



IBM Software Group

Essentials of Visual Modeling with UML

Module 6: Class Diagrams

Rational software



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.

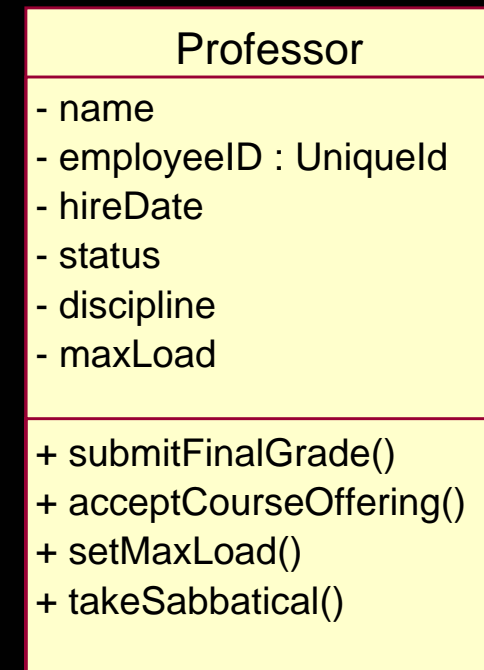
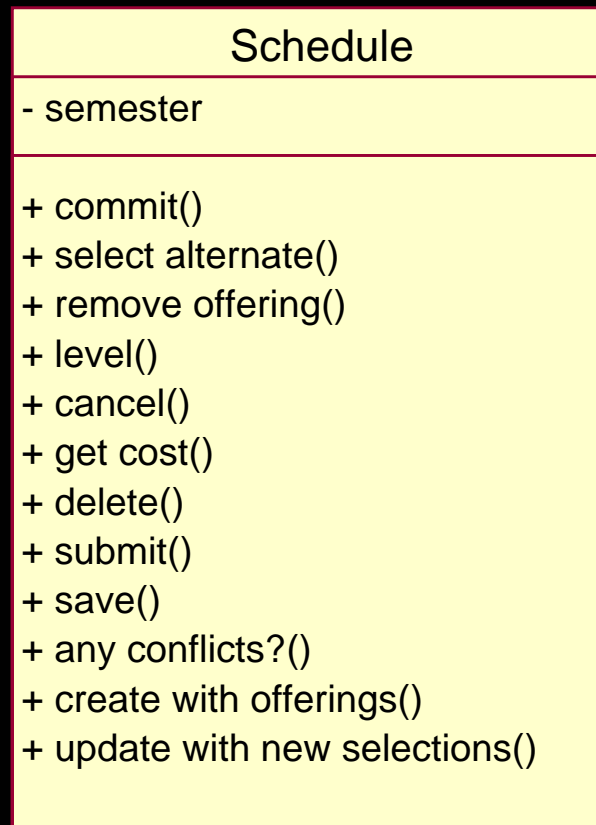
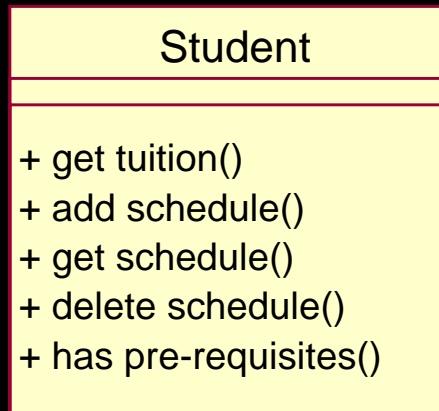
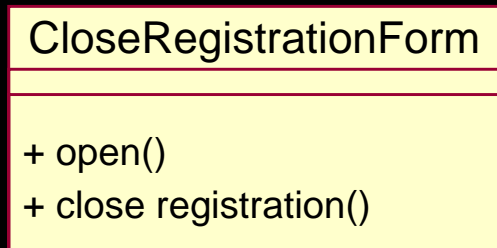
Where Are We?

- ★ ♦ Class diagrams
 - ♦ Class relationships
 - Association
 - Aggregation
 - Generalization



What Is a Class Diagram?

◆ Static view of a system

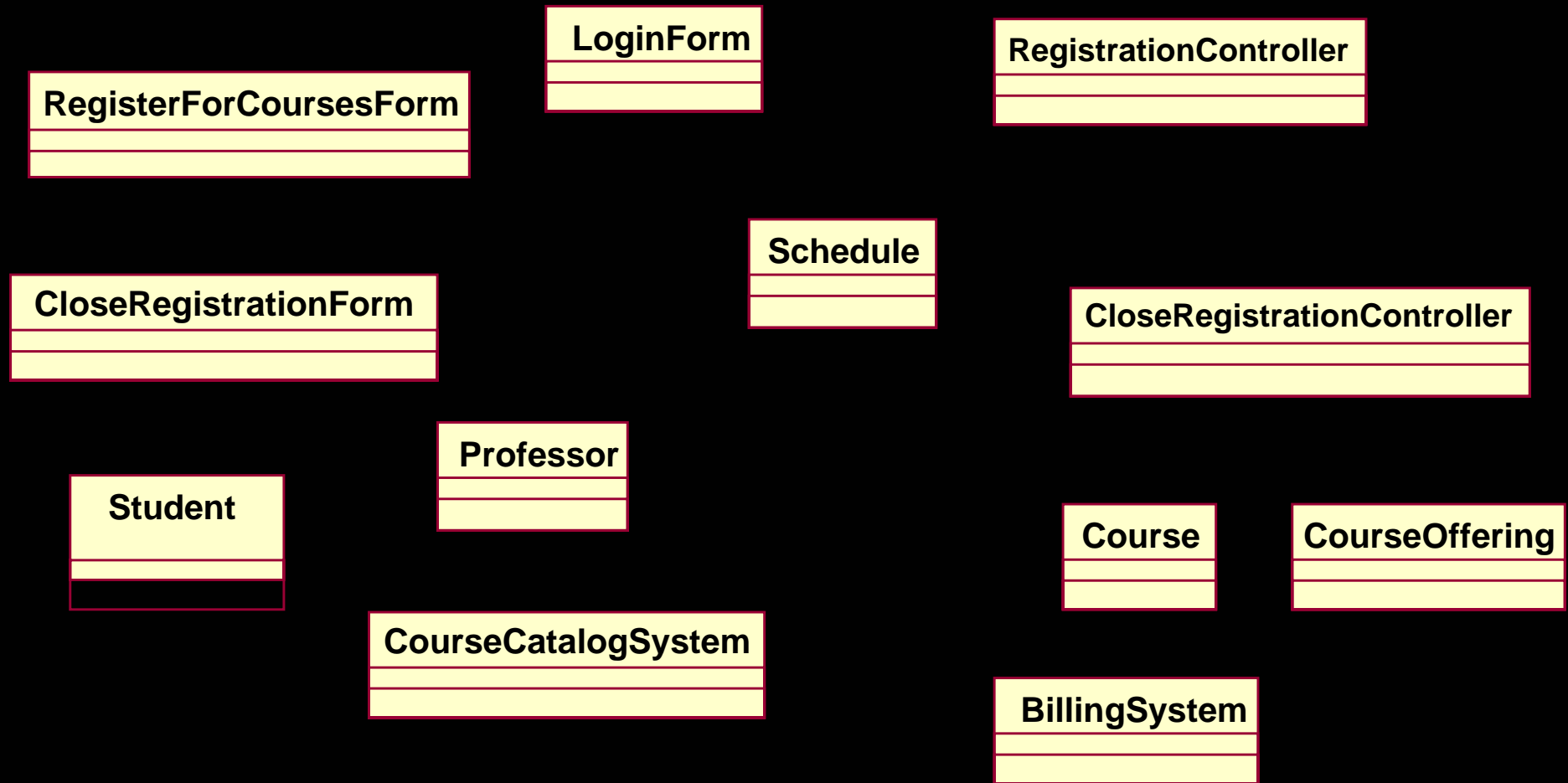


Class Diagram Usage

- ◆ 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

Example: Class Diagram

- ♦ Is there a better way to organize class diagrams?



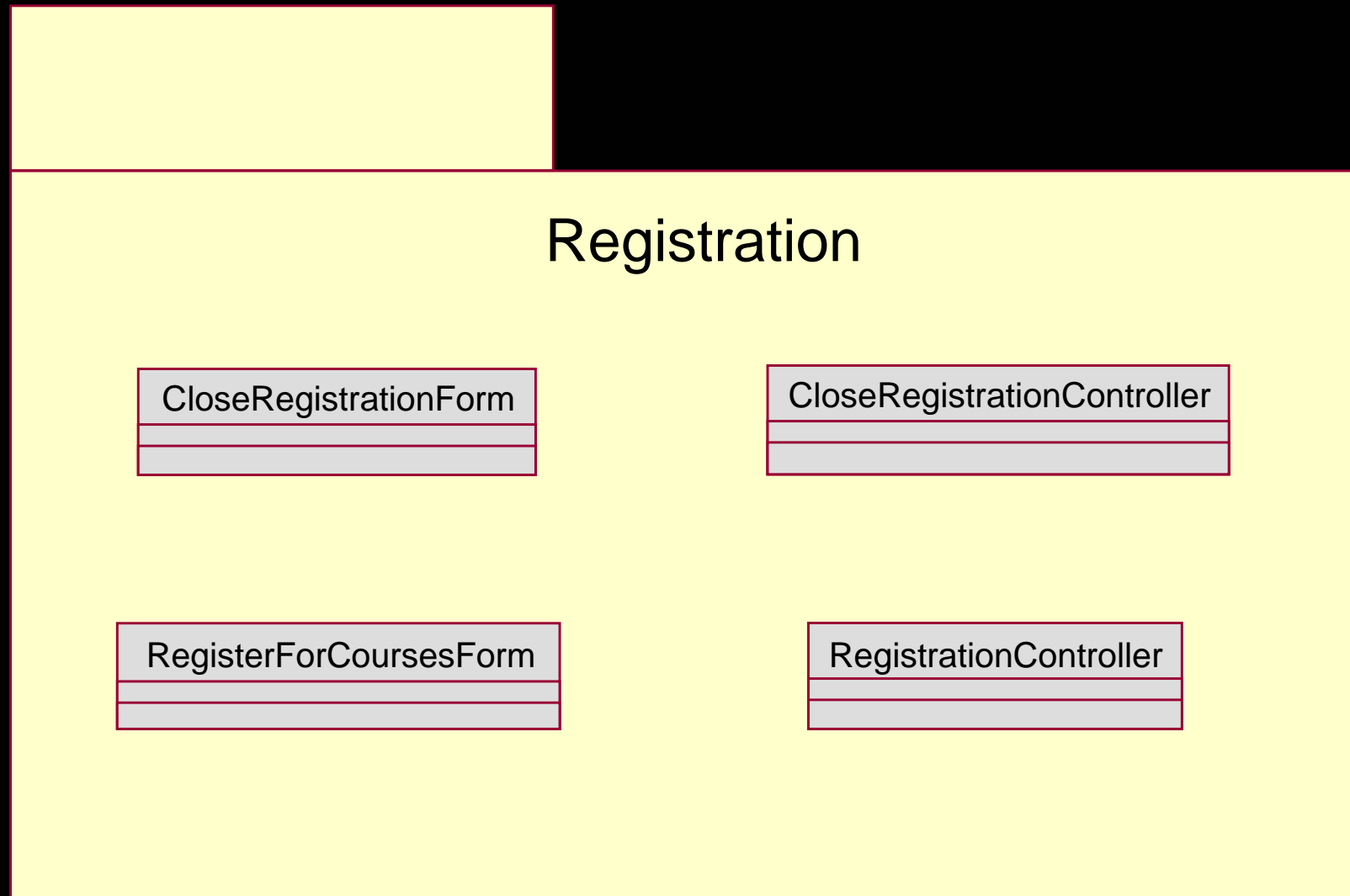
Review: What Is a Package?

- ♦ A general purpose mechanism for organizing elements into groups.
- ♦ A model element that can contain other model elements.



- ♦ A package can be used:
 - To organize the model under development
 - As a unit of configuration management

Example: Registration Package



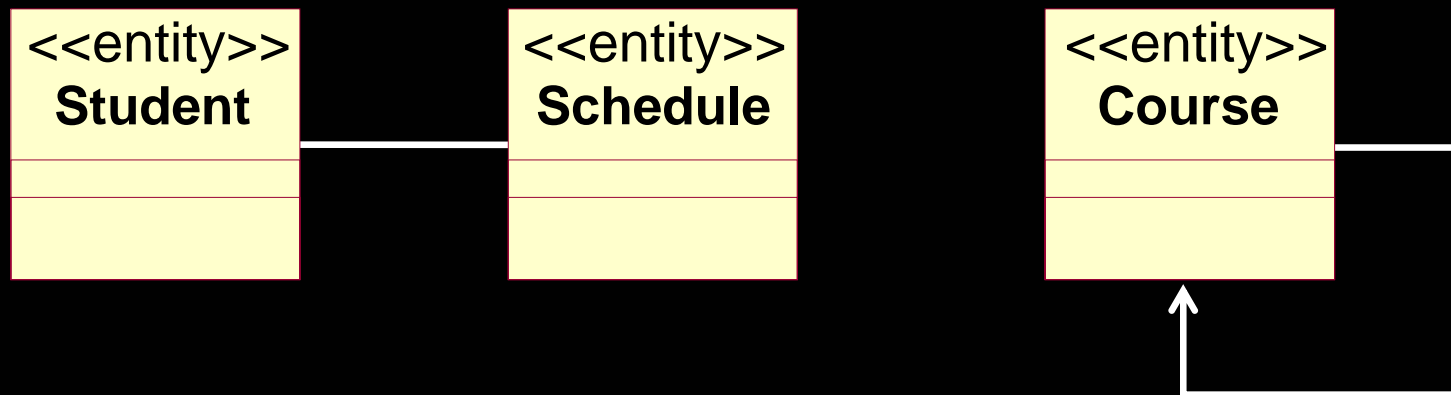
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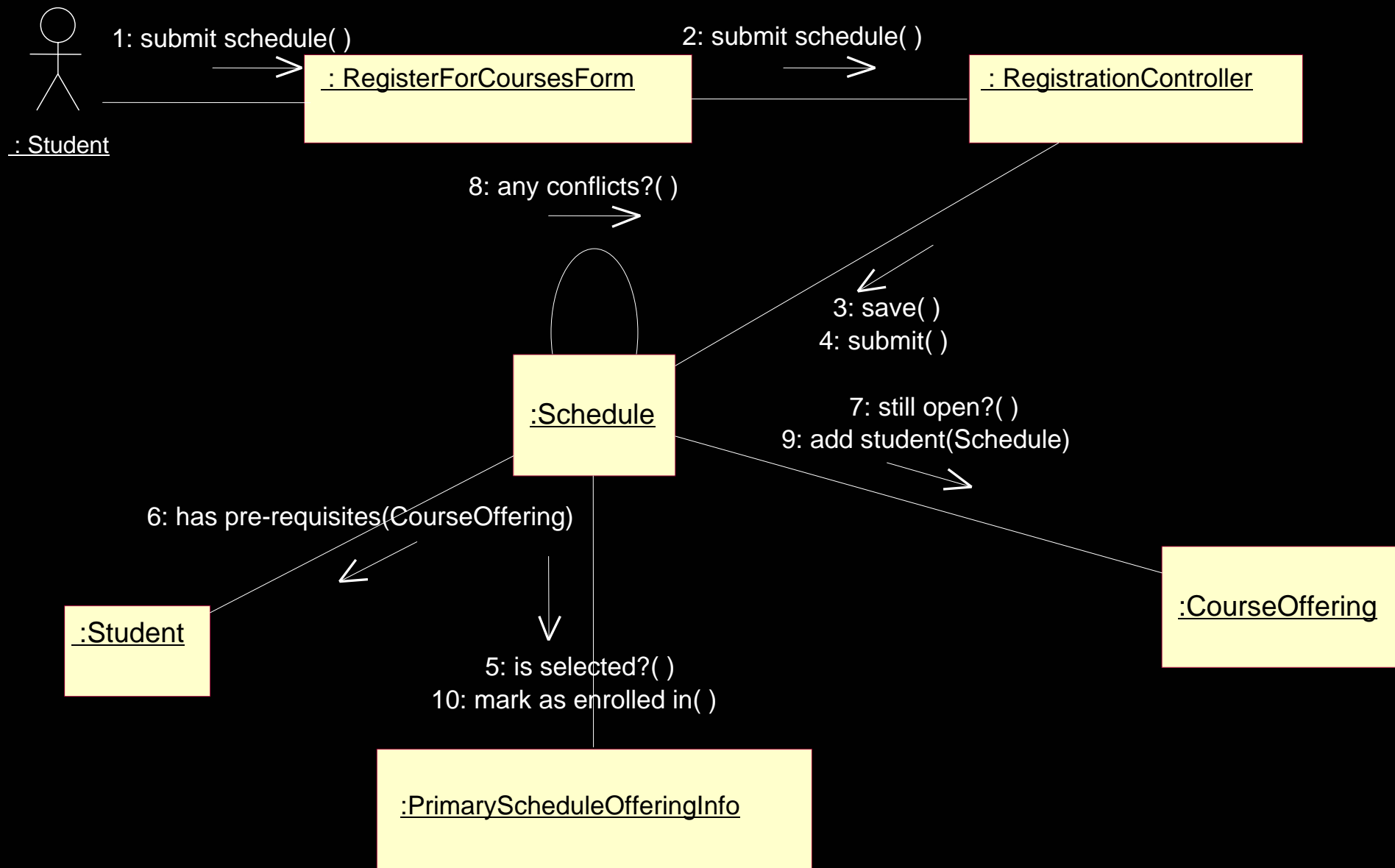


What Is an Association?

- ◆ 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.



Example: What Associations Can You Find?



What Is Multiplicity?

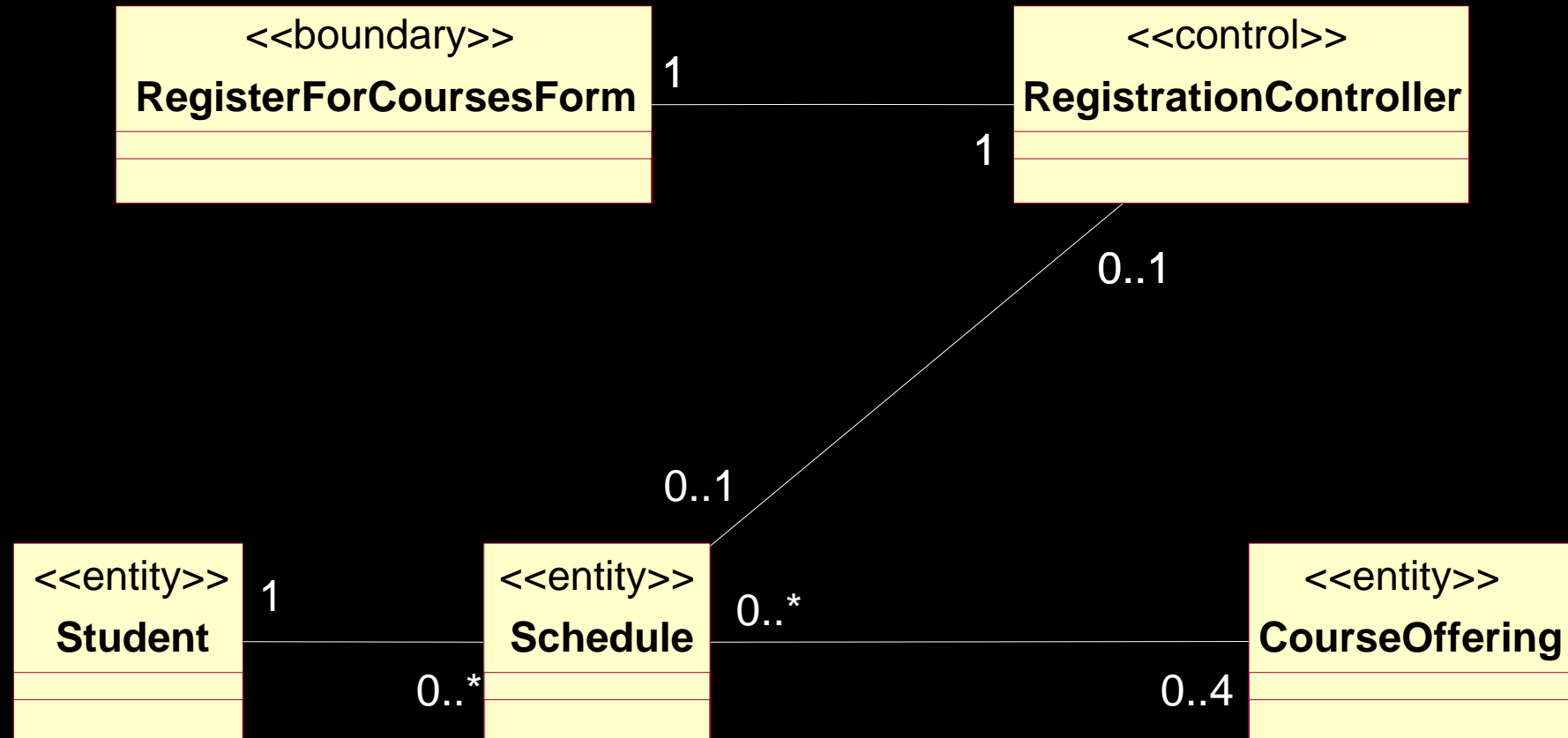
- ♦ Multiplicity is the number of instances one class relates to ONE instance of another class.
- ♦ For each association, there are two multiplicity decisions to make, one for each end of the association.
 - For each instance of Professor, many Course Offerings may be taught.
 - For each instance of 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 scalar role)	0..1
Specified Range	2..4
Multiple, Disjoint Ranges	2, 4..6

Example: Multiplicity



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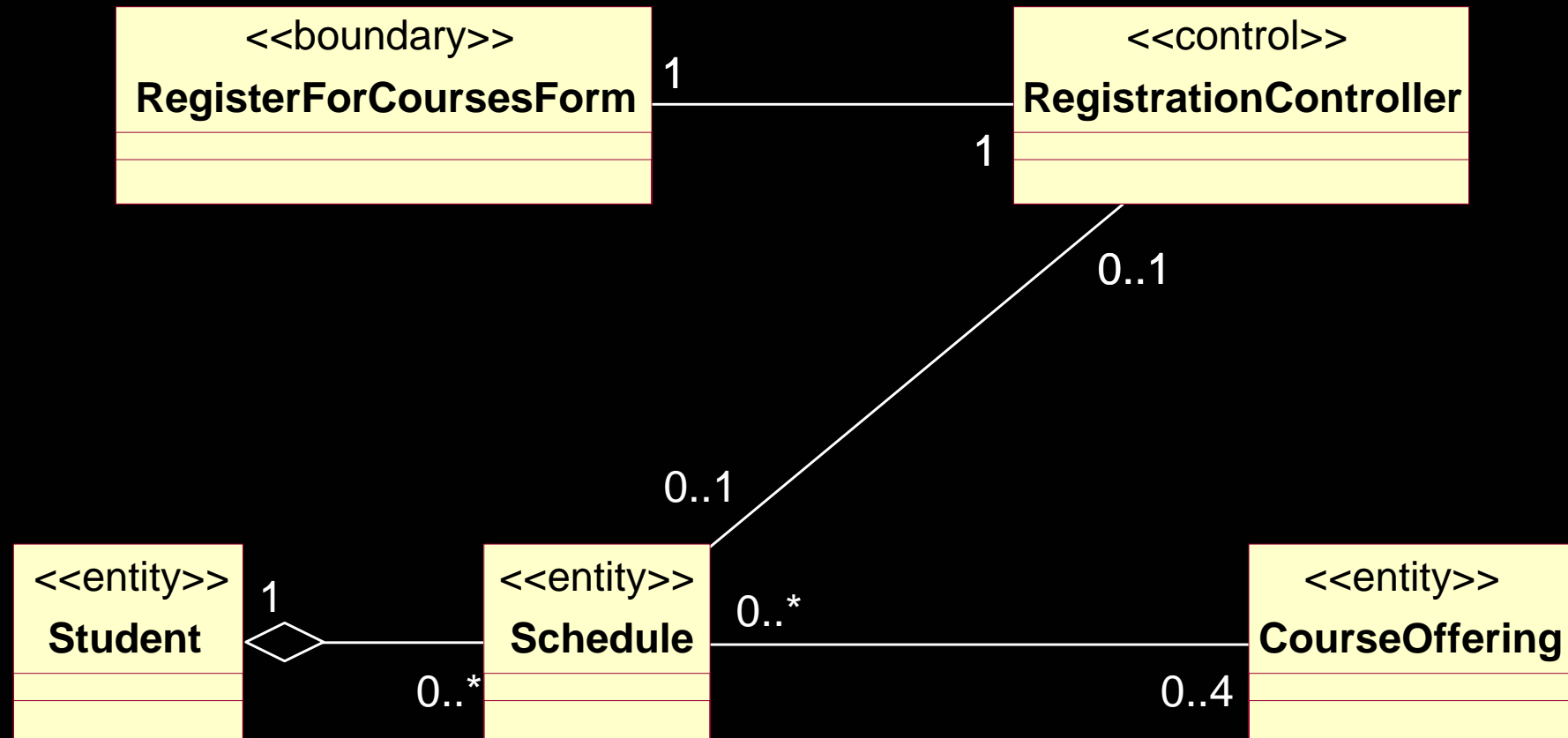


What Is an Aggregation?

- ◆ 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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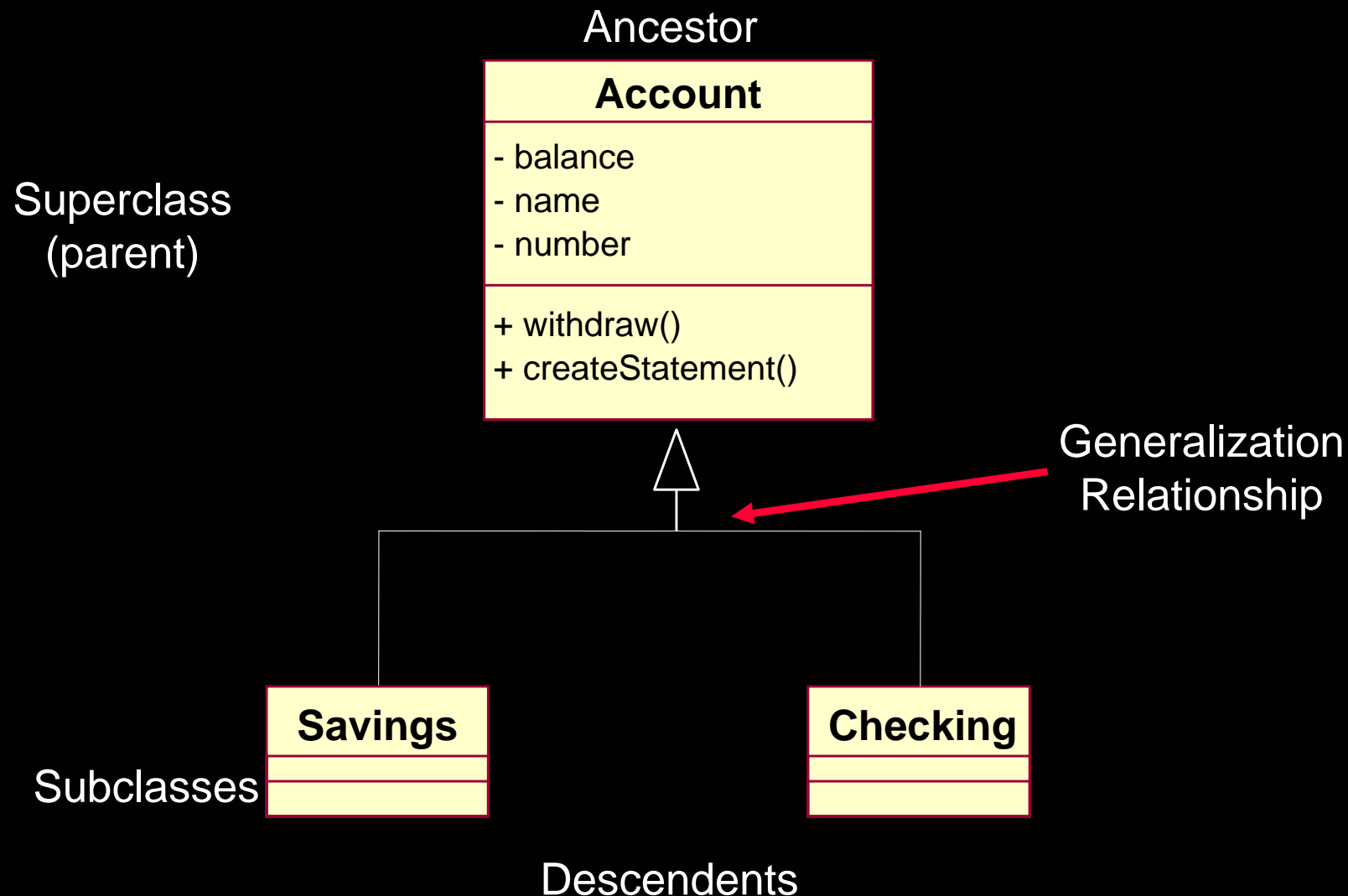


What Is Generalization?

- ◆ 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.

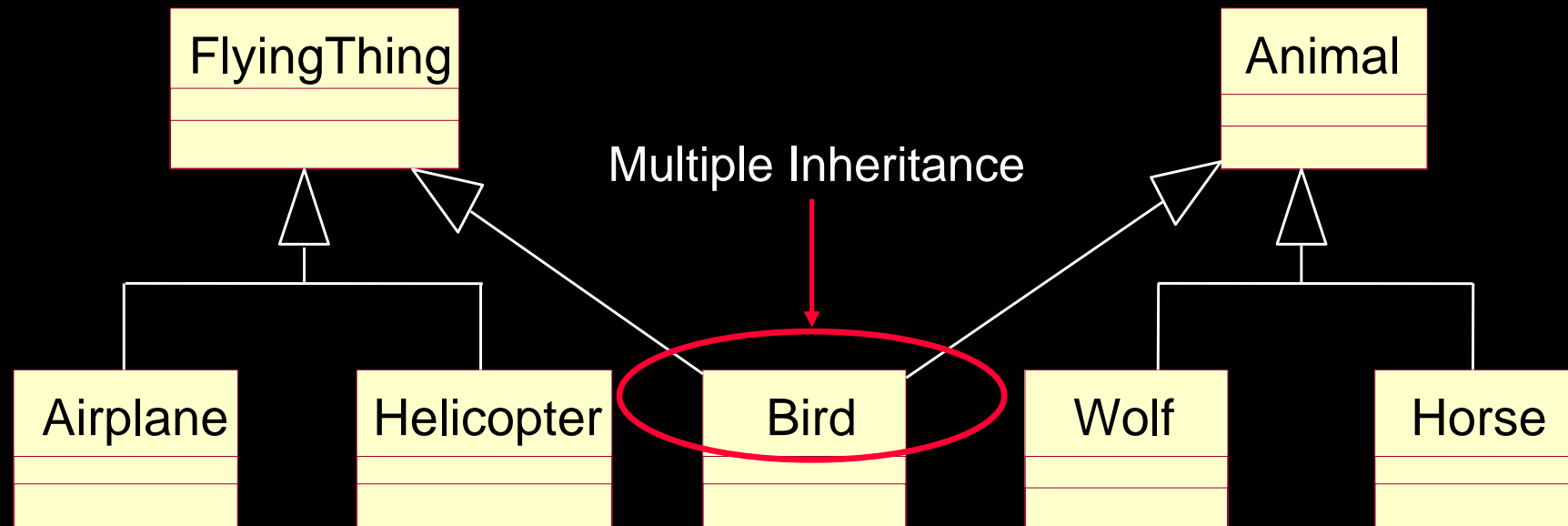
Example: Single Inheritance

- ◆ One class inherits from another.



Example: Multiple Inheritance

- ◆ A class can inherit from several other classes.



***Use multiple inheritance only when needed and
always with caution!***

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?



Exercise

- ♦ Given:
 - A set of classes and their relationships
- ♦ Draw:
 - A class diagram

