QUEUE

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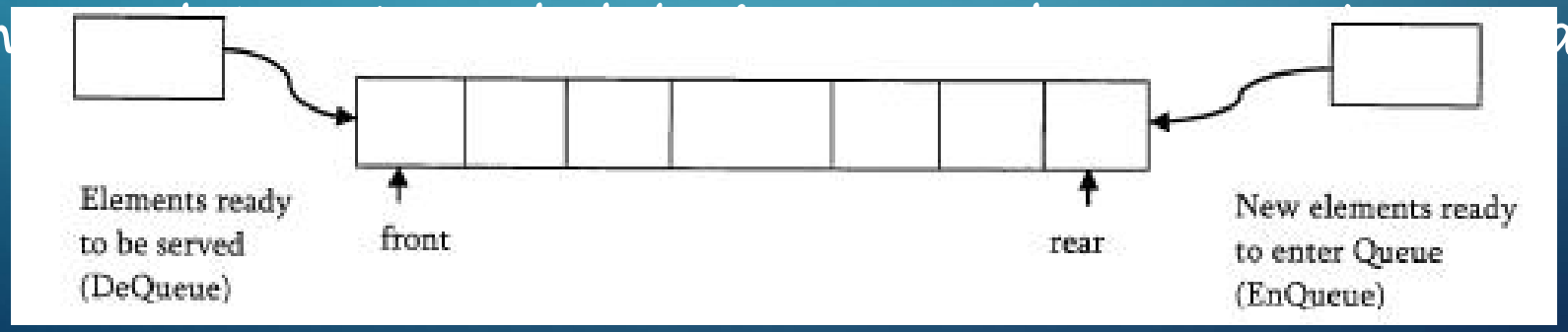
WHAT IS A QUEUE ?

- A queue is a data structure used for storing data (similar to Linked List and Stacks).
- A queue is a line of people or things waiting to be served in sequential order starting at the beginning of the line or sequence
- A queue is an ordered list in which insertions are done at on d (front).



HOW IS QUEUES USED ?

- Line at reservation counter explains the concept of a queue.
- When we enter the line we put ourselves at the end of the line, and the person who is at the front of the line is the next who will be served.
  The person will exit the queue and will be served.

QUEUE ADT

Main Queue Operations

- EnQueue(int data): Inserts an element at the end of the queue
- Int DeQueue() : Removes and returns the element at the front of the queue

Auxiliary Queue Operations

- Int Front() : Returns the element at the front without removing it.
- Int QueueSize() : Returns the number of elements stored
- Int IsEmptyQueue() : Indicates whether no elements are stored.

APPLICATIONS

Direct Application

- Operating systems schedule jobs in the order of arrival (e.g., a print queue)
- Simulation of real-world queues such as line at a ticket counter
- Multiprogramming
- Asynchronous data transfer (file IO, pipes, sockets)
- Waiting times of customers at call center
- Determining number of cashier to have at a supermarket

Indirect Application

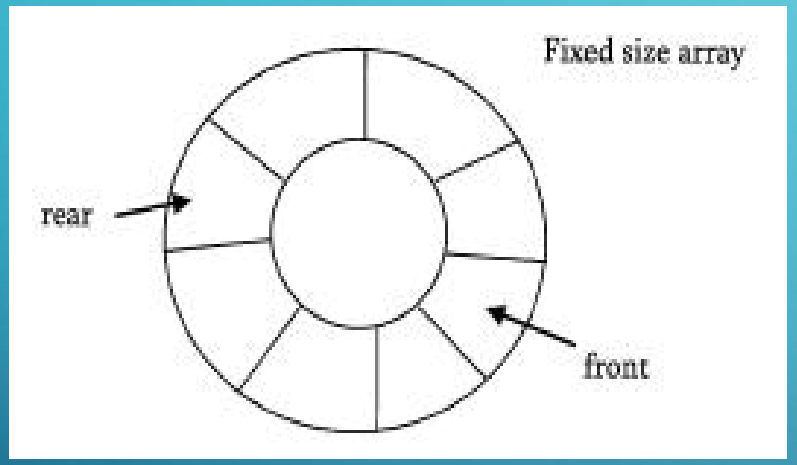
- Auxiliary data structure for algorithms
- Component of other data structure

IMPLEMENTATION

There are many ways (similar to Stacks) of implementing queue operations and below are commonly used methods.

- Simple circular array based implementation
- Dynamic circular array based implementation
- Linked list implementation

SIMPLE CIRCULAR ARRAY IMPLEMENTATION



The simple implementation of Queue ADT uses an array. In the array, we add elements circularly and use two variables to keep track of start element and end element.

Generally, Front is used to indicate the start element and rear is used to indicate the end element in the queue.

LINKED LIST IMPLEMENTATION

- The other way of implementing queues is by using Linked lists. EnQueue operation is implemented by inserting element at the ending of the list.
- DeQueue operation is implemented by deleting an element from the beginning of the list.