CSC 355. Discrete Structures & Basic Algorithms
Project 3. Linked Lists

General Guidelines.

The instructions given below describe the required methods in each class. You may need to write additional methods or classes that will not be directly tested but may be necessary to complete the assignment.

Note on academic dishonesty: Please note that it is considered academic dishonesty to read anyone else's solution code, whether it is another student's code, code from a textbook, or something you found online. You MUST do your own work! It is also considered academic dishonesty to share your code with another student. Anyone who is found to have violated this policy will be subject to consequences according to the syllabus and university policy.

Learning Goals.

- Practice with generics in Java.
- Gain an understanding of how to implement linked lists.

Project Overview.

In this project you need to create the 3 java files that are describe below:

1. Create a Java class (***SimplyLinkedList.java***) where you implement a simple linked list. In your class you need to implement your **own methods to do**:
   a. **Insertion.** To add a node or nodes into the linked list.
   b. **Deletion.** To delete a node.
   c. **Searching.** To find a certain element.
   d. **Traversal.** To access each element of the linked list.
2. Create a Java class (***DoublyLinkedList.java***) where you implement a double linked list. In your class you need to implement your **own methods to do**:
   a. **Insertion.** To add a node or nodes into the double linked list.

   b. **Deletion.** To delete a node.
   c. **Searching.** To find a certain element.
   d. **Traversal.** To access each element of the linked list (for doubly linked list is forward and backward).

3. Create a Java class **(*LinkedListTest.java*)** where you test your simple and double linked lists methods. Inside the class you will:
   a. Let the user insert by a command line argument; *N* integer elements, the user will have the option to insert certain number of integer elements but with an option to add more into the list.
      i. The options that the user can choose are:
         1) Insert (Ask number of elements)
         2) Delete
            1.First element in the list
            2. Last element in the list
            3. By element
         3) Search
            1. By element
         4) Traversal & Print
         6) Exit
   b. Let the user choose between the options (a) Insert, b) Delete, c) Search, d) Traversal & Print (with this format [1] <-> [2] <-> [3]) and perform the instruction on both Single Linked List and Double Linked List.
   c. Test the difference in your implementation on *single linked list* vs *double linked list* measuring the time (nanoseconds) that take to search an integer element in a single linked list and a double linked list and print the result when the user selects the option c) Search.

Submission Procedure.

Submit your project in the designated section in D2L with all the java files created to solve the project.

Note: Only properly submitted projects are graded! No projects will be accepted by email or in any other way except as described in this handout.

Grading.

Total: 60 points

- Not following instructions (up to 100% deduction on that part of the assignment)
- Bad Coding Style (up to 10-point deduction total)
- Implementing something in an unnecessarily inefficient way (up to 25% deduction for that part of the assignment)
- Improper submission (up to 100% deduction on that part of the assignment)
- Does not compile (up to 100% deduction on that part of the assignment)

Regrade Requests

- We do not enjoy giving zeroes, especially when it is because of a small error, so we do allow regrade requests especially in cases where you received a 0 because of a small compiling issue or something else that can be fixed easily. There is still a standard deduction for most of these issues that is generally equivalent to turning the project in three days late.
- All regrade requests should be submitted according to the guidelines in the syllabus and within the allotted time frame.