CONDITIONAL SELECTION STATEMENTS

C++ programming language provides three conditional selection statements. They are:

1. *if* statement.

2. *if .... else* statement.
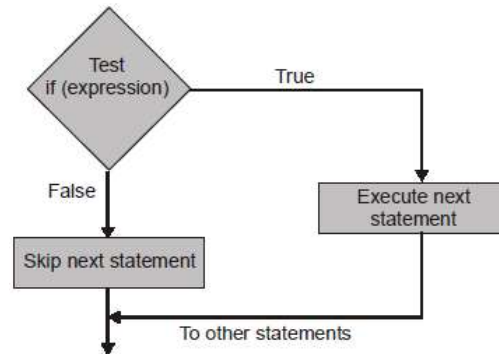
3. *switch* statement.

1. *if* STATEMENT:

The *if* statement allows to execute an instruction or block of instructions only if the specified condition is true. It has the following syntax:

> *if (conditional expression) statement* ;

If there are more than one statement to be executed , they are enclosed in curly braces {}:

> *if (conditional expression)*
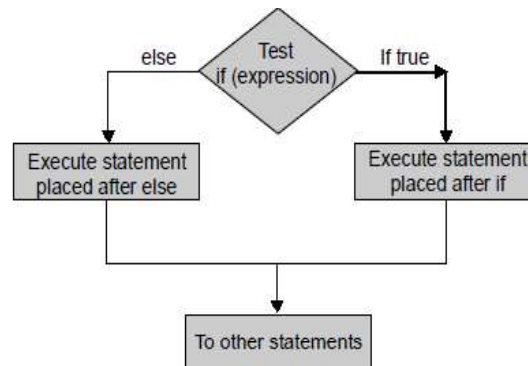>
> *{*
>
> > *Block_of_statements ;*
>
> *}*


| ```
if (x %2==0)
    cout << "x is even";
``` | ```
if (x %2==0)
{
    cout << "x is even";
    cout << x;
}
``` |
|---|---|

2. *if .... else* STATEMENT.

This statement is used when we have two choices, it is written as follows:

> *if (condition)*
>
> *{*
>
> > *Block1_of_statements ;*
>
> *}*
>
> *else*
>
> *{*
>
> > *Block2_of_statements ;*
>
> *}*

```
if (x %2== 0)
{
    cout << "x is even";
}
else
{
    cout << "x is odd";
}
```

The following program uses the *if....else* to test for divisibility (قابلية القسمة) of an integer.

```
#include<iostream.h>
main( )
{
    int n, m ;
    cout << "Enter two integer numbers: " ;
    cin>>n >>m ;
    if (n % m==0)
        cout<<n<< " is divisible by"<<m ;
    else
        cout<<n<<" is not  divisible by "<< m ;
    return (0) ;
}
```

A chain of *if .. else* expressions is used if there are more than two choices. The following program selects the name of the day of the week out of 7 choices.

```
#include<iostream.h>
void main(  )
{
    int  day ;
    cout<<"Enter the day number(1-7)"<<endl;
    cin>> day ;
    if (day == 1)
        cout<<"It is Sunday "<<endl;
    else if (day == 2)
```

```
            cout<<"It is Monday "<<endl;
      else if (day == 3)
            cout<<"It is Tuesday "<<endl;
      else if (day == 4)
            cout<<"It is Wednesday "<<endl;
      else if (day == 5)
            cout<<"It is Thursday "<<endl;
      else if (day == 6)
            cout<<"It is Friday "<<endl;
      else if(day==7)
            cout<<"It is Saturday "<<endl;
      else
            cout<<"The number is not in range.";
}
```

Ex: **Write a program to find the roots of a quadratic equation $Ax^2 + Bx + C = 0$**

```
#include<iostream.h>
#include<stdio.h>
void main(  )
{
      float A, B, C, D,x1,x2;
      cout<< "Enter the coefficients : " ;
      cin>>A>>B>>C ;
      D=B*B-4*A*C;
      if(D<0)
            cout<<"complex roots";
      else if (D>0)
      {
            x1=(-B/(2*A))+sqrt(D)/(2*A);
            x2=(-B/(2*A))-sqrt(D)/(2*A);
            cout<<"x1="<<x1;
            cout<<"x2="<<x2;
      }
      else
      {
            x1=-B/(2*A);
            x2=x1;
            cout<<"x1="<<x1;
            cout<<"x2="<<x2;
      }
}
```

Note: Relational and logical operators are often used with *if* and *if….else* statements.

Ex: Write a program to find the maximum of three integers

```
#include<iostream.h>
void main(  )
{
     int A, B, C, max;
     cout<< "Enter the three numbers : " ;
     cin>>A>>B>>C ;
     if (A>B && A>C)
          max=A;
     else if (B>C)
          max=B;
     else
          max=C;
     cout<<"the maximum integer is "<<max;
}
```

H.W Write a program receives student's marks (8 marks) and evaluates the average:

If 50<=average<60 print "poor".

If 60<=average<70 print "medium".

If 70<=average<80 print "good".

If 80<=average<90 print "very good".

If 90<=average<=100 print "excellent".

Otherwise print "fail".

CONDITIONAL SELECTION OPERATOR *(? :)*

If there are two options to choose from, the conditional selection operator *(? :)* may be used in place of *if … else* . The syntax is illustrated below :

condition ? statement 1 : statement 2

The above expression means that if the *condition* is true then *statement1* will be executed, otherwise *statement2* will be executed. For example:
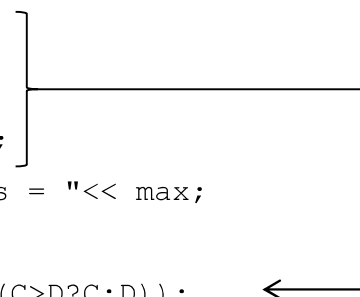
m>n ? max = m : max = n ;

y=(x>3) ? 100:200;

z=(x>3) ? x*x : 2*x+1;

Ex: Use the selection operator *(? :)* to find the maximum of four integers.

```
#include<iostream.h>
void main(  )
{
     int A, B, C, D, max;
     cout<< "Enter four numbers : " ;
     cin>>A>>B>>C>>D ;
     int max1=(A > B) ? A:B ;
     int max2=(C > D) ? C:D ;
     max=(max1 > max2) ? max1:max2 ;
     cout<< "Maximum of four numbers = "<< max;
}
max=((A>B?A:B)>(C>D?C:D)?(A>B?A:B):(C>D?C:D));
```

_H.W_ Use the selection operator **(? :)** to find the maximum of six integers.

3. The _switch_ STATEMENT (Multiple Choice Statement)

When a multiple selection is required we may use **_switch_** statement which is illustrated below:

switch (expression or variable)

{

      case value1 : statement1; break;

      case value2 : statement2; break;

      ....

      case value n : statement n; break;

      default : statement;

}

During execution of the program, the expression is evaluated and compared with the values mentioned in different cases of switch expression. If the value matches a value of a particular case, the statements in that case are executed. If no case-value matches with the value of the expression the program goes to the last statement which is a **_default statement_** as shown in figure below: