If – else statement

C++ if Statement

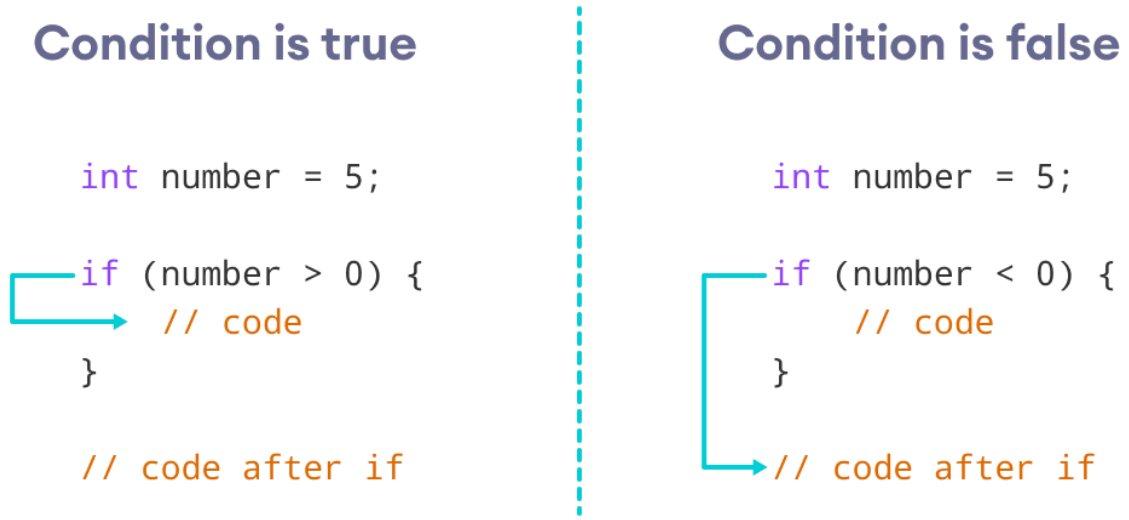
The syntax of the `if` statement is:

```
if (condition) {
  // body of if statement
}
```

The `if` statement evaluates the `condition` inside the parentheses `( )`.

- If the `condition` evaluates to `true`, the code inside the body of `if` is executed.
- If the `condition` evaluates to `false`, the code inside the body of `if` is skipped.

> **Note:** The code inside `{ }` is the body of the `if` statement.



If – else statement

Example 1: C++ if Statement

```
// Program to print positive number entered by the user
// If the user enters a negative number, it is skipped

#include <iostream>
using namespace std;

int main() {

  int number;

  cout << "Enter an integer: ";
  cin >> number;

  // checks if the number is positive
  if (number > 0) {
    cout << "You entered a positive integer: " << number
<< endl;
  }

  cout << "This statement is always executed.";

  return 0;
}
```

Output 1

```
Enter an integer: 5
You entered a positive number: 5
This statement is always executed.
```

If – else statement

When the user enters `5`, the condition `number > 0` is evaluated to `true` and the statement inside the body of `if` is executed.

Output 2

```
Enter a number: -5
This statement is always executed.
```

When the user enters `-5`, the condition `number > 0` is evaluated to `false` and the statement inside the body of `if` is not executed.

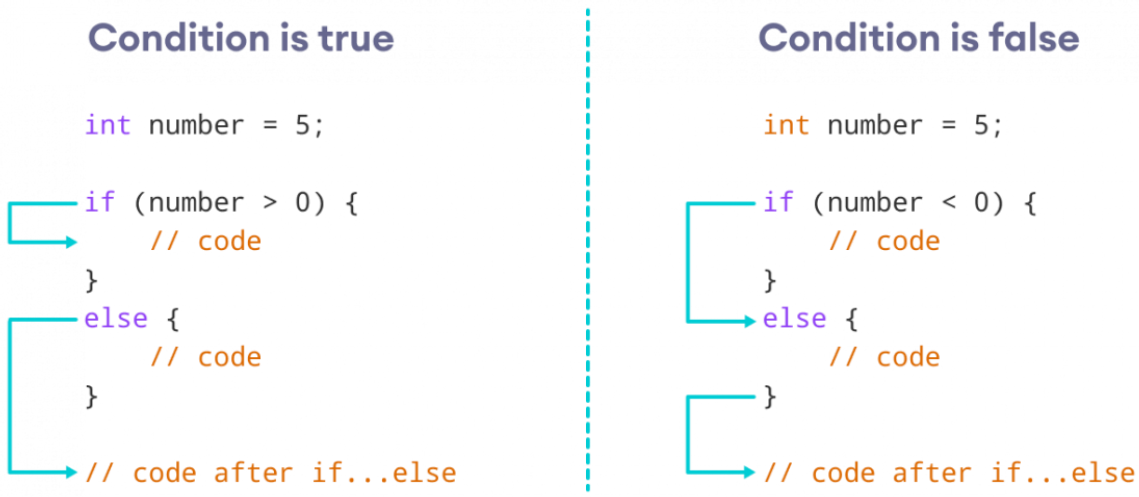
C++ if...else

The `if` statement can have an optional `else` clause. Its syntax is:

```
if (condition) {
  // block of code if condition is true
}
else {
  // block of code if condition is false
}
```

The `if..else` statement evaluates the `condition` inside the parenthesis.

If – else statement



How if...else Statement Works

If the `condition` evaluates `true`,

- the code inside the body of `if` is executed
- the code inside the body of `else` is skipped from execution

If the `condition` evaluates `false`,

- the code inside the body of `else` is executed
- the code inside the body of `if` is skipped from execution

Example 2: C++ if...else Statement

```
// Program to check whether an integer is positive or
negative
// This program considers 0 as a positive number

#include <iostream>
```

If – else statement

```
using namespace std;

int main() {

  int number;

  cout << "Enter an integer: ";
  cin >> number;

  if (number >= 0) {
    cout << "You entered a positive integer: " << number
<< endl;
  }
  else {
    cout << "You entered a negative integer: " << number
<< endl;
  }

  cout << "This line is always printed.";

  return 0;
}
```

Output 1

```
Enter an integer: 4
You entered a positive integer: 4.
This line is always printed.
```

In the above program, we have the condition `number >= 0`. If we enter the number greater or equal to `0`, then the condition evaluates `true`.
Here, we enter `4`. So, the condition is `true`. Hence, the statement inside the body of `if` is executed.

Output 2

```
Enter an integer: -4
```

If – else statement

```
You entered a negative integer: -4.
This line is always printed.
```

C++ if...else...else if statement

The `if...else` statement is used to execute a block of code among two alternatives. However, if we need to make a choice between more than two alternatives, we use the `if...else if...else` statement.

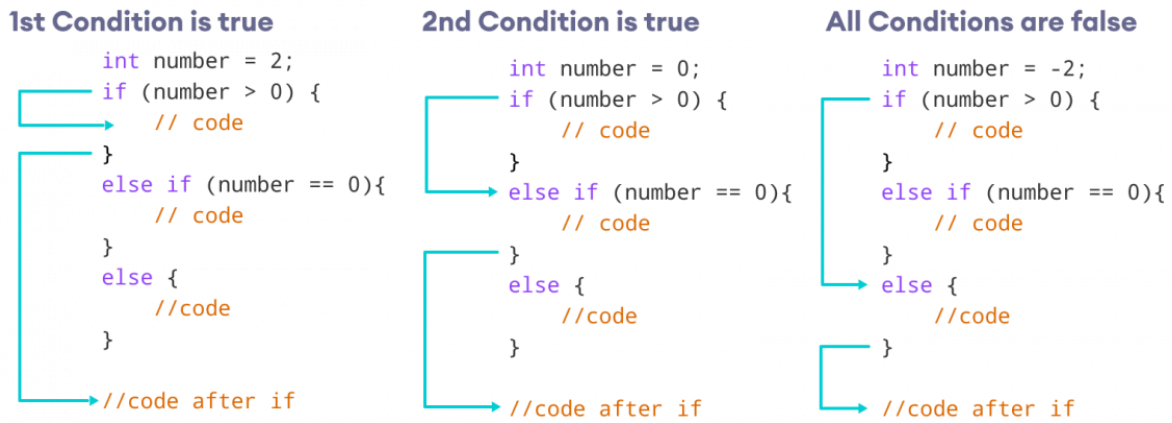
The syntax of the `if...else if...else` statement is:

```
if (condition1) {
  // code block 1
}
else if (condition2){
  // code block 2
}
else {
  // code block 3
}
```

Here,

- If `condition1` evaluates to `true`, the `code block 1` is executed.
- If `condition1` evaluates to `false`, then `condition2` is evaluated.
- If `condition2` is `true`, the `code block 2` is executed.
- If `condition2` is `false`, the `code block 3` is executed.

If – else statement



How if...else if...else Statement Works

Note: There can be more than one `else if` statement but only one `if` and `else` statements.

Example 3: C++ if...else...else if

```
// Program to check whether an integer is positive,
negative or zero

#include <iostream>
using namespace std;

int main() {

  int number;

  cout << "Enter an integer: ";
  cin >> number;

  if (number > 0) {
```

If – else statement

```
    cout << "You entered a positive integer: " << number
<< endl;
  }
  else if (number < 0) {
    cout << "You entered a negative integer: " << number
<< endl;
  }
  else {
    cout << "You entered 0." << endl;
  }

  cout << "This line is always printed.";

  return 0;
}
```

Output 1

```
Enter an integer: 1
You entered a positive integer: 1.
This line is always printed.
```

Output 2

```
Enter an integer: -2
You entered a negative integer: -2.
This line is always printed.
```

Output 3

```
Enter an integer: 0
You entered 0.
This line is always printed.
```

In this program, we take a number from the user. We then use the `if...else if...else` ladder to check whether the number is positive, negative, or zero.

If – else statement

If the number is greater than `0`, the code inside the `if` block is executed. If the number is less than `0`, the code inside the `else if` block is executed. Otherwise, the code inside the `else` block is executed.

C++ Nested if...else

Sometimes, we need to use an `if` statement inside another `if` statement. This is known as nested `if` statement.
Think of it as multiple layers of `if` statements. There is a first, outer `if` statement, and inside it is another, inner `if` statement. Its syntax is:

```
// outer if statement
if (condition1) {

  // statements

  // inner if statement
  if (condition2) {
    // statements
  }
}
```

Notes:

- We can add `else` and `else if` statements to the inner `if` statement as required.
- The inner `if` statement can also be inserted inside the outer `else` or `else if` statements (if they exist).
- We can nest multiple layers of `if` statements.

Example 4: C++ Nested if

```
// C++ program to find if an integer is positive, negative
or zero
// using nested if statements

#include <iostream>
using namespace std;

int main() {

  int num;

  cout << "Enter an integer: ";
   cin >> num;

  // outer if condition
  if (num != 0) {

    // inner if condition
    if (num > 0) {
      cout << "The number is positive." << endl;
    }
    // inner else condition
    else {
      cout << "The number is negative." << endl;
    }
  }
  // outer else condition
  else {
    cout << "The number is 0 and it is neither positive
nor negative." << endl;
  }

  cout << "This line is always printed." << endl;
```

If – else statement

```
  return 0;
}
```

Output 1

```
Enter an integer: 35
The number is positive.
This line is always printed.
```

Output 2

```
Enter an integer: -35
The number is negative.
This line is always printed.
```

Output 3

```
Enter an integer: 0
The number is 0 and it is neither positive nor negative.
This line is always printed.
```

In the above example,

- We take an integer as an input from the user and store it in the variable `num`.
- We then use an `if...else` statement to check whether num is not equal to `0`.
  - If `true`, then the **inner** `if...else` statement is executed.
  - If `false`, the code inside the **outer** `else` condition is executed, which prints `"The number is 0 and it is neither positive nor negative."`

If – else statement

- The **inner** `if...else` statement checks whether the input number is positive i.e. if `num` is greater than **0**.
  - If `true`, then we print a statement saying that the number is positive.
  - If `false`, we print that the number is negative.

> **Note:** As you can see, nested `if...else` makes your logic complicated. If possible, you should always try to avoid nested `if...else`.

Body of if...else With Only One Statement

If the body of `if...else` has only one statement, you can omit `{ }` in the program. For example, you can replace

```
int number = 5;

if (number > 0) {
  cout << "The number is positive." << endl;
}
else {
  cout << "The number is negative." << endl;
}
```

with

If – else statement

```
int number = 5;

if (number > 0)
  cout << "The number is positive." << endl;
else
  cout << "The number is negative." << endl;
```

The output of both programs will be the same.

> **Note:** Although it's not necessary to use `{ }` if the body of `if...else` has only one statement, using `{ }` makes your code more readable.