

# CSE 142

## Objects and Classes

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## 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

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## Object Review

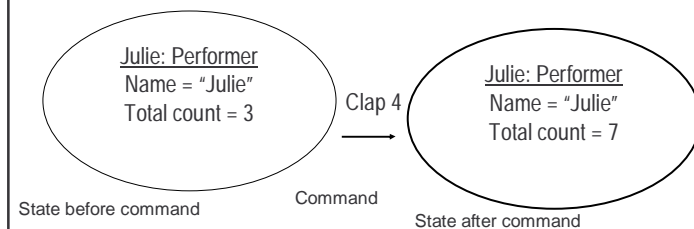
- Objects have properties and responsibilities
- Can send messages to objects
  - Queries [Find out values associated with properties]
  - Commands [Instruct an object to do something]  
May cause a change in state
- Performer Example
  - TellCount is a query
  - Clap and Twirl are commands  
Increase total count for objects

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## State



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

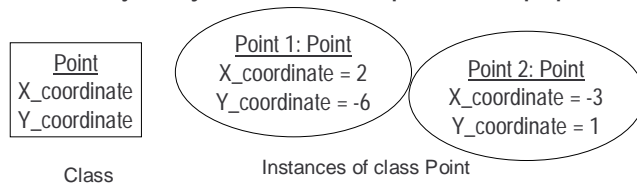
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## Classes

- 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

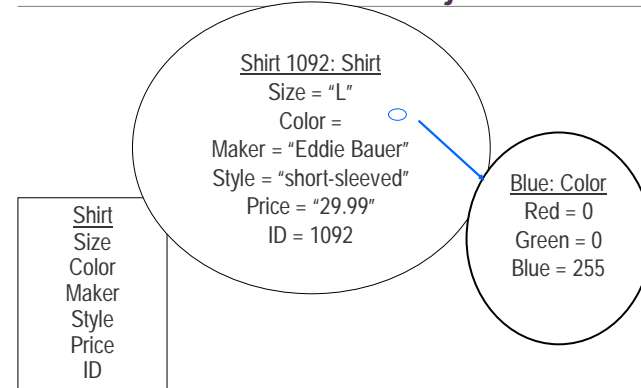


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## Shirt Class and Object



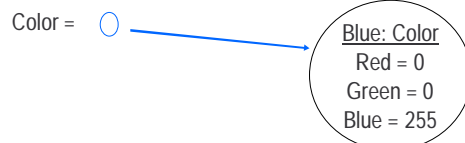
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## Objects as Properties

- **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



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## Type Review

- What is a type?

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

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## Student Registration System

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

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## 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

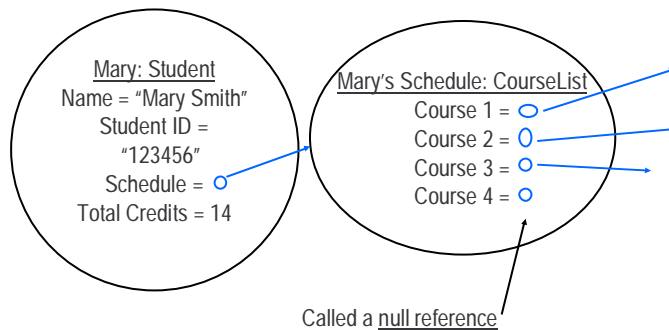
Brainstormed on Wednesday

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## Student Object Example



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## Student Registration System Exercise

Student:  
Name  
Student ID  
Schedule  
Total Credits

CourseList  
Course 1  
Course 2  
Course 3  
Course 4

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

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### 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

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### 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

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### Example Model of Mary and Joe

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### 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?

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## Classes and Objects in Java

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- **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

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## Summary

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- 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

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