Chapter-2

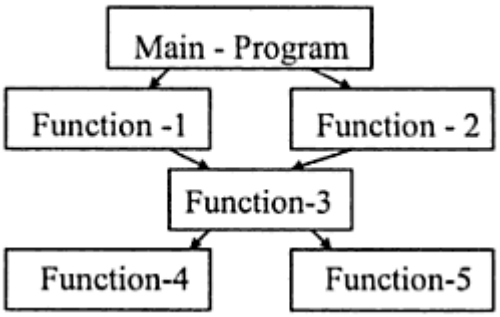
Concept of Object Oriented Programming

Programming paradigm

Programming paradigm refers to the style or way of programming.Some paradigm gives more importance to procedure whereas others give importance to data.The various approaches in programming are modular,top-down,bottom–up and structured programming.C++ implements two types of aradigms,procedural and object oriented paradigm.

Procedure oriented programming paradigm

Procedure oriented programming consists of a set of instructions and organizes these instructions into functions.Programming uing high-level languages such C,COBOL is known as procedure-oriented programming.



Limitations of Procedure oriented programming are,

1)Data is undervalued

Procedural programming gives importance on doing things.Data is given less importanceie, any fuction can access and change data.

2)Adding new data element needs modification to functions

As functions access global data ,data cannot be changed without modifying functions that access data.

3)Difficult to create new data types

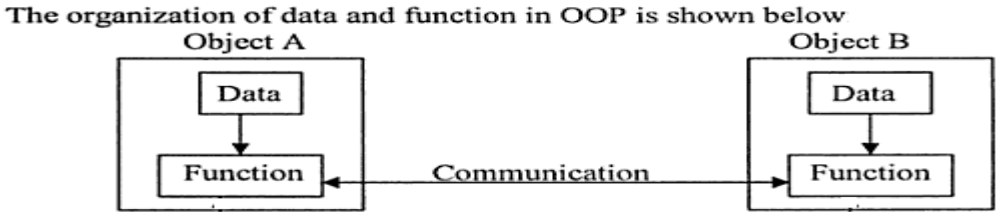
The ability of a programming language to create new data types is called Extensibility..Extensibility helps to reduce program complexity.Procedural languages are not extensible.

4)Poor modelling

In procedural programming data and functions are independent.So neither data nor function cannot model objects effectively.

Object Oriented Programming Paradigm

Object Oriented Programming binds data and function into a single unit called Object.In OOP program is divided into objects.Objects communicate with each other by using functions.



Advantages of Object Oriented Pogramming

- Easy to maintain and modify code.
- Provides modular structure for programs.
- Code sharing.
- Information hiding.
- It is good for defining abstract data type.
- It implements real life scenario.

Basic concepts in Object Oriented Programming

The main concepts of Object Oriented Programming are,

1)Objects:-Objects are real world objects such as a person,student,book car,TV ...etc.Objects are a cobination of data and functions.An object has a unique identity,state and behaviour.Objects interact with each other by sending messages.

2)Classes:-Classes are user defined data type which containd both data and function.A class is a collection of objects.An object is an instance of a class.Objects communicate with each other by message passing.

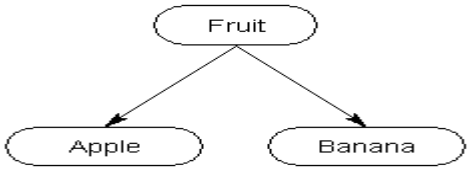
3)Abstraction:-Abstraction refers to displaying essential features by hiding other details.Data abstraction separates interface and implementation.Abstraction provides data security.

4)Encapsulation:-The wrapping up of data and function into a single unit is called encapsulation.It prevents data from accidental modific-ations by external functions.We can control the access on data by defining the access modifier.Three commonly used access modifier are public,private and protected..

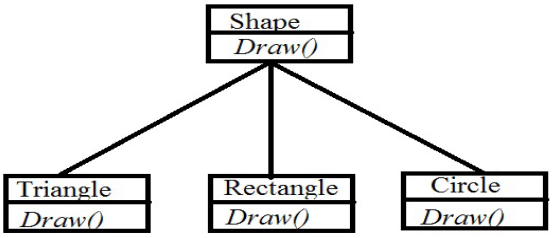
5)Modularity:-Modularity is the process by which a larger program is sub-divided into smaller programs called modules.

6)Inheritance:-Inheritance is the process by objects of one class acquires the properties of objects of another class.The concept of inhe-ritance provides reusability. The existing class is called base class and the new class is called derived class.The different forms of inheritance are Single inheritance,Multiple inheritance,Multilevel inheritance,Hier-archical inheritance and Hybrid inhetitance.

Consider an apple and a banana. Although an apple and a banana are different fruits, both have in common that they *are* fruits.



7)Polymorphism:-'*Poly*' means many,'*Morph*' means shape.Polymorphism is the ability of an objector function to take multiple forms.



In the above example the function shape can be used to draw triangle,rectangle and circle.ie,it takes multiple forms.

There are two types of polymorphism

a)Compile time (Early binding / Static)polymorphism.

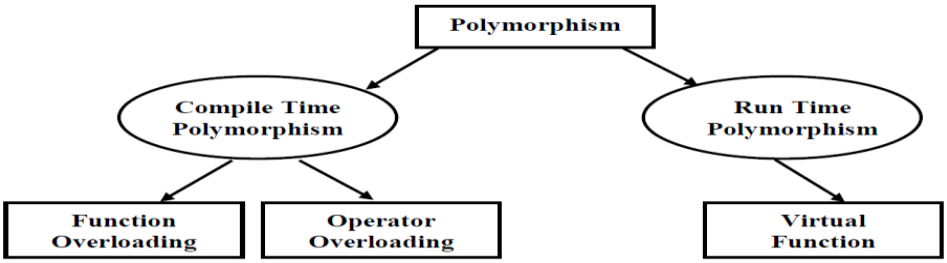
b)Run-time (Late binging /Dynamic) polymorphism.

Compile time polymorphism

Compile time polymorphism is achieved through Function overloading and operator overloading.In function overloading ,function have same name but different arguments.

Run-time polymorphism

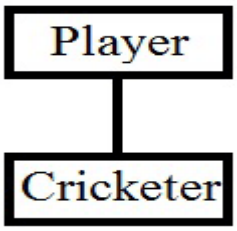
Run-time polymorphism is achieved through virtual functions.Here binding or linking of a function with function definition is done during execution(run) time.



Different types of Inheritance

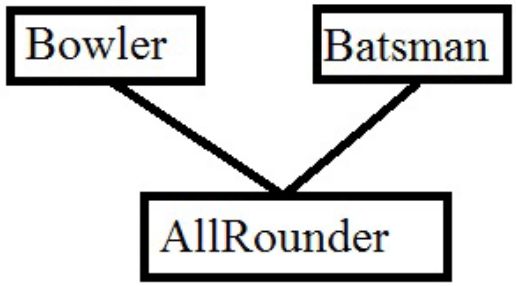
Single Inheritance

When a derived class inherits properties and behaviors of only one base class, it is called single inheritance. Cricketer is a derived class from the base class Player.



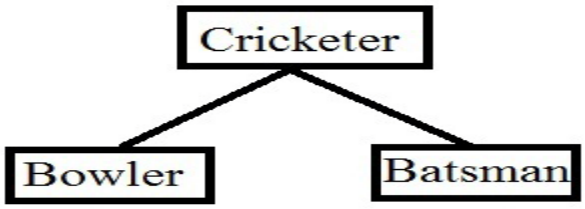
Multiple inheritance

When a derived class inherits properties and behaviors of more than one base class, it is called multiple inheritance. In following figure, AllRounder is a derived class from two base classes: Bowler and Batsman.



Hierarchical Inheritance

When properties and behaviors of one base class are inherited by more than one derived class, it is called hierarchical inheritance. In following figure, Bowler and Batsman are two derived classes from same base class Cricketer.

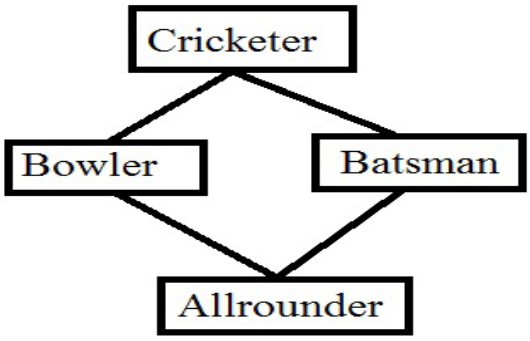


Multilevel Inheritance

When properties and methods of a derived class are inherited by another class, it is called multilevel inheritance. In following figure, Cricketer is derived class from Player base class. Then Cricketer acts as base class for the Bowler class.

Hybrid Inheritance

It is combination of multiple and multilevel inheritance.



Difference between Procedure oriented programming and Object oriented programming

Procedure Oriented programming	**Object oriented Programming**
i)Focus is on procedure rather than data. ii)Data is not secure . iii)Employs top-down approach. iv)It does not model real world's objects. v)Programs are decomposed into functions	i)Focus is on the data rather than Procedure. ii)Data is secured. iii)Employs bottom-up approach. iv)It model the real world's objects. v)Programs are decomposed into objects.