Programming Fundamentals- I

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Administrative Stuff

- **Assignment No. 02** has been posted on PIAZZA:

PF-I Basic Concepts

Link:https://piazza.com/uol.edu.pk/fall2016/cs1012/resources

- Required Reading to understand Assignment No. 02:

  C++ How to Program, Deitel & Deitel (Chapter # 1 & 2)

  Thinking in C++, Bruce Eckel (Chapter # 2 & 3, Appendices: A & B)

Difference between Memory and Storage

Memory Vs Storage

- **Storage** device keeps the data for long times, the data is not lost when the storage device or computer is off.
- **Memory** holds data for short intervals and this data is lost if the computer is turned off.
- Storage devices are much slower than computer memory.
- To clarify the difference consider storage devices as **file cabinets** (common in offices) and memory as **work desk** (table usually).

Debugger

- A **debugger** is a software program used to test and find **bugs (errors)** in other programs.
- It helps the programmer to understand and trace program errors more easily.

Anatomy of a C++ Program

```
#include <iostream>
using namespace std;
int main( )
{
    int x, y, z;
    x = 5;
    y = 7;
    z = x + y;
    cout << z;
    getch();
    return 0;
}
```

//Anatomy of a C++ Program

Lines that begin with a # in column 1 are called **preprocessor directives (commands)**.

- When we write our programs, including libraries of functions help us that we do not have to write the same code over and over.
- Example: the **#include <iostream>** directive causes the preprocessor to include a copy of the standard input/output header file **iostream** at this point in the code.
- Some of the functions are very complex and long. Not having to write them ourselves make it easier and faster to write programs.

Preprocessor Directives

#include <iostream>

#include <stdlib.h>

#include <string.h>

- Lines that begin with a # in column 1 are called **preprocessor directives(commands)**.
- To access the functions which are stored in the library, it is necessary to tell the compiler, about the file to be accessed.
- These files contain information about some library functions used in the program:

Preprocessor Directives

- **#include** Directive provides instructions to the compiler to link (link section) function from the system library.
- The **#include** directives “paste” the contents of the files, e.g., iostream, stdlib.h and string.h into your source code, at the every place where the directives appear.
- Syntax:-

  #include<string.h>

  string.h is header file.

Preprocessor Directives

- **iostream** stands for **“standard I/O”, stdlib** stands for **“standard library”,** and **string.h** includes useful **string manipulation functions**.
- #include<iostream> header file is included because it contains information about the **cout/cin** that is used in this program.
- This header file was included because it contains information about the **cout** that is used in this program.
- **cout** saves you from the complexity of writing your own function of how to display text on the computer screen.
- Hence you are more productive with the actual program rather than worrying about such issues.

```
#include <iostream>
using namespace std;
int main( )
{
    int x, y, z;
    x = 5;
    y = 7;
    z = x + y;
    cout << z;
    getch();
    return 0;
}
```

//Anatomy of a C++ Program

Lines that begin with a # in column 1 are called **preprocessor directives (commands)**.

Main function

```
int main ( )
{
    statement(s)
    return 0;
}
```

The main() function

- Every ‘C++’ program must have one **main()** function section.
- **main()** is always the first function called in a program execution.
- Every program must have a **function** called **main**. This is where program execution begins.

The main() function

```
int main(void)
{ …
}
```

- The parentheses following the reserved word “main” indicate that it is a function.
- **void** indicates that the function takes no arguments
- The **reserved word** “int” indicates that main() **returns** an integer value.

Main() function section

- **“main”** function basically serves as the entry point of the core program.
- It contains two parts

1) Declaration part:

It declares all variables used in the executable part.

2) Executable part:

It has atleast one statement.

The Function Body

- A left brace **{** --begins the **body** of every function. A corresponding right brace -- **}** -- ends the function body.

return 0 ;

- Because function main() returns an integer value, there must be a statement that indicates what this value is.
- The statement

return 0 ;

indicates that main() returns a value of zero to the operating system.

- A value of 0 indicates that the program execution terminated successfully.

Some programmer jargon

Some words that will be used a lot:

- **Source code:** The stuff you type into the computer. The program you are writing. Code is known as **source code**.
- A file containing source code is called a **source file**.
- **Compile (build):** Taking source code and making a program that the computer can understand.
- **Executable:** The compiled program that the computer can run.
- **Library:** Added functions for C++ programming which are bolted on to do certain tasks.
- **Header file:** Files ending in .h which are included at the start of source code.

Program Header Comment

- We can use **//** for a single line comment.
- We can use **/* */** for single line as well as multiline comments.
- These are called **comment delimiters**

Compilation

- Performed by a program called the **compiler**
- Translates the preprocessor-modified source code into **object code (machine code)**
- Checks for **syntax errors** and **warnings**
- Saves the **object code** to a disk file, if instructed to do so (we will not do this).
  - If any compiler errors are received, no object code file will be generated.
  - An object code file will be generated if only warnings, not errors, are received.