DATA STRUCTURES

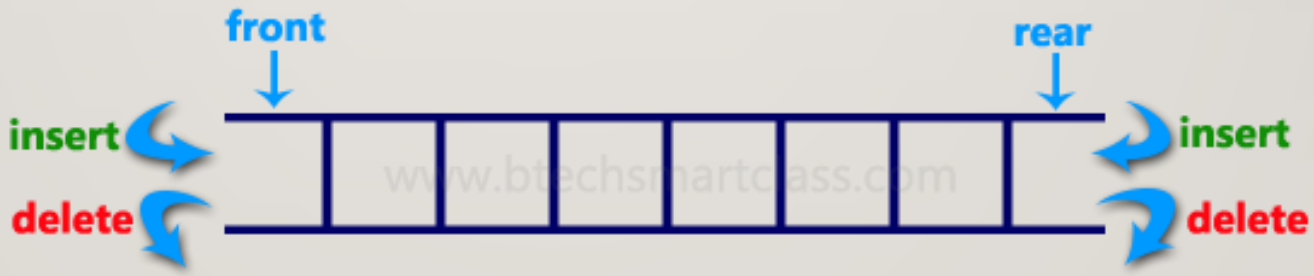
LECTURE-10

QUEUE

Dr. Sumitra Kisan

Deques

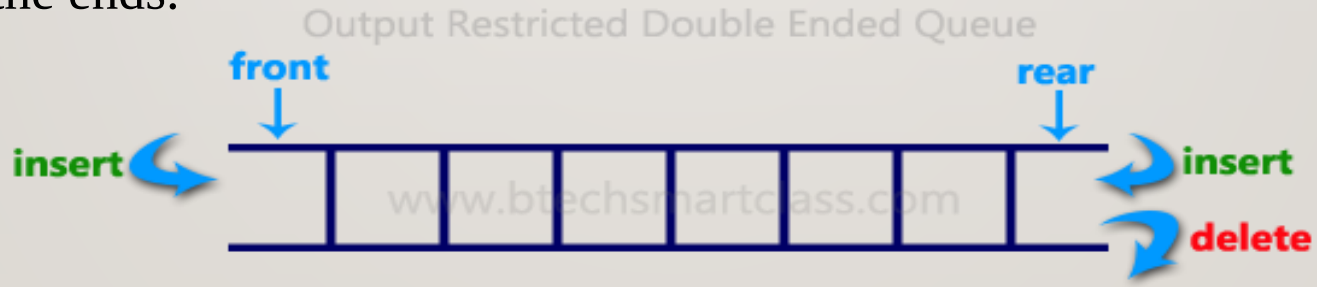
- A deque is a list in which elements can be inserted or deleted at either end.
- It is also known as a head-tail linked list because elements can be added to or removed from the front (head) or back (tail).
- A deque can be implemented either using a circular array or a circular doubly linked list.
- In a deque, two pointers are maintained, LEFT or FRONT and RIGHT or REAR which point to either end of the deque.
- The elements in a deque stretch from LEFT end to the RIGHT and since it is circular, Deque[N-1] is followed by Deque[0].
- Use: Palindrome-Checker



There are two variants of a double-ended queue:

➢***Input restricted deque****:* In this deque, insertions can be done only at one of the ends while deletions can be done from both the ends.

➢***Output restricted deque****:* In this deque, deletions can be done only at one of the ends while insertions can be done on both the ends.



Priority Queues

- A priority queue is a queue in which each element is assigned a priority.
- The priority of elements is used to determine the order in which these elements will be processed.
- The general rule of processing elements of a priority queue can be given as:
  - ✓ An element with higher priority is processed before an element with lower priority
  - ✓ Two elements with same priority are processed on a first come first served (FCFS) basis
- Priority queues are widely used in operating systems to execute the highest priority process first.
- In computer's memory priority queues can be represented using arrays or linked lists.

Types of Priority Queues

There are two types of priority queues:

Ascending Priority Queue: Elements can be inserted in any order but only smallest element can be removed.

Descending Priority Queue: Elements can be inserted in any order but only largest element can be removed.

Array Representation of Priority Queues

- When arrays are used to implement a priority queue, then a separate queue for each priority number is maintained.
- Each of these queues will be implemented using circular arrays or circular queues. Every individual queue will have its own FRONT and REAR pointers.
- We can use a two-dimensional array for this purpose where each queue will be allocated same amount of space.
- Given the front and rear values of each queue, a two dimensional matrix can be formed.