Assignment 3 Programming

Psuedo Code

Amro Elbahrawy

40221760

SPQ Psuedo code:

Use an array to store the queue contents with an initial capacity of 0.

Set the initial state of the queue to min heap.

Use a size variable to track how many elements are in the queue.

Set the size of the array to the initial capacity in the constructor.

Toggle() method:

Check the current state of the queue and switch it to the opposing heap (e.g. if the current state of the heap is "Min", then switch it to a max heap and vise-versa)

Start from (number of elements/2)-1 until 0 and perform heap conversion, depending on max and min and swapping elements recursively until the heap is constructed.

removeTop() method:

check if the queue is empty and return an appropriate message based on that.

Save the first element in the queue to display it at the end.

Remove the first element in the queue and replace is with the last element in the queue.

Decrement the size variable of the queue.

Restore the order of the heap.

Return the key and value of the removed entry.

Insert method(key, value):

Check if the queue is full and extend it by 50% of its current capacity if it is.

Create a new Node object with the given key and value.

Add it to the queue and increment the size variable.

Return the key and value of the entry.

extendArray() method:

Initialize a new array with 150% of the old queue’s size.

Copy the contents of the queue into the new queue.

Use that as the new queue.

top() method:

return the first element in the queue without removing it.

remove(key, value):

Look if an element in the queue exists with the given key and value. Return an appropriate error message if it does not exist.

If the element was found, save its value in another object.

Remove the found object and replace it with the last entry in the queue.

Decrement the size variable.

Restore the order of the heap.

Return the key and value of the entry.

replaceKey(old key, new key):

Check if an entry exists in the queue.

If an entry was found in the queue, replace its key with the new one.

Restore the order of the heap based on the changes of the key.

Return the entry’s old key.

replaceValue(key, value):

Check if an entry exists in the queue with the given key.

If an entry was found in the queue, replace its value with the new one.

Return the entry’s old value.

Size():

Returns the size variable that keeps track of the number of elements in the queue.

State():

Returns the current state of the queue, whether it is a min or a max heap.

isEmpty():

Returns True or false based on if the queue is empty.