Operators

Operators in C++

- An operator is a symbols which is used to perform logical and mathematical operations in a C++ program.
- These C++ operators join individual constants and variables to form expressions.
- Operators, functions, constants and variables are combined together to form expressions.

Consider the expression **A + B * 5**. where, **+** and ***** are operators, **A** and **B** are variables, **5** is constant and **A + B * 5** is an expression

In C++, Operators can be categorized in three groups on the basis of operands, i.e. **unary**, **binary**
and **ternary** and they can be used to manipulate a variable with up to 3 arguments at a time.

- ### Unary Operators

Unary operators are operators that only deal with one argument (which is generally a single variable).
For example:

-a OR a++ OR a--

- ### Binary Operators

Binary operators are operators that deal with two arguments, both generally being either variables or constants.
For example:

a+b OR a*b OR a/b

- ### Ternary Operators

Ternary operators are operators that deal with three arguments which can be anything from a constant to a complete boolean expression.
For example:

(a>b) ? a : b

C++ Language offers many types of operators. They are,

- Assignment operators
- Arithmetic operators
- Shorthand(Arithmetical Assignment) operator
- Increment/decrement operators
- Relational operators

- Logical operators
- Conditional operators (ternary operators)

Assignment Operators

In C programs, values for the variables are assigned using assignment operators. For example, if the value "10" is to be assigned for the variable "sum", it can be assigned as "sum = 10;"

Arithmetical Operators

These are used to perform mathematical calculations like addition, subtraction, multiplication, division and modulus in C program.

S. No	Arithmetic Operators	Operation	Example
1	+	Addition	A+B
2	-	Subtraction	A-B
3	*	multiplication	A*B
4	/	Division	A/B
5	%	Modulus	A%B

Arithmetical Assignment Operators

These are used to add/sub/mul/div/mod (s) right operand to the left operand and assign the result to left operand

Operator	Example	Result
+=	sum += 10	This is same as sum = sum + 10
-=	sum -= 10	This is same as sum = sum – 10
*=	sum *= 10	This is same as sum = sum * 10
/=	sum /= 10	This is same as sum = sum / 10
%=	sum %= 10	This is same as sum = sum % 10

Increment & Decrement Operators

In C, ++ and -- are called increment and decrement operators respectively.

Both of these operators are unary operators, i.e, used on single operand. ++ adds 1 to operand and -- subtracts 1 to operand respectively.

Increment operator (++):

- Increment operator is used to increment the current value of variable by adding integer 1.
- Increment operator can be applied to only variables
- Increment operator are two types as follows :
  - **Pre Increment:**

    Pre-increment operator is used to increment the value of variable before using in the expression. In the Pre-Increment value is first incremented and then used inside the expression. i.e.

    b=++y;

    In this example suppose the value of variable 'y' is 5 then value of variable 'b' will be 6 because the value of 'y' gets modified before using it in a expression.

  - **Post Increment:**

    Post-increment operator is used to increment the value of variable as soon as after executing expression completely in which post increment is used. In the Post-Increment value is first used in a expression and then incremented. i.e.

    b=x++;

4.1.1.2 Decrement operator (--):

- Decrement operator is used to decrease the current value of variable by subtracting integer 1.
- Like Increment operator, Decrement operator can be applied to only variables
- Decrement operator are two types as follows :
  - **Pre Decrement:**

    Pre-Decrement operator is used to decrease the value of variable before using in the expression. In the Pre-Decrement value is first decremented and then used inside the expression. i.e.

    b=--y;

In this example suppose the value of variable 'y' is 5 then value of variable 'b' will be 4 because the value of 'y' gets modified before using it in a expression.

- **Post Decrement:**

  Post-Decrement operator is used to decrement the value of variable as soon as after executing expression completely in which post decrement is used. In the Post-Decrement value is first used in a expression and then decremented. i.e.

  b=x--;

  In this example suppose the value of variable 'x' is 5 then value of variable 'b' will be 5 because old value of 'x' is used.

Assignments

1. Write a program to calculate square of a given number.
2. Write a program to swap using third variable.
3. Write a program to calculate area of Triangle.
4. Write a program to calculate area of Circle.
5. Write a program to calculate Simple Interest.

Relational Operators (Conditional operator)

Relational operators are used to find the relation between two operands. It is used to make condition(s) in programs.

If the relation is true, it returns value 1 and if the relation is false, it returns value 0.

S. No	Operators	Example	Description
1	>	x > y	x is greater than y
2	<	x < y	x is less than y
3	>=	x >= y	x is greater than or equal to y
4	<=	x <= y	x is less than or equal to y
5	==	x == y	x is equal to y
6	!=	x != y	x is not equal to y

Conditional (Ternary) Operators

The conditional operator evaluates an expression returning a value if that expression is true and different one if the expression is evaluated as false.

Syntax:

expression ? result1 : result2;

Where,
Expression is a boolean condition which returns into either TRUE or FALSE If result of expression is **TRUE** then result1 is executed
If result of expression is **FALSE** then result2 is executed

Logical Operators

Logical operators are used to perform logical operations on the given expressions.

There are 3 logical operators in C language. They are, logical AND (&&), logical OR (||) and logical NOT (!).

S. No	Operators	Example	Description
1	&&	(x>5)&&(y<80)	It returns true when both conditions are true.
2	||	(x>5)||(y<80)	It returns true when at-least one condition is true.
3	!	!(x>5)	It reverse the state of the operand(x>5), If (x>5) is true, logical NOT makes it false

* Operator:

This is used as pointer to a variable. Example : * a where, * is pointer to the variable a. We will discuss this in depth in upcoming chapter.

& Operator:

This is used to get the address of the variable. Example : &a will give address of a. We will also discuss this in depth in upcoming chapter.

Assignments

1. Write a program to calculate gross salary and net salary by accepting basic salary from user. formula is mentioned below:
2. TA is 10% of basic salary, PF is 7.8% of basic and DA is Rs500.

gs=basic+da+ta; ns=gs-pf;

Decision Making Statements/Control Statements

Decision making is about deciding the order of execution of statements based on certain conditions or repeat a group of statements until certain specified conditions are met. C program executes sequentially. Sometimes, a program requires checking of certain conditions in a program execution. C language handles decision-making by supporting the following statements

- If statement
- switch statement
- conditional/ternary operator

if Statements

The if statement may be implemented in different forms depending on the complexity of conditions to be tested. The different forms are,

- Simple if statement
- If. ..else statement
- Nested if ..else statement
- else if statement

Simple if statement

The general form of a simple if statement is,

```
if(expression)
{
        statement-inside;
}
        statement-outside;
```

If the expression is true, then 'statement-inside' it will be executed, otherwise 'statement- inside' is skipped and only 'statement-outside' is executed.

if...else statement

The general form of a simple if...else

statement is, if(expression)

```
{
   statement-block1;
}
else
{
    statement-block2;
}
```

Assignments

1. Write a program that accepts a number from user and check whether it is positive or negative or zero.
2. Write a program to calculate first number is divisible by second or not.
3. Write a program that accepts a three digit number from user and check whether it is palindrome or not.