UNIT — 5

Design and Implementation of OO Platform

★ **Object Oriented Analysis :-** Object-oriented analysis and design is a technical approach for analysing and designing an application, system or business by applying object-oriented programming as well as using visual modelling throughout the software development process.

OOD is the process of planning a system of intreating object for the purpose of solving a software problem. It is the main approach of software design.

An object contains encapsulated data and procedure, grouped together to represent the entity. An object-oriented program is described by the integration of these object. OOD is the discipline of defining the objects and their intreation to solve a problem that was identified and documented during object oriented analysis. OOD is a method of design on compassing the process of object-oriented decomposition and notation for dep both logical and physical as well as static and dynamic model of the system under the design.

The input for OOD is provided by the output of OOA. relies that an output Both analysis and design can be performed increment-ly. Some typical input for object-oriented design are —

1. Conceptual model
2. Use case
3. System sequence diagram
4. User interface
5. Relational data model
6. Object - relational mapping model
7. Information hiding
8. Interface
9. Polymorphism

★ **Object Modelling Techniques:-**

The object modelling techniques is methodologies of OOA, design and implementation that focuses on creating a model of object from the real world and then to use this model to develop object oriented software.

Object modelling techniques (OMT) was developed by James Rambaugh. It is primarily used by system and software developers to support full life cycle development while targeting object-oriented implementation. OMT has proven itself easy to understand. It is very successfull in many application domain - telecommunication, transportation, compilers etc. The popular object modelling techniques are used in many real world problem.

• **Phases of OMT:-** The OMT methodology covers the full SDLC. The methodology has following phase-

1. Analysis
2. System design
3. Object design
4. Implementation

1- **Analysis** — Analysis is the first phase of OMT methodology. The aim of analysis phase is to build a model of the real world situation to show its important properties and domain.

2- **System Design** — The system design phase comes after the analysis phase. System design phase determines the overall system architecture using sub-system architecture, concurrent task and data storage. During system design, the high level structure of system is designed.

3- **Object Design** — The object design phase comes after the system design phase is over. Here the implementation phase is described. OOD is fully

4- **Implementation** — Implementation phase of the OMT is a matter of translating the design into a programming language construct. It is the important to have good software engineering practice so that the design phase is smoothly translated into the implementation phase such as —

(1-) To increase flexibility
(2-) For the design tracibility
(3-) To increase efficiency

★ **Dynamic Modelling :-**

Dynamic system modelling (DSM) is used to describe and predict the interaction over time between multiple component of a phenomenon that is

viewed as a system. It focus on the mechanism of how the component and the system evolve across time. Although DSM is just emerging in the field of communication. DSM has a rich history in many academic field originating in mathematics and physics before its adaption in the life social and the natural science.

"The dynamic model are generally models that contain or depend upon an element of time especially allowing for interaction between variable over the time.

There are many kind of dynamic model —

1- Linear model
2- Non- linear model

The component of the dynamic model are their states. The dynamic model include the activity diagram, state diagram, sequence diagram.

★ **Functional object-oriented design :-**

Functional programming is a way of thinking about software construction by creating pure function. It avoid concept of shared state mutable data in observed in object oriented programming.

"Functional language emphasizes on expression and declaration rather than execution of statement.

- **Characteristics of functional object-oriented design :-**

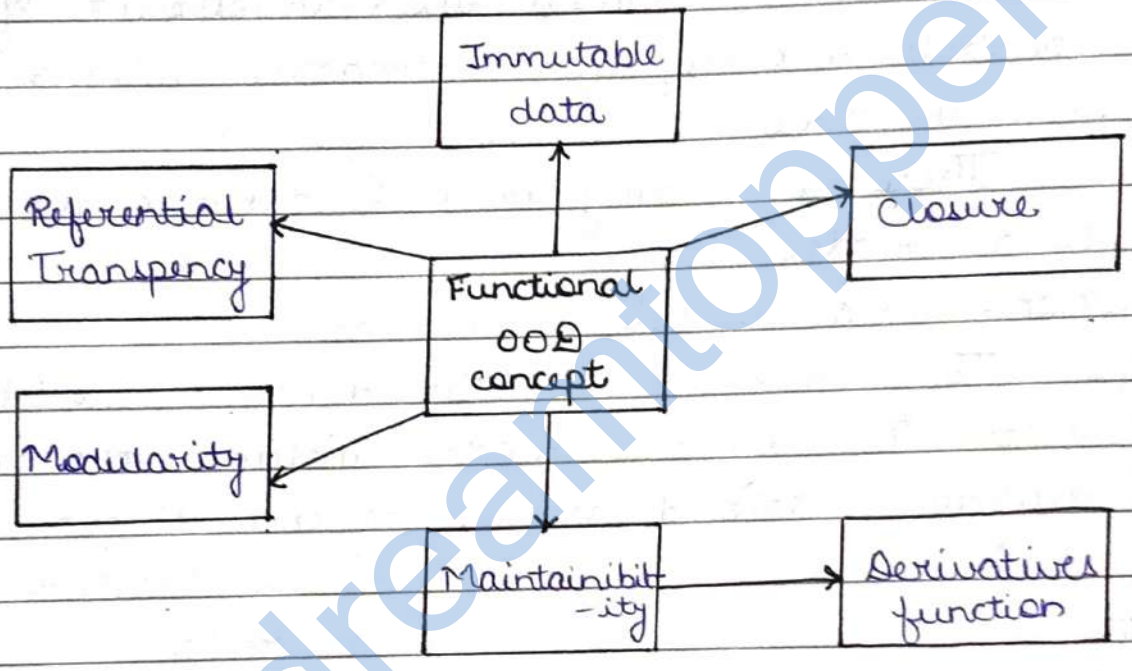
There are following characteristics of functional programming which is given below —

1- Functional design focus on result not on process. The data is immutable.

2- Functional programming decompose the problem into functions.

3- It does not support iteration like loop statement and conditional statement.

Block diagram of Functional design :-



★ Difference between object oriented programming and function object-oriented design :-

- OO Programming :- Object-oriented programming (OOP) is a programming paradigm based on the concept of "object" which are data structure that contain the data in the field of fields often known as attributes and code in the form of procedure which often known as method.

- Functional OO programming :- Functional programming

is a programming paradigm, a style of building the structure and element of computer program that treat computation as the evaluation of the mathematic function and avoid the changing state and mutable data.

Both OOP and FP have the shared goal of creating understandable flexible program that are free from bugs.

In all program, there are two primary component-

1- The data and data behaviours.

2- OOPS say that bringing together data and its associated behaviour in the OOP which makes it easier to understand how a program work.

Example -

```
employee = [
Employee.new("Bob", 1,00,000.0);
Employee.new("Jane", 1,25,000.0);
]
```

★ **Object oriented programming system for implementation:-** Implementing an object oriented design generally involves using a standard object oriented programming language or mapping object design to database.

★ **Implementation using programming language :-** Usually the task of transforming an object design into code is a standard process. Any object-oriented programming language like C++, Java, C# and python include provision for representing classes.

The following figure show that representation of the class circle using C++.

Circle
− X − Coord − Y − Coord # radius
+ find Area + find Volume + scale ( )

```
class circle
{
 private :
 double X − Coord ;
 double Y − Coord ;
protected :
   double radius;
public :
   double find Area ();
   double find Volume ();
   void scale ();
};
```

★ **Implementing association of object-oriented programming association :-** Most programming language do not provide construct to implement association directly. The association may be either unidirectional or bidirectional. Besides each association may be either one to one, one to many, many to many.

★ **Implementing Constraints :-** Constraints in classes restrict the range and types of value that the attributes may take. In order to implement constraints, a valid default value is assigned to the attributes when an object is initialized from classes.

Example – Consider a class employee where age is an attribute that may have value in the range of 18 to 60. The following C++ code incorporate it-

```
class Employee {
 private : char * name;
```

```
int age;
// other attributes
public
    Employee () {
    strcpy (name, " ");
    age = 18;
    }
class Age Error { };
void change Age (int a) {
if (a < 18 || a > 60)
    throw Age Error ();
    age = a;
}
};
```

* **Object - Oriented Databases :-** An object database is a database management system in which information is represented in the form of object as used in the form of object as used in OOP. Object database are different form of relational database which are tabumented. It combine the database capabilities with object-oriented programming.

It allow the programmers to develop the product, store them as an object and replicate or modifying existing object to make the new object within OODBMS.

Because the database is integrated with programming language the programmer can maintain the consistency within an environment. The relational DBMS project by that way of contrast maintain a clearer division between the database model and the application.

Some of object - oriented database are designed to work with object - oriented programming languages such as Python, JavaScript, C#, Visual Basic, .Net, C++ etc.

Example -

Object - 1	Instances
Date	01-12-01
Activity code	24
Route No.	J-95
Daily Production	2.5
Hours	6.0
Labour Hours	6.0

Object 2: Maintenance Activity

Activity code	
Activity name	
Production unit	

Most object database also offer some kind of the query language, allowing object to be find using a very declarative programming approach.

Access to data can be faster because an object can be retrieved directly without a search by the following pointers -

Multimedia application are facilitated because the class method associated with the data are responsible for its correct interpretation.

The efficiency of such database is greatly be improved in areas which demand the massive amount of data about one time.

For example — A banking institution could get the user account information and provide them efficiency

with the extensive information such as transaction, account information entities etc.

The object data management group was constr of object database and relational mapping vendor member of academic community. It goals was to create a set of specification that would be allow for portable application that store the object into the Database management system.