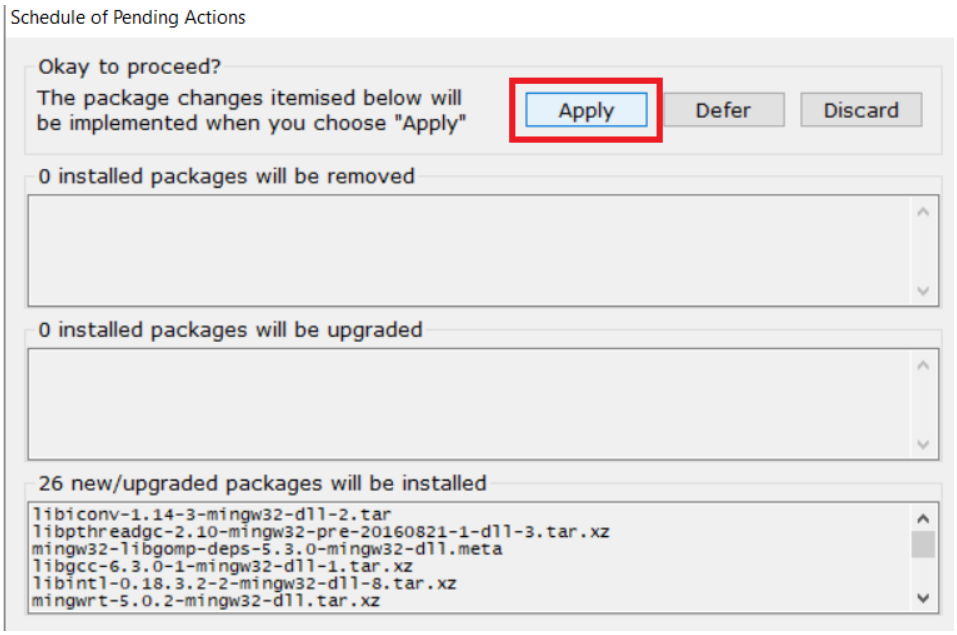
When the MinGW installation is complete, click on **Continue**.



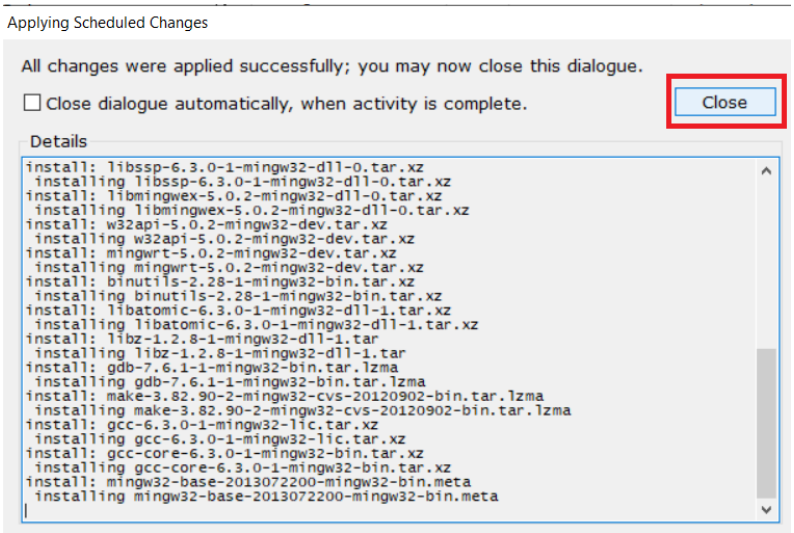
Now we will install the basic GCC Compiler for C by clicking on the **mingwn-base** checkbox and clicking on **mark for installation**. Then click on **installation** and click **Apply Changes**.



Click on **Apply**.

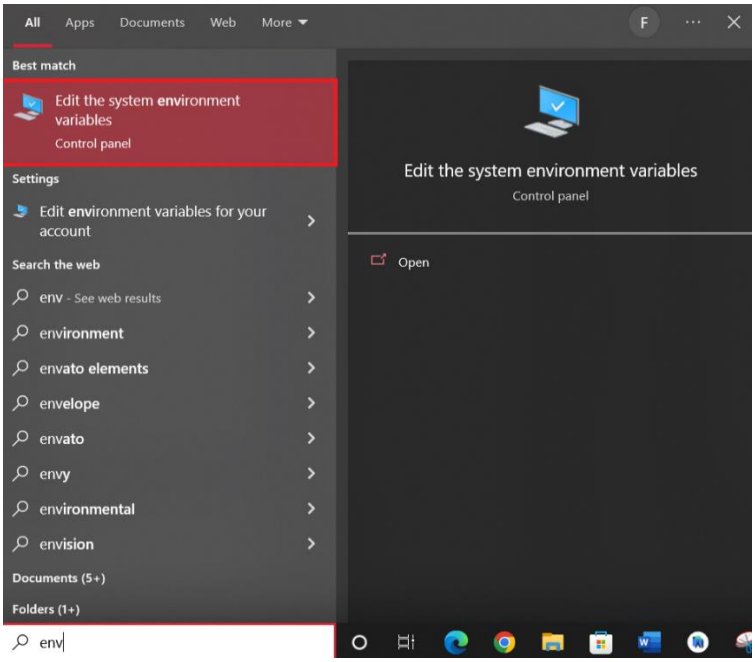


When the installation is complete, click on **Close**.

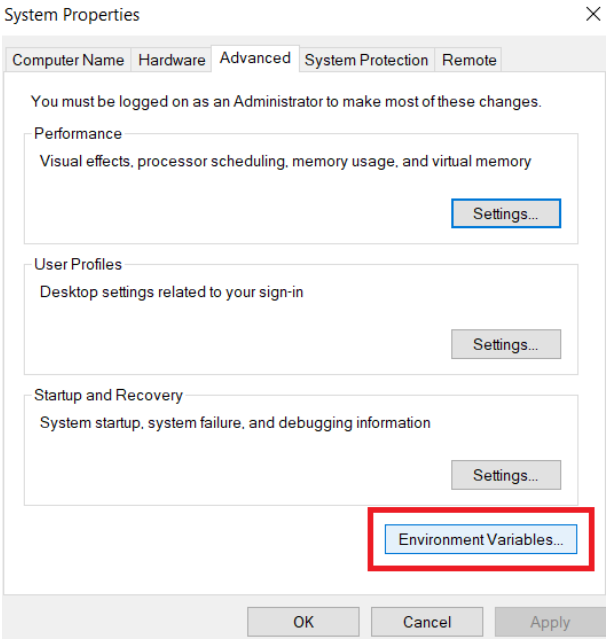


Now we will add the path to MinGW to system environment variables so that we don't have to give the full path to the GCC compiler when we run the compiler from the command prompt. Use the following steps to add the path to MinGW to system environment variables:

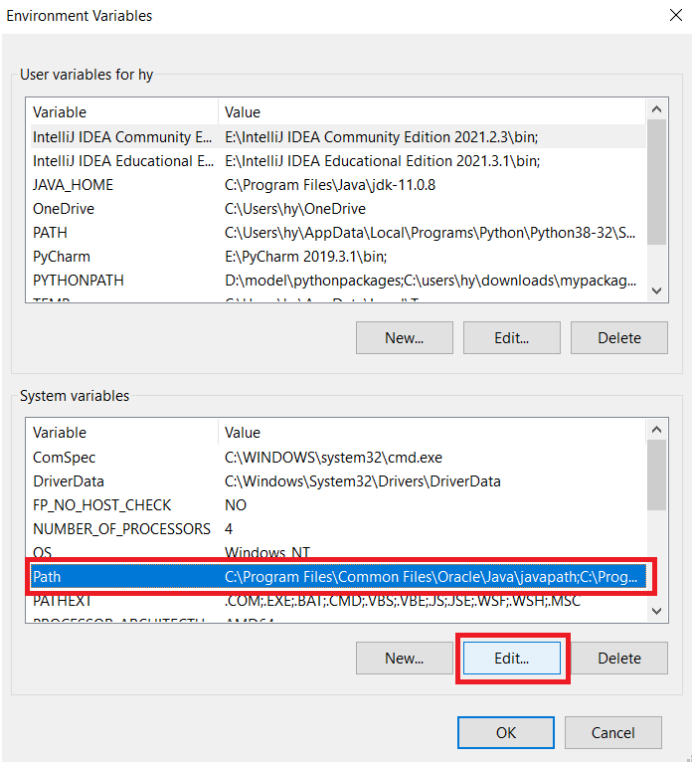
Type **environment variables** in the search bar of Windows and click on **edit the system environment variables**.



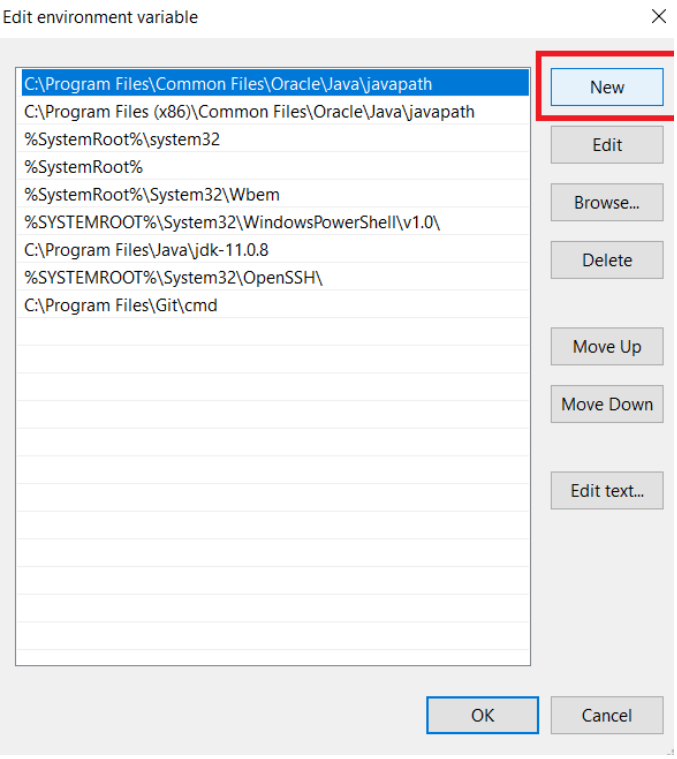
Click on the **environment variables**.



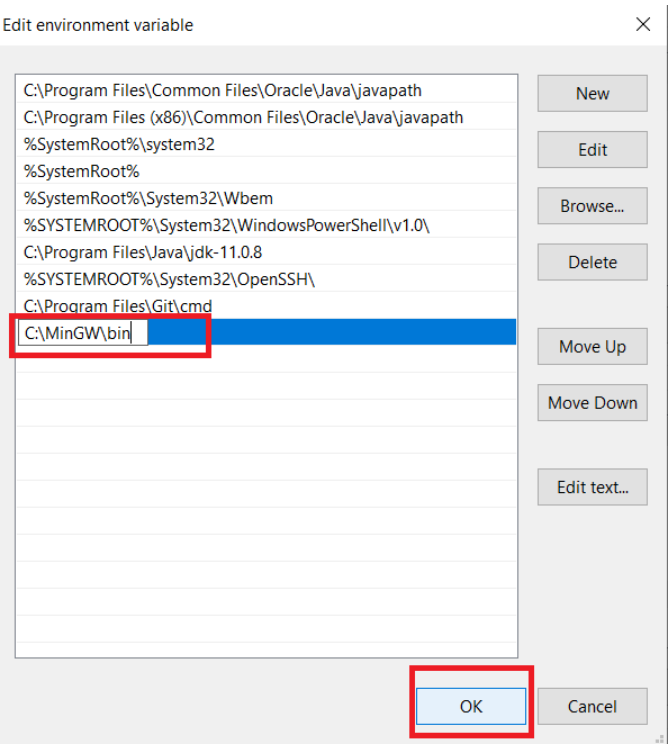
From the **system, variables** click on the **Path** and select **Edit**.



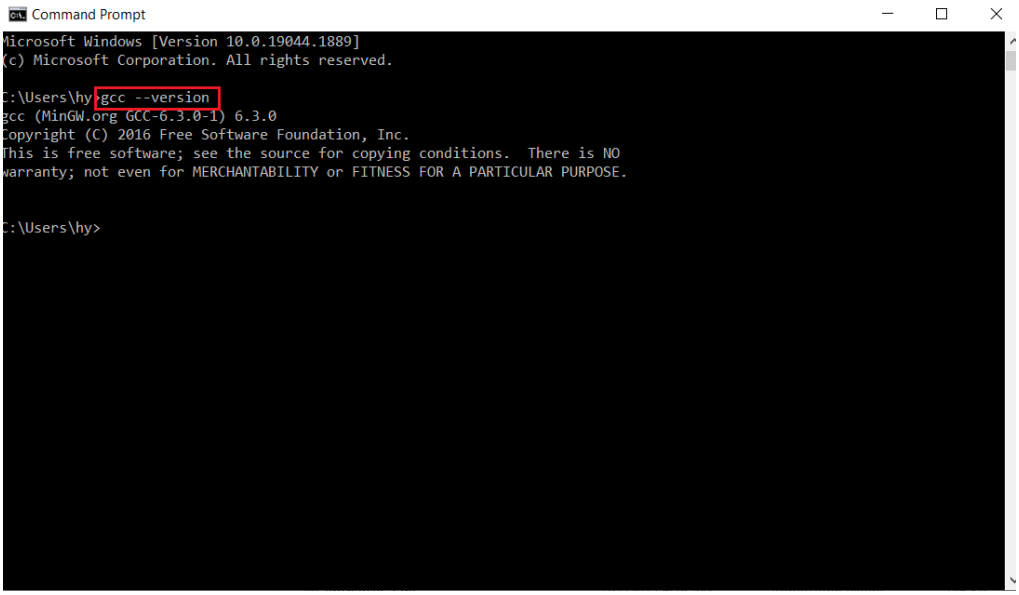
Click on **New** to add a new path.



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.



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

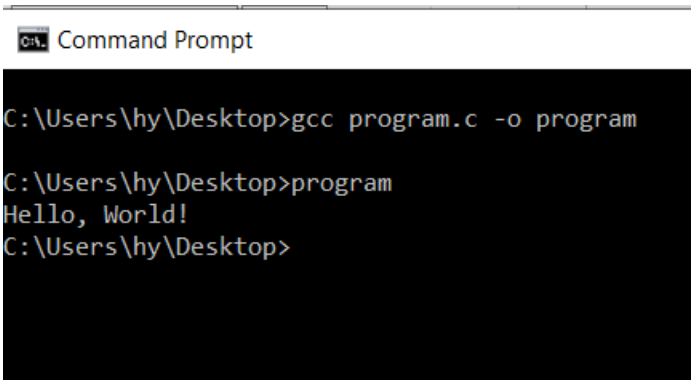
- To compile your C program using the GCC compiler type the following command in cmd.

  gcc source_file_name.c -o object_file_name

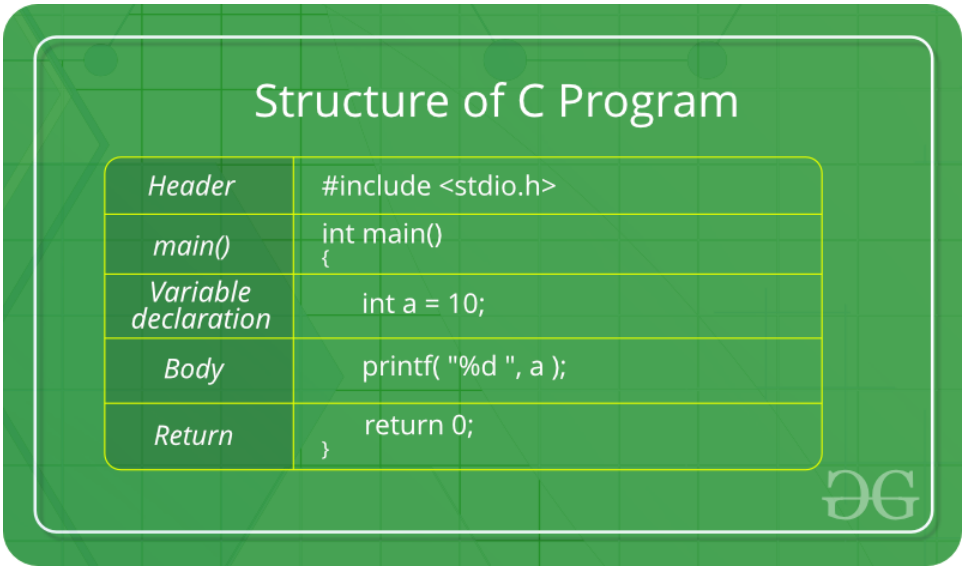
- Where the object file name is the name you wish to name the exe file after compiling your program.
- In our case, we will write:

  gcc program.c -o program

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



Structure of a Basic C Program



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	printf("Hello \n World");	Hello World
\t	Horizontal tab	printf("Hello \t World");	Hello World
\'	Single quote	printf("Hello \'World\' ");	Hello 'World'
\"	Double quote	printf("Hello \"World\" ");	Hello "World"
\\	Backslash	printf("Hello \\World");	Hello \World

References:

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

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

https://www.simplilearn.com/tutorials/c-tutorial/use-of-c-language

https://www.w3schools.com/c/c_intro.php

https://www.wikihow.com/Compile-a-C-Program-Using-the-GNU-Compiler-(GCC)

https://www.geeksforgeeks.org/c-language-set-1-introduction/

https://www.log2base2.com/C/basic/escape-sequence-in-c.html