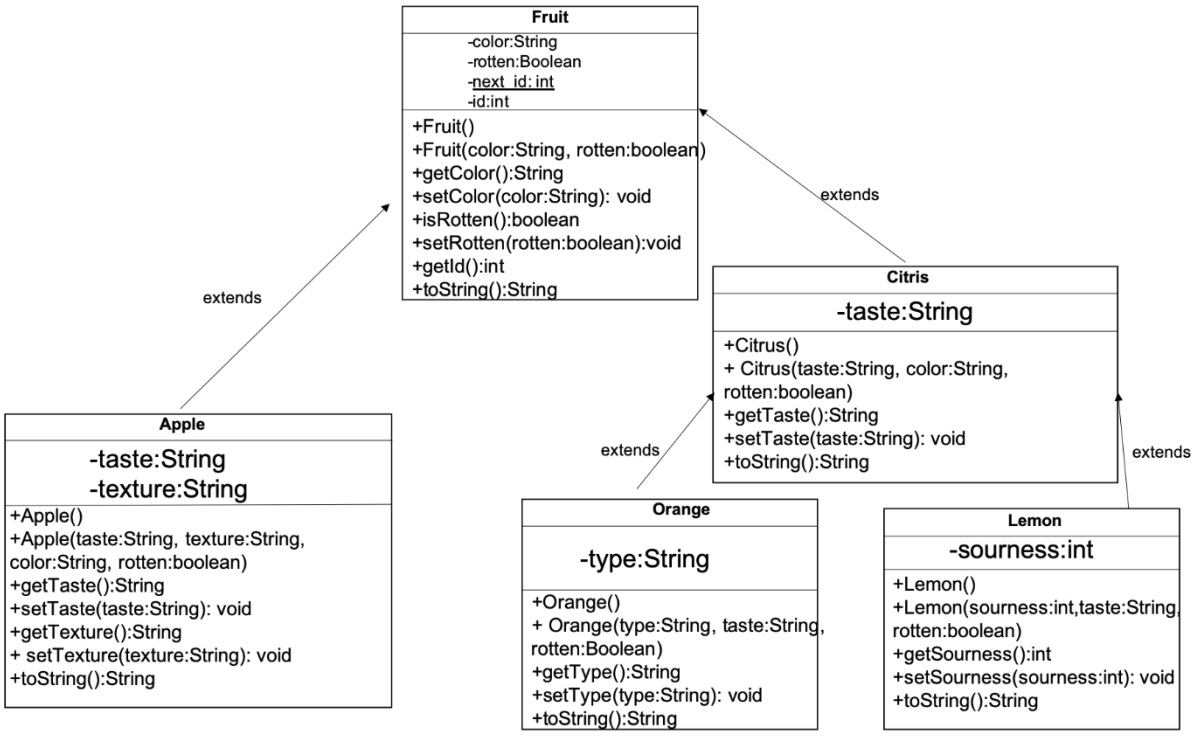
Introduction to Java
CS9053 Section I
Thursday 6 PM – 8:30 PM
Prof. Dean Christakos
Feb 16th, 2024
Due: Feb 23rd, 2024

Assignment 4

Part I: Inheritance

1. Here is a UML hierarchy of Fruits. Your first step is to implement this hierarchy. In constructors with args, you should use `super()` constructor with args to set the values in superclasses.

   `toString()` should contain the name of the class and all of the fields/data for that class. You can decide whether this will work by a subclass calling the `toString` method of the superclass and including that in the subclass `toString` result (as in the `GeometricObject` hierarchy) or if the `toString` method accesses all the data/fields in the object itself.



`Orange` objects are always “orange” in color. `Lemon` objects are always “yellow” in color.

This uses the static “id” pattern. Every creation of a new Fruit object (of any kind) should generate a new and unique id from the static `next_id` field, which is stored in the `id` field and accessible by `getId`

(Note: It’s spelled “Citrus”, and I spelled it wrong in the UML)

2. Now that you’ve implemented this, write `equals` methods for all the classes. The equals method should take an `Object` as an argument and return `true` if the field values of the class and its superclass(es) are equal.

Part II – Arraylists

1. Create an `ArrayList` of `Fruit` objects.

    a. Create 8 Fruit objects:

    1 non-rotten red `Apple` with a crisp texture and sweet taste
    2 rotten green `Apple` objects with a soft texture and tart taste
    3 non-rotten `Lemon` objects with a sour taste. "sourness" should be a random integer from 0-100 for each object
    2 rotten `Orange` objects of type "mandarin" with a sweet taste.

    Put those objects in the `Arraylist`. They should all be able to be added to the same `Arraylist`, regardless of their subclass. The `Arraylist` MUST be parameterized to accept `Fruit` objects. It should accept all `Fruit` objects but should not accept non-fruit objects. For example, this:

    ```
    fruitArrayList.add(new Object());
    ```

    should not compile

    b. Print out the average sourness of all the `Lemon` objects in the `Arraylist`. You have to do this by looping through the array list, finding the `Lemon` objects, and their sourness

    c. **Remove the matching objects:** Retain the 1st rotten green `Apple` object in an `Apple` variable. The goal is ultimately to remove all of the `Apple` objects in the `Arraylist` that match this variable:

    To start: Loop through the `Arraylist` and print out (using `toString`) which objects in the `Apple` object is equal (in value) to the `Apple` object in your variable.

    Also print out which object in the `Arraylist` is the **same object** as the one in your variable.

    You must figure out how to remove all the matching objects from the Arraylist. There is no one correct way to do this. But there are incorrect ways.

    d. **Print out the remaining objects:** Loop through the Arraylist again and print out (using `toString`) all the remaining objects in the Arraylist.