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Further Inside

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Notes: - OOPs

At This Level

Object Oriented Fundamentals: -

Object Orientation can be broadly described as "The software modeling and development disciplines that make it easy to construct complex systems from individual components."

All computer programs consist of 2 elements :code and data. A program can be conceptually organized around its code or around its data i.e. some programs are written around "What is happening ?" and others are written around "Who is being affected ?" These are the 2 paradigms that govern how a program is constructed.The first way is called the *process oriented model*. This approach characterizes a program as a series of linear steps (code). The process oriented model can be thought of as code acting on data. The problem with this approach appears as programs grow larger and more complex.

To manage increasing complexity , the 2nd approach called *Object Oriented Programming (OOP)*Was conceived. OOP organizes a program around its data (i.e. Objects) and a set of well defined interfaces to that data.An object oriented program can be characterized as data controlling access to code.

An object oriented program specifies the exact characteristics and behavior of its data types,which allows us to know exactly what to expect from various data types.

The data of an object can be accessed only by functions associated with that object.However functions of one object can access the functions of the other object.

Features of Object Oriented Programming: -

- ü Emphasis on data rather than procedures.
- ü Thinking of a problem in terms of objects.
- ü Data structures are designed such that they characterize the objects.
- ü Functions that operate on the data of an object are tied together in the data structure.
- ü Data is hidden and cannot be accessed by external functions.
- ü Object may communicate with each other through functions.
- ü New data and functions can be easily added whenever necessary.
- ü Follows bottom-up approach in program design.

Object Oriented Terminology and Concepts: -

Objects: - Objects are basic entities of an object oriented system. They may represent a person, a place, a bank account and so on as may be required by the program to handle. Objects should be chosen such that they match the real world objects.

When a program is executed, the objects interact by sending messages to one another. Each object contains data and code to manipulate the data. Objects can interact without having to know details of each others data or code. It is sufficient to know the type of message accepted and the type of response returned by the objects.

Class: -The entire set of data and code of an object can be made a user defined data type with the help of a class.

In OOPs, class is a template that describes both data and the valid actions for data items. When a variable is declared to be a type of a class, it is called an object of that class. Those functions that are defined as valid for a class are known as methods and they are the only functions that manipulate the data of that class's objects. *Objects are independent of each other; hence changes to the attributes of one object have no effect on the attributes of other objects, and sending a message to one object has no effect on other objects.*

Data Abstraction and Encapsulation: -Abstraction can be defined as the ability to look at something without being concerned with its internal details. With data abstraction data structures and items can be used without having to be concerned about the exact details of implementation.

The wrapping up of data and functions into a single unit (called Class) is known as *encapsulation.*

Data encapsulation is the most striking feature of a class. The data is not accessible to the outside world. It is accessible by only those functions ,which are wrapped in a class.

Inheritance: -New classes can be extended from old ones through Inheritance.Inheriatance can be thought of as the relationship that exists between parents and their child.

Polymorphism: -The term Polymorphism is combination of two Greek words,*poly* and *morphs. Poly* means

many and morphs means forms, that is multiple form.

In other words, the calling of a variety of operations using the same interface can be labelled as *Polymorphism.*

Advantages of OOP: -

The principle advantages of OOP are:

- · Through Inheritance ,we can eliminate redundant code and extend the use of existing classes.The

same code can be used as many times as required.

- The principle of data hiding helps the programmer to build secure programs that cannot be tampered by code in other parts of the program.
- Object oriented systems can be easily upgraded from small to large systems.