CSCI3200 Spring 2023 LAB2-Generic Singly Linked List

Objective: In this lab project, the student will demonstrate their understanding on linked list-based implementation and Java generic. After completing this project, the students should be able to:

- Confidently use a linked list as fundamental data structure to implement a linear ADT based on requirement
- Comfortable in implementing linked list with different list or node structure. Different from one reference variables, you are going to work on two reference variable in this project.
- Implement varies operations on singly linked list and extend them to other linked list structure if necessary.
- Provide a linked list ADT that can be generally used through Java Generic

Download the compressed folder LAB2 from D2L. There are five ".java" files in this folder, including:

1. ***Student.java*** and ***Node.java*** are the two classes that we have used in class during our discussion and implementation of linked list. You are required to implement a genericLinkedList in this project with a set of required methods. If you are not comfortable in moving to generic type directly, you can use those two class to implement the linkedlist with Student type item and then transfer it into generic in the end. If you are comfortable to directly work on the generic type, then you do not need to use those two classes in your project.
2. ***genericNode.java:*** in this file, you are going to implement a Node whose item is generic type <E extends Comparable>. Based on the generic type discussion we had in class to translate the provide Node class to genericNode. genericNode's functionality should be the same as Node except the difference of item type.
3. ***myGenericLinkedList.java:*** in this file, you are going to implement a generic type linked list with a set of required methods. The method signature is already provided, you only need to provide the implementation based on the requirement. You will need to implement the genericNode before you work on this class.
4. ***mainClass.java:*** in this file, you are going to create an instance of myGenericLinkedList and then test each of the required method. You need to test each of the required method at least once.

myGenericLinkedList.java contains detailed requirement for each method. For clarity, you can find illustration with examples for some of the required methods below. The

following example are provided with the assumption that Student type is used to initialize the ***myGenericLinkedList instance.***

1. ***insert(E newItem):*** the insert method inserts a newItem (with no duplicate allowed) into the list in order. After the insertion, the list contains item in increasing order. For example, after insert(s3), insert(s1), insert(s2) are called, the list is s1->s2->s3
2. ***merge (myGenericLinkedList anotherList):*** this method will merge this list with anotherList, since both list are sorted, you are going to merge them so that the result is also a sorted list. For example, if this.list contains s1->s3->s4 and anotherList contains s2->s5, then after the merge method is called, you will have s1->s2->s3->s4->s5

What to Submit:

- ***genericNode.java***
- ***myGenericLinkedList.java***
- ***mainClass.java***

Remarks:

- Please do not modify myGenericLinkedList. Java other than provide implementation of the required methods. Do not change the provided method signature including return type. If you see a need of change during the implementation, please contact the instructor.