

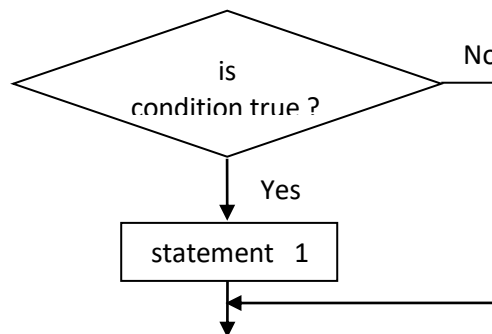
## **Selection (conditional) statement**

## 1. Selection (conditional) statement

- 1) if statement
- 2) if...else statements
- 3) Nested if statements
- 4) Switch statement

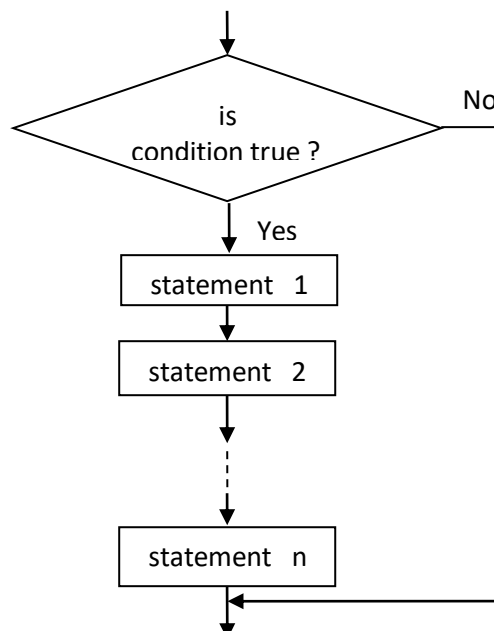
### 1.1 if statement

```
if (condition)  
    statement 1;
```



If we wish to execute several statements if the condition is true, we use a **block** which is a set of statements enclosed in braces.

```
if (condition)  
{  
    Statement 1;  
    Statement 2;  
    .  
    .  
    .  
    Statement n;  
}
```



**Example:** Write a C++ program that computes the division for two integer numbers.

```
#include <iostream.h>
void main()
{
    int  num1 , num2;
    cout<<"Enter two integer numbers: ";
    cin >> num1 >> num2;
    if (num2 != 0)
        cout<<num1<<"/"<<num2<<"= " <<num1/num2<<endl;
}
```

In case we want to compute the modulus in addition to division, we use the block:

```
#include <iostream.h>
void main()
{
    int  num1 , num2;
    cout<<"Enter two integer numbers: ";
    cin >> num1 >> num2;
    if (num2 != 0)
    {
        cout<<num1<<"/"<<num2<<"= " <<num1/num2<<endl;
        cout<<num1<<"%"<<num2<<"= " <<num1%num2<<endl;
    }
}
```

## 1.2 if...else statement

```
if (condition)
    statement1;
else
    statement2;
```

**Example:** Write a C++ program that inputs an integer number, and determines whether the number is even or odd.

```
#include <iostream.h>
void main()
{
    int  number;
    cout<<"Enter an integer number: ";
    cin >> number;
    if (number % 2 == 0)
        cout<<"The number is even."<<endl;
```

```

else
    cout<<"The number is odd."<<endl;
}

```

Sometimes if...else can be expressed in a compressed way using the **conditional operator (?:)**. For example, the previous program can be written as follows:

```

#include <iostream.h>
void main()
{
    int  number;
    cout<<"Enter an integer number: ";
    cin >> number;
    cout<<(number%2 == 0 ? "The number is even." :
        "The number is odd.") << endl;
}

```

**Example:** Write a C++ program that computes the following equation:

$$y = \begin{cases} x + 5 & x > 10 \\ 2x & x \leq 10 \end{cases}$$

```

#include <iostream.h>
void main()
{
    float  x , y;
    cout<<"Enter a value of x: "<< endl;
    cin >> x;
    y = (x > 10) ? x+5 : 2*x;
    cout<<"y= " << y << endl;
}

```

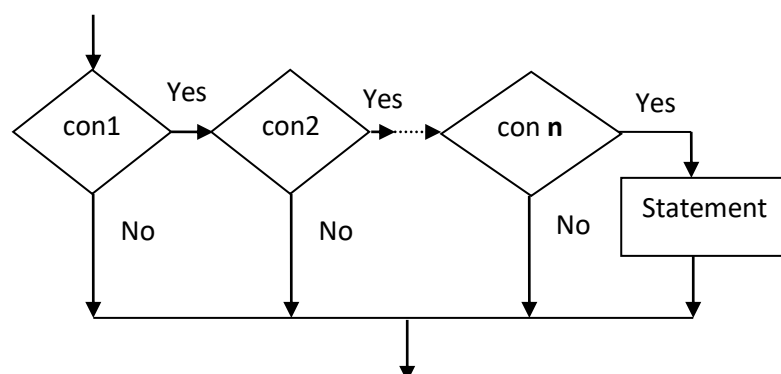
### 1.3 Nested if statements

1)

```

if (condition 1)
    if (condition 2)
        .
        .
        if (condition n)
            statement;

```



This type of nested if statements can also be written as follows:

if(condition1 && condition2 && ... && condition n) statement;

**Example:** Write a program that converts an integer number to character.

```
#include <iostream.h>
```

```
void main()
```

```
{
```

```
    int  number;
```

```
    cout<<"Enter an integer number: ";
```

```
    cin >> number;
```

```
    if (number >=0)
```

```
        if (number <=127)
```

```
            cout<<"The character is: "<<(char)number<<endl;
```

```
}
```

The two if statements can be replaced by the statement:

```
if (number >=0 && number <=127)
```

```
    cout<<"The character is: "<<(char)number<<endl;
```

2)

```
if (condition 1)
```

```
    statement1;
```

```
else
```

```
    if (condition 2)
```

```
        statement2;
```

```
else
```

```
    .
```

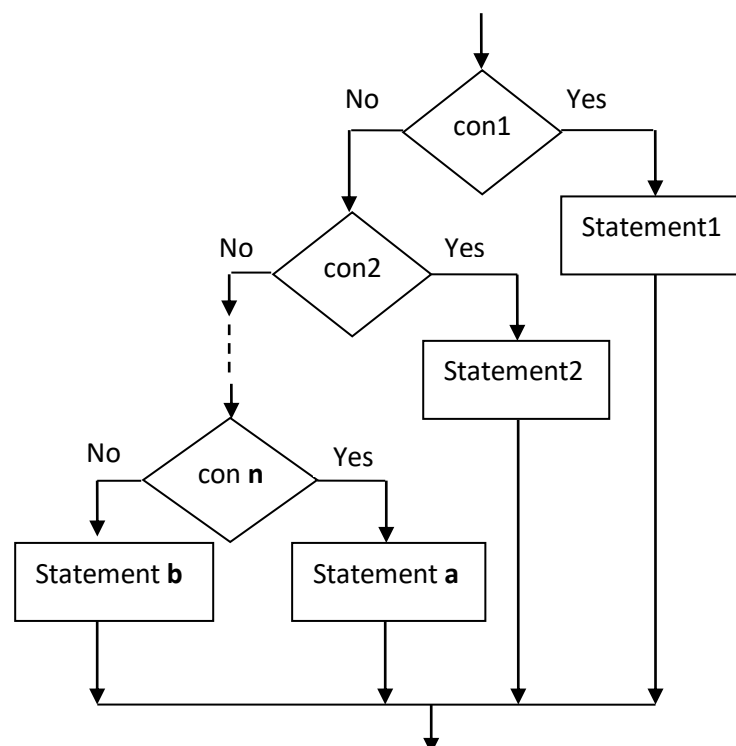
```
    .
```

```
    if (condition n)
```

```
        statement a;
```

```
else
```

```
    statement b;
```



**Example:** Write a C++ program that reads an average mark and prints the equivalent grade.

```
#include <iostream.h>
void main()
{
    float average;
    cout<<"Enter an average mark: ";
    cin >> average;
    if(average >= 90)
        cout<<"Your grade is excellent."<<endl;
    else
        if(average >= 80)
            cout<<"Your grade is very good."<<endl;
        else
            if(average >= 70)
                cout<<"Your grade is good."<<endl;
            else
                if(average >= 60)
                    cout<<"Your grade is medium."<<endl;
                else
                    if(average >= 50)
                        cout<<"Your grade is pass."<<endl;
                    else
                        cout<<"Your grade is fail."<<endl;
}
```

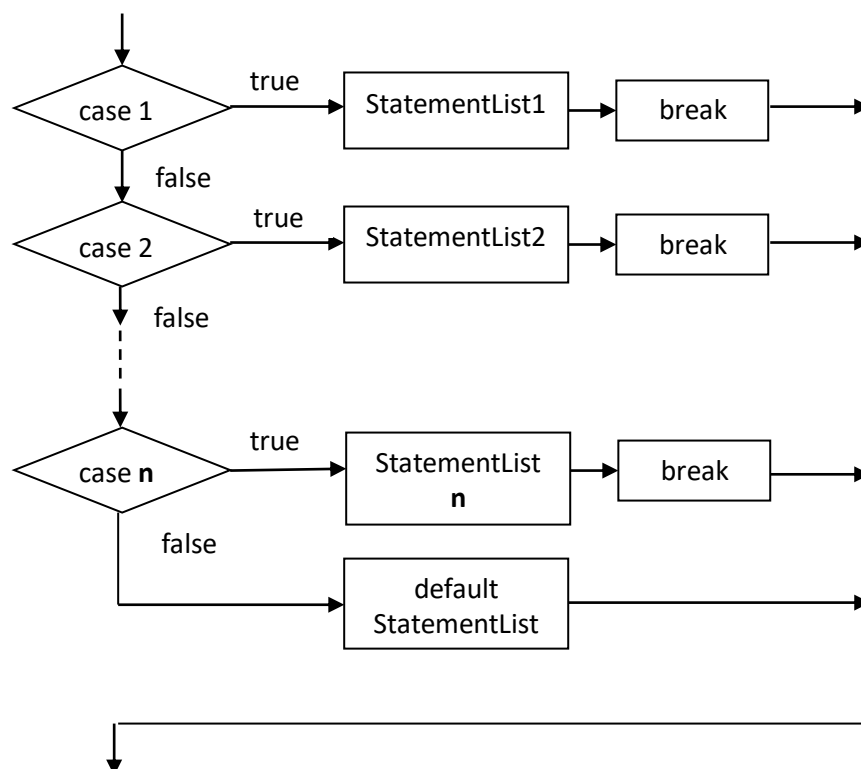
**Example:** Write a program that performs the arithmetic operations (+, -, \*, /) determined by a user input.

```
#include <iostream.h>
void main()
{
    float x , y;
    char op;
    cout<<"Enter value of x: ";
    cin >> x;
    cout<<"Enter value of y: ";
    cin >> y;
    cout<<"Enter operator: ";
    cin >> op;
    if(op == '+')
        cout << x+y;
    else
        if(op == '-')
            cout << x-y;
```

```
else
    if(op == '*')
        cout << x*y;
    else
        if(op == '/')
            cout << x/y;
        else
            cout << "Invalid operation.";
}
```

## 1.4 Switch statement

```
switch (expression) {
    case constant1: statementList1; break;
    case constant2: statementList2; break;
    .
    .
    case constantN: statementListN; break;
    default: statementList;
}
```



**Example:**

```
#include <iostream.h>
void main()
{
    float x , y;
    char op;
    cout<<"Enter value of x: ";
    cin >> x;
    cout<<"Enter value of y: ";
    cin >> y;
    cout<<"Enter operator: ";
    cin >> op;
    switch(op){
        case '+': cout<<x<<"+"<<y<<"="<<x+y; break;
        case '-': cout<<x<<"-"<<y<<"="<<x-y; break;
        case '*': cout<<x<<"*"<<y<<"="<<x*y; break;
        case '/': cout<<x<<"/"<<y<<"="<<x/y; break;
        default: cout<<"Invalid operation.";
    }
}
```

**Example:**

```
#include <iostream.h>
void main()
{
    char g;
    cout <<"Enter your grade: ";
    cin >> g;
    switch(g)
    {
        case 'A':
            cout <<"Your average must between 90 - 100" ;
            break;
        case 'B':
            cout <<"Your average must between 80 - 89" ;
            break;
        case 'C':
            cout <<"Your average must between 70 - 79" ;
            break;
        case 'D':
            cout <<"Your average must between 60 - 69" ;
            break;
        case 'E':
            cout <<"Your average must between 50 - 59" ;
            break;
    }
```



```
    default:
        cout << "Your average must between 0 - 49" ;
    }
}
```

## Homework

1. If a=1, b=2, and c=3, what are the values of a, b and c at the end of the following program segment?

```
if (a <= b)
    if (c > 2)
        c =2;
if (c < 3)
    a = 0;
else
    b = 0;
if (ch >= '0' && ch <= '9')
    cout << "kind = digit";
else if (ch >= 'A' && ch <= 'Z')
    cout << "kind = capital letter";
else if (ch >= 'a' && ch <= 'z')
    cout << "kind = small letter";
else
    cout << "kind = special";
```

2. Suppose the input is 5. What is the value of alpha after executing the following C++ code?

```
cin>>alpha;
switch(alpha)
{
    case 1:
    case 2: alpha = alpha + 2; break;
    case 4: alpha++;
    case 5: alpha = 2 * alpha;
    case 6: alpha = alpha +5; break;
    default: --alpha;
}
```

3. Suppose the input is 3. What is the value of b after executing the following C++ code?

```
cin>>b;
switch(b)
{
    case 3: b = b + 3;
    case 1: b++; break;
    case 5: b = b + 5;
```

```
case 4: b = b + 4;  
}
```

4. Write a program that reads a number and determines whether the number is positive, negative, or zero.
5. Write a C++ program that computes the following equation:

$$y = \begin{cases} 5x^2 + 6 & 0 \leq x \leq 100 \\ 0 & x \leq 0 \\ x^2 + 4x + 4 & x > 100 \end{cases}$$

6. Write a program that reads a character and prints out whether it is a vowel or a consonant.