Practical No -13

Title: Implement Double-ended Queue concept

Aim: A double-ended queue (deque) is a linear list in which additions and deletions may be made at either end. Obtain a data representation mapping a deque into a one-dimensional array. Write C++ program to simulate deque with functions to add and delete elements from either end of the deque.

Prerequisite:

- Basics understanding of Queue

Objectives:

- To understand implementation of Double-endedQueue

Input: Elements in array

Outcome:

- At end of this experiment, student will be able to illustrate the concept of Double-ended queue in data structure.

Theory:

The deque stands for Double Ended Queue. Deque is a linear data structure where the insertion and deletion operations are performed from both ends. We can say that deque is a generalized version of the queue

Queue Representation

The following diagram represent insertion and deletion in a deque can be performed on both ends i.e. from Front as well as from Rear end

Representation of deque

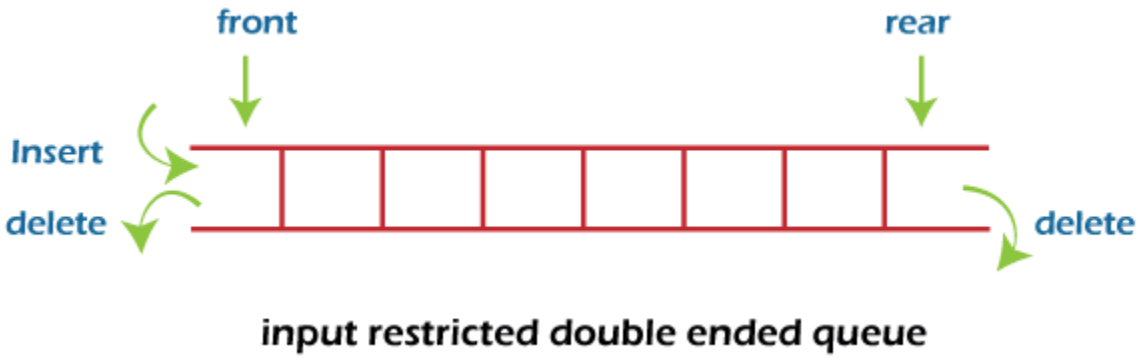
Types of deque

There are two types of deque -

- Input restricted queue
- Output restricted queue

Input restricted Queue

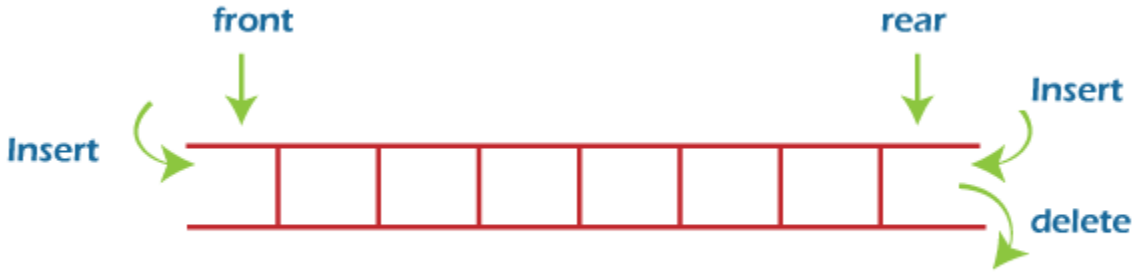
In input restricted queue, insertion operation can be performed at only one end, while deletion can be performed from both ends.



input restricted double ended queue

Output restricted Queue

In output restricted queue, deletion operation can be performed at only one end, while insertion can be performed from both ends.



Output restricted double ended queue

Basic Operations
Queue operations may involve initializing or defining the queue, utilizing it and then completely erasing it from memory. Following are basic operations associated with queues –

- **enqueueFront**: Insert or add an item at the front of the deque.
- **enqueueRear:** Insert or add an item at the rear of the deque.

- **dequeueFront:** Delete or remove the item from the front of the queue.
- **dequeueReart:** Delete or remove the item from the rear of the queue.
- **getFront**: Retrieves the front item in the deque.
- **getRear:** Retrieves the last item in the queue.
- **isEmpty**: Checks if the deque is empty.
- **isFull:** Checks if the deque is full.

Conclusion:

Thus we have implemented C++ program for double ended queue and perform the basic operation.