COMP 203 Data Structures and Algorithms, Fall 2023
Lab Assignment 3

LAB 3 TOTAL=100 pt

Submit your code and any other answers to Canvas.

Files to submit

Question 1 (40 pts)

TestArrays.java

Question2 (60 pts)

SinglyLinkedList.java

Assignment

Array

1. Implement a Java class named TestArrays, which has main method that uses the java.util.Arrays class and performs the following

(a) Declare a new array called A using a single line of command so that the array contains the following values in this order: 9, 8, 7, 6, 5, 4, 3, 2, 1, 0 (5pts)

(b) Sort array A in ascending order (i.e. from lowest to highest) using the sort method of the Arrays class. (5pts)

(c) Make a copy of the sorted array and store it as array B using the copyOf method of the Arrays class. (5pts)

(d) Compare the two arrays using the equals method of the Arrays class. Print the result on the screen. (10pts)

(e) Call the toString method of the Arrays class and print the contents of array A on the screen. (5pts)

(f) Implement the binarySearch method with binary recursion and search for number 5 in array A. Print the output of this method on the screen. (10pts)

2. Singly linked List

a. Create a generic Node<T> Class that has a constructor with parameter T data for singly linked list. (10 pt)

b. Create a generic SinglyLinkedList <T> Class that has an empty constructor. (10pt)

c. Write a function with the name “public void append(T data)” to insert a node at the end of the SLL. (10pt)

d. Write a function with the name “public void delete(T data)” to delete the node that has the value *data*. (10pt)

e. Write a function with the name “public void display()” to print the node values in the SLL. (10pt) It should print in the following format:

```
X -> Y -> Z -> null
```

f. Write a main function that has an Integer type SLL from SinglyLinkedList class (with name IntSLL) and do the following operations on it in the order of: (5pt)

```
IntSLL.append(1);

IntSLL.append(2);

IntSLL.append(3);

IntSLL.display();

IntSLL.delete(2);

IntSLL.display();
```

Output should be in the following form:

```
0 -> 1 -> 2 -> 3 -> null
0 -> 1 -> 3 -> null
```

g. In the same main function, create an String type SLL from SinglyLinkedList class (with name StrSLL) and do the following operations on it in the order of: (5pt)

```
StrSLL.append("Apple");

StrSLL.append("Banana");

StrSLL.append("Cherry");

StrSLL.display();
```

Output should be in the following form:

```
Apple -> Banana -> Cherry -> null
```

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