

DS Training-Session IV-Doubly & Circular Linked List[1] - Protected...

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2023-24 Odd Semester  
TRAINING ON DATA STRUCTURES  
Linked List ADT

2

Topics to be covered

3

Doubly Linked List

4

Example for DLL

5

Operations in DLL - Structure declaration

6

Inserting an element in a DLL

# Doubly Linked List

- Each node contains two links namely forward link and backward link.

BLINK	DATA ELEMENT	FLINK
-------	-----------------	-------


```
Struct Node
{
    int Element;
    Struct Node *FLINK;
    Struct Node *BLINK;
};
```

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# Operations in DLL – Structure declaration


```
struct node
{
    int element;
    struct node *flink;
    struct node *blink;
};
```

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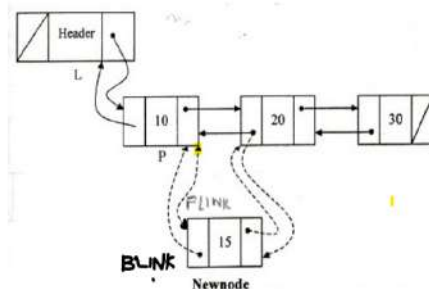
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- 3 Doubly Linked List
- 4 Example for DLL
- 5 Operations in DLL - Structure declaration
- 6 Inserting an element in a DLL
- 7 Deleting an element from a DLL
- 8 Features of DLL

## Inserting an element in a DLL

```
Insert (int X, list L, position P)
{
    Struct Node * Newnode;
    Newnode = malloc (size of (Struct Node));
    If (Newnode != NULL)
    {
        Newnode → Element = X;
        Newnode → Flink = P → Flink;
        P → Flink → Blink = Newnode;
        P → Flink = Newnode;
        Newnode → Blink = P;
    }
}
```



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3 Doubly Linked List

4 Example for DLL

5 Operations in DLL - Structure declaration

6 Inserting an element in a DLL

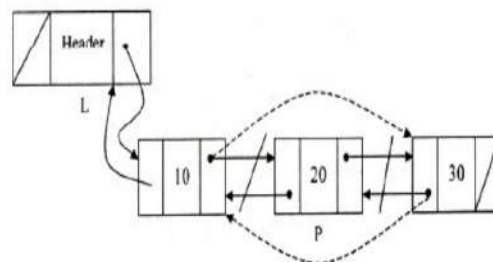
7 Deleting an element from a DLL

8 Features of DLL

## Deleting an element from a DLL

```
void Delete (int X, List L)
```

```
{  
    position P;  
    P = Find (X, L);  
    If ( IsLast (P, L))  
    {  
        Temp = P;  
        P → Blink → Flink = NULL;  
        free (Temp);  
    }  
    else  
    {  
        Temp = P;  
        P → Blink → Flink = P → Flink;  
        P → Flink → Blink = P → Blink;  
        free (Temp);  
    }  
}
```



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Deleting an element from a DLL.

8

Features of DLL.

9

**Circular linked list**  
In CLL, the pointer of the last node points to the first node. Can be implemented in two ways – Singly linked list and Doubly linked list with or without headers.  
(In singly linked circular list, the last node of the list points to the first node.)  
(In doubly linked circular list, the last node of the list points to the first node and the first node points to the last node.)

10

Singly linked and Doubly linked circular list

11

Comparison of Linked list and Circular linked list

12

Advantages of Circular linked list

## Circular linked list

- In CLL, the pointer of the last node points to the first node
- Can be implemented in two ways – Singly linked list and Doubly linked list with or without headers
- In a singly linked circular list, the last node of the list points to the first node.
- In a doubly linked circular list, forward link of the last node points to the first node and backward link of the first node points to the last node.

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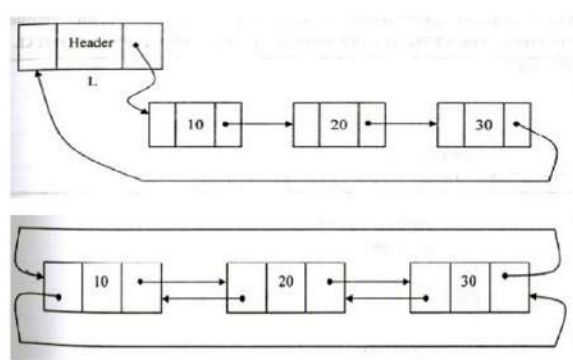
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- 7 Deleting an element from a DLL.
- 8 Features of DLL.
- 9 Circular linked list.
- 10 Singly linked and Doubly linked circular list.
- 11 Comparison of Linked list and Circular linked list.
- 12 Advantages of Circular linked list.

# Singly linked and Doubly linked circular list



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9Circular Linked List

- In a circular linked list, the last node points back to the first node, forming a continuous loop.
- It is used in applications where the sequence of elements is not known in advance.
- It is used in applications where the sequence of elements is not known in advance.
- It is used in applications where the sequence of elements is not known in advance.

10Singly linked and Doubly linked circular list

- In a singly linked circular list, the last node points back to the first node.
- In a doubly linked circular list, the last node points back to the first node and the first node points forward to the last node.

11Comparison of Linked list and Circular linked list

- In a linked list, the last node points to null.
- In a circular linked list, the last node points back to the first node.

12Advantages of Circular linked list

- It is used in applications where the sequence of elements is not known in advance.
- It is used in applications where the sequence of elements is not known in advance.
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13Applications of Linked List

- It is used in applications where the sequence of elements is not known in advance.
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14Polynomial addition

- It is used in applications where the sequence of elements is not known in advance.
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- It is used in applications where the sequence of elements is not known in advance.

# Applications of Linked List

- Polynomial Manipulation
- Radix sort 45, 34, 21, 09, 03, 12  
21, 12, 03, 34, 45, 09  
03, 09, 12, 21, 34, 45
- Multi list

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