# DATA STRUCTURE AND ALGORITHMS

By

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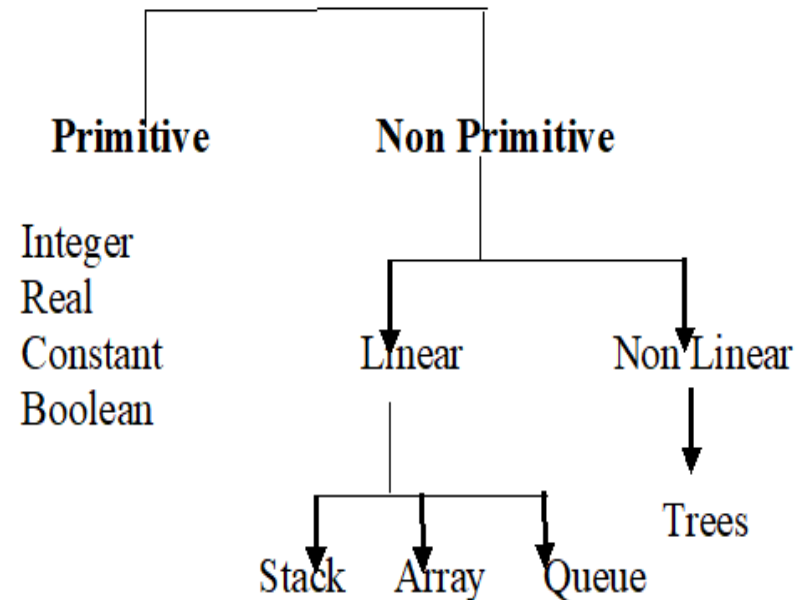Perambalur-621 107

**Data Structure**

Logical or mathematical model of a particular organization of a data is called data structure. In other word group of element handle us a unit is called a data structure.

Ex: Array, Stack, Queue

**Algorithm**

Algorithm is a set of explicit and finite steps which carried out for a given set of initial condition, produce the corresponding output and terminal at finite time.

**DATA STRUCTURE**

```
                    DATA STRUCTURE

              Primitive         Non Primitive

              Integer
              Real
              Constant          Linear      Non Linear
              Boolean

                         Stack  Array  Queue        Trees
```

Array

A Set of value of list of value that can be store a single name (or) Common Name

Syntax:

Data type-Array name[integer exp]

Ex:

Int a[10]

Int b[3][3]

## List

The term list refer to a linear collection of data item

Example : A list of student name in the class

## Pseudo code

Structural  conversion of Programming language human reading, rather than machine reading understanding of algorithm such as variable declaration it is a natural language.

## Stack

A stack is an order list in which items may be added or deleted only at one end called top of the stack. Then stack are also called last in first out(LIFO) list because last items to be added to the stack. In the first item removed from it stack may be functionally representation as bellow.

The two basic operation associate stack are push and pop

**Push**

The term used for inserting element in to the stack

**Pop**

The term used pop deleting element from the stack

The stack permit delete an element from an insert on element into the stack.
The stack permit delete an element from an insert on element into the stack

New items may be put on the top of the stack in which case  the top of the  stack move upwards to corresponds to the new highest elements or terms.

Which are at the top of the stack may be removed in which case the top of the stack move from down words to corresponds new highest element.

Hence insertion and deletion are perform one end of the stack. The insertion operation refer to as PUSH & deletion operation is refer to Pop

**Operation to stack:**

The tools change that can be made stack are special name PUSH & POP.
The given stack is items(i) , performing operation push s(i) at the item I to be top of the s(i), similarly the operation pop(s) remove the element and return at to the function value

## Algorithm(stack):

Procedure **insertion**(item,stack,n,top)

        If top > n then call STACK-FULL

   Top       =       top+1

    Stack(top)  =      item

End Insertion.


Procedure **Deletion** (item,stack,n,top)

If top > 0 then call STACK-EMPTY

Item        =    stack(top)

top         top-1;

End Deletion.

**Queue**

  A queue is logically first in first out queue is linear list of element . in which deletion can take place only at one end is called **front.** Insertion can take place only the other end is called **Rear** end. Queue are also call(FIFO) the first element of the queue is called **empty queue**

**Queue implementation.**
(1) **Static implementation(using array variable)**
(2) **Dynamic implementation(using Pointer variable)**

**Static implementation**

  The queue is implemented using array the must know the exact number of element. We want to store in the queue because we have declare the size of the array at design time(or) before processing start in cause begin array the became the front for queue and last location of array will art as rear for the queue.

**Dynamic implementation**

  In main advantage the dynamic representation memory is utilize efficiently the dynamic representation is a below.

Another advantage of dynamic implementation is that its possible to insert element  in the middle of the list addition of new none n between a queue recur addition of creating a new none inserting into the recurs passion by adjusting to pointer. Deletion also the adjustment  pointer

**Insertion operation**
Initialize front = 0 and rear=1
If rear>= Maxisi=E
Write queue overflow and returen
Else
Set rear=rear+1
Queue[rear]=item
If front=1
Return

**Deletion operation**

If front $< 0$

Wirte queue is empty and return

Else item=queue[front]

Find new value of front
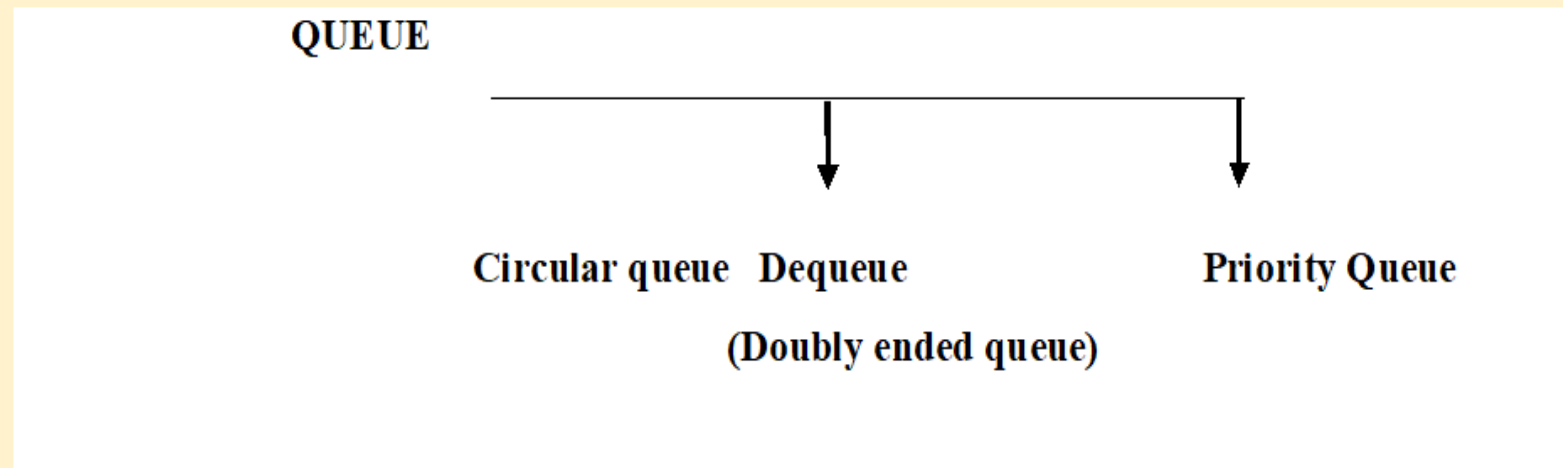
If(front=rear)

Set front=0, rear=1

Else

Front=front+1

**QUEUE**

Circular queue   Dequeue                    Priority Queue

(Doubly ended queue)

## (1) Circular queue

A circular queue is one of insertion of new element is done at the very first location of the queue. In other words have queue insert an element last location of the array the next element we will insertion of the very first location at the array it's possible to insert new element if given only location
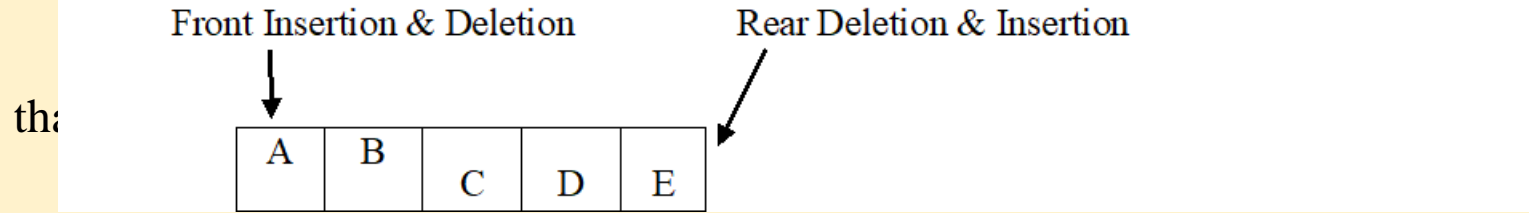


## (2) De queue(double ended queue)

Both side of insertion and deletion operation

It's a homogeneous list of element in which insertion and deletion operation are performed on both side. That is element are inserted from rear end(or) front end it commonly refer us the queue.

# Priority Queue

Front Insertion & Deletion     Rear Deletion & Insertion

| A | B | | | |
|---|---|---|---|---|
| | | C | D | E |

... s been assign a priority and such tha... ...tion based on some property(priority of task to be process) is referred as priority queue

Ex: No.of Print line

## Time complexity

Compile time+run time

## Space complexity

Reduce memory space.

## List

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Ex: A list of student name in the class