Data Structures and Algorithms

Lab Journal - Lab 3

Name: ___________________________________

Enrollment #: ___________________________________

Class/Section: ___________________________________

Objective

This lab is intended to introduce students to Queues and their applications. The students will implement the Queue and employ it in solving the given problems.

Task 1 :

Give answers to the following.

1. Show the contents of a (linear) queue and position of front and rear markers (at each step) once the following sequence of statements is executed.

```
Queue Q;
```

1. Q.enqueue(10);	
2. Q.enqueue(20);	
3. Q.enqueue(30);	
4. Q.dequeue();	
5. Q.dequeue();	
6. Q.enqueue(40);	

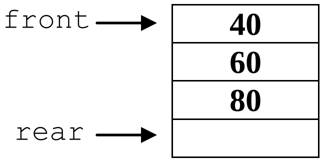
7. Q.dequeue()	
8. Q.dequeue()	

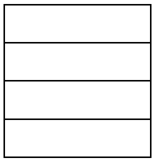
2. Consider a circular QUEUE with N=8 memory cells. Find the number of elements in QUEUE for the following positions of front and rear.

front = 0 ; rear = 4 ;	
front = 2 ; rear = 0 ;	
front = 4 ; rear = 6 ; And two elements are dequeued.	

3. Suppose q is an instance of a circular queue and the queue size is 4. Show the contents of the queue and positions of the front and rear markers once the following sequence of statements is executed. The initial contents of the queue are listed in the following.

```
q.dequeue();
q.dequeue();
q.enqueue(15);
q.enqueue(25);
```





Task 2 :

Implement the following exercises.

Exercise 1

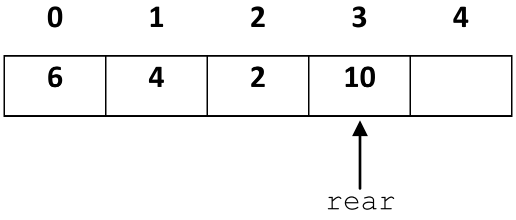
Create a class Circular Queue that implements the functionality of a queue providing all the required operations (Enqueue(), Dequeue(), Empty(), Full() and getFront()).

Exercise 2

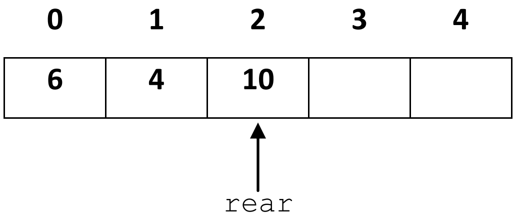
Write a program that reads a string from a text file and determines if the string is a palindrome or not. Use a Stack and a Queue to check for the palindrome.

Exercise 3

Implement an ascending priority queue using a (linear) array. The items can be added to the queue like a normal queue. However, the dequeue operation should remove the minimum item from the queue. Once an element is removed from the queue, shift the rest of the elements to the left. A sample run of the program should result in the contents as illustrated in the following Figure. (You do not need the maker 'front' for this implementation).



dequeue() :



Implement the given exercises and get them checked by your instructor. If you are unable to complete the tasks in the lab session, deposit this journal alongwith your programs (printed or handwritten) before the start of the next lab session.

S No.	Exercise	Checked By:
1.	Exercise 1	
2.	Exercise 2	
3.	Exercise 3	

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