# IOOP- Unit2

## INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

# Introduction : Operators in C++

- An operator is a symbol that tells the compiler to perform specific mathematical or logical manipulations.

1) **Assignment Operator**
2) **Arithmetic Operator**
3) **Relational Operator**
4) **Logical Operators**
5) **Shorthand Arithmetic Assignment Operators**
6) **Increment/Decrement Operators**
7) **Conditional Operator**
8) **Sizeof () Operator**
9) **Comma Operator**
10) **Ternary Operator**
11) **Operator precedence levels and Associativity**

# Assignment Operators

| Simple Assignment Operator | Shorthand Assignment Operator |
|---|---|
| x = x+1 | x += 1 |
| x = x-1 | x -= 1 |
| x = x*(n+1) | x *= n+1 |
| x = x / (n+1) | x /= n+1 |
| x = x % (n+1) | x %= n+1 |

# Assignment Operators

## << Shift Left

| SYNTAX | BINARY FORM | VALUE |
|---|---|---|
| x = 7; | 00000111 | 7 |
| x=x<<1; | 00001110 | 14 |
| x=x<<3; | 01110000 | 112 |
| x=x<<2; | 11000000 | 192 |

## >> Shift Right

| SYNTAX | BINARY FORM | VALUE |
|---|---|---|
| x = 192; | 11000000 | 192 |
| x=x>>1; | 01100000 | 96 |
| x=x>>2; | 00011000 | 24 |
| x=x>>3; | 00000011 | 3 |

# Arithmetic Operators

| Operator | Meaning | Example | Result |
|---|---|---|---|
| + | Addition | 10 + 2 | 12 |
| - | Subtraction | 10 – 2 | 8 |
| * | Multiplication | 10 * 2 | 20 |
| / | Division | 10 / 2 | 5 |
| % | Modulus (remainder) | 10 % 2 | 0 |
| ++ | Increment | a++ (consider a = 10) | 11 |
| -- | Decrement | a-- (consider a = 10) | 9 |
| += | Addition Assignment | a += 10 (consider a = 10) | 20 |
| -= | Subtraction assignment | a -= 10 (consider a = 10) | 0 |
| *= | Multiplication assignment | a *= 10 (consider a = 10) | 100 |
| /= | Division assignment | a /= 10 (consider a = 10) | 1 |
| %= | Modulus assignment | a %= 10 (consider a = 10) | 0 |

# Relational Operators

| Operators | Meaning | Example | Result |
|---|---|---|---|
| < | Less than | 5<2 | False |
| > | Greater than | 5>2 | True |
| <= | Less than or equal to | 5<=2 | False |
| >= | Greater than or equal to | 5>=2 | True |
| == | Equal to | 5==2 | False |
| != | Not equal to | 5!=2 | True |

# Logical Operators

There are following logical operators supported by C++ language.

Assume variable A holds 1 and variable B holds 0, then −

Show Examples

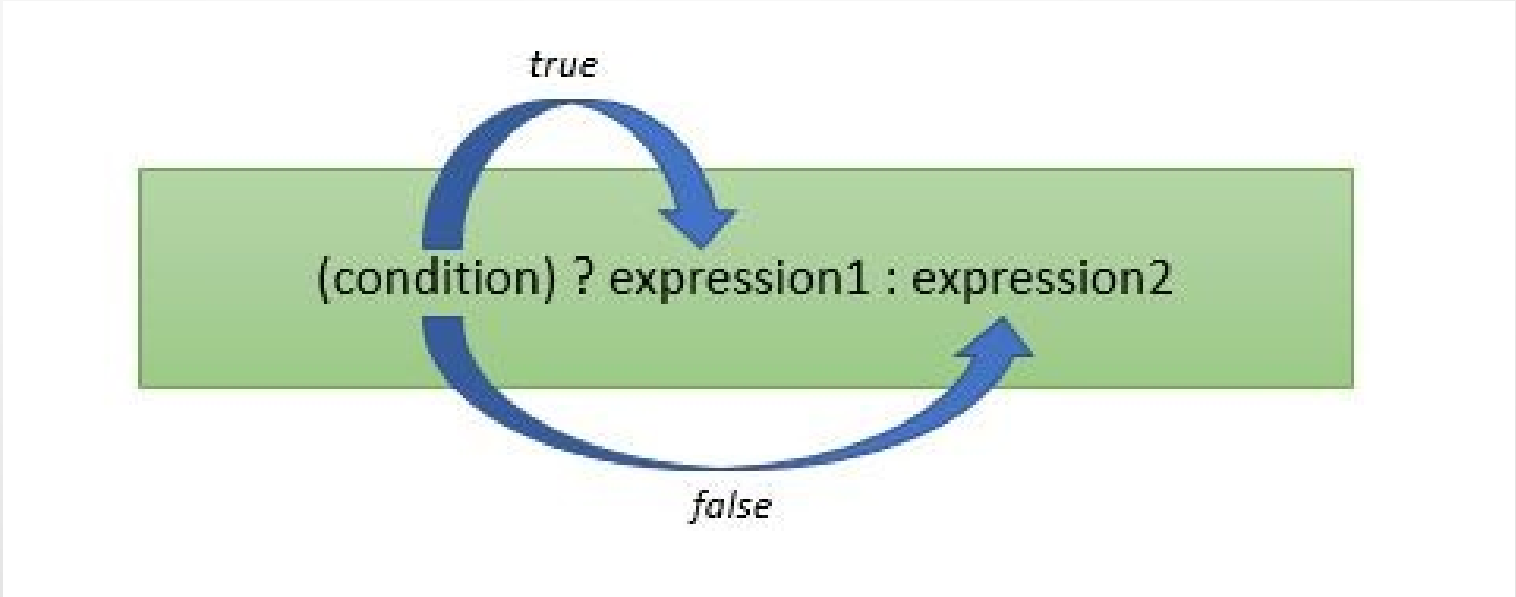
| Operator | Description | Example |
|---|---|---|
| && | Called Logical AND operator. If both the operands are non-zero, then condition becomes true. | (A && B) is false. |
| \|\| | Called Logical OR Operator. If any of the two operands is non-zero, then condition becomes true. | (A \|\| B) is true. |
| ! | 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. |

# Increment Decrement Operator

| OPERATOR | MEANING |
| --- | --- |
| ++a | Increment a by 1, then use new value of a |
| a++ | Use value of a, then increment a by 1 |
| --b | Decrement a by 1, then use new value of a |
| b-- | Use value of a, then decrement a by 1 |

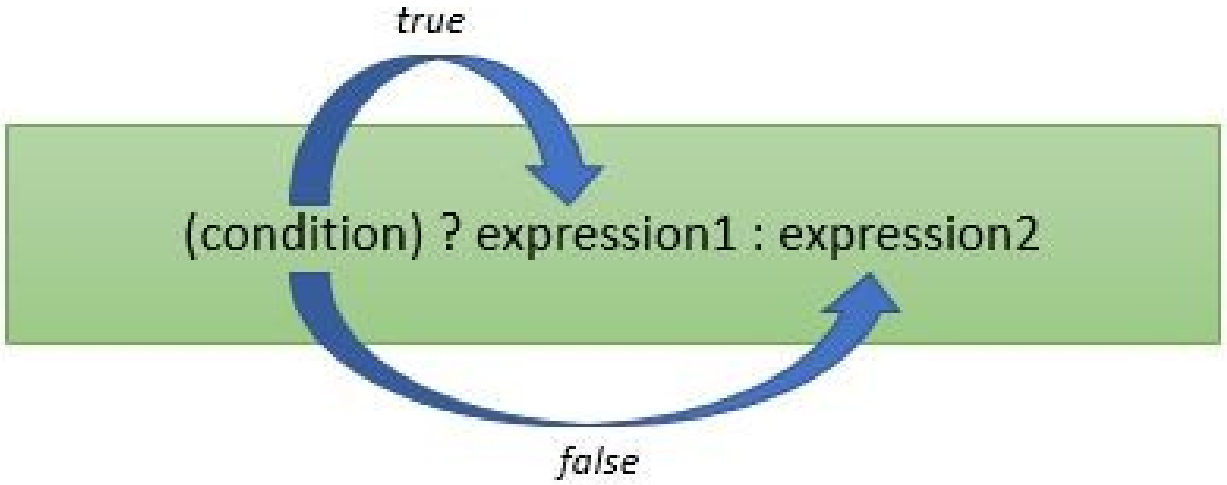
# Conditional Operator

- The conditional operator (? :) is a ternary operator (it takes three operands). The conditional operator works as follows:
- The first operand is implicitly converted to bool. It is evaluated and all side effects are completed before continuing.
- If the first operand evaluates to true (1), the second operand is evaluated.
- If the first operand evaluates to false (0), the third operand is evaluated.



# Conditional Operator

```
#include <iostream>
using namespace std;
int main() {
   int i = 1, j = 2;
   cout << ( i > j ? i : j ) << " is greater." << endl;
```



# sizeof() Operator

- The sizeof is a keyword, but it is a compile-time operator that determines the size, in bytes, of a variable or data type.
- The sizeof operator can be used to get the size of classes, structures, unions and any other user defined data type.
- The syntax of using sizeof is as follows −
    - **sizeof (data type)**
- Where data type is the desired data type including classes, structures, unions and any other user defined data type.

# sizeof() Operator

```
#include <iostream>
using namespace std;
int main() {
   cout << "Size of char : " << sizeof(char) << endl;
   cout << "Size of int : " << sizeof(int) << endl;
   cout << "Size of short int : " << sizeof(short int) << endl;
   cout << "Size of long int : " << sizeof(long int) << endl;
   cout << "Size of float : " << sizeof(float) << endl;
   cout << "Size of double : " << sizeof(double) << endl;
   return 0;
}
```

# sizeof() Operator

O/P :

Size of char : 1

Size of int : 4

Size of short int : 2

Size of long int : 4

Size of float : 4

Size of double : 8

# Comma Operator

- The purpose of comma operator is to string together several expressions.
- The value of a comma-separated list of expressions is the value of the right-most expression.
- Essentially, the comma's effect is to cause a sequence of operations to be performed.
- The values of the other expressions will be discarded.
- This means that the expression on the right side will become the value of the entire comma-separated expression.
- For example −
- **var = (count = 19, incr = 10, count+1);**

# Comma Operator

```
#include <iostream>

using namespace std;

int main() {

   int i, j;

   j = 10;

   i = (j++, j+100, 999+j);

   cout << i;

   return 0;

}
```

When the above code is compiled and executed, it produces the following result − **1010**

Here is the procedure how the value of i gets calculated: j starts with the value 10. j is then incremented to 11. Next, j is added to 100. Finally, j (still containing 11) is added to 999, which yields the result 1010.

# Operator precedence levels and Associativity

- If there are multiple operators in a single expression, the operations are not evaluated simultaneously. Rather, operators with higher precedence have their operations evaluated first.
- Let us consider an example:

  int x = 5 - 17 * 6;
- Here, the multiplication operator * is of higher level precedence than the subtraction operator -. Hence, 17 * 6 is evaluated first.
- As a result, the above expression is equivalent to

  int x = 5 - (17 * 6);

- If we wish to evaluate 5 - 17 first, then we must enclose them within parentheses: int x = (5 - 17) * 6;

# Operator precedence levels and Associativity

```
#include <iostream>
using namespace std;
int main() {
  // evaluates 17 * 6 first
  int num1 = 5 - 17 * 6;
  // equivalent expression to num1
  int num2 = 5 - (17 * 6);
  // forcing compiler to evaluate 5 - 17 first
  int num3 = (5 - 17) * 6;
  cout << "num1 = " << num1 << endl;
  cout << "num2 = " << num2 << endl;
  cout << "num3 = " << num3 << endl;
  return 0;
}
```

# Operator precedence levels and Associativity

Output :

num1 = -97

num2 = -97

num3 = -72