EXPERIMENT NO 5

For Loop in C++

Objectives:

- Learn the syntax of for loop and how & when to use it in C++

Equipment required:

- Dev-C++/Eclipse/Visual Studio installed in PC/Windows

DISCUSSION

1. Pre-Lab

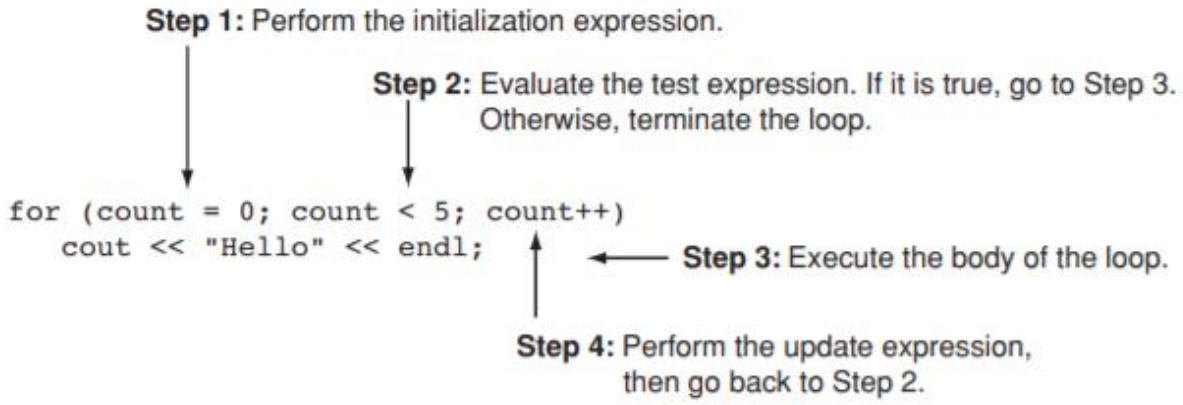
For Loop

A for loop is a repetitive control structure that allows you to efficiently write a loop that needs to execute a specific number of times.

Syntax

```
for (initialize loop variables; loop terminator;
loop variable update)
{
  Statements in the block or one statement
}
```

Explanation



Example

```
int main (){

const int MIN_NUMBER = 1,   // Starting value
          MAX_NUMBER = 10;  // Ending value
int num;

cout << "Number Number Squared\n";
cout << "-----------------------\n";

for (num = MIN_NUMBER; num <= MAX_NUMBER; num++)
    cout << num << "\t\t" << (num * num) << endl;

return 0;

}
```

Output:

```
Number  Number Squared
---------------------
1               1
2               4
3               9
4               16
5               25
6               36
7               49
8               64
9               81
10              100
```

Other Forms of the Update Expression

You are not limited to using increment statements in the update expression. Here is a loop that displays all the even numbers from 2 through 100 by adding 2 to its counter:

```
for (num = 2; num <= 100; num += 2)
   cout << num << endl;
```

And here is a loop that counts backward from 10 down to 0:

```
for (num = 10; num >= 0; num--)
   cout << num << endl;
```

Defining a Variable in the for-Loop's Initialization Expression

Not only may the counter variable be initialized in the initialization expression, but it may be defined there as well. The following code shows an example.

```
for (int num = MIN_NUMBER; num <= MAX_NUMBER; num++)
   cout << num << "\t\t" << (num * num) << endl;
```

Using Multiple Statements in the Initialization and Update Expressions

It is possible to execute more than one statement in the initialization expression and the update expression. When using multiple statements in either of these expressions, simply separate the statements with commas. For example

```
int x, y;
for (x = 1, y = 1; x <= 5; x++)
{
    cout << x << " plus " << y
         << " equals " << (x + y)
         << endl;
}
```

Omitting the for-Loop's Expressions

The initialization expression may be omitted from inside the for-loop's parentheses if it has already been performed or no initialization is needed. Here is an example.

```
int num = 1;
for ( ; num <= maxValue; num++)
   cout << num << "\t\t" << (num * num) << endl;
```

Nested Loops

A loop that is inside another loop is called a nested loop. A clock is a good example of something that works like a nested loop. The second hand, minute hand, and hour hand all spin around the face of the clock. Each time the hour hand increments, the minute hand increments 60 times. Each time the minute hand increments, the second-hand increments 60 times. Here is a program segment with a for loop that partially simulates a digital clock. It displays the seconds from 0 to 59:

Example

```
for (int hours = 0; hours < 24; hours++)
{
    for (int minutes = 0; minutes < 60; minutes++)
    {
        for (int seconds = 0; seconds < 60; seconds++)
        {
            cout << setw(2) << hours << ":";
            cout << setw(2) << minutes << ":";
            cout << setw(2) << seconds << endl;
        }
    }
}
```

Output:

```
00:00:00
00:00:01
00:00:02
   .
   .
   .
23:59:59
```

(The program will count through each second of 24 hours.)

2. Post-Lab (Lab Tasks)

1. Write a program to print a table of any number using for loop (Take input from user).
2. Write a program that takes the power of a number using for loop.
   Example Output:
   Enter number: 3
   Enter power: 4
   3^4 = 81

   Note: use for loop not pow(x,y) function

3. Write a program which prints the numbers from 1 to 40 (10 numbers in one line, total 4 lines). But multiples of 4 should be replaced with your first name, multiples of 5 should be replaced with your GPA and multiples of both 4 and 5 should be replaced with your roll number? **USING ONLY ONE FOR LOOP**

4. Write a program that finds a factorial of a number entered by the user using for loop.

END