C++ Programming Language

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Operators

Arithmetic Operators

- Assume variable A holds 10 and variable B holds 20, then: Show Examples

Operator	Description	Example
+	Adds two operands	A + B will give 30
-	Subtracts second operand from the first	A - B will give -10
*	Multiplies both operands	A * B will give 200
/	Divides numerator by de-numerator	B / A will give 2
%	Modulus Operator and remainder of after an integer division	B % A will give 0
++	Increment operator, increases integer value by one	A++ will give 11
--	Decrement operator, decreases integer value by one	A-- will give 9

Operators(cont.)

- **Relational Operators(Comparison operators)**
  - Assume variable A holds 10 and variable B holds 20, then: Show Examples

Operator	Description	Example
==	Checks if the values of two operands are equal or not, if yes then condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not, if values are not equal then condition becomes true.	(A != B) is true.
>	Checks if the value of left operand is greater than the value of right operand, if yes then condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand, if yes then condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand, if yes then condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand, if yes then condition becomes true.	(A <= B) is true.

Operators(cont.)

- **Logical Operators(Boolean operators)**
  - Assume variable A holds 1 and variable B holds 0, then: Show Examples

Operator	Description	Example
&&	Called Logical AND operator. If both the operands are non-zero, then condition becomes true.	(A && B) is false.
||	Called Logical OR Operator. If any of the two operands is non-zero, then condition becomes true.	(A || B) is true.
!	Called Logical NOT Operator. Use to reverses the logical state of its operand. If a condition is true, then Logical NOT operator will make false.	!(A && B) is true.

Operators(cont.)

Assignment Operators

- Show Examples

Operator	Description	Example
=	Simple assignment operator, Assigns values from right side operands to left side operand	C = A + B will assign value of A + B into C
+=	Add AND assignment operator, It adds right operand to the left operand and assign the result to left operand	C += A is equivalent to C = C + A
-=	Subtract AND assignment operator, It subtracts right operand from the left operand and assign the result to left operand	C -= A is equivalent to C = C - A
*=	Multiply AND assignment operator, It multiplies right operand with the left operand and assign the result to left operand	C *= A is equivalent to C = C * A
/=	Divide AND assignment operator, It divides left operand with the right operand and assign the result to left operand	C /= A is equivalent to C = C / A
%=	Modulus AND assignment operator, It takes modulus using two operands and assign the result to left operand	C %= A is equivalent to C = C % A

Operators(cont.)

Additional Operators

Operator	Description
sizeof	sizeof operator returns the size of a variable. For example, sizeof(a), where a is integer, will return 4.
Condition ? X : Y	Conditional operator. If Condition is true ? then it returns value X : otherwise value Y
,	Comma operator causes a sequence of operations to be performed. The value of the entire comma expression is the value of the last expression of the comma-separated list.
. (dot) and -> (arrow)	Member operators are used to reference individual members of classes, structures, and unions.
Cast	Casting operators convert one data type to another. For example, int(2.2000) would return 2.
&	Pointer operator & returns the address of an variable. For example &a; will give actual address of the variable.
*	Pointer operator * is pointer to a variable. For example *var; will pointer to a variable var.

Operators(cont.)

- **Additional Operators**
  - Conditional ? : Operator
    - Exp1 ? Exp2 : Exp3;

```
#include <iostream>
using namespace std;
int main ()
    { // Local variable declaration:
        int x, y = 10;
        x = (y < 10) ? 30 : 40;
        cout << "value of x: " << x << endl;
    return 0; }
```

  - When the above code is compiled and executed, it produces the following result: value of x: 40

Operators(cont.)

- **Additional Operators**
  - Casting Operators
    - (type) expression

```
#include <iostream>
using namespace std;
int main()
{    double a = 21.09399;
     float b = 10.20; int c ;
   c = (int) a; cout << "Line 1 - Value of (int)a is :" << c <<endl;
    c = (int) b; cout << "Line 2 - Value of (int)b is :" << c << endl ;
return 0; }
```

When the above code is compiled and executed, it produces the following result:

Line 1 - Value of (int)a is :21 Line 2 - Value of (int)b is :10

Common Escape Sequences

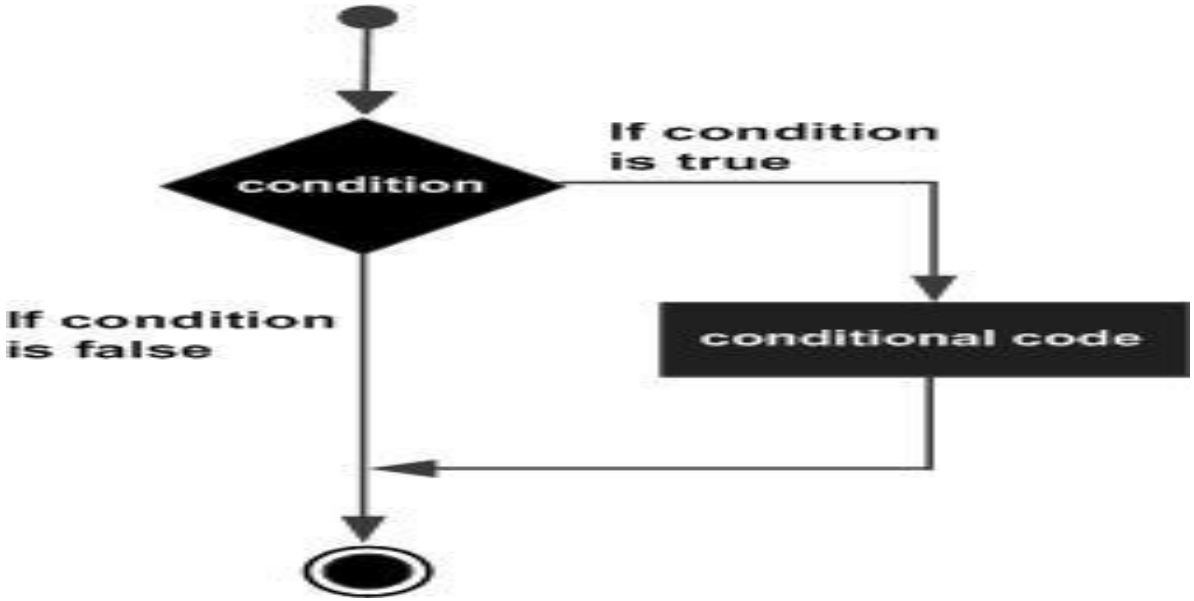
- **Escape sequences** give you the ability to exercise greater control over the way information is output by your program

Escape Sequence	Name	Description
\n	Newline Causes	the cursor to go to the next line for subsequent printing.
\t	Horizontal tab	Causes the cursor to skip over to the next tab stop.
\a	Alarm	Causes the computer to beep.
\b	Backspace	Causes the cursor to back up, or move left one position.
\r	Return	Causes the cursor to go to the beginning of the current line, not the next line.
\\	Backslash	Causes a backslash to be printed.
\'	Single quote	Causes a single quotation mark to be printed.
\"	Double quote	Causes a double quotation mark to be printed.

Decision Making

- **if statement**
  - Syntax:
    - if(condition)

      { // statement(s) will execute if the condition is true }



Decision Making(cont.)

- **if statement :**Example

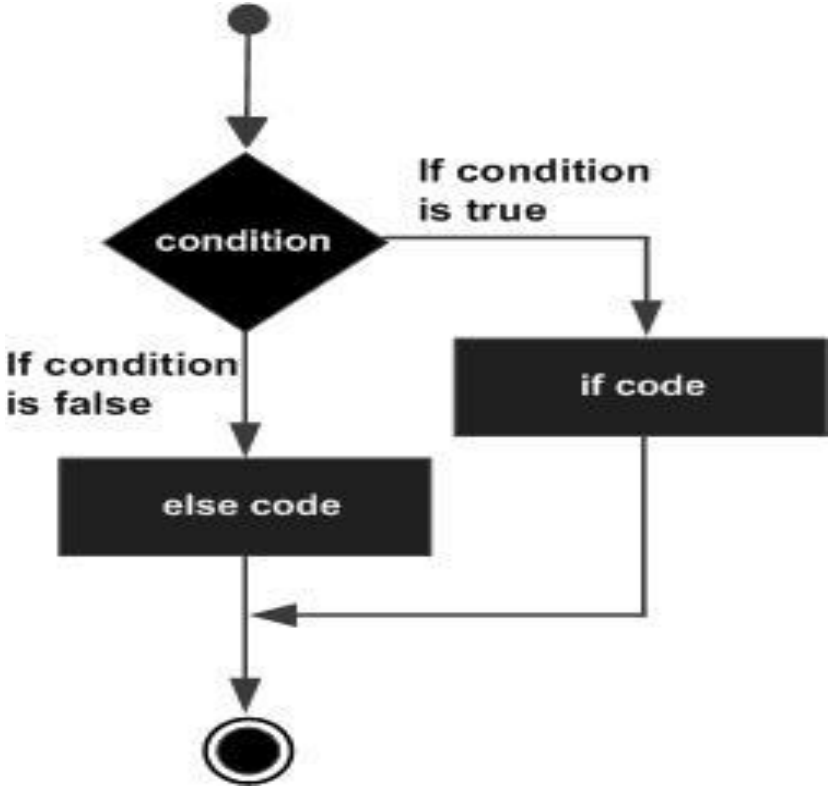
```
#include <iostream>
 using namespace std;
int main ()
{
    int a = 10;
    if( a < 20 ) // if condition is true then print the following
    { cout << "a is less than 20;" << endl; }
     cout << "value of a is : " << a << endl;
      return 0;
}
```

Output: a is less than 20; value of a is : 10

Decision Making(cont.)

- **if…else statement**
  - Syntax:

```
if (condition)
   {
     S1;
    }
else
 {
    S2;
 }
```



Decision Making(cont.)

- **if…else statement:** Example

```
#include <iostream>
using namespace std;
int main ()
{   int a = 100;
    if( a < 20 ) // if condition is true then print the following
    {
        cout << "a is less than 20;" << endl; }
    else // if condition is false then print the following
    {
        cout << "a is not less than 20;" << endl;}
    cout << "value of a is : " << a << endl; return 0; }
```

Output: a is not less than 20; value of a is : 100

Decision Making(cont.)

- **if...else if...else Statement**
  - Syntax:

```
if(Condition 1)
{ // Executes when the Condition 1 is true }
 else if(Condition 2)
 { // Executes when the Condition 2 is true }
else if(Condition 3)
 { // Executes when the Condition 3 is true }
 else { // executes when the none of the above
Condition is true. }
```

Decision Making(cont.)

- **if...else if...else Statement:** Example

```
#include <iostream>
 using namespace std;
 int main ()
  {   int a = 100;
        if( a == 10 ) // if condition is true then print the following
          {cout << "Value of a is 10" << endl; }
      else if( a == 20 ) // if else if condition is true
          {cout << "Value of a is 20" << endl; }
       else if( a == 30 ) // if else if condition is true
          {cout << "Value of a is 30" << endl; }
       else // if none of the conditions is true
          {cout << "Value of a is not matching" << endl; }
      cout << "Exact value of a is : " << a << endl; return 0; }
```

Output: Value of a is not matching

Exact value of a is : 100

Decision Making(cont.)

- **switch statement**
  - Syntax:

```
switch(expression)
{
    case constant-expression : statement(s);
     break; //optional
   case constant-expression : statement(s);
     break; //optional
    // you can have any number of case statements.
     default : //Optional
   statement(s);
}
```

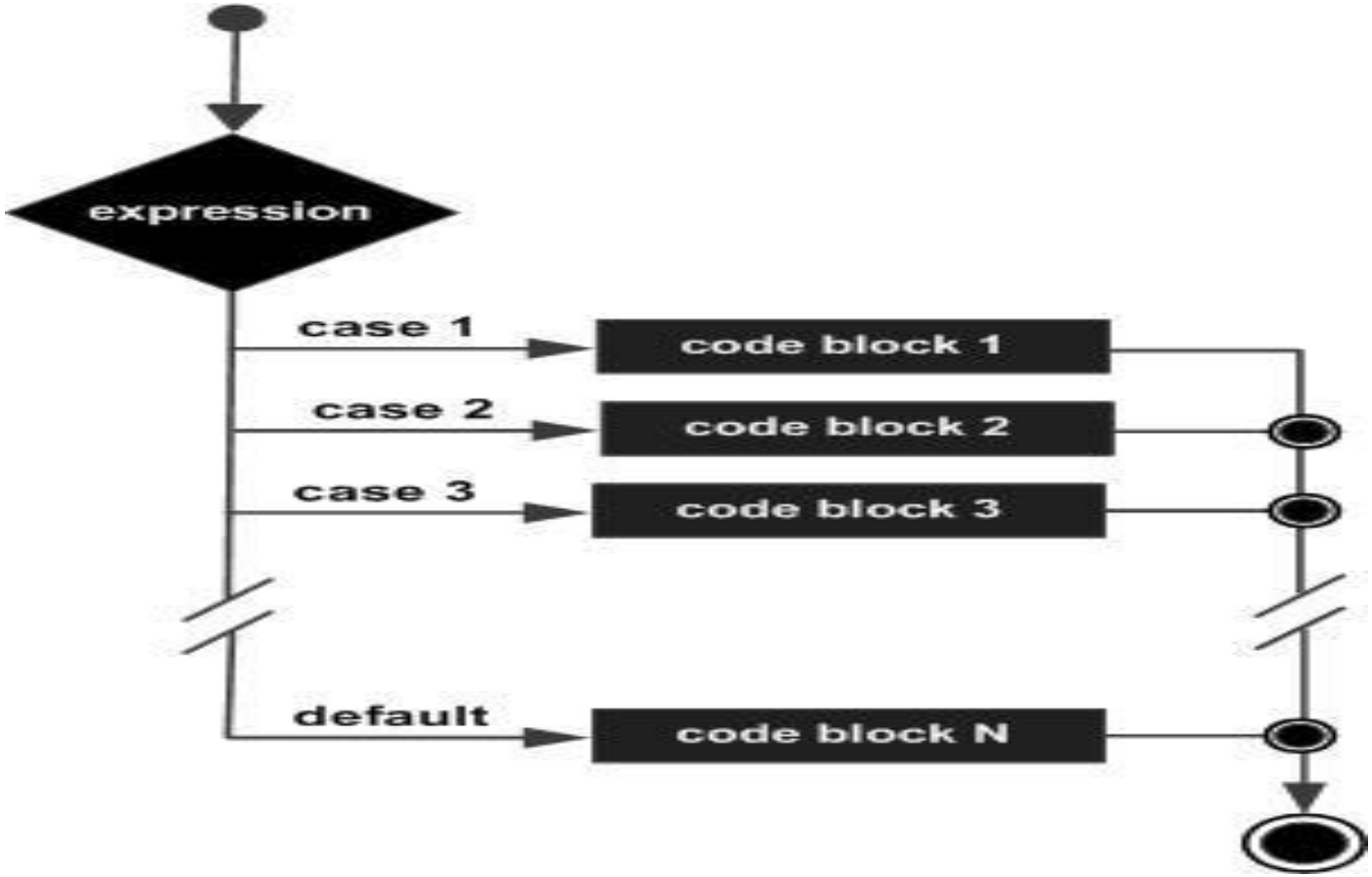
Decision Making(cont.)

switch statement

- The expression used in a switch statement must have an integral or enumerated type, or be of a class type in which the class has a single conversion function to an integral or enumerated type.
- You can have any number of case statements within a switch. Each case is followed by the value to be compared to and a colon.
- The constant-expression for a case must be the same data type as the variable in the switch, and it must be a constant or a literal.
- When the variable being switched on is equal to a case, the statements following that case will execute until a break statement is reached.
- When a break statement is reached, the switch terminates, and the flow of control jumps to the next line following the switch statement.
- Not every case needs to contain a break. If no break appears, the flow of control will *fall through* to subsequent cases until a break is reached.
- A switch statement can have an optional default case, which must appear at the end of the switch. The default case can be used for performing a task when none of the cases is true. No break is needed in the default case.

Decision Making(cont.)

- **switch statement**



Decision Making(cont.)

- **switch statement:** Example

```
#include <iostream>
 using namespace std;
int main ()
   {    char grade = 'D';
    switch(grade)
    {   case 'A' : cout << "Excellent!" << endl;
          break;
         case 'B' : case 'C' : cout << "Well done" << endl;
        break;
        case 'D' : cout << "You passed" << endl;
        break;
        case 'F' : cout << "Better try again" << endl;
         break;
         default : cout << "Invalid grade" << endl; }
         cout << "Your grade is " << grade << endl; return 0; }
```

Decision Making(cont.)

- **switch statement:** Example

Output:

You passed

Your grade is D

Decision Making(cont.)

- **nested if statements**
  - Syntax:

```
if( Condition1)
{
// Executes when the Condition1 is true
      if(Condition 2)
     {
     // Executes when the Condition2 is true
      }
 }
```

Decision Making(cont.)

- **nested if statements** Example:

```
#include <iostream>
using namespace std;
 int main ()
 { int a = 100, b = 200;
      if( a == 100 )
       {
            if( b == 200 )
             { cout << "Value of a is 100 and b is 200" << endl; }
      }
      cout << "Exact value of a is : " << a << endl;
      cout << "Exact value of b is : " << b << endl;
 return 0; }
```

Decision Making(cont.)

nested if statements Example:

Output

```
Value of a is 100 and b is 200
Exact value of a is : 100
Exact value of b is : 200
```

Decision Making(cont.)

- **nested switch statements**
  - Syntax:

```
switch(ch1)
{
    case 'A':
        cout << "This A is part of outer switch";
        switch(ch2)
        {
        case 'A': cout << "This A is part of inner switch"; break; case
        'B': // ...
        }
    break;
    case 'B': // ...
}
```

Decision Making(cont.)

- **nested switch statements** Example:

```
#include <iostream>
using namespace std;
int main ()
{
int a = 100; int b = 200;
switch(a)
{ case 100:
        cout << "This is part of outer switch" << endl;
         switch(b)
             {
                case 200: cout << "This is part of inner switch" << endl;
             }
  }
cout << "Exact value of a is : " << a << endl;
cout << "Exact value of b is : " << b << endl; return 0; }
```

Decision Making(cont.)

- **nested switch statements** Example:

Output:

```
This is part of outer switch
This is part of inner switch
Exact value of a is : 100
Exact value of b is : 200
```

some Examples

Examples

- **Example 1**
  - Write a program which input three numbers and display the largest number using ternary operator.
- **Example 2**
  - What is the output of following program?

```
int result = 4 + 5 * 6 + 2;
cout<<result;

int a = 5 + 7 % 2;
cout<<a;
```

Examples

- **Example 3**
  - What is the output of following program?

int x = 10,y;
y = x++;
cout<<y;
	int x = 10,y;
	y = x++;
	cout<<x;
		int x = 10;
		x++;
		cout<<x;

int x = 10,y;
y = ++x;
cout<<y;
	int x = 10;
	cout<<++x;
		int x = 10;
		cout<<x++;

Examples

- **Example 4**
  - What is the output of following program?

int x = 10; cout<<x<<x++;	int x = 10; cout<<++x<<x++<<x;	int x = 10; cout<<x++<<x<<++x;

int x = 10,y;
y = x + x++;
cout<<y;
	int x = 10,y;
	y = ++x + x++ + x;
	cout<<y;
		int x = 10,y;
		y = x++ + x + ++x;
		cout<<y;

Thanks