University of Mosul

College of Computer Sciences and Mathematics

Department of Artificial Intelligence

Algorithms and Structured Programming (I)

First stage

Lecture 5

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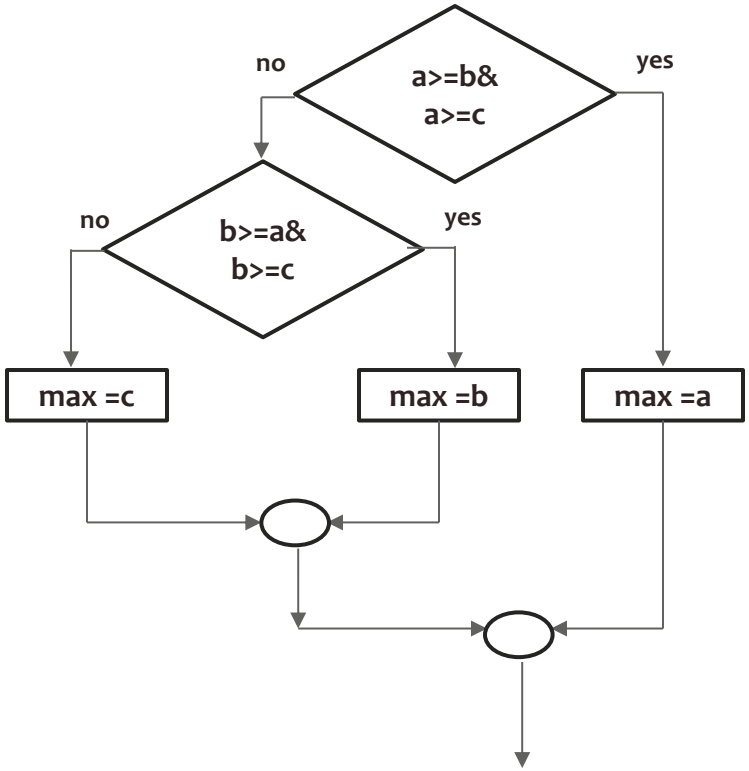
Lecture 5 Outline

1. Programs about the If statement
2. Switch statement
3. Programs about the Switch statement

Write a program to find the maximum number from three numbers a,b,c

Sol-1:

```
#include <iostream>
using namespace std;
int main()
{
    int a, b, c;
    cout << "\n a = ";
    cin >> a;

    cout << "\n b = ";
    cin >> b;

    cout << "\n c = ";
    cin >> c;

    if (a >= b && a >= c)
        cout << "\n a is the max number: " << a;
    else if (b >= a && b >= c)
        cout << "\n b is the max number: " << b;
    else
        cout << "\n c is the max number: " << c;

    return 0;
}
```




```
a = 20
b = 30
c = 10
b is the max number: 30
```

Sol-2:

```
#include <iostream>
using namespace std;
int main()
{
    int a, b, c;
    cout << "\n a = ";
    cin >> a;
    cout << "\n b = ";
    cin >> b;
    cout << "\n c = ";
    cin >> c;

    if (a >= b && a >= c)
        cout << "\n a is the max number: " << a;

    if (b >= a && b >= c)
        cout << "\n b is the max number: " << b;

    if (c >= a && c >= b)
        cout << "\n c is the max number: " << c;
    return 0;
}
```

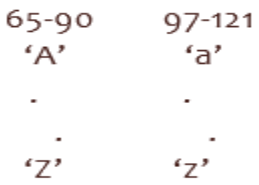
Write a C++ program to read a character from the user and check whether it is a small letter, a capital letter, or a symbol, and display the appropriate message.

```
#include <iostream>
using namespace std;
int main()
{
    char c;
    cout << "\n enter one char: ";
    cin >> c;

    if (c >= 'a' && c <= 'z')
        cout << "The char is small.\n";
    else if (c >= 'A' && c <= 'Z')
        cout << "The char is capital.\n";
    else
        cout << "The char is a symbol.\n";

    return 0;
}
```

```
if (c >= 'a' && c <= 'z')
    cout << "The char is small.\n";
else
    if (c >= 'A' && c <= 'Z')
        cout << "The char is capital.\n";
    else
        cout << "The char is a symbol.\n";
```

```
 enter one char: f
The char is small.
```

Write a C++ program to read a character. If the character is lowercase, convert it to uppercase, and if it is uppercase, conv ert it to lowercase.



- الحرف `'A'` في ASCII يساوي 65، بينما الحرف `'a'` يساوي 97.
- إذا قمنا بطرح 65 من 97، نحصل على الفرق، وهو 32.
- **إذا كان الحرف صغيرًا** (مثل `'a'`)، يمكننا تحويله إلى كبير بطرح 32:
- مثال: الحرف `'a'` يساوي 97. عندما نطرح 32، نحصل على 65، وهو الحرف `'A'`.
- **إذا كان الحرف كبيرًا** (مثل `'A'`)، يمكننا تحويله إلى صغير بإضافة 32:
- مثال: الحرف `'A'` يساوي 65. عندما نضيف 32، نحصل على 97، وهو الحرف `'a'`.

Sol-1:

```cpp
#include <iostream>
using namespace std;
int main()
{
    char ch, newCh;
    cout << "\nEnter one character: ";
    cin >> ch;

    if (ch >= 'a' && ch <= 'z')
    {
      newCh = ch - 32;
      cout << "The letter is small = " << ch << " and converted to capital letter = " << newCh << endl;
    }
    else if (ch >= 'A' && ch <= 'Z')
    {
      newCh = ch + 32;
      cout << "The letter is capital = " << ch << " and converted to small letter = " << newCh << endl;
    }
    else
    {
      cout << "The entered character is not a letter." << endl;
    }
    return 0;
}
```

Sol-2:

```
#include <iostream>
using namespace std;
int main()
{
    char ch, newCh;
    cout << "\n enter one char: ";
    cin >> ch;
    if (ch >= 'a' && ch <= 'z')
    {
        newCh = ch - 32;
        cout << "The letter is small = " << ch << " and converted to capital letter =" << newCh <<endl;
    }
    else
    }
        if (ch >= 'A' && ch <= 'Z')
        {
        newCh = ch + 32;
        cout << "The letter is capital = " << ch << " and converted to small letter = " << newCh<< endl;
        }
        else
        {
        cout << "The entered character is not a letter.\n";
        }
     }
    return 0;
}
```

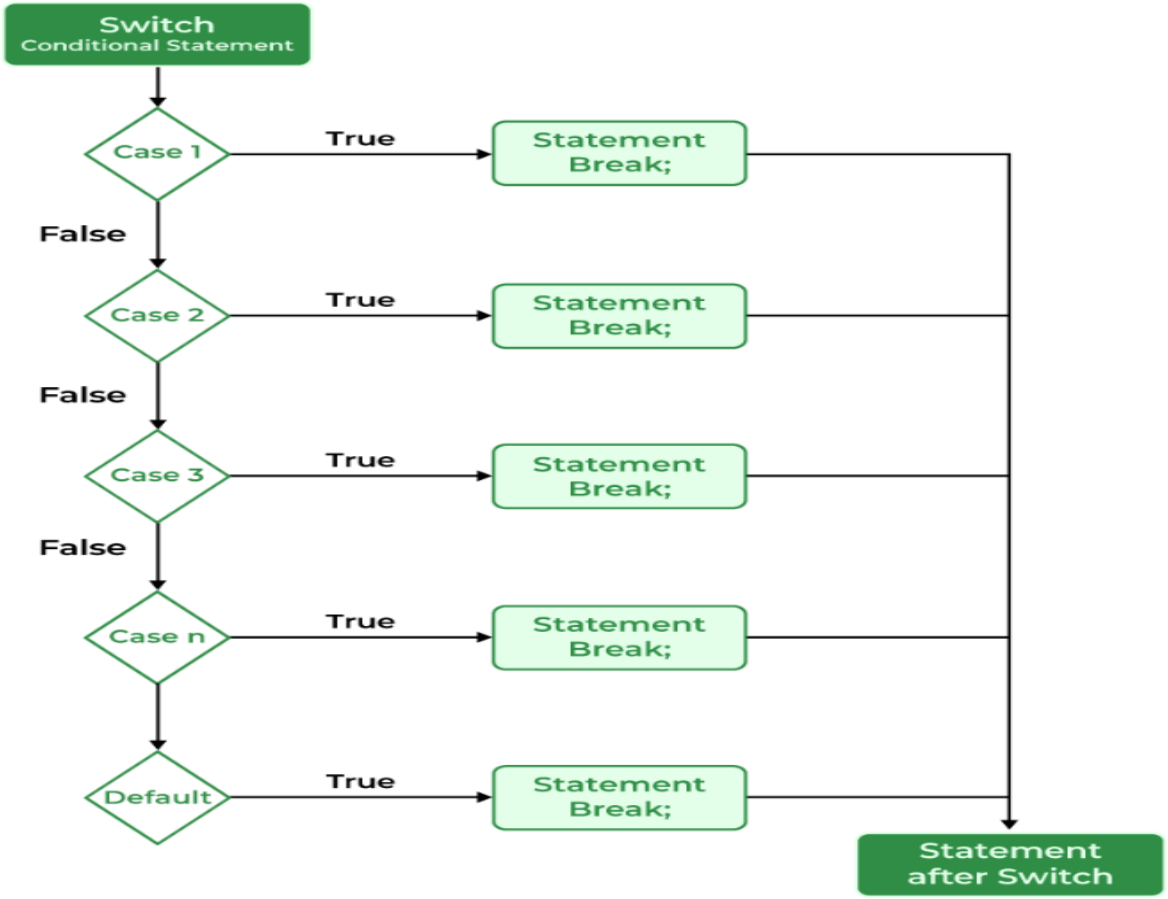
Switch case

Switch case it is one of control statement that control the execution of the program ,it's selected a one choice from many choices to execute the specific blocks of statements depending on the value of the given expression, which is matching with a value of the case. It is an alternative to the long if-else-if ladder which provides an easy way to execute different parts of code based on the value of the expression.

Syntax of switch Statement in C++

```
switch (expression)
{
        case value-1 :
                Statements-1;
                break;
        case value-2 :
                Statements-2;
                break;
         .        .
         .        .
        default :
                Statements-n;
}
```

Flowchart of Switch Statement in C++



Rules of the switch Statement in C++

There are some rules that we need to follow when using switch statements in C++. They are as follows:

1.The case value must be either ***int*** or ***char*** type.

2.There can be any number of cases.

3.No duplicate case values are allowed.

4.Each statement of the case can have a break statement. It is optional.

5.The default Statement is also optional.

Working of switch Statement in C++

Step 1.: The switch expression is evaluated.

Step 2.: The evaluated value is then matched against the present case values.

Step 3.: If the matching case value is found, that case block is executed.

But, If the matching code is not found, then the default case block is executed if present.

Step 4.: If the break keyword is present in the block, then program control comes out of the switch statement.

But, If the break keyword is not present, then all the cases after the matching case are executed.

Step 5. : Statements after the switch statement is executed.

Write a program in C++ to print a corresponding message of any value of x. if x=1 then print one, x=2 print two, x=3 print three , if x is any number then print other number. Use switch case.

```
#include <iostream>
using namespace std;
void main()
{
    int x;
    cout << "Enter a value for x: ";
    cin >> x;
    switch (x)
   {
    case 1:
        cout << "one\n";
        cout << x << endl;
        break;
    case 2:
        cout << "two\n";
        cout << x << endl;
        break;
    case 3:
        cout << "three\n" << x << endl;
        break;
    default:
        cout << "other numbers\n";
    }
}
```

Write a program in C++ to read two integer number and the operations (+,-) that applied between them by using switch case statement.

```
#include <iostream>
using namespace std;
int main()
{
    int x, y, sum, sub;
    char op;
    cout << "Enter x, y and the operation op: ";
    cin >> x >> y >> op;

    switch (op)
    {
    case '+':
        sum = x + y;
        cout << "Sum: " << sum << endl;
        break;
    case '-':
        sub = x - y;
        cout << "Subtraction : " << sub << endl;
        break;
    default:
        cout << "The operation is wrong." << endl;
    }
    return 0;
}
```

```
Enter x, y and the operation op: 10
7
-
Subtraction : 3
```