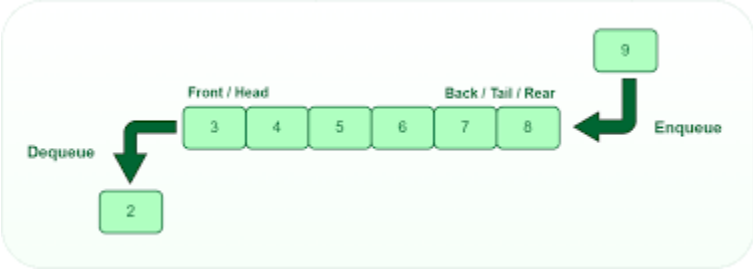
Queue

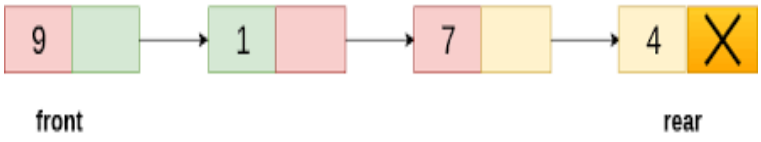
A Queue is a First-In-First-Out (FIFO) data structure where the first element inserted is the first element removed. In the queue, insertions and deletions are made at different ends. New elements are added at one end, called the rear, and elements are removed from the other end, called the front.

Queue using array:



A queue can be implemented using an array by maintaining two pointers - front and rear. The front pointer points to the first element of the queue and the rear pointer points to the last element of the queue. Initially, both pointers point to -1. When an element is inserted into the queue, the rear pointer is incremented by 1 and the element is added at that position. When an element is deleted from the queue, the front pointer is incremented by 1 and that element is removed from the front position

Queue using LinkedList:



In a linked list implementation of a queue, each node of the queue consists of two parts - the data part and the link part. The data part stores the element and the link part stores the address of the next node. The front pointer points to the first node of the queue and the rear pointer points to the last node of the queue. Initially, both pointers point to NULL. When an element is inserted into the queue, a new node is created and added at the rear position. When an element is deleted from the queue, the front pointer is incremented by 1 and that element is removed from the front position.

Features of code:

```
bool isEmpty() = 0; // Checks if the queue is empty
bool isFull() = 0;  // Checks if the queue is full

void enqueue(int element) = 0; // Adds an element to the queue
int dequeue() = 0;             // Removes an element from the queue

int front() = 0; // Gives the element at front
int back() = 0;  // Gives the element at rear
```

Snippet from Queue.h

Output showing the working of code

Contents of compiled main.cpp:

```
Using Array:

The values in the queue are:

5 enqued
The values in the queue are:
5,
2 enqued
3 enqued
The values in the queue are:
5,2,3,
Dequed 5
The values in the queue are:
2,3,
Front is: 2
Rear  is: 3
```

```
Using Linked list:

The values in the queue are:

5 enqued
The values in the queue are:
5,
2 enqued
3 enqued
The values in the queue are:
5,2,3,
Dequed 5
The values in the queue are:
2,3,
Front is: 2
Rear  is: 3
```