U19CS012

TUTORIAL - 10

STACK AND QUEUE USING LINKED LIST

(A) Write an Algorithm for each of the following:

1) Implementation of stack using Linked List

> In Linked List implementation of stack, every new element is inserted at 'top' element. That means every new inserted element is pointed by 'top'.
> Whenever we want to remove an element from stack, simply remove the node which is pointed by 'top' by moving 'top' to previous node in the list.

(I) push(value) - Inserting an element to stack

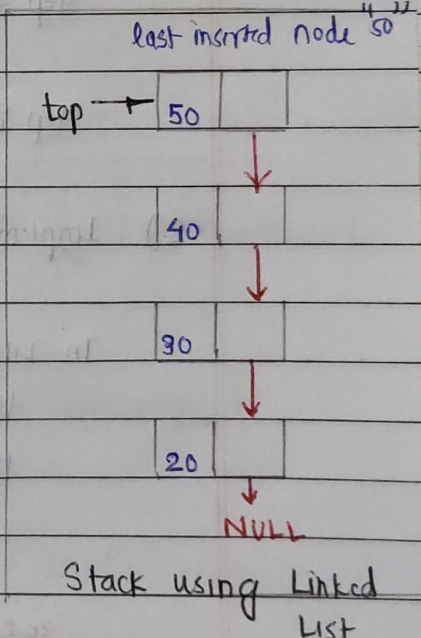
Step 1> Create a newNode with given value

Step 2> Check whether stack is Empty (top == NULL)

Step 3> If it is Empty, then set newNode → next = NULL

Step 4> If it is Not Empty, then set newNode → next = top

Step 5> Finally, set top = newNode



Stack using Linked List

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(II) pop() - Deleting an Element from a stack

Step 1> Check whether stack is Empty
(top == NULL)

Step 2> If it is Empty,
then display "Stack is empty! Deletion not Possible!"
and terminate the function

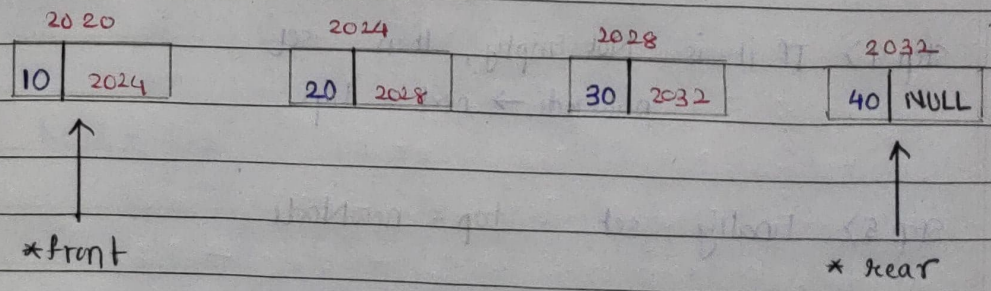
Step 3> If it is Not Empty,
then define a Node pointer 'temp'
and set it to 'top'

Step 4> Then set top = top → next

Step 5> Finally, delete 'temp' (free(temp))

2) Implementation of Queue using Linked List

In Linked list implementation of Queue,
the last inserted node is always pointed by 'rear'
the first node is always pointed by 'front'



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(I) enQueue (value) - Inserting an element into the Queue

Step 1> Create a newNode with given value and
set newNode → next = NULL

Step 2> Check whether queue is Empty (rear == NULL)

Step 3> If it is Empty,
then set front = newNode
and rear = newNode

Step 4> If it is Not Empty,
then set rear → next = newNode
and rear = newNode

(II) deQueue() - Deleting an Element from Queue

Step 1> check whether queue is Empty (front == NULL)

Step 2> If it is Empty
then display "Queue is Empty! Deletion Not Possible!"
and terminate from the function

Step 3> If it is Not Empty
then, define a Node pointer 'temp'
set it to 'front'

Step 4> Then set 'front = front → next'
and delete 'temp' (free(temp))