SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF INFORMATION TECHNOLOGY

23ITT101-PROGRAMMING IN C AND DATA STRUCTURES

I YEAR - II SEM

UNIT 4 – STACK AND QUEUE

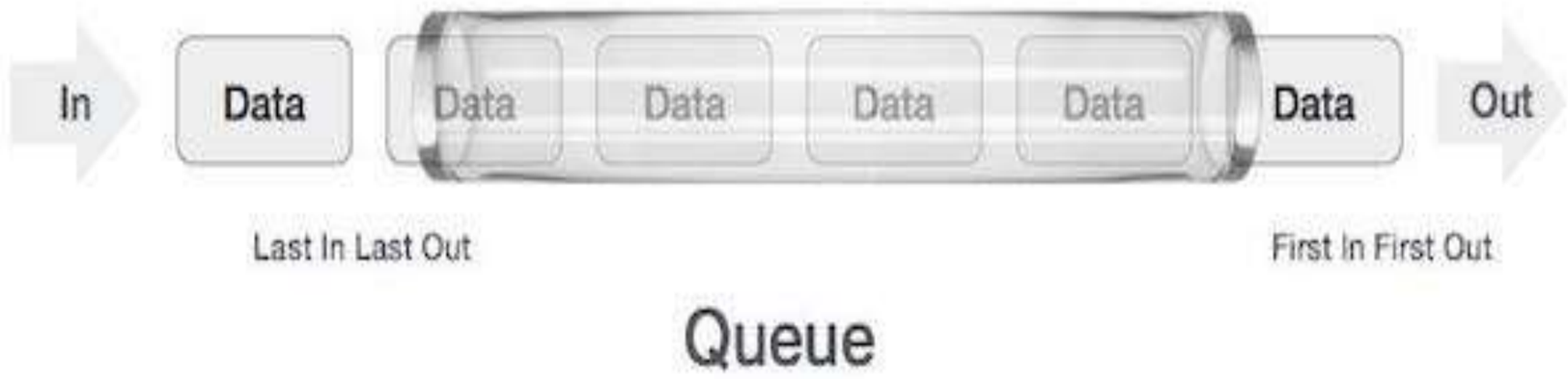
TOPIC 2 – Queue ADT

INTRODUCTION

- Queue is an abstract data structure, somewhat similar to Stacks. Unlike stacks, a queue is open at both its ends.
- One end is always used to insert data (enqueue) and the other is used to remove data (dequeue). Queue follows First-In-First-Out methodology, i.e., the data item stored first will be accessed first.
- A real-world example of queue can be a single-lane one-way road, where the vehicle enters first, exits first. More real-world examples can be seen as queues at the ticket windows and bus-stops.

Queue Representation

- This feature makes it FIFO data structure. FIFO stands for First-in-first-out.
- The following diagram given below tries to explain queue representation as data structure.



Operation of Queue

- **enqueue() −** add (store) an item to the queue.
- **dequeue()** − remove (access) an item from the queue.
- **peek()** − Gets the element at the front of the queue without removing it.
- **isFull()** − check if Queue is full.
- **isEmpty()** − check if Queue is empty.

peek()

- **peek()** − Gets the element at the front of the queue without removing it.

```
int peek() {
    return queue[front];
}
```

isfull()

- **isFull()** − check if Queue is full.

```
bool isfull() {
   if(rear == MAXSIZE - 1)
      return true;
   else
      return false;
}
```

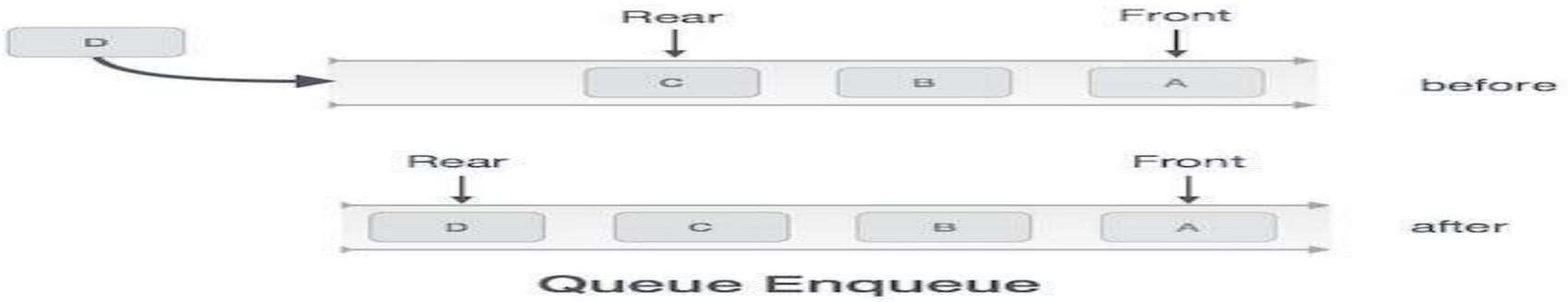
isEmpty( )

- **isEmpty()** − check if Queue is empty

```
bool isempty() {
   if(front < 0 || front > rear)
      return true;
   else
      return false;
}
```

enqueue()

- **enqueue() −** add (store) an item to the queue.
- Queues maintain two data pointers, **front** and **rear**. Therefore, its operations are comparatively difficult to implement than that of stacks.
  - **Step 1** − Check if the queue is full.
  - **Step 2** − If the queue is full, produce overflow error and exit.
  - **Step 3** − If the queue is not full, increment rear pointer to point the next empty space.
  - **Step 4** − Add data element to the queue location, where the rear is pointing.
  - **Step 5** − Returns success.



Queue Enqueue

enqueue()

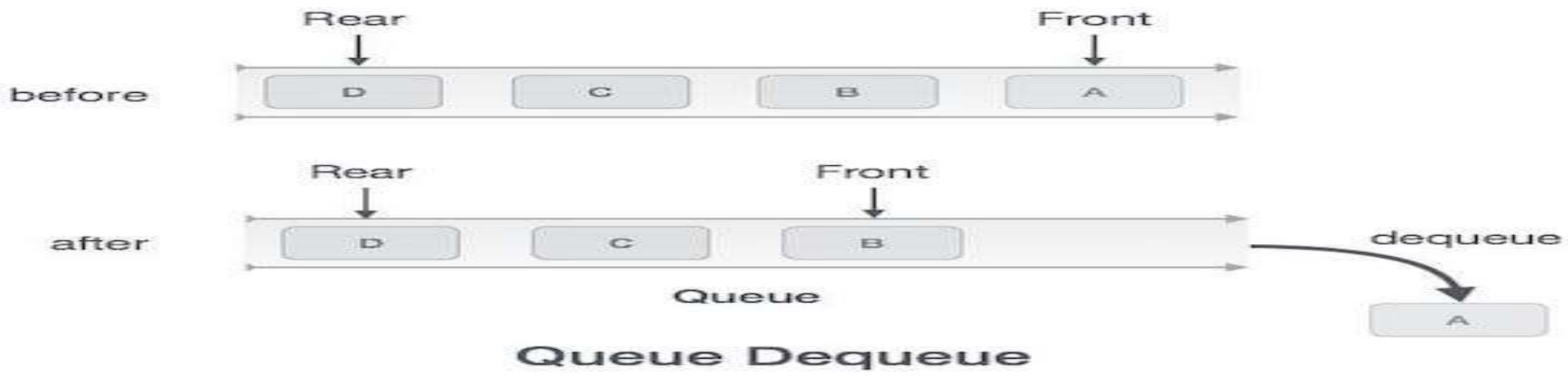
```
int enqueue(int data)
    if(isfull())
        return 0;

    rear = rear + 1;
    queue[rear] = data;

    return 1;
end procedure
```

dequeue()

- **dequeue()** − remove (access) an item from the queue.
  - **Step 1** − Check if the queue is empty.
  - **Step 2** − If the queue is empty, produce underflow error and exit.
  - **Step 3** − If the queue is not empty, access the data where front is pointing.
  - **Step 4** − Increment front pointer to point to the next available data element.
  - **Step 5** − Return success.



Queue Dequeue

dequeue()

```
int dequeue() {
   if(isempty())
      return 0;

   int data = queue[front];
   front = front + 1;

   return data;
}
```

https://www.tutorialspoint.com/data_structures_algorithms/expression_parsing.htm