PES UNIVERSITY ONLINE

DATA STRUCTURES AND ITS APPLICATIONS

Vandana M L

Department of Computer Science and Engineering

DATA STRUCTURES AND ITS APPLICATIONS

Circular Singly Linked List

Vandana M L

Department of Computer Science and Engineering

Circular Linked List

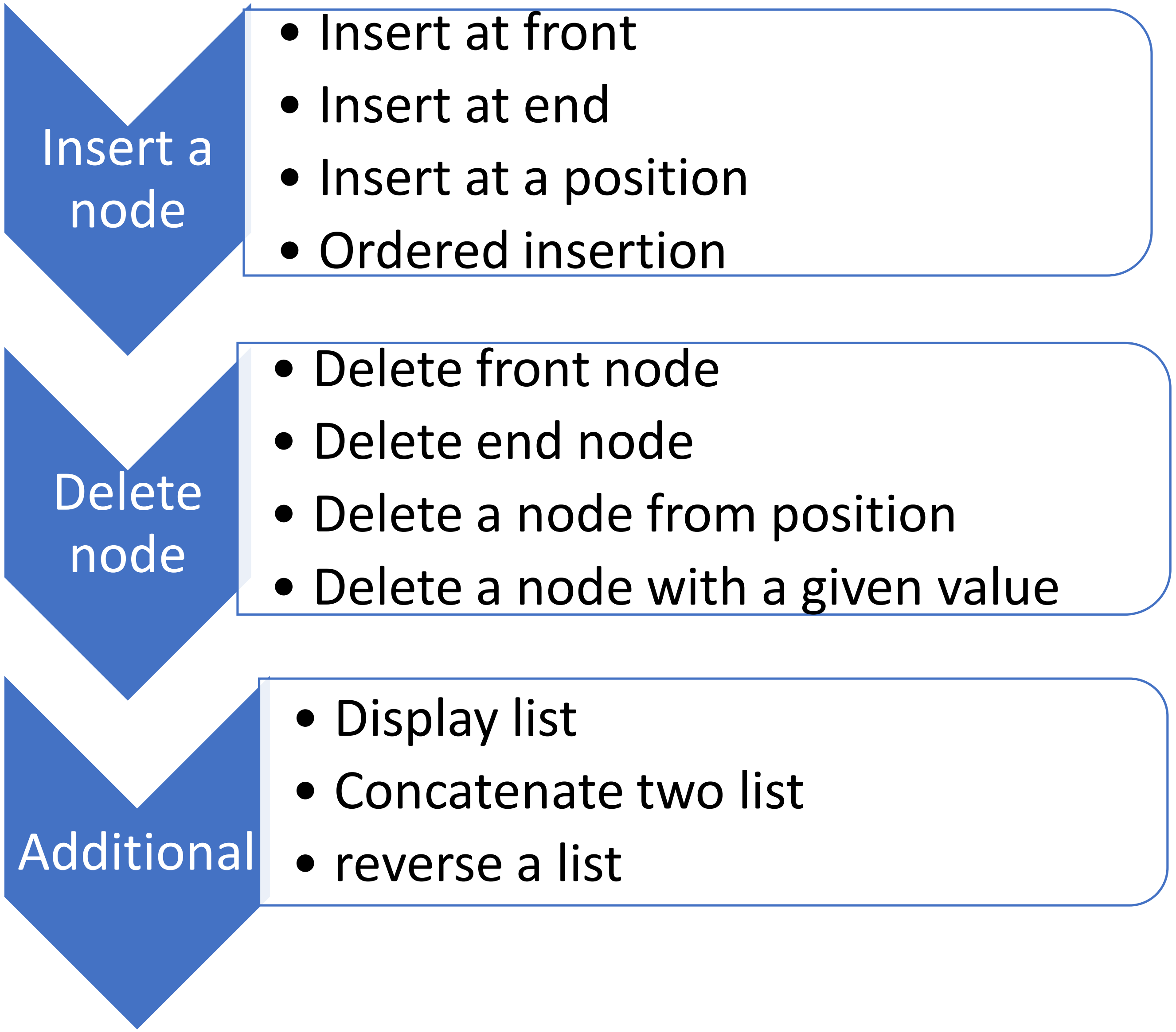
Circular linked list is a linked list where all nodes are connected to form a circle.

- Circular Singly Linked List

- Circular Doubly Linked List

With additional head node
Without additional head node

Circular Linked List Operations



Insert a node

- Insert at front
- Insert at end
- Insert at a position
- Ordered insertion

Delete node

- Delete front node
- Delete end node
- Delete a node from position
- Delete a node with a given value

Additional

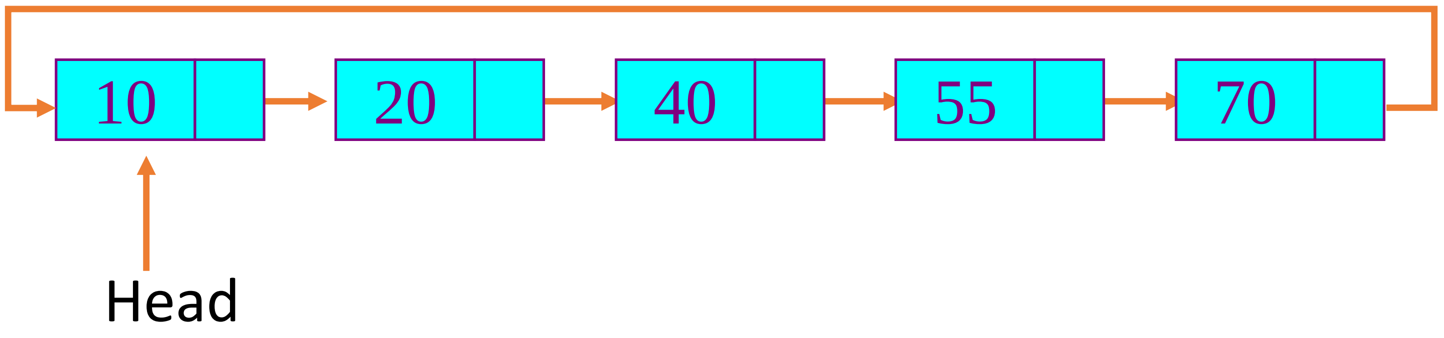
- Display list
- Concatenate two list
- reverse a list

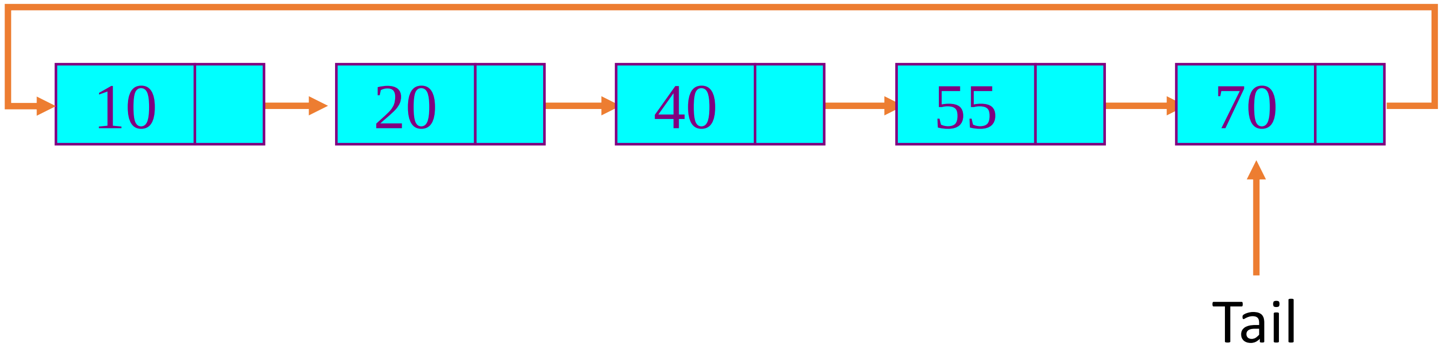
Circular Linked List: Applications

- Useful for implementation of queue, eliminates the need to maintain two pointers as in case of queue implementation using arrays
- Circular linked lists are useful for applications to repeatedly go around the list like playing video and sound files in “looping” mode
- Advanced data structures like Fibonacci Heap Implementation
- Plays a key role in linked implementation of graphs

Circular Singly Linked List

- It supports traversing from the end of the list to the beginning by making the last node point back to the head of the list
- A Tail pointer is often used instead of a Head pointer





Circular Singly Linked List Node Definition

```
#include <iostream>
using namespace std;

struct Node{
  int data;
  struct Node* next;
};
typedef struct node csll_node;
```

Insertion at the beginning

Insert at the front of linked list

- Create a node

If the list is empty

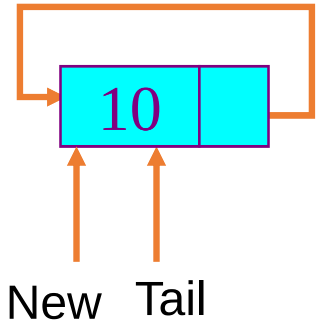
- make the tail pointer point towards the new node

Else

- Change the new node link field to point to the first node
- Change the last node link to point to the new node

Circular Singly Linked List Operations

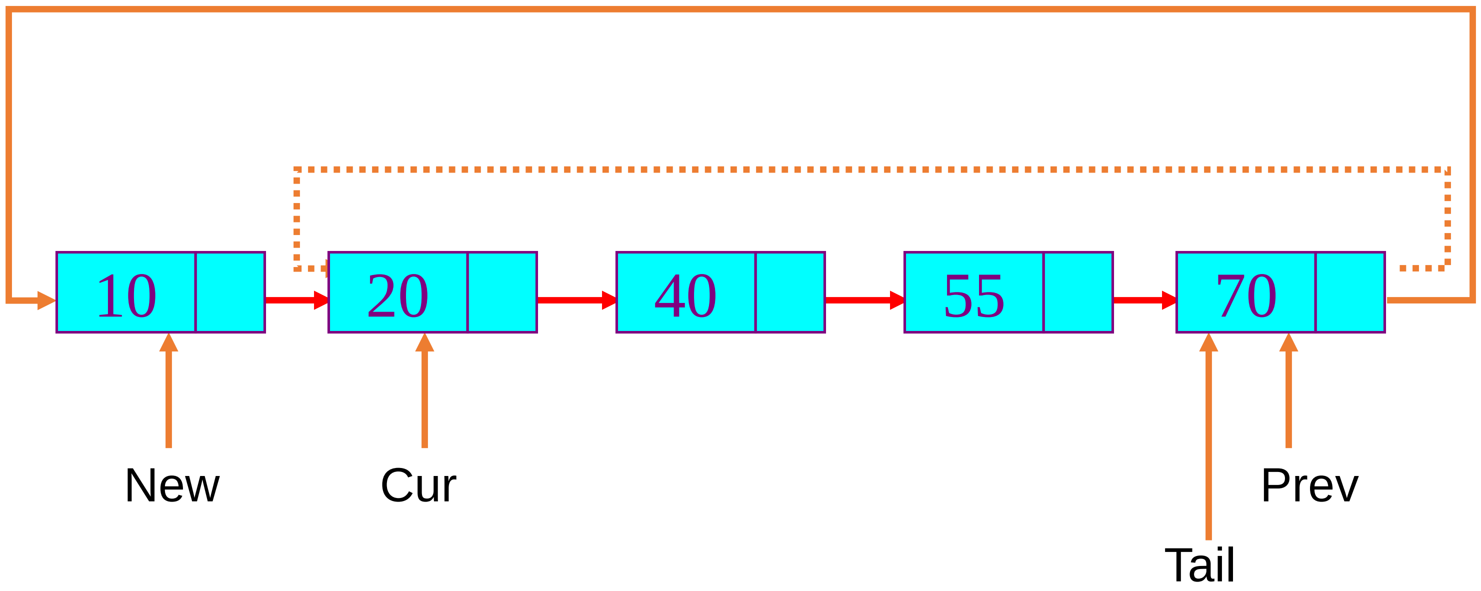
Insertion into an empty list



Insert to head of a Circular Linked List

New->next = Cur; ⇨ New->next = Tail->next;

Prev->next = New; ⇨ Tail->next = New;

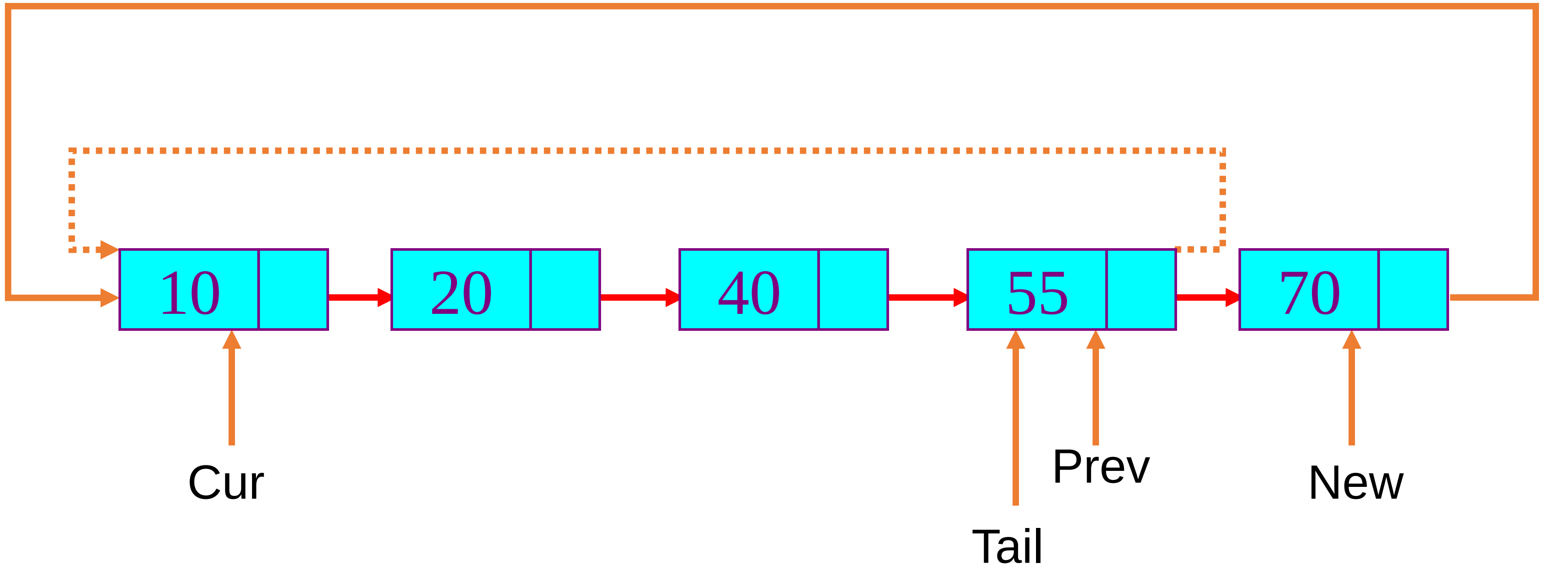


Insert to the end of a Circular Linked List

New->next = Cur; → New->next = Tail->next;

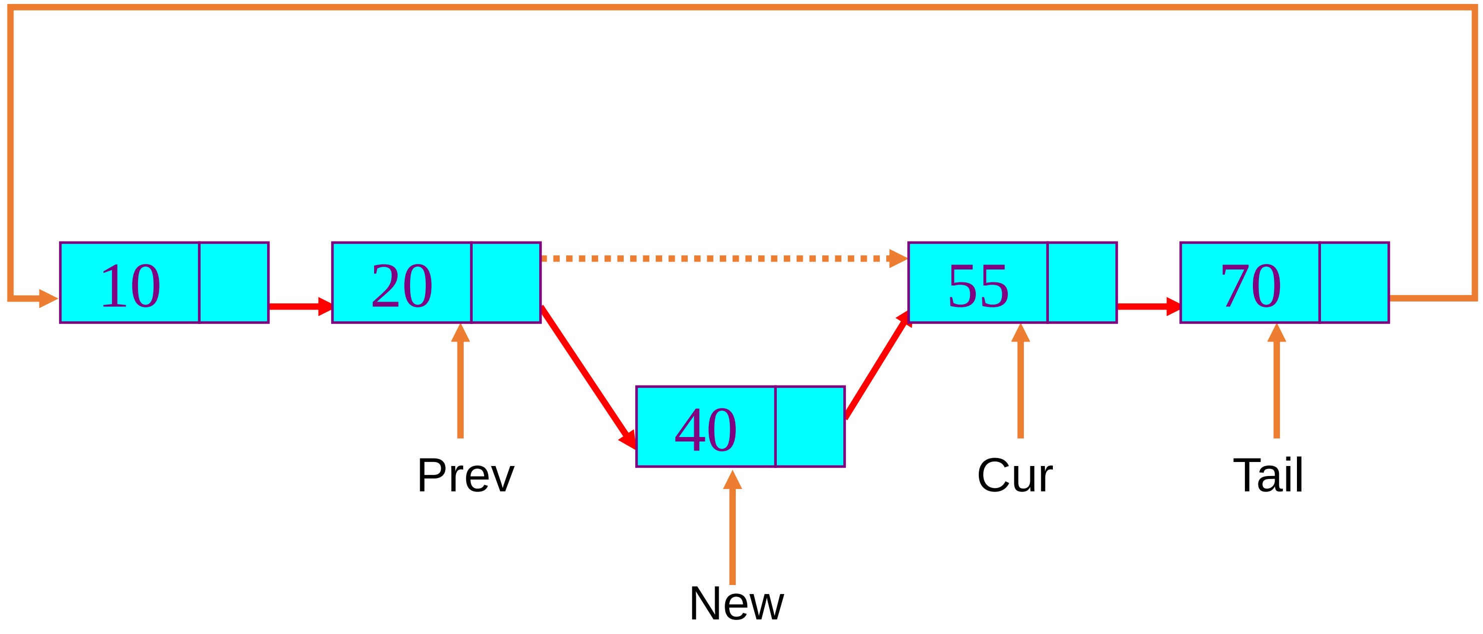
Prev->next = New; → Tail->next = New;

Tail = New;



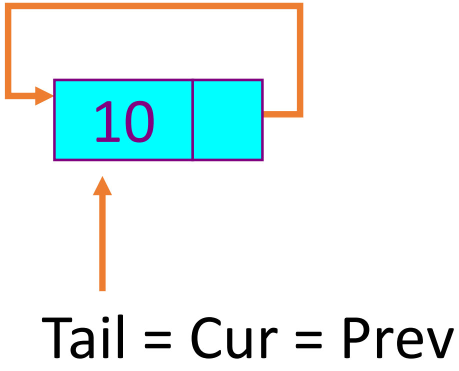
Insert to the middle of Circular Linked List

```
New->next = Cur;

Prev->next = New;
```



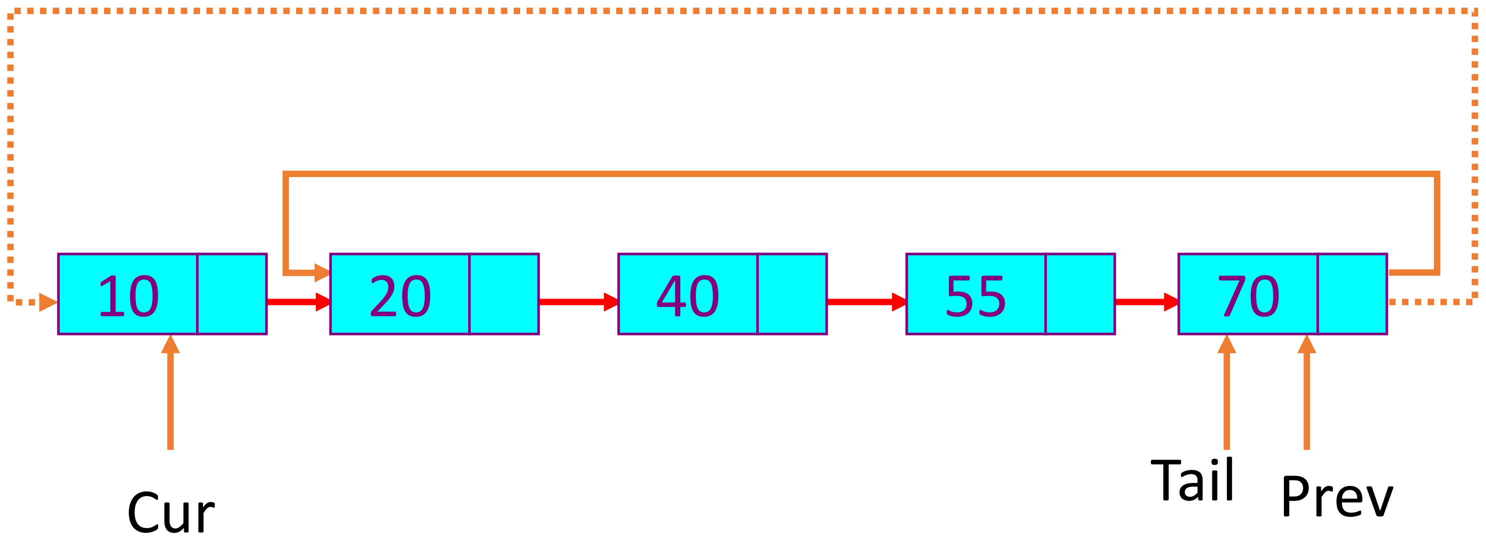
Delete a node from a single-node Circular Linked List

```
Tail = NULL;

free( Cur);
```



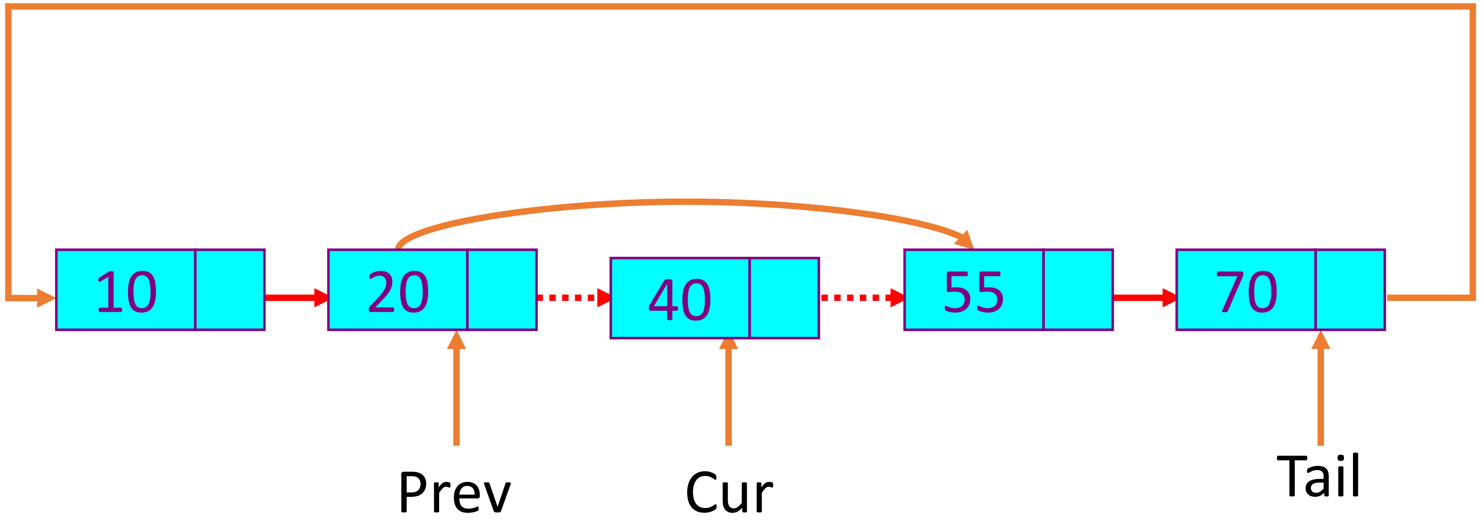
Delete the head node from a Circular Linked List

```
Prev->next = Cur->next;          // same as: Tail->next = Cur->next

free(cur);
```



Delete a middle node Cur from a Circular Linked List

```
Prev->next = Cur->next;

Free(Cur);
```



Circular Singly Linked List operations

Apply the concepts to implement following operations for a singly linked list

- insert a node after a given node(pointer)
- Insert a node after a node with a given value

PES UNIVERSITY ONLINE

THANK YOU

Vandana M L

Department of Computer Science & Engineering

vandanamd@pes.edu

+91 7411716615