COSC 1437: Programming Lab & Assignment (Fall 2016)

Queue Implementation (in three ways)
+ Stack Implementation (in three ways)
+ isPalindrome (using Stack & Queue)

Topics

- In Ch. 8, we learned (circular) Queue implementation in three ways, including array-based, reference-based, and List-based.
- In Ch. 7, we discuss details of Stack implementation in three ways, including array-based, reference-based, and list-based.
- In this lab, you are asked to complete the three Queue implementations. Also, you'll implement one simple application, where both Stack and Queue are utilized to check whether the given word is in a symmetric language (i.e., palindrome).

Prerequisite Activities

- **Three stack implementations** (i.e., "StackArrayBased.java", "StackReferenceBased.java", and "StackListBased.java") and their required files are provided with one simple driver, "TestStack.java" in the directory TestStack in the zipped file. You don't need to modify code(s) in "TestStack.java"; however, the three Stack implementations are not correct. Therefore, your first activity is to correct the errors in the stack implementation(s), referring to "handout_chap7.pdf".
- If you successfully correct all the errors and run "TestStack.java", you should get the following output:

```
9  8  7  6  5  4  3  2  1  0
90  80  70  60  50  40  30  20  10  0
900  800  700  600  500  400  300  200  100  0
Press any key to continue  . . .
```

- NOTE: We assume that every index always starts from 0, not 1.

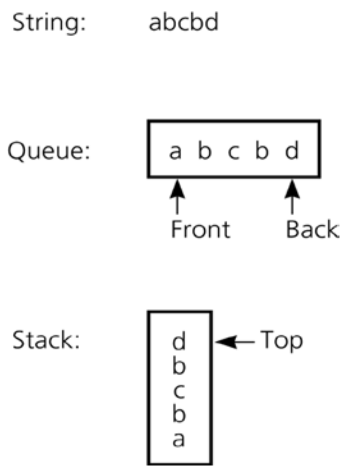
- **Three Queue implementations** (i.e., "QueueArrayBased.java", "QueueReferenceBased.java", and "QueueListBased.java") and their required files are provided with one simple driver, "TestQueue.java" in the directory TestQueue in the zipped file. Notice that the given "TestQueue.java" won't run because intentional errors were embedded in the three Queue implementations. Thus, your first mission is to correct errors in the three implementations, referring to "**handout_chap8.pdf**." If all errors are corrected, "TestQueue.java" will generate the following output:

```
5  6  7  8  9
a5  a6  a7  a8  a9
5.0  6.0  7.0  8.0  9.0
Press any key to continue  . . .
```

Main Activity

- Using one of your Queue implementation (in Ch. 8) and also one of your Stack implementation (in Ch. 7), implement an application that recognizes Palindromes, say "IsPalindrome.java".
- By definition, palindrome = {***str*** | ***str*** reads the same left to right as right to left}
- Implement "isPal()" in "IsPalindrome.java" class and then call "isPal()" in main() of "IsPalindrome.java".
- Please demonstrate that your implementation is correct, with a couple of your own strings in your main().
- In class, we will discuss how to implement isPal() using both Queue and Stack. Please refer to "**Example: Recognizing Palindromes**" in "**handout_chap8.pdf**". Below is the pseudo code that evaluate whether the given string is palindrome or not.

(Example)



```
boolean isPal(str)
{
        for (i = 1 to str.length( )) {
            queue.enqueue(ith character of str);
            stack.push(ith character of str);
        }
        // start to compare
        while (!queue.isEmpty( )) {
            if (queue.dequeue( ) != stack.pop( ))
                return false;
        }
        // finished w/ empty queue (and empty stack)
        return true;
}
```

What to Hand in

- Turn in your program (i.e., "**IsPalindrome.java**") via Blackboard.