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Queue

Data Structure

Queue

- ❑ A queue can be defined as an ordered list of elements in which insert operations to be performed at one end called **REAR** and delete operations to be performed at another end called **FRONT**.
- ❑ Queue is referred to be as **FIFO (First-In-First-Out)** list.
- ❑ For example, **people waiting in line for a rail ticket form a queue.**



Queue Operations

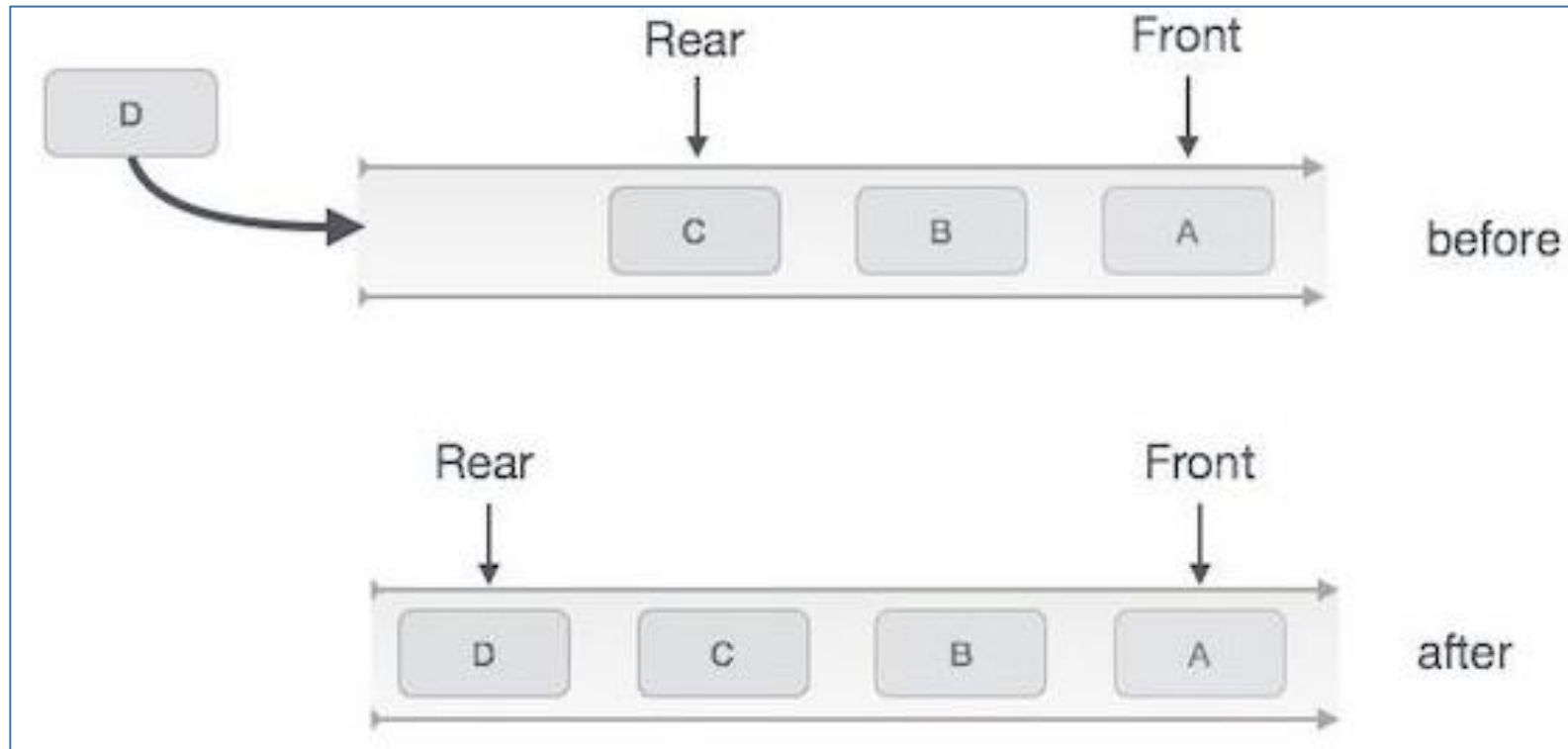
- ❑ **Enqueue()** – Insert (add) an item to the queue.
- ❑ **Dequeue()** – Delete (remove) an item from the queue.

Enqueue Operation

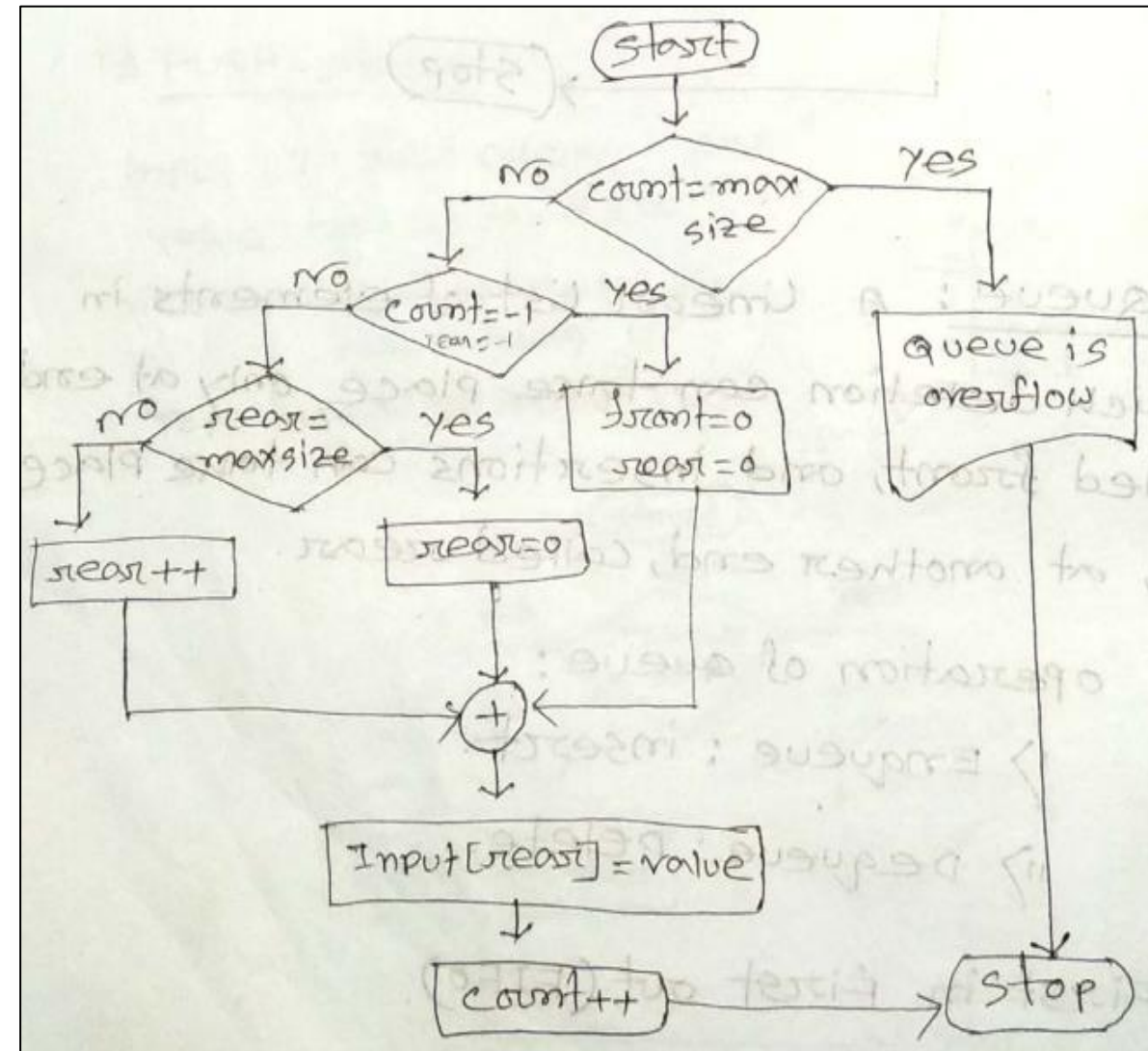
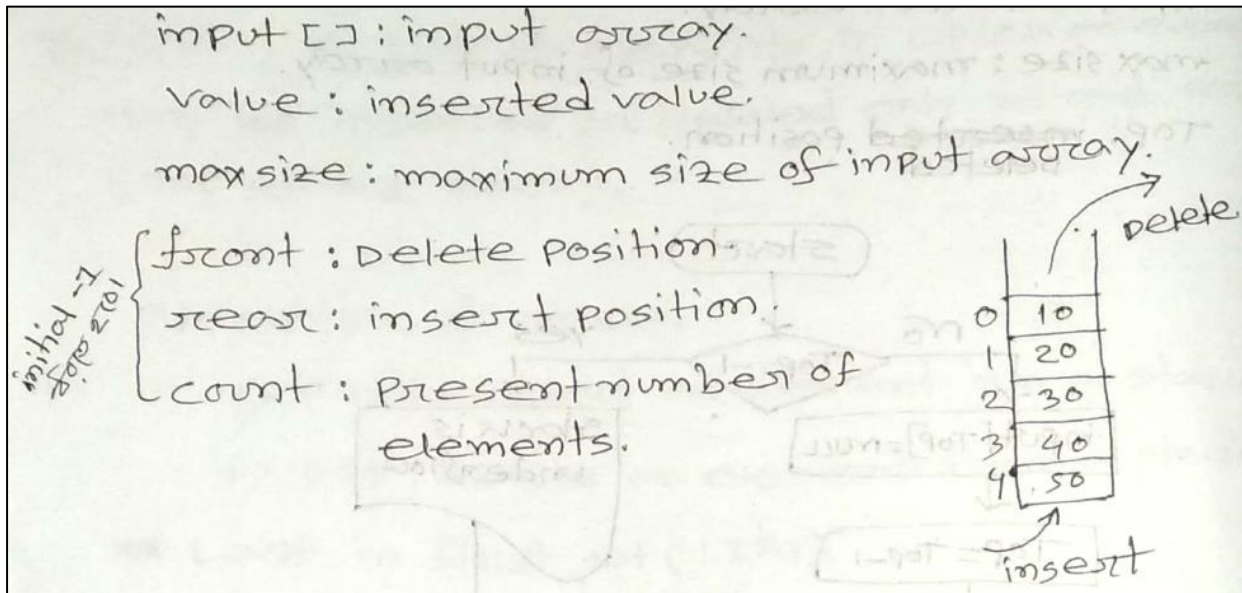
The following steps should be taken to enqueue (insert) data into a queue -

- **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** – return success.

Enqueue Operation: Cont...



Flowchart of Enqueue Operation

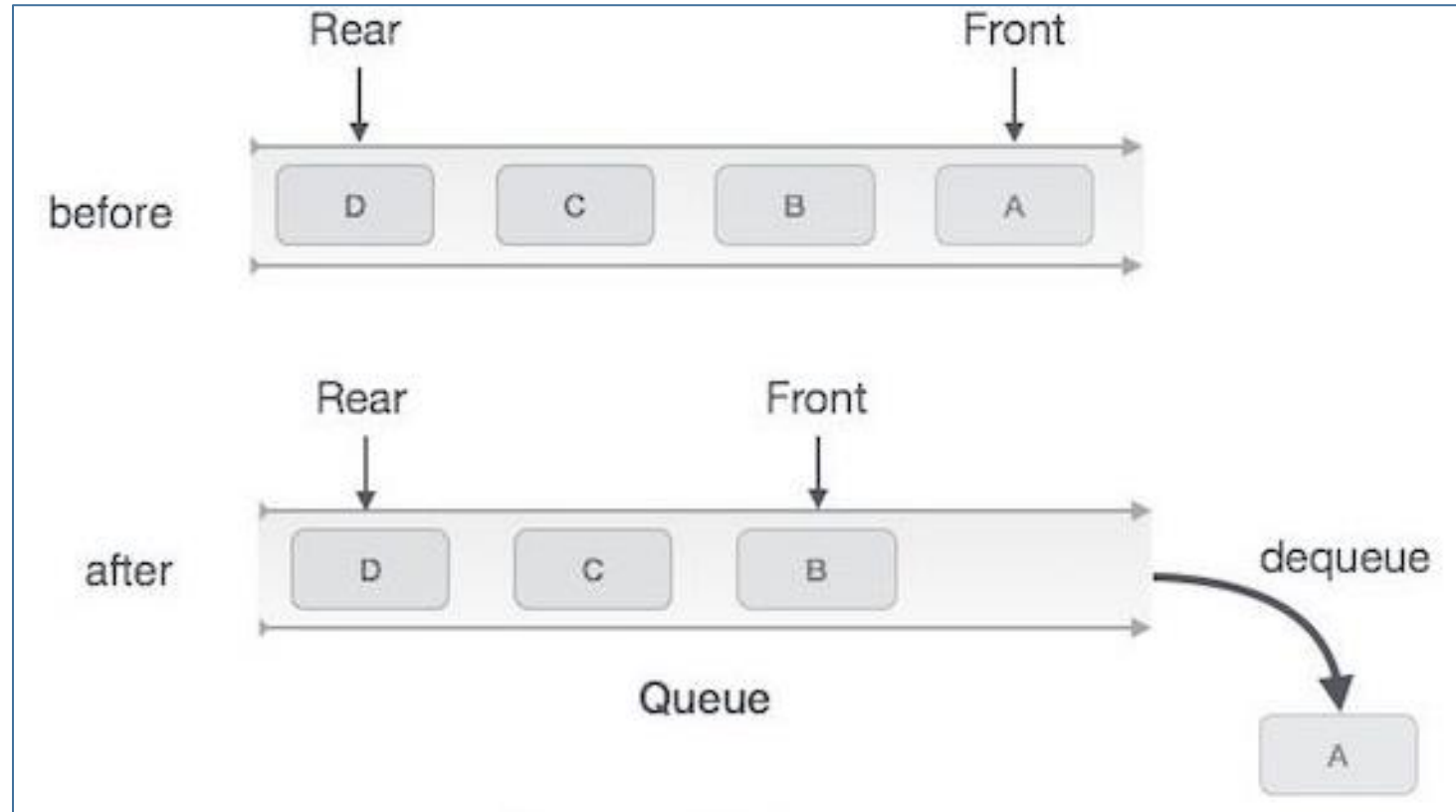


Dequeue Operation

The following steps are taken to perform dequeue operation –

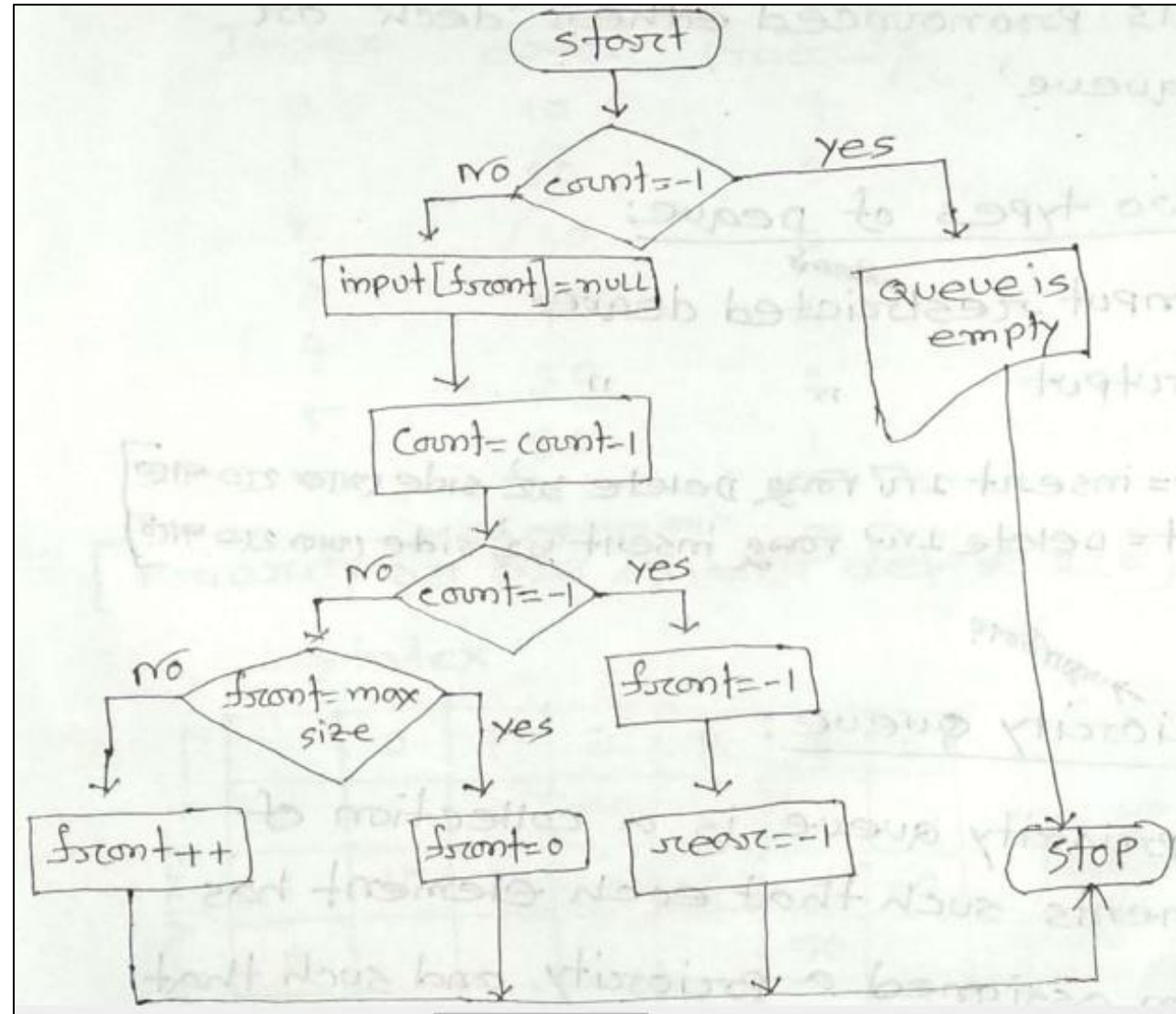
- **Step 1** – Check if the queue is empty.
- **Step 2** – If the queue is empty, produce underflow error and exit.
- **Step 3** – If the queue is not empty, access the data where **front** is pointing.
- **Step 4** – Increment front pointer to point to the next available data element.
- **Step 5** –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

Dequeue Operation: Cont...



Flowchart of Dequeue Operation

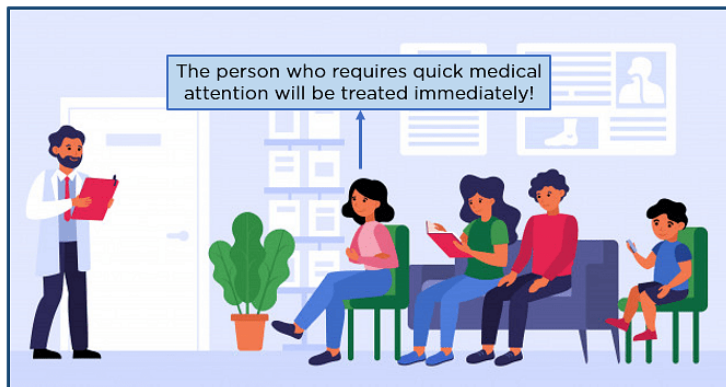
input []: input array
count: number of element
front: delete index.
rear: input index.
max size: maximum size of input array



Application of Queue

- ❑ Maintaining the playlist in media players.
- ❑ Buy a movie ticket.
- ❑ Vehicles on toll-tax bridge
- ❑ A single-lane one-way road.
- ❑ Waiting lists for a single shared resource like printer, disk, CPU.
- ❑ Call Center phone systems use Queues to hold people calling them in order, until a service representative is free.

Hospital Emergency Queue



Advantage and Disadvantage of Queue

□ Advantages

- Able to manage large amounts of data, as well as being quick and flexible.
- Able to handle a variety of data kinds and being both flexible and speedy.

□ Disadvantages

- The need to delete other elements in order to add a new element to the queue.
- There is no easy way to search the queue.
- It's also difficult to add or remove pieces from the midst of the queue.