CMSC 131
Object-Oriented Programming I

ArrayList, File IO

Dept of Computer Science
University of Maryland College Park

Slides based on material provided by Ben Bederson, Bonnie Dorr, Fawzi Emad, David Mount, Nelson Padua-Perez, Jan Plane, Pedram Sadeghian, and various TAs over the years

Announcements

- Remember that there is a deadline to address grading concerns for each graded assignment/test/ quiz, etc. Information can be found on the class web page

- We take academic integrity matters seriously

- Do not post project implementations online

ArrayList

- A class in the Java class library that implements a **list**

- It is part of the **java.util** package, and therefore an appropriate **import** statement is required (e.g., **import java.util.ArrayList;)**

- An ArrayList **holds references** to objects.

  - We need to specify the kind of object the ArrayList will store.

  - If we are storing any **primitive type** then we need to use the appropriate **wrapper** (e.g., Integer, Double, Float)

- You specify the class in between < and > after ArrayList

- **Example:** ArrayListEx1.java, ArrayListEx2.java

- The ArrayList class provides a toString method that calls the toString() for each of the elements in the list, separating each string with commas and surrounding the final string with [ ]

ArrayList Methods

- **ArrayList Default Constructor** - Initializes a list of size 0

- **add** - Adds reference to the end of the list

  - An ArrayList does not store an object; **it stores a reference to an object**

  - An ArrayList **does not make a copy of the object associated with the provided reference**

- **get**(**int** **i**) - Returns the reference at index i.

  - The first reference is at index 0, the second at index 1, etc.

- **size**() - Returns the number of references in the ArrayList

- **remove**(**int** **i**) - Removes the reference at index i.

  - After removing a reference, references are shifted to close the gap

- **clear**() - Removes all the references from ArrayList

- Java API Entry

  - https://docs.oracle.com/en/java/javase/17/docs/api/java.base/java/util/ArrayList.html

ArrayList and Sorting

- You can sort an ArrayList if the references refer to objects that have a compareTo method

- **Example:** SortingEx1.java

- If you want to sort objects of classes you defined:

  - Define a compareTo method in the class

  - Add **implements Comparable<CLASSNAME>** to the class definition

    - **Example:** public class Banana implements Comparable<Banana>

- **Example:** SortingEx2.java

File I/O

- We can use the **Scanner** class along with the **File** class to open and read data from a text file

- **Example:** ReadingFriendsInfo.java

- We can read data from an online source using the *Scanner* class and the **URL** class

- **Example:** ReadingFromTextFile.java, ReadingOnlineData.java