

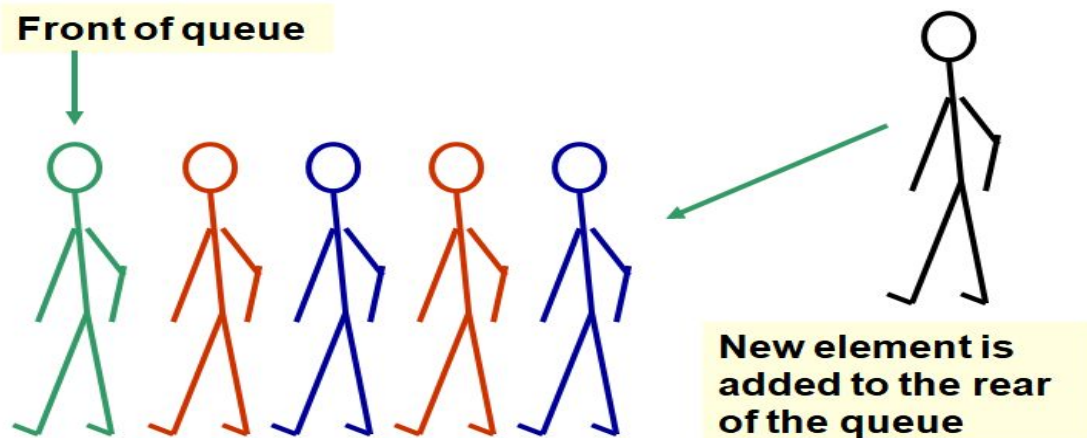
Queue

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Queue

Dictionary meaning of queue is a "Waiting line"

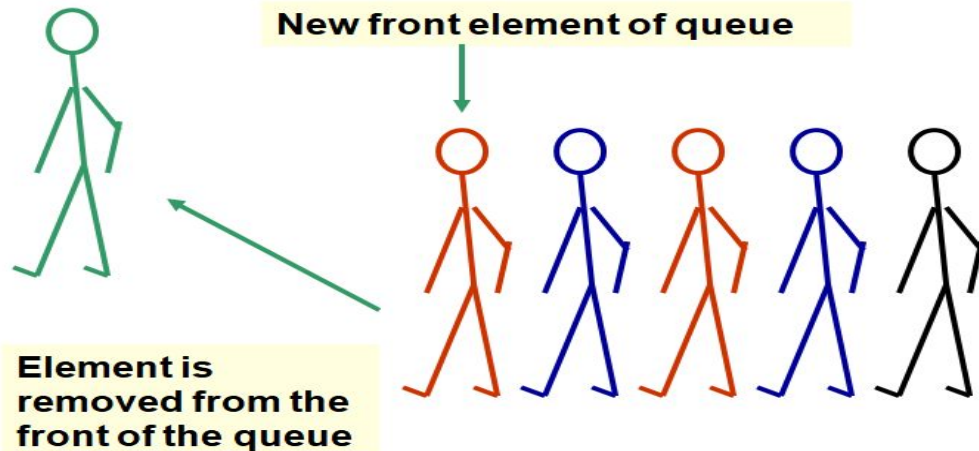
- e.g.
- Waiting line for purchasing the movie tickets.
 - Waiting line at library.
 - Waiting line at bus stop
 - Waiting line at ATM



Queue

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What is Queue?

Definition.:

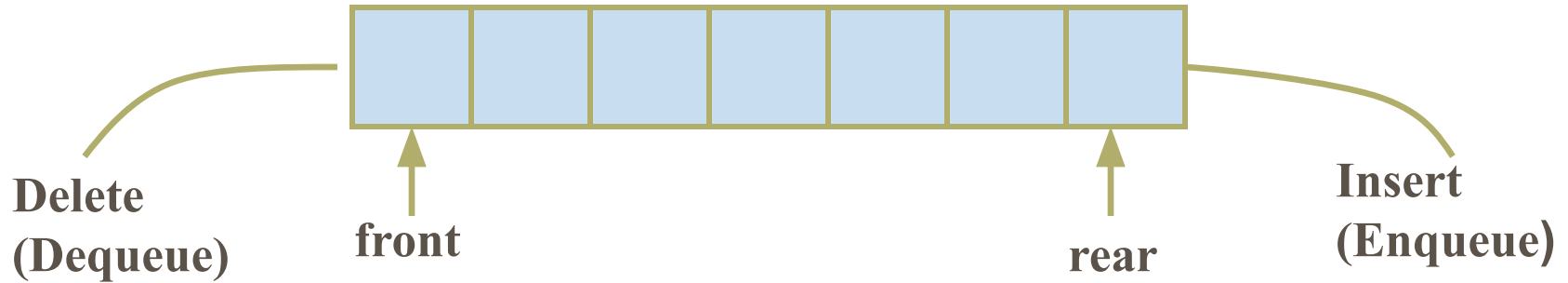
Queue is a list in which the elements can be inserted from one end, called Rear, and the elements can be deleted from another end, called Front.

- It is also called as First In, First Out (FIFO)
- When we wish to model the queue, We need three elements.
 - Two Indices (One point to front and another point to rear of the Queue.)
 - An Array to hold the elements.
- We can add element, delete element to and from the queue.
- When we want to add the new element, one must again verify whether the queue is full, while deleting an element, we must ensure that queue is not empty.

Basic Operations on Queue

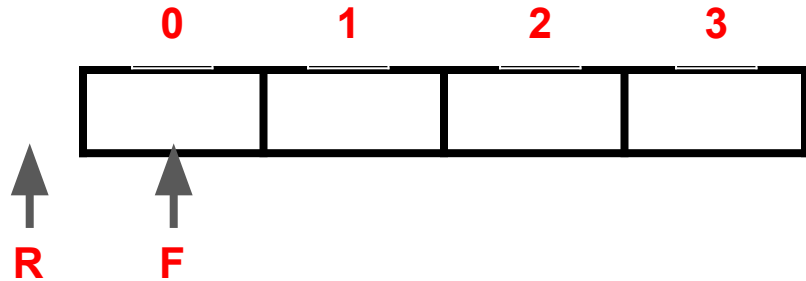
Followings are the basics operations of Queue

- Insert / Enqueue
- Delete / Dequeue
- Full
- Empty



Basic Operations on Queue

- A queue can be implemented with an array, as shown here.
- For example, Consider following Queue with **Maxsize = 4**.
- Operations
 - Enqueue 4
 - Enqueue 8
 - Enqueue 6
 - Dequeue
 - Dequeue
 - Enqueue 10
 - Enqueue 12
 - Dequeue
 - Dequeue
 - Dequeue



$$F = 0$$
$$R = -1$$

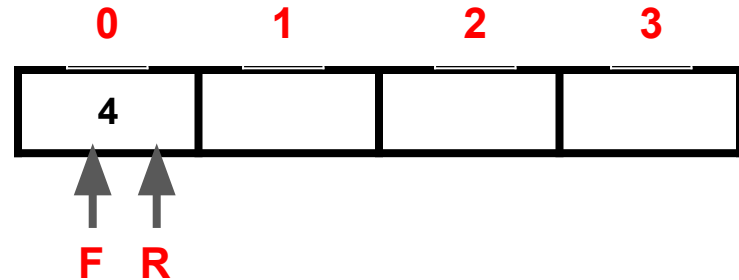
Initial Condition

$$F = R + 1$$
$$R = R + 1$$

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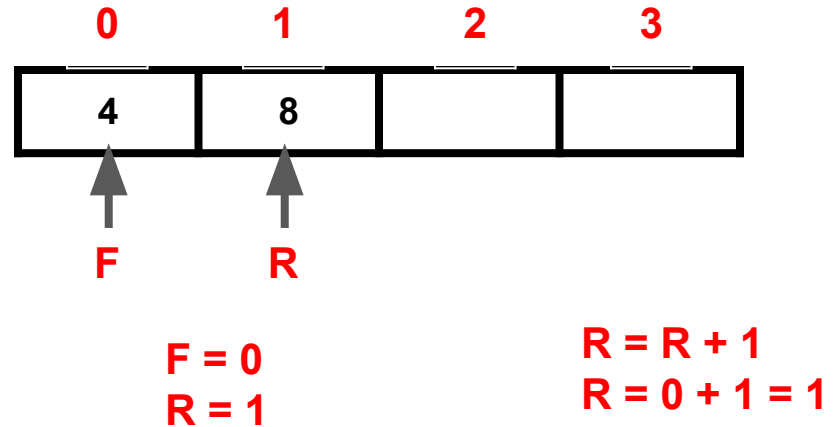


$$F = 0$$
$$R = 0$$

$$R = R + 1$$
$$R = -1 + 1 = 0$$

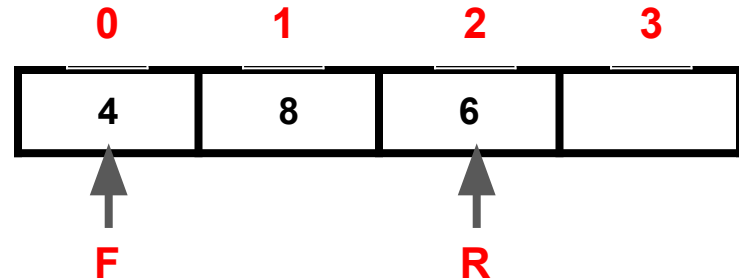
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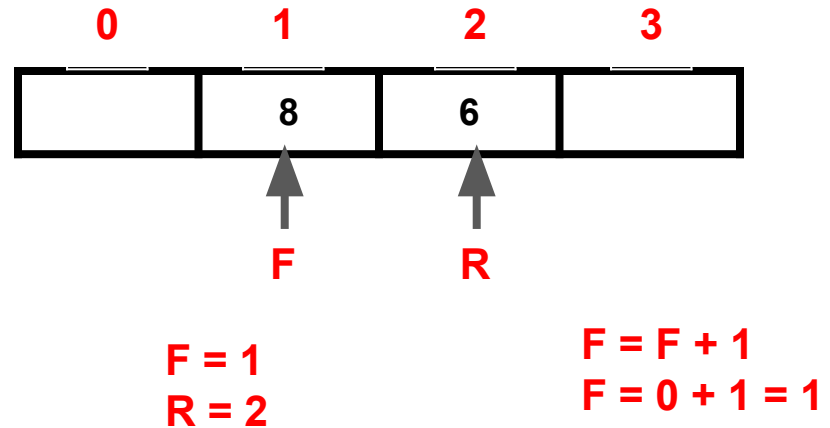


$$F = 0$$
$$R = 2$$

$$R = R + 1$$
$$R = 1 + 1 = 2$$

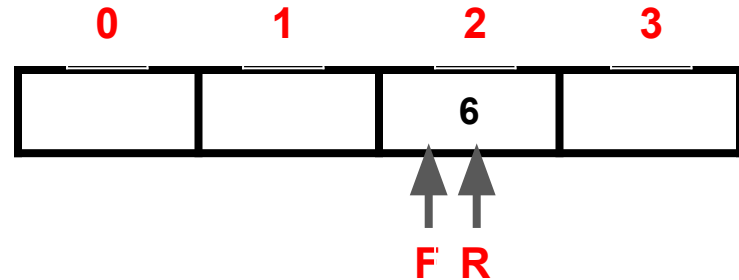
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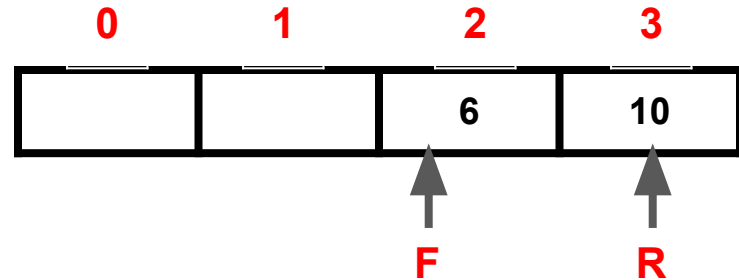


$$F = 2$$
$$R = 2$$

$$F = F + 1$$
$$F = 1 + 1 = 2$$

Basic Operations on Queue

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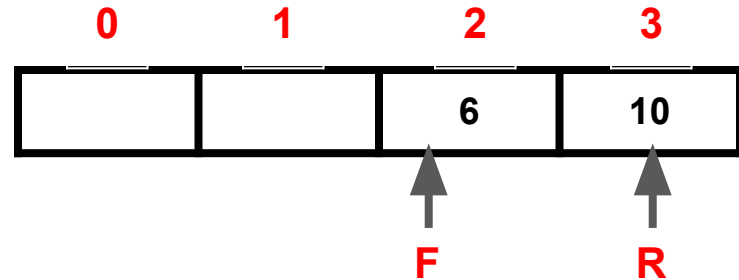


$$F = 2$$
$$R = 3$$

$$R = R + 1$$
$$R = 2 + 1 = 3$$

Basic Operations on Queue

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 - Dequeue
 - Dequeue
 - Enqueue 10
 - **Enqueue 12**
 - Dequeue
 - Dequeue
 - Dequeue



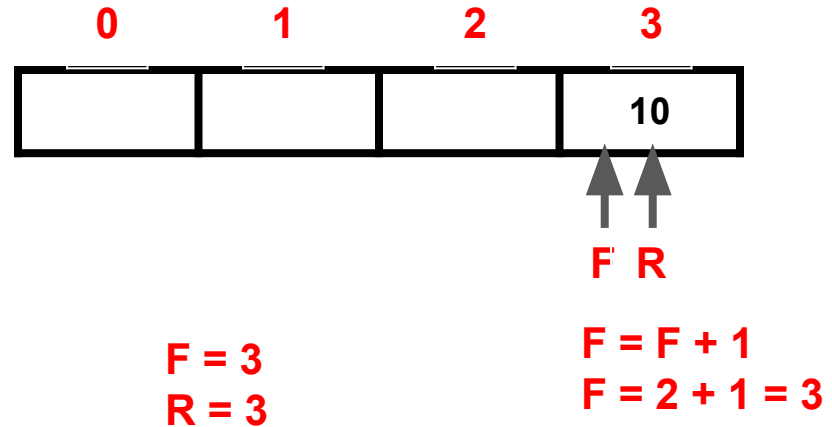
$$F = 2$$
$$R = 4$$

$$R = R + 1$$
$$R = 3 + 1 = 4$$

QUEUE FULL

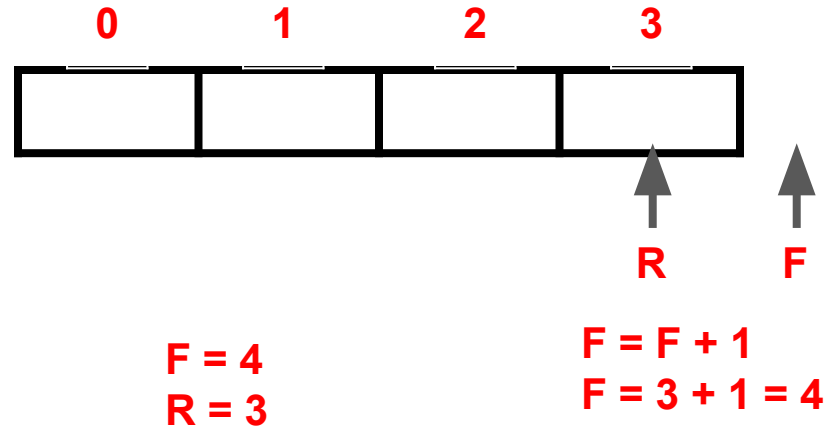
Basic Operations on Queue

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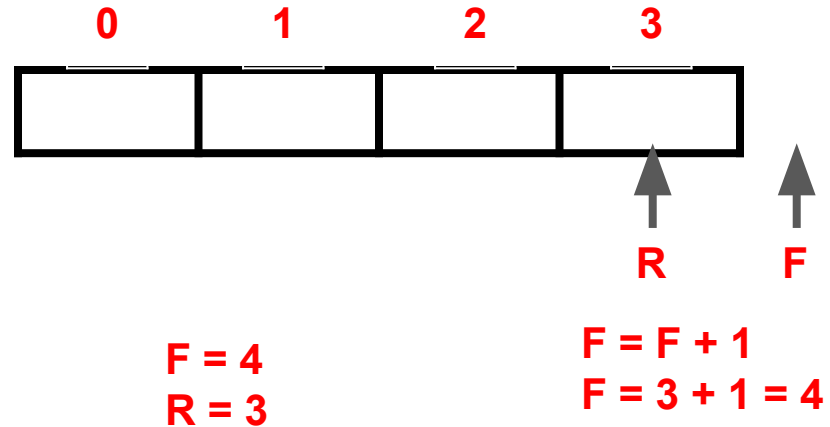
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 - Dequeue
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 - Dequeue
 - **Dequeue**

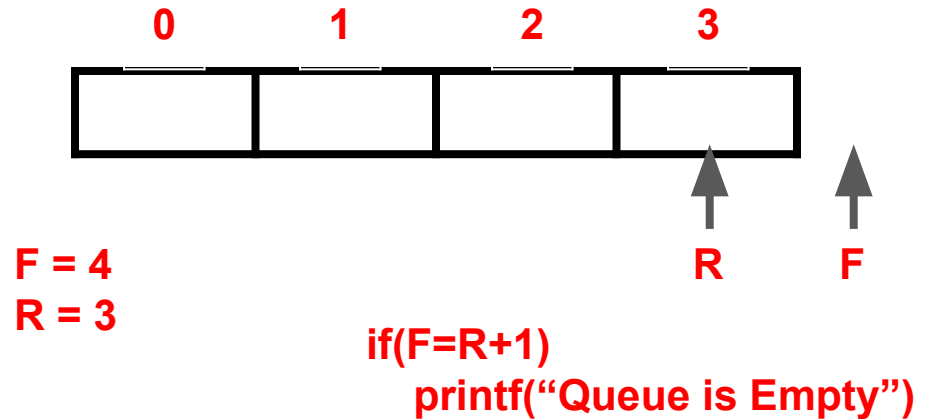


QUEUE EMPTY

Basic Operations on Queue

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- Enqueue 6
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- Dequeue
- Enqueue 10
- Enqueue 12
- Dequeue
- Dequeue
- **Dequeue**



QUEUE EMPTY

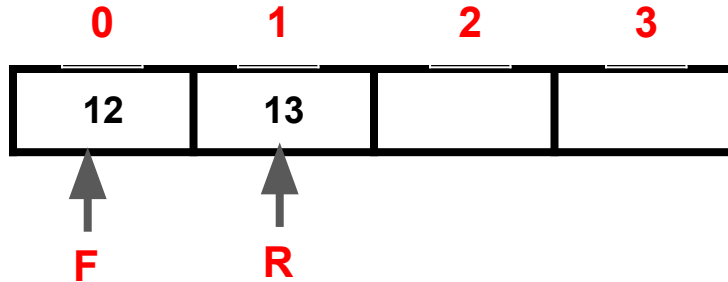
Types of Queue

- Linear Queue
- Circular Queue
- Double Ended Queue
- Priority Queue

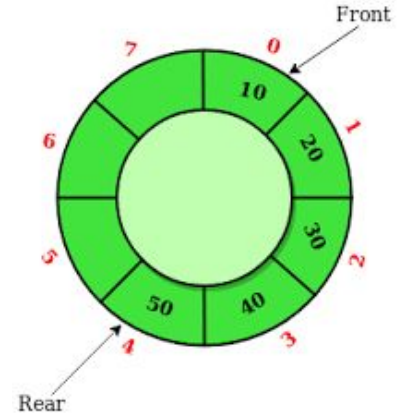
Types of Queue

- Linear Queue
- Circular Queue

$$F=(F+1)\%maxsize$$
$$F=(3+1)\%4$$
$$F=0$$



$$R=(R+1)\%maxsize$$
$$R=(0+1)\%4$$
$$R=1\%4$$
$$R=1$$



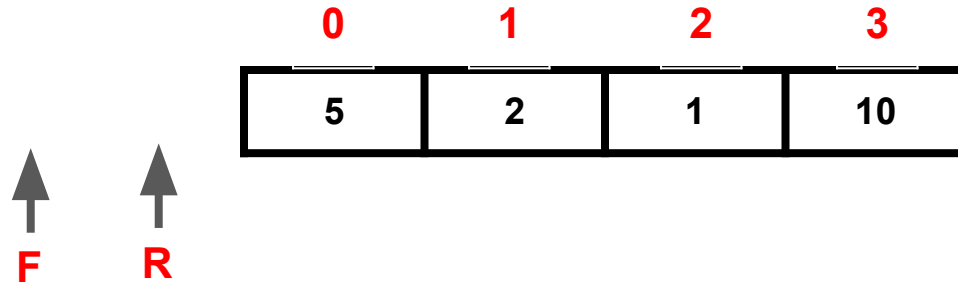
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Applications of Queue

Real World Applications

- Cashier Line in any Store
- Waiting on hold on Technical support
- Peoples on an escalator
- Waiting line at Bus Stop

Applications of Queue

Applications Related to Computer Science

- When data is transferred asynchronously between two processes e.g. IO Buffer
- In sharing resource Management
- Jobs in printing
- Job scheduling
- Simulation