Northeastern University

Lecture 4: Java Review - 4

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Outline

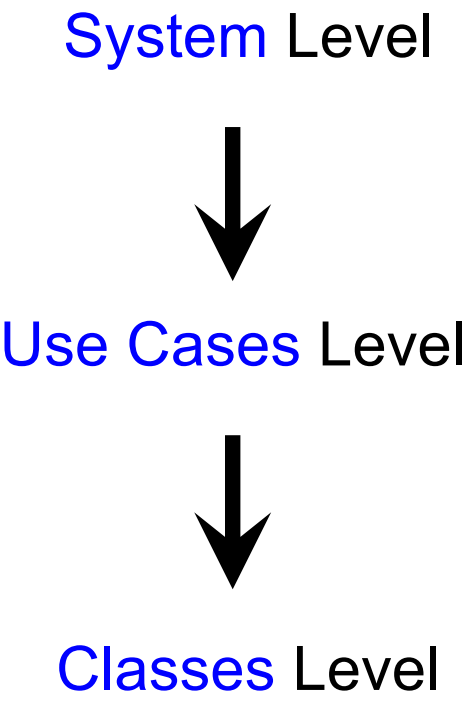
- System vs. Classes

System vs. Classes

Choosing Classes

- Considering a registration system for your school
- Issues:
  - » Who will use the system?
  - » What can each actor do with the system?
  - » Which scenarios involve common goals?

Different Levels



Choosing Classes

System Level

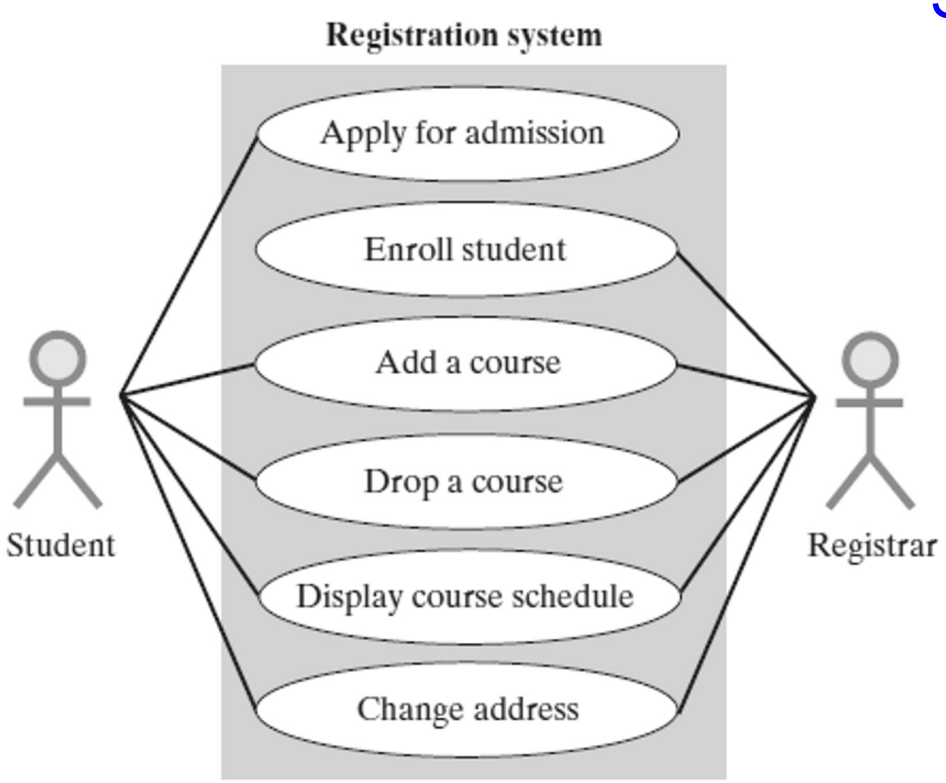


Figure P-4: A use case diagram for a registration system

Choosing Classes

System Level

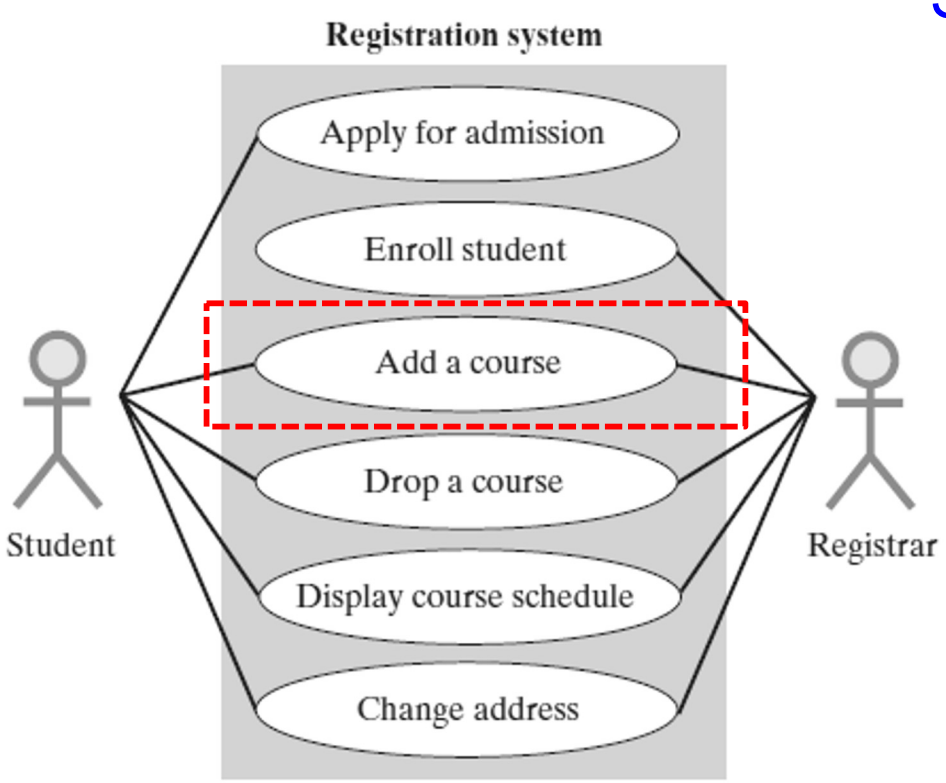


Figure P-4: A use case diagram for a registration system

Note: The use case diagram is part of a UML, which will be explained later.

Identifying Classes

Use Case Level

System: Registration
Use case: Add a course
Actor: Student
Steps:

1. Student enters identifying data.
2. System confirms eligibility to register.
   a. If ineligible to register, ask student to enter identification data again.
3. Student chooses a particular section of a course from a list of course offerings.
4. System confirms availability of the course.
   a. If course is closed, allow student to return to Step 3 or quit.
5. System adds course to student's schedule.
6. System displays student's revised schedule of courses.

Figure P-5: A description of a use case for adding a course

Interpretation of the Description

- Nouns: classes
  - a student (Student)
  - a course (Course)
  - a list of courses offered (CourseList)
  - a student's schedule of courses (CourseSchedule)
- Verbs: actions
  - confirm whether a student is eligible to register
  - see whether a course is closed
  - add a course to a student's schedule
- One way to assign actions to classes: class-responsibility-collaboration (CRC) cards

CRC Cards

Class Level

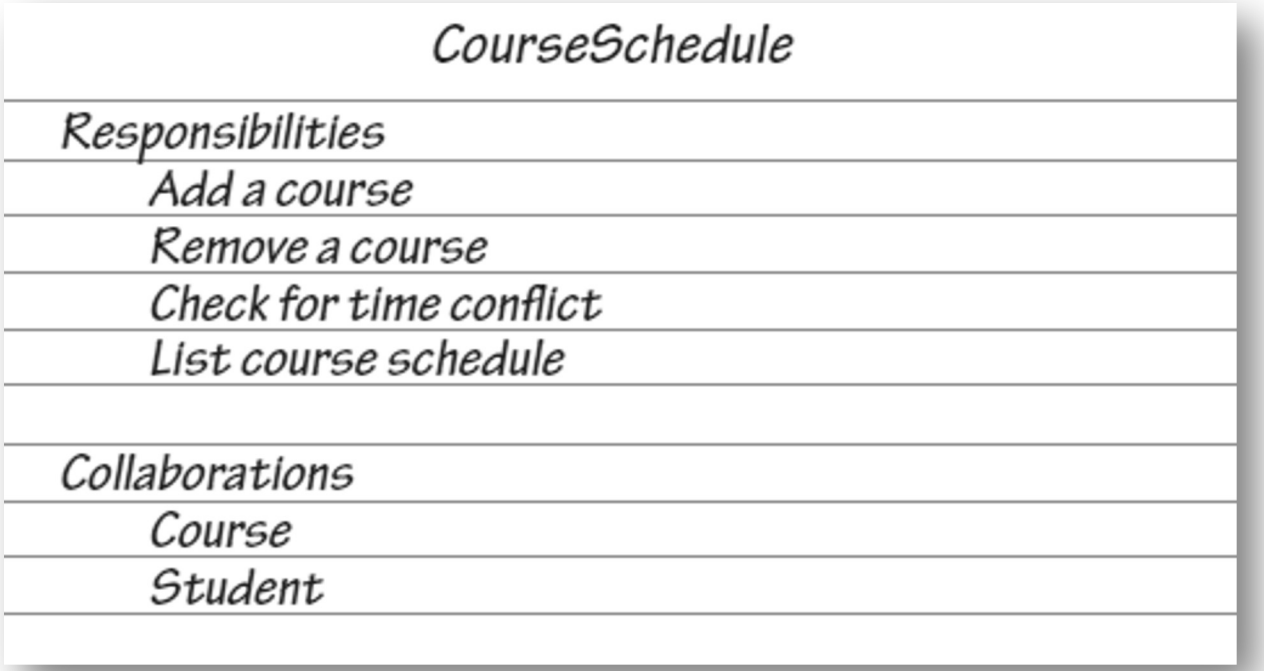


Figure P-6: A class-responsibility-collaboration (CRC) card

Exercise

- Write a CRC card for the class `Student`

Answer

Student
Responsibilities Set name and ID Set name Set ID Get name Get ID Get a string that represents a student
Collaborations String Name

The Unified Modeling Language (UML)

- Designers use the UML to Illustrate a software system's necessary classes and their relationship.
- Class diagram: place each class description into a box analogous to a CRC card
  - » class name
  - » attributes (data fields)
  - » operations (methods)
  - » Omit: constructors, get methods and set methods

The Unified Modeling Language (UML)

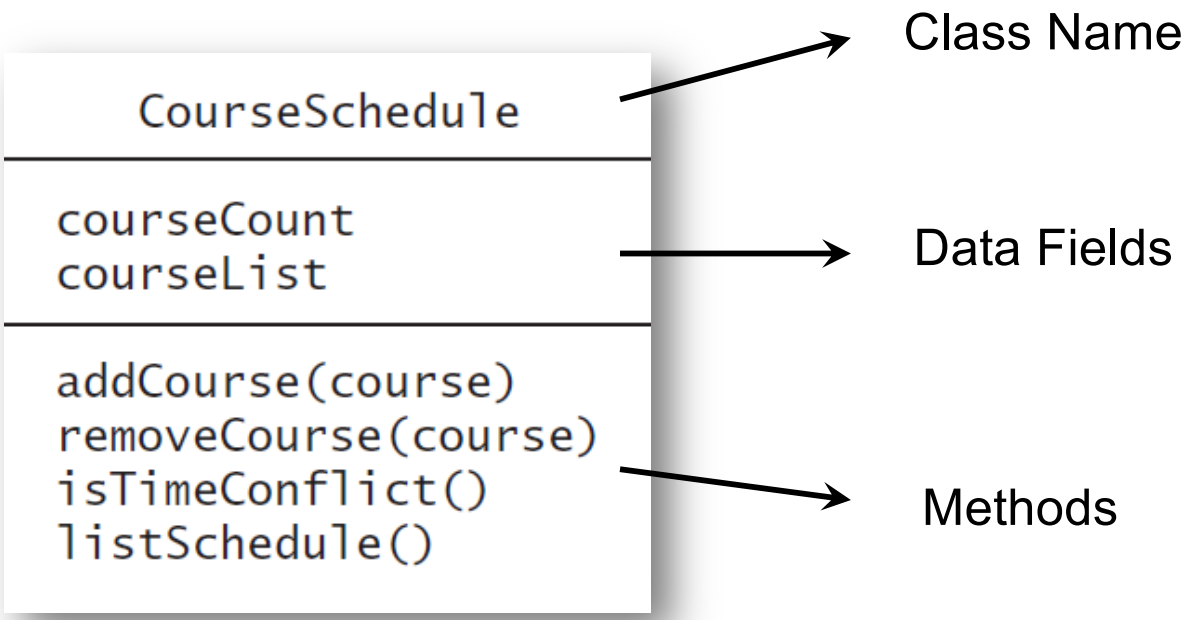


Figure P-7: A class representation that can be a part of a class diagram

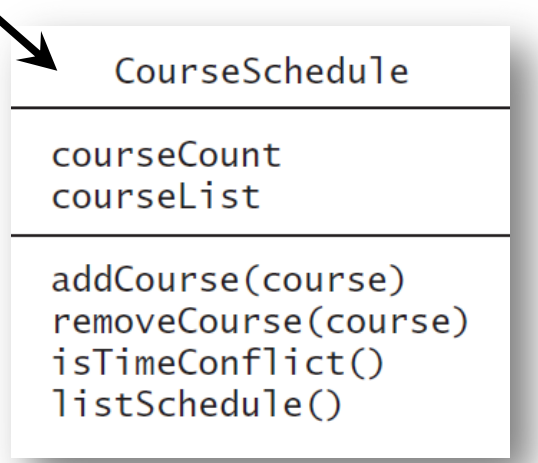
The Unified Modeling Language (UML)

- The visibility of a field or method:
  - +: public
  - -: private
  - #: protected
- The data type of a field, parameter, or return value are placed after a colon
  - data field: define data type
    - - courseCount: integer
  - method: define parameter and return value
    - + addCourse(course: Course): void

The Unified Modeling Language (UML)

- You can provide more details for Fig P-7:
  - » Data fields:

```
-courseCounter: integer
-coursList: List
```



  - » Methods:

```
+addCourse(course: Course): void
+removeCourse(course: Course): void
+isTimeConflict(): boolean
+listSchedule(): void
```

The Unified Modeling Language (UML)

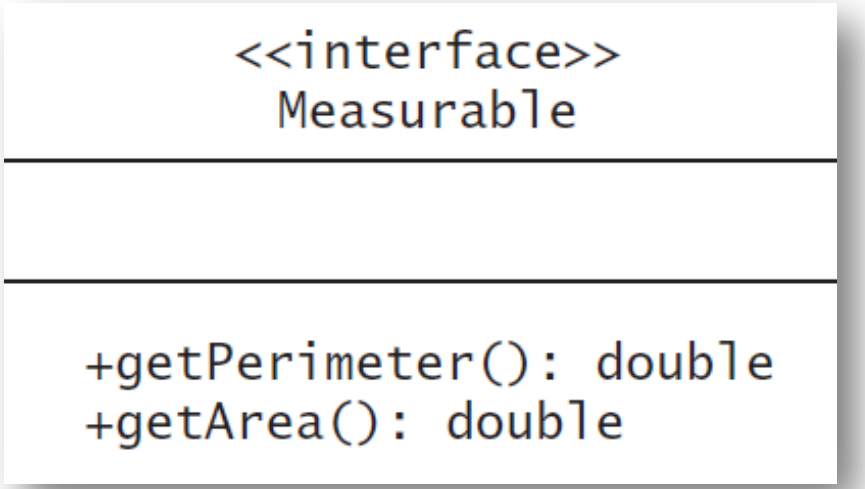


Figure P-8: UML notation for the interface **`Measurable`**

The Unified Modeling Language (UML)

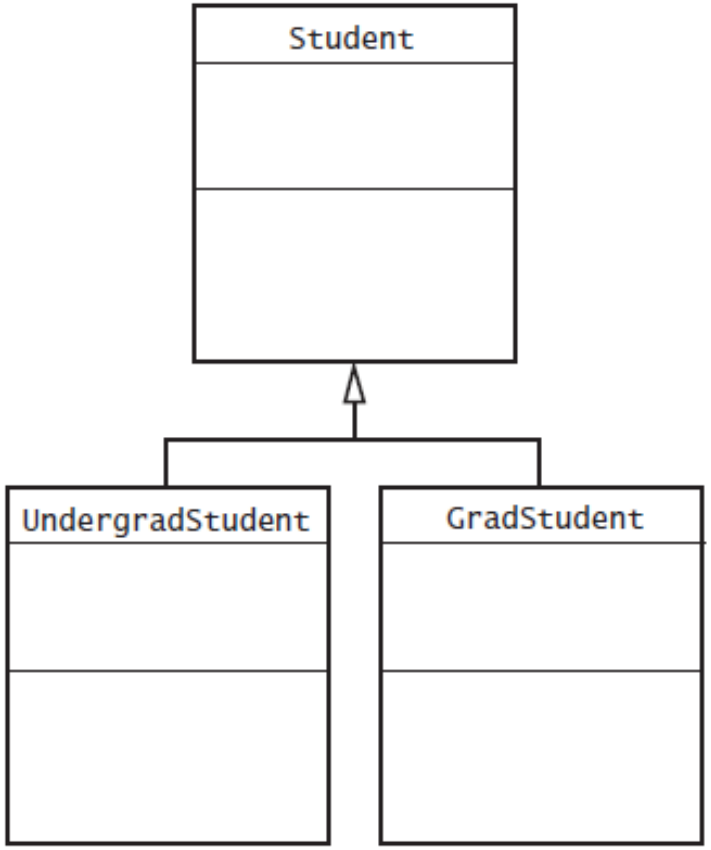
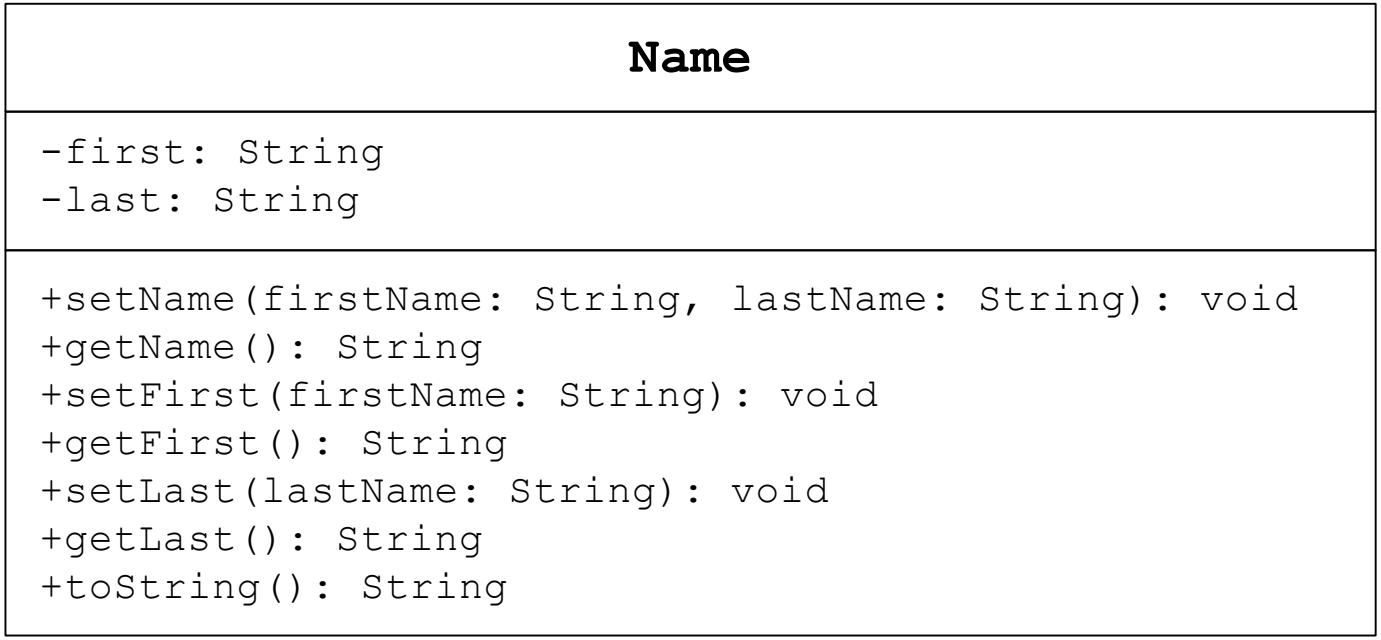


Figure P-9 A class diagram showing the base class `Student` and two subclasses

Exercise

- How would the class `Name` (used in previous slide) appear in a UML class diagram?

Answer


Name
-first: String
-last: String
+setName(firstName: String, lastName: String): void
+getName(): String
+setFirst(firstName: String): void
+getFirst(): String
+setLast(lastName: String): void
+getLast(): String
+toString(): String

The Unified Modeling Language (UML)

- An association:
  - » a relationship between two objects of different classes
  - » the same as collaboration at CRC card

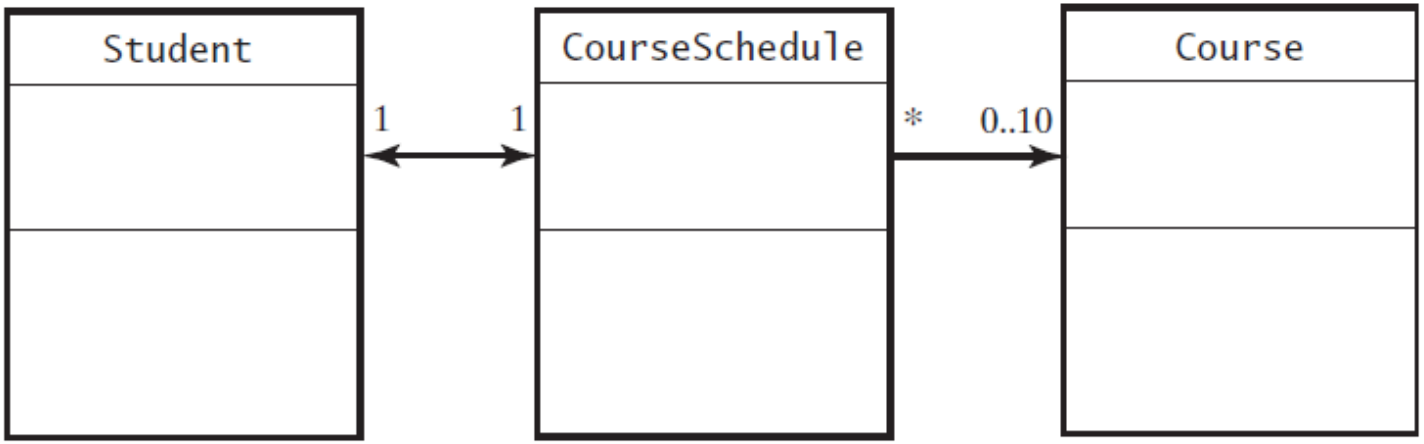


Figure P-10: Part of a UML class diagram with associations