



College of Electrical & Mechanical Engineering, NUST



Department of Mechanical Engineering

## CS-114 - Fundamental of Programing

### Lab Manual # 07

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**DATE:**

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## **Lab Manual # 07** **Repetition structures (I)**

### **Objective:**

To understand repetition structure and the types of repetition structure.

### **Description:**

Repetition structures, or loops, are used when a program needs to repeatedly process one or more instructions until some condition is met, at which time the loop ends.

Two types of repetition structures 1) Pretest and 2) posttest loops.

#### Pretest:

1. Loop condition appears at beginning of pretest loop
2. Determines number of times instructions w/in loop body are processed

#### Types of pretest loop:

1. while
2. for

#### Posttest:

1. Loop condition appears at end of posttest loop
2. Determines number of times instructions w/in loop body are processed
3. HOWEVER, instructions processed at least once--the first time!

#### Types of posttest loop:

1. do...while Loop

### **For Loop**

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

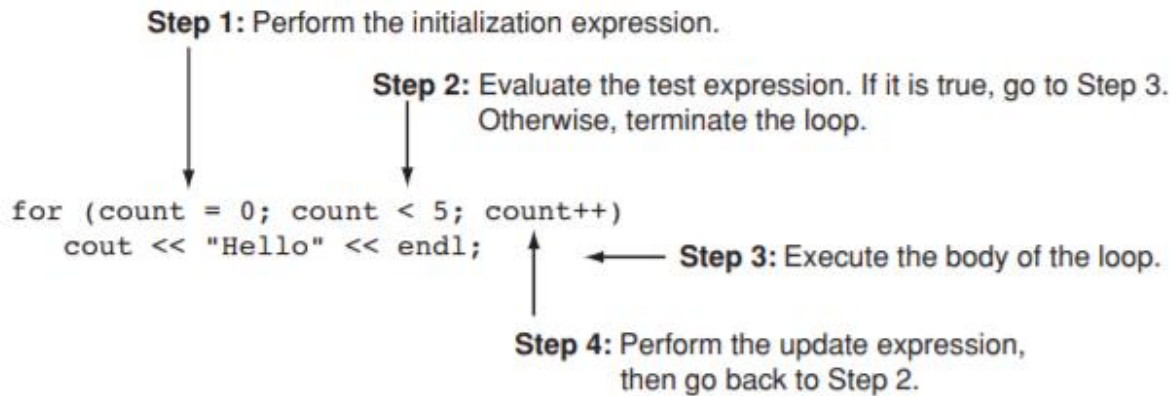
#### Syntax

The syntax of a for loop in C++ is –

```
for ( init; condition; increment )
{
    statement(s);
}
```



How it works



Example:

Example	Output:
<pre>int main (){ const int MIN_NUMBER = 1, // Starting value         MAX_NUMBER = 10; // Ending value int num;  cout &lt;&lt; "Number Number Squared\n"; cout &lt;&lt; "-----\n";  for (num = MIN_NUMBER; num &lt;= MAX_NUMBER; num++)     cout &lt;&lt; num &lt;&lt; "\t\t" &lt;&lt; (num * num) &lt;&lt; endl;  return 0; }</pre>	<pre>Number Number Squared ----- 1          1 2          4 3          9 4         16 5         25 6         36 7         49 8         64 9         81 10        100</pre>

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;
```



### **Lab Task:**

1. Write a program in C++ to find the sum of first 10 natural numbers.
2. Write a C++ program to Print Table of any Number.

Output should look like:  $2 \times 1 = 2$

$2 \times 2 = 4$

3. Write a Program to Generate Factorial. A Certain Number Factorial of any number is the product of an integer and all the integers below it for example factorial of 4 is:

$4! = 4 * 3 * 2 * 1 = 24$

4. Write a C++ program to generate Fibonacci sequence up to a certain number input by user.
5. Write a C++ program to print full pyramid using \* where the height of pyramid is input by user using for loop.

Example of full pyramid:



### **Home Task:**

1. Write a C++ Program to check whether a given number is a power of two or not.
2. Write a C++ program to reverse the digits of a given integer.
3. Write a program in C++ which prints the numbers from 1 to 150 except the multiples of 10. Make use of continue statement.
4. Write a C++ program to find sum of digits of a number.  
Sum of digits means add all the digits of any number, for example we take any number like 358. Its sum of all digit is  $3+5+8=16$ .
5. Write a program in C++ to check whether a number is prime or not.

#### **Useful links for practice**

<https://www.w3schools.com/>

<https://www.codecademy.com/learn/learn-c-plus-plus>