Programming Fundamentals (CS)

Whatsapp# 0333-5077664 **Muhammad Athar** email id: athar@northern.edu.pk

(Week 5) Lecture 8 and 9

Objectives: Learning objectives of this lecture are

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



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Muhammad Athar

email id: athar@northern.edu.pk

Whatsapp# 0333-5077664

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.3) Declare an identifier to store bill.4) Multiply quantity with product and save in identifier declared in step 3.	<pre>cout << "Enter Quantity "; cin >> qty; cout << "Enter Unit price "; cin >> unitprice; int bill; bill = qty * unitprice;</pre>
5) In step 4 you got bill before discount display it.	cout << "Bill befor discount " << bill << endl; int discount;
6) Declare another identifier for storing discount.	discount = bill * 10 / 100;
7) Compute 10 percent of bill computed	cout << "Discount " << discount << endl;
in step 3 and assign it to identifier	bill = bill - discount;
declared in step 6.	<pre>cout << "Bill After discount " << bill << endl;</pre>
8) Display value of discount.	
9) Subtract bill and discount and assign it to bill.	
10) In step 9 you got bill after discount display it.	}

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Now let us modify shove statement a hit, make discount conditional. Consider following

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 ";</pre>
                                                                Statement is conditional. Question arises on
        cin >> qty;
                                                                what condition this statement should be
        cout << "Enter Unit price ";</pre>
                                                                executed? Answer is simple and is given in
        cin >> unitprice;
                                                                above statement that this statement should be
       int bill;
                                                                executed only when amount of bill is greater
                                                                than 2000. We can say that.
       bill = qty * unitprice;
                                                                If bill is greater than 2000
        cout << "Bill befor discount " << bill <<</pre>
                                                                Than
       int discount;
                                                                Execute discount = bill * 10 / 100;
       discount = bill * 10 / 100;
        cout << "Discount " << discount << endl;</pre>
       bill = bill - discount;
        cout << "Bill After discount " << bill << endl;</pre>
}
```

Before writing a code for above program lets 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

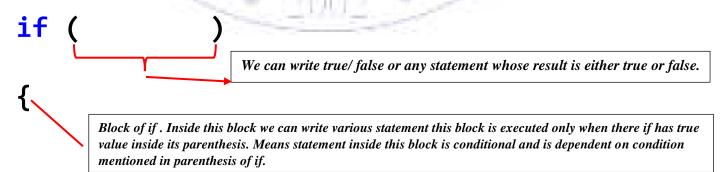
Consider given code for explanation of Boolean operators

```
#include "iostream"
using namespace std;
void main()
{
       int num1, num2;
                                                     If value of num1 is equal to num2 answer will be true
       cin >> num1;
                                                     otherwise answer will be false and stored in result.
        cin >> num2;
        bool result = num1 == num2;
                                                      If value of num1 is greater than num2 than answer will
                                                      be true otherwise answer will be false and stored in
        result = num1 > num2;
                                                     If value of num1 is less than num2 than answer will be
        result = num1 < num2;
                                                     true otherwise answer will be false and stored in result.
       result = num1 != num2;
                                                      If value of num1 is not equal num2 than answer will be
                                                      true otherwise answer will be false and stored in result.
       result = num1 >= num2;
                                                      If value of num1 is greater than or equal to num2 than
                                                      answer will be true otherwise answer will be false and
        result =
                 num1 <= num2;
                                                      stored in result.
}
                                                      If value of num1 is less than or equal to num2 than
                                                      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.



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

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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 than 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 than execute written inside this block.
             (An expression/statement that results true/false)
            If True than execute written inside this block.
             (An expression/statement that results true/false)
             If true than 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)
{

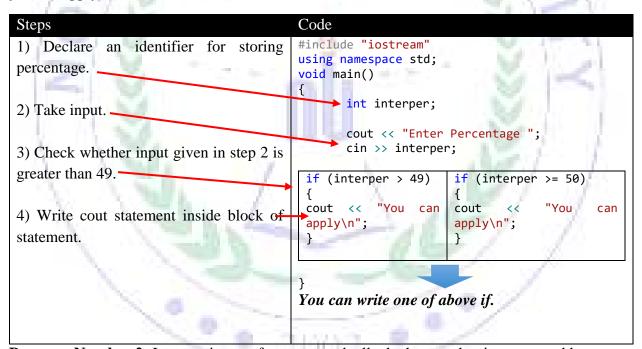
 You can write any code here

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.

<u>Program Number 1:</u> 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.



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"
	<pre>using namespace std; coid main()</pre>
2) Take input	{
	int number;

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Muhammad Athar email id: ath

email id: athar@northern.edu.pk

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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 ";</pre>
       cin >> number;
     if (number % 2 == 0)
       {
              cout << "Even\n";</pre>
                                                                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
              cout << "Odd\n";</pre>
                                                         if (number % 2 == 0)
}
                                                         {
                                                              cout << "Even\n";</pre>
ELSE:
   Else block is executed when if is not executed
                                                         else
   One if has only one else.
                                                         {
   Else cannot be written without if.
   > Else is written immediately after if
                                                            cout << "Odd\n";</pre>
   Writing else is not compulsory.
                                                         }
   Code written inside else block is also conditional.
```

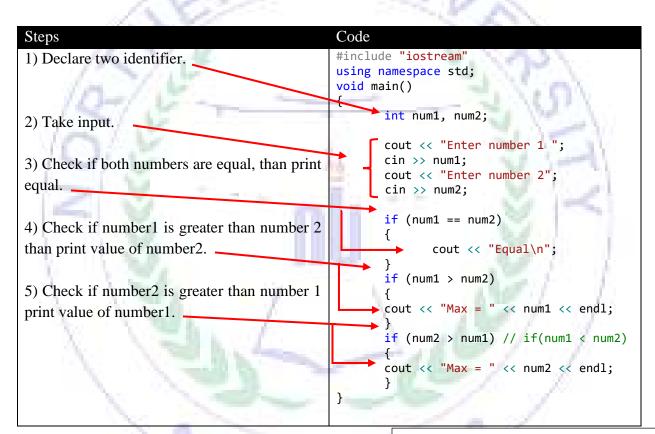
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<u>Program Number 3:</u> Input two numbers from user and tell whether both numbers are equal or not if numbers are not equal than print maximum number.



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";
      }</pre>
```

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```
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                 cout << "Enter number 2";</pre>
                 cin >> num2;
                 if (num1 == num2)
                        cout << "Equal\n";</pre>
                 if (num1 > num2)
                        cout << "Max = " << num1 << endl;</pre>
                 if (num2 > num1) // if(num1 < num2)</pre>
                        cout << "Max = " << num2 << end1</pre>
          }
          #include "iostream"
          using namespace std;
          void main()
                 int num1, num2;
                 cout << "Enter number 1 ";</pre>
                 cin >> num1;
                 cout << "Enter number 2";</pre>
                 cin >> num2;
                      (num1 == num2)
                                                                    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
                        cout << "Equal\n";</pre>
False
                 else
                        if (num1 > num2)
                                                                                   Check num1 is greater than num2.
                                                                                    If yes than execute block.
                                cout << "Max = " << num1 << endl;</pre>
                        if (num2 > num1) // if(num1 < num2)</pre>
                                                                                   Check num2 is greater than num1.
                                                                                    If yes than execute block.
                                cout << "Max = " << num2 << end1;</pre>
                 }
          }
```

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email id: athar@northern.edu.pk

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```
This block can be replaced as
     if (num1 > num2)
     {
          cout << "Max = " << num1 << endl;</pre>
     }
     else
     {
        cout << "Max = " << num2 << end1;</pre>
     }
Key points of IF-ELSE
#include "iostream"
using As this block is written in else of condition where equality of number is checked. If equality matched
void n 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 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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```
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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
{
}
```