Chapter V

Object Orientation the new software paradigm

Compiled Yilkal B.

Chapter Outline

- *The potential benefits of object orientation*
- *The potential drawbacks of object orientation*
- *Object standards*
- *The object orientation software process*

Structured vs. Object Orientation paradigm

Structured paradigm

- It is a development strategy based on the concept that a system should be separated into two parts:
  - **Data** and **functionality** (modeled using a process model).
- Using the structured approach, you develop applications in which data is separated from behavior in both the **design model** and in the **system implementation** (i.e , the program).

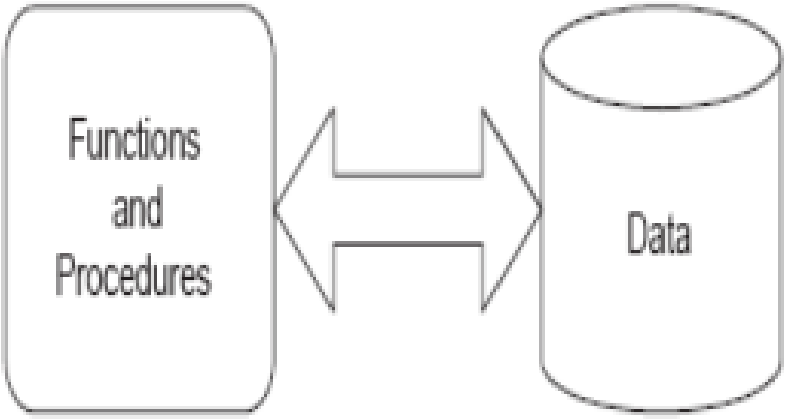
Object oriented Paradigm

- The main concept behind the object-oriented paradigm is that instead of defining systems as two separate parts (data and functionality), **system** defined as a collection of interacting objects.

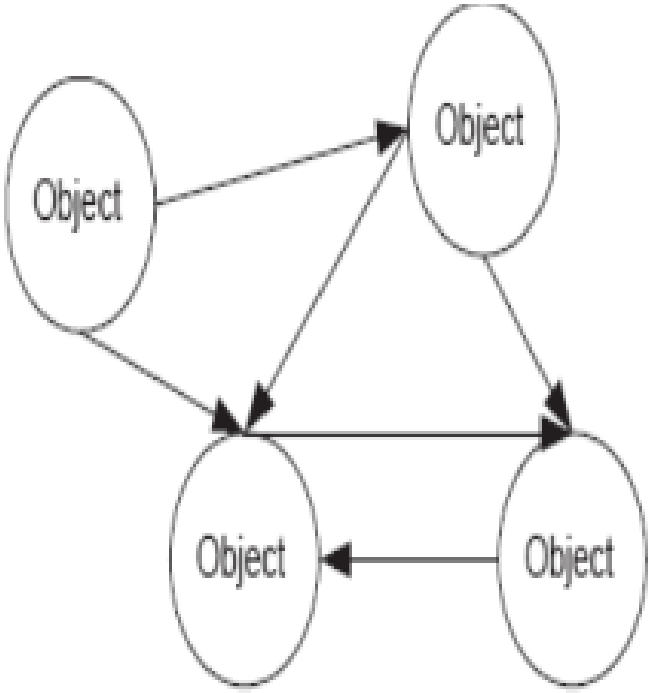
  – Describes and build system that consists object.

Cntd…

- *An object-oriented system comprises a number of software objects that interact to achieve the system objective.*



A Structured Application



An Object Application

The Potential Benefits of the Object Oriented paradigm

- ***Increased reusability:***

  - *The OO paradigm provides opportunities for reuse through the concepts of inheritance, polymorphism, encapsulation, modularity, coupling and cohesion.*
  - *It provides* ***more opportunities for reuse*** *than the structured paradigm*

- ***Increased extensibility :*** *Because classes have both data and functionality, when you* ***add new features*** *to the system you need to make changes in one place, the class*

- ***Improved Quality :*** *Quality systems are on time, on budget and meet or exceed the expectations of their users.*

  - *Improved quality comes from increased participation of users in systems development.*
  - *OO systems development techniques provide greater opportunity for users to participate in the development process.*

Cntd...

- ***Financial benefits***

- *Reusability, extensibility, and improved quality are **all technical benefits**.*
- *Object orientation enables you to build **systems better, faster and cheaper (BFC)***
- *The benefits OO are realized through out the entire development life cycle, not just programming*

- ***Increased Chance of Project success***

- *A project is successful if it is **on time**, **on budget** and **meets the needs of the its users**.*
- *Users are expert at business and they are the only ones who can tell you what they need.*
- *You need to know the right question to ask, know the business very well.*
- *You need models that communicate the required information and that users understand.*
- *You need to work closely with users*

Cntd…

- ***Reduce maintenance Burdon***

- *Software organizations currently **spend significant resources (80%) maintaining** and*
- ***operating software**, and because of the **long waiting list of work to be done**,*
- *it takes significant time to get new projects started.*
- ***These two problems** are respectively called*
  - *the maintenance Burdon and*
  - *The application backlog*

- *These are problems that object orientation **can help you to overcome***

The Potential Drawbacks of OO

- **Nothing is perfect including OO**. While many exiting benefits exist to OO, they come at a price:

1. **OO requires greater concentration on requirements analysis and design**

- You cannot build a system that meets users needs unless you know what those needs are(you need to do requirements)
- You cannot built a system unless you know how it all fit together (you need to do analysis and design)

2. **Developers must closely work with users**

- Users are the experts but they have their own jobs to do (busy)

3. **OO requires a complete change in the mindset on the part of individuals**

- they should understand the benefits of OO

Cntd…

*4. **OO requires the development culture of the IS dept to change***

- *The change in the mind set of individual developers actually reflect an over all change in the development culture*
- *Do more analysis and design but (less programming) and working with users*

*5. **OO is just more than programming***

*6. **Many OO benefits are long term***

– OO truly pays off when you extend and enhance your system

*7. **OO demands up front investments in training education and tools***

– Organizations must train and educate their development staff.

– Buy books, development tools and magazines

Cntd…

8. OO techniques do not guarantee you will build the right system

– While OO increases the probability of project success ,it still depends on the ability of individuals involved.

– developers, users, mangers must be working together to have a good working atmosphere

9. OO necessitates increased testing

– OO is typically iterative in nature, and probably developing complex system using the objects, the end result is you need to spend more time in testing.

10. OO is only part of the solution

– You still need CASE tools

– Need to perform quality assurance (QA)

– You still need usable interface so the users can work with the systems effectively

Object Standards

- OO orientation today becomes the significant part of the software development .
- Objects are the primary enabling technology for components.
- It also stays in the future because of the standard set by the OMG.
- OO orientation today becomes the significant part of the software development .
- Objects are the primary enabling technology for components.
- It also stays in the future because of the standard set by the OMG.
  - CORBA(Common object request broker architecture): the standard architecture for supporting distributed objects.
  - UML (Unified modeling language)-the standard modeling language for the object oriented software.
  - ANSI(Americans National Standards Institute)-Defined standards for C++. Http://www.ansi.org

Cntd…

- *Sun Microsystems ,Http://www.sum.com actively maintains, enhances and supports a de facto standard definition for java and related standards such as Enterprise Java Beans (EJB).*
- *The Object Database Management group (ODMG)- Http://www.odmg.org actively maintains, enhances and supports a standard definition for object oriented databases and object query language (OQL).*
- *ANSI (Americans National Standards Institute)-Defined standards for C++. Http://www.ansi.org*
- *Sun Microsystems ,Http://www.sum.com actively maintains, enhances and supports a de facto standard definition for java and related standards such as Enterprise Java Beans (EJB).*
- *The Object Database Management group (ODMG)- Http://www.odmg.org actively maintains, enhances and supports a standard definition for object oriented databases and object query language (OQL).*

The object orientation software process

- The Object-Oriented Modeling (OOM) technique visualizes things in an application by using models organized around objects.
- Any software development approach goes through the **following stages**:
  - **Analysis**
  - **Design and**
  - **Implementation.**
- In object-oriented software engineering, the software developer identifies and organizes the application in terms of object-oriented concepts, **prior to** their final representation in any **specific programming language or software tools.**

Cntd…

Phases in Object-Oriented Software Development

- The **major phases of software development** using object–oriented methodology are **object-oriented analysis,** object-oriented design, and **object-oriented implementation.**

i. Object–Oriented Analysis

- In this stage, the problem is formulated, **user requirements are identified**, and then a model is built based upon real–world objects.
- **The analysis produces models** on how the desired system should function and **how it must be developed.**
- The models **don't** include any implementation details so that it can be understood and examined by any non–technical application expert.

Cntd…

ii. Object–Oriented Design

- Object-oriented design includes **two main stages**, namely, system design and object design.

I. System Design:

In this stage, the complete architecture of the desired system is designed.

- The system is **considered as a set of interacting subsystems** that in turn is composed of a hierarchy of interacting objects, grouped into classes.
- System design is done according to both the **system analysis model** and **the proposed system architecture.**
- Here, the emphasis is **on the objects** comprising the system rather than the processes in the system.

Cntd…

II. Object Design: *In this phase, a* ***design model is developed based*** *on both the models developed in the system analysis phase and the architecture designed in the* ***system design phase.***

- *All the classes required are identified.*
- *The designer decides whether: new classes are to be created from scratch,*
- *any existing classes can be used in their original form, or*
- *new classes should be inherited from the existing classes*

The ***associations between the identified classes*** *are established and the hierarchies of classes are identified.*

Besides, the developer designs the internal details of the classes and their associations, i.e., the data structure for each attribute and the algorithms for the operations.

Cntd…

III. Object–Oriented Implementation and Testing

In this stage, the design model developed in the object design is translated into code.

- In an appropriate **programming language or software tool**.
- The **databases are created** and the specific hardware requirements are ascertained.
- Once the code is in shape, it is **tested using specialized** techniques to identify and remove the errors in the code

End of chapter Five

Any Question?