UCS301 Data Structures

Lab Assignment 4: Queues

(Week 4)

1) Develop a menu driven program demonstrating the following operations on simple Queues: enqueue(), dequeue(), isEmpty(), isFull(), display(), and peek().

2) Develop a menu driven program demonstrating the following operations on Circular Queues: enqueue(), dequeue(), isEmpty(), isFull(), display(), and peek().

3) Write a program interleave the first half of the queue with second half.
Sample I/P: 4 7 11 20 5 9 Sample O/P: 4 20 7 5 11 9

4) Write a program to find first non-repeating character in a string using Queue. Sample I/P: a a b c Sample O/P: a -1 b b

5) Write a program to implement a stack using (a) Two queues and (b) One Queue.

Additional Questions

1) Given a function n, write a function that generates and prints all binary numbers with decimal values from 1 to n.
Input: n = 2
Output: 1, 10
https://www.geeksforgeeks.org/interesting-method-generate-binary-numbers-1-n/

2) Given a queue with random elements, we need to sort it. We are not allowed to use extra space. The operations allowed on queue are:

1. enqueue() : Adds an item to rear of queue.
2. dequeue() : Removes an item from front of queue.
3. isEmpty() : Checks if a queue is empty.

Input: 11, 5, 4, 21
Output: 4, 5, 11, 21
https://www.geeksforgeeks.org/sorting-queue-without-extra-space/

3) Given a Queue consisting of first n natural numbers (in random order). The task is to check whether the given Queue elements can be arranged in increasing order in another Queue using a stack. The operation allowed are:

1. Push and pop elements from the stack
2. Pop (Or Dequeue) from the given Queue.
3. Push (Or Enqueue) in the another Queue.

Input : Queue[] = { 5, 1, 2, 3, 4 }
Output : ***Yes***
Check if a queue can be sorted into another queue using a stack - GeeksforGeeks

4) The school cafeteria offers circular and square sandwiches at lunch break, referred to by numbers 0 and 1 respectively. All students stand in a queue. Each student either prefers square or circular sandwiches. The number of sandwiches in the cafeteria is equal to the number of students. The sandwiches are placed in a stack. At each step:

- If the student at the front of the queue prefers the sandwich on the top of the stack, they will take it and leave the queue.
- Otherwise, they will leave it and go to the queue's end.

This continues until none of the queue students want to take the top sandwich and are thus unable to eat
Input: students = [1,1,0,0], sandwiches = [0,1,0,1]
Output: 0
Number of Students Unable to Eat Lunch - LeetCode