IDHAYA COLLEGE FOR WOMEN

KUMBAKONAM - 612 001

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

ACADEMIC YEAR	**:**	**2019 – 2020**
SEMESTER	**:**	**II**
CLASS	**:**	**I – M.Sc (CS)**
SUBJECT IN-CHARGE	**:**	**N. AARTHI**
SUBJECT NAME	**:**	**OOAD & UML**
SUBJECT CODE	**:**	**P16CS21**

UNIT – V

UML

UML, Examples on Behavioral models , Structural models , Architectural models from real world problems

Models

- **Behavioral model**
- **Structural model**
- **Architectural model**

Behavioral model

- Behavioral models describe the internal dynamic aspects of an information system that supports the business processes in an organization.
- Behavioral model describes the interaction in the system.
- It represents the interaction among the structural diagrams.
- Behavioral modeling shows the dynamic nature of the system.

They consist of thefollowing

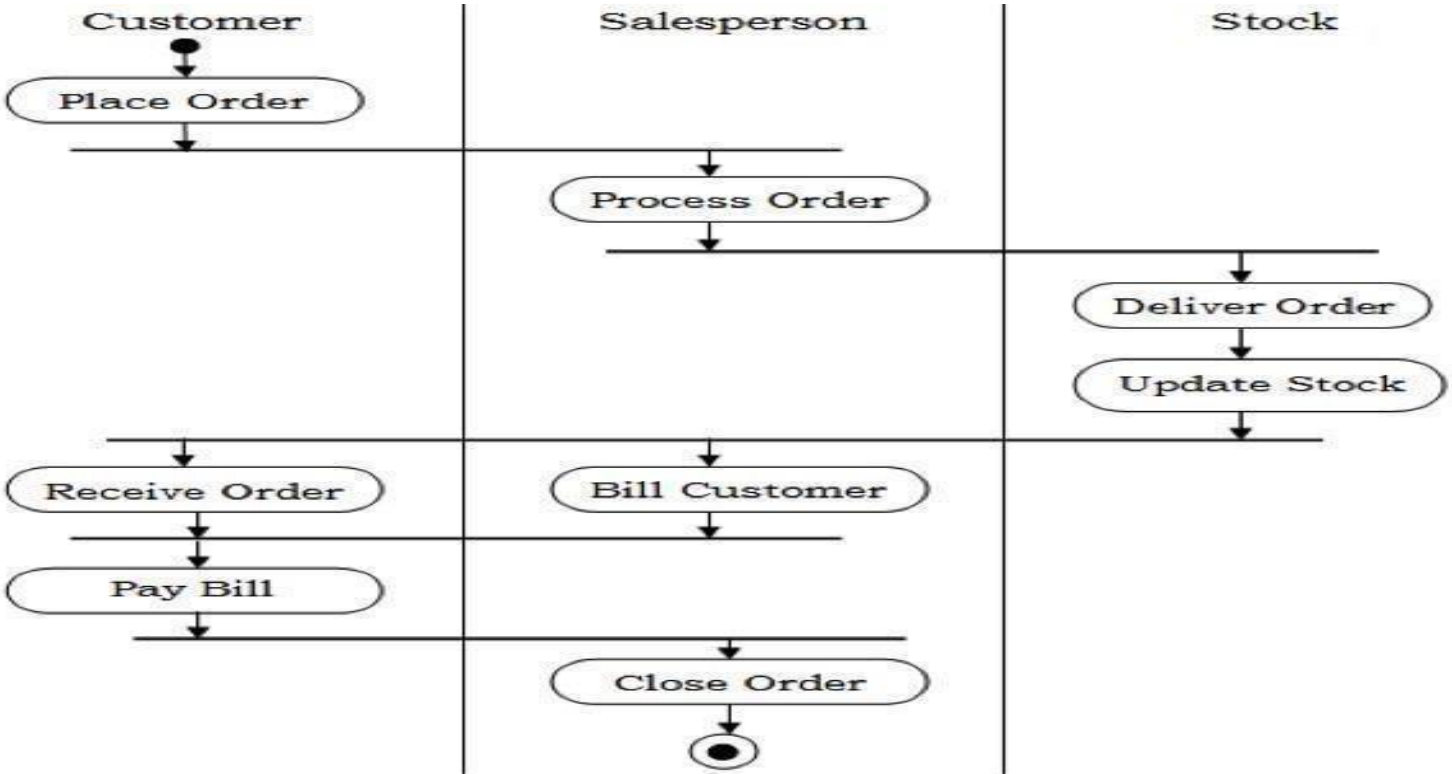
- **Activity diagrams**
- **Sequence Diagram**
- **Collaboration Diagram**
- **State-Chart Diagram**
- **Use case diagrams**

Activity diagrams

- An activity diagram depicts the flow of activities which are ongoing non-atomic operations in a state machine. Activities result in actions which are atomic operations.
- Activity diagrams comprise of –
  - ❖ Activity states and action
  - ❖ states Transitions
  - ❖ Objects
- Activity diagrams are used for modeling –
- workflows as viewed by actors, interacting with the system.
- It gives the details of operations or computations using flowcharts.

Examples

- **The following figure shows an activity diagram of a portion of the Automated Trading House System.**

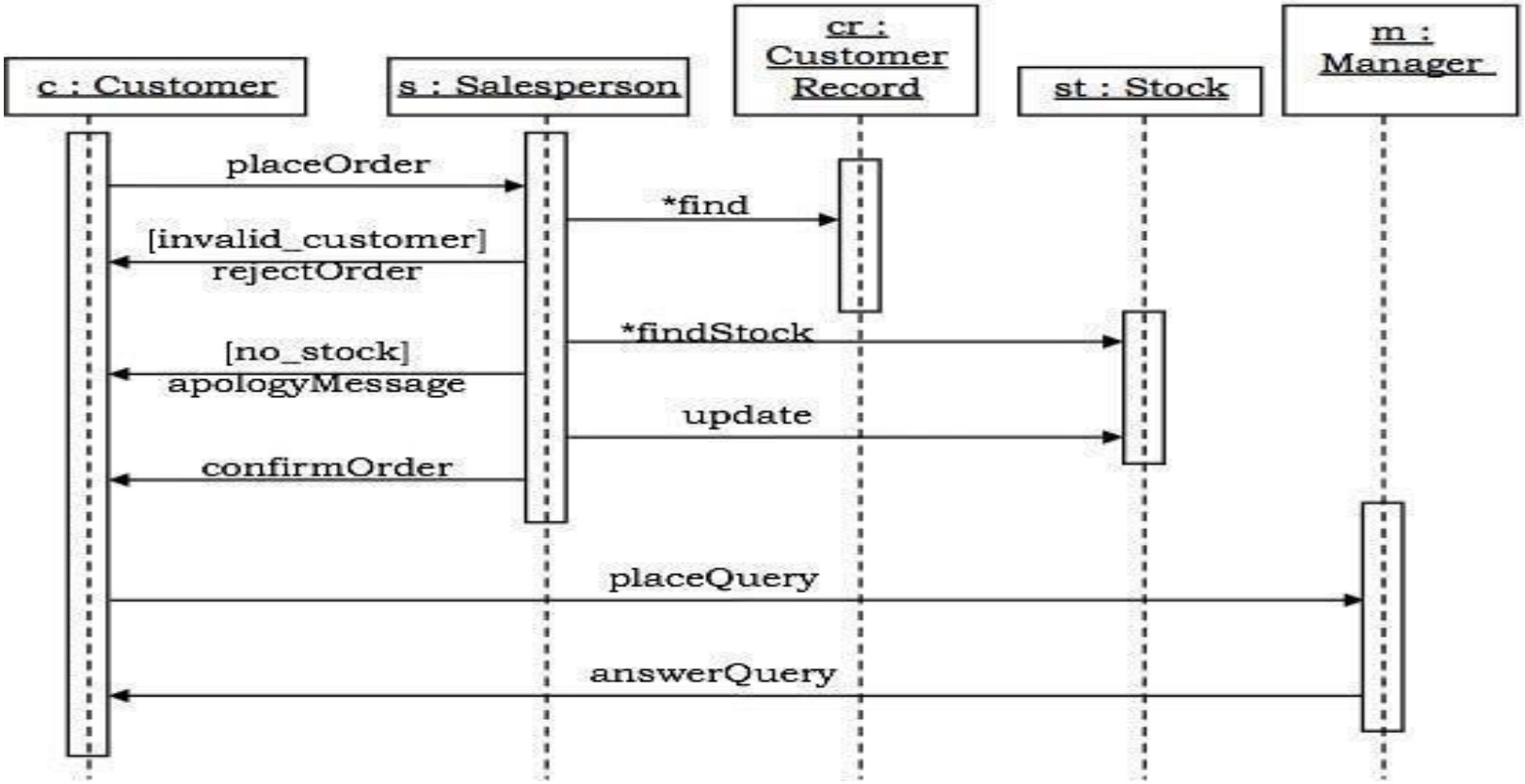


Sequence Diagrams

- **Sequence diagrams are interaction diagrams that illustrate the ordering of messages according to time.**
- **These diagrams are in the form of two-dimensional charts.**
- **The objects that initiate the interaction are placed on the x–axis.**
- **The messages that these objects send and receive are placed along the y–axis, in the order of increasing time from top to bottom.**

Examples

- A sequence diagram for the Automated Trading House System is shown in the following figure.

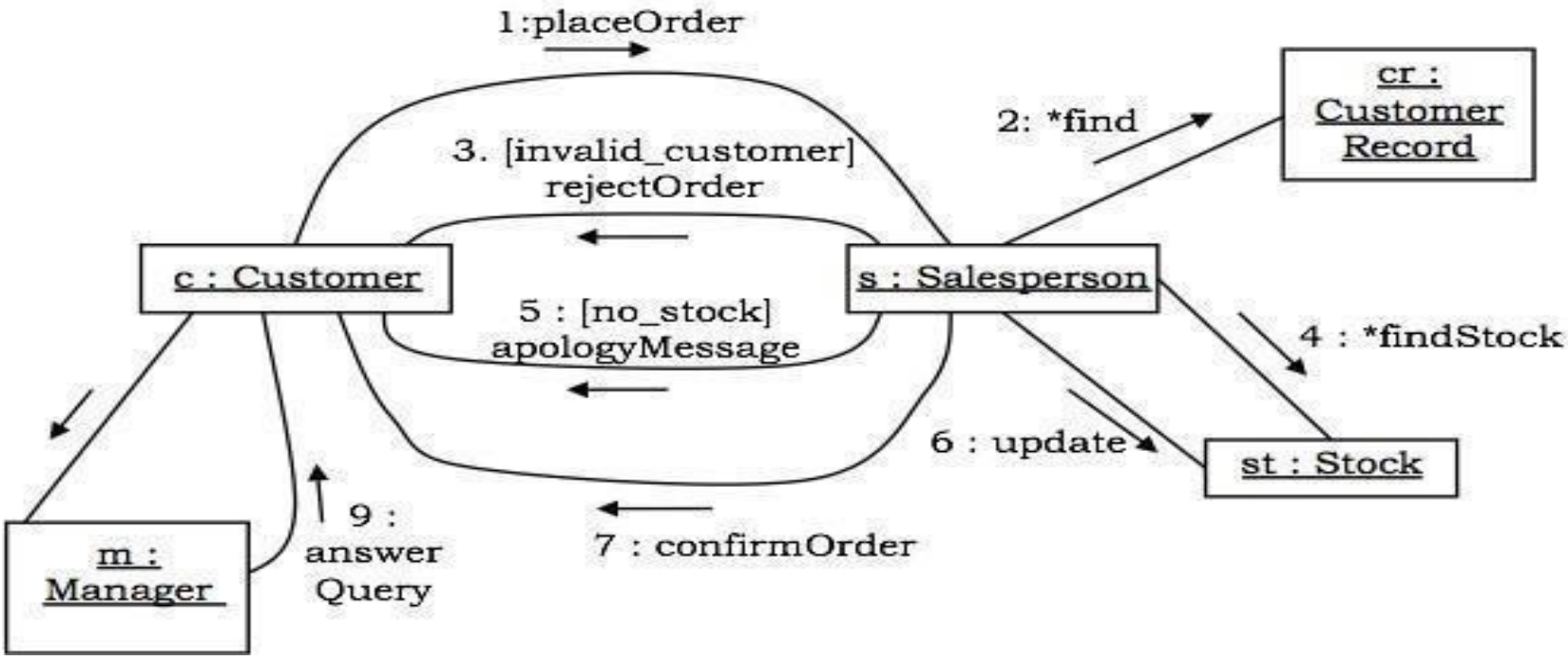


Collaboration diagram

- **Collaboration diagrams are interaction diagrams that illustrate the structure of the objects that send and receive messages.**
- **Notations – In these diagrams, the objects that participate in the interaction are shown using vertices.**
- **The links that connect the objects are used to sendand receive messages.**
- **The message is shown as a labeled arrow.**

Examples

- Collaboration diagram for the Automated Trading House System is illustrated in the figure below.



State-Chart Diagrams

- **A state–chart diagram shows a state machine that depicts the control flow of an object from one state to another. A state machine portrays the sequences of states which an object undergoes due to events and their responses to events.**

❖ **State–Chart Diagrams comprise of –**

❖ **States: Simple or Composite**

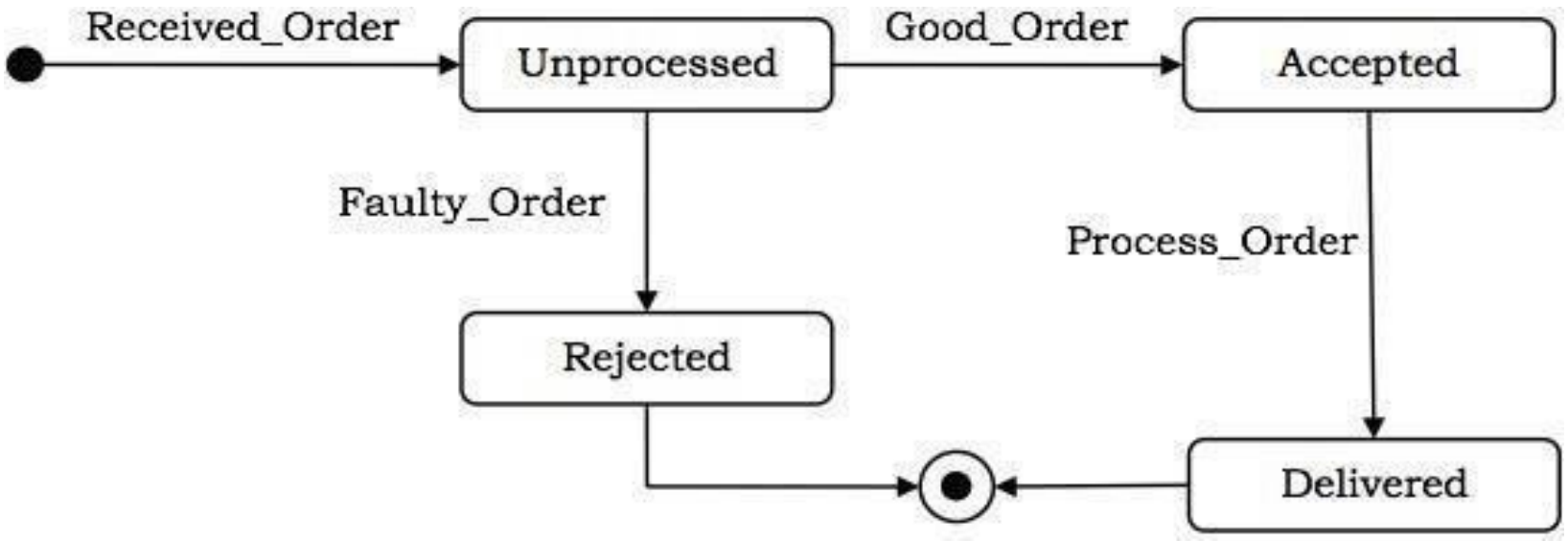
❖ **Transitions between states**

❖ **Events causing transitions**

❖ **Actions due to the events**

Examples

- **In the Automated Trading House System, let us model Order as an object and trace its sequence. The following figure shows the corresponding state–chart diagram.**



Use casediagrams

- **Use case diagrams present an outside view of the manner the elements in a system behave and how they can be used in the context.**

❖ **Use case diagrams comprise of –**

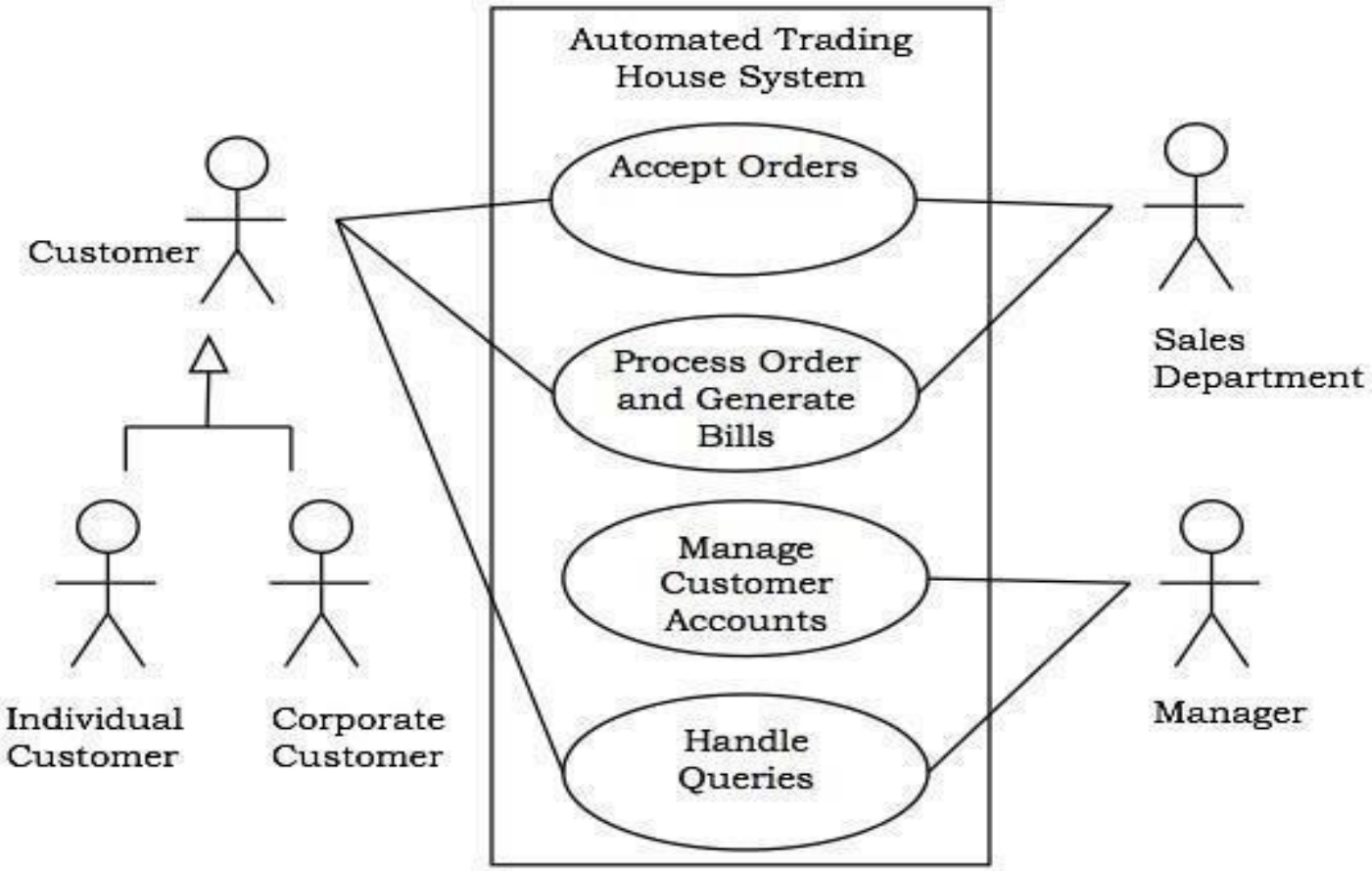
❖ **Use cases**

❖ **Actors**

❖ **Relationships like dependency, generalization, and association**

Examples

- Let us consider an Automated Trading House System.



StructuralModel

- **Structural modeling captures the static features of a system.**
- **They consist of the following -**

1. **Classes diagrams**
2. **Objects diagrams**
3. **Component diagram**
4. **Deployment diagrams**

Classes diagrams

- A class diagram models the static view of a system.
- It comprises of the classes, interfaces, and collaborations of a system; and the relationships between them.

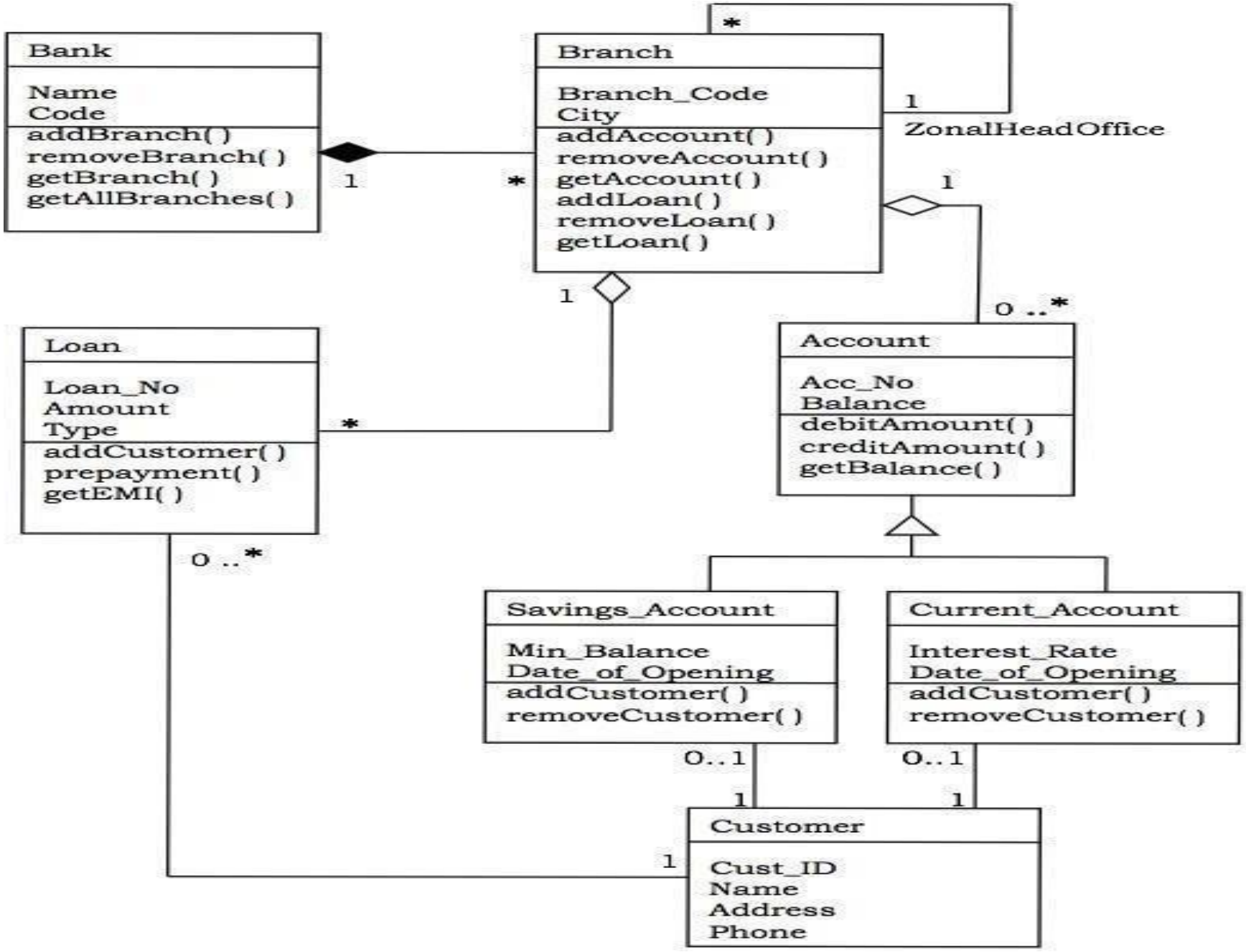
Examples

- **Relationships**

1. **A Bank "has–a" number of Branches – composition,one–to–many**
2. **A Branch with role Zonal Head Office supervises other Branches –unary association, one–to-many**
3. **A Branch "has–a" number of accounts – aggregation, one–to–many**

- **From the class Account, two classes have inherited, namely, Savings Account and Current Account.**

1. **A Customer can have one Current Account – association, one–to–one**
2. **A Customer can have one Savings Account – association, one–to–one**
3. **A Branch "has–a" number of Loans – aggregation,one–to–many**
4. **A Customer can take many loans – association,one–to–many**

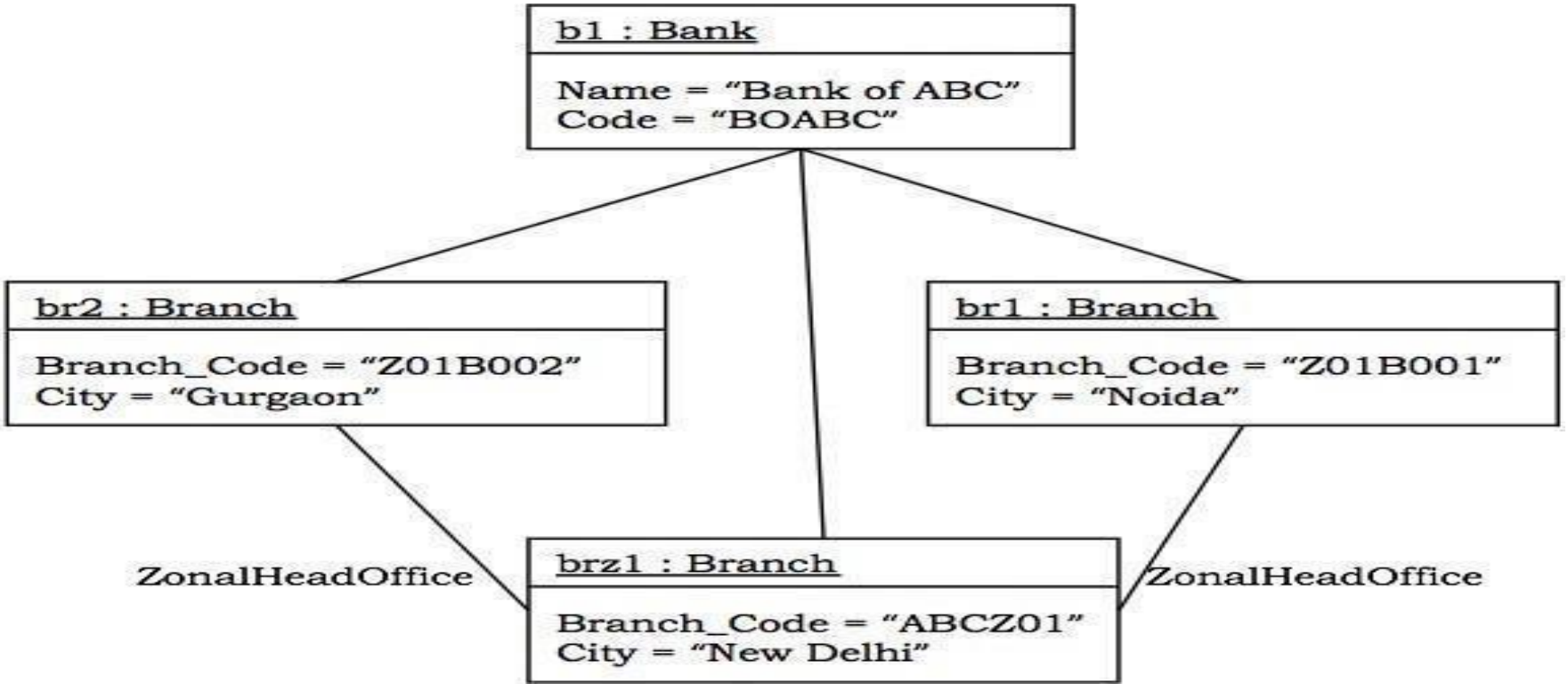

Bank
Name
Code
addBranch( )
removeBranch( )
getBranch( )
getAllBranches( )
Branch
Branch_Code
City
addAccount( )
removeAccount( )
getAccount( )
addLoan( )
removeLoan( )
getLoan( )
ZonalHeadOffice
Loan
Loan_No
Amount
Type
addCustomer( )
prepayment( )
getEMI( )
Account
Acc_No
Balance
debitAmount( )
creditAmount( )
getBalance( )
Savings_Account
Min_Balance
Date_of_Opening
addCustomer( )
removeCustomer( )
Current_Account
Interest_Rate
Date_of_Opening
addCustomer( )
removeCustomer( )
Customer
Cust_ID
Name
Address
Phone
1
*
0 ..*
0..1

ObjectDiagram

- **An object diagram models a group of objects and their links at a point of time.**
- **It shows the instances of the things in a class diagram.**
- **Object diagram is the static part of an interaction diagram.**

Examples

- **The following figure shows an object diagram of a portion of the class diagram of the Banking System.**



Component diagrams

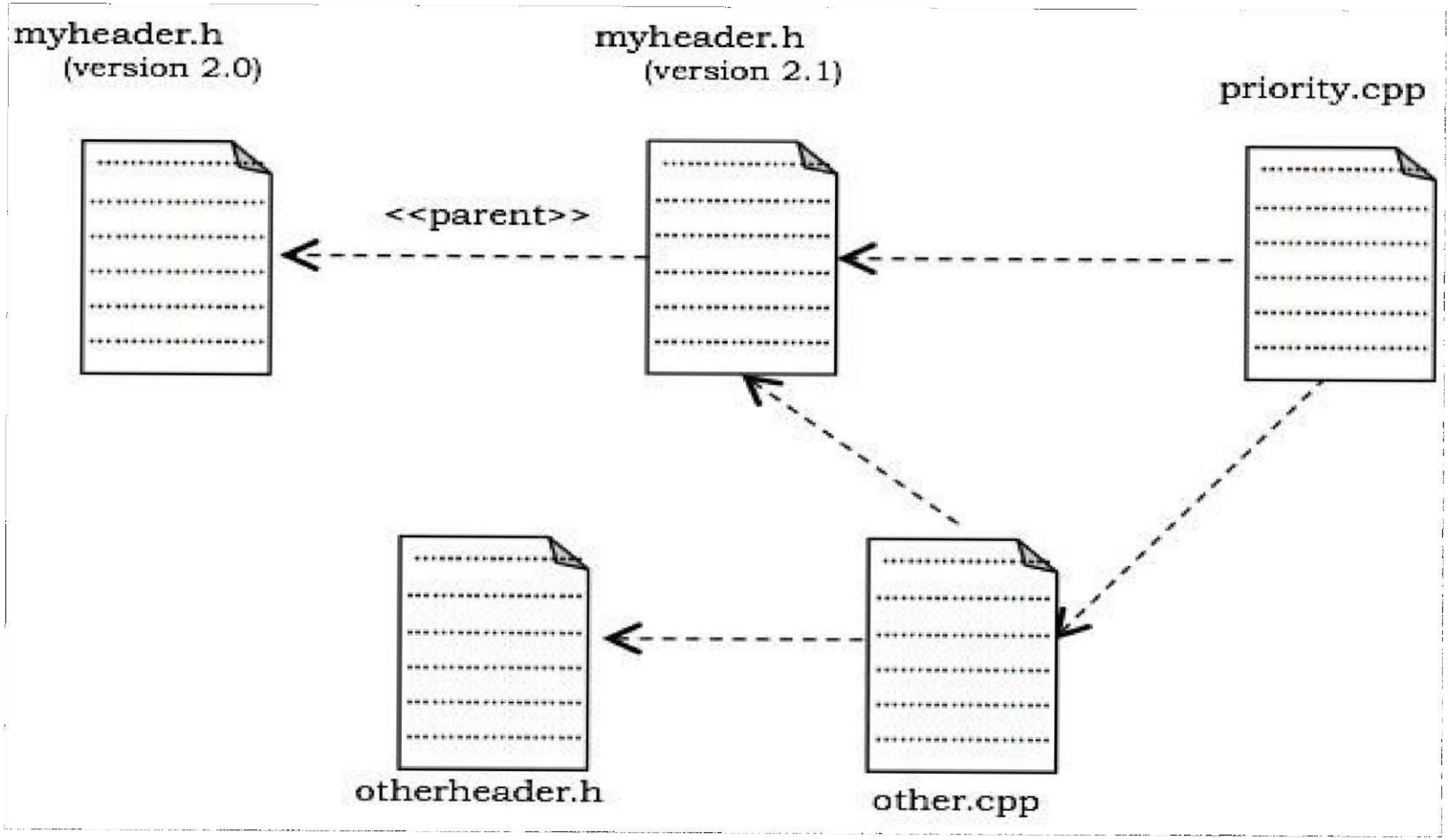
- **Component diagrams show the organization and dependencies among a group of components.**
- **Component diagrams comprise of –**
- **Components**
- **Interfaces**
- **Relationships**
- **Packages and Subsystems (optional)**

Component diagrams are used for….

- **constructing systems through forward and reverse engineering.**
- **modeling configuration management of source code files while developing a system using an object-oriented programming language.**
- **representing schemas in modeling databases.**
- **modeling behaviors of dynamic systems.**

Examples

- The following figure shows a component diagram to model a system's source code that is developed using C++.
- It shows four source code files, namely, myheader.h, otherheader.h, priority.cpp, and other.cpp. Two versions of myheader.h are shown, tracing from the recent version to its ancestor.
- The file priority.cpp has compilation dependency on other.cpp. The file other.cpp has compilation dependency on otherheader.h.


myheader.h
(version 2.0)
myheader.h
(version 2.1)
priority.cpp
<<parent>>
otherheader.h
other.cpp

Deployment Diagram

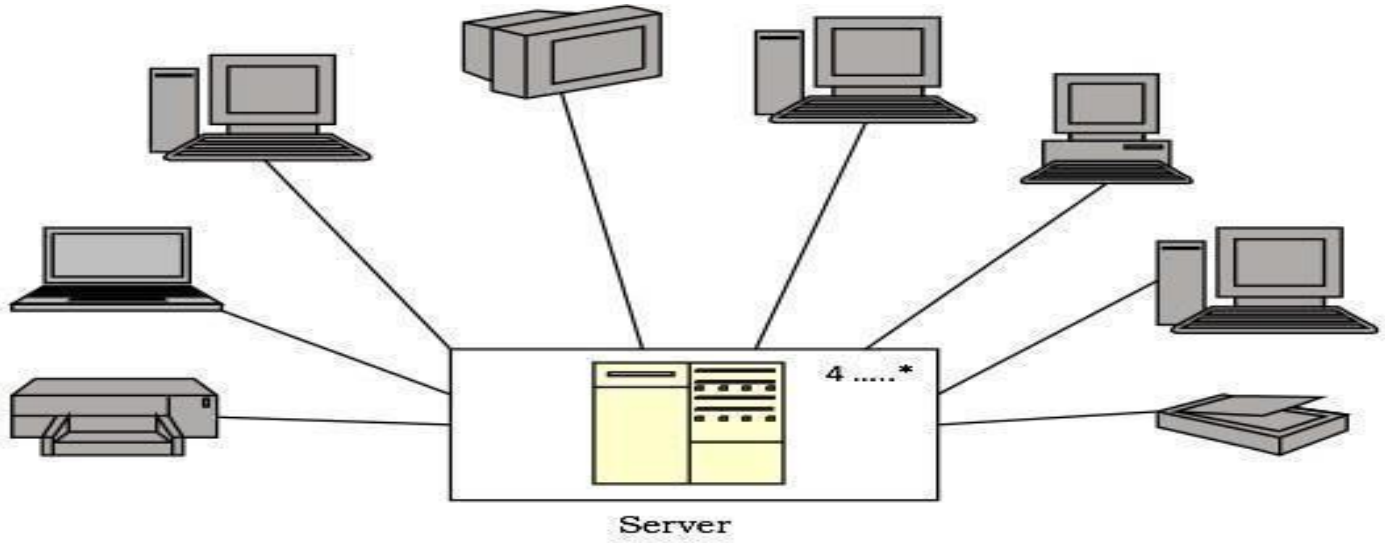
- **A deployment diagram puts emphasis on the configuration of runtime processing nodes and their components that live on them.**
- **They are commonly comprised of nodes and dependencies, or associations between the nodes.**

Deployment diagramsareused to….

- **Model devices in embedded systems that typically comprise of software-intensive collection of hardware.**
- **represent the topologies of client/server systems.**
- **model fully distributed systems.**

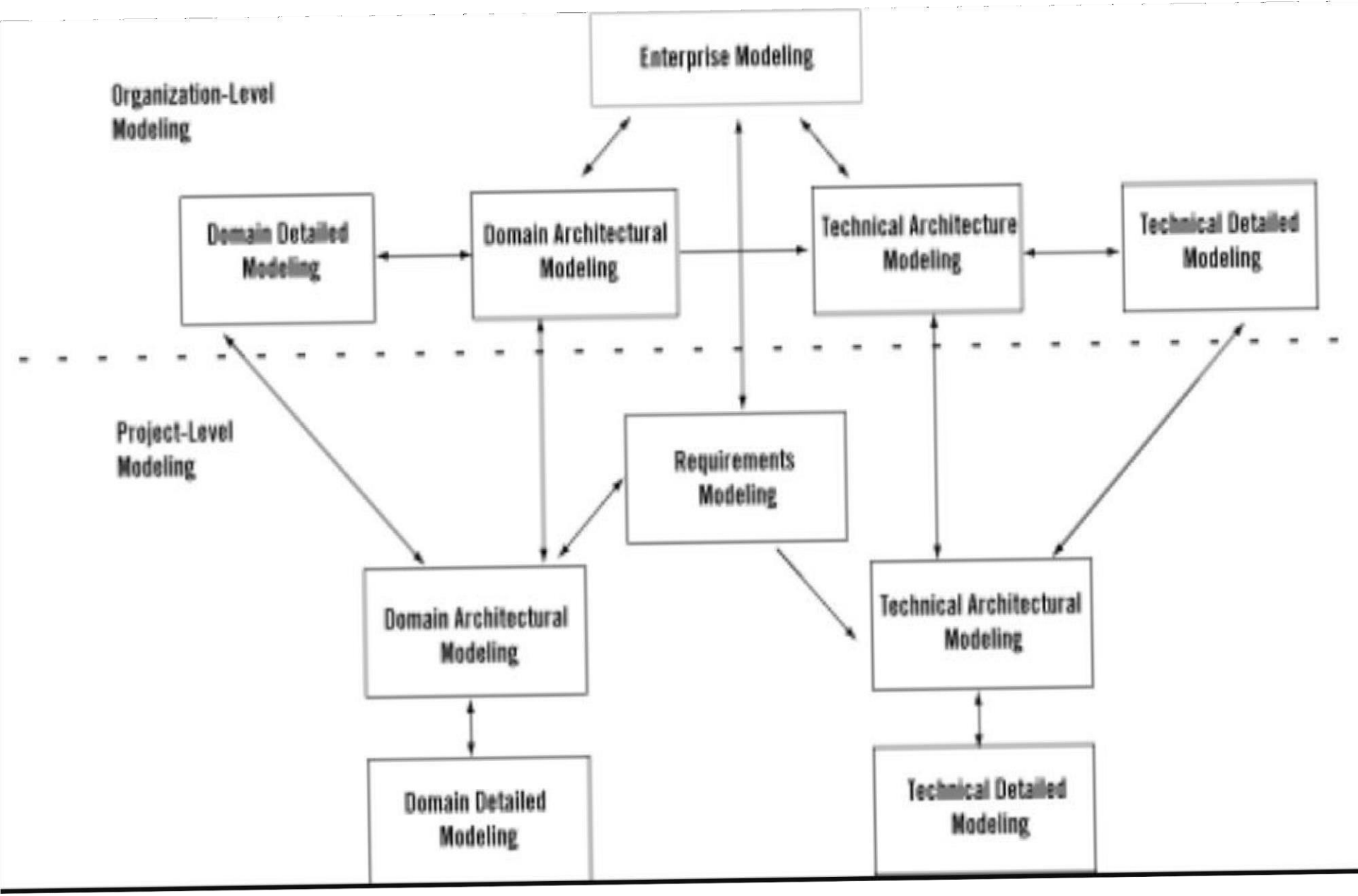
Example

- **The following figure shows the topology of a computer system that follows client/server architecture.**
- **The figure illustrates a node stereotyped as server that comprises of processors.**



Architectural model

- Architectural model represents the overall framework of the system.
- It contains both structural and behavioral elements of the system.
- Architectural model can be defined as the blueprint of the entire system.
- Package diagram comes under architectural modeling.


Enterprise Modeling
Organization-Level Modeling
Domain Detailed Modeling
Domain Architectural Modeling
Technical Architecture Modeling
Technical Detailed Modeling
Project-Level Modeling
Requirements Modeling
Domain Architectural Modeling
Technical Architectural Modeling
Domain Detailed Modeling
Technical Detailed Modeling

All the Best...