

Object Oriented Concepts with UML

203105207

Prof. Shaleen Shukla, Assistant Professor
Information Technology Department





CHAPTER-1

Introduction and Modelling Concepts



What is Object-Orientation?

- It means that we organize software as a collection of discrete objects that incorporate both data structure and behavior
 - **Object = Data Structure + Behavior**
(attributes) (operations)



What is Object-Orientation?

- **Five aspects of OO approach (characteristics)**

- Identity
- Classification
- Inheritance
- Polymorphism
- Encapsulation





What is Identity?

- It means that data is quantized into discrete, distinguishable entities called objects
- Ex. **White queen in chess**
- Every object has its own inherent identity





What is Classification?

- Objects with same data structure and behavior are grouped together into a class
- Ex. **Insects, mammals**
- A class is an abstraction that describes a properties important to an application and ignores the rest





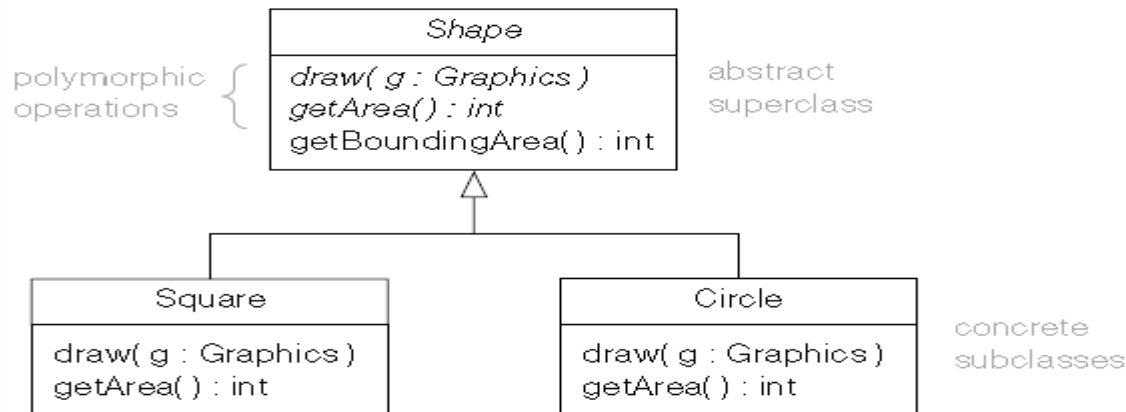
What is Inheritance?

- It's the sharing of attributes and operations among categories supported a hierarchical relationship.
- Each subclass inherits all features of its superclass and adds its own unique features



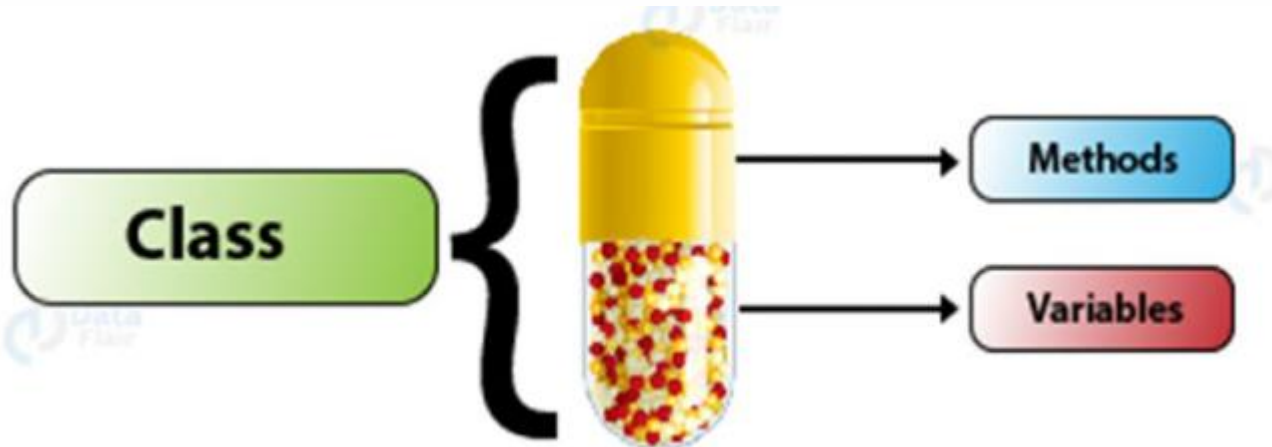
What is Polymorphism?

- The same operation behave differently for different classes
- Polymorphism means “many forms”. Polymorphic operations have many implementations. This is well illustrated by the Figure. polymorphism means objects of different classes have operations with the same signature but different implementations.



What is Encapsulation?

- Encapsulation refers to the bundling with the strategies that operate that data, or the limiting of direct access to a number of Associate in Nursing object's parts.





What is OO Development?

- It is a way to thinking about the software based abstraction that exists in the real world as well as in the program
- Here development refers to the software life cycle:
Analysis, design, and implementation
- It is the identification and organization of application concepts, rather than their final representation in a programming language



What is OO Methodology?

- **Five aspects of OO approach (characteristics)**

- System Conception
- Analysis
- System Design
- Class Design
- Implementation



What is UML?

- UML stands for **Unified Modelling Language**.
- It's Associate in Nursing industry-standard graphical language for specifying, visualizing, constructing, and documenting the artifacts of computer code systems.

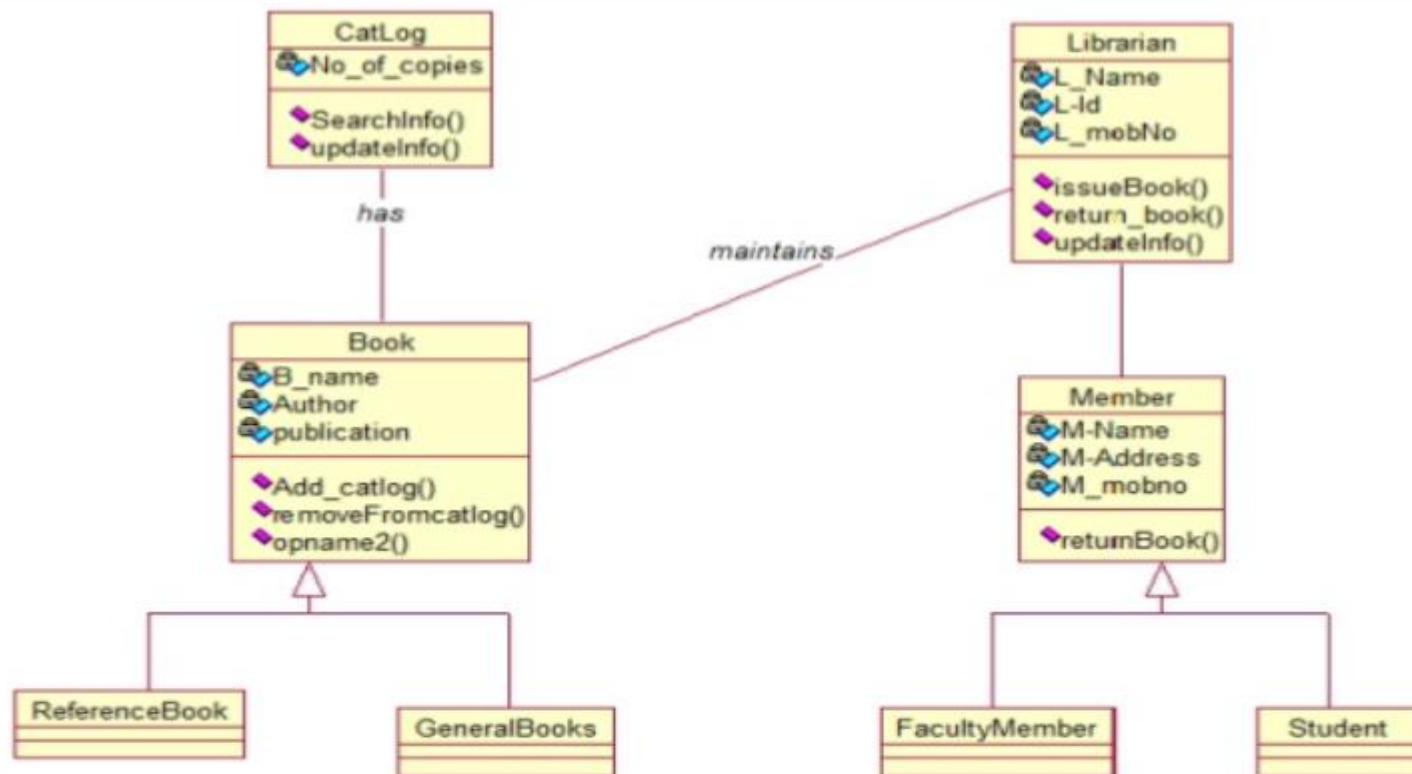


UML Diagrams

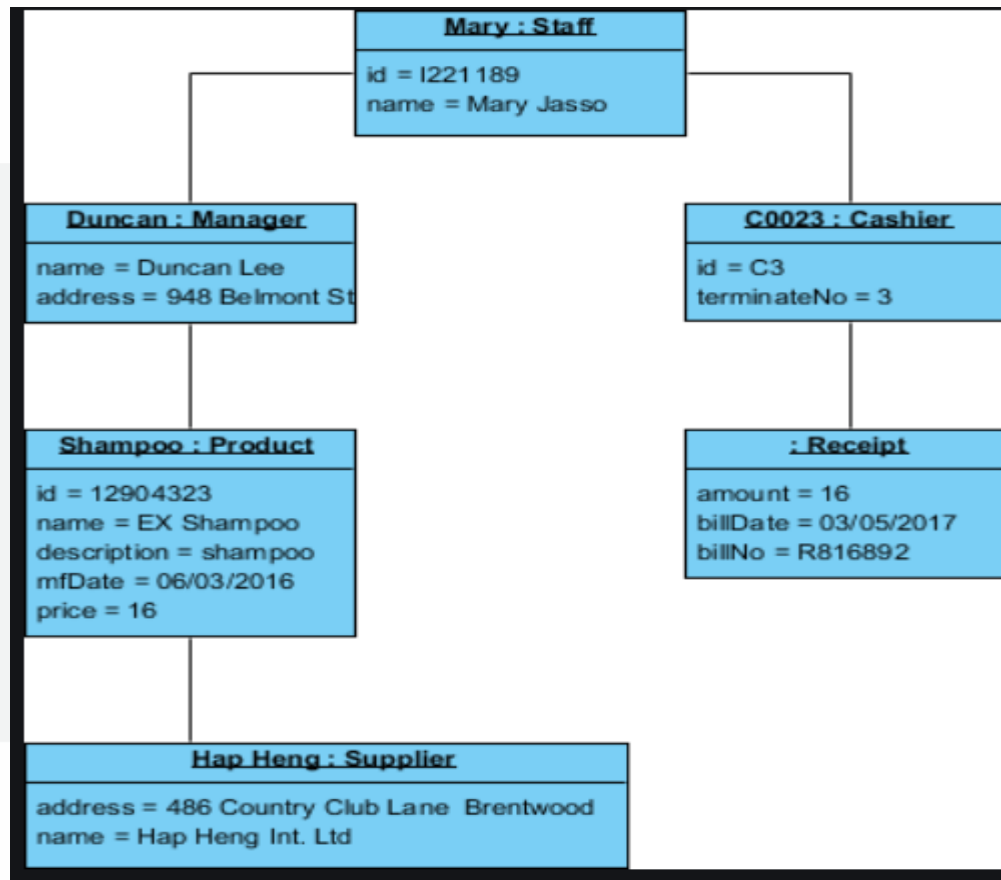
- Class Diagram
- Object Diagram
- State Diagram
- Use Case Diagram
- Sequence Diagram
- Activity Diagram



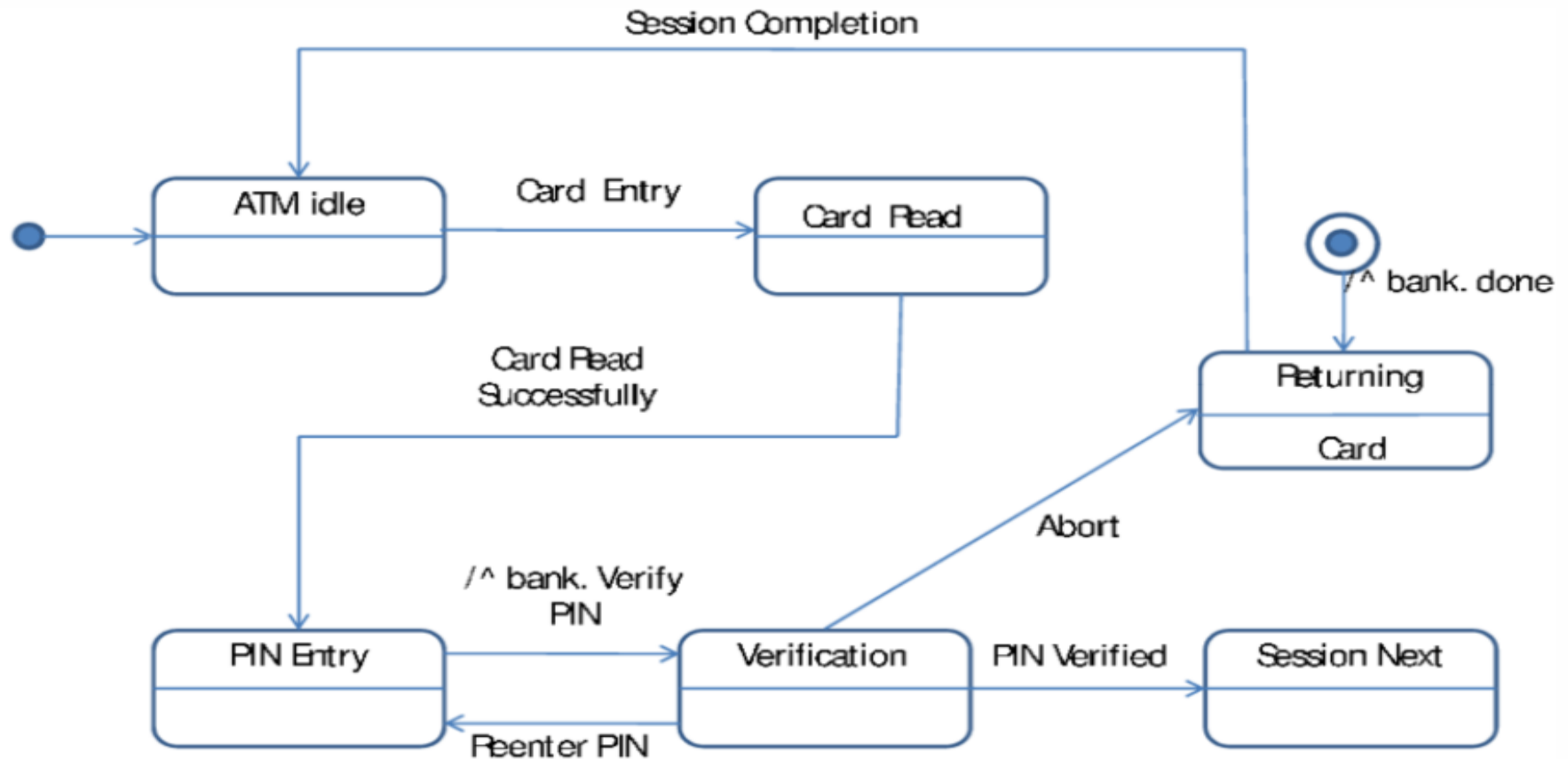
Class Diagram



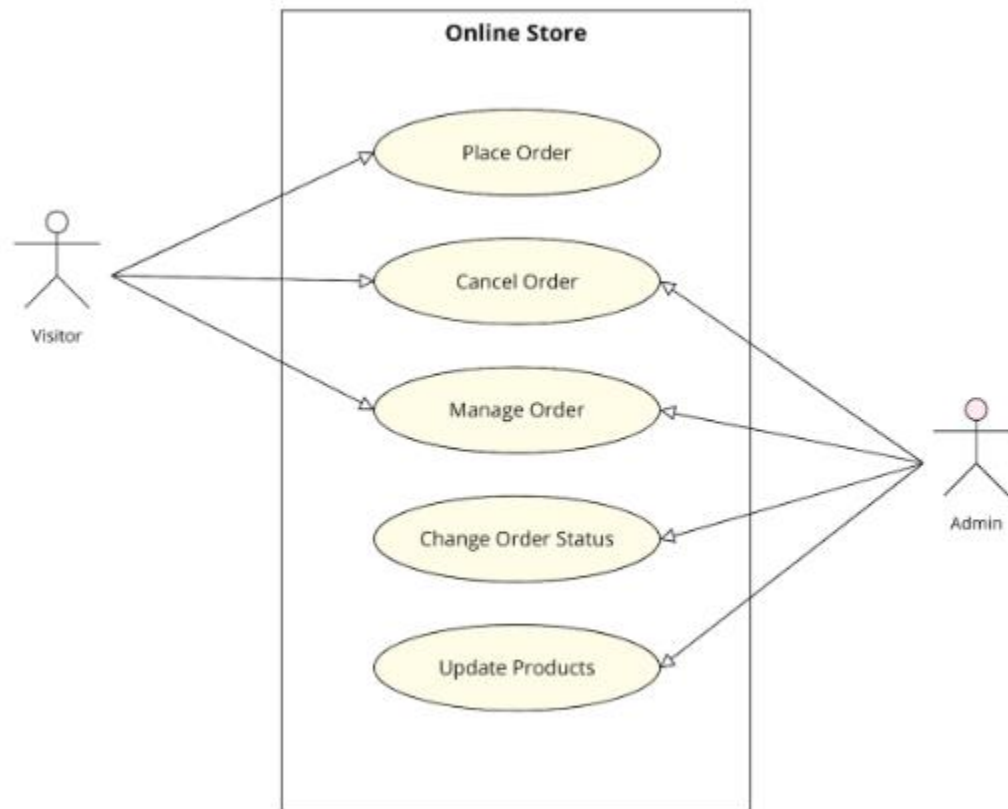
Object Diagrams



State Diagrams

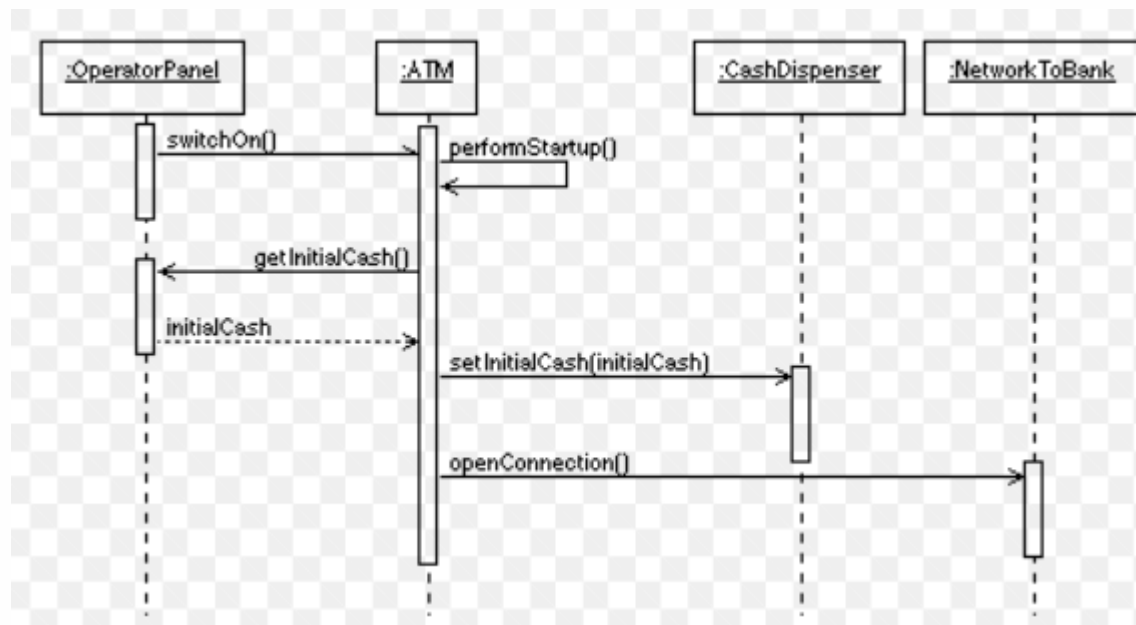


Use Case Diagrams

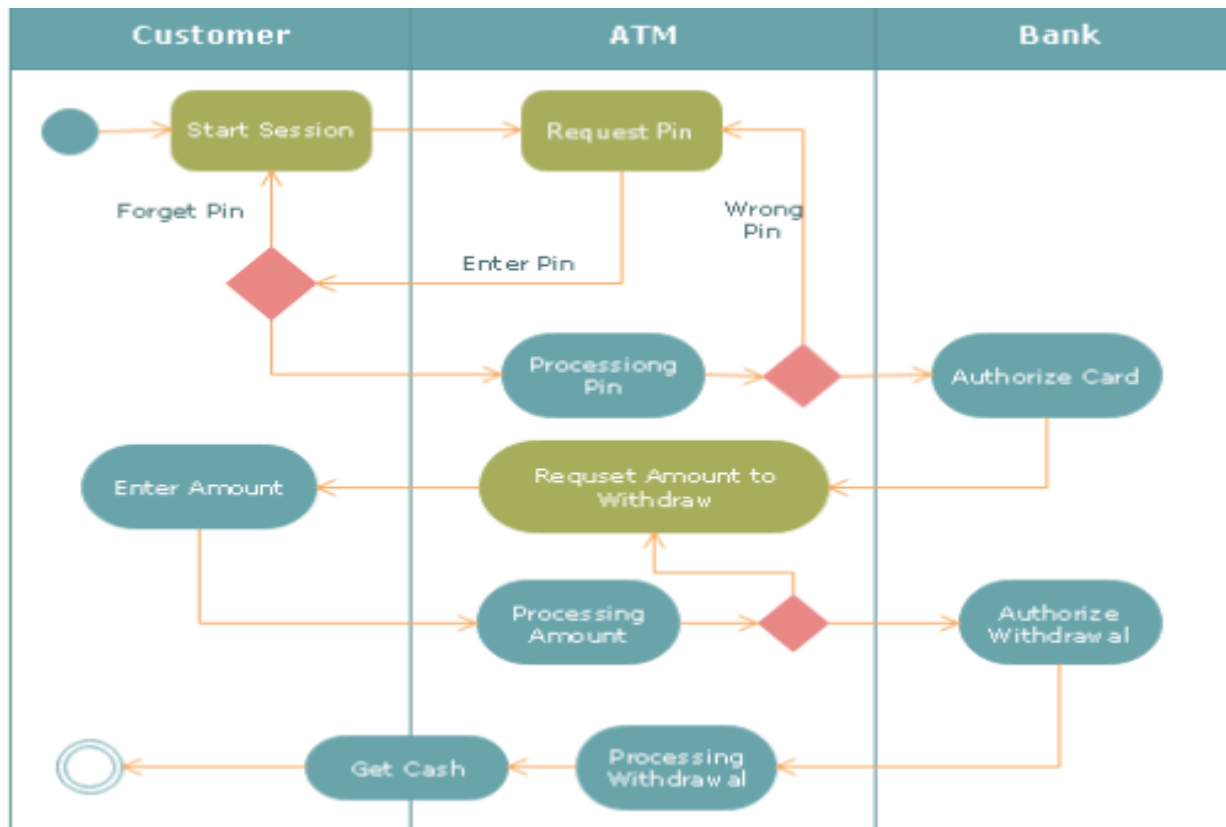




Sequence Diagrams



Activity Diagrams



Modelling

- A model is Associate in Nursing abstraction of one thing for the aim of understanding it before building it.
- Unified Modeling Language (UML) Models represent systems at different levels of detail.
- Some models describe a system from a higher, more abstract level, while other models provide greater detail.
- UML models contain model elements, such as actors, use cases, classes, and packages, and one or more diagrams that show a specific perspective of a system. A model can also contain other, more detailed models.



Modelling

You can use models to do the following things:

- Visually represent a system that you want to build
- Communicate your vision of a system to customers and colleagues
- Develop and test the architecture of a system
- Use the UML diagrams to direct code generation



Three Models of Modelling Concepts

- Class Model
- State Model
- Interaction Model

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Class Model

- Describes structure of objects in a system
- Like identity, their relationships, their attributes, and their operations
- Provides context for the state and interaction models
- Changes and interactions are meaningless unless there is something to be changed or with which to interact



State Model

- Describes those aspects of objects concerned with time and sequencing of operations
- Events that mark changes, states that define the context for events, and the organization of events and states
- The state model captures control, the aspect of a system that describes the sequences of operations that occur
- But it does not take care of what they operate on, or how they are implemented



Interaction Model

- Describes interactions between objects
- Like how individual objects collaborate to achieve the behavior of the system as a whole
- The interaction model describes different aspects of behavior
- Use cases, Sequence diagrams and Activity diagrams document the interaction model





Pre Requisites

- Familiar with Analysis and Design of Class and Objects
- Be familiar with Three models

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