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LAB 08
Summary

Items	Description
Course Title	Programming Fundamentals
Lab Title	Operators in C++
Duration	3 Hours
Operating System/Tool/ Language	Ubuntu/ g++/ C++
Objective	To get familiar with use of loop

In computer programming, loops are used to repeat a block of code.

A loop is used for executing a block of statements repeatedly until a particular condition is satisfied. For example, when you are displaying number from 1 to 100 you may want set the value of a variable to 1 and display it 100 times, increasing its value by 1 on each loop iteration instead of writing the print statement 100 times.

There are 3 types of loops in C++.

- for loop
- while loop
- do...while loop

While loop:

In while loop, condition is evaluated first and if it returns true then the statements inside while loop execute, this happens repeatedly until the condition returns false. When condition returns false, the control comes out of loop and jumps to the next statement in the program after while loop.

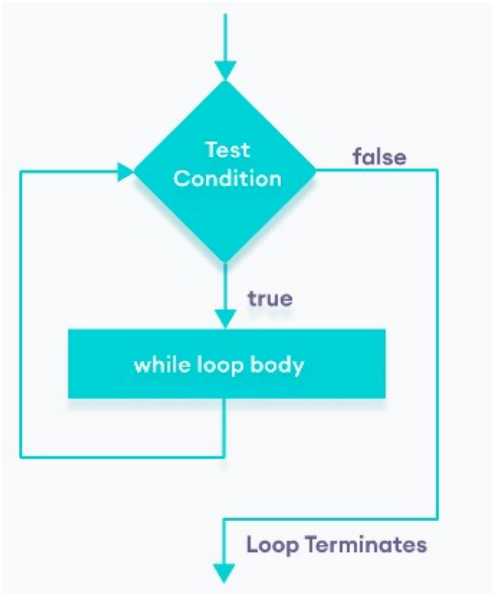
The syntax of the `while` loop is:

```
while (condition) {
    // body of the loop
}
```

Here,

- A `while` loop evaluates the `condition`
- If the `condition` evaluates to `true`, the code inside the `while` loop is executed.
- The `condition` is evaluated again.
- This process continues until the `condition` is `false`.
- When the `condition` evaluates to `false`, the loop terminates.

Flowchart of while loop:



Example 1.1:

Display numbers from 1 to 5.

```cpp
// C++ Program to print numbers from 1 to 5

#include <iostream>

using namespace std;

int main() {
    int i = 1;

    // while loop from 1 to 5
    while (i <= 5) {
        cout << i << " ";
        ++i;
    }

    return 0;
}
```

Output:

1 2 3 4 5

Working of program:

Iteration	Variable	i <= 5	Action
1st	i = 1	true	1 is printed and i is increased to 2.
2nd	i = 2	true	2 is printed and i is increased to 3.
3rd	i = 3	true	3 is printed and i is increased to 4
4th	i = 4	true	4 is printed and i is increased to 5.
5th	i = 5	true	5 is printed and i is increased to 6.
6th	i = 6	false	The loop is terminated

Infinite while loop:

A while loop that never stops is said to be the infinite while loop, when we give the condition in such a way so that it never returns false, then the loops becomes infinite and repeats itself indefinitely.

```cpp
// infinite while loop
while(true) {
    // body of the loop
}
```

Example 1.2:

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

int main()
{
        int a=1;
        while (a<0)
        {
            cout << "The value of variable is " << a;
            a = a + 1;

        }
        return 0;
}
```

Do while Loop:-

The do...while loop is a variant of the while loop with one important difference: the body of do...while loop is executed once before the condition is checked.

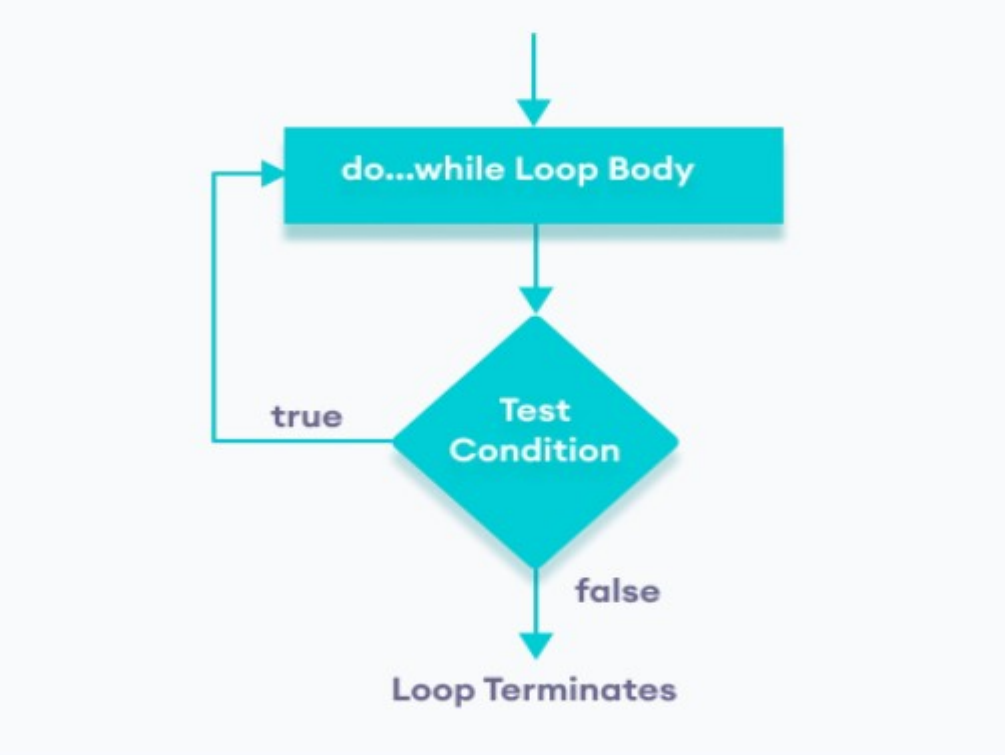
Its syntax is

do {

// body of loop;

}

while (condition);



Flowchart of C++ do...while loop

Sample: Display Numbers from 1 to 5

```
// C++ Program to print numbers from 1 to 5

#include <iostream>

using namespace std;

int main() {
    int i = 1;

    // do...while loop from 1 to 5
    do {
        cout << i << " ";
        ++i;
    }
    while (i <= 5);

    return 0;
}
```

Here is how the program works.

Iteration	Variable	i <= 5	Action
	i = 1	not checked	1 is printed and i is increased to 2
1st	i = 2	true	2 is printed and i is increased to 3
2nd	i = 3	true	3 is printed and i is increased to 4
3rd	i = 4	true	4 is printed and i is increased to 5
4th	i = 5	true	5 is printed and i is increased to **6**
5th	i = 6	false	The loop is terminated

Break and Continue statements in loops

whenever break statement is executed within the loop, it will transfer the control to next line after the loop ie will force the control to exit from loop. Break usually associated with if.
syntax : break;

Continue statement :
whenever continue statement is executed within the loop, it will transfer the control to the start of the loop.
Syntax : continue;

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Lab Tasks

Task#01

Write a C++ program to print the following:

> Hadith from Al-Bukhari #7392 which Abu Huraira Reports the Messenger of Allah (pbuh) as saying, "Allah has ninety-nine Names, one-hundred less one; and he who memorized them all by heart will enter Paradise."

Tsk#02

A Palindromic prime is a prime number that is also a palindromic number. Write a program that displays all the palindromic prime numbers between 100 and 999.

Output

```
101
131
151
181
191
313
353
373
383
727
757
787
797
919
929
```

Task#03

Use while loop:
Write a program to find the sum of positive numbers. Take positive numbers from user as an input.
If the user enters a negative number, the loop ends and that negative number entered should not be added to the sum. Finally the program should display the total sum.
For example user entered 12,5,3,-2 then the program should return 20.

Task#04

Use do while for finding the sum of positive numbers
The program will ask use for a number and keeps on asking a new number from user and adding in previous number.
If the user enters a negative number, the loop ends
The negative number entered is not added to the sum
In the end displays the sum of positive numbers.
Output

```
Enter a number: 6
Enter a number: 12
Enter a number: 7
Enter a number: 0
Enter a number: -2

The sum is 25
```

Output

```
Enter a number: -6
The sum is 0.
```

Task#05

Use while Loop:

In this problem, you would ask the user to enter some integers. User can enter as many numbers as he wants to. When the user wants to stop entering the numbers, he would press 0. When the user presses 0, you would display the maximum number and minimum number entered by the User.

For example user entered 6,18,319,74,0 then the program should display:

Minimum number = 6

Maximum number = 319

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Task#06

Use While loop
Create a C++ program which takes an integer number and should display whether the number is prime or not. This process should continue until the user enter negative number.

Practice Question:
Run all sample programs

Submission Instructions:
Please submit a pdf fille, having your code as well as output screenshot.
Dont forget to rename your file.