CL1002 – Programming Fundamentals Lab

Lab # 03

Introduction to C Programming

Instructor: Engr. Muhammad Usman

Email: usman.rafiq@nu.edu.pk

Department of Computer Science,

National University of Computer and Emerging Sciences FAST Peshawar

Programming

Programming is the process of creating a set of instructions that tell a computer how to perform a task.

Introducing C

C is a general-purpose programming language developed in 1972 by Dennis Ritchie.
C has been used to write everything from operating systems (including Windows and many others) to complex programs like the Python interpreter, Git, Oracle database, and more.
C programming is considered as the base for other programming languages, most of the compilers, Kernels, etc. are written in C language, and most of the programming languages follow C syntax, for example, C++, Java, C#, etc. That is why it is known as mother language.

GCC

GCC is a Linux-based C compiler released by the Free Software Foundation which is usually operated via the command line. It often comes distributed freely with a Linux installation, so if you are running UNIX or a Linux variant you will probably have it on your system. You can invoke GCC on a source code file simply by typing:-
gcc filename
The default executable output of GCC is "a.out", which can be run by typing
“ ./a.out ”. It is also possible to specify a name for the executable file at the
command line by using the syntax “ -o outputfile” , as shown in the following
example : -
gcc filename -o outputfile
Again, you can run your program with "./outputfile". (The ./ is there to ensure
you run the program for the current working directory.)

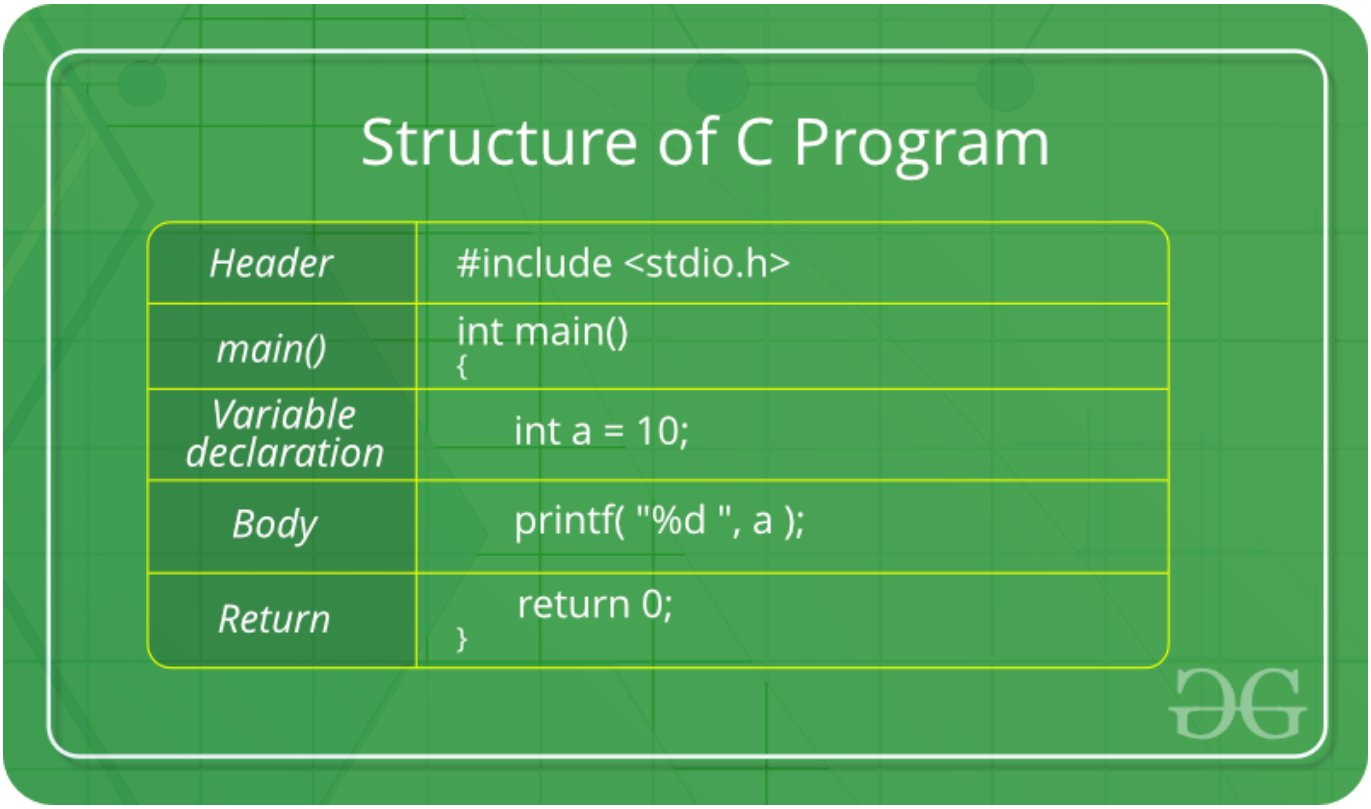
Beginning with C programming:

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

Structure of a C program

We can formally assess the structure of a C program. By structure, it is meant that any program can be written in this structure only. Writing a C program in any other structure will hence lead to a Compilation Error.

The structure of a C program is as follows:



The components of the above structure are:

#include <stdio.h> includes the standard input output library functions. The printf() function is defined in stdio.h .

int main() The main() function is the entry point of every program in c language.

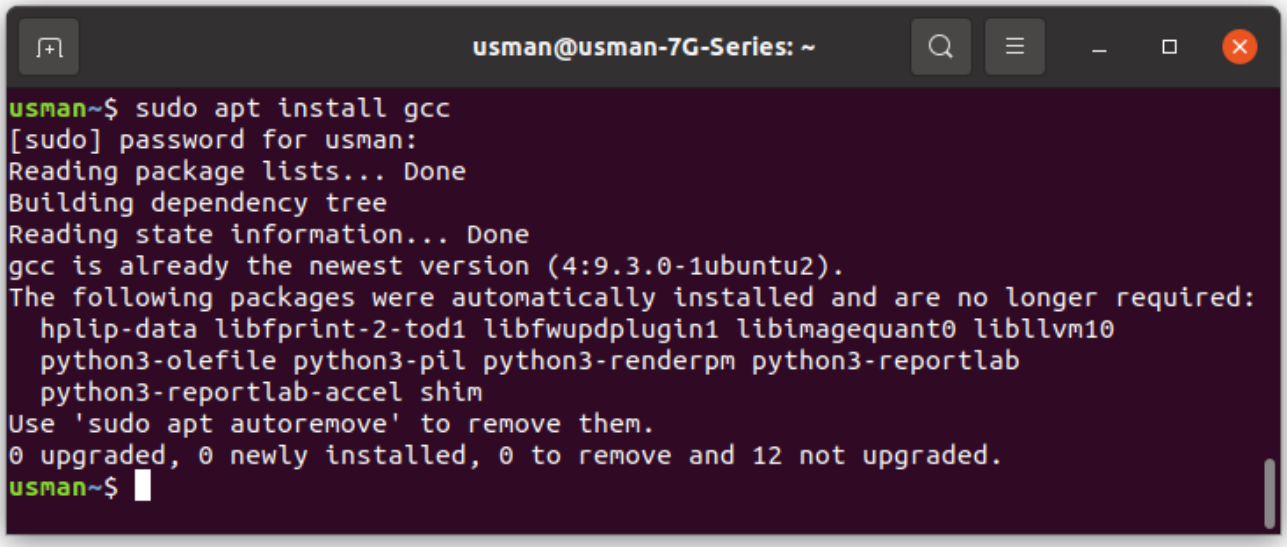
printf() The printf() function is used to print data on the console.

return 0 The return 0 statement, returns execution status to the OS. The 0 value is used for successful execution.

Task: A Simple First Program

You need to perform the following to complete the task.

1. Open the Terminal (Ctrl + Alt + t)
2. Installation gcc



Note: gcc is already installed on lab PCs

3. Create file of .c file extension using touch command

   ~$ **touch helloworld.c**

4. Now open the text editor using gedit command

   ~$ gedit helloworld.c

5. Write the following code in helloworld.c file.

```c
#include <stdio.h>
int main()
{
    printf("Hello World");
    return 0;
}
```

6. Save and close the file.

7. compile and execute it

```
~$ gcc helloworld.c -o  helloworld.out
~$./helloworld.out
```

printf() and scanf() in C

The printf() and scanf() functions are used for input and output in C language. Both functions are inbuilt library functions, defined in stdio.h (header file).

printf() function

The printf() function is used for output. It prints the given statement to the console.
The syntax of printf() function is given below:

```
printf("format string",argument_list);
```

The format string can be %d (integer), %c (character), %s (string), %f (float) etc.

---

scanf() function

The scanf() function is used for input. It reads the input data from the console.

```
scanf("format string",argument_list);
```

Variables in C

- A named memory location where data is stored is called variable.
- A quantity whose value may change during execution of the program is called variable. It is represented by a symbol or name.
- Variable is name of reserved area allocated in memory. In other words, it is a name of memory location.
- It is a combination of "vary + able" that means its value can be changed.
  int data=10 // Here data is variable

Let's see the syntax to declare a variable:

type variable_list;

The example of declaring the variable is given below:

```
int a;
float b;
char c;
```

Here, a, b, c are variables. The int, float, char are the data types.

We can also provide values while declaring the variables as given below:

```
int a=10,b=20;     //declaring 2 variable of integer type
float f=20.8;
char c='A';
```

Rules for defining variables

- A variable can have alphabets, digits, and underscore.
- A variable name can start with the alphabet, and underscore only. It can't start with a digit.
- No whitespace is allowed within the variable name.
- A variable name must not be any reserved word or keyword, e.g. int, float, etc.

Valid variable names:

```
int a;
int _ab;
int a30;
```

Invalid variable names:

```
int 2;
```

```c
int a b;

int long;
```

Program to print cube of given number

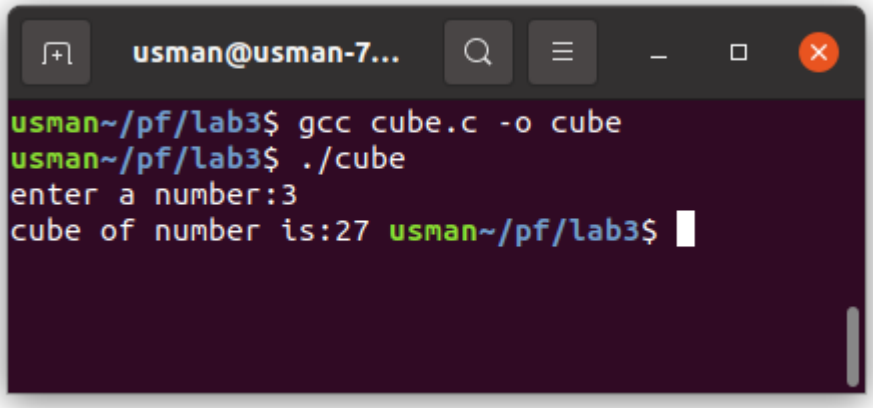
Let's see a simple example of c language that gets input from the user and prints the cube of the given number.

```c
#include<stdio.h>
int main(){

 int number;
 printf("enter a number:");
 scanf("%d",&number);
 printf("cube of number is:%d ",number*number*number);

 return 0;
}
```

Output



The **scanf("%d",&number)** statement reads integer number from the console and stores the given value in number variable.

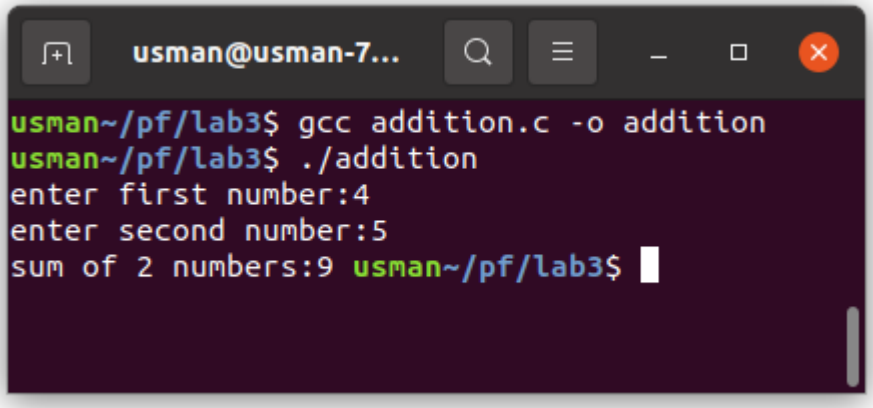
The **printf("cube of number is:%d ",number*number*number)** statement prints the cube of number on the console.

Program to print sum of 2 numbers

Let's see a simple example of input and output in C language that prints addition of 2 numbers.

```
1 #include<stdio.h>
2 int main(){
3
4 int x=0,y=0,result=0;
5
6 printf("enter first number:");
7 scanf("%d",&x);
8 printf("enter second number:");
9 scanf("%d",&y);
10
11 result=x+y;
12 printf("sum of 2 numbers:%d ",result);
13
14 return 0;
15 }
```

Output



Exercises:

1. Design flow chart to find the difference between two numbers.
2. Write a C program to find the difference between the two numbers.
3. Design flow chart to find the sum and average of three numbers.
4. Write a C program to find the sum and average of three numbers.

References

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

https://www.javatpoint.com/first-c-program