

DSA through C++

Deque



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Agenda

- ① Variations of queue
- ② deque
- ③ operations on deque
- ④ ways to implement deque

Queue

A queue is an ordered list in which insertions are done at one end (rear or back) and deletions are done at other end (front)

Working principle is First In First Out

Variations of Queue

- Insertion restricted

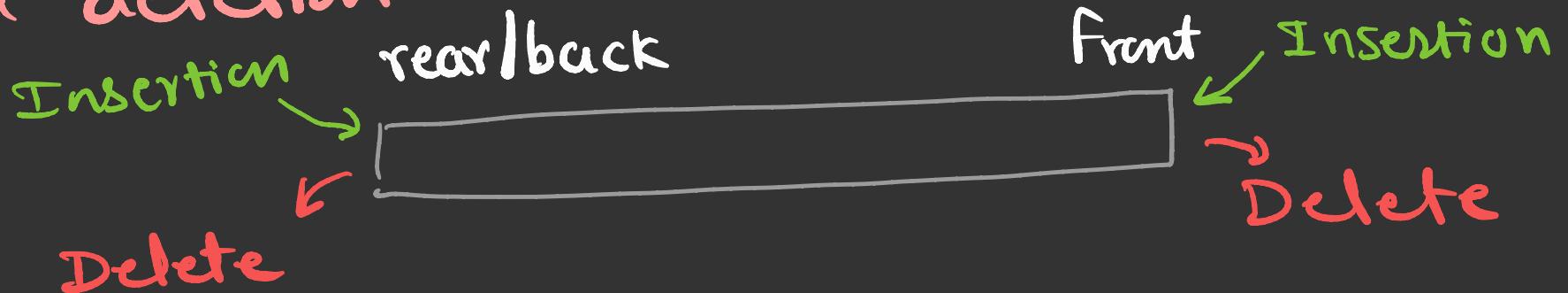


- Deletion restricted



Deque

- Deque is another variation of queue
- Both ends can be used for insertion and deletion



Operations on deque

insert at front

insert at back

delete at front

delete at back

front

back

Constructor

Destructor

Copy constructor

copy assignment operator

Dequeue Implementation

- ① Using Array
- ② Using Dynamic Array
- ③ Using Linked List

front = ~~1~~ ~~0~~ 6 5 4 5

front = ~~1~~ ~~0~~ X 2 3 2

Rear = ~~1~~ ~~0~~ X 2 3 2

0	1	2	3	4	5	6
20	40	70			60	50

insertFront



insertBack



deleteFront

Dynamic Array

deleteBack

0	1	2	3	4	5	6
30	50	90	70	10	40	60

c = 7

f = 3

r = 2

c = 14

f = 0

r = 6

0	1	2	3	4	5	6	7	8	9	10	11	12	13
70	10	40	60	30	50	90							

γ	δ
0	1
2	3
4	5
6	7
30	50
90	70
10	40
60	

$$C=7$$

$$\delta = 3$$

$$\gamma = 2$$

$$C=14$$

γ	δ
0	1
2	3
4	5
6	7
7	8
9	10
10	11
11	12
12	13
30	50
90	70
10	40
60	

Wrong

Another variation

- Priority Queue

A priority queue is a collection of elements such that each element has been assigned a priority. The order of elements are deleted and processed comes from the following rules

- An element of higher priority is processed before any element of lower priority.
- Two elements with the same priority are processed according to the order in which they were added in the queue.

Implementation

- using linked list
- using Arrays
- using Dynamic Arrays
- using heap (Preferred)