Building New Classes

CS 1324

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Organizing Data

- We've started abstracting data
  - Separating things in the world into abstract categories: int, double, char, String
  - Grouping homogeneous data together into arrays
- We also need to be able to group things that are not homogeneous together
    - Objects and Classes

General Structure

- Each object contains different data
- Data describes the state of the objects
    - Properties are represented as attributes
- Each object follows the behavior of the class
    - Actions are represented as methods
- What is the State of the String? Behavior?
- How is a StringBuilder different from a String?
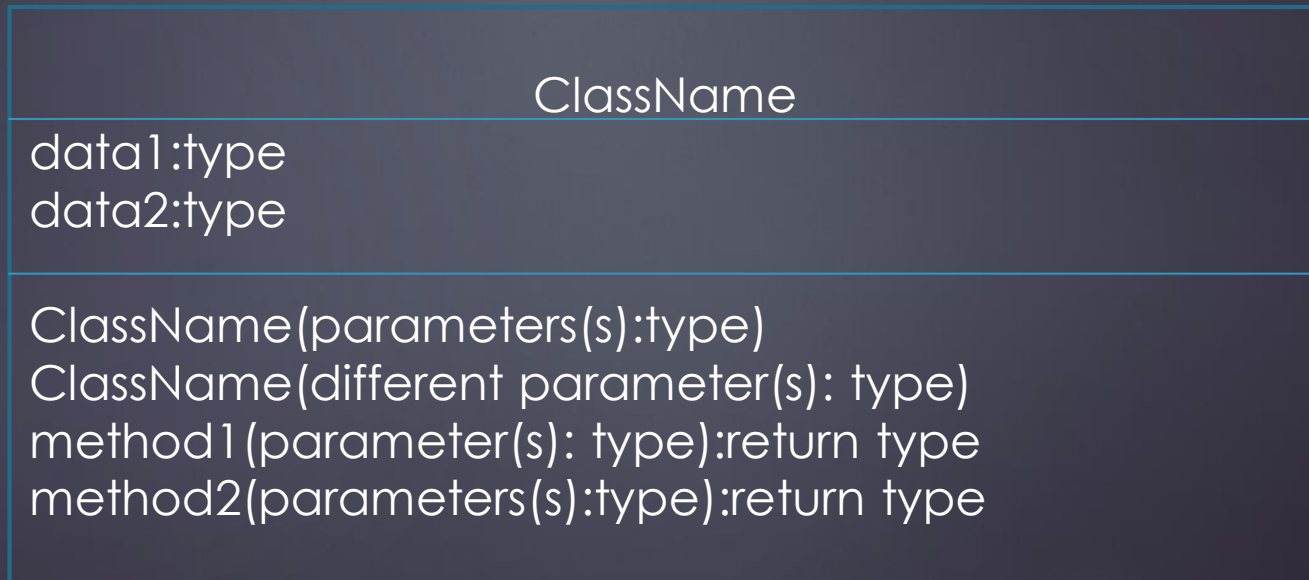   - Properties or Actions?

Instant Quiz Question 1

▶ Which of the following is not a property of the ArrayList class?

a) A sequence of objects

b) The size of the sequence

c) The largest value stored in the sequence

d) The capacity of the sequence

Example: Point

- Data: x and y (public unusual)
- Constructors
- Methods
  - getLocation()
  - equals()
  - toString()
  - setLocation()
  - translate()
- What is the state? Behavior?

UML

▶ Unified Modeling Language

▶ Expresses the design of a class/objects graphically

ClassName
data1:type data2:type
ClassName(parameters(s):type) ClassName(different parameter(s): type) method1(parameter(s): type):return type method2(parameters(s):type):return type

Defining Classes-I

▶ Data

  ▶ Properties of the objects in the class

    ▶ Each object gets its own copy

▶ Constructors

  ▶ Instructions for building objects

  ▶ Look like a method, but no return type

  ▶ May or may not have parameters

  ▶ At the end of the constructor calls, all data initialized

Defining Classes-II

- Methods
  - Describe the behavior of the object
  - Accessors
    - Provide a copy of class/instance data to someone outside the class
  - Mutators
    - Change the state of the object

Example

- Write a simple contact class for a cell phone directory
  - Keep it simple!
- Design first in UML
  - Name?
  - Data?
  - Methods?
  - Constructors?
    - Nor formally a part of UML
- Implement

Create Objects in Another Class

▶ Create a second class for the main program
  ▶ I usually call this Driver
▶ Create an object reference in the main method
  ▶ The reference is initially null
▶ Construct the object
▶ Constructors initialize the data
▶ What if we want to store a group of them?
  ▶ Works exactly like classes from the API

Instant Quiz Question 2

▶ Suppose we wanted to create a class to store an individual task to do. Which of the fields below would not be included

a) Name of task

b) Due date

c) Name of responsible parties

d) Number of tasks to be done

e) Priority (high, usual, low)

Debugging Problem

- Remove the constructor
- Create a constructor with no parameters, but give it a return type
  - This makes it a method instead of a constructor
- Construct an object

Default Constructor

► If you don't create a constructor for your class the compiler creates a default constructor for you

  ► This can cause debugging problems

  ► Compiler really doesn't know how to initialize objects

► If you forget that constructors don't have return values, compiler interprets constructor as just another method

  ► But you may not notice since it can still call default constructor