Introduction to C++

CLASS- 4

Expressions, OOPS Concepts

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Expressions

C++ contains expressions, which can consist of one or more operands, zero or more operators to compute a value.

Every expression produces some value which is assigned to the variable with the help of an assignment operator.

Ex- (a+b) - c

4a2 - 5b +c

(a+b) * (x+y)

Expressions

An expression can be of following types:

- Constant expressions
- Integral expressions
- Float expressions
- Pointer expressions
- Relational expressions
- Logical expressions
- Bitwise expressions
- Special assignment expressions

Constant expressions

A constant expression is an expression that consists of only constant values. It is an expression whose value is determined at the compile-time but evaluated at the run-time.

It can be composed of integer, character, floating-point, and enumeration constants.

Ex-

Expression containing constant	Constant value
x = (2/3) * 4	(2/3) * 4
extern int y = 67	67
int z = 43	43

Integral and Float Expressions

An integer expression is an expression that produces the integer value as output after performing all the explicit and implicit conversions.

Ex- (x * y) -5 (where x and y are integers)

Float Expressions: A float expression is an expression that produces floating-point value as output after performing all the explicit and implicit conversions.

Pointer and relationship Expressions

A pointer expression is an expression that produces address value as an output.

Ex- &x, ptr, ptr++, ptr--

Relational Expressions- A relational expression is an expression that produces a value of type bool, which can be either true or false. It is also known as a boolean expression. When arithmetic expressions are used on both sides of the relational operator, arithmetic expressions are evaluated first, and then their results are compared.

Logical and bitwise Expressions

A logical expression is an expression that combines two or more relational expressions and produces a bool type value.

The logical operators are '&&' and '||' that combines two or more relational expressions.

Ex- a>b && x>y, a>10 || b==5

Bitwise Expressions: A bitwise expression is an expression which is used to manipulate the data at a bit level. They are basically used to shift the bits.

Ex- x=3

x>>3

Special Assignment Expressions

Special assignment expressions are the expressions which can be further classified depending upon the value assigned to the variable.

- **Chained Assignment-** Chained assignment expression is an expression in which the same value is assigned to more than one variable by using single statement.

Ex- a=b=100

Special Assignment Expressions

- **Embedded Assignment Expression**- An embedded assignment expression is an assignment expression in which assignment expression is enclosed within another assignment expression.
- **Compound Assignment**- A compound assignment expression is an expression which is a combination of an assignment operator and binary operator.

  Ex- a+=10

C++ OOPs Concepts

The major purpose of C++ programming is to introduce the concept of object orientation to the C programming language.

Object Oriented Programming is a paradigm that provides many concepts. The programming paradigm where everything is represented as an object is known as truly object-oriented programming language.

Object Oriented Programming System

Object-Oriented Programming is a methodology or paradigm to design a program using classes and objects. It simplifies the software development and maintenance by providing some concepts:

- Object
- Class
- Inheritance
- Polymorphism
- Abstraction
- Encapsulation

Object Oriented Programming System

- **Object-** Any entity that has state and behavior is known as an object, means a real word entity.
- **Class-** Collection of objects is called class. It is a logical entity.
- **Inheritance-** When one object acquires all the properties and behaviors of parent object i.e. known as inheritance. It provides **code reusability**. It is used to achieve runtime polymorphism.

Object Oriented Programming System

- **Polymorphism**- When one task is performed by different ways, it known as polymorphism.

example: to draw something e.g. shape or rectangle etc.

In C++, we use Function overloading and Function overriding to achieve polymorphism.

- **Abstraction-** Hiding internal details and showing functionality is known as abstraction.

In C++, we use abstract class and interface to achieve abstraction.

- **Encapsulation-** Binding (or wrapping) code and data together into a single unit is known as encapsulation. For example: capsule, it is wrapped with different medicines.

Object Oriented Programming System

Advantage of OOPs over Procedure-oriented programming language:

- OOPs makes development and maintenance easier where as in Procedure-oriented programming language it is not easy to manage if code grows as project size grows.
- OOPs provide data hiding whereas in Procedure-oriented programming language a global data can be accessed from anywhere.
- OOPs provide ability to simulate real-world event much more effectively. We can provide the solution of real word problem if we are using the Object-Oriented Programming language.

- Control statements