
Life is Full of Alternatives Part 3

Last Time

- We covered
 - Logical operators
 - Looked at complex examples that use the `if` selection structure
- Today we will look at the `if` selection structure in more detail

Single Alternative if

- The if selection structures we saw last time all have a single alternative

```
if (condition)      or      if (condition)
    one statementT;      {
next statementF;      multiple statementsT;
                        }
                        next statementF;
```

- If condition is true, statement(s) following if execute
- if condition is false, statement(s) following if are skipped.

Multiple Statements

- If you have multiple statements that need to be executed if the condition is true, they should be surrounded by curly braces { }

Examples

```
if (x >= 0)
    cout << "x is positive" << endl;
```

```
if (x < 0)
    x = -x;
```

```
if ((x == 0) && (y == 0))
{
    x = 1;
    y = 1;
}
```

Program

- Write a program segment that allows the user to input two integer values into variables `num1` and `num2`. Your program is to then exchange the values in the variables `num1` and `num2` only if `num1` is greater than `num2`

if/else Selection Structure

- This is the multiple alternative `if`
- Used when different statements should execute if the condition is false

```
if (condition)          if (condition)
    statementT;        {
                        statementsT;
else                    }
    statementF;        else
                        {
                        statementsF;
                        }
                        }
```

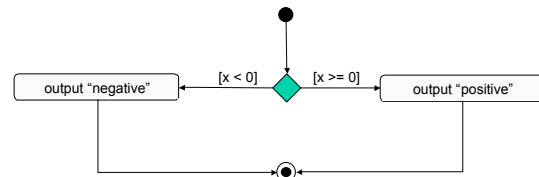
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UML Activity Diagram

```
if (x >= 0)
    cout << "x is positive" << endl;
else
    cout << "x is negative" << endl;
```



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Examples

```
x = 25.0;
if (y != (x - 10.0))
    x = x - 10.0;
else
    x = x / 2.0;

if ((y < 15.0) && (y >= 0.0))
    x = 5 * y;
else
    x = 2 * y;
```

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Program

- Write a program that inputs an integer number and outputs if its even or odd
- Write a program that computes the area of a triangle or a rectangle based on the user typing in 't' or 'r' first

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Problem

- What is the output of the following program segment

```
i = 5;
j = 2;
if((i % j) == 0)
    i = j;
    j = i;
    cout << i << j;
    cout << "That's all folks" << endl;
```

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Conditional Operator ?:

- C++ provides the conditional operator `?:` as a shortcut way of writing simple if/else structures

- For example, the structure

```
if (x >= 0)
    cout << "positive" << endl;
else
    cout << "negative" << endl;
```

- Could be written as

```
cout << ( x >= 0 ? "positive" : "negative" ) << endl;
```

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Conditional Operator ?:

- The format of the operator is
 - `(condition ? true-statement : false-statement)`
- The conditional operator works if there is only one statement for a true evaluation and only one statement for a false evaluation

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Nested if/else Selection Structures

- What if there are more than two alternatives?

```
if (condition1)
    statement1;
else if (condition2)
    statement2;
...
else
    default statement;
```

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Problem

- Write a C++ program segment that allows the user the ability to input an integer from the keyboard. If the integer is positive, increment a variable `poscount` by 1. If the integer is negative, increment a variable `negcount` by 1. If neither, increment `zerocount` by 1

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Solution

```
cin >> intvalue;
if(intvalue > 0)
    poscount = poscount + 1;
else if(intvalue < 0)
    negcount = negcount + 1;
else
    zerocount = zerocount + 1;
```

- Can you come up with another way of doing this?

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Solution

- Will this solution work?

```
cin >> intvalue;
if(intvalue > 0)
    poscount = poscount + 1;
if(intvalue < 0)
    negcount = negcount + 1;
if(intvalue = 0)
    zerocount = zerocount + 1;
```

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Problem

- Write a program that displays a letter grade corresponding to an exam score

```
90 - 100 A
80 - 89 B
70 - 79 C
60 - 69 D
0-59 F
```

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Summary

- In today's lecture we covered
 - `if/else` selection structures
 - `if` structures with multiple statements { }
 - Nested `if/else` selection structures
- Readings
 - P. 77 - 78: `if/else` selection structures
 - P. 78 - 79: conditional operator ? :
 - P. 79 - 81: nested `if/else` selection structures and `if` structures with multiple statements