Data Structure Design

Video - 16

Leetcode - 641

~~Medium~~ Easy

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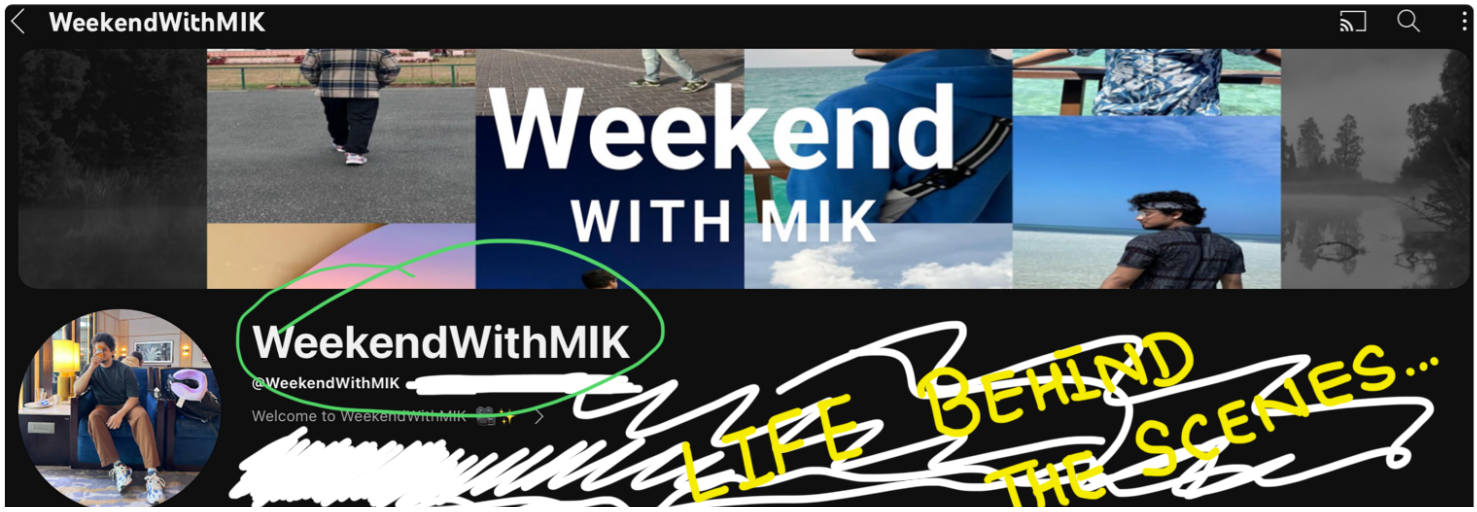

641. Design Circular Deque

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Design your implementation of the circular double-ended queue (deque).

Implement the `MyCircularDeque` class:

- `MyCircularDeque(int k)` Initializes the deque with a maximum size of `k`.
- `boolean insertFront()` Adds an item at the front of Deque. Returns `true` if the operation is successful, or `false` otherwise.
- `boolean insertLast()` Adds an item at the rear of Deque. Returns `true` if the operation is successful, or `false` otherwise.
- `boolean deleteFront()` Deletes an item from the front of Deque. Returns `true` if the operation is successful, or `false` otherwise.
- `boolean deleteLast()` Deletes an item from the rear of Deque. Returns `true` if the operation is successful, or `false` otherwise.
- `int getFront()` Returns the front item from the Deque. Returns `-1` if the deque is empty.
- `int getRear()` Returns the last item from Deque. Returns `-1` if the deque is empty.
- `boolean isEmpty()` Returns `true` if the deque is empty, or `false` otherwise.
- `boolean isFull()` Returns `true` if the deque is full, or `false` otherwise.

Example 1:

Input

```
["MyCircularDeque", "insertLast", "insertLast", "insertFront", "insertFront", "getRear", "isFull", "deleteLast", "insertFront", "getFront"]
[[3], [1], [2], [3], [4], [], [], [], [4], []]
```

Output

```
[null, true, true, true, false, 2, true, true, true, 4]
```

Explanation

```
MyCircularDeque myCircularDeque = new MyCircularDeque(3);
myCircularDeque.insertLast(1);  // return True
myCircularDeque.insertLast(2);  // return True
myCircularDeque.insertFront(3); // return True
myCircularDeque.insertFront(4); // return False, the queue is full.
myCircularDeque.getRear();      // return 2
myCircularDeque.isFull();       // return True
myCircularDeque.deleteLast();   // return True
myCircularDeque.insertFront(4); // return True
myCircularDeque.getFront();     // return 4
```

Approach

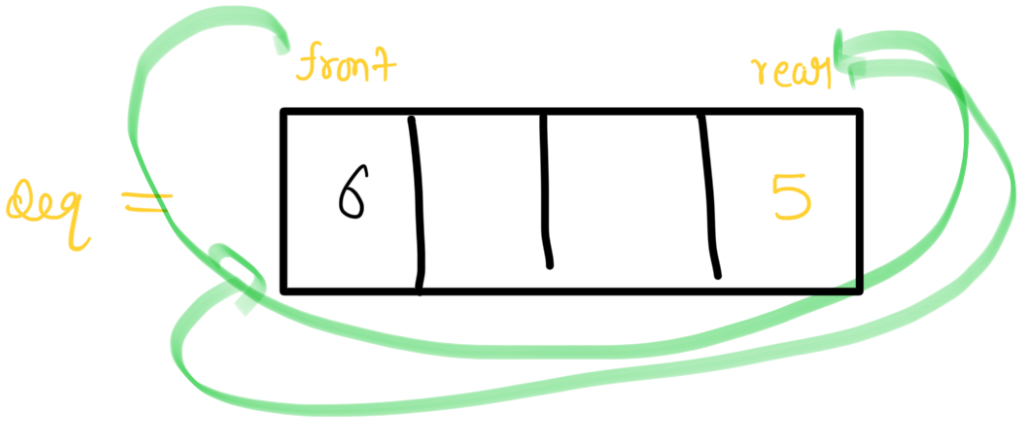
College की याद आगई।

Q.1- Array.

"doubly linked list"
↓
list<int>

deque.

Circular



deq[rear] = 5;

rear = (rear+1) % K;

deq[front] = 6;

front = (front-1+K) % K;

Circular

- increment → (+1) %. K
- decrement → (−1 +K) %. K

front

rear

insert front = (front −1 +K) %. K

insert Rear = (rear+1) %. K

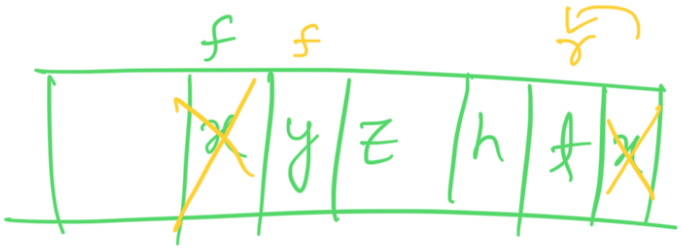
K

CurrentSize

```
front = 0 ;
rear = K-1 ;
currentCount = 0 ;
```

K

```
vector<int> deq(K);
```



deleteFront = (front + 1) % K;

deleteRear = (rear - 1 + K) % K;

```
// isFull()
if (currentCount == K)
    return True
```

```
//isEmpty()
if (curCount == 0)
    return True;
```

```
getFront() {
        if (conCount == 0)
            return -1;

        return deq[front];
    }

getLast() {
        if(con == 0) re -1;
        return deq[rear];
}
```