
Fundamentals of Computer Programming

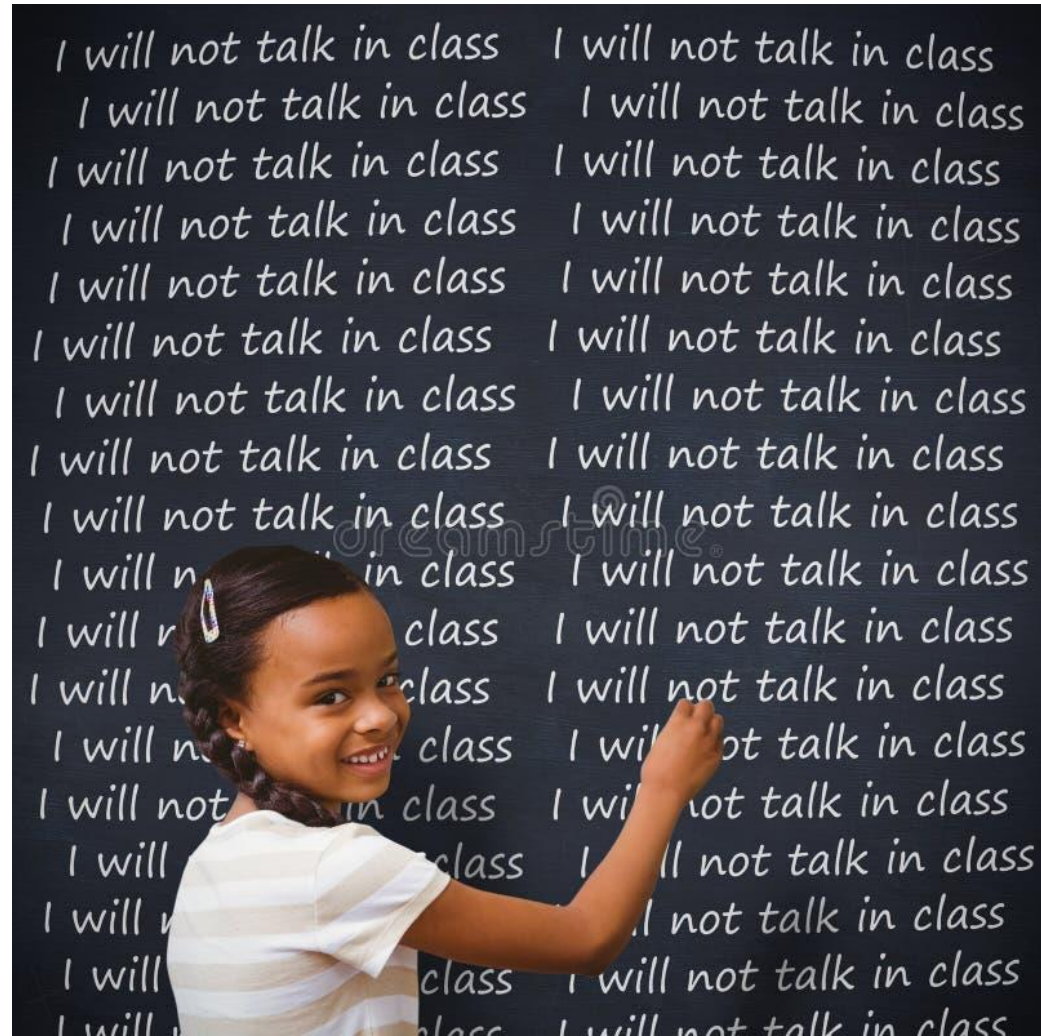
CS-110

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Repetition Structures (Loops)

Week 3-A



Learning Objectives

01

To understand the purpose of loops in programming

02

To differentiate between *for*, *while*, and *do-while* loop

03

To implement different loops to solve problems

04

To understand the use of *break* and *continue*

Why We Need Loops?

- Suppose we want to print "Hello World" 5 times. Manually, we have to write **cout** for the C++ statement 5 times as shown.

Output

```
Hello World  
Hello World  
Hello World  
Hello World  
Hello World
```

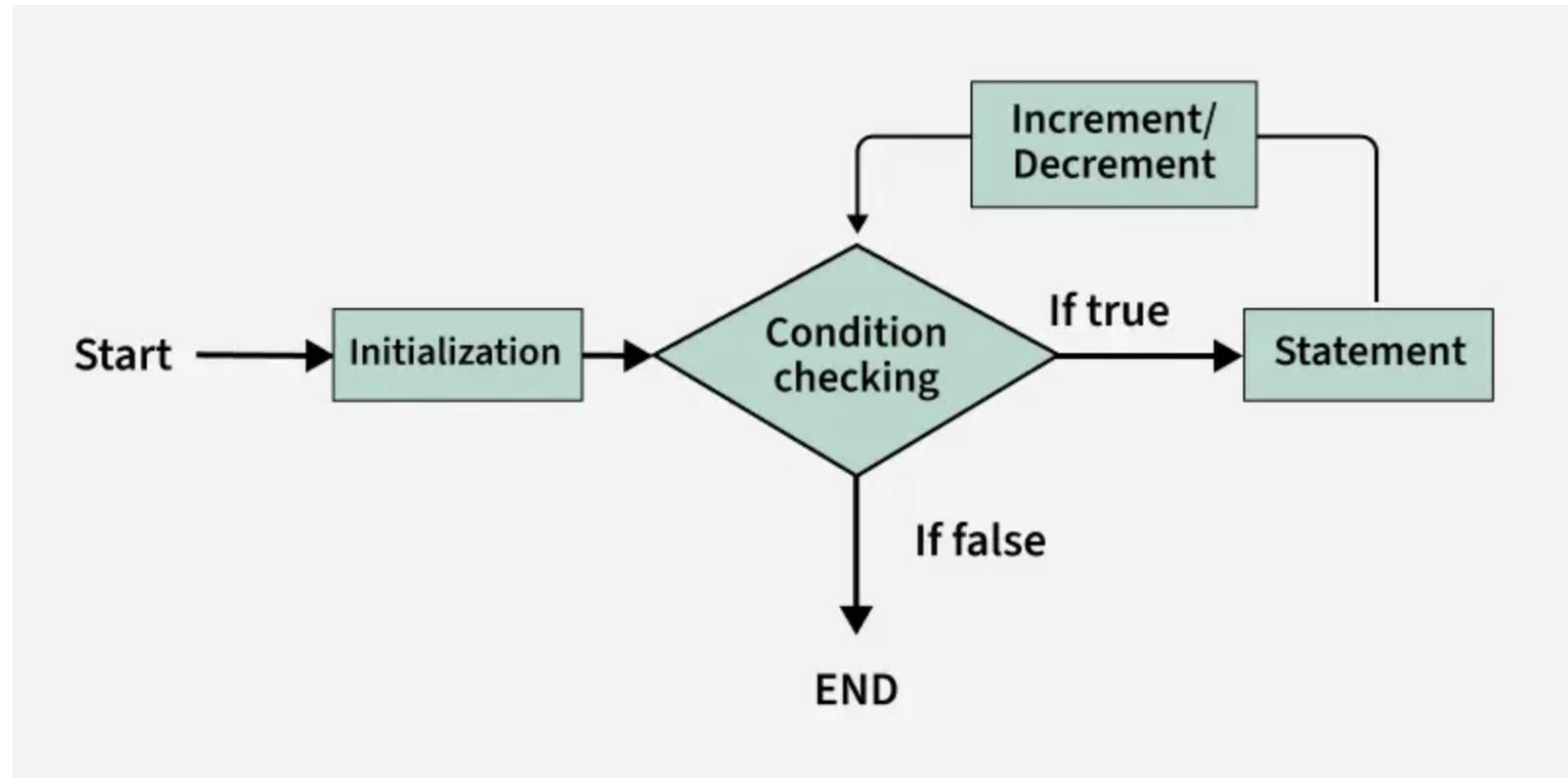
```
#include <iostream>  
using namespace std;  
  
int main() {  
  
    cout << "Hello World\n";  
    cout << "Hello World\n";  
    cout << "Hello World\n";  
    cout << "Hello World\n";  
    cout << "Hello World";  
    return 0;  
}
```

Different Types of Loops

- C++ provides **three types of loops** that work the same, but are preferred in different use cases:
 - **For Loop:** *When number of iterations is known.*
 - **While Loop:** *When number of iterations is unknown.*
 - **Do-while Loop:** *When code must run at least once.*
- **Entry-Controlled Loops:** *While + For*
- **Exit-Controlled Loops:** *Do-While*

For Loop

- The **for-loop** is an **entry-controlled loop**, which means that it checks whether the test condition is true before executing the statements inside it.



Syntax

```
for (initialization; condition; updation)
{
    // body of for loop
}
```

The various **parts of the for loop** are:

- **Initialization:** Initialize the variable to some initial value.
- **Test Condition:** This specifies the test condition. If the condition evaluates to true, then body of the loop is executed. If evaluated false, loop is terminated.
- **Update Expression:** After the execution loop's body, this expression increments/decrements the loop variable by some value.

Example

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

int main()
{
    // For loop that starts with i = 1 and ends
    // when i is greater than 5.
    for (int i = 1; i <= 5; i++)
    {
        cout << i << " ";
    }
    return 0;
}
```

Output

1 2 3 4 5

For-Loop Syntax Variation

```
Initialization;  
for (;condition;)  
{  
    // body of for loop  
    update;  
}
```

Output

```
1 2 3 4 5
```

```
#include <iostream>  
using namespace std;  
  
int main()  
{  
    // For loop that starts with i = 1 and ends  
    // when i is greater than 5.  
    int i = 1;  
    for (; i <= 5;)  
    {  
        cout << i << " ";  
        i++;  
    }  
    return 0;  
}
```

Practice:

You want to buy a new phone that costs **50,000 PKR**. You decide to save **5,000 PKR every month**. Write a C++ program using a **for loop** that shows how much money you will have saved after each month until you reach the goal.



Acknowledgment

- Content of these slides are taken from:
 - <https://www.geeksforgeeks.org/>
 - <https://www.tutorialspoint.com/>
 - <https://www.programiz.com/>