CMSC 131

Object-Oriented Programming I

this reference, Encapulation, API

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This material is based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Jan Plane

Overview

- this reference
- Abstraction
- Encapsulation
- API

Code Duplication Avoidance

- For the current project (Medieval Soldiers) and future projects we will be grading for comments and code duplication avoidance
- Code Duplication
  - If there is a fragment of code that appears in several section of your program, then that code should be factored out and placed in an auxiliary method
- Example:
  - ExperimentWithCodeDup.java
  - ExperimentNoCodeDup.java

this Reference

- Current Object
  - Represents the object a non-static method operates on
- **this**
  - Represents a reference to the current object
  - It is a special reference initialized for you
  - It does not make sense in a static method
- When we use it? (See **Example:** CD.java/CDDriver.java)
  - To tell parameters from instance variables
    - Notice that we could refer to instance variables by using this.<instanceVariableName>
  - To call constructors from another constructors
    - **this** must be the first statement in the constructor
  - In equals method implementation
  - To return a reference to the same object (cascading of method calls)
  - To define non-static methods based on static ones
- Eclipse capitalizes on the use of this when automatically defining code
  - Source →"Generate Constructors using fields"

Abstraction (Technique)

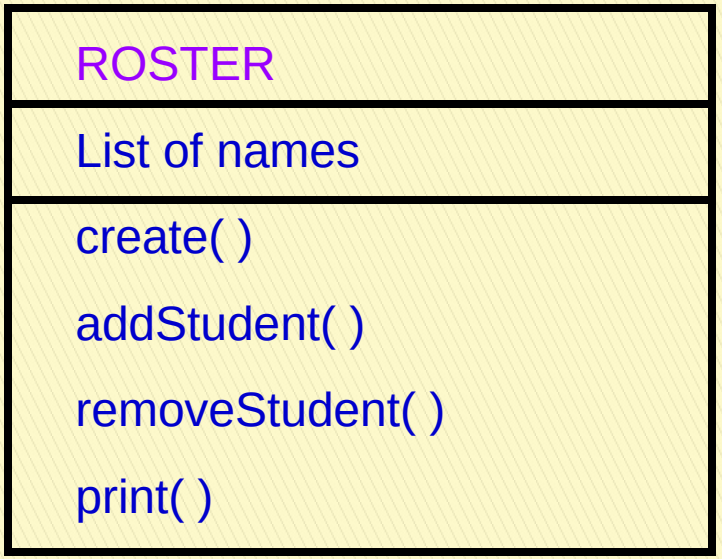
- Abstraction
  - Provide high-level model of activity or data
- Procedural abstraction
  - Specify what actions should be performed
  - Hide algorithms
- Data abstraction
  - Specify data objects for problem
  - Hide representation

Encapsulation (Technique)

- Encapsulation
  - Confine information so it is only visible/accessible through an associated external interface
  - Makes possible **Information hiding**
- Approach
  - For some entity X in program
    - Abstract data in X
    - Abstract actions on data in X
    - Collect data & actions on X in same location
  - Protects and hides X
- Extension of abstraction

Abstraction & Encapsulation Example

- Abstraction of a Roster
  - Data
    - List of student names
  - Actions
    - Create roster
    - Add student
    - Remove student
    - Print roster
- Encapsulation
  - Only these actions can access names in roster



API (Application Programming Interface)

- API → Application Programming Interface
- Interface implemented by a software that enables interaction with other software
- API designed in such a way that …
  - You can develop programs that will not break when the system represented by the API is updated
    - Example: We can change how we represent a phone number internally from String to integers
  - The only thing in the API are things the user will absolutely need
- Example: Java API
  - Project BattleField API
    - http://www.cs.umd.edu/class/fall2010/cmsc131H/projects/MedievalSoldiers/doc/index.html
  - http://download.oracle.com/javase/6/docs/api/index.html

Java Support for API Development

- Visibility via private/public
- The public access specifier allow us to define what will represent the interface
- The private access specifier allow us to encapsulate
- Only make something public if there is a reason to. Why?
  - As long as interface is preserved, class can change without breaking other code
  - The more limited the interface, the less is to maintain
  - To avoid giving object users unnecessary information
  - **Example:** Let's add a getSalary method to the ExperimentNoCodeDup class
    - Let's change it so we use String as a salary instead of double
- Rule of thumb
  - Make instance variables private
  - Implement set/get methods
    - Needed as private instance variables cannot be accessed outside the class declaration
  - Make auxiliary methods private