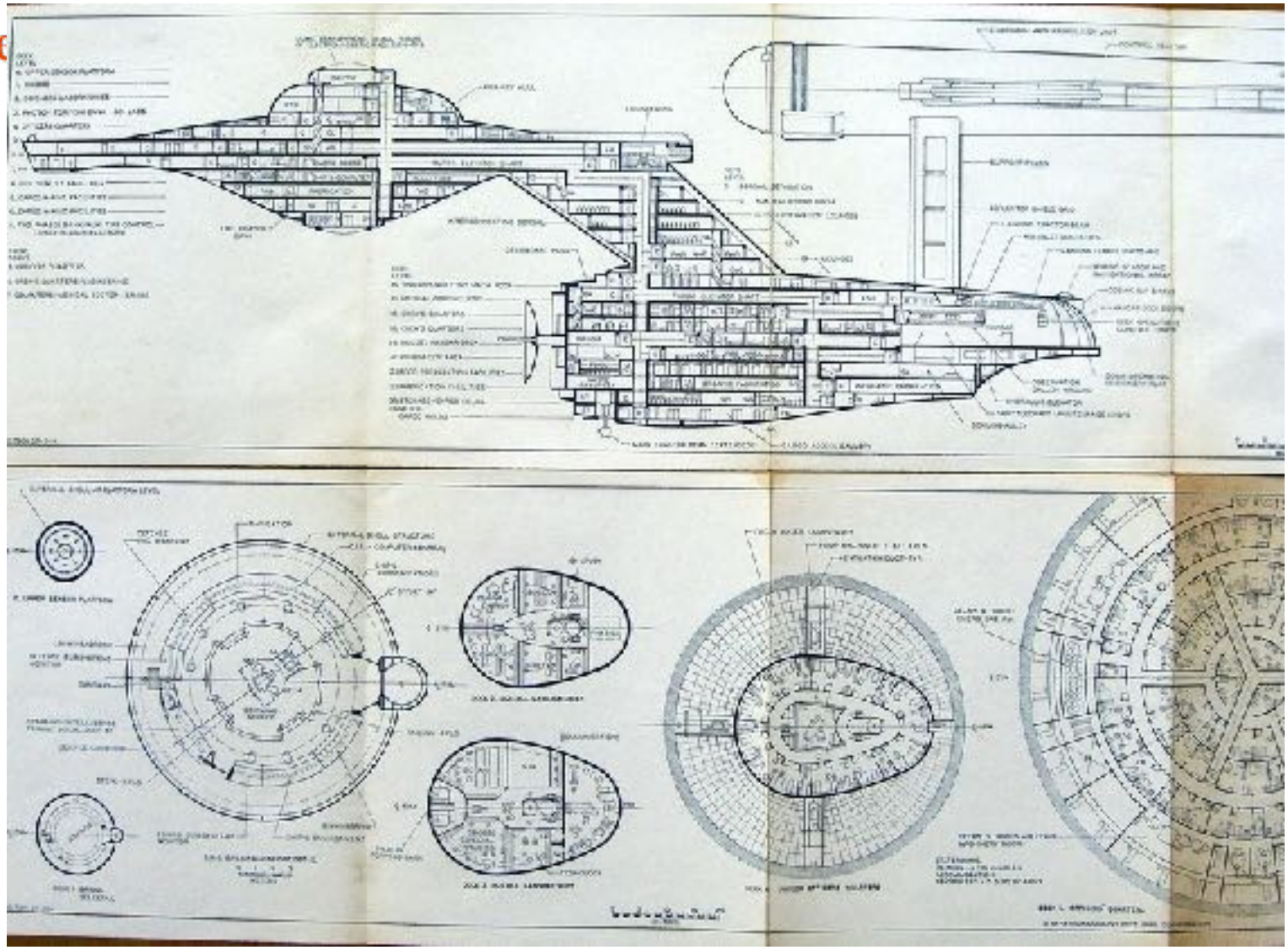
Diagram Notations - UML



Announcement

- Sprint 3 is done
- Sprint 2 grading by Thu
- Informal feedback on class (google form) today

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Some UML diagrams

- **Activity Diagram**
- **Class Diagram**
- Communication Diagram
- Component Diagram
- Composite Structure Diagram
- Deployment Diagram
- Interaction Overview Diagram
- Object Diagram
- Package Diagram
- **Sequence Diagram**
- **State Machine Diagram**
- Timing Diagram
- **Use Case Diagram**

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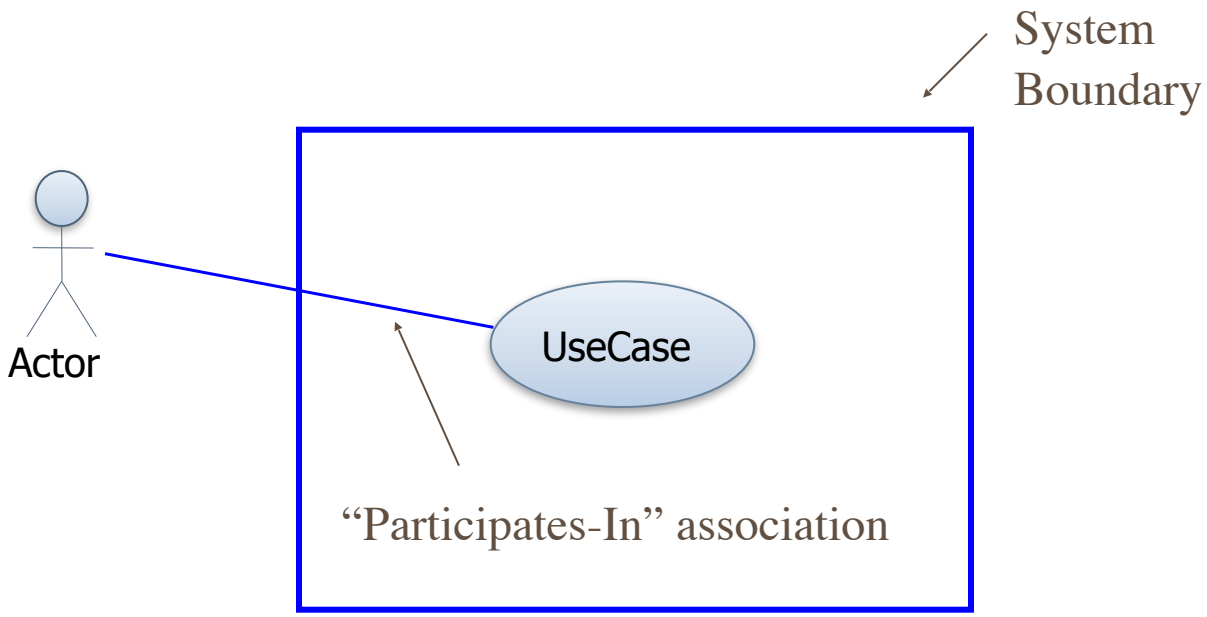
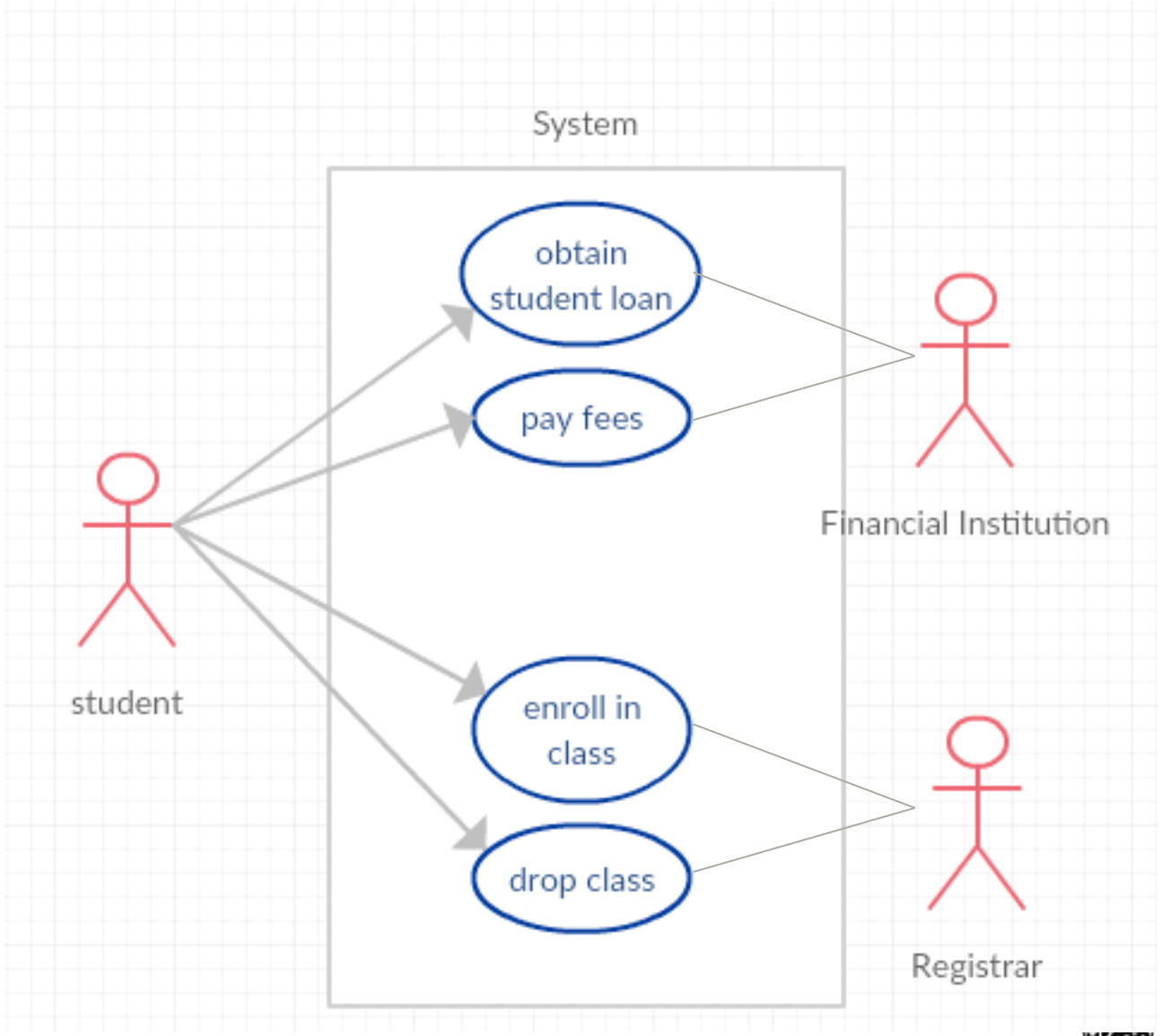
Use Case Diagrams

- Use Case Diagram at its simplest is a representation of a user's interaction with a system.
- Use Cases similar to User Stories, but more formal and more complex

Use Case Includes

- Summary of usage requirements
- From users point of view
- Basic Course of Events
- Alternative Paths
- Preconditions / Postconditions





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http://agilemodeling.com/artifacts/useCaseDiagram.htm

Includes vs. Generalization vs. Extends

- Use "includes" when you are repeating yourself in two or more separate use cases and you want to avoid repetition.

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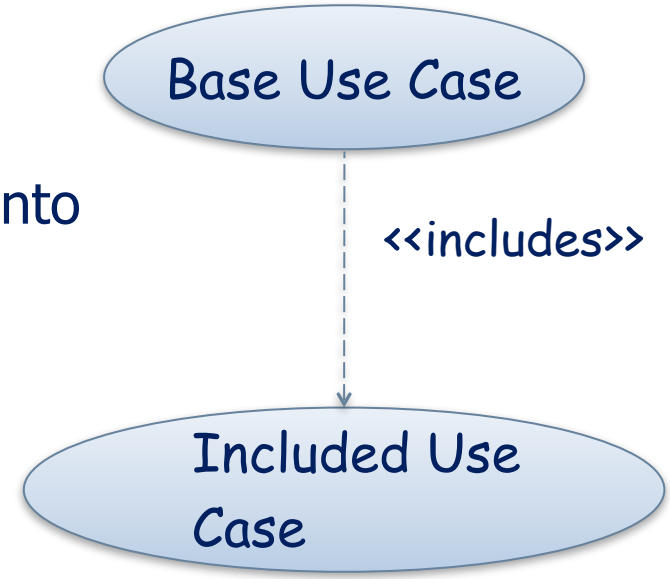
Include

Factors use cases into additional ones



Includes vs. Generalization vs. Extends

- Use “includes” when you are repeating yourself in two or more separate use cases and you want to avoid repetition.

- **Use “generalization”, when you have a use case that is a special type of another use case**

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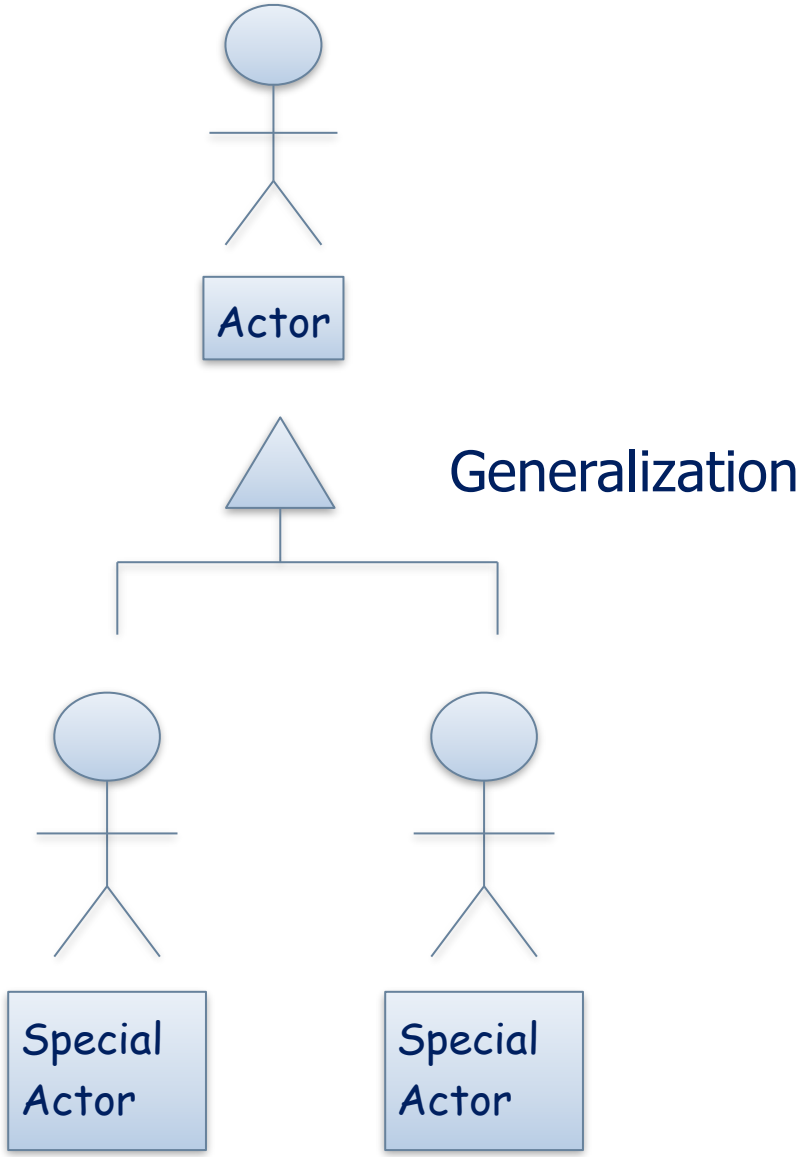
Generalization



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Includes vs. Generalization vs. Extends

- Use “includes” when you are repeating yourself in two or more separate use cases and you want to avoid repetition.

- Use “generalization”, when you have a use case that is a special type of another use case

- **Use “extends” when you are describing a variation on normal behavior - you can completely reuse another’s behavior, but is dependent either on runtime or system implementation decision**

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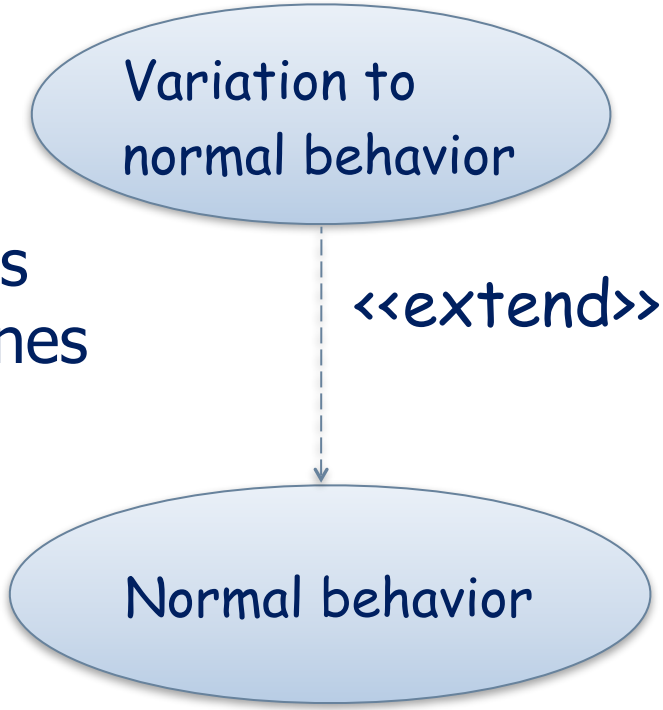
Extends

Factors use cases into additional ones



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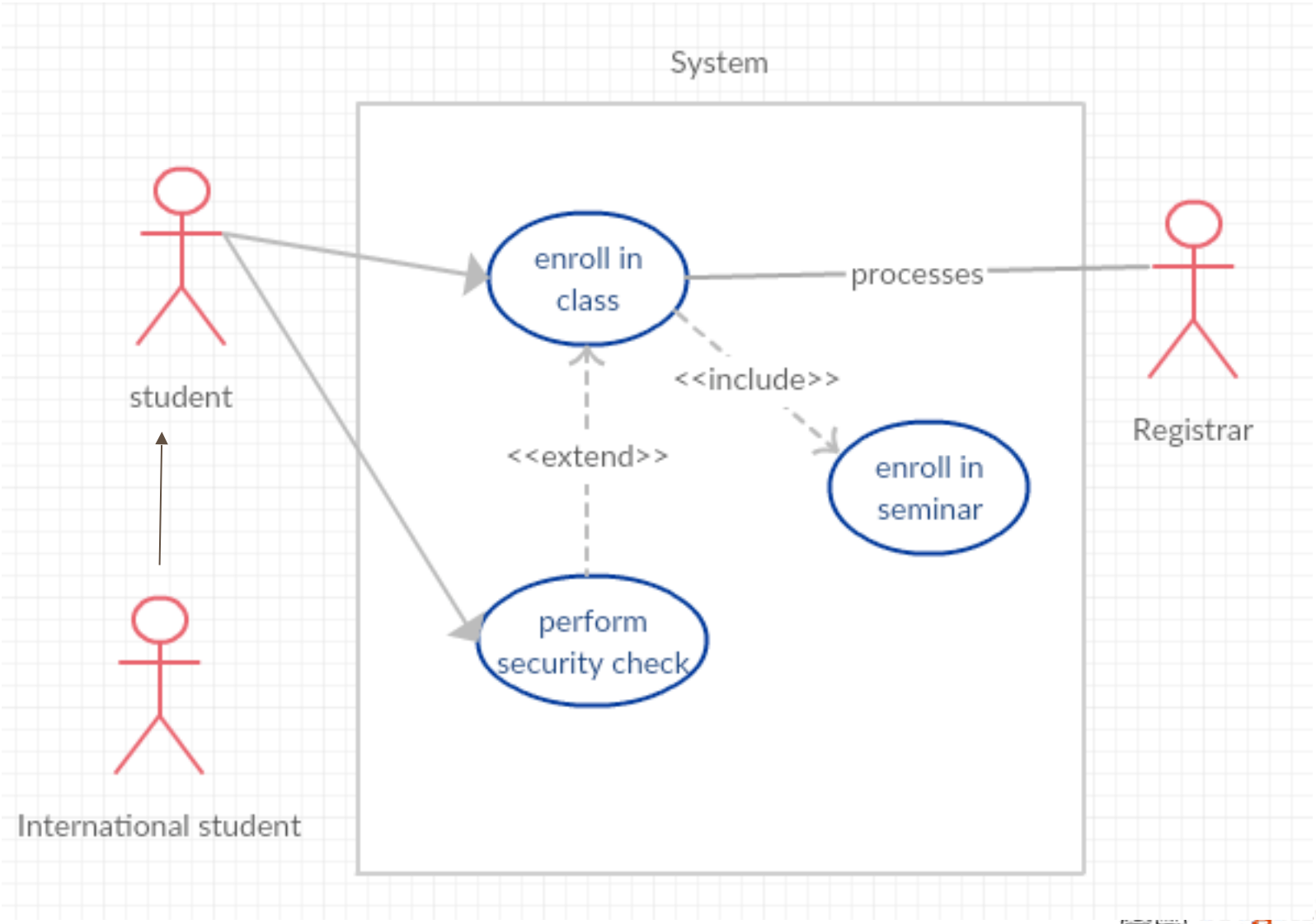

Exercise

- Get (buy/rent) the (SE) book from Amazon

Class Diagrams

But first, Object Terminology Review

- An object mirrors real world entity
- Examples:
  - Person, student, book, card, game, etc.

Object Terminology Review

- Objects Contain (class):
  - attributes (variables)
  - functionality (methods)
- Objects can have properties or be acted upon

Inheritance

- Allows one Class to automatically “assume” the attributes of another class
- Defines an “is a” relationship for classes

Building an Object Oriented Model

Our model should:

- represent entities
- show connections and interactions
- show enough detail to evaluate designs

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Classes

A class describes a group of objects with:

- similar properties (attributes)
- common behavior (operations)
- common relationships
- common meaning

Example class:

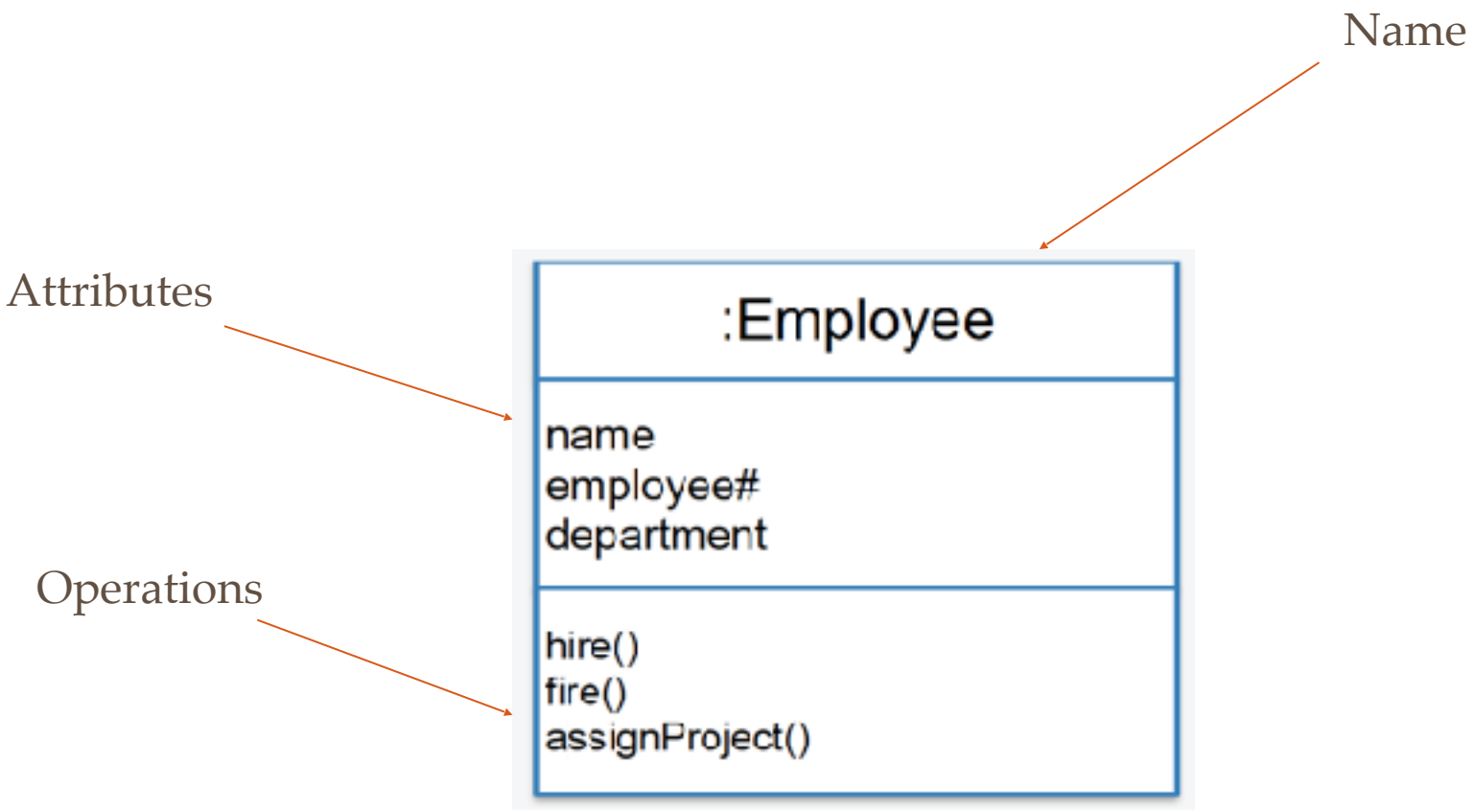
employee:

has a name,
employee#,
department

an employee is

hired,
fired;

an employee works in one or more projects



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UML Class Diagram parts

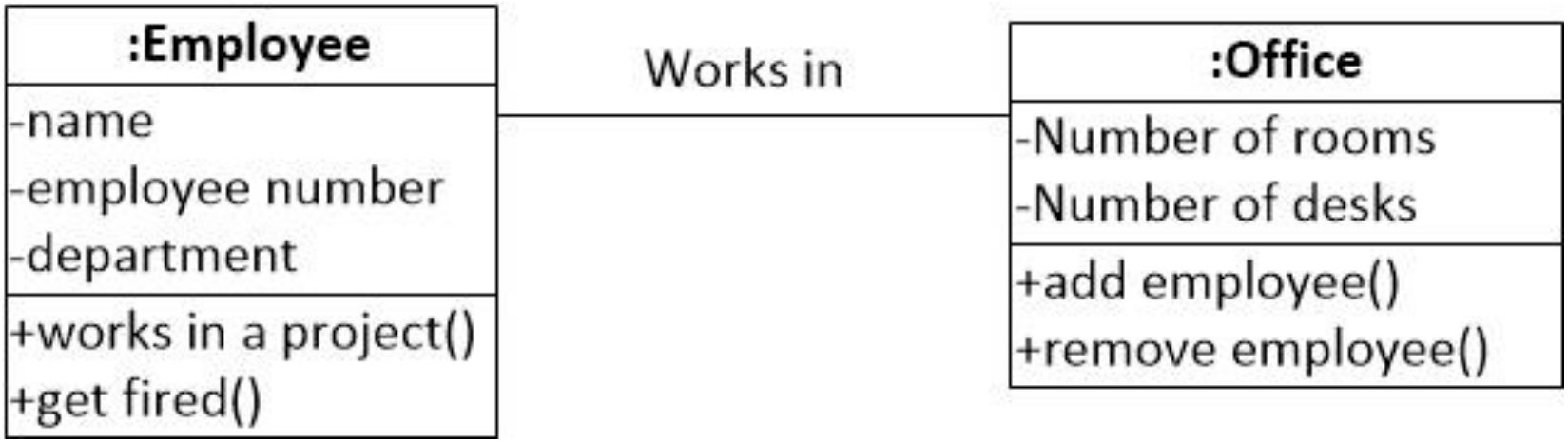
Objects do not exist in isolation

UML supports:

- Association
- Aggregation and Composition
- Generalization
- Dependency

Class Associations

- Most generic kind of relationship
  - Instructor <teaches a> class
  - Kid <plays with a > friend
  - Employee <works in an> office



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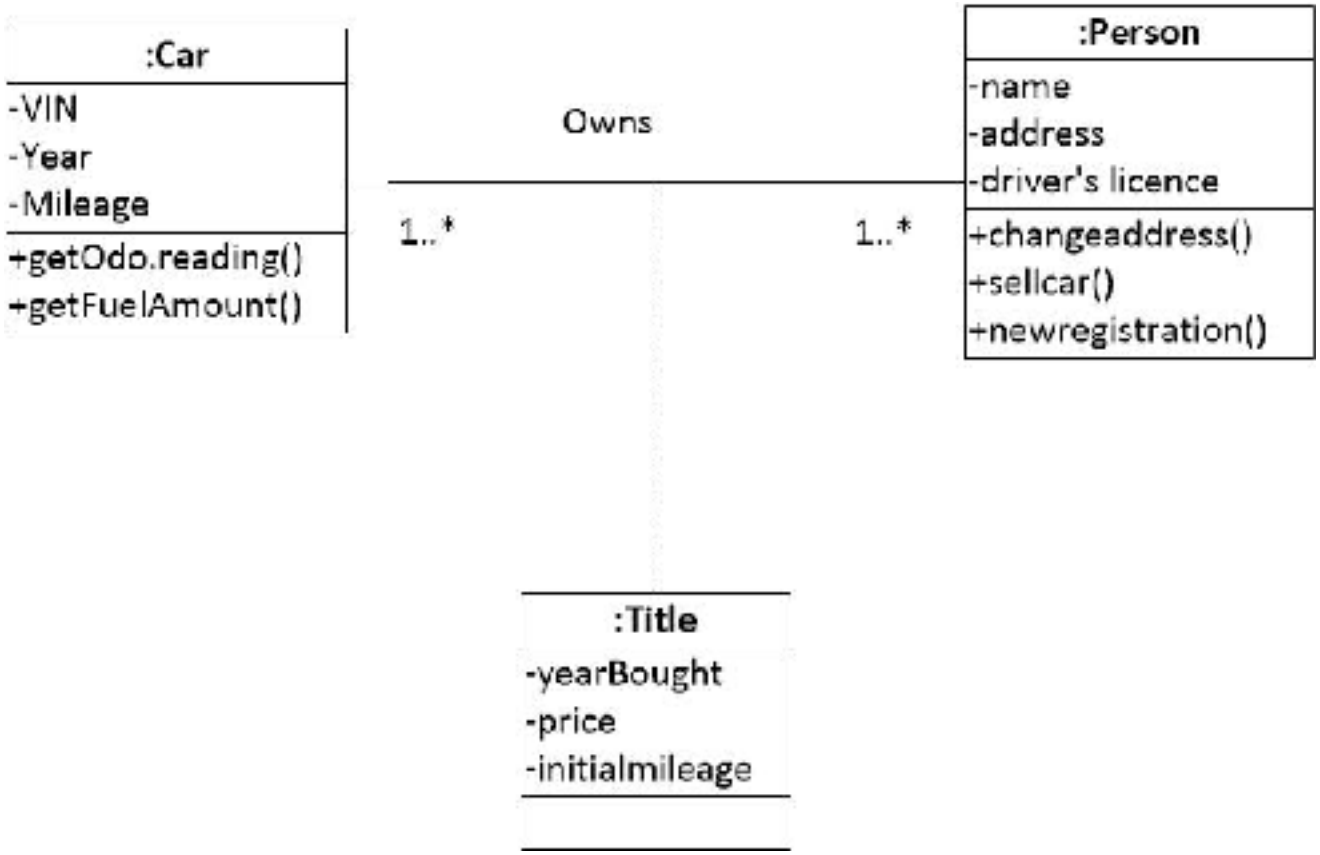
Example of an association class



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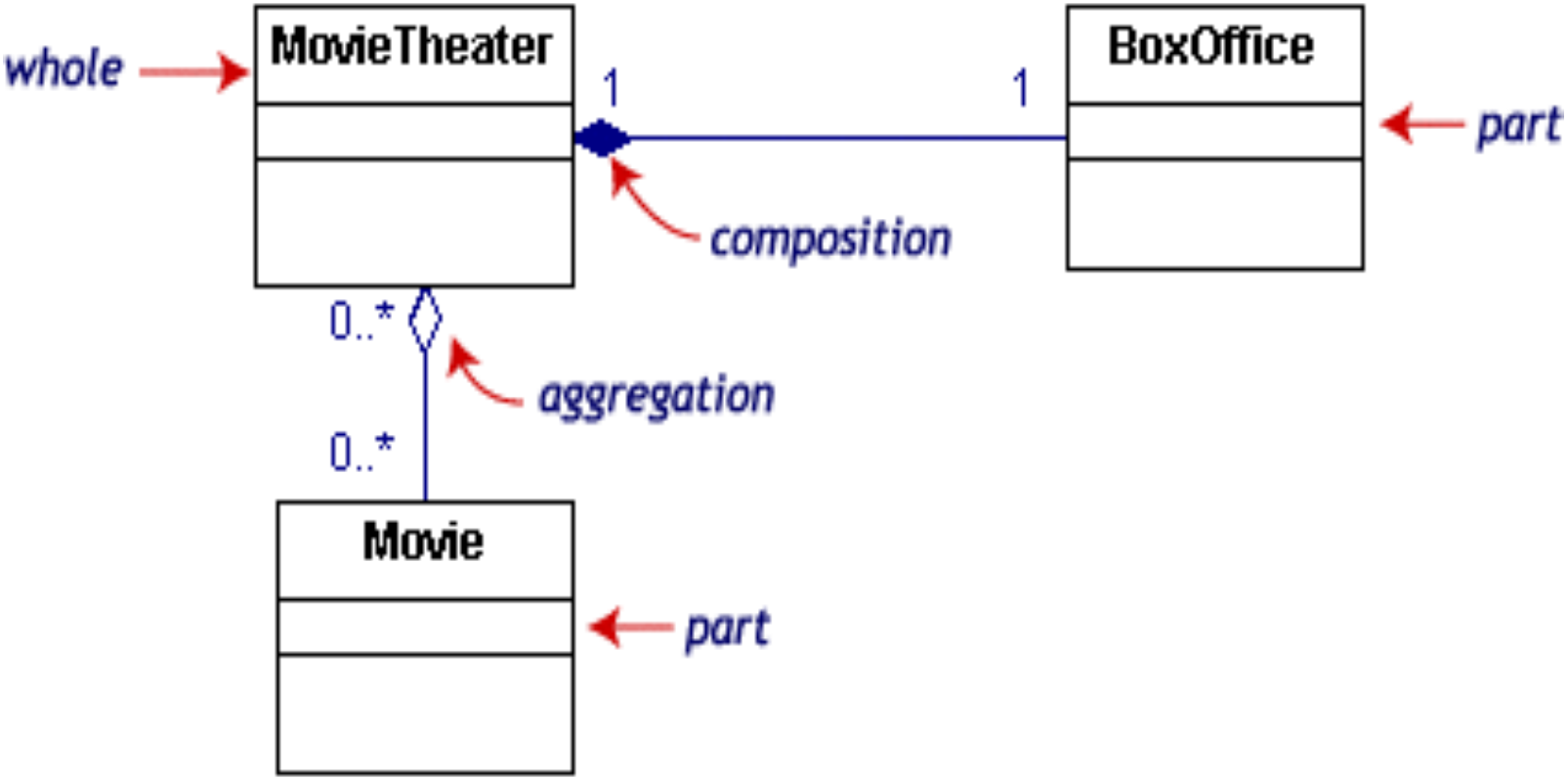
Aggregation and Composition

- Aggregation - a more specific kind of relationship
  - “has-a-relationship”
  - “is a part of relationship”
  - part can exist independent of the whole
- bird <is-part-of-a> flock, airplane type <has-a> engine model

- Composition: more specific yet
  - consists-of relationship
  - contains relationship
  - part cannot exist independent of the whole
- house <consists-of a> room, university <contains a> department

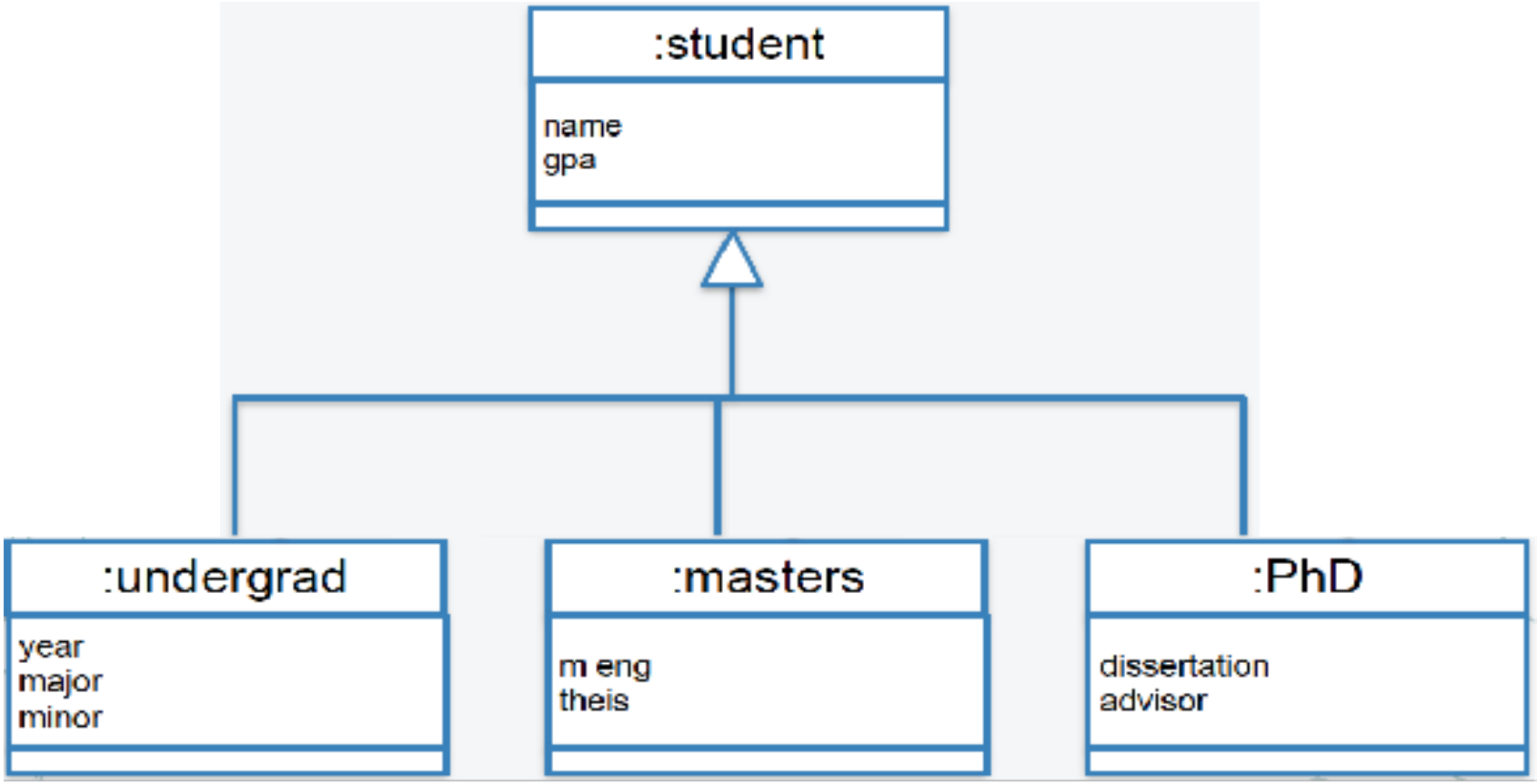
Aggregation and Composition example



Generalization

- <child> is more specific versions of the <parent>
- <child> inherits attributes, associations, & operations from the <parent>
- <child> can override an inherited aspect

Generalization example



Example: University system

1. System records for each university employee
   - Details
   - (mailing) Address
2. Students
   - buy parking pass
   - enroll in classes
   - enroll in (health) seminars
- Faculty
   - buy parking pass
   - write grant funding
   - teach classes

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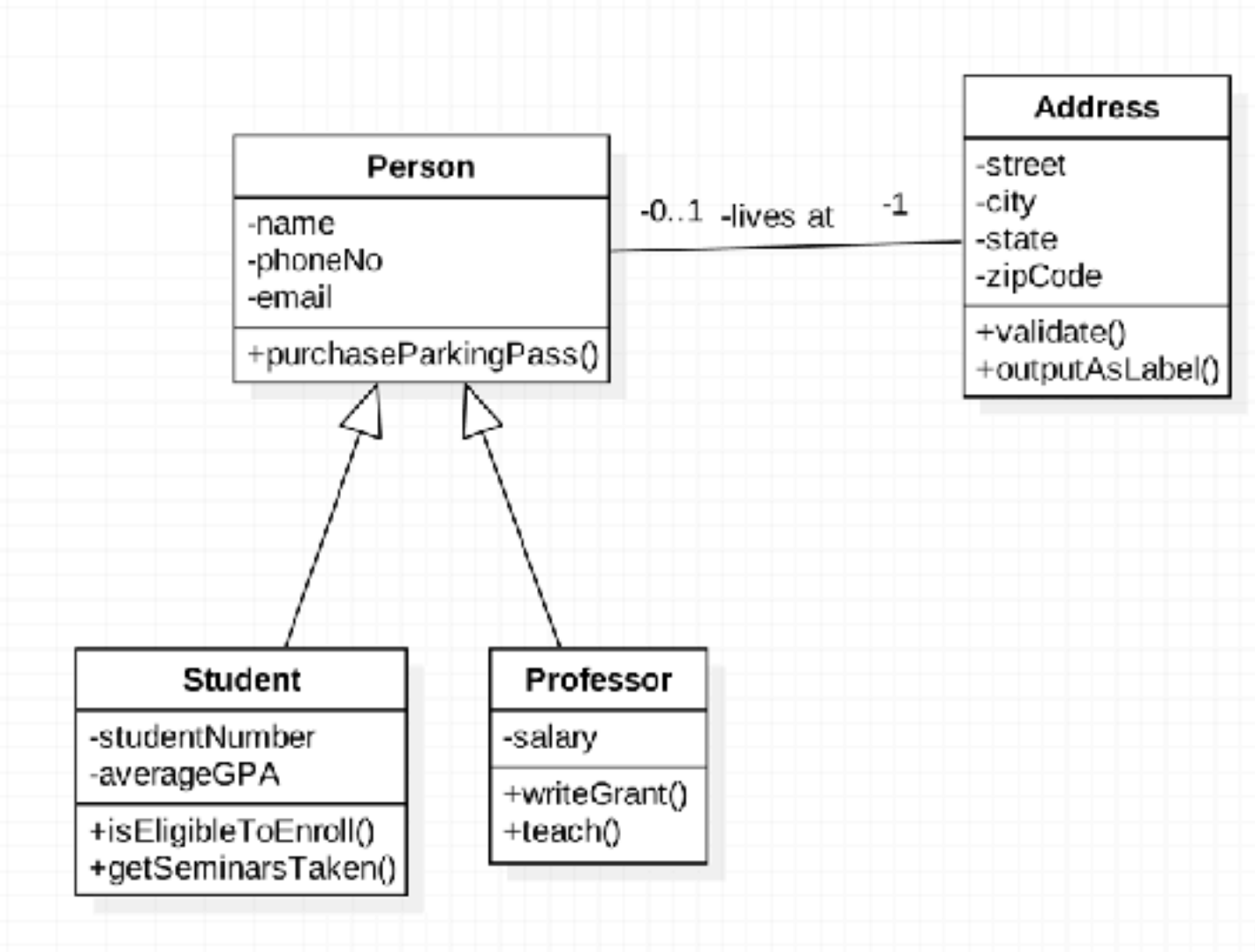
Example



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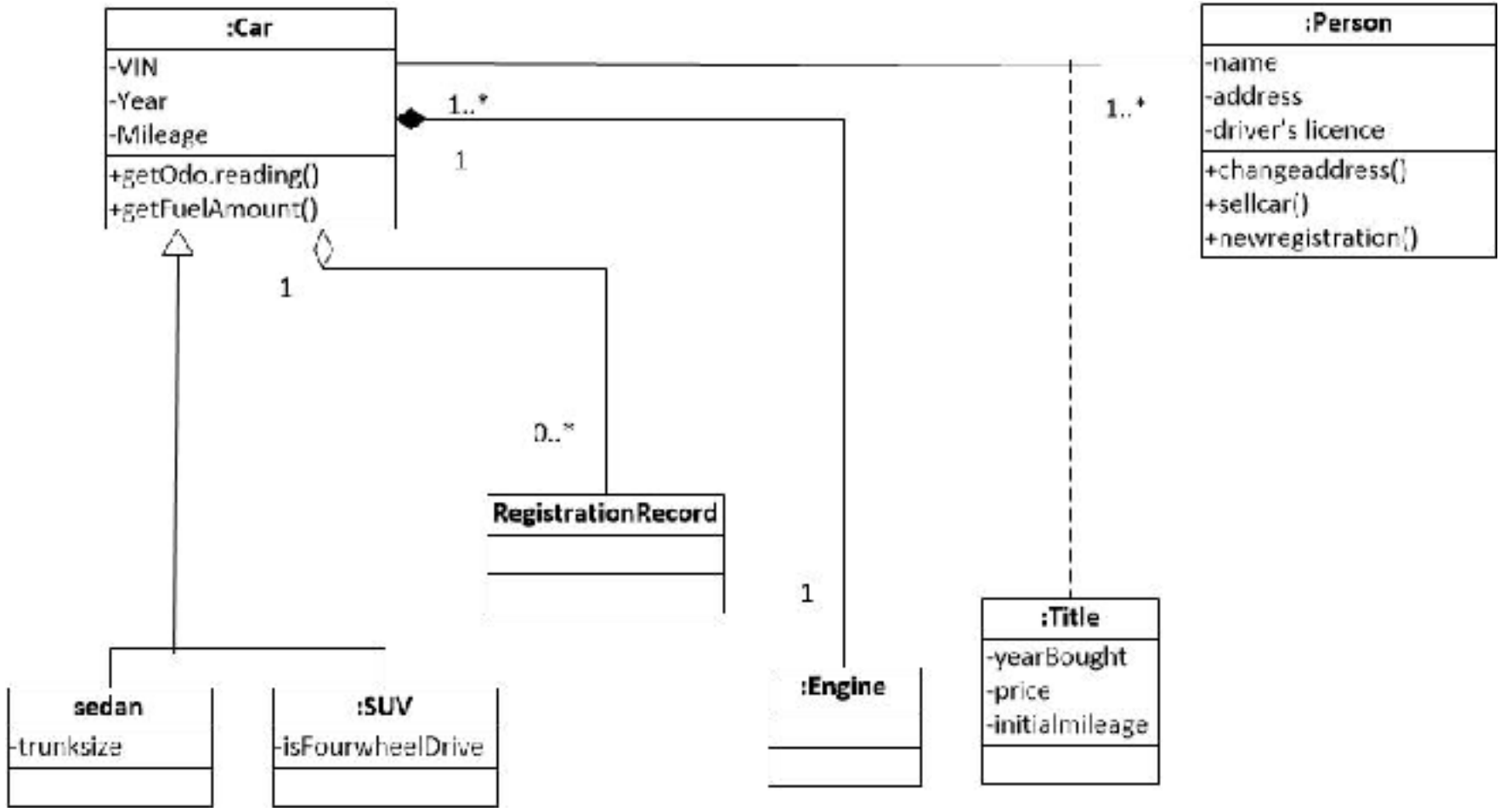

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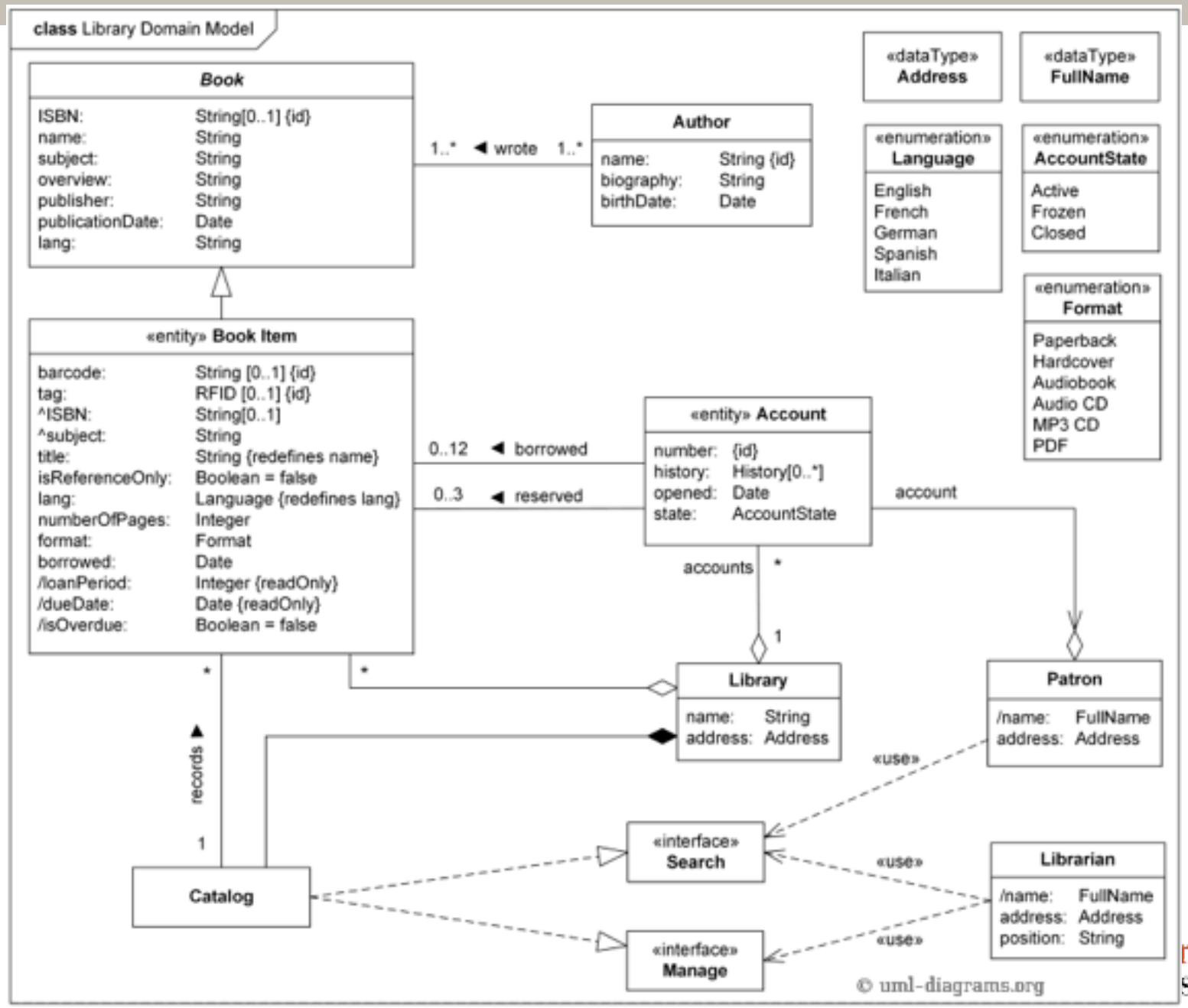
Exercise

- Book buying in Amazon system
  - Specific book versions may have differences (online, hard copy, soft copy)
  - Books are written by authors
  - Books have reviews
  - A user (or their account)



http://www.uml-diagrams.org/class-diagrams-overview.html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Informal Early Feedback

- http://tinyurl.com/cs361-ief

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