
Java if...else Statement

In this tutorial, you will learn about control flow statements using Java if and if...else statements with the help of examples.

In computer programming, we use the if statement to control the flow of the program. For example, if a certain condition is met, then run a specific block of code. Otherwise, run another code.

For example assigning grades (A, B, C) based on percentage obtained by a student.

- if the percentage is above **90**, assign grade **A**
- if the percentage is above **75**, assign grade **B**
- if the percentage is above **65**, assign grade **C**

There are three forms of `if...else` statements in Java.

1. if statement
2. if...else statement
3. if...else if...else statement
4. Nested if...else statement

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1. Java if (if-then) Statement

The syntax of a **if-then** statement:

```
if (condition) {
  // statements
}
```

Here, `condition` is a boolean expression. It returns either `true` or `false`.

- if `condition` evaluates to `true`, statements inside the body of `if` are executed
- if `condition` evaluates to `false`, statements inside the body of `if` are skipped

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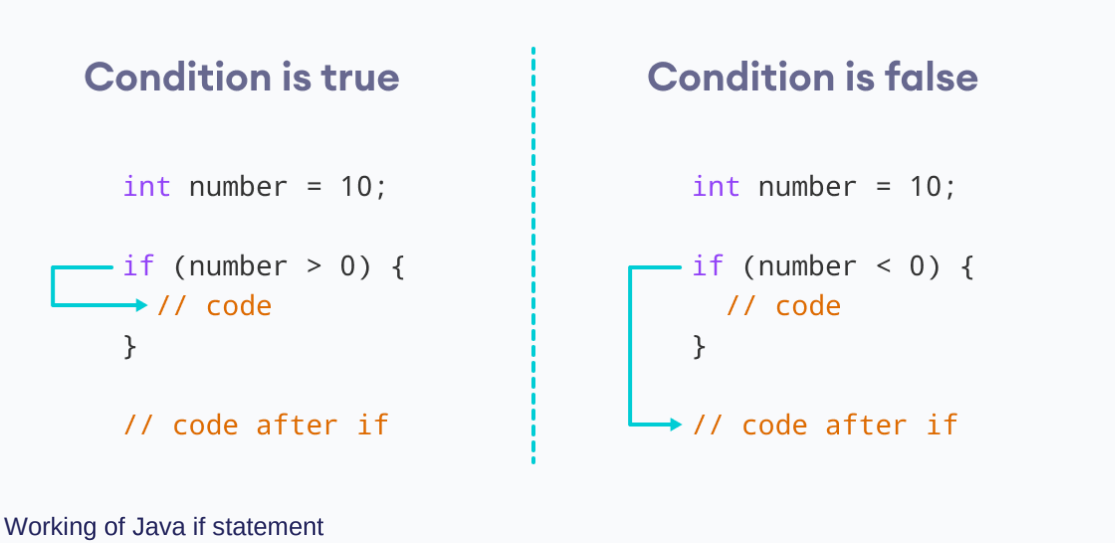
How if statement works?



Working of Java if statement

Example 1: Java if Statement

```
class IfStatement {

  public static void main(String[] args) {


    int number = 10;


    // checks if number is greater than 0
    if (number > 0) {
      System.out.println("The number is positive.");
    }


    System.out.println("Statement outside if block");
  }
}
```

Output

```
The number is positive.

Statement outside if block
```

In the above example, we have created a variable named `number`. Notice the test condition,

```
number > 0
```

Here, the condition is checking if `number` is greater than **0**. Since `number` is greater than **0**, the condition evaluates `true`.

If we change the variable to a negative integer. Let's say **-5**.

```
int number = -5;
```

Now, when we run the program, the output will be:

```
Statement outside if block
```

This is because the value of `number` is less than **0**. Hence, the condition evaluates to `false`. And, the body of `if` block is skipped.

> **Note**: To learn about condition expression, make sure to visit Java Relational Operators and Java Logical Operators.

We can also use Java Strings as the test condition.

Example 2: Java if with String

```
class Main {

  public static void main(String[] args) {

    // create a string variable

    String language = "Java";


    // if statement

    if (language == "Java") {

      System.out.println("Best Programming Language");

    }

  }
```

```
}
```

Output

```
Best Programming Language
```

In the above example, we are comparing two strings in the `if` block.

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2. Java if...else (if-then-else) Statement

The `if` statement executes a certain section of code if the test expression is evaluated to `true`. However, if the test expression is evaluated to `false`, it does nothing.

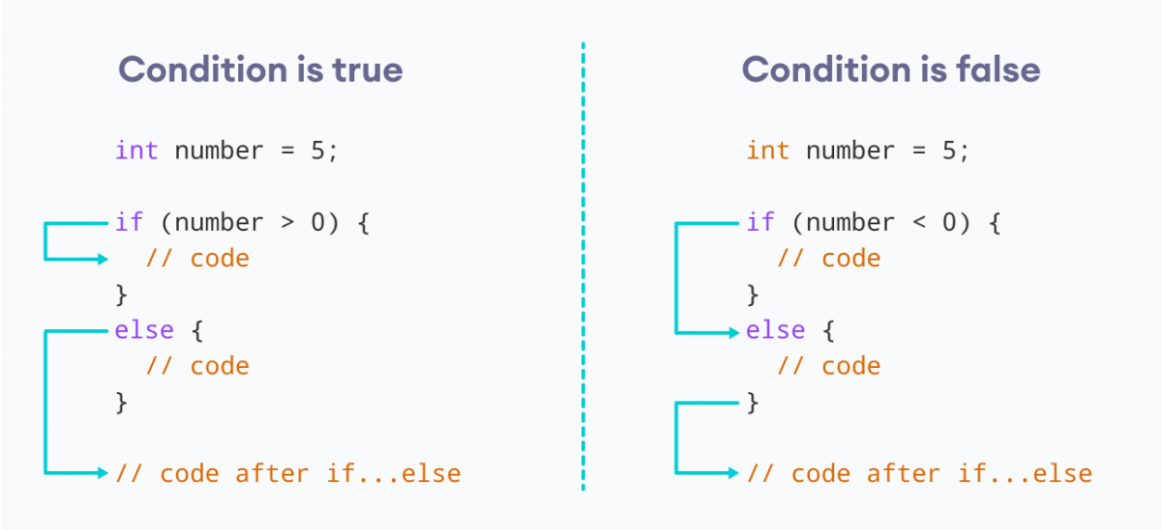
In this case, we can use an optional `else` block. Statements inside the body of `else` block are executed if the test expression is evaluated to `false`. This is known as the **if-...else** statement in Java.

The syntax of the **if...else** statement is:

```
if (condition) {

  // codes in if block

}else {

  // codes in else block

}
```

Here, the program will do one task (codes inside `if` block) if the condition is `true` and another task (codes inside `else` block) if the condition is `false`.

How the if...else statement works?



Working of Java if-else statements

Example 3: Java if...else Statement

```
class Main {

  public static void main(String[] args) {

    int number = 10;


    // checks if number is greater than 0

    if (number > 0) {

      System.out.println("The number is positive.");

    }


    // execute this block

    // if number is not greater than 0

    else {

      System.out.println("The number is not positive.");

    }


    System.out.println("Statement outside if...else block");

  }

}
```

Output

```
The number is positive.

Statement outside if...else block
```

In the above example, we have a variable named `number`. Here, the test expression `number > 0` checks if `number` is greater than 0.

Since the value of the `number` is `10`, the test expression evaluates to `true`. Hence code inside the body of `if` is executed.

Now, change the value of the `number` to a negative integer. Let's say `-5`.

```
int number = -5;
```

If we run the program with the new value of `number`, the output will be:

```
The number is not positive.

Statement outside if...else block
```

Here, the value of `number` is `-5`. So the test expression evaluates to `false`. Hence code inside the body of `else` is executed.

---

3. Java if...else...if Statement

In Java, we have an **if...else...if** ladder, that can be used to execute one block of code among multiple other blocks.

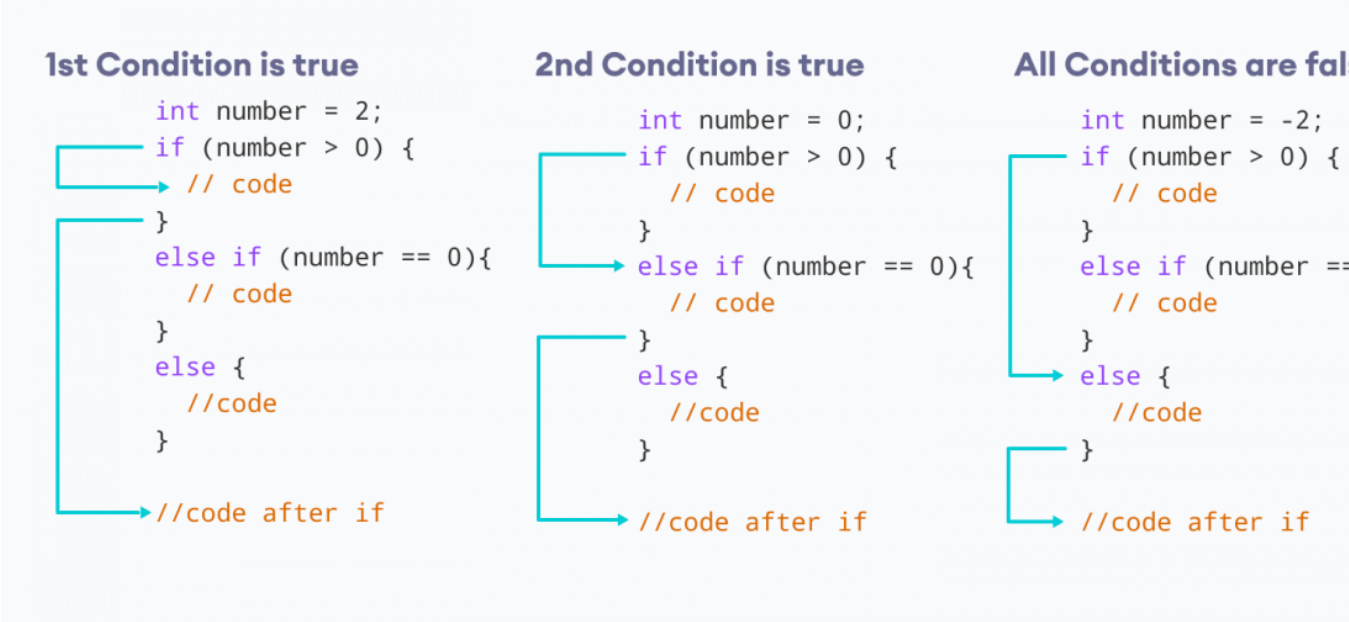
```
if (condition1) {
  // codes
}else if(condition2) {
  // codes
}else if (condition3) {
  // codes
}
.
```

```
.else {

  // codes

}
```

Here, `if` statements are executed from the top towards the bottom. When the test condition is `true`, codes inside the body of that `if` block is executed. And, program control jumps outside the **if...else...if** ladder.

If all test expressions are `false`, codes inside the body of `else` are executed.

How the if...else...if ladder works?



Working of if...else...if ladder

Example 4: Java if...else...if Statement

```
class Main {

  public static void main(String[] args) {



    int number = 0;
```

```
    // checks if number is greater than 0
    if (number > 0) {
      System.out.println("The number is positive.");
    }

    // checks if number is less than 0
    else if (number < 0) {
      System.out.println("The number is negative.");
    }

    // if both condition is false
    else {
      System.out.println("The number is 0.");
    }
  }
}
```

Output

```
The number is 0.
```

In the above example, we are checking whether `number` is **positive**, **negative**, or **zero**. Here, we have two condition expressions:

- `number > 0` - checks if `number` is greater than `0`
- `number < 0` - checks if `number` is less than `0`

Here, the value of `number` is `0`. So both the conditions evaluate to `false`. Hence the statement inside the body of `else` is executed.

> **Note**: Java provides a special operator called **ternary operator**, which is a kind of shorthand notation of **if...else...if** statement. To learn about the ternary operator, visit Java Ternary Operator.

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4. Java Nested if..else Statement

In Java, it is also possible to use `if..else` statements inside an `if...else` statement. It's called the nested `if...else` statement.

Here's a program to find the largest of **3** numbers using the nested `if...else` statement.

Example 5: Nested if...else Statement

```
class Main {

  public static void main(String[] args) {


    // declaring double type variables

    Double n1 = -1.0, n2 = 4.5, n3 = -5.3, largest;


    // checks if n1 is greater than or equal to n2

    if (n1 >= n2) {


      // if...else statement inside the if block

      // checks if n1 is greater than or equal to n3

      if (n1 >= n3) {

        largest = n1;

      }


      else {

        largest = n3;

      }

    } else {


      // if..else statement inside else block

      // checks if n2 is greater than or equal to n3

      if (n2 >= n3) {

        largest = n2;

      }
```

```
      else {
        largest = n3;
      }
    }

    System.out.println("Largest Number: " + largest);
  }
}
```

Output:

```
Largest Number: 4.5
```

In the above programs, we have assigned the value of variables ourselves to make this easier.

However, in real-world applications, these values may come from user input data, log files, form submission, etc.

Java switch Statement

In this tutorial, you will learn to use the switch statement in Java to control the flow of your program's execution with the help of examples.

The `switch` statement allows us to execute a block of code among many alternatives.

The syntax of the `switch` statement in Java is:

```
switch (expression) {

  case value1:
    // code
    break;

  case value2:
    // code
```

```
    break;


  ...

  ...


  default:
    // default statements
  }
```

How does the switch-case statement work?

The `expression` is evaluated once and compared with the values of each case.

- If `expression` matches with `value1`, the code of `case value1` are executed. Similarly, the code of `case value2` is executed if `expression` matches with `value2`.
- If there is no match, the code of the **default case** is executed.

> **Note**: The working of the switch-case statement is similar to the Java if...else...if ladder. However, the syntax of the `switch` statement is cleaner and much easier to read and write.

Example: Java switch Statement

```
// Java Program to check the size// using the switch...case statement

class Main {

  public static void main(String[] args) {


    int number = 44;

    String size;


    // switch statement to check size

    switch (number) {


      case 29:
```

```
        size = "Small";
        break;

      case 42:
        size = "Medium";
        break;

      // match the value of week
      case 44:
        size = "Large";
        break;

      case 48:
        size = "Extra Large";
        break;

      default:
        size = "Unknown";
        break;

    }
    System.out.println("Size: " + size);
  }
}
```

Output:

```
Size: Large
```

In the above example, we have used the switch statement to find the size. Here, we have a variable `number`. The variable is compared with the value of each case statement.

Since the value matches with **44**, the code of `case 44` is executed.

```
size = "Large";break;
```

Here, the `size` variable is assigned with the value `Large`.

Recommended Reading: Create a Simple Calculator Using the Java switch Statement

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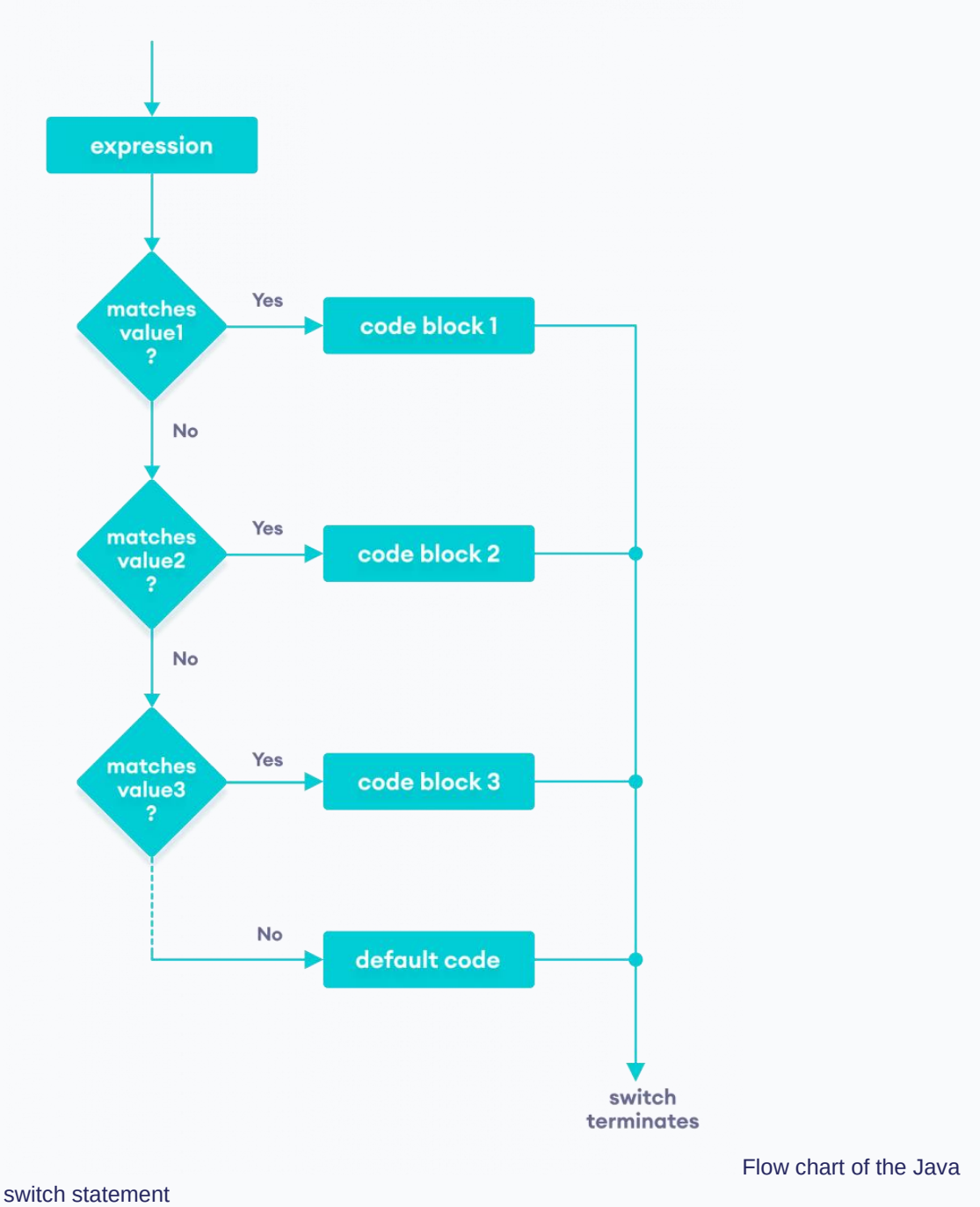
Flowchart of switch Statement



Flow chart of the Java switch statement

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break statement in Java switch...case

Notice that we have been using `break` in each case block.

```
 ...case 29:
  size = "Small";
  break;
...
```

The `break` statement is used to terminate the **switch-case** statement. If `break` is not used, all the cases after the matching case are also executed. For example,

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


    int expression = 2;


    // switch statement to check size
    switch (expression) {
      case 1:
        System.out.println("Case 1");


        // matching case
      case 2:
        System.out.println("Case 2");


      case 3:
        System.out.println("Case 3");


      default:
        System.out.println("Default case");
    }
```

```
  }
}
```

Output

```
Case 2
Case 3
Default case
```

In the above example, `expression` matches with `case 2`. Here, we haven't used the break statement after each case.

Hence, all the cases after `case 2` are also executed.

This is why the `break` statement is needed to terminate the **switch-case** statement after the matching case. To learn more, visit Java break Statement.

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default case in Java switch-case

The switch statement also includes an **optional default case**. It is executed when the expression doesn't match any of the cases. For example,

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

    int expression = 9;

    switch(expression) {

      case 2:
        System.out.println("Small Size");
        break;

      case 3:
        System.out.println("Large Size");
```

```
        break;


      // default case
      default:
        System.out.println("Unknown Size");
    }
  }
}
```

Output

```
Unknown Size
```

In the above example, we have created a **switch-case** statement. Here, the value of `expression` doesn't match with any of the cases.

Hence, the code inside the **default case** is executed.

```
default:
  System.out.println("Unknown Size);
```

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

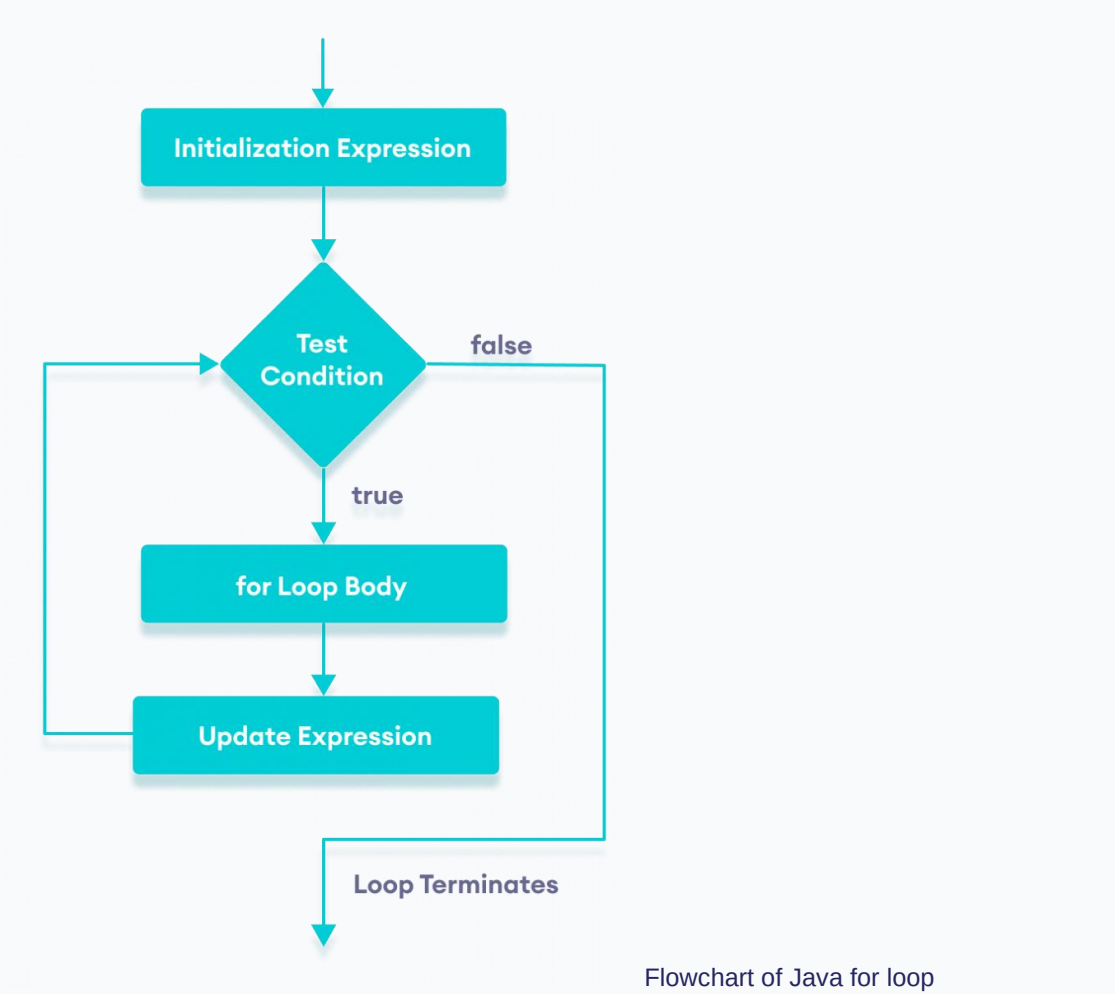
Java `for` loop is used to run a block of code for a certain number of times. The syntax of `for` loop is:

```
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.

Java for-each Loop

In this tutorial, we will learn about the Java for-each loop and its difference with for loop with the help of examples.

In Java, the **for-each** loop is used to iterate through elements of arrays and collections (like ArrayList). It is also known as the enhanced for loop.

---

for-each Loop Sytnax

The syntax of the Java **for-each** loop is:

```
for(dataType item : array) {

    ...

}
```

Here,

- **array** - an array or a collection
- **item** - each item of array/collection is assigned to this variable
- **dataType** - the data type of the array/collection

Example 1: Print Array Elements

```
// print array elements

class Main {

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

```
    // create an array
    int[] numbers = {3, 9, 5, -5};

    // for each loop
    for (int number: numbers) {
      System.out.println(number);
    }
  }
}
```

Output

```
3
9
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, `item` will be 3.
- In the second iteration, `item` will be 9.
- In the third iteration, `item` will be 5.
- In the fourth iteration, `item` will be -5.

Example 2: Sum of Array Elements

```
// Calculate the sum of all elements of an array
class Main {
 public static void main(String[] args) {

   // an array of numbers
```

```
    int[] numbers = {3, 4, 5, -5, 0, 12};
    int sum = 0;

    // iterating through each element of the array
    for (int number: numbers) {
      sum += number;
    }

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

Output:

```
Sum = 19
```

In the above program, the execution of the `for each` loop looks as:

Iteration	Variables
1	`number` = 3 `sum` = 0 + 3 = 3
2	`number` = 4 `sum` = 3 + 4 = 7
3	`number` = 5 `sum` = 7 + 5 = 12
4	`number` = -5 `sum` = 12 + (-5) = 7
5	`number` = 0 `sum` = 7 + 0 = 7
6	`number` = 12 `sum` = 7 + 12 = 19

As we can see, we have added each element of the `numbers` array to the `sum` variable in each iteration of the loop.

---

for loop Vs for-each loop

Let's see how a `for-each` loop is different from a regular Java for loop.

1. Using for loop

```
class Main {

 public static void main(String[] args) {


   char[] vowels = {'a', 'e', 'i', 'o', 'u'};


   // iterating through an array using a for loop
   for (int i = 0; i < vowels.length; ++ i) {
     System.out.println(vowels[i]);
   }
 }
}
```

Output:

```
a
e
i
o
u
```

2. Using for-each Loop

```
class Main {

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

```
    char[] vowels = {'a', 'e', 'i', 'o', 'u'};


    // iterating through an array using the for-each loop
    for (char item: vowels) {
      System.out.println(item);
    }
  }
}
```

Output:

```
a
e
i
o
u
```

Here, the output of both programs is the same. However, the **for-each** loop is easier to write and understand.

This is why the **for-each** loop is preferred over the **for** loop when working with arrays and collections.

Java while and do...while Loop

In this tutorial, we will learn how to use while and do while loop in Java with the help of examples.

In computer programming, loops are used to repeat a block of code. For example, if you want to show a message 100 times, then you can use a loop. It's just a simple example; you can achieve much more with loops.

In the previous tutorial, you learned about Java for loop. Here, you are going to learn about `while` and `do...while` loops.

Java while loop

Java `while` loop is used to run a specific code until a certain condition is met. The syntax of the `while` loop is:

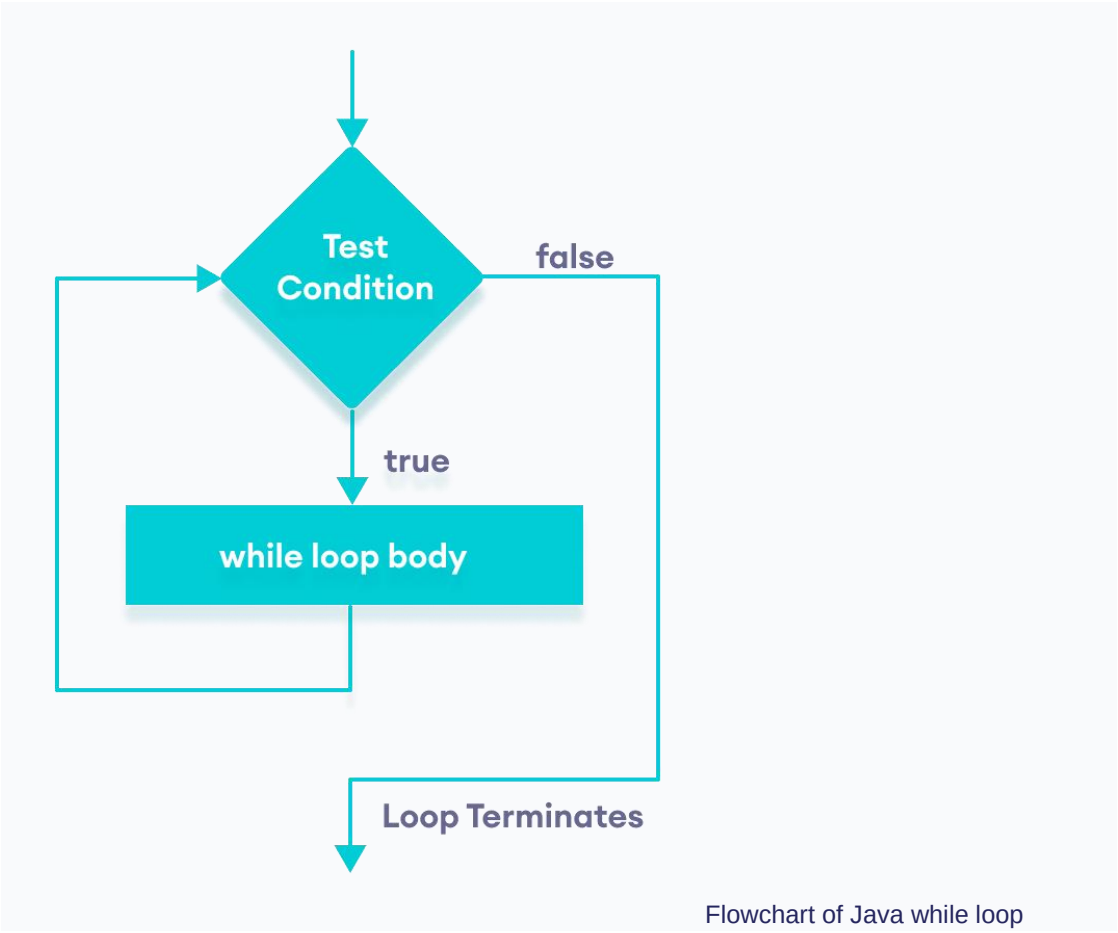
```
while (testExpression) {

    // body of loop

}
```

Here,

1. A `while` loop evaluates the **textExpression** inside the parenthesis `()`.
2. If the **textExpression** evaluates to `true`, the code inside the `while` loop is executed.
3. The **textExpression** is evaluated again.
4. This process continues until the **textExpression** is `false`.
5. When the **textExpression** evaluates to `false`, the loop stops.

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

Flowchart of while loop



Flowchart of Java while loop

Example 1: Display Numbers from 1 to 5

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

class Main {

  public static void main(String[] args) {


    // declare variables

    int i = 1, n = 5;


    // while loop from 1 to 5

    while(i <= n) {

      System.out.println(i);

      i++;

    }
```

```
  }
}
```

Output

```
1
2
3
4
5
```

Here is how this 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 2: Sum of Positive Numbers Only

```
// Java program to find the sum of positive numbersimport java.util.Scanner;

class Main {

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

```
    int sum = 0;

    // create an object of Scanner class
    Scanner input = new Scanner(System.in);

    // take integer input from the user
    System.out.println("Enter a number");
    int number = input.nextInt();

    // while loop continues
    // until entered number is positive
    while (number >= 0) {
      // add only positive numbers
      sum += number;

      System.out.println("Enter a number");
      number = input.nextInt();
    }

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

Output

```
Enter a number
25
Enter a number
9
Enter a number
5
```

```
Enter a number

-3

Sum = 39
```

In the above program, we have used the Scanner class to take input from the user. Here, `nextInt()` takes integer input from the user.

The `while` loop continues until the user enters a negative number. During each iteration, the number entered by the user is added to the `sum` variable.

When the user enters a negative number, the loop terminates. Finally, the total sum is displayed.

Java do...while loop

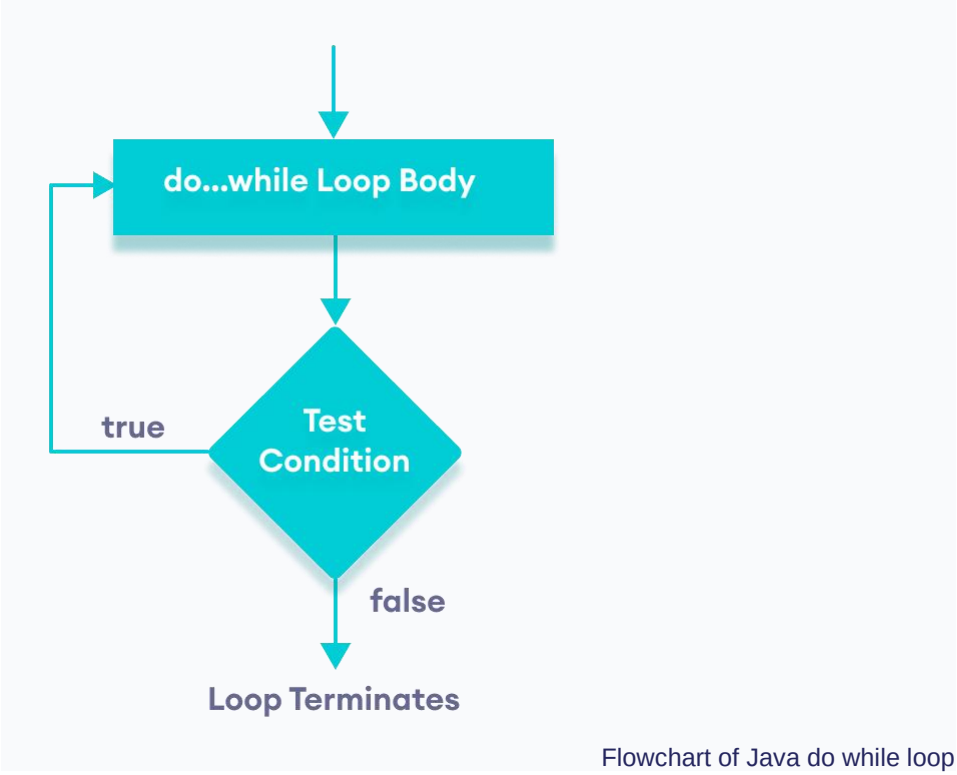
The `do...while` loop is similar to while loop. However, the body of `do...while` loop is executed once before the test expression is checked. For example,

```
do {
    // body of loop
} while(textExpression)
```

Here,

1. The body of the loop is executed at first. Then the **textExpression** is evaluated.
2. If the **textExpression** evaluates to `true`, the body of the loop inside the `do` statement is executed again.
3. The **textExpression** is evaluated once again.
4. If the **textExpression** evaluates to `true`, the body of the loop inside the `do` statement is executed again.
5. This process continues until the **textExpression** evaluates to `false`. Then the loop stops.

Flowchart of do...while loop



Flowchart of Java do while loop

Let's see the working of `do...while` loop.

Example 3: Display Numbers from 1 to 5

```
// Java Program to display numbers from 1 to 5

import java.util.Scanner;

// Program to find the sum of natural numbers from 1 to 100.

class Main {

  public static void main(String[] args) {


    int i = 1, n = 5;


    // do...while loop from 1 to 5

    do {

      System.out.println(i);

      i++;
```

```
    } while(i <= n);
  }
}
```

Output

```
1
2
3
4
5
```

Here is how this program works.

Iteration	Variable	Condition: i <= n	Action
	`i = 1` `n = 5`	not checked	`1` is printed. `i` is increased to 2.
1st	`i = 2` `n = 5`	`true`	`2` is printed. `i` is increased to 3.
2nd	`i = 3` `n = 5`	`true`	`3` is printed. `i` is increased to 4.
3rd	`i = 4` `n = 5`	`true`	`4` is printed. `i` is increased to 5.
4th	`i = 5` `n = 5`	`true`	`6` is printed. `i` is increased to 6.
5th	`i = 6` `n = 5`	`false`	The loop is terminated

Example 4: Sum of Positive Numbers

```
// Java program to find the sum of positive numbersimport java.util.Scanner;

class Main {
```

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


    int sum = 0;
    int number = 0;


    // create an object of Scanner class
    Scanner input = new Scanner(System.in);


    // do...while loop continues
    // until entered number is positive
    do {
      // add only positive numbers
      sum += number;
      System.out.println("Enter a number");
      number = input.nextInt();
    } while(number >= 0);


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

Output 1

```
Enter a number
25
Enter a number
9
Enter a number
5
Enter a number
-3
Sum = 39
```

Here, the user enters a positive number, that number is added to the `sum` variable. And this process continues until the number is negative. When the number is negative, the loop terminates and displays the sum without adding the negative number.

Output 2

```
Enter a number

-8

Sum is 0
```

Here, the user enters a negative number. The test condition will be `false` but the code inside of the loop executes once.

Infinite while loop

If **the condition** of a loop is always `true`, the loop runs for infinite times (until the memory is full). For example,

```
// infinite while loopwhile(true){

    // body of loop

}
```

Here is an example of an infinite `do...while` loop.

```
// infinite do...while loopint count = 1;do {

   // body of loop

} while(count == 1)
```

In the above programs, the **textExpression** is always `true`. Hence, the loop body will run for infinite times.

---

for and while loops

The `for` loop is used when the number of iterations is known. For example,

---

```
for (let i = 1; i <=5; ++i) {

   // body of loop

}
```

And `while` and `do...while` loops are generally used when the number of iterations is unknown. For example,

```
while (condition) {

    // body of loop

}
```
