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Read Me

CircularArrayBaseQueue.java

Methods:

enqueue

Places data at the end of the queue if the queue is not already filled. Updates the rear index to keep track of where the next element will go. Handles array wrap around if needed.

dequeue

Checks to see if the array is already empty before trying to remove an element. Places the front element's data in a temporary container. Then the front element is set to null and the front is updated to the index of the next element in the queue. Handles array wrap-around if needed.

isFull

Checks the array to see if the queue fills the array. Calls the size() method to compare it to the size of the array. Returns true if the array is full and false if it is not filled.

isEmpty

Checks to see if the first element in the queue is set to null. This only occurs when the queue is empty, thus returning true if it is set to null. Otherwise, returns false.

size

size first checks to see if the first element is null. If it is it simply returns 0. If not, it will then check to see if rear contains anything. If rear has something in it, that means the array is full since it will only contain data if it has wrapped around and is referencing the same element as front. In this case it returns the length of the array. If the array is not full, it checks to see if the front index is less than the rear index. If this is the case it returns the difference of the two. If the front is more than the rear, that means the array has wrapped around and size will return the result of that calculation.

reset

Reset moves the elements so that the front of the queue is located at index 0 and keeps the elements contiguous. This method takes into account for wrapping so that the integrity of the data structure is maintained.

reverse

The reverse method switches the front half elements with the rear elements without changing the indexes for front and rear. This is accomplished by using a temp for both instance variables. It is also made to handle a wrap-around case.

shuffle

The shuffle method uses random integers to swap the elements around. It repeats this n/2 number of times since that is enough to give every element a chance to be swapped

toString

Overrides the toString method to output each of the elements in the queue in order as in the queue.

ArrayBaseStack.java

Methods:

push

This method takes data in and pushes it on to the current top of the stack and updates the top so the next element will go on top.

pop

Takes the top element off of the stack and returns the contents to the caller. Updates the top index.

bottom

Bottom checks to see what the bottom element contains and then returns it. It does not update any indexes

isEmpty

Checks the bottom of the stack to see if there is anything in there. If it is equal to null then the whole stack is empty.

isFull

Checks the last element of the array to see if it has something in it. If it does then the stack is full.

size

Calculates the size of the stack based on the position of the top relative to the bottom and returns it as an integer.

toString

Converts the data from the stack into a string separating each element with a "\n" and outputs the string to the caller.