CMPSCI 182L Data Structures and Program Design: Lab

Project 2 Linear Linked Lists (30 points)

Due March 23, 2021


(On page 308) Implement the ADT character string as the class *LinkedString* by using a linear linked list of characters.  Include the following *LinkedString* constructors and methods:

`public LinkedString(char[] value)`

>    Allocates a new character linked list so that it represents the sequence of characters currently contained in the character array argument.

`public LinkedString(String original)`

>    Initializes a new character linked list so that it represents the same sequence of characters as the argument.

`public char charAt(int index)`

>    Returns the character value at the specified index. The first character in the linked character string is in position zero.

`public LinkedString concat(LinkedString str)`

>    Concatenates the specified linked character string to the end of this linked character string.

`public boolean isEmpty()`

>    Returns true if, and only if length() is 0.

`public int length()`

>    Returns the length of this linked character string.


`public LinkedString replace(char oldChar, char newChar)`

>    Returns a new linked character string resulting from replacing all occurrences of `oldChar` in this linked character string with `newChar`.

```
public String toString()
```

> Returns a Java String which contains all of the characters in this linked character string. This means that the toString() method override will have to traverse the linked character string and concatenate all of the characters in it onto a Java String which is then returned.

The objective of this assignment is to implement ADT LinkedString so that it mimics the Java *String* class, but your ADT LinkedString must use a linked list data structure "on the back end" to store the characters in a LinkedString object. Therefore, all of the operations listed above should work in exactly the same way as the Java String class. For example, character positions should start at zero. Also, you will want to keep track of the number of characters in the string with a variable named *size* or *length*; so that the ADT can easily determine the length of a LinkedString without traversing the linked list and counting the nodes.

Remember to include a Test class which creates one or more LinkedString objects and invokes each and every method in your ADT LinkedString.

Be sure to read the assignment rubric on the Canvas website for the list of Java classes which are required for this assignment.