CS 245 - Practice Assignment 6 Spring, 2020

Practice Assignment 6 - Lists

The goal of this assignment is to practice the implementation of two List implementations: the ArrayList and the Linked List.

Background

We discussed the LinkedList implementation. In addition to the “vanilla” version, there are three variants: the circular list, doubly-linked list and dummy head list. You are free to use any variant you choose. The ArrayList implementation is similar to the Stack or Queue implementations in that the data is stored in an array which can grow as needed. This assignment will have you implement a LinkedList and an ArrayList.

Requirements (Process)

Requirement 1: Get the files you need. You will copy them to your own GitHub repository using the following procedure:

1. Log into GitHub. If you do not have a GitHub account, create one via github.com > Sign Up.
2. Point your browser to the URL https://classroom.github.com/a/UHs8rHSA.
3. If necessary, authorize GitHub Classroom by selecting the “Authorize github” button.
4. If available, select your name from the list of names available. This will link your GitHub ID.
5. Accept the assignment by selecting the appropriate button.

If successful, your repository should contain two (2) Java files:

- Practice06Test.java — the main file
- List.java — the interface for the List implementation

Requirement 2: Add to the code in order to make it run. Specifically, you must add two classes: `ArrayList.java` and `LinkedList.java`. The functions defined in List must be implemented in these classes, specifically: `add` (two versions), `get`, `remove`, `size`.

The constructor for `ArrayList.java` must create an array of size 10 where the data (added through the `add` function) is stored. The array must be doubled from its original size if additional array positions are required. Additional functions may also be used.

Java does not allow direct creation of an array of a template type, which you will need for the implementation of the `ArrayList.java` class. There are a few methods for declaring an array. One

such method is described in a Q&A on Edureka: https://www.edureka.co/community/4050/how-do-i-create-generic-array-in-java.

The constructor for `LinkedList.java` must have one pointer, `head`, to a Node, which is likely null at the time of construction (though this may not be the case if you choose a dummy head implementation. The `LinkedList` grows and shrinks as needed. In addition, the class contains an int instance indicating the number of items stored in the `LinkedList` instance. Additional functions may also be used.

Submission

You are required to submit two classes for this assignment: ArrayList.java and LinkedList.java. Use GitHub to check in the two classes required to complete the implementation. On Canvas, submit the URL for your GitHub repository.

Grading

Assuming no change to the other parts of the Practice06Test implementation, the assignment generates a grade ("`Grade for this assignment`") based on correctness of the data structure implementations. This will be the starting point for the grade for the assignment.

See the assignment due date on Canvas. Late assignments receive a 25% penalty per day. Assignments submitted later than 4 days after the due date will receive no credit.