Information System Design

IT60105

Lecture 11

Class and Object Diagrams

Lecture #11

- What is a class diagram?
- Basic components in any class diagram and their notations
- Example: *Class Diagram* in OLP system
- What is an object diagram
- Basic components in any object diagram and their notations
- Example: *Object Diagram* in OLP system

Class Diagram

What is a Class Diagram?

- A class is a structural component of any object oriented system. The class diagram used to model the structural view of the underlying system

- A class diagram is a collection of all possible classes in a system and relationships among them

- The different relations may occur in a class diagram are
  - Association/Aggregation
  - Generalization/Specialization

- Class diagrams also show the attributes and operations of a class. also it can depicts the navigability (direction of trace ability) and the constraints that apply to the way objects are connected

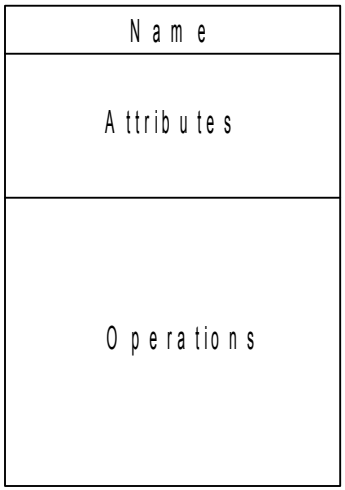
Basic Class Model Notations

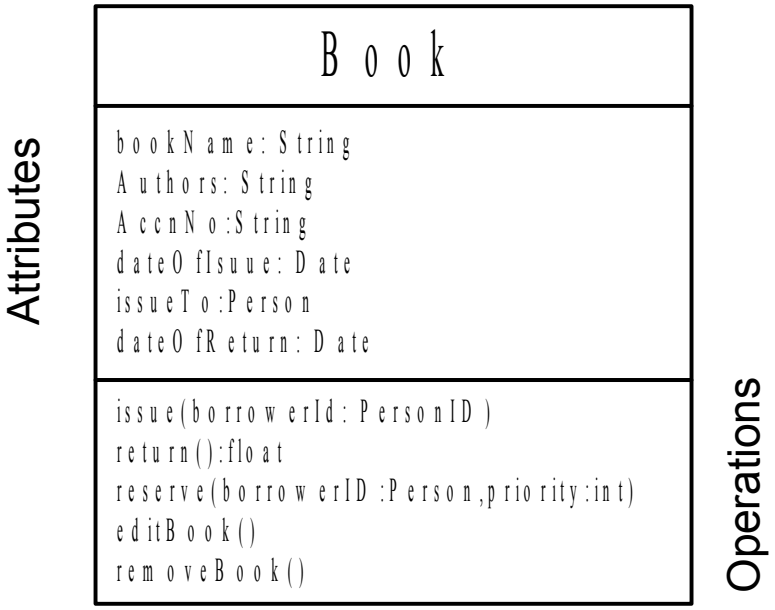
- Class

- Example

Detail Class Diagram

- Class diagram also shows the attributes and operations of classes

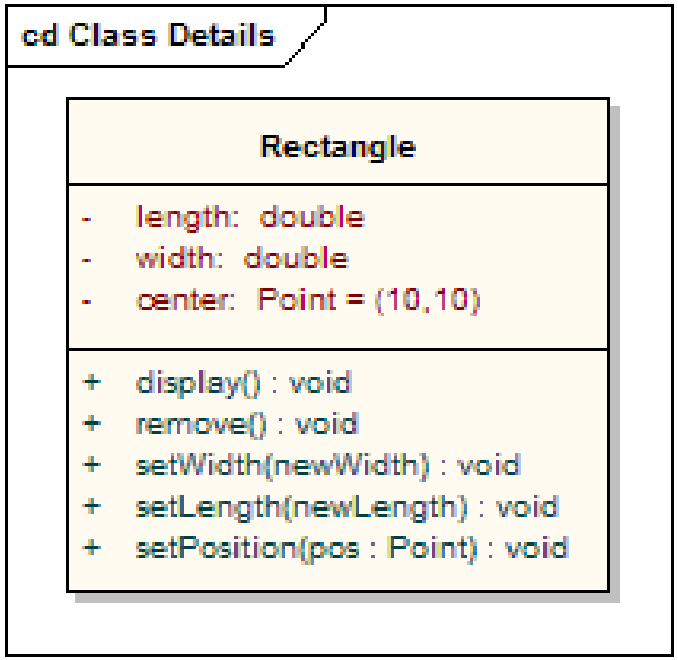




- Think: For the class Server, what are the attributes? operations?

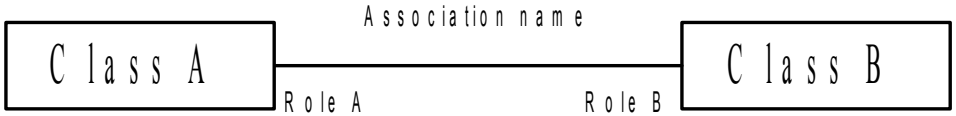
Visibility

- The notation that precedes the attribute or operation name indicates the visibility of the element, if the + symbol is used the attribute or operation has a public level of visibility, if a - symbol is used the attribute or operation is private. In addition the # symbol allows an operation or attribute to be defined as protected and the ~ symbol indicates package visibility.

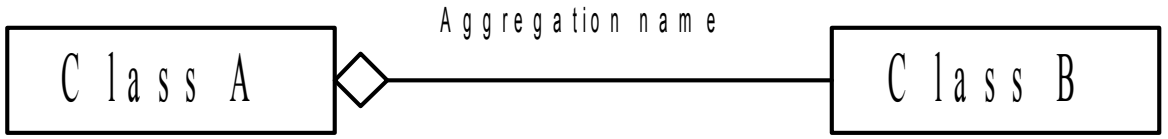


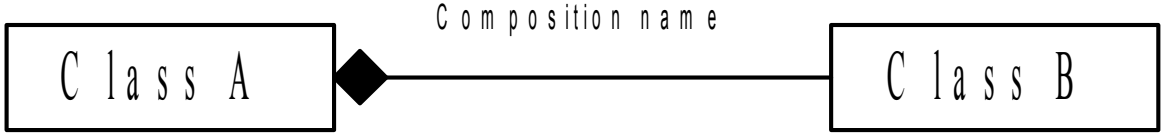
Relation Association

- An association implies two model elements have a relationship - usually implemented as an instance variable in one class. This connector may include named roles at each end, cardinality, direction and constraints. Association is the general relationship type between elements. For more than two elements, a diagonal representation toolbox element can be used as well. When code is generated for class diagrams, associations become instance variables in the target class.

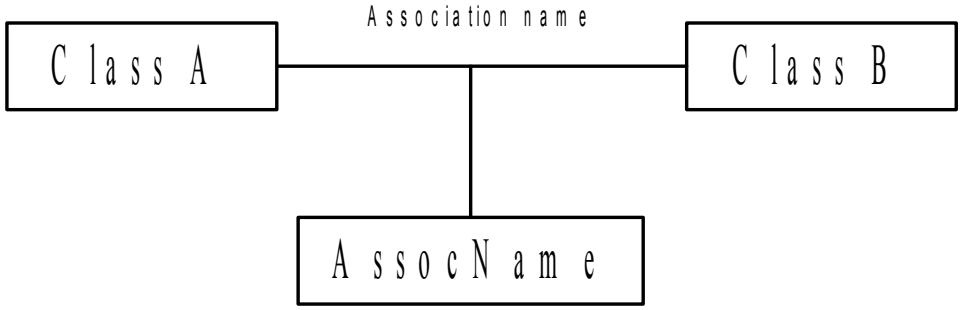


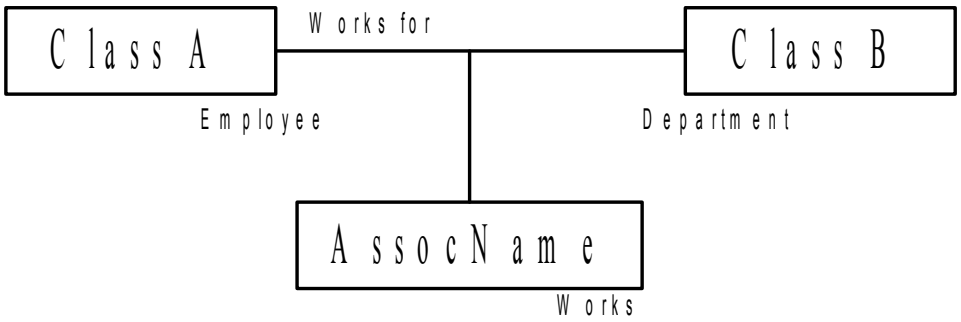
Aggregation and Composition





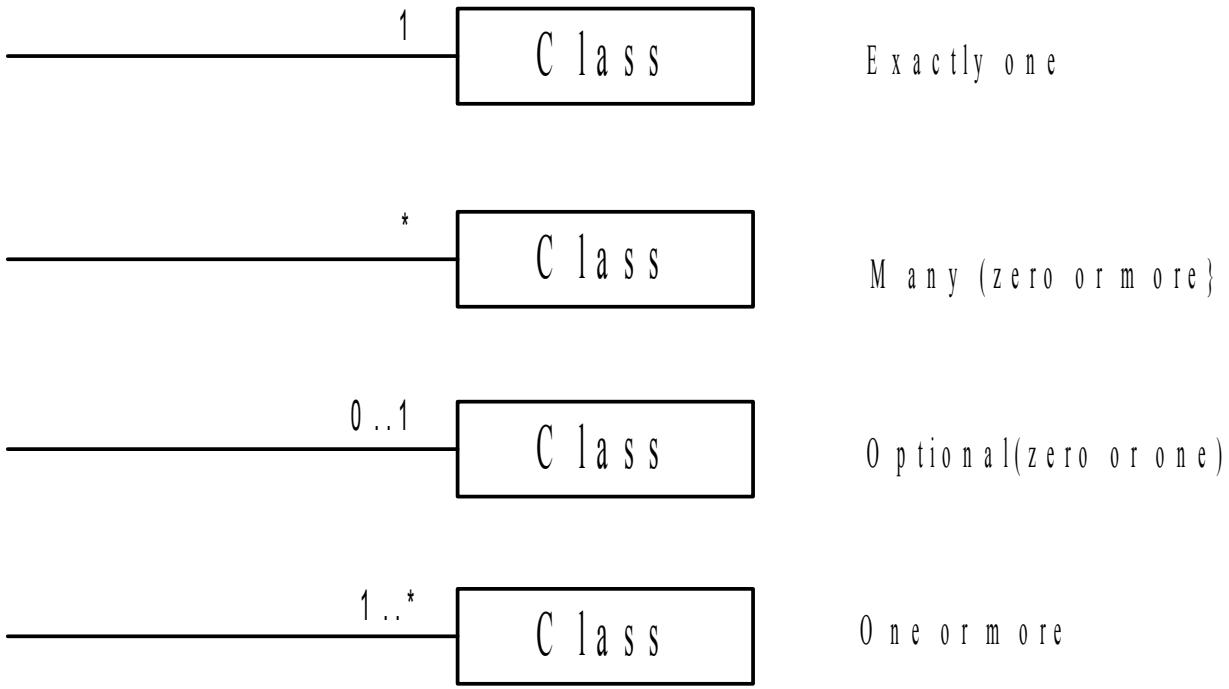
Association Class



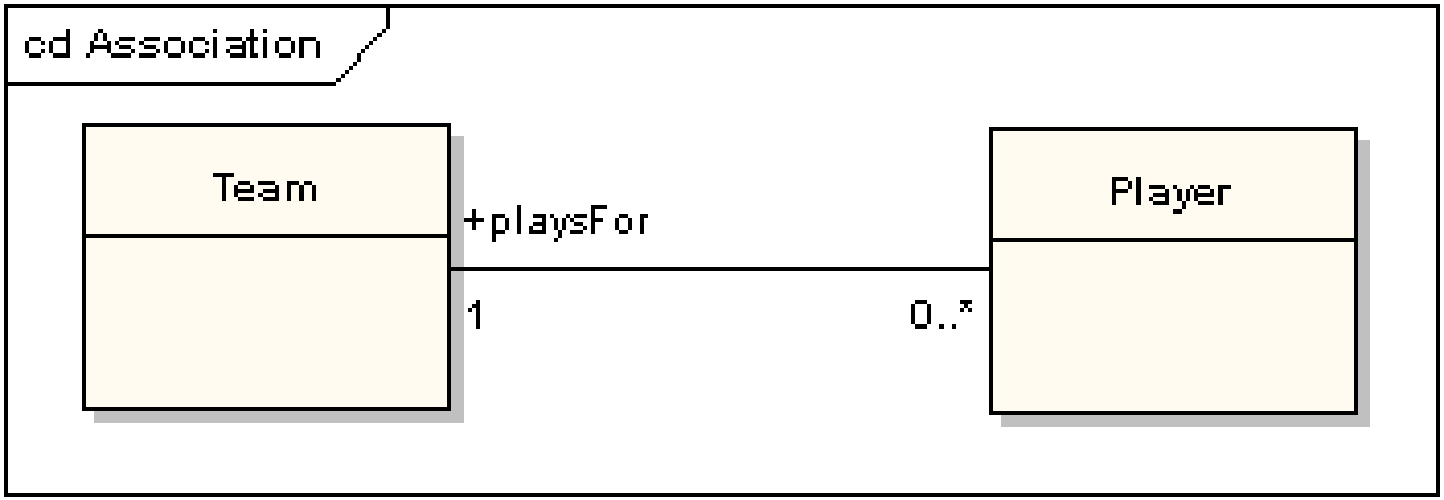


Multiplicity

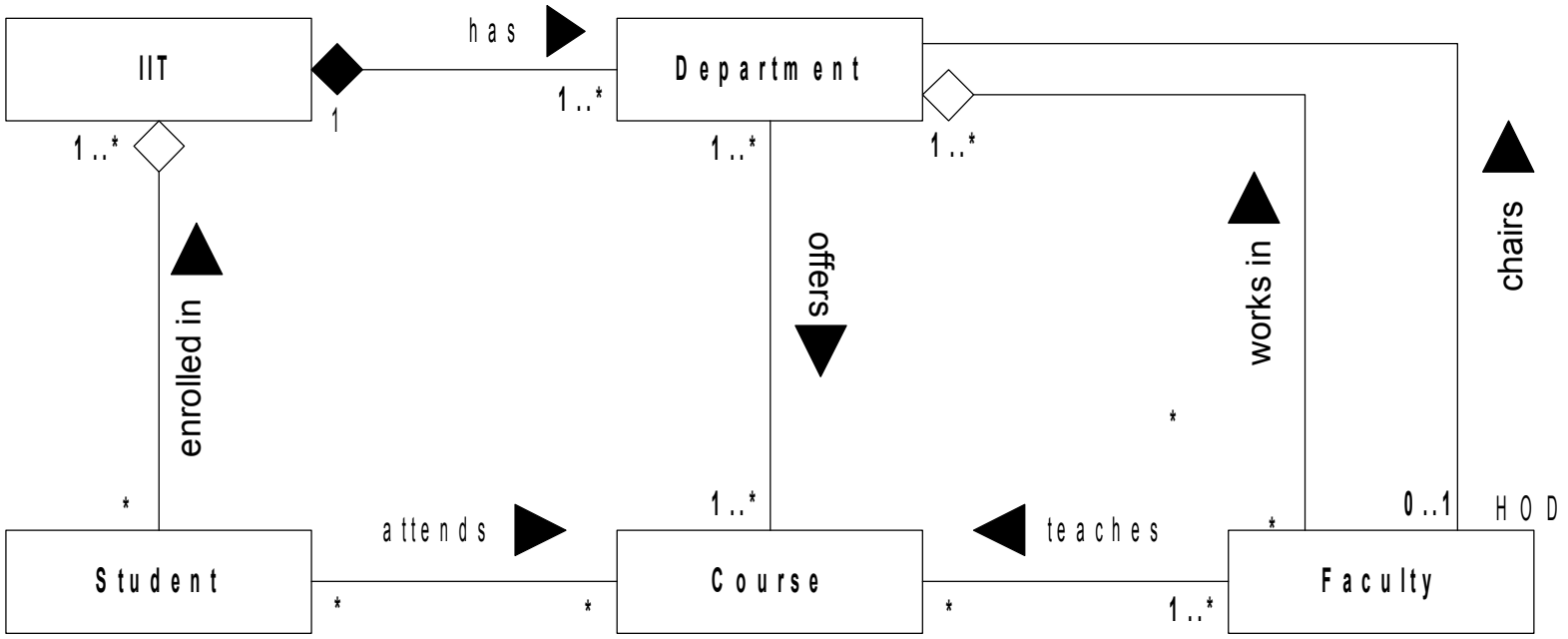
cc



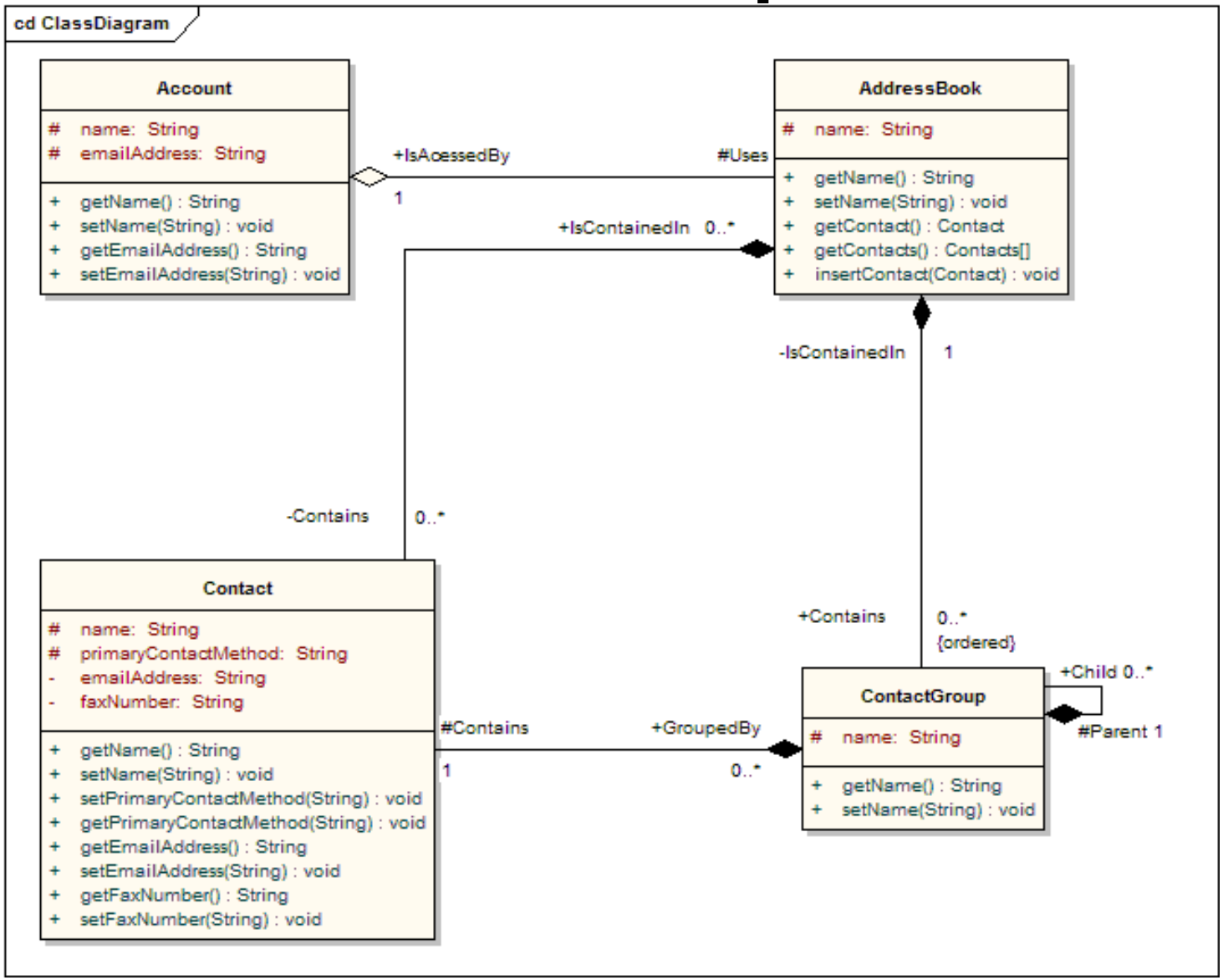
Multiplicity & Association



Example of a Class Diagram



Another Example

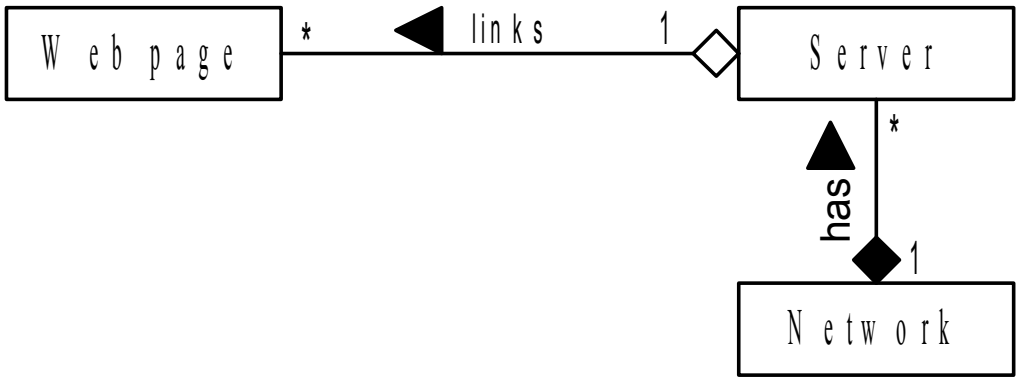


Example: Internet

- ? Internet
  - Network of networks (is a collection of servers)
  - A collection of web pages
- This internet can be thought of an object-oriented system
  - ? Use case diagram
  - ? Activity diagrams
  - ? State-chart diagrams

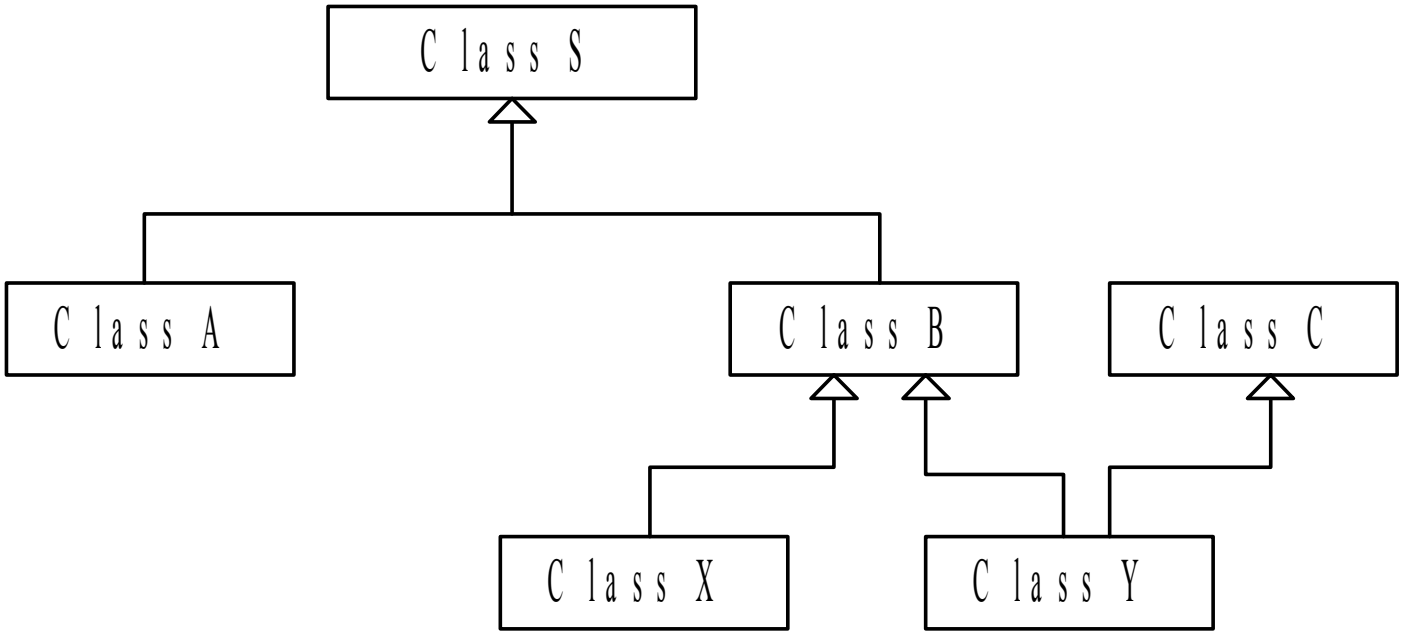
  etc…..
- Let's consider the class diagram of the system Internet

Example: Internet

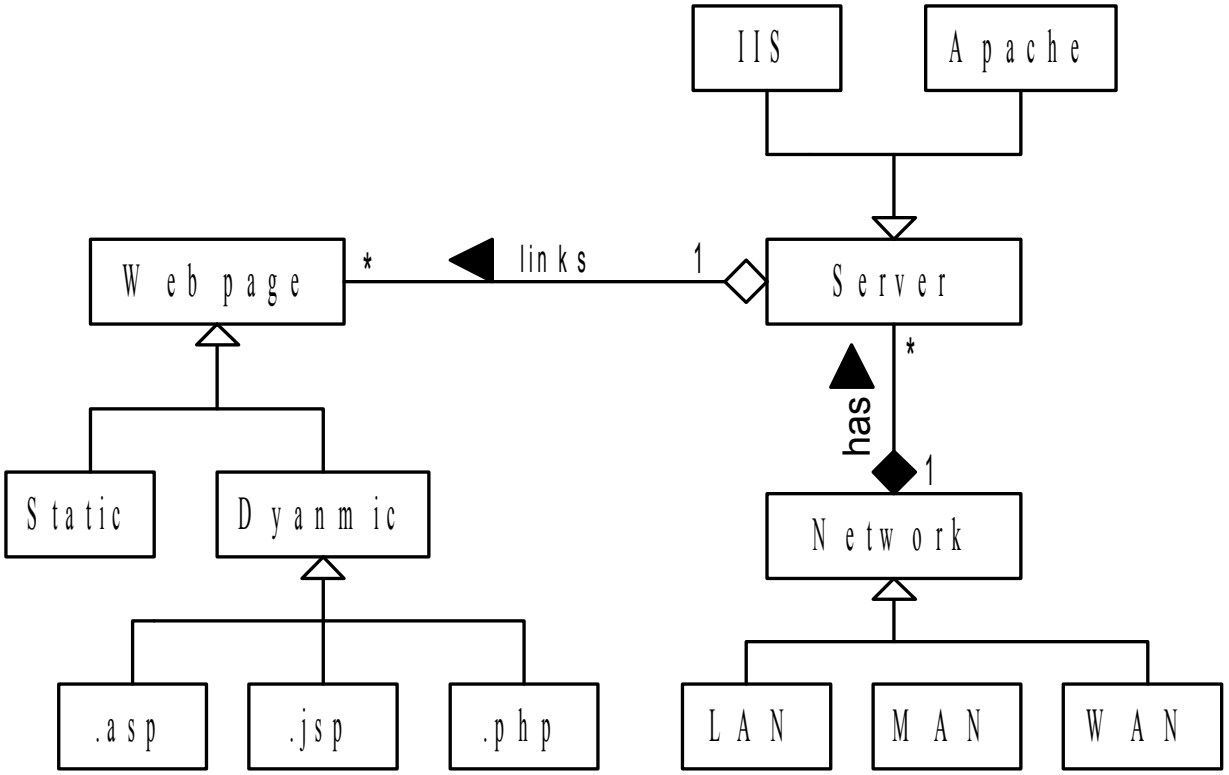


- This class diagram shows a collection of all possible classes in the system namely, the Internet and relationships among them
- This simple class diagram shows the association and aggregation relationship

Interface: Generalization & Specialization

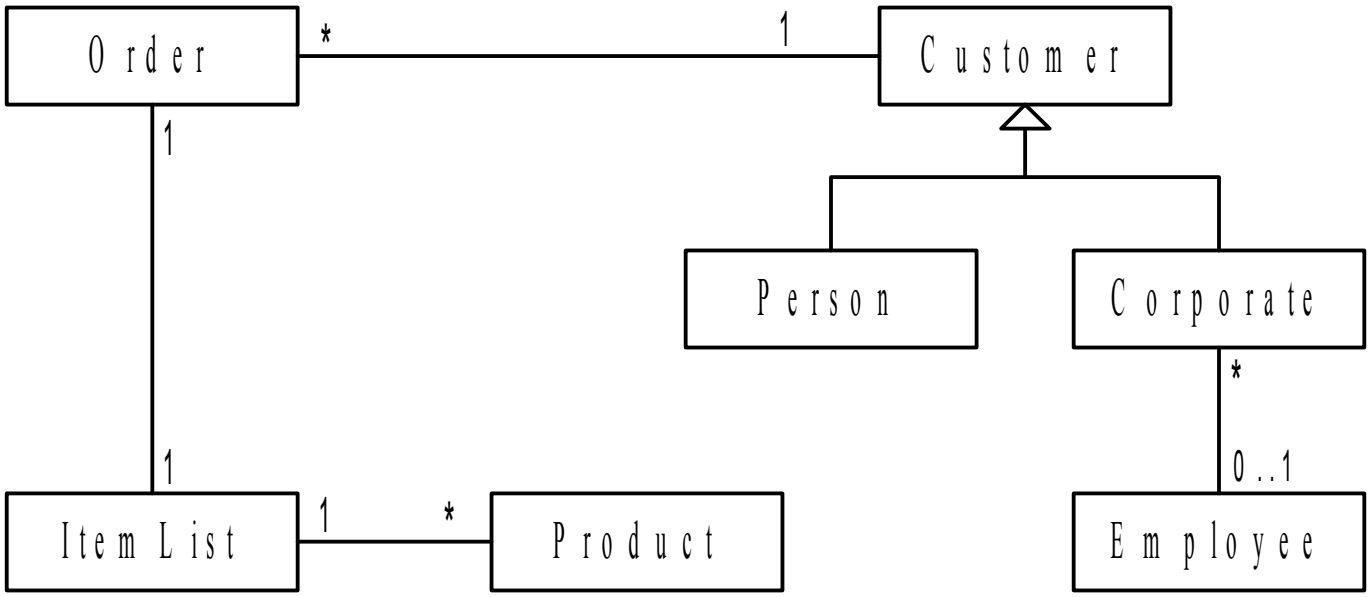


Another view of Internet Class Diagram



- This class diagram shows the generalization/specialization relationship

Example: Class Diagram in OLP System



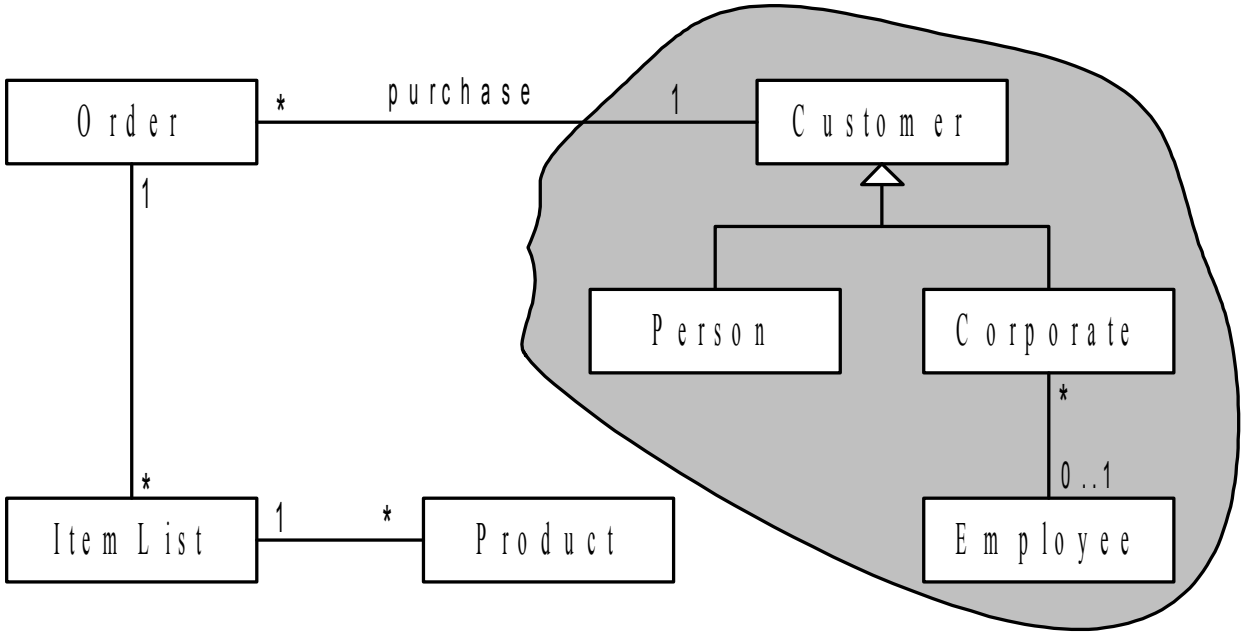
Object Diagram

What is an Object Diagram

- An object is an instance of a class
- An object diagram is a collection of object and its relationships among them, just like class diagrams
- More precisely, an object diagram is a snapshot of the objects in a system at a particular point of time
- Since object diagram shows instances rather than classes, an object diagram is often called an instance diagram
- Usually, an object diagram is used to provide an example configuration of objects

Example: Object Diagram

- Let us consider a composition of a class in OLP system

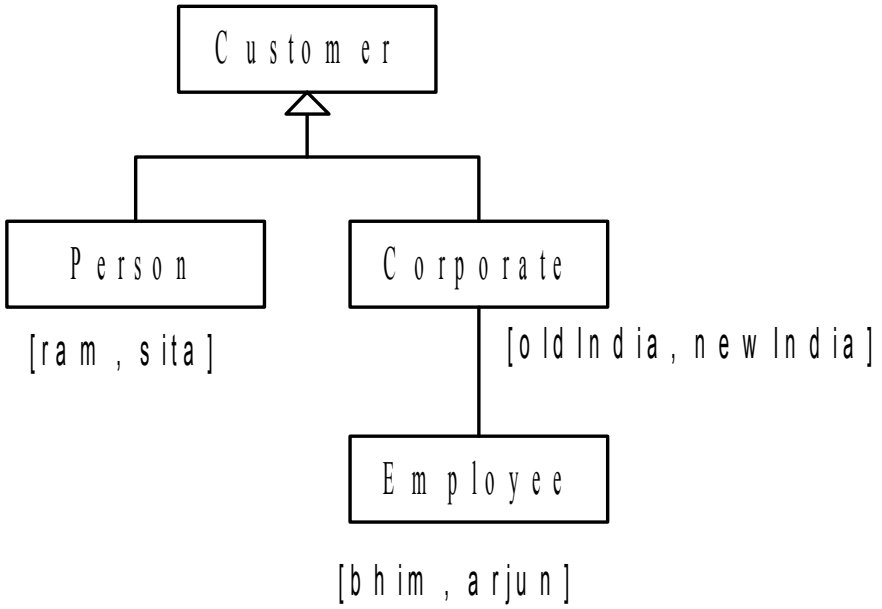


- From the application point of views, the customer class signifies that a customer is either a person or an organization or an employee of an organization

Example: Object Diagram

- Further consider a particular snapshot at an instance

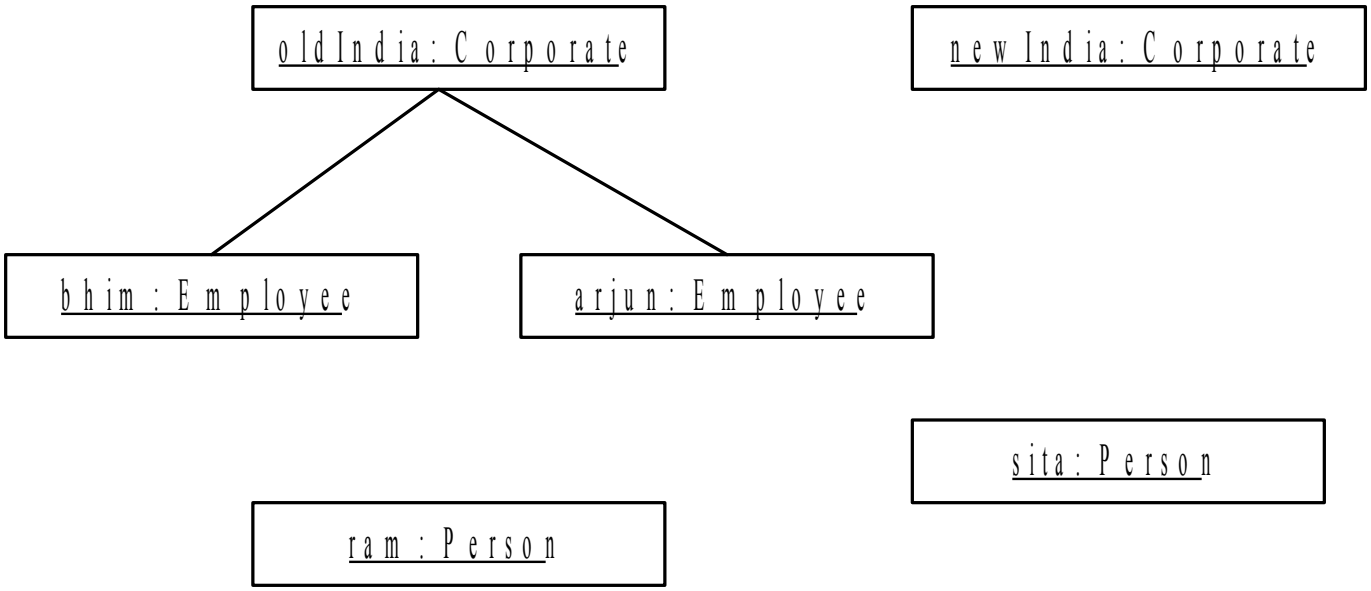
ram: Person
sita: Person
bhim: Employee
arjun: Employee
oldIndia: Corporate
newIndia: Corporate



Further assume that *bhim* and *arjun* are the employees of *oldIndia*

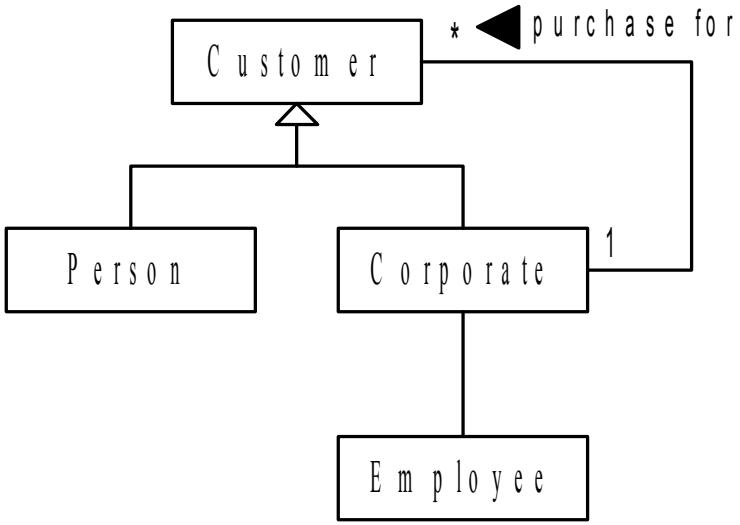
Example: Object Diagram

- The object diagram for the above snapshot will look like this



More Example: Object Diagram

- Let's consider a small modification in the class diagram

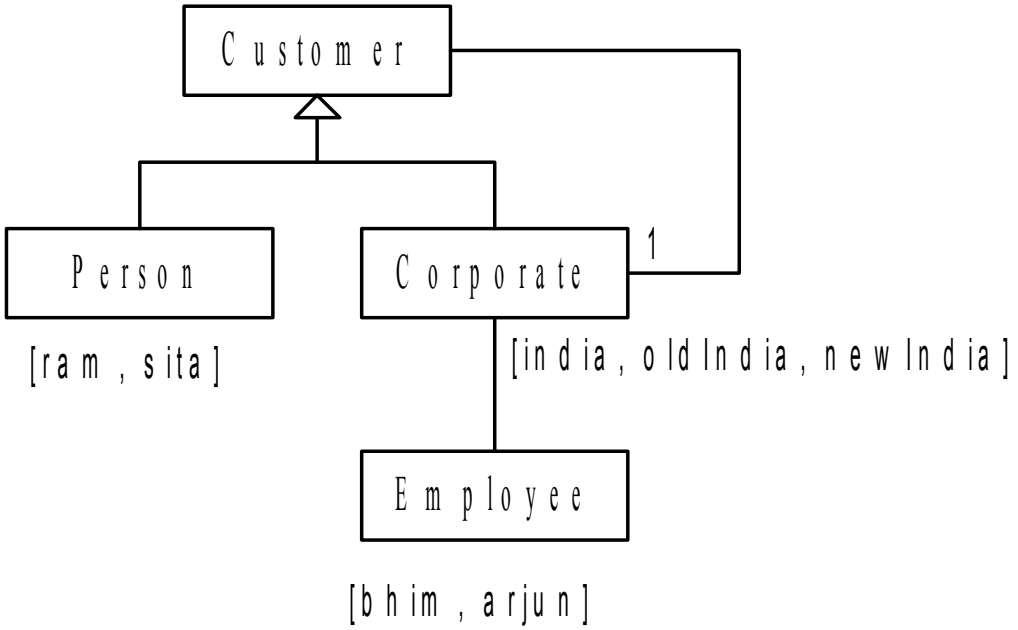


- This signifies that a customer being a corporate can purchase for others, say person, organizations

More Example: Object Diagram

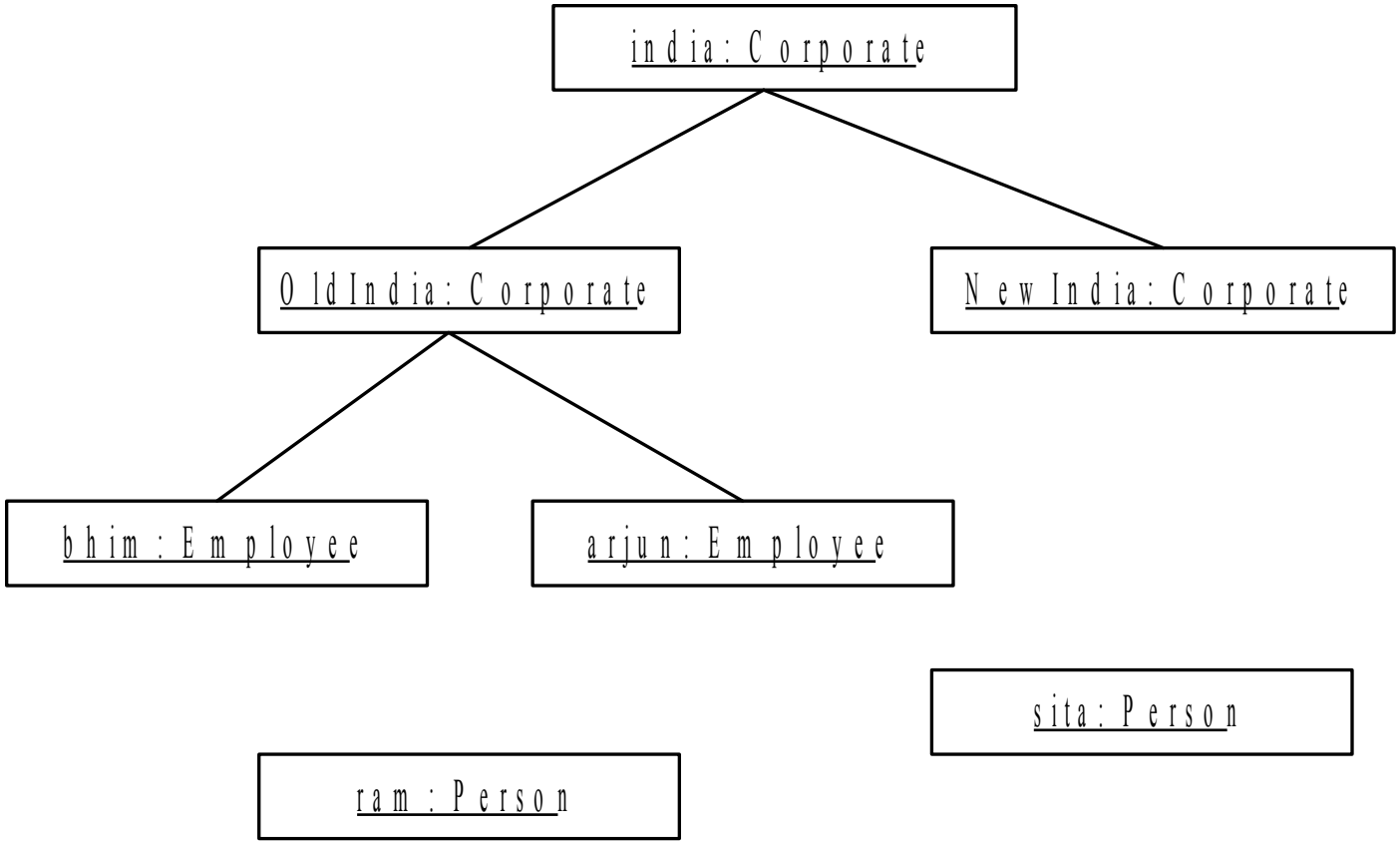
- A snapshot under this modified situation is

ram: Person
sita: Person
bhim: Employee
arjun: Employee
oldIndia: Corporate
newIndia: Corporate
india: Corporate



Here, suppose *india* purchase for *oldIndia* and *newIndia*

More Example: Object Diagram



Problems to Ponder

- For all the geometric objects possible like point, straight line, circle, ellipse etc. obtain the following
  - Class diagram
  - Object diagram for an instance of object with reference to an instance of a graphics that is drawn based on the geometric objects
- Conceptual class diagram?
- Domain class diagram?