CSCI207: Data Structures

Assignment 2

Requirements

1. Implement a stack using a singly linked list.
2. Reverse a string using stacks.
3. Palindromes
4. Implement a stack using a queue

Implement a stack using a singly linked list.

- Starting from the singly linked list code, implement "TStackList class" that implements the logic of a stack using a linked list. For this purpose, you always insert elements at the head of the list and also remove from that place. So, it is actually a very simple case of linked list maintenance.
- **Hint:** (without using STL)

Note that:

- Your implementation should be generic so that it can accept elements of any type.

Reverse a string using stacks.

- Based on your implementation of "TStackList" above, implement a C++ function that takes as input a string (array of characters) and returns as output the mirror view of the string. That is, it is reversed form. So, if the input is "ABCD", the output is "DCBA". For this, you can use a stack where you read the string character by character and push it to the stack. When completely processes, the reverse of the string can be achieved by simply popping element by element from the stack and adding the popped elements to a new string that is returned.
- **Hint:** (without using STL)

Palindromes

- "A palindrome" is a string that reads the same from both directions.
  For example: the word "mom" is a palindrome. Also, the string "Murder for a jar of red rum" is a palindrome.

- So, you need to implement a Boolean function that takes as input a string and its return is true (1) in case the string is a palindrome and false (0) otherwise.

- There are many ways to detect if a phrase is a palindrome. The method that you will implement in this task is by using two stacks. This works as follows. Push the left half of the characters to one stack (from left to right) and push the second half of the characters (from right to left) to another stack. Pop from both stacks and return false if at any time the two popped characters are different. Otherwise, you return true after comparing all the elements. Phrases of odd length have to be treated by skipping the middle element like the word "mom", your halves are "m" and "m".
- **Hint:** (without using STL)

Implement a stack using a queue

Note that:

- You still have the enqueue, dequeue, size, and is empty methods. So if you want to pop the last inserted element, you have to dequeue size() -1 elements from the queue and enqueue them again and finally dequeue the last element, which is now the first element of the queue.
- **Hint:** (without using STL)

Due Date: Wednesday the 15th of December 2021 at 11:55 PM
Delay Policy: Any delay you lose full assignment grade as the submission will be suspended on the deadline.
Submissions: will be on Moodle not by email.
NOTE: Submit your assignment individually (no teams are permitted). If plagiarism is **DETECTED** or **SUSPECTED**, tough actions will be applied.