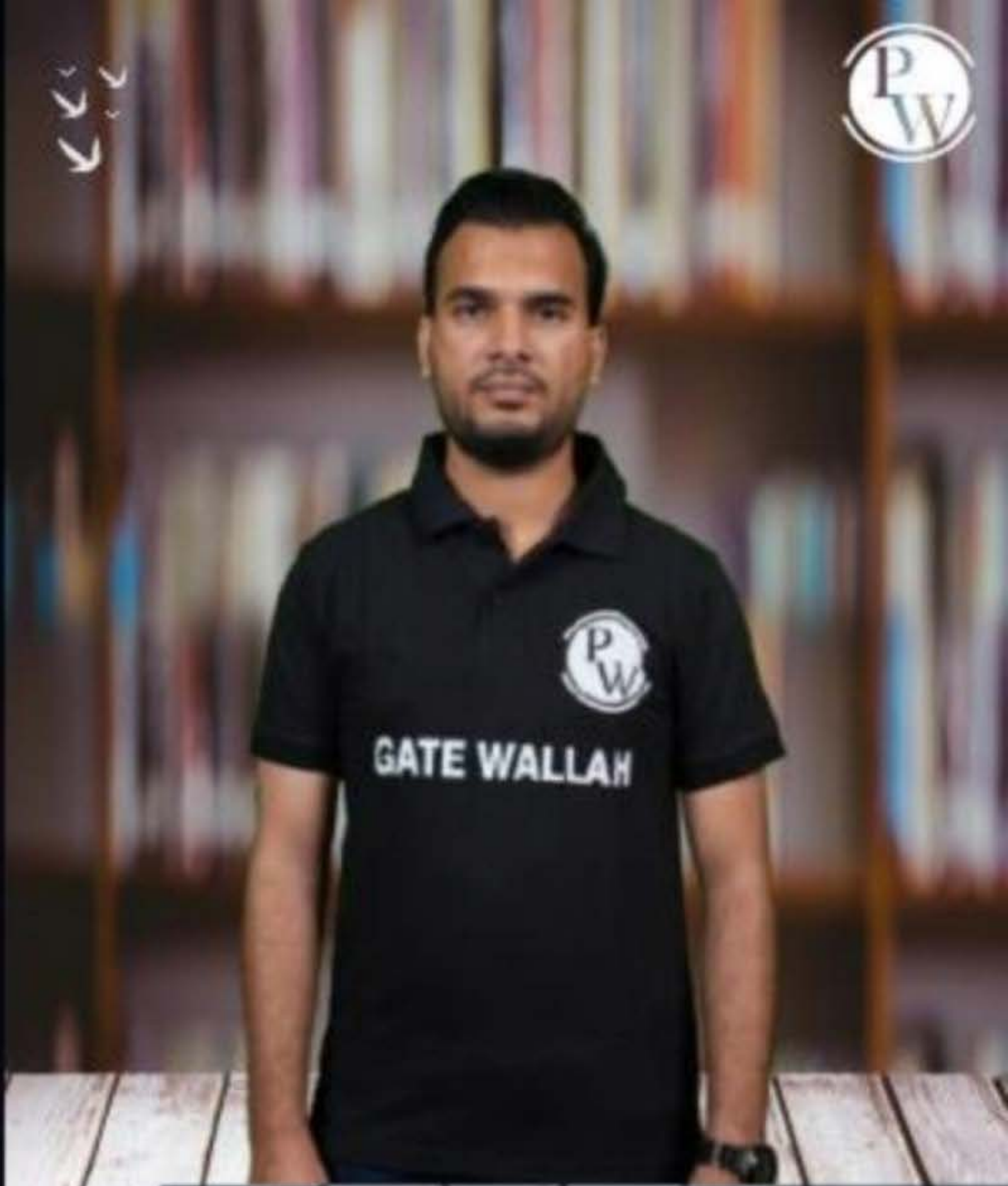
COMPUTER SCIENCE AND DA

Data Structures through Python

Queues and Hash Tables

Lecture No. 3



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RECAP

→ Implementation of Simple Queue using brute force approach

→ Drawback of Simple Queue

⇓

→ Solution to this Drawback is Circular Queue

Topics To be covered

1) Circular Queue

2) How circular queue solve the drawback of simple Queue

3) Problem solving

Circular Queue

$\underbrace{rear = rear + 1}$

if((rear + 1) % maxsize == f)

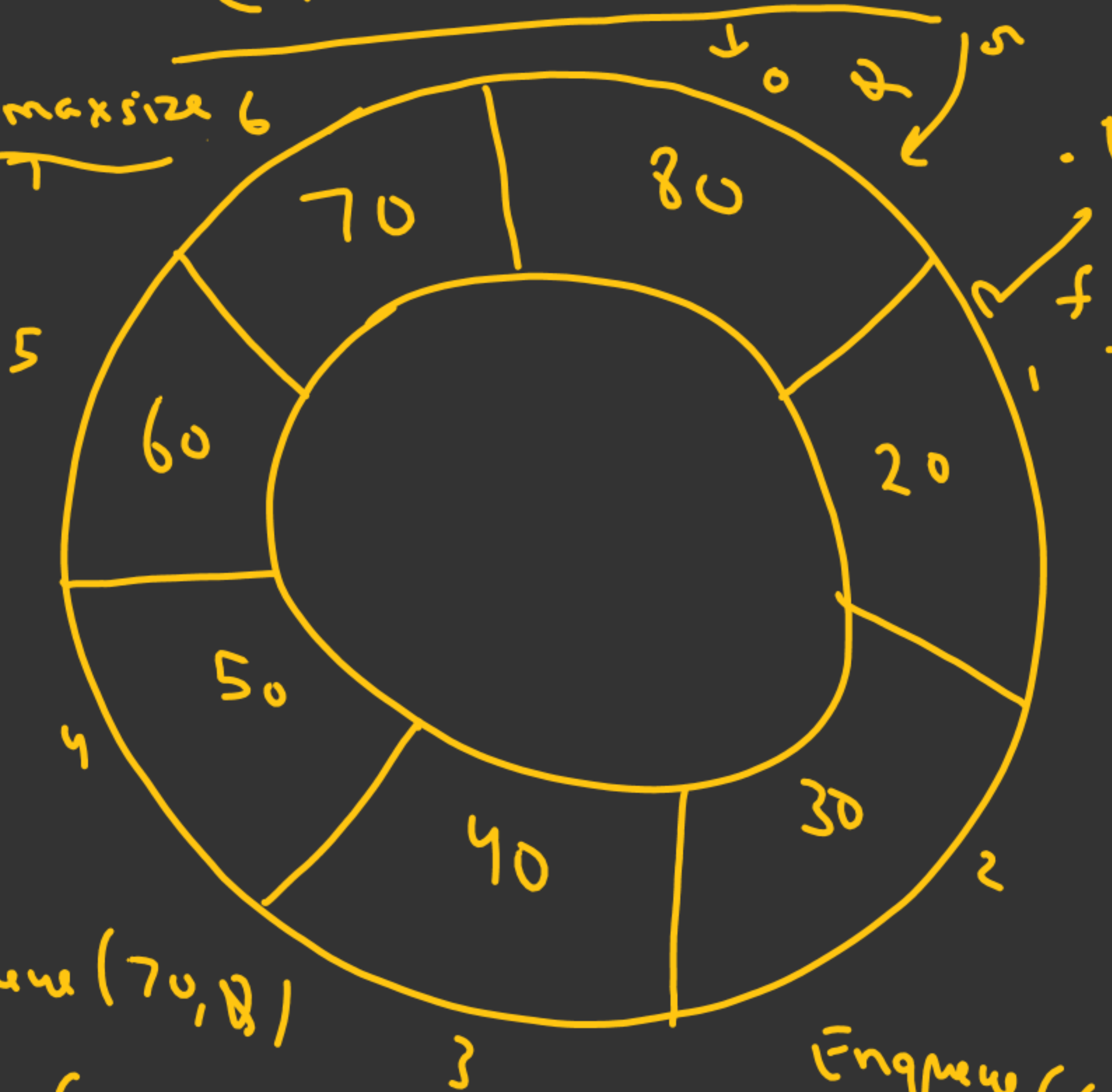
r = None

f = None

$\underbrace{rear = (rear+1) \% maxsize}$

(6+1) % 7

= 0 , f = 1



- Enqueue(10, Q)

r = 0, f = 0

- Enqueue(20, Q)

r = 1, f = 0

Enqueue(30, Q)

r = 2, f = 0

- Enqueue(40, Q)

r = 3, f = 0

- Enqueue(50, Q)

r = 4, f = 0

Enqueue(60, Q)

r = 5, f = 0

Enqueue(70, Q)

r = 6 , f = 0

Enqueue(80, Q)

Dequeue(Q)

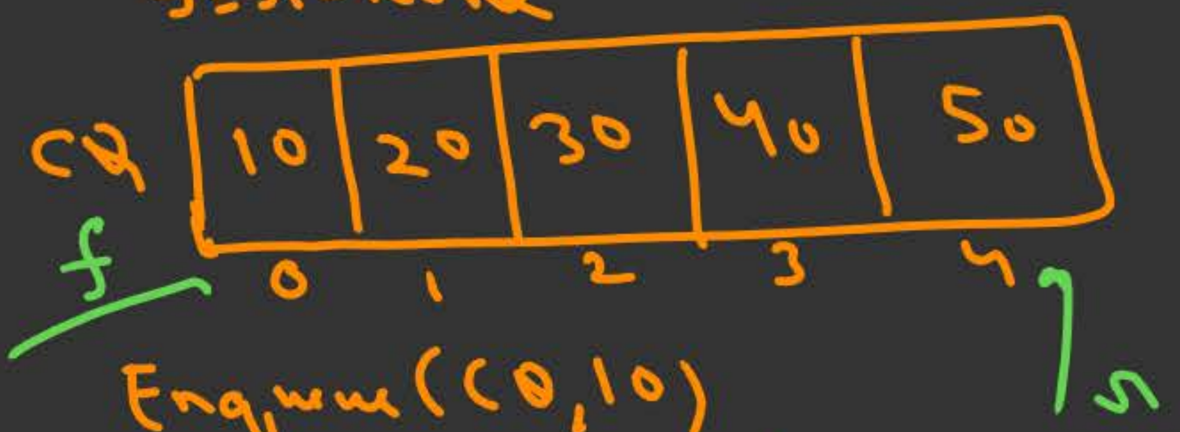
r = 6, f = 1

Implementation of Circular Queue

r, f, maxsize

maxsize = 5

f = r = None



```
def Enqueue(CQ, value):
overflow {  if (r+1) % maxsize == f :
                print("Queue is full")
                return

Queue
is      {   if r is None and f is None:
empty           r = 0
                f = 0
            else
                r = (r+1) % maxsize
            CQ[r] = value
```

Enqueue(CQ,10)
↳ r = 0, f = 0

Enqueue(CQ,20)
r = 1 % 5 = 1
CQ[1] = 20

Enqueue(CQ,30)
r = 2 % 5 = 2
CQ[2] = 30

Enqueue(CQ,40)
r = 3 % 5 = 3
CQ[3] = 40

Enqueue(CQ,50)
r = 4 % 5 = 4
CQ[4] = 50

Enqueue(CQ,60)
(4+1) % 5
5 % 5 = 0
r = 0
Queue is full

```
def Deque(CQ):
    if f==None:
        print("Queue is empty")
        return
    del_val=CQ[f]
    if r==f:
        r=None
        f=None
    else
        f=(f+1)%maxsize
    return del_val
```

Queue empty

only one value in Queue

maxsize=5

CQ	0	1	2	3	4

f=0
r=4

Dequeue(CQ)
↳ del.val=CQ[0]=10
f=1%5=1

Dequeue(CQ)
↳ del-val=CQ[1]=20
f=2%5=2

Dequeue(CQ)
↳ del-val=CQ[2]=30
f=3%5=3

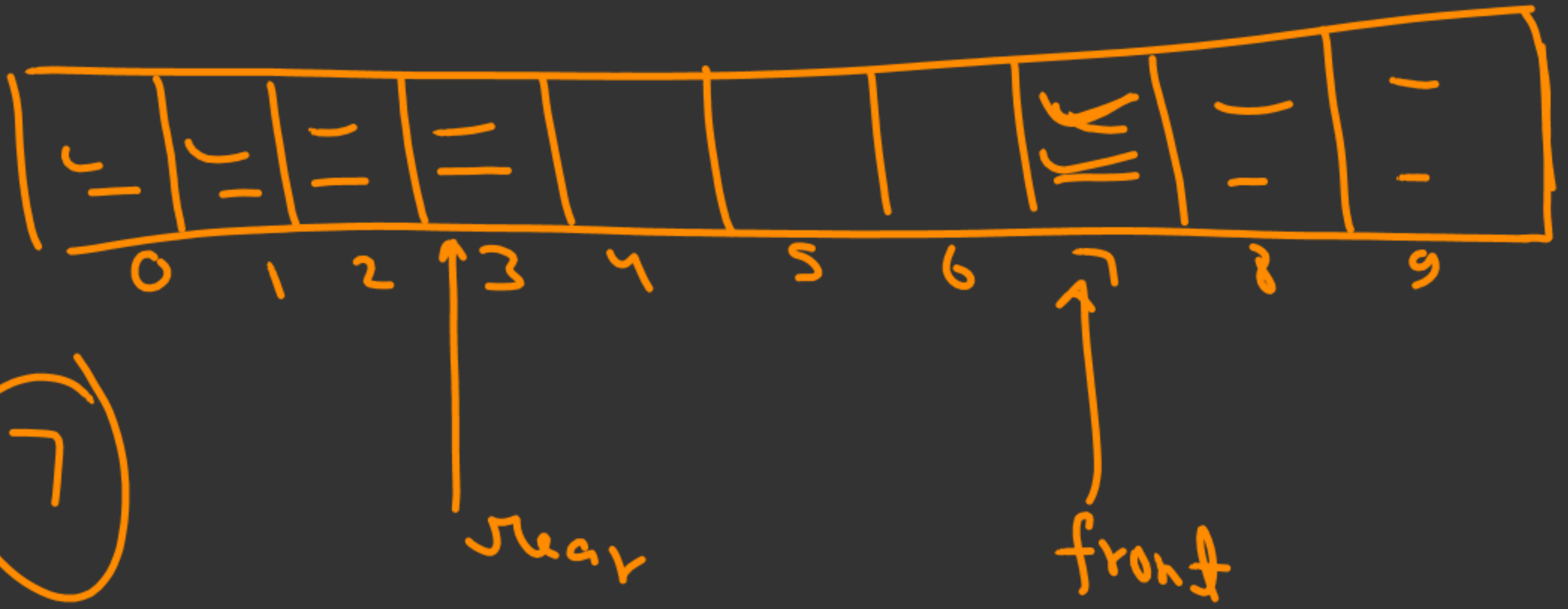
Dequeue(CQ)
↳ del.val=CQ[3]=40
f=4%5=4

Dequeue(CQ)
↳ del.val=CQ[4]=50
r=None
f=None

Dequeue(CQ)
↳ Queue is empty.

Q) You are given a circular queue with n = 10, front = 7, rear = 3.

What is the count of no. of elements in Queue.



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THANK - YOU