

COP3538 Project 2 – Stacks and Priority Queues

Due Date: Friday, 10/13/2017 11:59 PM

Turn in:

Submit the zipped Eclipse program including at least Project2.java, Stack.java, Priority.java, State.java and States2.csv. The zip file should be named <your last name>_Project2.zip (for example, Liu_Project2.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 (correct it if necessary)
2. Create a class named **Stack** that will implement a stack of state objects using an array. Support the following methods.
 - a. Constructor that creates the stack array based on a size provided.
 - 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 returns true if the stack is full, false otherwise
3. Create a class named **Priority** that implements a priority queue of state objects using an array, based on *population*, highest population is the highest priority. Support the following methods:
 - a. Constructor that creates the stack array based on a size provided.
 - b. An **insert** method to insert a state into the queue.
 - c. A **remove** method to remove a state from the front of the queue and return it.
 - d. A **printQueue** method to print the queue in priority order, see the example.
 - e. An **isEmpty** method that returns true if the queue is empty, false otherwise
 - f. An **isFull** method that returns true if the queue is full, false otherwise
4. Create a class named **Project2** that will:
 - a. Read the csv file (States2.csv) of states and create a single stack of state objects containing states from regions **South**, **West**, and **Midwest** that data (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 three priority queues, one for each region.
 - d. Pop states off the stack one at a time and insert them into the appropriate priority queue until the stack is empty.
 - e. Print all three priority queues in this order: **South**, **West**, then **Midwest**.
 - f. Remove items from the **South** priority queue, one at a time, and push them on the stack.
 - g. Remove items from the **West** priority queue, one at a time, and push them on the stack.
 - h. Remove items from the **Midwest** priority queue, one at a time, and push them on the stack.

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- i. Print the stack, then exit the program

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

Stack Contents: OR South Priority Queue Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
-----	-----	-----	-----	-----	-----
Florida	Tallahassee	FL	19,552,860	South	27
Arkansas	Little Rock	AR	2,959,373	South	4
Alabama	Montgomery	AL	4,833,722	South	7

Provide comments in this form for the **State**, **Stack**, and **Priority** 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 Project2 class.

```
/**
 * COP 3538: Project 2 - Stacks and Priority Queues
 * <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 Project2
{
```

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Example:

COP3538 Project 2
Instructor: Xudong Liu

Stacks and Priority Queues
Enter the file name: **States2.csv**

There were 33 state records put on the stack.

Stack Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
Wyoming	Cheyenne	WY	582,658	West	1
Wisconsin	Madison	WI	5,742,713	Midwest	8
Washington	Olympia	WA	6,971,406	West	10

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South Priority Queue Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
Florida	Tallahassee	FL	19,552,860	South	27
Georgia	Atlanta	GA	9,992,167	South	14

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West Priority Queue Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
California	Sacramento	CA	38,332,521	West	53
Washington	Olympia	WA	6,971,406	West	10

. . .

Midwest Priority Queue Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
Illinois	Springfield	IL	12,882,135	Midwest	18
Ohio	Columbus	OH	11,570,808	Midwest	16

. . .

Stack Contents:

State Name	Capital City	State Abbr	State Population	Region	US House Seats
North Dakota	Bismarck	ND	723,393	Midwest	1
South Dakota	Pierre	SD	844,877	Midwest	1

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