CS1083 Assignment #10 – Fall 2021

Due: Wednesday December 1ˢᵗ before 11:00pm (Atlantic), submitted in the Assignment 10 submission folder in Desire2Learn. (Read the submission instructions at the end of this document carefully).

The purpose of this assignment is:
- Review and practice with the **doubly linked list** data structure.

Preparation:
- Review the textbook examples of linked lists from Ch. 13.

This assignment is to be done individually. If you have questions, direct them to a tutor/assistant during a help session in the "Faculty of Computer Science Student Success Centre" team or to your course instructor.

A Sorted Class List of Student

Write a program to organize students into a class list. To do this we will use a **doubly linked list**. In a doubly linked list each node points to the node after (next) and before (previous) it. Note: You may NOT use the java.util.LinkedList class.

Part A:

The Student class is provided in D2L. This class is used to represent a student that may be on a class list. Information about the student includes their first name, last name, and student ID. Revise this class so that Students objects are comparable. The students will be ordered in the class list in alphabetical order by last name (for example, names starting with A will be at the front of the list). If students have the same last name, they will then be ordered by first name, and if they have the same first and last name, they will be ordered by their student ID (in ascending order (smallest to largest)).

Part B:

The Javadoc for a ClassList class and its nested StudentNode class is also provided in D2L. This class represents a doubly linked list of Student objects. Complete the methods of this class as described in the Javadoc comments.
Notes:
- Make use of the fact that this is a doubly linked list (this may be helpful at times), and make sure that all of the variables are kept up-to-date when items are added or removed.
- Use the same method names and comments as provided in the Javadoc.

Part C:

Write a test driver to exercise the classes from parts A & B. Specifically:

- Add a number of (unsorted) items to the list.
- Print the list (you should see that they are sorted).
- Remove a few items from the list that are currently in the list (choose items in different positions to test different scenarios).
- Print the list again (the items that you removed should be gone and the remaining items should still be sorted).
- Add a few more items to the list.
- Print the contents of the list in reverse order by getting the reversed contents of the list as an array and loop through it to print it out.
- Attempt to remove an item from the list that isn't there; catch the Exception that is thrown & display its message.
- Get the number of items in the list & display it.

Side Note: Think about different test cases that should be included when adding items to the list and removing items from the list. Also, when creating Student objects make sure to include names and ID's that demonstrate your compareTo method works properly. (Aim for good test coverage.)

Code must be appropriately commented (including **Javadoc comments**).

For this assignment, only an electronic submission is required.
Your electronic submission (submitted via Desire2Learn) will consist of <u>two files</u>:

   i.   a written report. This should begin with a title page. As always, your title page should include: the course (CS 1083), the assignment number (Assignment #10 in this case), your full name, and your UNB student number. That should be followed by each part clearly identified with a section heading. Include:

            a. the source code for Part A
            b. the source code for Part B
            c. the source code and output for Part C

    This written report should be prepared using a word processor; we recommend using Microsoft Word (i.e. create a .docx file for your report). Copy & paste your java source code & required output into the report document. Add appropriate headings for each part. Fix up the formatting where necessary, adjusting line breaks & page breaks to ensure that your document is easy to read. Use a monospaced font for your code to maintain proper indentation.) Once the report is complete and you've checked it all over, save the .docx file for your own records, and then **save a second copy in pdf format for submission**. (Note: Be sure to open

that file in a pdf viewer to verify that the pdf was generated correctly.) The **SINGLE pdf file** containing your report will be submitted to the appropriate assignment submission folder on Desire2Learn. (It is important that you submit a pdf file and NOT the original Word document. This pdf will allow the marker to write comments directly on your work to give you better feedback.)

Note: Please name this report as follows: **YourName_A10_Report.pdf**

ii.   an archive file (.zip) that contains all your work for this assignment. Make sure that your archive includes **all source code** (.java files - in case the marker wishes to compile & run your code). This archive should be submitted as a single file to the appropriate drop box on Desire2Learn.

Note: Please   name   this   archive   file   as   follows: **YourName_A10_Archive.zip**