COP3538 Project 3 – Linked lists

Due Date: Monday, 10/30/2017 3:50 PM

Turn in:

Submit the zipped Eclipse program including at least Project3.java, Stack.java, Queue.java, State.java and States3.csv. The zip file should be named <your last name>_Project3.zip (for example, Liu_Project3.zip). The program should be well documented in the format of doc comments in Java. Detailed formats are found at http://www.oracle.com/technetwork/articles/java/index-137868.html.

Requirements:

1. Reuse your **State** class from Project 1 (corrected if necessary)
2. Create a class named **Stack** that will implement a stack of state objects using a **singly linked list**. Support the following methods.
    a. Constructor that creates the stack.
    b. A **push** method to push a state on the stack
    c. A **pop** method to pop a state off the stack and return it.
    d. A **printStack** method to print the stack, see the example.
    e. An **isEmpty** method that returns true if the stack is empty, false otherwise
    f. An **isFull** method that always returns false
3. Create a class named **Queue** that implements a queue (double-ended queue, actually) of state objects using a **doubly linked list**. Support the following methods:
    a. Constructor that creates the queue.
    b. An **insertEnd** method to insert a state at the end of the queue.
    c. An **insertFront** method to insert a state at the front of the queue.
    d. A **removeEnd** method to remove a state from the end of the queue and return it.
    e. A **removeFront** method to remove a state from the front of the queue and return it.
    f. A **findDelete** method to find a state in the queue by state name, and delete it from the queue. Return true if it was found and deleted and false otherwise.
    g. A **printQueue** method to print the queue in order front to end
    h. An **isEmpty** method that returns true if the queue is empty, false otherwise
    i. An **isFull** method that returns false always
4. Create a class named **Project3** that will:
    a. Read a file (csv) of states and create a single stack of state objects containing states from regions **New England**, **Middle Atlantic**, and **South** (discard any states not in those regions, do not modify the input file.).
    b. Print the stack starting with the top of the stack.
    c. Create a queue. Pop items from the stack, one at a time, and insert them to the queue: insert the first popped state in the front, the second popped state at the end, the third popped state at the front, the fourth popped state at the end, and so forth.
    d. Print the queue.
    e. Delete states Massachusetts, New Hampshire, Rhode Island, Maryland, New Jersey, Pennsylvania, Alabama, Kentucky, and North Carolina in the queue and print the queue again.

f. Remove items from the queue, one at a time, and push them on the stack. Remove one state from the front, then one from the back, then the front, then the back, and so forth.
g. Print the stack, then exit the program

The queues and the stack should be printed in the following format:

```
Stack Contents:  or  Queue Contents:

State Name              Capital City    State Abbr  State Population  Region            US House Seats
-------------------------------------------------------------------------------------------------------
Connecticut             Hartford           CT         3,596,080      New England          5
Florida                 Tallahassee        FL        19,552,860      South               27
Arkansas                Little Rock        AR         2,959,373      South                4
```

Provide comments in this form for the **State, Stack,** and **Queue** classes:

Comments for the class:

```
/**
 * Detailed description of the class.
 *
 * @author <your name>
 * @version <date you last changed the class>
 */
```

Public method comments:

```
/**
 * Description of the purpose of the method, the meaning of the
 * input parameters (if any) and the meaning of the return values * (if any).
 *
 * @param  parameter  description of the parameter (one for each)
 * @return description of the return value
 */
```

Provide comments in this form for the Project3 class.

```
/**
 * COP 3538: Project 3 – Linked lists
 * <p>
 * Description of the class using as many lines as needed
 * with <p> between paragraphs. Including descriptions of the
 * input required and output generated.
 *
 * @author <your name>
 * @version <the date you last modified the program>
 */
public class Project3
{
```

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Example:

```
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Linked lists
Enter the file name: States3.csv

There were 23 state records put on the stack.

Stack Contents:

State Name              Capital City    State Abbr  State Population  Region            US House Seats
-------------------------------------------------------------------------------------------------------
West Virginia           Charleston          WV         1,854,304      Middle Atlantic      3
Virginia                Richmond            VA         8,260,405      Middle Atlantic     11
. . .
Arkansas                Little Rock         AR         2,959,373      South                4
Alabama                 Montgomery          AL         4,833,722      South                7

Queue Contents:

State Name              Capital City    State Abbr  State Population  Region            US House Seats
-------------------------------------------------------------------------------------------------------
Alabama                 Montgomery          AL         4,833,722      South                7
Connecticut             Hartford            CT         3,596,080      New England          5
. . .
Delaware                Dover               DE           925,749      Middle Atlantic      1
Arkansas                Little Rock         AR         2,959,373      South                4

Queue Contents:

State Name              Capital City    State Abbr  State Population  Region            US House Seats
-------------------------------------------------------------------------------------------------------
Connecticut             Hartford            CT         3,596,080      New England          5
Florida                 Tallahassee         FL        19,552,860      South               27
. . .

Delaware                Dover               DE           925,749      Middle Atlantic      1
Arkansas                Little Rock         AR         2,959,373      South                4

Stack Contents:

State Name              Capital City    State Abbr  State Population  Region            US House Seats
-------------------------------------------------------------------------------------------------------
Virginia                Richmond            VA         8,260,405      Middle Atlantic     11
West Virginia           Charleston          WV         1,854,304      Middle Atlantic      3
. . .
Arkansas                Little Rock         AR         2,959,373      South                4
Connecticut             Hartford            CT         3,596,080      New England          5
```