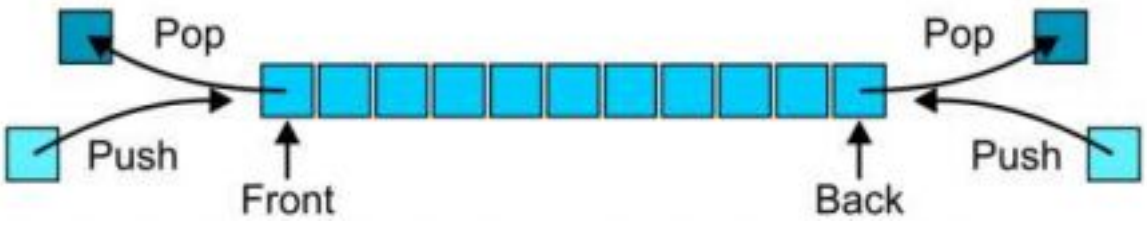
Double-Ended Queue

- A Deque or deck is a double-ended queue.

Allows elements to be added or removed on either the ends.



TYPES OF DEQUE

❑ Input restricted Deque

- Elements can be inserted only at one end.
- Elements can be removed from both the ends.

❑ Output restricted Deque

- Elements can be removed only at one end.
- Elements can be inserted from

both the ends.

Deque as Stack and Queue

As STACK

- When insertion and deletion is made at the same side.

As Queue

- When items are inserted at one end and removed at the other end.

OPERATIONS IN DEQUE

- Insert element at back
- Insert element at front
- Remove element at front
- Remove element at back

Insert_front

- insert_front() is a operation used to push an element into the front of the *Deque*.

PUSH o 1 2 3 4 5 7

FRONT REAR

0 1 2 3 4 5 7

Algorithm Insert_front

step1. Start

step2. Check the queue is full or not as if (r == max-1)

&&(f==0) step3. If false update the pointer f as f= f-1 step4. Insert the element at pointer f as Q[f] = element step5. Stop

Insert_back

- insert_back() is a operation used to push an element at the back of a *Deque*.

PUSH 9 1 2 3 4 5 7

FRONT REAR

1 2 3 4 5 7

Alogrithm insert_back

Step1: Start

Step2: Check the queue is full or not as if (r == max-1) &&(f==0) if yes queue is full

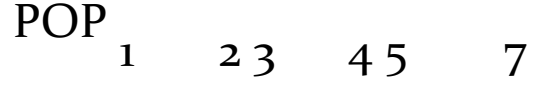
Step3: If false update the pointer r as r= r+1

Step4: Insert the element at pointer r as Q[r] =

element Step5: Stop

Remove_front

- remove_front() is a operation used to pop an element on front of the *Deque*.



FRONT REAR

2 3 4 5 7

Alogrithm Remove_front

Step1: Start

Step2: Check the queue is empty or not as if (f == r) if yes queue is empty.

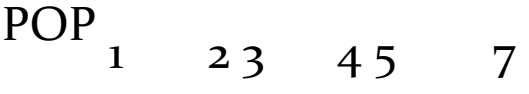
Step3: If false update pointer f as f = f+1 and delete element at position f as element = Q[f]

Step4: If (f== r) reset pointer f and r as f = r = -1

Step5: Stop

Remove_back

- remove_front() is a operation used to pop an element on front of the *Deque*.



FRONT REAR

1 2 3 4 5

Alogrithm Remove_back

step1. Start

step2. Check the queue is empty or not as if (f == r) if yes queue is

empty

step3. If false delete element at position r as element = Q[r] step4. Update pointer r as r = r-1

step5. If (f == r) reset pointer f and r as f = r= -1

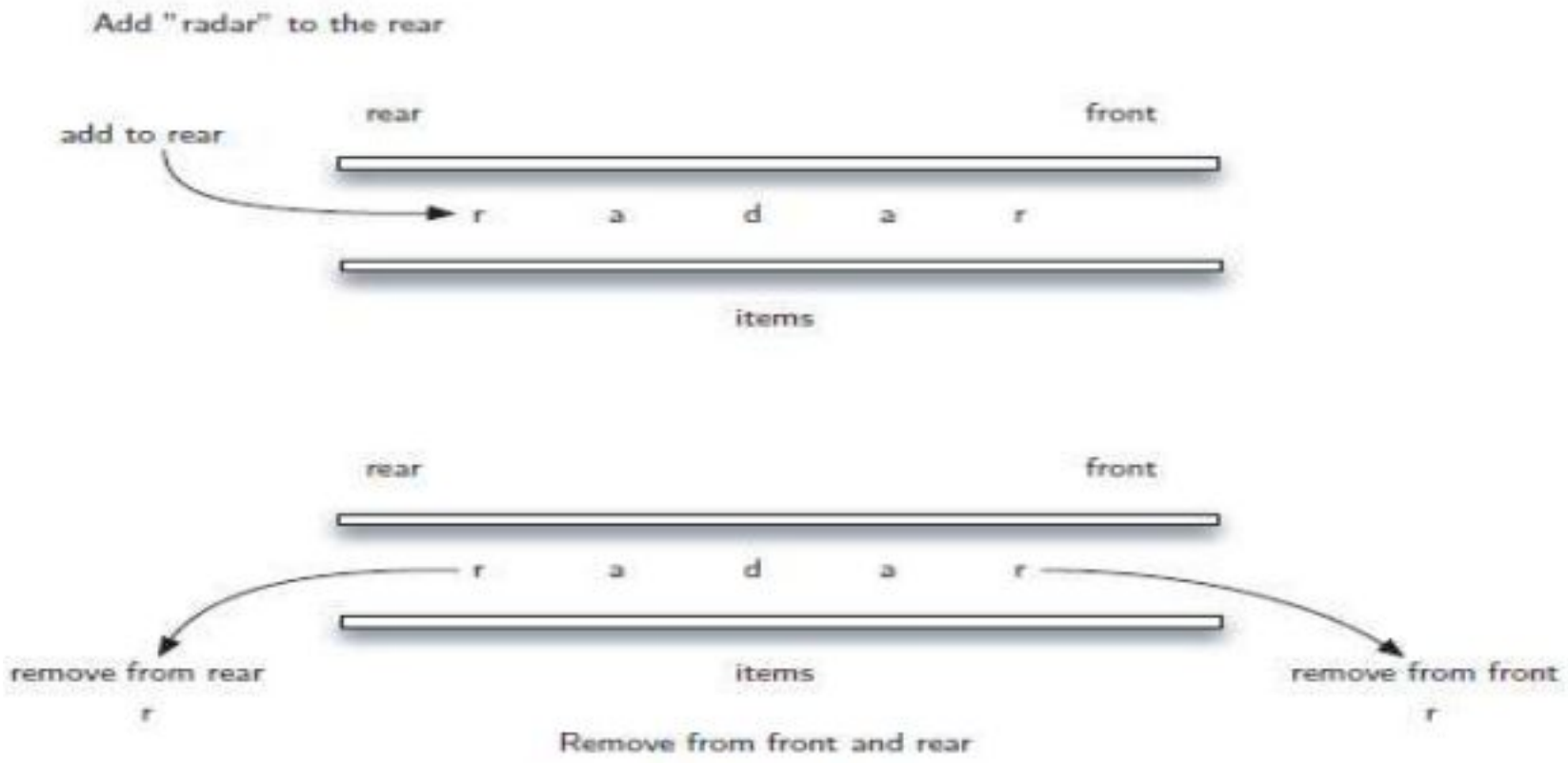
step6. Stop

Empty

- It is used to test weather the Deque is empty or not.

APPLICATIONS OF DEQUE

Palindrome-checker


Add "radar" to the rear
add to rear
rear
front
r a d a r
items
rear
front
r a d a r
remove from rear
r
items
remove from front
r
Remove from front and rear

Thank You