SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
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Department of Artificial Intelligence and Data Science

Course Name: 23ITB201 Data structures and Algorithms

II Year / III semester

Unit I – List ADTs

Topic: Linked list

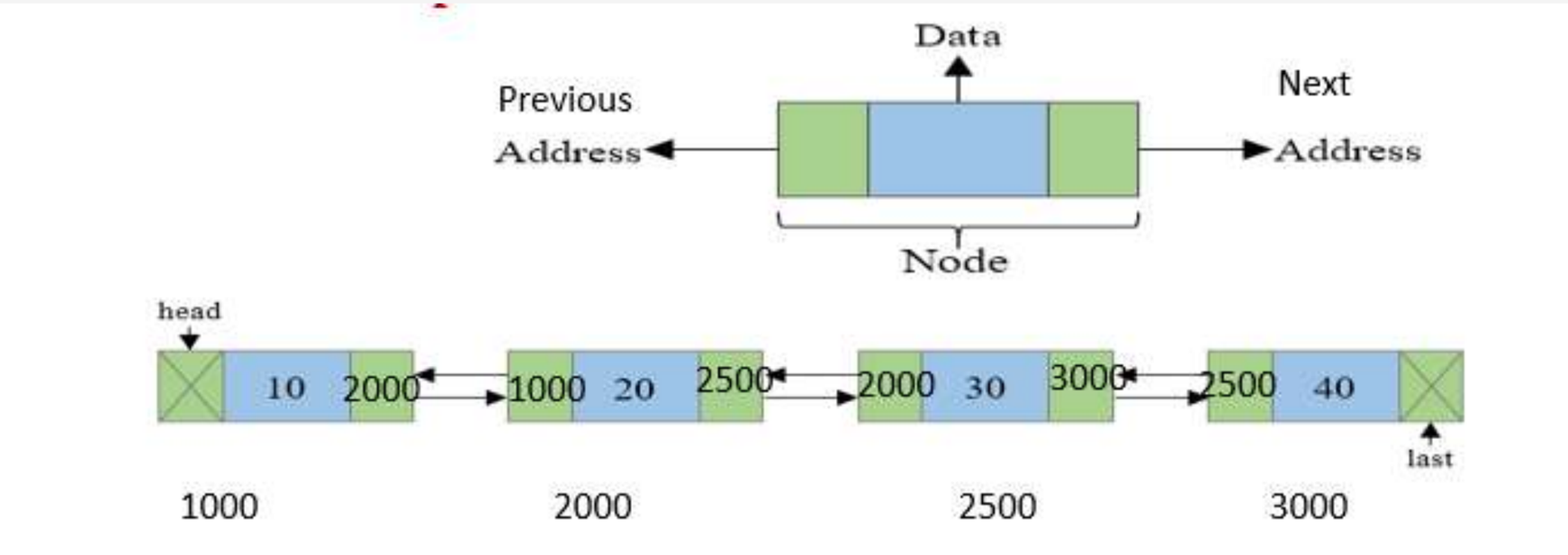
Linked list

Doubly Linked list

Doubly Linked list

- Doubly linked list is a collection of nodes linked together in a sequential way.
- Each node of the list contains three parts **data part** and the **previous and next node reference or address part.**

Doubly Linked list representation

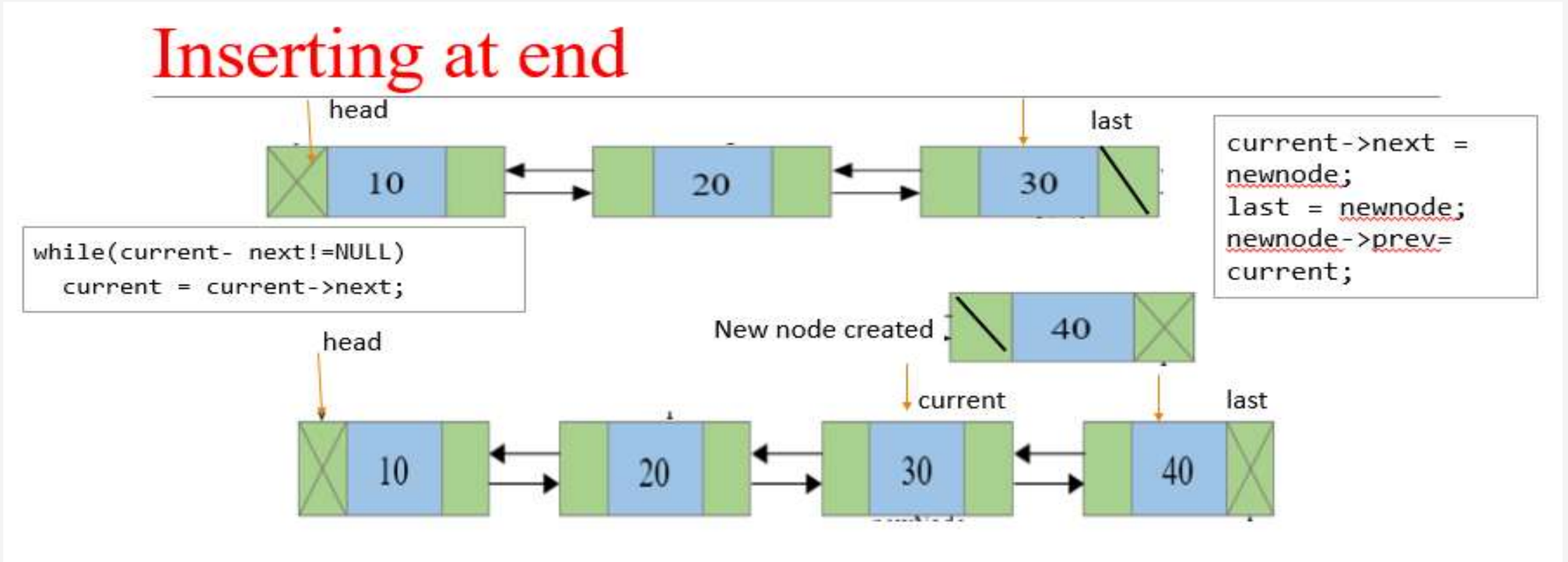


Structure definition of DLL

Structure definition of DLL

```
struct node {
      int data;                          //
Data field
     struct node * prev;      //
Address of previous node
     struct node * next;    // Address
of next node
}
```

Operations on DLL- Inserting node at end



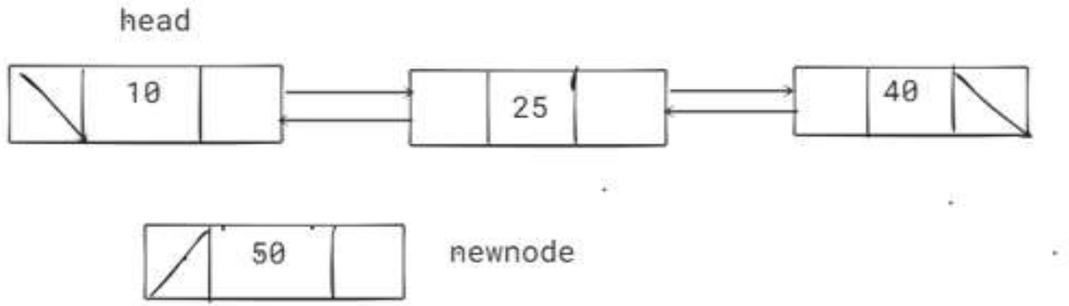
Inserting node at end

C routine to create a node and insert at end

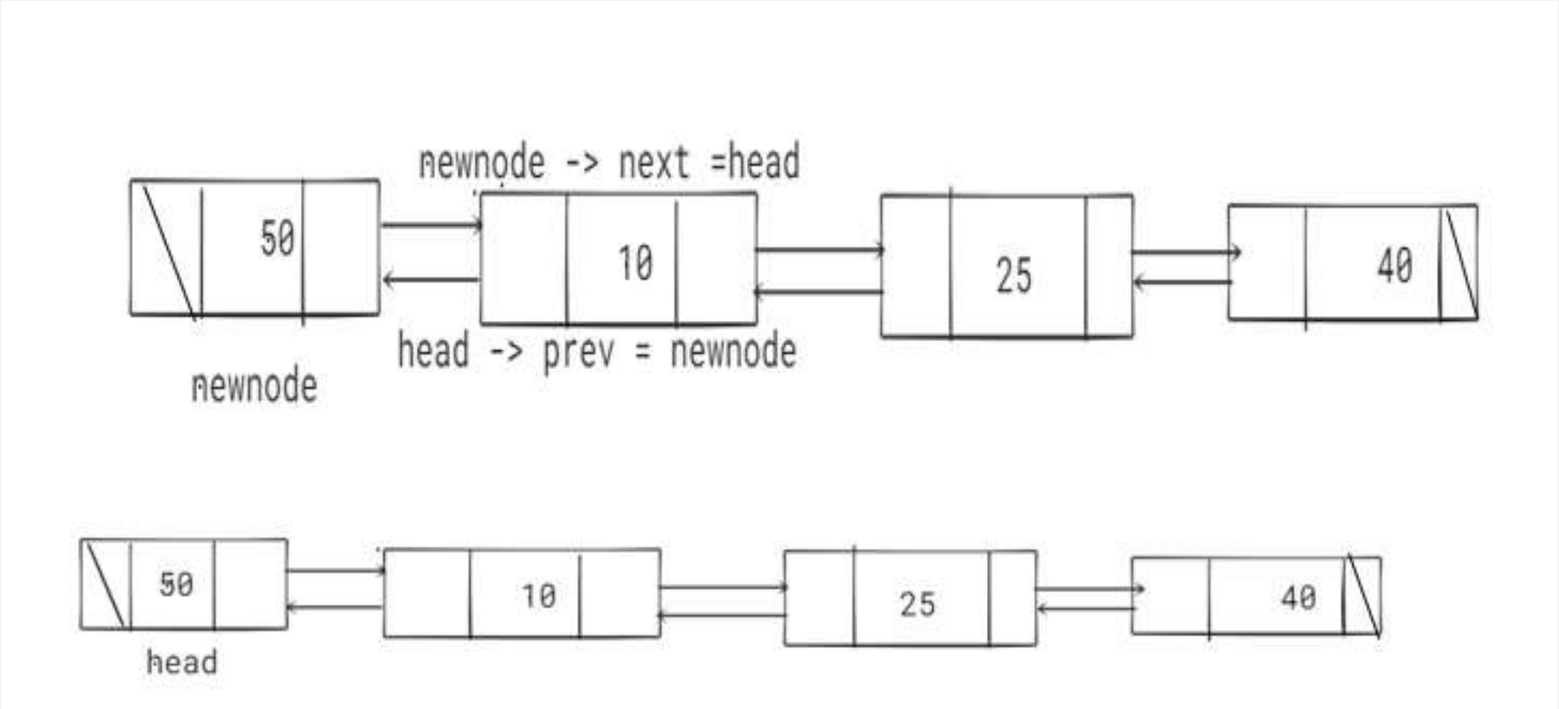
```
void insert(int data) {
struct node *newnode = (struct node*)
malloc(sizeof(struct node));
     newnode->data = data;
     newnode->prev = NULL;
     newnode->next = NULL;
      if(head==NULL) {
         head = newnode;
         return;
     }
current = head;
   while(current->next!=NULL)
      current = current->next;
   // Insert node at the end
   current->next = newnode;
   last = newnode;
   newnode->prev = current;
};
```

Inserting node as first node in DLL

Insert at beginning



Inserting node as first node in DLL



Inserting node as first node in DLL

C Routine for Inserting node at Beginning

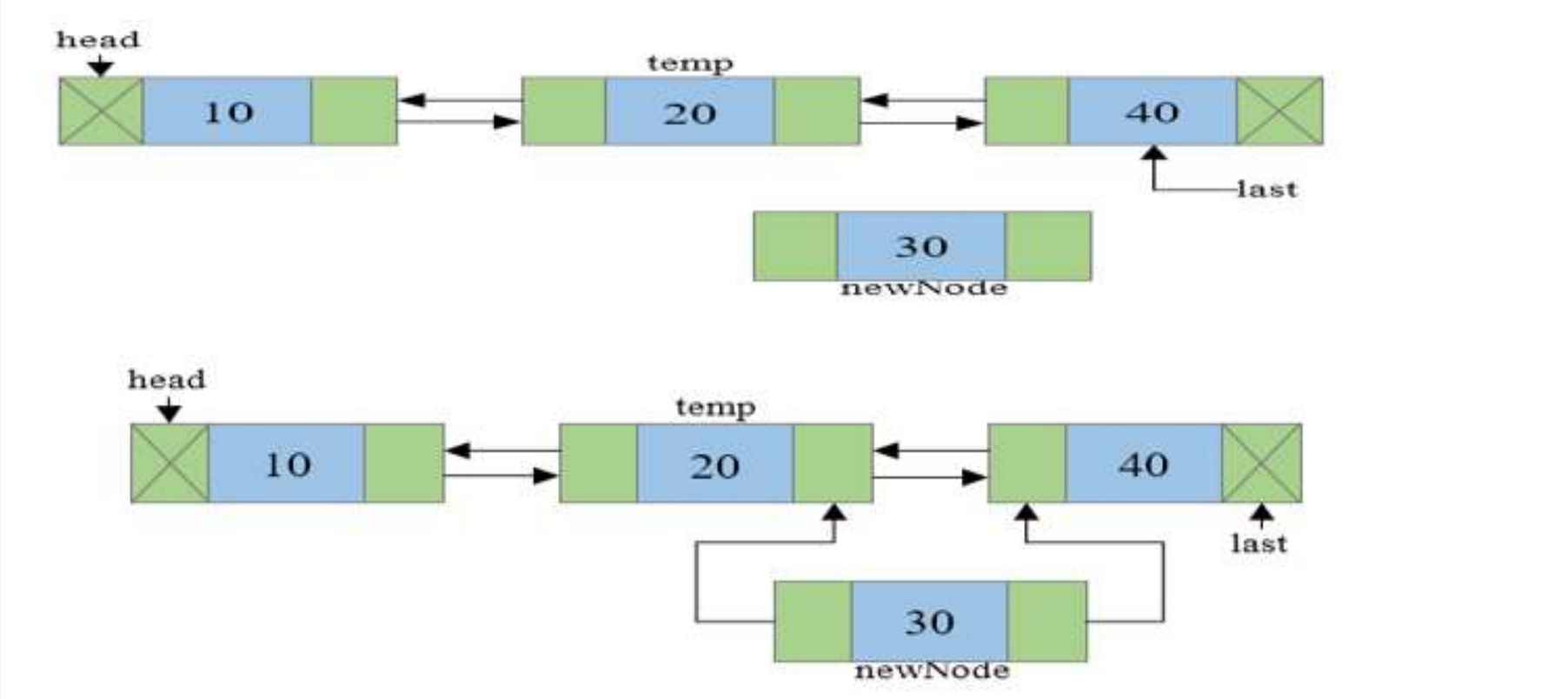
```
void insertAtBeginning(int data)
{
    struct node * newNode;
   newNode = (struct node *)malloc(sizeof(struct node));
 newNode->data = data;
 newNode->next = head;
 newNode->prev = NULL;
 head->prev = newNode;
  head = newNode;
}
```

Insert at any intermediate position

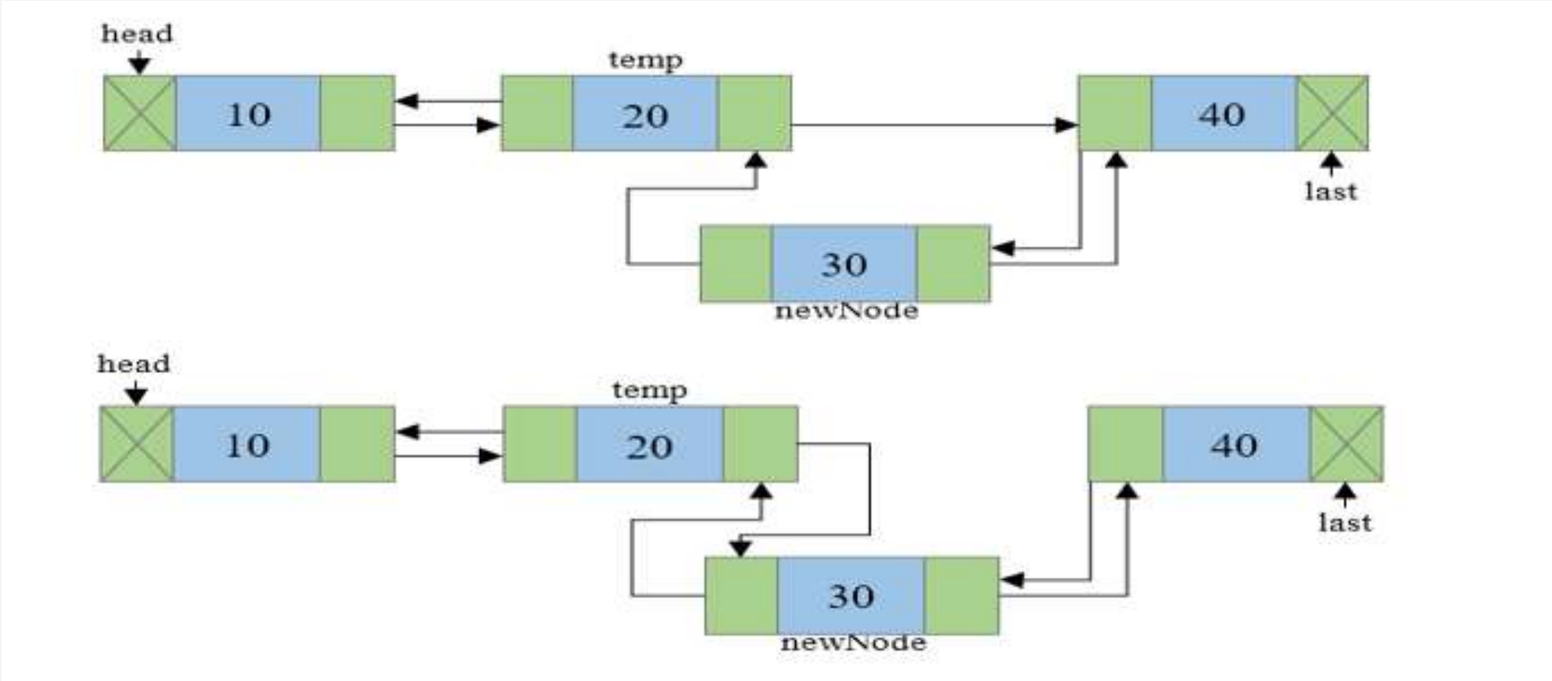
Insert at any intermediate position

```
void insertpos()
{
    int pos, i = 2;
    printf("\n Enter position to be
inserted : ");
    scanf("%d", &pos);
    temp = head;
    while (i < pos)
     {
       temp = temp->next;
            i++;
      }
create();
       newnode->prev = temp;
       newnode->next = temp->next;
       temp->next->prev = newnode;
       temp->next = newnode;
       }
```

Steps in inserting as intermediate node



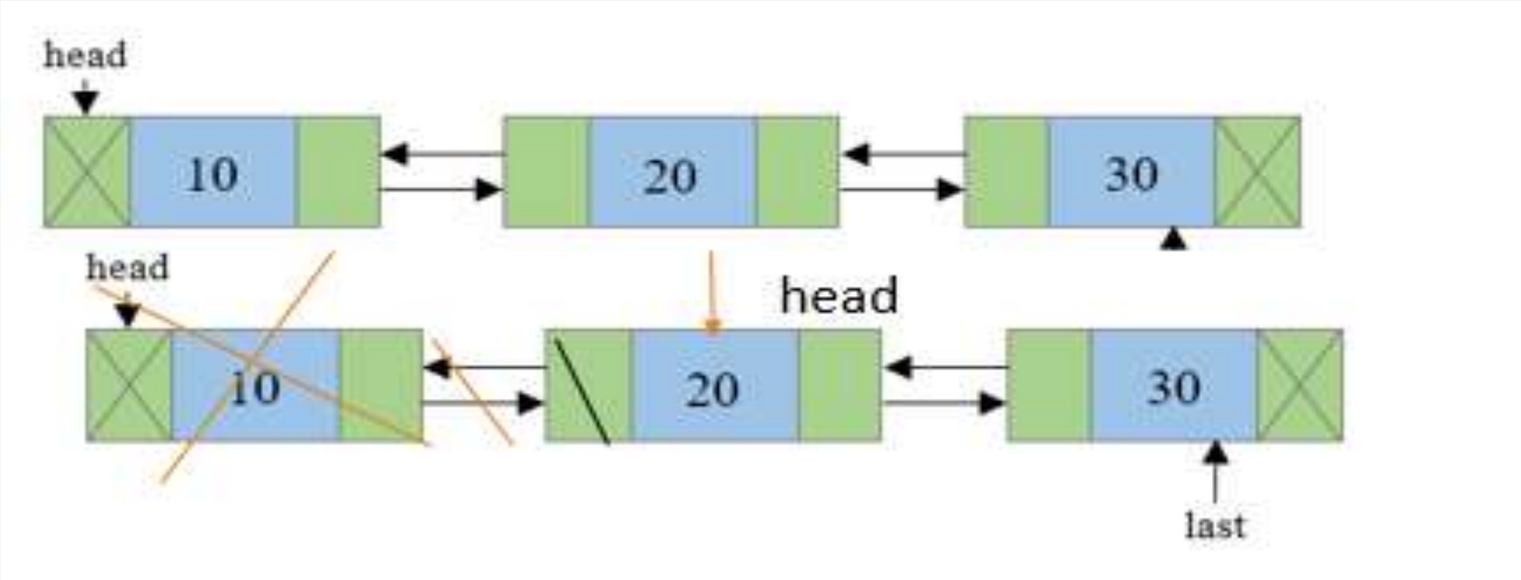
Steps in inserting as intermediate node



Delete the first node

```
void deleteFromBeginning()
{
    struct node * toDelete;
        toDelete = head;
        head = head->next;
        if (head != NULL)
        head->prev = NULL; // Remove the link to previous node
        free(toDelete);
}
```

Delete the first node

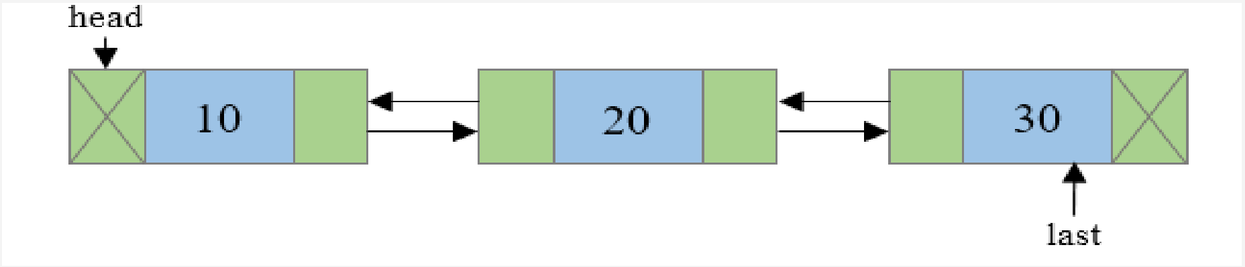


Delete last node in the DLL

```
Delete last node in the DLL
void deleteEnd()
{
    struct node * toDelete;

        toDelete = last;
        last = last->prev; // Move last pointer to 2nd last node

        if (last != NULL)
            last->next = NULL;
            free(toDelete);}
```



Assessment

- What are the advantages of DLL?
- Create a structure for DLL node.


thank
you