

Northern University, Nowshera

Programmings Fundamentals (CS)

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(Week 5) Lecture 8 and 9

Objectives: Learning objectives of this lecture are

- **Conditional Statements**
- **Comparison/Relational Operators**
- **IF**
- **IF-else**



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Lecture # 9 Conditional Statement (IF)

Before discussing anything about conditional programmatically, let us discuss about what conditional statement actually means. There is a famous saying *“Hard work is a key to success”* after reading this statement we can say success **is conditional** and is associated with hard work. If a person does not work hard he can't get succeeded. Similarly in programming we have to make some statement conditional. Consider statement given below.

Statement: A person buys a product from XYZ shop. You have to write a program where you have to input quantity of a product and price of one product. Provide 10 percent discount on bill, display bill before discount, amount discounted and bill after discount.

Steps	Code
1) Declare two identifiers for storing quantity purchased by customer and price of 1 product.	<pre>#include "iostream" using namespace std; void main() { int qty, unitprice;</pre>
2) Take input.	<pre> cout << "Enter Quantity "; cin >> qty;</pre>
3) Declare an identifier to store bill.	<pre> cout << "Enter Unit price "; cin >> unitprice;</pre>
4) Multiply quantity with product and save in identifier declared in step 3.	<pre> int bill;</pre>
5) In step 4 you got bill before discount display it.	<pre> bill = qty * unitprice; cout << "Bill before discount " << bill << endl;</pre>
6) Declare another identifier for storing discount.	<pre> int discount;</pre>
7) Compute 10 percent of bill computed in step 3 and assign it to identifier declared in step 6.	<pre> discount = bill * 10 / 100; cout << "Discount " << discount << endl;</pre>
8) Display value of discount.	<pre> bill = bill - discount;</pre>
9) Subtract bill and discount and assign it to bill.	<pre> cout << "Bill After discount " << bill << endl;</pre>
10) In step 9 you got bill after discount display it.	<pre>}</pre>

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Now let us modify above statement a bit, make discount conditional. Consider following statement.

Statement: A person buys a product from XYZ shop. You have to write a program where you have to input quantity of a product and price of one product. Provide 10 percent discount on bill if bill is greater than 2000. Display bill before discount, discount and bill after discount.

In above statement discount is conditional.

```
#include <iostream>
using namespace std;
void main()
{
    int qty, unitprice;

    cout << "Enter Quantity ";
    cin >> qty;
    cout << "Enter Unit price ";
    cin >> unitprice;

    int bill;

    bill = qty * unitprice;

    cout << "Bill before discount " << bill << endl;

    int discount;

    discount = bill * 10 / 100;

    cout << "Discount " << discount << endl;

    bill = bill - discount;

    cout << "Bill After discount " << bill << endl;
}
```

Statement is conditional. Question arises on what condition this statement should be executed? Answer is simple and is given in above statement that this statement should be executed only when amount of bill is greater than 2000. We can say that.

If bill is greater than 2000

Then

Execute discount = bill * 10 / 100;

Before writing a code for above program let's look at **Boolean /comparison** operators. These are binary operators means require two values and their result is either true or false.

Boolean Operator	Meaning
==	Equals
!=	Not equal
>	Greater than
>=	Greater than or equal

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<	Less than
<=	Less than or equal

Consider given code for explanation of Boolean operators

```
#include "iostream"
using namespace std;
void main()
{
```

```
    int num1, num2;
```

```
    cin >> num1;
    cin >> num2;
```

```
    bool result = num1 == num2;
```

```
    result = num1 > num2;
```

```
    result = num1 < num2;
```

```
    result = num1 != num2;
```

```
    result = num1 >= num2;
```

```
    result = num1 <= num2;
```

```
}
```

If value of num1 is equal to num2 answer will be true otherwise answer will be false and stored in result.

If value of num1 is greater than num2 then answer will be true otherwise answer will be false and stored in

If value of num1 is less than num2 then answer will be true otherwise answer will be false and stored in result.

If value of num1 is not equal num2 then answer will be true otherwise answer will be false and stored in result.

If value of num1 is greater than or equal to num2 then answer will be true otherwise answer will be false and stored in result.

If value of num1 is less than or equal to num2 then answer will be true otherwise answer will be false and stored in result.

Note that while solving right hand side will be evaluated first and the answer will be stored in LHS identifier.

If Statement

If statement is used for making statement conditional. Following is a syntax of if statement.

```
if (
```

We can write true/ false or any statement whose result is either true or false.

```
{
```

Block of if . Inside this block we can write various statement this block is executed only when there if has true value inside its parenthesis. Means statement inside this block is conditional and is dependent on condition mentioned in parenthesis of if.

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}

Now coming back to our program. **Statement:** A person buys a product from XYZ shop. You have to write a program where you have to input quantity of a product and price of one product. Provide 10 percent discount on bill if bill is greater than 2000. Display bill before discount, discount and bill after discount.

Steps	Code
1) Declare two identifiers for storing quantity purchased by customer and price of 1 product.	<pre>#include "iostream" using namespace std; void main() { int qty, unitprice;</pre>
2) Take input.	<pre> cout << "Enter Quantity "; cin >> qty;</pre>
3) Declare an identifier to store bill.	<pre> cout << "Enter Unit price "; cin >> unitprice;</pre>
4) Multiply quantity with product and save in identifier declared in step 3.	<pre> int bill;</pre>
5) In step 4 you got bill before discount display it.	<pre> bill = qty * unitprice; cout << "Bill before discount " << bill << endl;</pre>
6) Declare another identifier for storing discount and assign 0 to it.	<pre> int discount = 0;</pre>
7) Apply if condition on bill is greater than 200.	<pre> if (bill > 2000) {</pre>
8) Compute 10 percent of bill computed in step 3 inside block of if.	<pre> discount = bill * 10 / 100;</pre>
9) Display value of discount.	<pre> } cout << "Discount " << discount << endl;</pre>
10) Subtract bill and discount and assign it to bill.	<pre> bill = bill - discount;</pre>
11) In step 9 you got bill after discount display it.	<pre> cout << "Bill After discount " << bill << endl; }</pre>

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This statement is conditional and is executed only **if** (bill > 2000) is true. First of all bill > 2000 is evaluated if its result is true then block of if will be executed.

In a single program we can write more than one if statements, if required.

```
#include "iostream"
using namespace std;
void main()
```

{

1

```
if (An expression/statement that results true/false)
```

```
{
```

If True then execute written inside this block.

```
}
```

2

```
if (An expression/statement that results true/false)
```

```
{
```

If True then execute written inside this block.

```
}
```

3

```
if (An expression/statement that results true/false)
```

```
{
```

If true then execute statements written inside this block.

```
}
```

```
}
```

Note: Between two if statement there can be any code for example.

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```
if (An expression/statement that results true/false)
{
}

```

You can write any code here

```
if (An expression/statement that results true/false)
{
}

```

Lecture # 10 Conditional Statement (IF-ELSE)

In previous lecture we discussed about IF statement. In this lecture we shall be discussing more examples regarding if statement.

Program Number 1: In Northern university many students apply for BSCS program. You have to ask for percentage obtained in intermediate. If percentage is greater than 49 Display message you can apply.

Steps	Code
1) Declare an identifier for storing percentage.	#include "iostream" using namespace std; void main() {
2) Take input.	int interper; cout << "Enter Percentage "; cin >> interper;
3) Check whether input given in step 2 is greater than 49.	if (interper > 49)
4) Write cout statement inside block of statement.	{ cout << "You can apply\n"; } if (interper >= 50) { cout << "You can apply\n"; }
	} <i>You can write one of above if.</i>

Program Number 2: Input an integer from user and tell whether number is even or odd.

Steps	Code
1) Declare an identifier for storing a number.	#include "iostream" using namespace std; void main() {
2) Take input	int number;

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3) Divide a number by 2. There are two possibility remainder might be 0 or 1.	<pre>cout << "Enter number "; cin >> number;</pre>
4) If remainder is 0 it is even.	<pre>if (number % 2 == 0) { cout << "Even\n"; }</pre>
5) If remainder is not 0 it's odd.	<pre>if (number % 2 != 0) { cout << "Odd\n"; }</pre>

An integer can either be even or odd so if integer is not even it is definitely odd.

Re writing program with else.

```
#include "iostream"
using namespace std;
void main()
{
```

```
    int number;
```

```
    cout << "Enter number ";
    cin >> number;
```

```
    if (number % 2 == 0)
    {
```

```
        cout << "Even\n";
```

```
    }
```

```
        cout << "Odd\n";
```

```
}
```

ELSE:

- Else block is executed when if is not executed.
- One if has only one else.
- Else cannot be written without if.
- Else is written immediately after if
- Writing else is not compulsory.
- Code written inside else block is also conditional.

Executed if only above condition is true.

In this case this statement will be executed all the time code is run, but this statement must be conditional it should be executed only when number is odd. We should this piece of code inside else block we can replace code as

```
if (number % 2 == 0)
{
    cout << "Even\n";
}
else
{
    cout << "Odd\n";
}
```


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Program Number 3: Input two numbers from user and tell whether both numbers are equal or not if numbers are not equal then print maximum number.

Steps	Code
1) Declare two identifier.	<pre>#include "iostream" using namespace std; void main() {</pre>
2) Take input.	<pre> int num1, num2;</pre>
3) Check if both numbers are equal, then print equal.	<pre> { cout << "Enter number 1 "; cin >> num1; cout << "Enter number 2"; cin >> num2;</pre>
4) Check if number1 is greater than number 2 than print value of number2.	<pre> } if (num1 == num2) { cout << "Equal\n"; }</pre>
5) Check if number2 is greater than number 1 print value of number1.	<pre> if (num1 > num2) { cout << "Max = " << num1 << endl; } if (num2 > num1) // if(num1 < num2) { cout << "Max = " << num2 << endl; } }</pre>

Now let's try to write different versions of above program.

```
#include "iostream"
using namespace std;
void main()
{
    int num1, num2;

    cout << "Enter number 1 ";
    cin >> num1;
```

Replace this block with else.

```
else
{
}
```

What code should be in else block. We have checked one condition that is of equality inside else we have to further check about greater number. code now becomes

```
if (num1 == num2)
{
    cout << "Equal\n";
}
```

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```
cout << "Enter number 2";
cin >> num2;
if (num1 == num2)
{
    cout << "Equal\n";
}
if (num1 > num2)
{
    cout << "Max = " << num1 << endl;
}
if (num2 > num1) // if(num1 < num2)
{
    cout << "Max = " << num2 << endl;
}
```

```
}
#include "iostream"
using namespace std;
void main()
{
    int num1, num2;
    cout << "Enter number 1 ";
    cin >> num1;
    cout << "Enter number 2";
    cin >> num2;
    if (num1 == num2)
    {
        cout << "Equal\n";
    }
    else
    {
```

If this block executes it will not go into else block but if this block does not executes it will move to else which means numbers are not equal.

False

```
if (num1 > num2)
{
    cout << "Max = " << num1 << endl;
}
if (num2 > num1) // if(num1 < num2)
{
    cout << "Max = " << num2 << endl;
}
}
```

Check num1 is greater than num2.
If yes than execute block.

Check num2 is greater than num1.
If yes than execute block.

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This block can be replaced as

```
if (num1 > num2)
{
    cout << "Max = " << num1 << endl;
}
else
{
    cout << "Max = " << num2 << endl;
}
```

Key points of IF-ELSE

```
#include "iostream"
```

```
using
void
{
```

As this block is written in else of condition where equality of number is checked. If equality matched no need to check further that's why rest of code is written in else. Inside else first greater number is being displayed.

```
if (some condition or true false)
```

```
{
```

```
}
```

```
if (some condition or true false)
```

```
{
```

```
}
```

```
if (some condition or true false)
```

```
{
```

```
}
```

```
else
```

```
{
```

Code written here will be executed only when above if statement is false i.e. above if is not executed.

This else has no link with first and second if. Else must be written immediately after if.

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```
}
```

```
}
```

When using IF-ELSE you cannot write code between them.

```
if (true/false)
```

```
{
```

```
}
```

Cannot code here because it breaks the sequence of if else.

```
else
```

```
{
```

```
}
```

