CSE 142

Objects and Classes

Outline for Today

- Short review of objects
- Discussion of objects and classes
- Object and class exercise

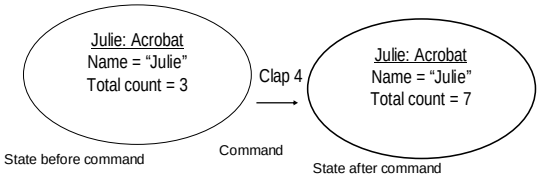
- Major concepts
  - Objects as instances of classes
  - Classes as templates
  - Objects as properties

Object Review

- Objects have properties and responsibilities
- Can send messages to objects
  - Queries [Find out values associated with properties]
  - Commands [Instruct an object to do something]
    May cause a change in state

- Acrobat Example
  - Count is a query
  - Clap and Twirl are commands
    Increase total count for objects

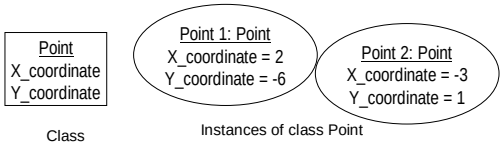
State



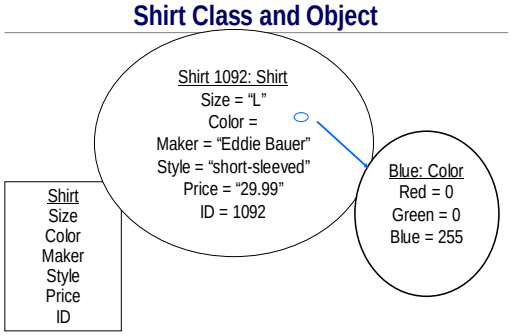
What is the state after the command Twirl 2?
What is the state after the query Count?

Classes

- Classes serve as templates/patterns for creating objects
- Every object is an instance of a class
- Objects in a class share same properties and responsibilities [Classes define reference types]
  - Each object may be distinct with unique values for properties



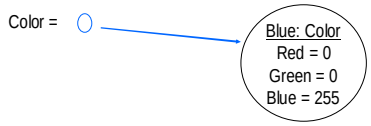
Shirt Class and Object



Objects as Properties

- **Relation: associates two or more objects in a well-defined way**
  - **Objects interact to solve a problem**
  - **Example relation: Object as a property of another object**
  - **Reference value: refers or denotes an object**

The color property in the Shirt object refers to a Color object



Type Review

- **What is a type?**

Shirt Property	Value	Type
Size	"L"	
Color	Reference value	
Maker	"Eddie Bauer"	
Style	"short-sleeved"	
Price	29.99	
ID	1092	

Student Registration System

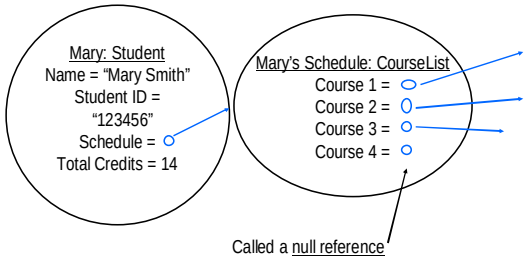
- **What classes would you use?**
  - **Remember: a class is a set of objects with the same properties and responsibilities**

Student Class

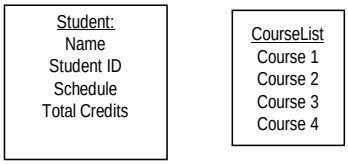
- **Properties**
  - **Student ID**
  - **Name**
  - **Address**
  - **Schedule**
  - **GPA**
  - **Phone Number**
  - **Transcript**
  - **Total credits**
  - **Full-time?**
- **Responsibilities**
  - **Add course**
  - **Drop course**
  - **Update address**
  - **Get GPA**
  - **Get transcript**
  - **Get schedule**
  - **Get student ID**
  - **Get total credits**
  - **Get full-time status**

Brainstormed on Monday

Student Object Example



Student Registration System Exercise



1. **Determine properties for classes for Course and Room**
2. **Use these classes to create instances (objects) modeling the students and schedules on the sheet**
3. **Draw object diagrams to represent the objects you create and use arrows to show references to objects**

Example: Mary

Mary Smith, Student ID: 123456

Schedule:

CSE 142	Course ID: 2520	4 credits	Guggenheim 224 room capacity: 275
MATH 120	Course ID: 5009	5 credits	Mary Gates 095 room capacity: 40
MUSIC 160	Course ID: 5669	5 credits	Music 126 room capacity: 220

Example: Joe

Joe Johnson, Student ID: 234567

Schedule:

MATH 120	Course ID: 5009	5 credits	Mary Gates 095 room capacity: 40
CSE 142	Course ID: 2520	4 credits	Guggenheim 224 room capacity: 275
MUSIC 310	Course ID: 4216	4 credits	Music 126 room capacity: 220
DANCE 105	Course ID: 2655	2 credits	Meany 267 room capacity: 45

Example Model of Mary and Joe

Queries about Mary and Joe

- What is the room number of Mary's first course?
- What department teaches Joe's second course?
- How many seats does the room for Mary's second course have?
- What is the course ID for Joe's third course?
- How many courses is Joe taking?

- To think about:
  - What would happen if the course ID for CSE 142 changed?
  - What if the room capacity for MUSIC 126 changed?

Classes and Objects in Java

- Preview of what's to come:
  - Objects have properties
  - In Java, we'll call these instance variables
  - Objects have responsibilities
  - In Java, we'll call these methods
  - Next week: we'll start Java

Now you have a solid foundation of concepts we'll use throughout the quarter

Summary

- Objects are instances of classes
- Classes serve as templates for creating objects
  - Objects in a class share the same properties and responsibilities
- Objects can be properties of other objects
  - Defines a relation between objects