National University of computer and emerging sciences

Department of Computer Science

CL1002-Programming Fundamentals– FALL 2023

LAB 03

BASIC PROGRAM WRITING IN C++

Learning Outcomes

In this lab you are expected to learn the following:

- C++ Program Execution Workflow
- Stream insertion
- Escape Sequence

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C++ Program Execution Workflow

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

   sudo apt install g++

   Note: g++ is already install on lab PCs
3. Create file of .cpp file extension using touch command

   touch helloworld.cpp

4. Now open the text editor using gedit command

   gedit helloworld.cpp

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

```cpp
#include <iostream>
using namespace std;

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

6. Save and close the file.

7. compile and execute it

$ g++ -o hello helloworld.cpp

$ ./hello

Stream insertion operator

Standard Output with cout in C++

In C++, cout is a stream object primarily used for sending output to the standard output, which is usually the screen. It's commonly employed for displaying text, variables, and other data to the user or developer during program execution. For formatted output operations, cout is combined with the insertion operator << (two "less than" signs).

```
cout << "Output sentence"; // prints Output sentence on screen
cout << 120;               // prints number 120 on screen
cout << x;                 // prints the value of x on screen
```

Escape Sequences

Escape sequences are combinations of characters that begin with a backslash (`\`) followed by a letter or digits. They are used to represent special characters that can't be directly typed or displayed. These sequences help format output and insert characters like newlines, tabs, and quotes into strings and character constants.

Common Escape Sequences:

- `\n`: Newline
- `\t`: Horizontal Tab
- `\\`: Backslash
- `\'`: Single Quote
- `\"`: Double Quote

Usage Example:

To insert a new line, you can use the `\n` escape sequence. For example:

cout << "Hello, World!\nThis is a new line.";

This produces the following output:

Hello, World!

This is a new line.

Alternatively, you can use the `endl` manipulator to achieve the same effect:

cout << "Hello, World!" << endl << "This is a new line.";

This achieves the same output as the previous example.

Escape sequences are used to represent special characters within strings and character constants. They are essential for formatting output and adding characters that can't be directly entered using the keyboard.

Detailed Example

Here's a C++ program that demonstrates the use of the horizontal tab escape sequence `\t` and multiple insertion operations (`<<`) for formatting output:

```
#include <iostream>

Using namespace std;

int main() {

        cout << "Name\t\tAge\tCity\n"; // Using \t for tabs

        cout << "John\t\t25\tNew York\n";

        cout << "Alice\t\t22\tLos Angeles\n";

        cout << "Bob\t\t30\tChicago\n";

        return 0;

}
```

In this program, the horizontal tab `\t` escape sequence is used to align the columns in the output. The program uses multiple insertion operations (`<<`) to format and display the names, ages, and cities of individuals in a tabular form.

When you run the program, it will display:

```
Name        Age   City

John        25    New York

Alice       22    Los Angeles

Bob         30    Chicago
```

Here, the `\t` escape sequence ensures that the text in each column is aligned by introducing appropriate tabs to separate the values. This showcases the formatting capability of C++ output streams using escape sequences and insertion operations.

Tasks

Task 1:

create a program that displays the following information:

Your first name.

Your last name .

The last 4 digits of your roll number.

Your CGPA.

Your program should display it in a formatted manner.

Expected Output:

Student Information:

Name: John Doe

Roll Number: ****1234

CGPA: 3.75

Task 2:

Write a program that prints the following 3 shapes separately using COUT statement:

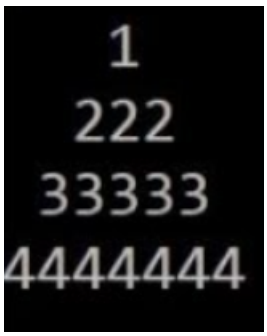
Task 3:

Write a program that prints your first name (i.e. Hassan) using cout with * and space characters.

Expected Output:

Task 4:

Write a program to print the following using just COUT statement.



Tasks Submission Instructions

Submission Instructions:

1. Save all .cpp files with your task number

   e.g. Task01.cpp

2. Now create a new folder with name ROLLNO_LAB03 e.g. i22-XXXX-LAB03
3. Move all your .cpp files to this newly created directory and compress it into .zip file.
4. Now you must submit this zipped file on Google Classroom.
5. If you don't follow the submission format marks will be deducted.

No late submissions will be accepted.

Plagiarism will get zero marks in all lab tasks