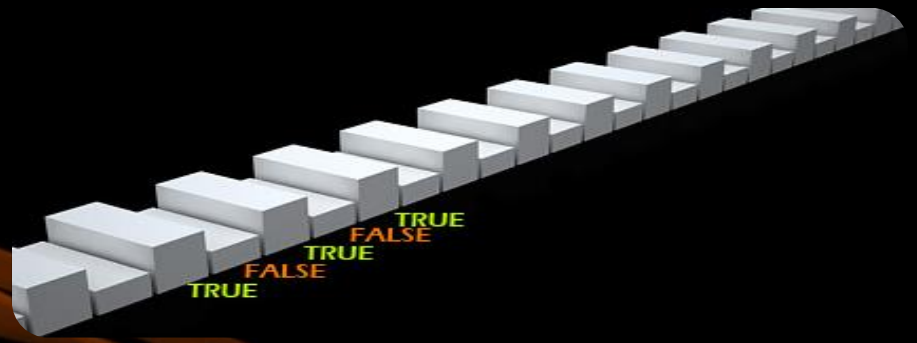
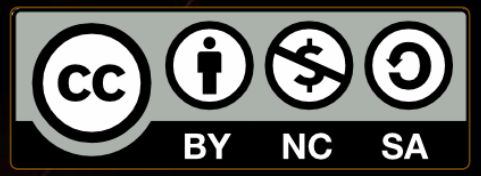


C Conditional Statements

Using Control-Flow Logic in C



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Technical Trainers

Software University

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Comparison and Logical Operators

Category	Operators
Arithmetic	+ - * / % ++ --
Logical	&& || ^ !
Comparison	== != < > <= >=
Assignment	= += -= *= /= %= &= |= ^= <<= >>=

Comparison Operators

Operator	Notation in C#	Applicable for
Equals	==	integer types, symbols
Not Equals	!=	
Greater Than	>	integer types, symbols, pointers
Greater Than or Equals	>=	
Less Than	<	
Less Than or Equals	<=	

- Example:

```
int result = (5 <= 6);
printf("%d", result); // 1
```

Logical Operators

Operator	Notation in C#	Example
Logical NOT	!	!false → true
Logical AND	&&	true && true → true
Logical OR	||	true || false → true
Logical Exclusive OR (XOR)	^	true ^ false → true

- De Morgan laws
  - `!!A ⇔ A`
  - `!(A || B) ⇔ !A && !B`
  - `!(A && B) ⇔ !A || !B`

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`if` and `if-else`

Implementing Conditional Logic

The if Statement

- The simplest conditional statement
- Enables you to test for a condition
- Branch to different blocks in the code depending on the result
- The simplest form of the `if` statement:

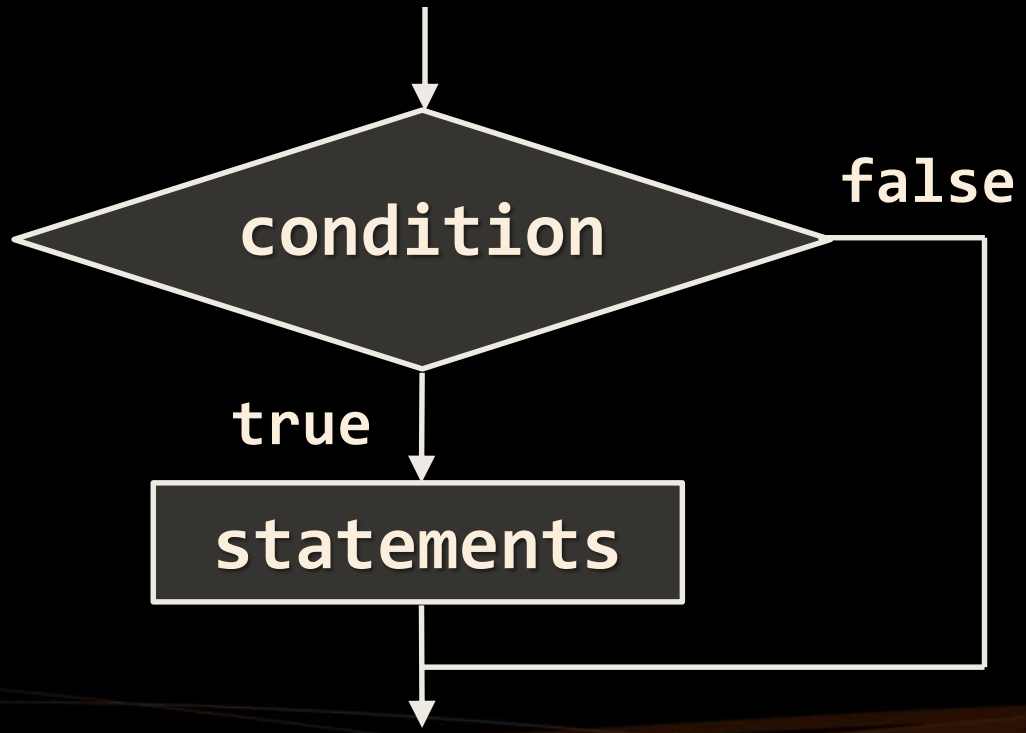
```
if (condition)
{
    statements;
}
```

Condition and Statement

- The condition can be:
  - Integer variable – `0` for false, `1` for true
  - Boolean logical expression (evaluates to 0 or 1)
  - Comparison expression (evaluates to 0 or 1)
  - Every other type (`0.0`, `'\0'`, `NULL` evaluate to 0)
- The statement can be:
  - Single statement ending with a semicolon
  - Block enclosed in curly braces

How It Works?

- The condition is evaluated
  - If it is true, the statement is executed
  - If it is false, the statement is skipped



The if Statement – Example

```
int main()
{
    int biggerNum, smallerNum;
    printf("Enter two numbers:\n");
    scanf("%d", &biggerNum);
    scanf("%d", &smallerNum);

    if (smallerNum > biggerNum)
    {
        biggerNum = smallerNum;
    }

    printf("The greater number is %d.", biggerNum);
    return 0;
}
```

Pass the address of **biggerNum**

Evaluates to **0** or **1**

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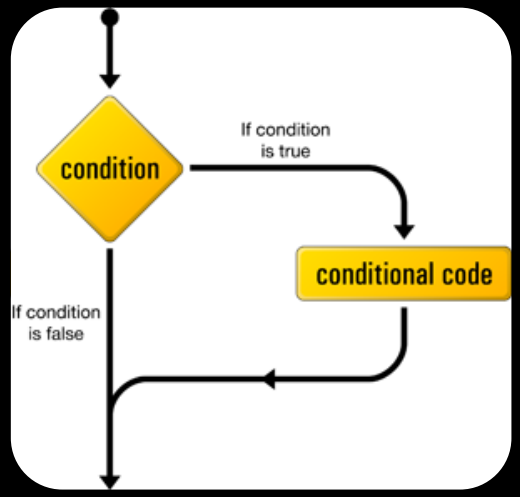
The if Statement

Live Demo



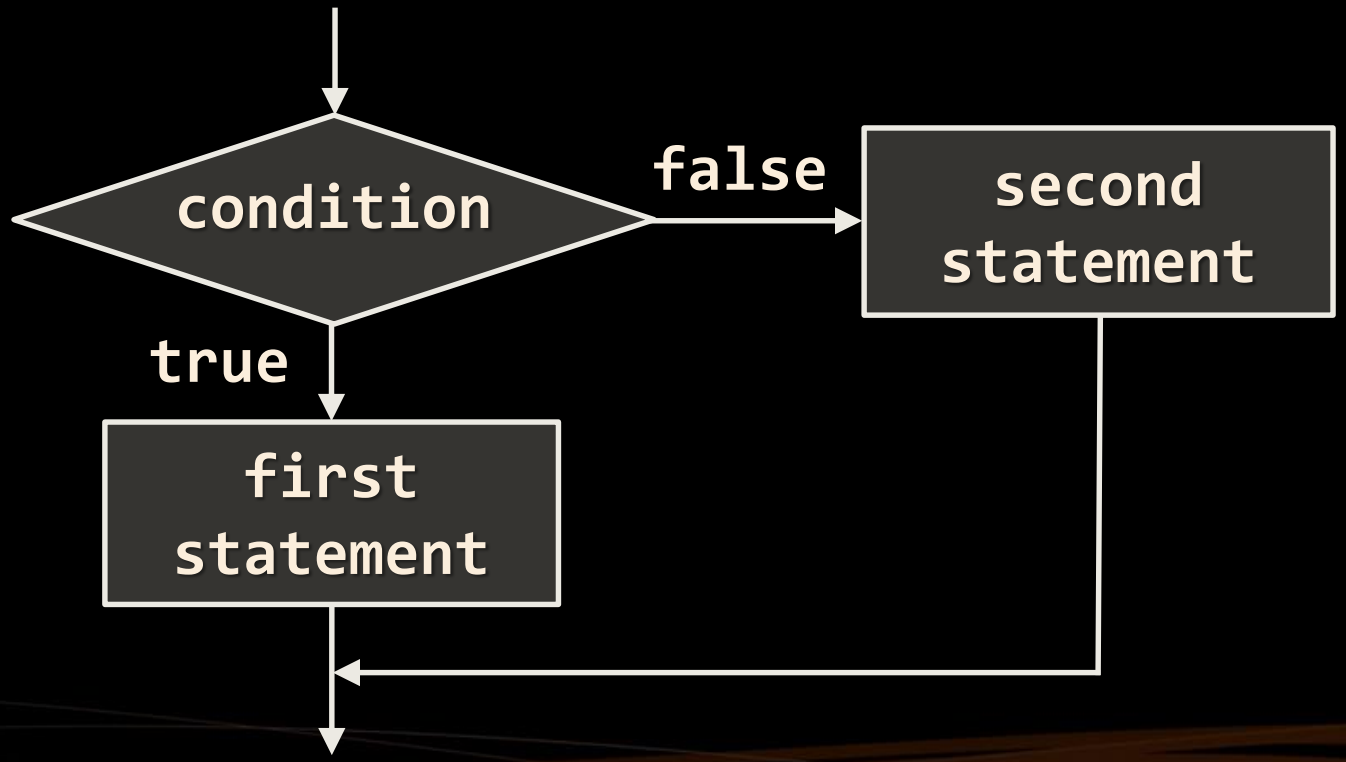
The if-else Statement

- More complex and useful conditional statement
- Executes one branch if the condition is true, and another if it is false
- The simplest form of an **if-else** statement:

```
if (expression)
{
    some_statement;
}
else
{
    another_statement;
}
```

How It Works?

- The condition is evaluated
  - If it is true, the first statement is executed
  - If it is false, the second statement is executed



if-else Statement – Example

- Checking a number if it is odd or even

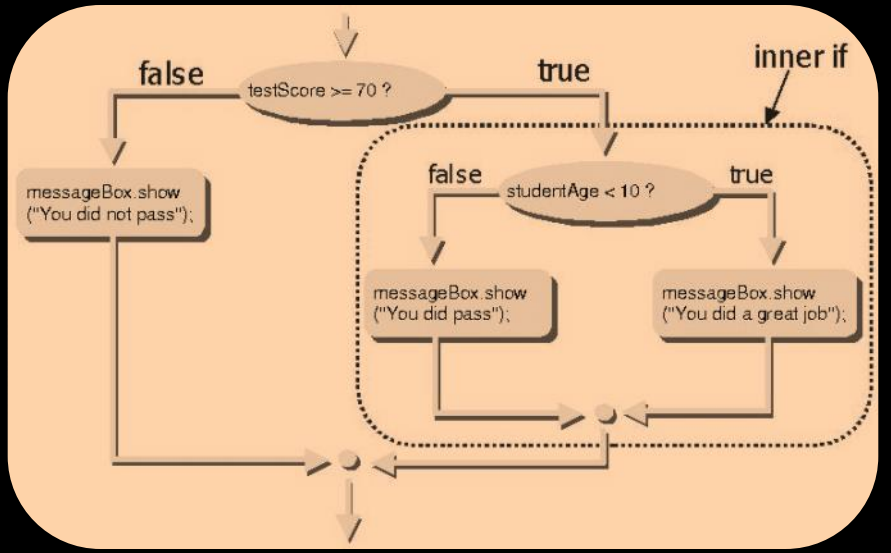
```
int num;
scanf("%d", num);

if (num % 2 == 0)
{
    printf("This number is even.");
}
else
{
    printf("This number is odd.");
}
```

The if-else Statement

Live Demo

Nested `if` Statements

Creating More Complex Logic



Nested if Statements

- `if` and `if-else` statements can be nested
  - Used inside one inside another
- Each `else` corresponds to its closest preceding `if`

```
if (expression)
{
    if (expression)
        some_statement;
    else
        another_statement;
}
else
    third_statement;
```

Nested if – Good Practices

- Always use { … } blocks to avoid ambiguity
  - Even when a single statement follows
- Avoid using more than three levels of nested if statements
- Put the case you normally expect to process first
  - Then write the unusual cases
- Arrange the code to make it more readable

Nested if Statements – Example

```
if (first == second)
{
    printf("These two numbers are equal.");
}
else
{
    if (first > second)
    {
        printf("These first number is bigger.");
    }
    else
    {
        printf("These second number is bigger.");
    }
}
```

Nested `if` Statements

Live Demo

Multiple if-else-if-else-…

- We may need to use another **if**-construction in the **else** block
  - Thus **else if** can be used:

```
int ch = 'X';
if (ch == 'A' || ch == 'a')
{
    printf("Vowel [ei]");
}
else if (ch == 'E' || ch == 'e')
{
    printf("Vowel [i:]");
}
else if  …
else …
```

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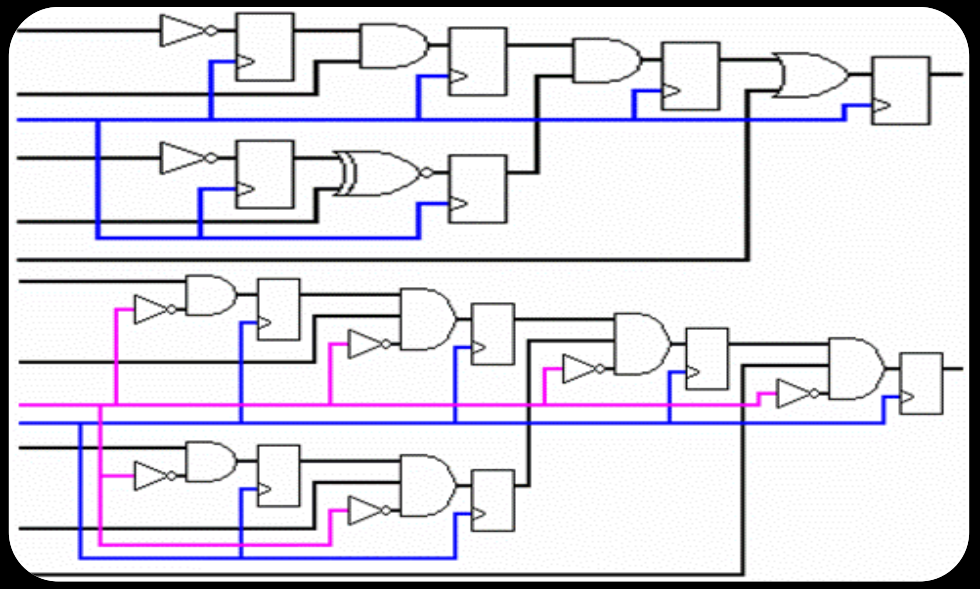
Multiple `if-else` Statements

Live Demo



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switch-case

Performing Several Comparisons at Once

The switch-case Statement

- Selects for execution a statement from a list depending on the value of the **switch** expression

```
switch (day)
{
    case 1: printf("Monday"); break;
    case 2: printf("Tuesday"); break;
    case 3: printf("Wednesday"); break;
    case 4: printf("Thursday"); break;
    case 5: printf("Friday"); break;
    case 6: printf("Saturday"); break;
    case 7: printf("Sunday"); break;
    default: printf("Error!"); break;
}
```

How switch-case Works?

1. The expression is evaluated
2. When one of the constants specified in a case label is equal to the expression
   - The statement that corresponds to that case is executed
3. If no case is equal to the expression
   - If there is default case, it is executed
   - Otherwise the control is transferred to the end point of the switch statement

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The switch-case Statement

Live Demo

Using `switch`: Rules

- Variable types like integral types and enums can be used for **`switch`** expression
- The keyword **`break`** exits the switch statement
- Be careful with "falling-through" multiple cases!
  - Use **`break`** after each case
- Multiple labels that correspond to the same statement are permitted

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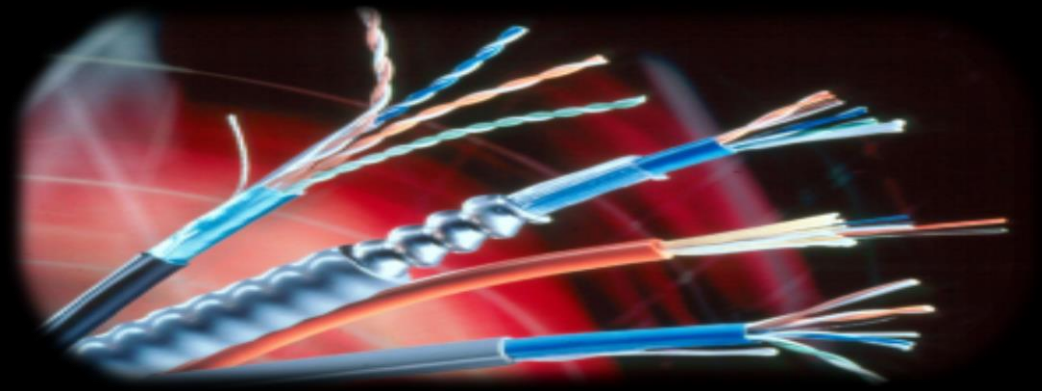
Multiple Labels in a `switch-case`

Live Demo



Using `switch` – Good Practices

- There must be a separate `case` for every normal situation
- Put the normal case first
  - Put the most frequently executed cases first and the least frequently executed last
- Order cases alphabetically or numerically
- In `default` use case that cannot be reached under normal circumstances

Summary

- Comparison and logical operators are used to compose logical conditions
- The conditional statements **`if`** and **`if-else`** conditionally execution of blocks of code
  - Constantly used in computer programming
  - Conditional statements can be nested
- The **`switch`** statement easily and elegantly checks an expression for a sequence of values

C Programming – Conditional Statements

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Questions?

https://softuni.bg/trainings/1212/C-Programming-October-2015

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