ASSIGNMENT 1

WEATHER REPORT

Problem Statement :- Create a class named weather report that holds a daily weather report with data members day\_of\_month, high\_temp, low\_temp, amount\_rain and amount\_snow. The constructor initializes the fields with default values: 99 for day\_of\_month, 999 for high\_temp,-999 for low temp and 0 for amount\_rain and amount\_snow. Include a function that prompts the user and sets values for each field so that you can override the default values. Write a C++/Java/Python program that creates a monthly report. a) Menu driven program with options to Enter data and display report b) Report Format Day Amt\_rain Amt\_snow High\_temp Low\_temp.

Average

Learning Objective :-

1. Concept of Object Oriented Programming
2. Features of OOP
3. Nested Class Etc.,

Theory :-

C++ Object Oriented Concepts :-

The prime purpose of C++ programming was to add object orientation to the C programming language, which in itself is one of the most powerful programming languages.

The Object Oriented Concepts

The core of the pure object-oriented programming is to create an object, in code, that has certain properties and behaviour. While designing C++ modules, we try to see the world in terms of objects. For example, a car is also an object which has certain properties (data) such as colour, number of doors, etc. It also has certain behaviour (methods) such as acceleration, breaking, and so on.

The keywords to note are described below:

1) Object :-

The Definition states: The object is an instance of a Class.

This is the basic unit of object oriented programming. Both the data and the methods/functions operating on it are bundled as a unit called object. Thus, an object can be described as a logical abstraction of a real world entity.

2) Class :-

The Definition states: The Class is a blueprint of Objects.

When you define a class, you define a blueprint for a kind/class of objects. This doesn't actually provide data to it, rather it defines the kind of data that will be present in the object. It also defines the behaviour of the real world entity that the object represents.

Some of the Features of Object Oriented Programming are:

* Encapsulation :-  
   The Definition states: The wrapping up of data and associated methods/functions into one unit is known as Encapsulation.  
   Encapsulation is placing the data and the functions that work on it in the same place (known as object). While working with procedural languages, it is not always clear which functions work on which variables but object-oriented programming provides you a framework to place the data and relevant functions together in the same object.
* Abstraction :-  
   The Definition states: The act of showing only those attributes necessary to use an object and hide all underlying details is known as Abstraction.  
   Thus Abstraction refers to providing only essential information to the outside world and hiding their background details, i.e., to represent the needed information in program without presenting the details.  
   For example, a database system hides certain details of how data is stored, created and maintained. Similarly, C++ classes provide different methods to the outside world without giving internal details about those methods and data.
* Data Hiding :-  
   The Definition states: The act of providing security to data by allowing only certain functions/ methods to access it is known as data hiding.  
   The hiding of data occurs in two situations:  
   Firstly, the object may not be used to access it directly. Only the function defined as the member of the same class is capable of accessing data. Hence the object is used without knowing the data it contains and other details  
   Secondly, any method/function written outside a class may not access any data declared as private within the class unless the class provides special rights to it (friend functions). Hence no external function may unintentionally tamper the data inside the object.
* Inheritance :-   
   The Definition states: The act of reusing existing logic or adding capabilities to is implemented as Inheritance.  
   In technical terms, Inheritance is the process of obtaining properties and behaviour from another entity. It is one of the most useful aspects of object-oriented programming. As the definition suggests it deals with forming of a new class from an existing class also called as base class. The new class formed is called as derived class.  
   This is a very important feature/concept of object-oriented programming since it helps to reduce the code size.
* Polymorphism :-   
   The Definition states: The ability of some logic to behave differently for different situations is known as Polymorphism.  
   The ability to use an operator or function in different ways or giving alternate meanings to the operators or functions is called polymorphism. Poly refers to many. That is a single function or an operator functioning in many ways, depending on the usage is called polymorphism.

Class Access Modifiers :- The concept of data hiding is implemented in C++ using class access modifiers. These restrict access to class members (data as well as functions) in turn preventing direct access to the internal representation of a class type.  
 The access restriction to the class members is specified by the labeled public, private, and protected sections within the class body. The keywords public, private, and protected are called access specifiers.

1] Public Members :- A public member is accessible from anywhere outside the class but within a program. You can set and get the value of public variables without any member function.

2] Private Members :- A private member variable or function cannot be accessed, or even viewed from outside the class. Only the class and friend functions can access private members. By default all the members of a class would be private.

3] Protected Members :- A protected member variable or function is very similar to a private member but it provides one additional benefit that they can be accessed in child classes (which are known as derived classes).

Related Mathematics :-

//Input :- Di = { d, r, s, h, l } The set D represents day in which the parameters d, r, s, h, l suggests weather information, Where, d :- day of the month r :- amount of rain s :- amount of snow h :- high temperature l :- low temperature

//Output :- R = { D1 D2 D3 …….. Dn }The set R represents report of the weather forecast and D represents day of which weather information is taken.

Definition of Algebra :- A system consisting of a set and one or more n-ary operations on the set is called algebra. An algebraic system is denoted by, (S, f1, f2, f3,……..) where S is a set of elements and f1, f2, f3,…. represents operations performed on S.

In the above program, Average = ( R, fr, fs, fh, fl ) Where, Average is an algebraic system, R is a set of report and fr, fs, fh, fl are the operations performed on set R.

fr :- Average of rain amount.

fs :- Average of snow amount.

fh :- Average of high temperature.

fl :- Average of low temperature.

D1 D2 D3

D4 Dn-1 Dn

**R**

Conclusion :- Using the concept of the class and objects , we have created weather report in C++.