LAB NO. 12

HEADER FILES IN C++

Lab Objectives

Following are the lab objectives:

1. Header files in C++

Instructions

- This is individual Lab work/task.
- Complete this lab work within lab timing.
- Discussion with peers is not allowed.
- Copy paste from Internet will give you **negative marks**.
- Lab work is divided into small tasks, complete all tasks sequentially.

Header files in C++

C++ offers its users a variety of functions, one of which is included in header files. In C++, all the header files may or may not end with the “.h” extension but in C, all the header files must necessarily end with the “.h” extension.

A header file contains:

- Function definitions
- Data type definitions

It offers the above features by importing them into the program with the help of a preprocessor directive “#include”. These preprocessor directives are used for instructing compiler that these files need to be processed before compilation.

In C++ program has the header file which stands for input and output stream used to take input with the help of “cin” and “cout” respectively.

There are of 2 types of header file:

- **Pre-existing header files:** Files which are already available in C/C++ compiler we just need to import them.
- **User-defined header files:** These files are defined by the user and can be imported using “#include”.

Syntax:

#include <filename.h>

or

#include "filename.h"

We can include header files in our program by using one of the above two syntax whether it is pre-defined or user-defined header file. The “#include” preprocessor is responsible for directing the compiler that the header file needs to be processed before compilation and includes all the necessary data type and function definitions.

Note: We can’t include the same header file twice in any program.

Create your own Header File:

Instead of writing a large and complex code, we can create your own header files and include them in our program to use it whenever we want. It enhances code functionality and readability. Below are the steps to create our own header file:

Example 1

1. Write your own C/C++ code and save that file with “.h” extension. Below is the illustration of header file:

```
// Function to find the sum of two
// numbers passed
int sumOfTwoNumbers(int a, int b)
{
    return (a + b);
}
```

2. Include your header file with “#include” in your C/C++ program as shown below:

```
// C++ program to find the sum of two
// numbers using function declared in
// header file
#include "iostream"
// Including header file
#include "sum.h"
using namespace std;
// Driver Code
int main()
{
    // Given two numbers
    int a = 13, b = 22;
    // Function declared in header
    // file to find the sum
    cout << "Sum is: "
         << sumOfTwoNumbers(a, b)
         << endl;
}
```

Output

```
Sum is: 35
```

Example 2

For our Rectangle class, the header file looks like this:

```
// Rectangle.p
class Rectangle
{
private:
   int height;
   int width;
public:
   Rectangle();
   Rectangle(int w, int h);
   void setWidth(int);
   int getWidth();
   void setHeight(int);
   int getHeight();
   int area();
};
```

The implementation file looks like this:

```
// Rectangle.cpp
#include "Rectangle.hpp"
// default constructor
Rectangle::Rectangle()
{
   width = 0;
   height = 0;
}
// constructor that takes arguments for width and height
Rectangle::Rectangle(int w, int h)
{
   width = w;
   height = h;
}
void Rectangle::setWidth(int w)
{
   width = w;
}
int Rectangle::getWidth()
{
   return width;
}
void Rectangle::setHeight(int h)
{
   height = h;
}
int Rectangle::getHeight()
{
   return height;
}
int Rectangle::area()
{
   return width * height;
}
```

Using your class in main and other classes

In any file where you want to use your class, just include its header file.If you use your class in the main C++ file, you would include your header in the .cpp file for main.

```
// main.cpp
#include "Rectangle.h"
int main()
{
  Rectangle rec;
Rectangle rec(5,6);
        cout << rec.area();
        int n1 = 10, n2=10;
        rec.setHeight(n1);
        rec.setWidth(n2);
        cout << rec.area();
}
```

Lab Tasks

Lab Tasks

Q1). Write a C++ program to create student class (in header file as .h) that contains attributes of the student name, roll no, and total-marks. Write two functions to get and display these attributes.

Q2). Write a C++ program to create a class name as arithmetic_operations (in header file as .h) with two attributes (number 1 and number 2). Write four functions addition, subtraction, multiplication and division. Program menu should be user friendly.

Home Activity

Q3). Create a class named “Student” (in header file as .h) with a string variable “name” and an integer variable “roll_no”. Assign the value of roll_no as “101” and that of name as "Ali" by creating an object of the class Student.

Q4). Write a C++ program to print the area of a rectangle by creating a class named 'Area' (in header file as .h) having two functions. First function named as “Set_Dim” takes the length and breadth of the rectangle as parameters and the second function named as 'Get_Area' returns the area of the rectangle. Length and breadth of the rectangle are entered through user.