#C if...else Statement

In this tutorial, you will learn about if statement (including if...else and nested if..else) in C programming with the help of examples.

C if Statement

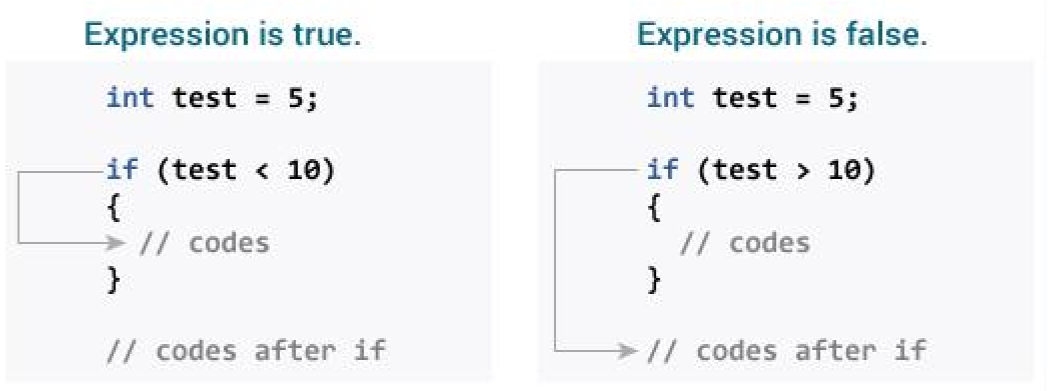
The syntax of the `if` statement in C programming is:

```
if (test expression)

{

   // statements to be executed if the test expression is true

}
```

How if statement works?

The `if` statement evaluates the test expression inside the parenthesis `()`.

- If the test expression is evaluated to true, statements inside the body of `if` are executed.
- If the test expression is evaluated to false, statements inside the body of `if` are not executed.



```
int test = 5;

if (test < 10)
{
  // codes
}

// codes after if
```

```
int test = 5;

if (test > 10)
{
  // codes
}

// codes after if
```

To learn more about when test expression is evaluated to true (non-zero value) and false (0), check relational and logical operators.

Example 1: if statement

```
// Program to display a number if it is negative

#include <stdio.h>int main() {

    int number;


    printf("Enter an integer: ");

    scanf("%d", &number);


    // true if number is less than 0

    if (number < 0) {

        printf("You entered %d.\n", number);

    }


    printf("The if statement is easy.");


    return 0;

}
```

Output 1

```
Enter an integer: -2

You entered -2.

The if statement is easy.
```

When the user enters -2, the test expression `number<0` is evaluated to true. Hence, `You entered -2` is displayed on the screen.

Output 2

```
Enter an integer: 5
```

```
The if statement is easy.
```

When the user enters 5, the test expression `number<0` is evaluated to false and the statement inside the body of `if` is not executed

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C if...else Statement

The `if` statement may have an optional `else` block. The syntax of the `if..else` statement is:

```
if (test expression) {

    // statements to be executed if the test expression is true

}else {

    // statements to be executed if the test expression is false

}
```

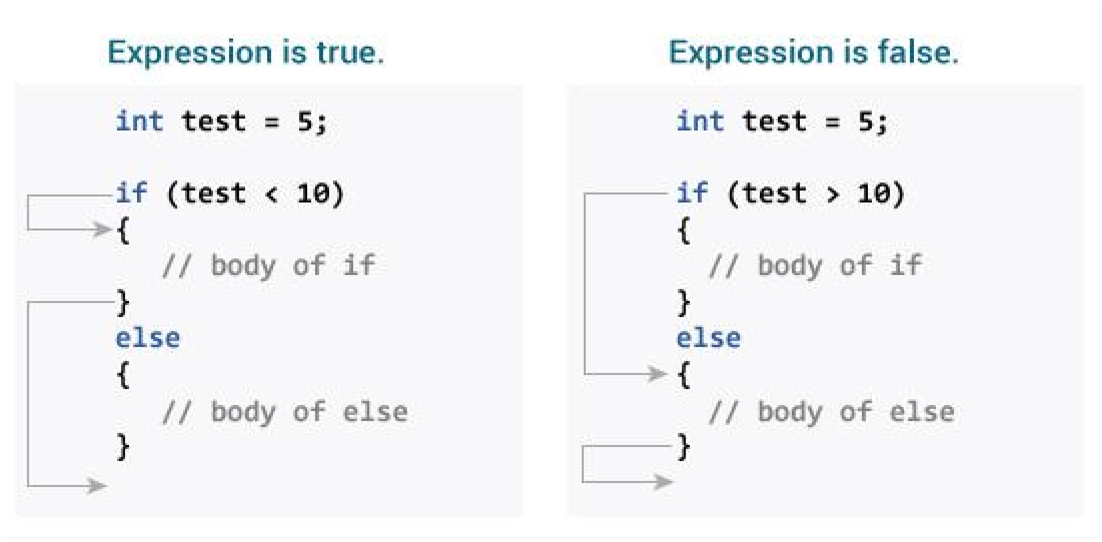
How if...else statement works?

If the test expression is evaluated to true,

- statements inside the body of `if` are executed.
- statements inside the body of `else` are skipped from execution.

If the test expression is evaluated to false,

- statements inside the body of `else` are executed
- statements inside the body of `if` are skipped from execution.



```
int test = 5;

if (test < 10)
{
   // body of if
}
else
{
   // body of else
}
```

```
int test = 5;

if (test > 10)
{
   // body of if
}
else
{
   // body of else
}
```

Example 2: if...else statement

```
// Check whether an integer is odd or even

#include <stdio.h>int main() {

    int number;

    printf("Enter an integer: ");

    scanf("%d", &number);


    // True if the remainder is 0

    if  (number%2 == 0) {

        printf("%d is an even integer.",number);

    }

    else {

        printf("%d is an odd integer.",number);

    }


    return 0;

}
```

Output

```
Enter an integer: 7

7 is an odd integer.
```

When the user enters 7, the test expression `number%2==0` is evaluated to false. Hence, the statement inside the body of `else` is executed.

C if...else Ladder

The `if...else` statement executes two different codes depending upon whether the test expression is true or false. Sometimes, a choice has to be made from more than 2 possibilities.

The if...else ladder allows you to check between multiple test expressions and execute different statements.

Syntax of if...else Ladder

```
if (test expression1) {

   // statement(s)

}else if(test expression2) {

   // statement(s)

}else if (test expression3) {

   // statement(s)

}

.

.else {

   // statement(s)

}
```

Example 3: C if...else Ladder

```
// Program to relate two integers using =, > or < symbol

#include <stdio.h>int main() {

    int number1, number2;

    printf("Enter two integers: ");

    scanf("%d %d", &number1, &number2);


    //checks if the two integers are equal.

    if(number1 == number2) {

        printf("Result: %d = %d",number1,number2);

    }


    //checks if number1 is greater than number2.

    else if (number1 > number2) {

        printf("Result: %d > %d", number1, number2);

    }


    //checks if both test expressions are false

    else {

        printf("Result: %d < %d",number1, number2);

    }


    return 0;

}
```

Output

```
Enter two integers: 12

23
```

```
Result: 12 < 23
```

Nested if...else

It is possible to include an `if...else` statement inside the body of another `if...else` statement.

Example 4: Nested if...else

This program given below relates two integers using either `<`, `>` and `=` similar to the `if...else` ladder's example. However, we will use a nested `if...else` statement to solve this problem.

```
#include <stdio.h>int main() {

    int number1, number2;

    printf("Enter two integers: ");

    scanf("%d %d", &number1, &number2);

    if (number1 >= number2) {

      if (number1 == number2) {

        printf("Result: %d = %d",number1,number2);

      }

      else {

        printf("Result: %d > %d", number1, number2);

      }

    }

    else {

        printf("Result: %d < %d",number1, number2);

    }


    return 0;

}
```

> If the body of an `if...else` statement has only one statement, you do not need to use brackets `{}`.

For example, this code

```
if (a > b) {
    print("Hello");
}
print("Hi");
```

is equivalent to

```
if (a > b)
    print("Hello");
print("Hi");
```

#C for Loop

In this tutorial, you will learn to create for loop in C programming with the help of examples.

In programming, a loop is used to repeat a block of code until the specified condition is met.

C programming has three types of loops:

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

We will learn about `for` loop in this tutorial. In the next tutorial, we will learn about `while` and `do...while` loop.

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for Loop

The syntax of the `for` loop is:

```
for (initializationStatement; testExpression; updateStatement)

{

    // statements inside the body of loop

}
```

How for loop works?

- ❖ The initialization statement is executed only once.
- ❖ Then, the test expression is evaluated. If the test expression is evaluated to false, the `for` loop is terminated.
- ❖ However, if the test expression is evaluated to true, statements inside the body of `for` loop are executed, and the update expression is updated.
- ❖ Again the test expression is evaluated.

This process goes on until the test expression is false. When the test expression is false, the loop terminates.

To learn more about test expression (when the test expression is evaluated to true and false), check out relational and logical operators.

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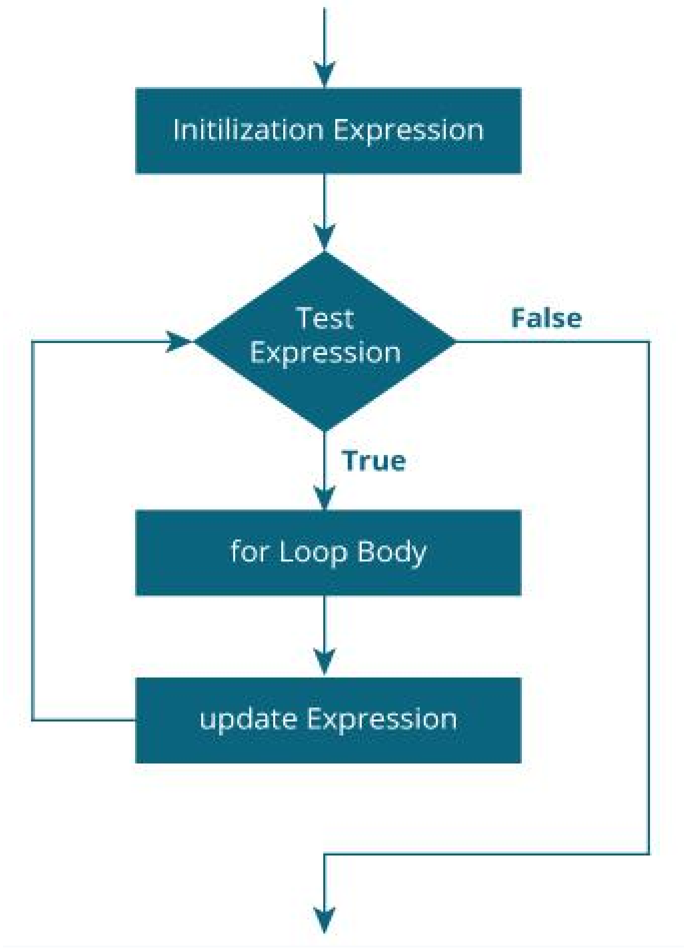
for loop Flowchart



Example 1: for loop

```
// Print numbers from 1 to 10#include <stdio.h>

int main() {

  int i;



  for (i = 1; i < 11; ++i)

  {

    printf("%d ", i);

  }

  return 0;

}
```

Output

```
1 2 3 4 5 6 7 8 9 10
```

1. `i` is initialized to 1.
2. The test expression `i < 11` is evaluated. Since 1 less than 11 is true, the body of `for` loop is executed. This will print the **1** (value of `i`) on the screen.
3. The update statement `++i` is executed. Now, the value of `i` will be 2. Again, the test expression is evaluated to true, and the body of for loop is executed. This will print **2** (value of `i`) on the screen.
4. Again, the update statement `++i` is executed and the test expression `i < 11` is evaluated. This process goes on until `i` becomes 11.
5. When `i` becomes 11, `i < 11` will be false, and the `for` loop terminates.

Example 2: for loop

```
// Program to calculate the sum of first n natural numbers// Positive integers 1,2,3...n are known as natural numbers

#include <stdio.h>int main(){

    int num, count, sum = 0;

    printf("Enter a positive integer: ");

    scanf("%d", &num);

    // for loop terminates when num is less than count

    for(count = 1; count <= num; ++count)

    {

        sum += count;

    }

    printf("Sum = %d", sum);

    return 0;

}
```

Output

```
Enter a positive integer: 10

Sum = 55
```

The value entered by the user is stored in the variable `num`. Suppose, the user entered 10.

The `count` is initialized to 1 and the test expression is evaluated. Since the test expression `count<=num` (1 less than or equal to 10) is true, the body of `for` loop is executed and the value of `sum` will equal to 1.

Then, the update statement `++count` is executed and the count will equal to 2. Again, the test expression is evaluated. Since 2 is also less than 10, the test expression is evaluated to true and the body of `for` loop is executed. Now, the `sum` will equal 3.

This process goes on and the sum is calculated until the `count` reaches 11.

When the `count` is 11, the test expression is evaluated to 0 (false), and the loop terminates.

Then, the value of `sum` is printed on the screen.

We will learn about `while` loop and `do...while` loop in the next tutorial.

#C while and do...while Loop

In this tutorial, you will learn to create while and do...while loop in C programming with the help of examples.

In programming, loops are used to repeat a block of code until a specified condition is met.

C programming has three types of loops.

1. for loop
2. while loop

3. do...while loop

In the previous tutorial, we learned about `for` loop. In this tutorial, we will learn about `while` and `do..while` loop.

while loop

The syntax of the `while` loop is:

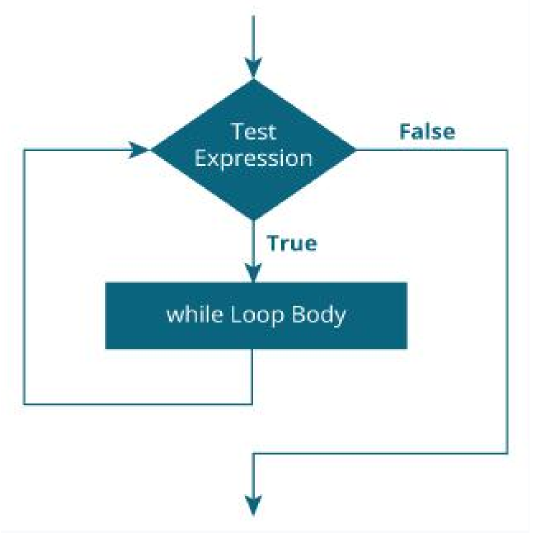
```
while (testExpression)

{

    // statements inside the body of the loop

}
```

How while loop works?

- ❖ The `while` loop evaluates the test expression inside the parenthesis `()`.
- ❖ If the test expression is true, statements inside the body of `while` loop are executed. Then, the test expression is evaluated again.
- ❖ The process goes on until the test expression is evaluated to false.
- ❖ If the test expression is false, the loop terminates (ends).

To learn more about test expression (when the test expression is evaluated to true and false), check out relational and logical operators.

Flowchart of while loop



Example 1: while loop

```c
// Print numbers from 1 to 5

#include <stdio.h>

int main(){

    int i = 1;

    while (i <= 5)

    {

        printf("%d\n", i);

        ++i;

    }

    return 0;

}
```

Output

```
1

2

3

4

5
```

Here, we have initialized `i` to 1.

1. When `i` is 1, the test expression `i <= 5` is true. Hence, the body of the `while` loop is executed. This prints 1 on the screen and the value of `i` is increased to 2.
2. Now, `i` is 2, the test expression `i <= 5` is again true. The body of the `while` loop is executed again. This prints 2 on the screen and the value of `i` is increased to 3.
3. This process goes on until `i` becomes 6. When `i` is 6, the test expression `i <= 5` will be false and the loop terminates.

do...while loop

The `do..while` loop is similar to the `while` loop with one important difference. The body of `do...while` loop is executed at least once. Only then, the test expression is evaluated.

The syntax of the `do...while` loop is:

```
do

{

   // statements inside the body of the loop

}while (testExpression);
```

How do...while loop works?

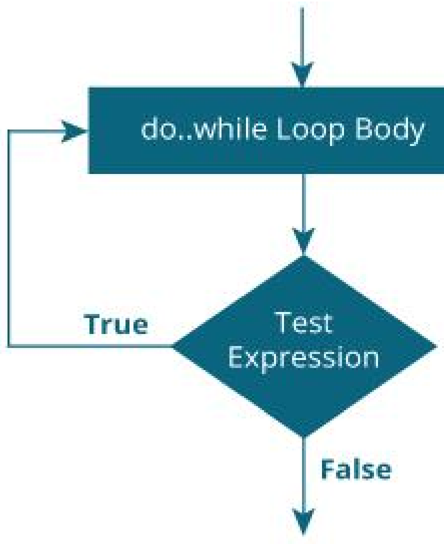
❖ The body of do...while loop is executed once. Only then, the test expression is evaluated.

❖ If the test expression is true, the body of the loop is executed again and the test expression is evaluated.

❖ This process goes on until the test expression becomes false.

❖ If the test expression is false, the loop ends.

Flowchart of do...while Loop



Example 2: do...while loop

```c
// Program to add numbers until the user enters zero

#include <stdio.h>int main(){

    double number, sum = 0;


    // the body of the loop is executed at least once

    do

    {

        printf("Enter a number: ");

        scanf("%lf", &number);

        sum += number;

    }

    while(number != 0.0);


    printf("Sum = %.2lf",sum);


    return 0;

}
```

Output

```
Enter a number: 1.5

Enter a number: 2.4

Enter a number: -3.4

Enter a number: 4.2

Enter a number: 0

Sum = 4.70
```