

M.Sc. III Sem. (Mathematics)

Paper 2nd - Fundamentals of Computer Science - I

Unit I

Reference Book : E. Balagurusamy, *Object Oriented Programming with C++*, McGraw Hill Education (India) Pvt. Ltd., New Delhi.

Topic : Object Oriented Programming

PROCEDURE ORIENTED PROGRAMMING :

Conventional programming, using high level languages such as COBOL, FORTRAN and C, is commonly known as procedure-oriented programming (POP). In the procedure-oriented approach, the problem is viewed as a sequence of things to be done such as reading, calculating and printing. A number of functions are written to accomplish these tasks.

POP has two major drawbacks, viz. (1) data move freely around the program and are therefore vulnerable to changes caused by any function in the program, and (2) it does not model very well the real-world problems.

Some characteristics exhibited by procedure-oriented programming are

- Emphasis is on doing things (algorithms).
- Large programs are divided into smaller programs known as functions.
- Most of the functions share global data.
- Data move openly around the system from function to function.
- Functions transform data from one form to another.
- Employs top-down approach in program design.

Object Oriented Programming Paradigm:

In Science and Philosophy, a paradigm is a distinct set of concepts or thought patterns, including theories, research methods, postulates, and standards for what constitutes legitimate contributions to a field.

Object Oriented Programming (OOP) treats data as a critical element in the program development and does not allow it to flow freely around the system. It ties data more closely to the functions that operate on it, and protects it from accidental modification from outside functions. OOP allows decomposition of a problem into a number of entities called **objects** and then builds **data** and **functions** around these objects. The organization of data and functions in object oriented programs is shown in the following figure. The data of an object can be accessed only by the functions associated with the object. However, functions of one object can access the functions of other objects.

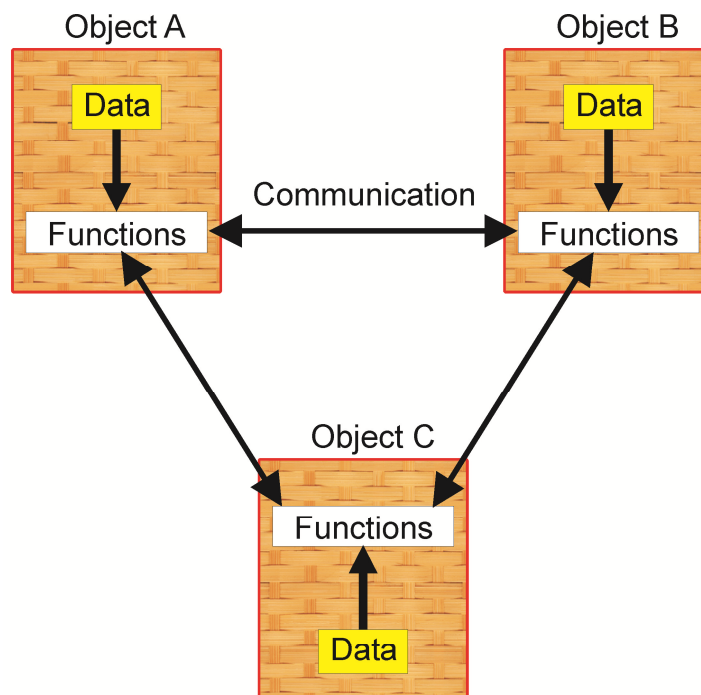


Figure : Organization of data and functions in OOP

Striking features of object oriented programming are :

- Emphasis is on data rather than procedure.
- Programs are divided into what are known as objects.
- Data structures are designed such that they characterize the objects.
- Functions that operate on the data of an object are tied together in the data structure.
- Data is hidden and cannot be accessed by external functions.
- Objects may communicate with each other through functions.
- New data and functions can be easily added whenever necessary.
- Follows bottom-up approach in program design.

Object Oriented Programming :

Object oriented programming is an approach that provides a way of modularizing programs by creating partitioned memory area for both data and functions that can be used as templates for creating copies of such modules on demand.

BASIC CONCEPTS OF OBJECT-ORIENTED PROGRAMMING :

The basic concepts of object oriented programming include :

- Objects
- Classes
- Data abstraction and encapsulation
- Inheritance
- Polymorphism
- Dynamic binding
- Message passing.