Software analysis and design

Module 5: Class Diagrams

Objectives

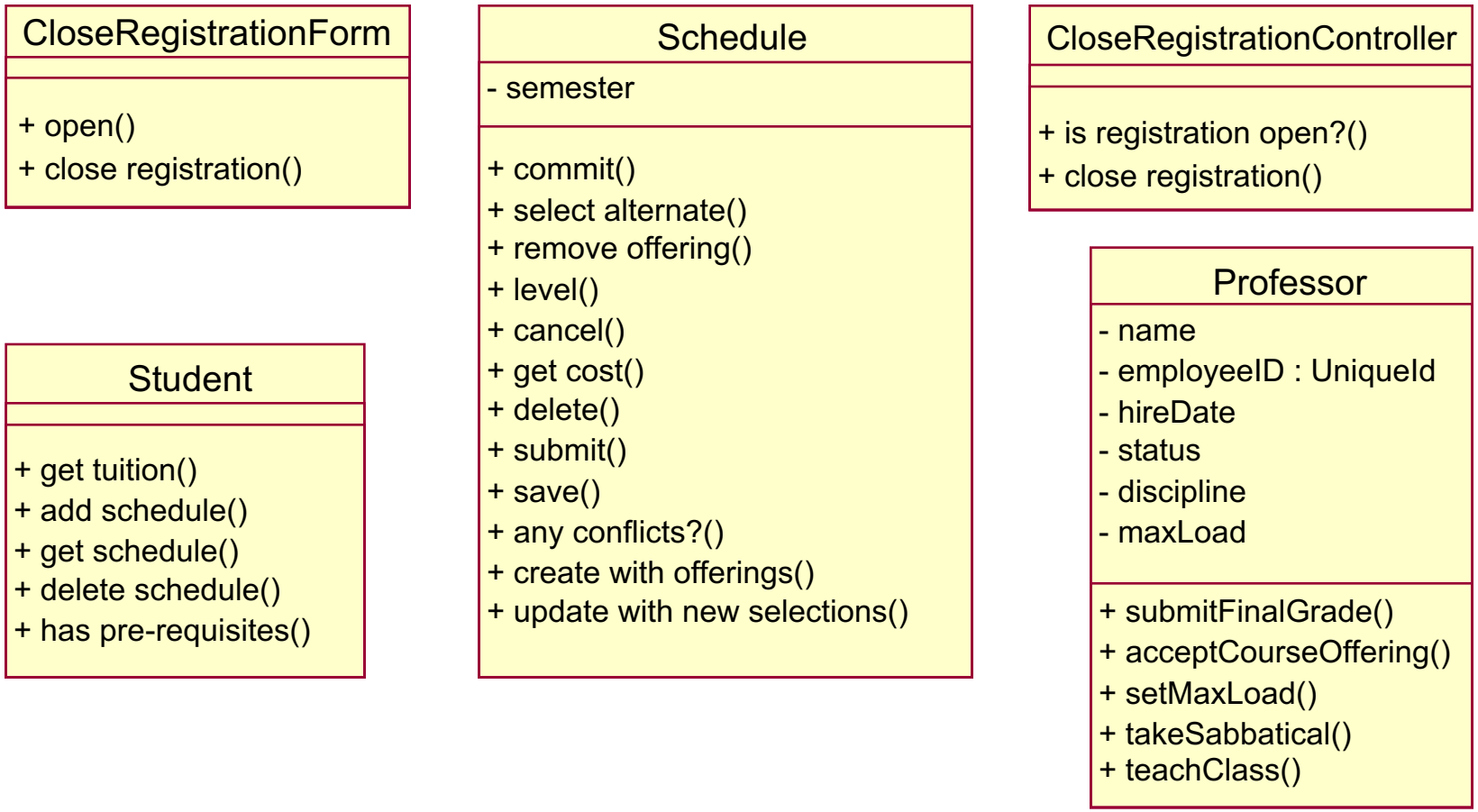
- Describe the static view of the system and show how to capture it in a model.
- Demonstrate how to read and interpret a class diagram.
- Model an association and aggregation and show how to model it in a class diagram.
- Model generalization on a class diagram.

Where Are We?

- Class diagrams
- Class relationships
  - Association
  - Aggregation
  - Generalization

What Is a Class Diagram?

- Static view of a system



Class Diagram Usage

- When modeling the static view of a system, class diagrams are typically used in one of three ways, to model:
  - The vocabulary of a system
  - Collaborations
  - A logical database schema

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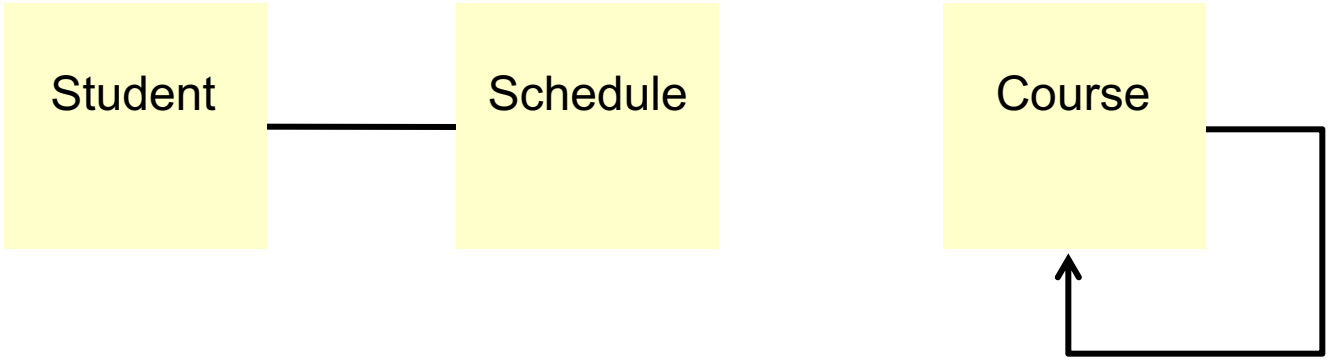
What Is an Association?

- The semantic relationship between two or more classifiers that specifies connections among their instances.
- A structural relationship specifying that objects of one thing are connected to objects of another thing.



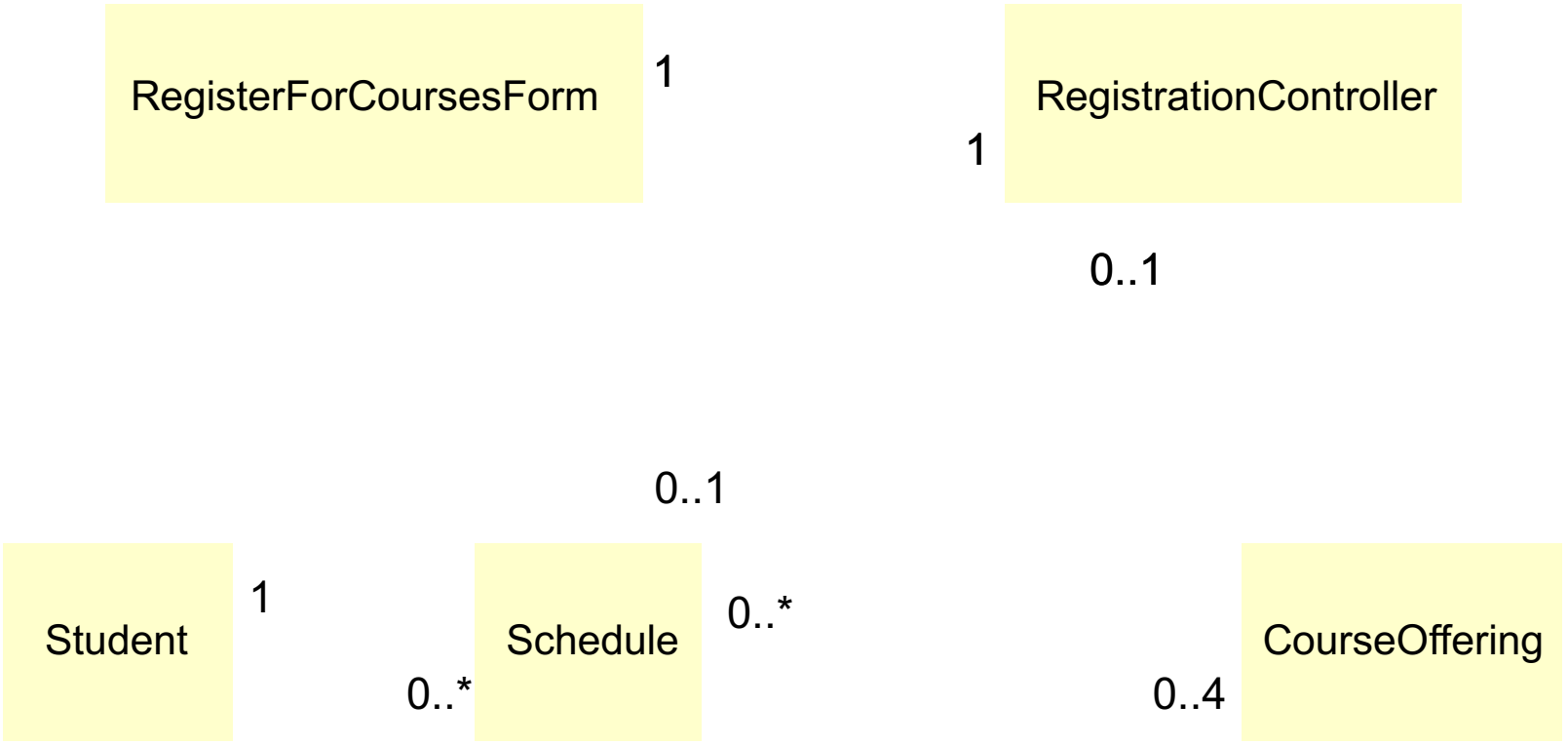
What Is Multiplicity?

- Multiplicity is the number of instances one class relates to ONE instance of another class.
- For each association, there are two multiplicity decisions to make, one for each end of the association.
  - For each instance of Professor, many Course Offerings may be taught.
  - For each instance of Course Offering, there may be either one or zero Professor as the instructor.

Multiplicity Indicators

Unspecified	
Exactly One	1
Zero or More	0..*
Zero or More	*
One or More	1..*
Zero or One (optional value)	0..1
Specified Range	2..4
Multiple, Disjoint Ranges	2, 4..6

Example: Multiplicity



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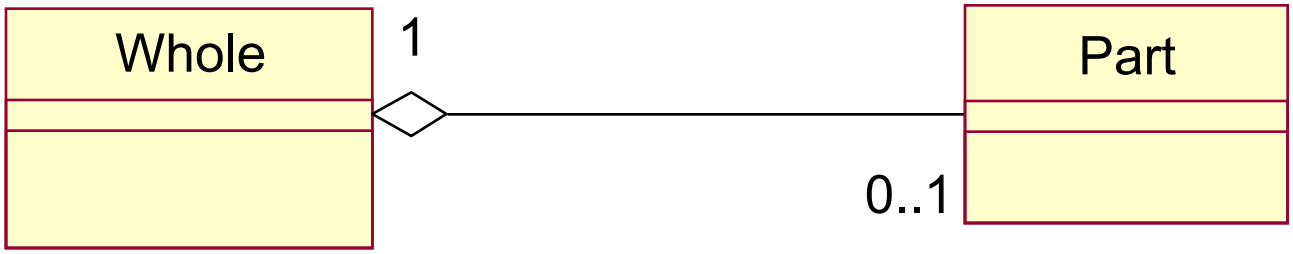
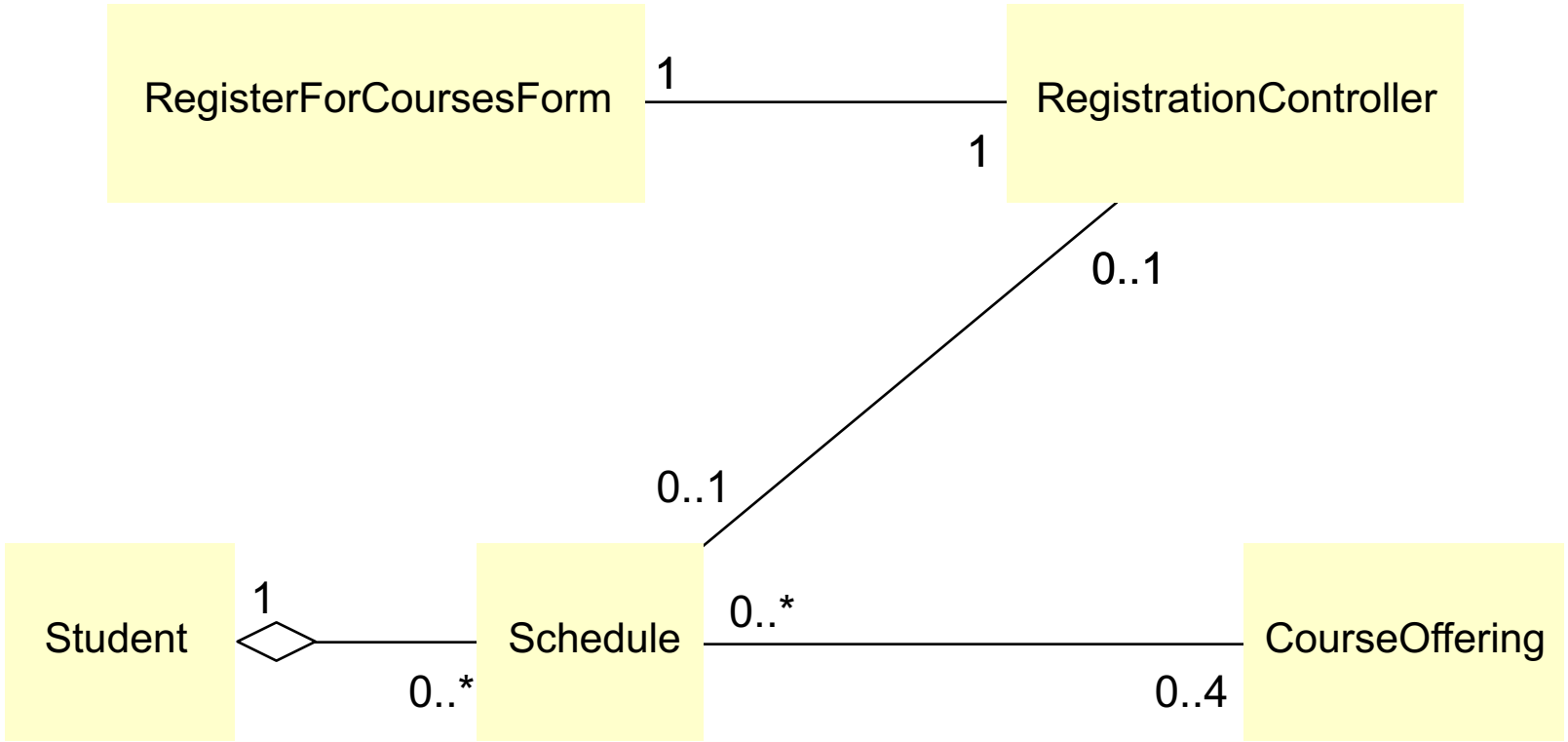
What Is an Aggregation?

- A special form of association that models a whole-part relationship between the aggregate (the whole) and its parts.
  - An aggregation is an “is a part-of” relationship.
- Multiplicity is represented like other associations.



Example: Aggregation



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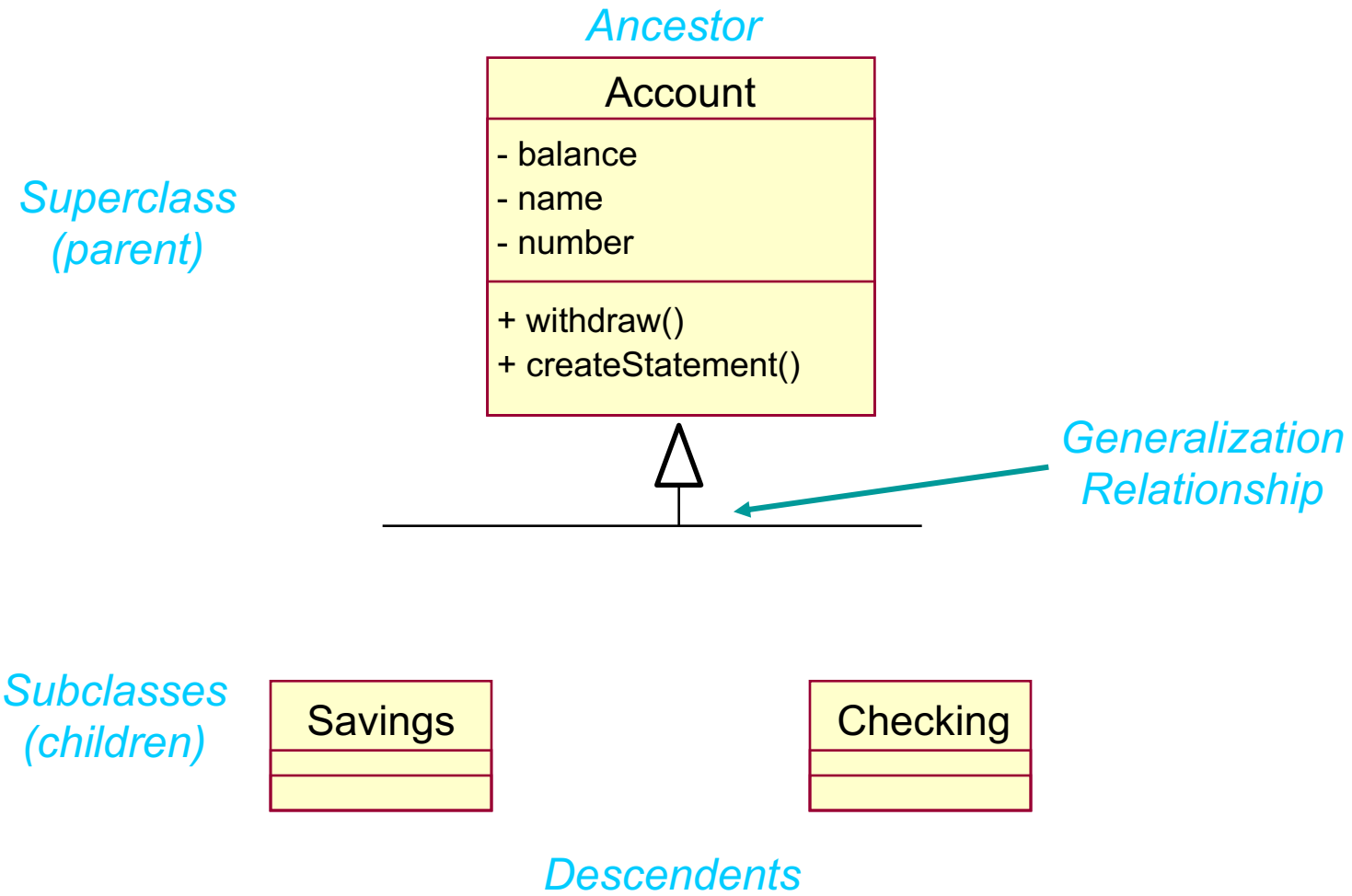
Review: What Is Generalization?

- A relationship among classes where one class shares the structure and/or behavior of one or more classes.
- Defines a hierarchy of abstractions where a subclass inherits from one or more superclasses.
  - Single inheritance
  - Multiple inheritance
- Is an “is a kind of” relationship.

Example: Single Inheritance

- One class inherits from another.



Review

- What does a class diagram represent?
- What benefits do packages provide to the model?
- Define association, aggregation, and generalization.
- How do you find associations?
- What is multiplicity? What information does multiplicity provide the modeler?