Java for Loop

In this tutorial, we will learn how to use for loop in Java with the help of examples and we will also learn about the working of Loop in computer programming.

In computer programming, loops are used to repeat a block of code. For example, if you want to show a message 100 times, then rather than typing the same code 100 times, you can use a loop.

In Java, there are three types of loops.

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

This tutorial focuses on the for loop. You will learn about the other type of loops in the upcoming tutorials.

Java for Loop

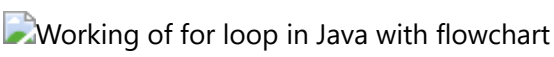
Java `for` loop is used to run a block of code for a certain number of times. The syntax of `for` loop is:

```
for (initialExpression; testExpression; updateExpression) {
    // body of the loop
}
```

Here,

1. The **initialExpression** initializes and/or declares variables and executes only once.
2. The **condition** is evaluated. If the **condition** is `true`, the body of the `for` loop is executed.
3. The **updateExpression** updates the value of **initialExpression**.
4. The **condition** is evaluated again. The process continues until the **condition** is `false`.

To learn more about the conditions, visit Java relational and logical operators.



Flowchart of Java for loop

Example 1: Display a Text Five Times

```
// Program to print a text 5 times

class Main {
  public static void main(String[] args) {
```

```
    int n = 5;
    // for loop
    for (int i = 1; i <= n; ++i) {
      System.out.println("Java is fun");
    }
  }
}
```

Output

Java is fun Java is fun Java is fun Java is fun Java is fun

Here is how this program works.

Iteration

Variable

Condition: i <= n

Action

1st

```
i = 1
n = 5

true
```

Java is fun is printed.
i is increased to **2**.

2nd

```
i = 2
n = 5

true
```

Java is fun is printed.
i is increased to **3**.

3rd

```
i = 3
n = 5

true
```

Java is fun is printed.
i is increased to **4**.

4th

```
i = 4
n = 5

true
```

Java is fun is printed.
i is increased to **5**.

5th

```
i = 5
n = 5

true
```

Java is fun is printed.
i is increased to **6**.

6th

```
i = 6
n = 5

false
```

The loop is terminated.

Example 2: Display numbers from 1 to 5

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

class Main {
  public static void main(String[] args) {

    int n = 5;
    // for loop
    for (int i = 1; i <= n; ++i) {
      System.out.println(i);
    }
  }
}
```


Output

1 2 3 4 5

Here is how the program works.

Iteration

Variable

Condition: i <= n

Action

1st

```
i = 1
n = 5

true
```

1 is printed.
i is increased to **2**.

2nd

```
i = 2
n = 5

true
```

2 is printed.
i is increased to **3**.

3rd

```
i = 3
n = 5

true
```

3 is printed.
i is increased to **4**.

4th

```
i = 4
n = 5

true
```

4 is printed.
i is increased to **5**.

5th

```
i = 5
n = 5
```

`true`

5 is printed.
i is increased to **6**.

6th

`i = 6`
`n = 5`

`false`

The loop is terminated.

Example 3: Display Sum of n Natural Numbers

```
// Program to find the sum of natural numbers from 1 to 1000.

class Main {
  public static void main(String[] args) {

    int sum = 0;
    int n = 1000;

    // for loop
    for (int i = 1; i <= n; ++i) {
      // body inside for loop
      sum += i;     // sum = sum + i
    }

    System.out.println("Sum = " + sum);
  }
}
```

Output:

Sum = 500500

Here, the value of sum is **0** initially. Then, the for loop is iterated from `i = 1 to 1000`. In each iteration, i is added to sum and its value is increased by **1**.

When i becomes **1001**, the test condition is `false` and sum will be equal to `0 + 1 + 2 + .... + 1000`.

The above program to add the sum of natural numbers can also be written as

```
// Program to find the sum of natural numbers from 1 to 1000.

class Main {
```

```
  public static void main(String[] args) {

    int sum = 0;
    int n = 1000;

    // for loop
    for (int i = n; i >= 1; --i) {
      // body inside for loop
      sum += i;     // sum = sum + i
    }

    System.out.println("Sum = " + sum);
  }
}
```

The output of this program is the same as the **Example 3**.

Java for-each Loop

The Java for loop has an alternative syntax that makes it easy to iterate through arrays and collections. For example,

```
// print array elements

class Main {
  public static void main(String[] args) {

    // create an array
    int[] numbers = {3, 7, 5, -5};

    // iterating through the array
    for (int number: numbers) {
       System.out.println(number);
    }
  }
}
```

Output

3 7 5 -5

Here, we have used the **for-each loop** to print each element of the numbers array one by one.

In the first iteration of the loop, number will be 3, number will be 7 in second iteration and so on.

To learn more, visit Java for-each Loop.

Java Infinite for Loop

If we set the **test expression** in such a way that it never evaluates to `false`, the `for` loop will run forever. This is called infinite for loop. For example,

```
// Infinite for Loop

class Infinite {
    public static void main(String[] args) {

        int sum = 0;

        for (int i = 1; i <= 10; --i) {
            System.out.println("Hello");
        }
    }
}
```

Here, the test expression ,`i <= 10`, is never `false` and `Hello` is printed repeatedly until the memory runs out.