CSCI 220 -- PA 7

Lists & Iterators

Feel free to discuss and help each other out but does not imply that you can give away your code or your answers! Make sure to read all instructions before attempting this lab.

New: You can work with a lab partner and each one must submit the same PDF file (include both names in the submission file). Each person must include a brief statement about your contribution to this assignment.

You must use an appropriate provided template from Canvas or my website (zeus.mtsac.edu/~tvo) and output "Author: Your Name(s)" for all your programs. If you are modifying an existing program, use "Modified by: Your Name(s)".

Exercise 1: Use a List (C++ **NodeList** or Java **LinkedPositionalList**) from the textbook to perform operations on a list of strings. Set up a driver to create a list, add a few items, remove a few items, and print the list as well as some information about the list. You must declare and use an iterator. Modify List to add two sequence-based operations: *indexOf (p)* to return an index/rank of a position and *atIndex(i)* to return position of ith element. Try a few test cases to show that the two operations are working correctly. *Note: most operations will be based on the current position of the cursor which is the iterator.*

Exercise 2: Set up **TextEditor** class, which can be used to store, edit, and display a string of characters using a List from exercise 1. The editor (TextEditor class) must support the following operations:

- left – move cursor left one character (do nothing if at beginning).
- right – move cursor right one character (do nothing if at the end).
- insert – insert the character c just before the cursor.
- delete – delete the character just at the cursor (if not at end).
- current – provide current position i of the cursor ($0 <= i <= n - 1$)
- move – move to position i if i is a valid position ($0 <= i <= n - 1$)
- display – display string and number of characters (including spaces and cursor)

Use > for the cursor so if your characters are "Hello World" and the cursor at the beginning then ">Hello World" (i.e, the cursor is the position of character 'H' in the example). The cursor shall not be stored in the list but should be printed to the screen to indicate where the cursor is at that moment. Note: most operations will be based on the current position of the cursor which is the iterator and the first 4

operations would run in O(1). We will only allow letters in the alphabet and space as valid characters. When an editor object is created, it can be an empty string as a default option, or you can specify a string such as "Hello World".

Set up a driver to create a TextEditor object, then use it to perform a few operations and then print the text. Try the following cases:

1. Create a TextEditor object with "HHello Word" (assume cursor at the end)
2. Display current information (should be "HHello Word >" with 11 characters)
3. Move cursor right
4. Move cursor left
5. Insert 'l'
6. Move cursor to position 0
7. Delete current character
8. Display current information (should be ">Hello World" with 11 characters)

Question 1: Would you use an array to implement List ADT? Explain why or why not.

Question 2: Describe Sequence ADT. Is there such an ADT in C++ or Java (pick one language)?

Extra Credit: Use a menu to perform various operations and you can submit this final version in lieu of exercise 2. Sample input/output (assume text editor starts with "HHello Word" and cursor at the end):

```
Enter a starting string: HHello Word<Enter>
Editing document . . .

  Editing Menu

1. Left
2. Right
3. Insert character
4. Delete character
5. Get current position
6. Move to position
7. Display
8. Quit

Enter an option: 7<Enter>
String: "HHello Word>"
Length: 11

Enter an option: 2<Enter>
Cursor is at the end (ignore).

Enter an option: 1<Enter>
Moved cursor left.

Enter an option: 3<Enter>
```

```
Enter a character: l<Enter>
Inserted character l.

Enter an option: 5<Enter>
Current position: 10

Enter an option: 6<Enter>
Enter a position: 0<Enter>
Moved to position 0.

Enter an option: 4<Enter>
Deleted one character.

Enter an option: 2<Enter>
Moved cursor right.

Enter an option: 7<Enter>
String: "H>ello World"
Length: 11

Enter an option: 8<Enter>
Thanks for using my editor program.
```

Fill out and turn in the PA submission file for this assignment (save as PDF format).