Programming for Beginners

Session 4 – Flow Control 1

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Content

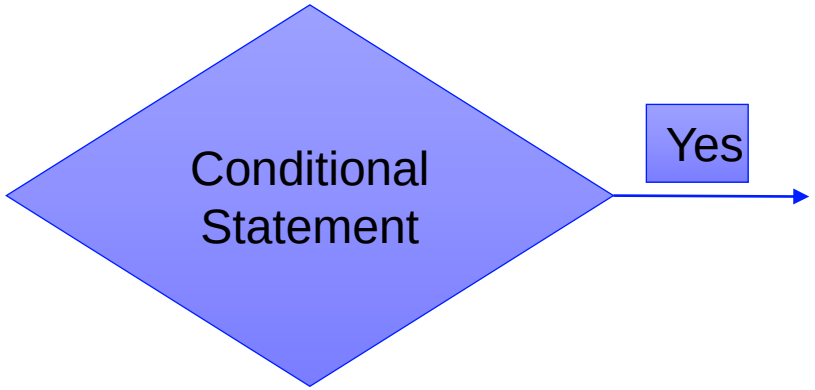
- if statement
- if – else
- Nested if
- if - else - if

What will you need today?

C++ Compiler (eg: Dev C++)
Alternate Online Compiler
Online C++ Compiler - online editor (onlinegdb.com)

C++ compiler support
C++ compiler support - cppreference.com

Conditional Statements



Conditional Statements

Examples:

If marks for the exam are above 45, have a passing grade.

If you have enough money, buy something.

If the battery is dead, plug it in to charge the battery.

if statement

Syntax:

Keyword → if (**condition**)

```
{
        statement 1;
        statement 2;
}
```

If the condition is true, these statements are executed

if statement

Example 1:

- If 100 is greater than 30, display “The number is greater than 30”.

```
#include <iostream>
using namespace std;

int main()
{
        if (100 > 30 )
        {
                cout<<” The number is greater than 30”<<endl;
        }

        return 0;
}
```

Since the condition is true,
This statement is executed

if statement

Example 2:

```
#include <iostream>
using namespace std;

int main()
{
        int numOne = 15 , numTwo = 3;

        if (numOne % numTwo ==0 )          // 15=3*5+0
        {
                cout<<“numOne can be divided by numTwo”<<endl;
        }

        return 0;
}
```

if statement

Example 3:

```
#include <iostream>
using namespace std;

int main()
{
        int lowerLimit = 40 , upperLimit = 100, Marks;
         cout<<“Enter a number:”;
        cin>>Marks;

        if (Marks > lowerLimit && Marks < upperLimit)
        {
                cout<<“The student has a passing grade”<<endl;
        }

        return 0;
}
```

Practice challenges 1

1. Develop a C++ program where the user is asked to enter the marks for assignments and check whether the it is less than 40. If the marks are less than 40, print that the student is not eligible for the end-semester examination.

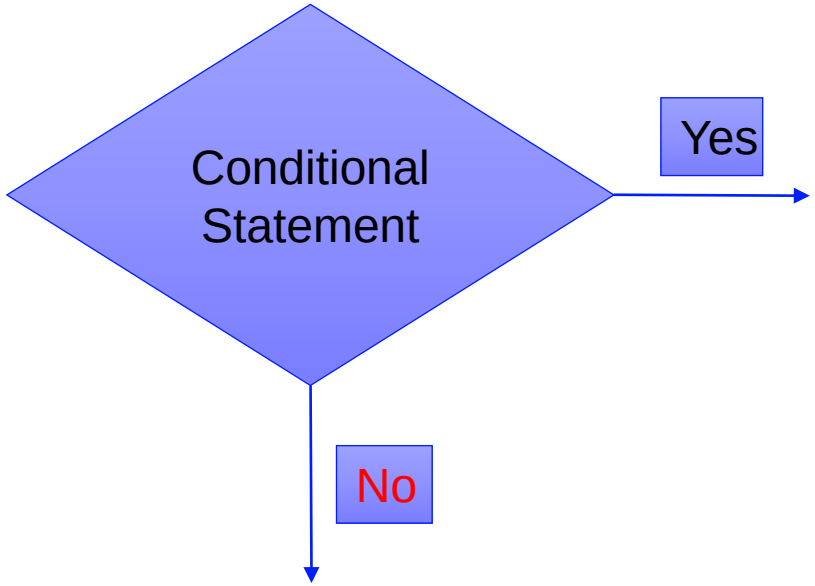
2. Develop a C++ program that checks whether user has entered an even number or not. if the user has entered an even number, then indicate whether the number is less than 100.

3. Write a C++ program to check whether user enters 'y‘ or ‘Y’.

4. Write down a C++ program to indicate whether user entered a character. Hint: use ASCII character values to check the condition

5. In a question paper there are 10 questions. Maximum marks allocation for first five questions is 25 (5 marks for each). 75 marks are allocated for other questions (15 marks for each). To pass the examination, student should obtain at least 15 marks from first five questions and at least 40 marks from other questions. Write down a C++ program to indicate whether the student passed the exam.

if the condition is not true?



if - else

Syntax:

Keyword → if (**condition**)

```
{
        statement 1;
        statement 2;
}
```

If the condition is true, these statements are executed

Keyword → else

```
{
        statement 1;
        statement 2;
}
```

If the condition is false, these statements are executed

if - else

Example 1:

```
int temp = 45;
if(temp >16 && temp <28)
{
        cout<<“The temperature is within the acceptable range”;
}
else
{
        cout<<“The temperature is within the acceptable range”;
}
```

if - else

Example 2:

```
float distance = 95.6;
if(distance <=100)
{
        cout<<“You can reach the place within 1 hour”;
}
else
{
        cout<<“Try another path”;
}
```

if - else

Example 3:

```
bool degree = true, skills=false;

if(degree && skills)
{
        cout<<“You are recruited for the job”;
}
else
{
        cout<<“Try again!”;
}
```

if - else

Example 4:

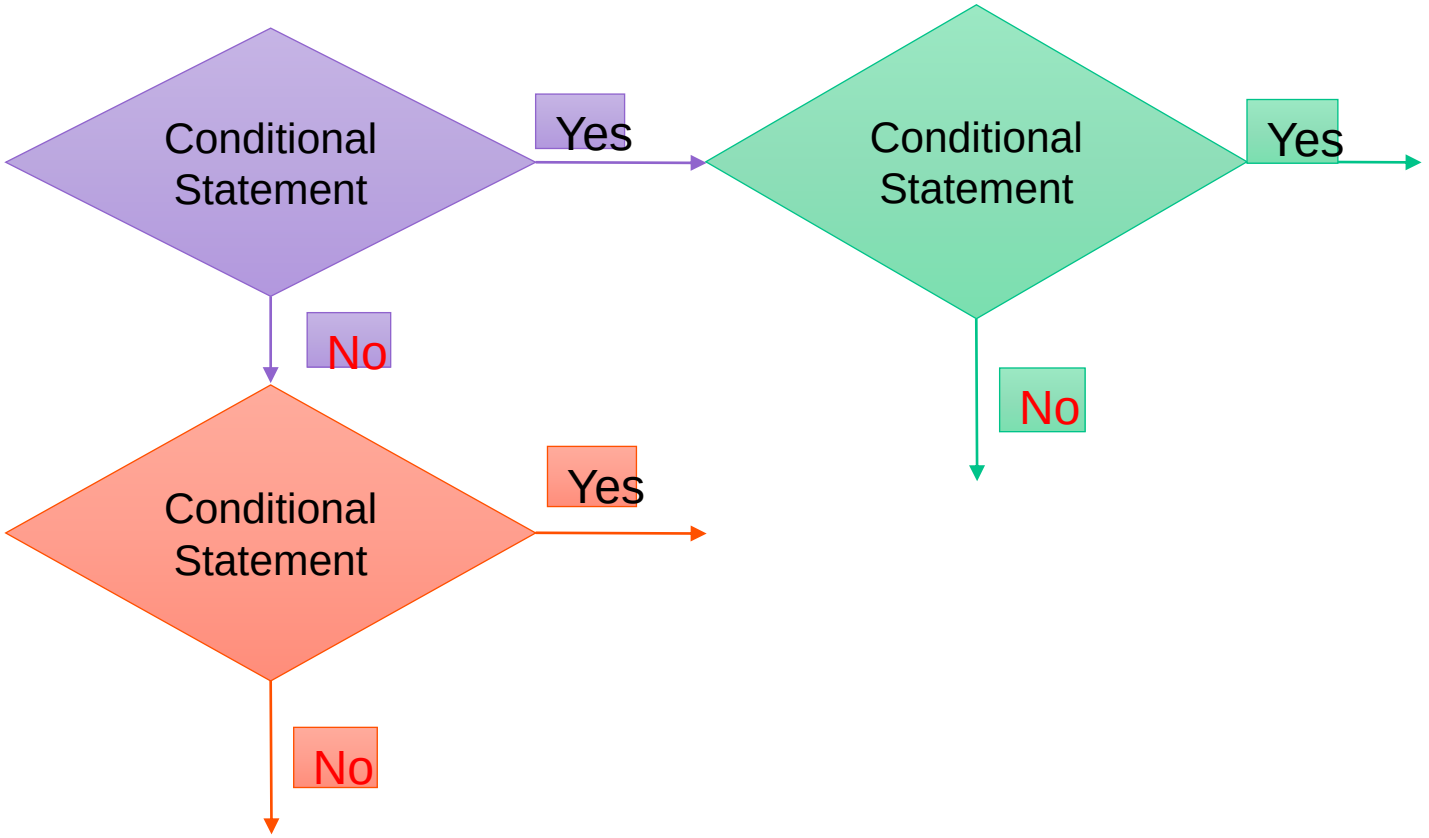
```
bool x = true, y=false;

if( x&&!y) || (!x&&y) )                    //XOR logic gate
{
        cout<<"Output is True";
}
else
{
        cout<<"Output is false";
}
```

Practice challenges 2

1. In a school, there are two examination halls called Hall 001 and Hall 002. Students having registration number below 125684 should be sit in Hall 001 whereas others should be sat in Hall 002. Develop a C++ program that indicate the relevant examination hall.

2. There is a door having a password of 4 digits number. Develop a C++ program that open the door only if the all four digits are match with the password.

Nested conditions



Nested if

Syntax:

```
if (condition1)
{
        if(condition2)
        {
                statement 1;
                statement 2;
        }
        else
        {
                statement 1;
                statement 2;
        }
}
else
{
        statement 1;
        statement 2;
}
```

If **conditions 1 and 2 are true**, these statements are executed

If **condition 1 is true** and **condition 2 is false,** these statements are executed

If the **condition 1 is false**, these statements are executed

Nested if

Example 1:

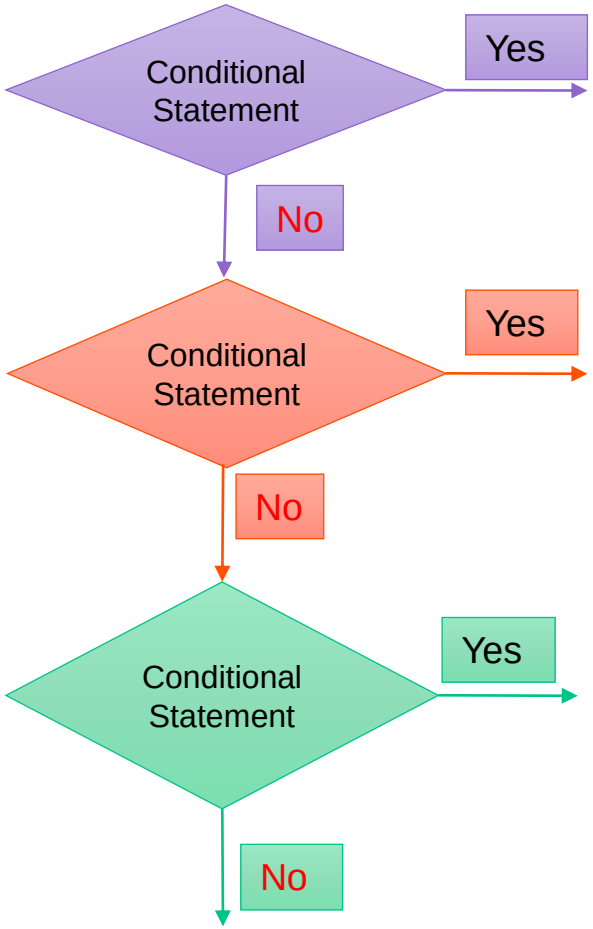
```
bool passOL = true, passAL = true;
if (passOL)
{
        if(passAL)
        {
                cout<<“Apply for the university”;
        }
        else
        {
                cout<<“No worries, retry AL”;
        }
        }
else
{
         cout <<“No worries, retry OL”;
}
```

Nested if

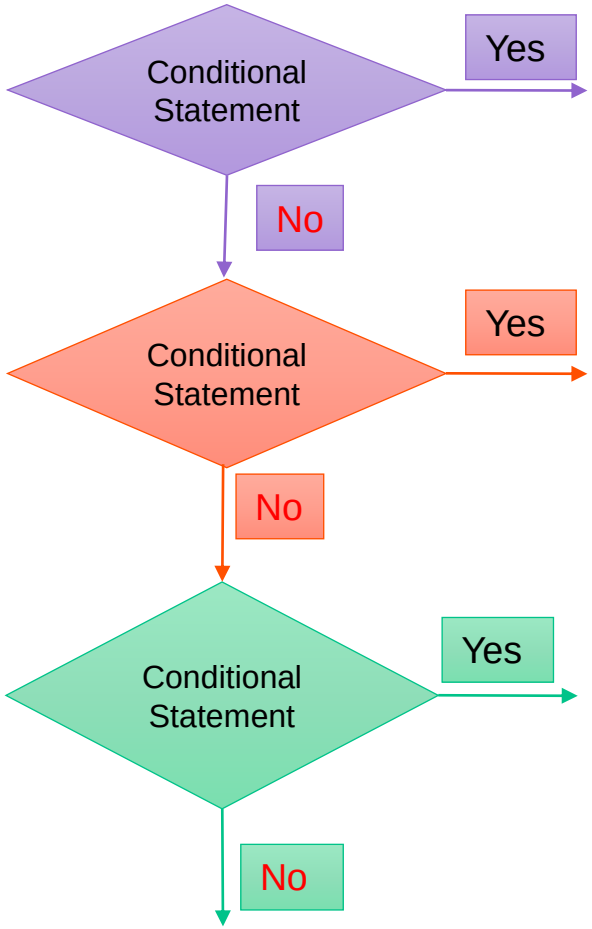
Example 2:

```
int investment = 1000, duration=3;
if (investment >1000)
{
        if(duration>5)
        {
                cout<<“Interest is 15% per year”;
        }
        else
        {
                cout<<“Interest is 10% per year”;
        }
}
else
{
        cout<<“Interest is 5% per year”;
}
```

What is happening here?



What is happening here?




```
if (condition)
{
}
else
{
        if (condition)
        {
        }
        else
        {

                if (condition)
                {
                }
                else
                {
                 }
         }
}
```

if-else-if

Syntax:

```
if (condition 1)
{
        statement 1;
        statement 2;
}
else if (condition 2)
{
        statement 1;
        statement 2;
}
…
else
{
        statement 1;
        statement 2;
}
```

If **condition 1 is true**, these statements are executed.

If **condition 1 is false** and **condition 2 is true,** these statements are executed

If all **conditions are false**, these statements are executed

if-else-if

```
char time='b';

if (time='b')
{
        cout<<"This is the time for breakfast. Have sandwiches!";
}
else if (time='l')
{
        cout<<"This is the time for lunch. Have fried rice!";
}
else if (time='d')
{
        cout<<"This is the time for dinner. Have noodles!";
}
else
{
        cout<< "This is tea time. Have a cup of tea!";
}
```

Practice challenges 3

1. For group work in a school, students are divided into four groups. Develop a C++ program that indicates the relevant group number.

Remainder of (Index No/4)	Group
0	A
1	B
2	C
3	D

2. Develop a C++ program that checks whether user input is a primary number using only nested-if. Hint: The user input is an integer value between 0 – 15.

Answers - Practice challenges 1

```cpp
//Question 01

#include <iostream>
using namespace std;

int main()
{
    int marks;
    cout<<"Enter marks: ";
    cin>>marks;

    if(marks < 40)
    {
        cout<<"The student is not eligible for the end-semester examination."<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 1

```cpp
//Question 02

#include <iostream>
using namespace std;

int main()
{
    int number;
    cout<<"Enter a number: ";
    cin>>number;

    if(number % 2 == 0)
    {
        cout<<"This is an even number"<<endl;

        if(number < 100)
        {
            cout<<"The number is less than 100"<<endl;
        }
    }
    else
    {
        cout<<"This is an odd number"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 1

```cpp
//Question 03

#include <iostream>
using namespace std;

int main()
{
    char character;
    cout<<"Enter character 'y' or 'Y': ";
    cin>>character;

    if(character == 'y')
    {
        cout<<"You entered 'y'"<<endl;
    }
    else if (character == 'Y')
    {
        cout<<"You entered 'Y'"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 1

```cpp
//Question 04

#include <iostream>
using namespace std;

int main()
{
    char character;
    cout<<"Enter userinput: ";
    cin>>character;

    if((character >= 65) &&  (character <= 122))
    {
        cout<<"You entered a character."<<endl;
    }
    else
    {
        cout<<"This is not a character."<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 1

```cpp
//Question 05

#include <iostream>
using namespace std;

int main()
{
    int marks[10], marksPart1, marksPart2;
    cout<<"Enter marks for each question: "<<endl;

    cout<<"Question 1 (0-5): ";
    cin>>marks[0];
    cout<<"Question 2 (0-5): ";
    cin>>marks[1];
    cout<<"Question 3 (0-5): ";
    cin>>marks[2];
    cout<<"Question 4 (0-5): ";
    cin>>marks[3];
    cout<<"Question 5 (0-5): ";
    cin>>marks[4];
    cout<<"Question 6 (0-15): ";
    cin>>marks[5];
    cout<<"Question 7 (0-15): ";
    cin>>marks[6];
    cout<<"Question 8 (0-15): ";
    cin>>marks[7];
    cout<<"Question 9 (0-15): ";
    cin>>marks[8];
    cout<<"Question 10 (0-15): ";
    cin>>marks[9];

    marksPart1 = marks[0] + marks[1] + marks[2] + marks[3] + marks[4];
    marksPart2 = marks[5] + marks[6] + marks[7] + marks[8] + marks[9];

    cout<<endl;
    cout<<"Marks for part 1: "<<marksPart1<<endl;
    cout<<"Marks for part 2: "<<marksPart2<<endl<<endl;

    if((marksPart1 + marksPart2) > 100)
    {
        cout<<"Input data is invalid!"<<endl;
        return 0;
    }

    if((marksPart1 >= 15) && (marksPart2 >= 40))
    {
        cout<<"Passed!"<<endl;
    }
    else
    {
        cout<<"Failed!"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 2

```cpp
//Question 01

#include <iostream>
using namespace std;

int main()
{
    int number;
    cout<<"Enter the registration number: ";
    cin>>number;

    if(number < 125684)
    {
        cout<<"Examination hall: Hall 001"<<endl;
    }
    else
    {
        cout<<"Examination hall: Hall 002"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 2

```cpp
//Question 02

#include <iostream>
using namespace std;

int main()
{
    int number;
    int password =  3579;

    cout<<"Enter the password: ";
    cin>>number;

    if(number == password)
    {
        cout<<"The door is opened!"<<endl;
    }
    else
    {
        cout<<"The door is closed!"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 3

```cpp
//Question 01

#include <iostream>
using namespace std;

int main()
{
    int number;

    cout<<"Enter Index No: ";
    cin>>number;

    if((number % 4) == 0)
    {
        cout<<"Group - A"<<endl;
    }
    else if((number % 4) == 1)
    {
        cout<<"Group - B"<<endl;
    }
    else if((number % 4) == 2)
    {
        cout<<"Group - C"<<endl;
    }
    else
    {
        cout<<"Group - D"<<endl;
    }

    return 0;
}
```

Answers - Practice challenges 3

```cpp
//Question 02

#include <iostream>

int main()
{
    int num;
    std::cout << "Enter a number between 0 and 15: ";
    std::cin >> num;

    if (num >= 0 && num <= 15)
    {
        if (num == 2 || num == 3 || num == 5 || num == 7 || num == 11 || num ==13)
        {
            std::cout << "The number is a prime number." << std::endl;
        }
        else
        {
            std::cout << "The number is not a prime number." << std::endl;
        }
    } else
    {
        std::cout << "Please enter a valid number between 0 and 15." << std::endl;
    }

    return 0;
}
```

Thank you