

DATA STRUCTURE – 1

LAB-3

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Initialize and declaration in link list:

Program:

```
main.c
1 //S.Praveen kumar
2 //AIE ch.en.u4aie22048
3 //data structures lab-3
4
5 // initialize and declaration of Link list;
6
7 #include<stdio.h>
8 #include<stdlib.h>
9 struct node
10 {
11     int data;
12     struct node* next;
13 };
14
15 int main()
16 {
17     struct node* head;
18     struct node* temp;
19     head=malloc(sizeof(struct node));
20     temp=malloc(sizeof(struct node));
21     temp=head;
22     int num,number,i;
23     printf("Creating a link list: \n");
24     printf("Enter the size of linked list: ");
25     scanf("%d",&num);
26     for(i=0;i<num;i++)
27     {
28         printf("enter the element %d:",i);
29         scanf("%d",&number);
30         temp->data=number;
31         if(i<num-1)
32         {
33             temp->next=malloc(sizeof(struct node));
34             temp=temp->next;
35         }
36     }
37     temp->next=NULL;
38     printf("The LINK LIST -----> \n");
39     while(head!=NULL)
40     {
41         printf("%d->",head->data);
42         head=head->next;
43     }
44     return 0;
45 }
46
47
```

Output:

```
input
Creating a link list:
Enter the size of linked list: 4
enter the element 0:10
enter the element 1:20
enter the element 2:30
enter the element 3:40
The LINK LIST ----->
10->20->30->40->

...Program finished with exit code 0
Press ENTER to exit console.
```

Insertion at beginning:

Program:

```
main.c
1  #include<stdio.h>
2  #include<stdlib.h>
3  struct node{
4      int data;
5      struct node* next;
6      struct node* prev;
7  };
8  int main()
9  {
10     int num,i,number,len,newnum;
11     struct node* head;
12     struct node* temp;
13     struct node* newnode;
14     struct node* Firstnode;
15     head=(struct node*)malloc(sizeof(struct node));
16     temp=malloc(sizeof(struct node));
17     temp=head;
18     printf("Enter the size in linked list: \n");
19     scanf("%d",&num);
20     temp->prev=NULL;
21     newnode=malloc(sizeof(struct node));
22     for(i=0;i<num;i++)
23     {
24         printf("element %d: ",i);
25         scanf("%d",&number);
26         temp->data=number;
27         if(i!=num-1)
28         {
29             temp->next=malloc(sizeof(struct node));
30             newnode=temp;
31             temp=temp->next;
32             temp->prev=newnode;
33         }
34     }
35     temp->next=NULL;
36     printf("Enter the element to begin: ");
37     scanf("%d",&newnum);
38     Firstnode=malloc(sizeof(struct node));
39     Firstnode->data=newnum;
40     Firstnode->prev=NULL;
41     Firstnode->next=head;
42     head=Firstnode;
43     while(head!=NULL)
44     {
45         printf("%d->",head->data);
46         head=head->next;
47     }
48     printf("\n\n");
49     return 0;
50 }
```

Output:

```
input
Enter the size in linked list:
5
element 0: 1
element 1: 2
element 2: 3
element 3: 4
element 4: 5
Enter the element to begin: 0
0->1->2->3->4->5->NULL

...Program finished with exit code 0
Press ENTER to exit console.
```

Insertion at end:

```
main.c
1 #include<stdio.h>
2 #include<stdlib.h>
3 struct node{
4     int data;
5     struct node* next;
6     struct node* prev;
7 };
8 int main()
9 {
10     int num,i,number,len,newnum;
11     struct node* head;
12     struct node* temp;
13     struct node* newnode;
14     struct node* Lastnode;
15     head=(struct node*)malloc(sizeof(struct node));
16     temp=malloc(sizeof(struct node));
17     temp=head;
18     printf("Enter the size in linked list: \n");
19     scanf("%d",&num);
20     temp->prev=NULL;
21     newnode=malloc(sizeof(struct node));
22     for(i=0;i<num;i++)
23     {
24         printf("element %d: ",i);
25         scanf("%d",&number);
26         temp->data=number;
27         if(i!=num-1)
28         {
29             temp->next=malloc(sizeof(struct node));
30             newnode=temp;
31             temp=temp->next;
32             temp->prev=newnode;
33         }
34     }
35     printf("Enter the element to end: ");
36     scanf("%d",&newnum);
37     Lastnode=malloc(sizeof(struct node));
38     Lastnode->data=newnum;
39     Lastnode->next=NULL;
40     Lastnode->prev=temp;
41     temp->next=Lastnode;
42     while(head!=NULL)
43     {
44         printf("%d->",head->data);
45         head=head->next;
46     }
47     printf("NULL\n");
48     return 0;
49 }
```

Output:

```
input
Enter the size in linked list:
4
element 0: 1
element 1: 2
element 2: 3
element 3: 4
Enter the element to end: 5
1->2->3->4->5->NULL

...Program finished with exit code 0
Press ENTER to exit console.
```

Inserting at specific position:

Program:

```
main.c
1  #include<stdio.h>
2  #include<stdlib.h>
3  struct node{
4      int data;
5      struct node* next;
6  };
7  int main()
8  {
9      int num,i,number,len,number1,pos;
10     struct node* head;
11     struct node* temp;
12     struct node* temp1;
13     struct node* temp2;
14     head=(struct node*)malloc(sizeof(struct node));
15     temp=malloc(sizeof(struct node));
16     temp=head;
17     printf("Enter the size in linked list: \n");
18     scanf("%d",&num);
19     for(i=0;i<num;i++)
20     {
21         printf("element %d: ",i);
22         scanf("%d",&number);
23         temp->data=number;
24         if(i!=num-1)
25         {
26             temp->next=malloc(sizeof(struct node));
27             temp=temp->next;
28         }
29     }
30     temp->next=NULL;
31     temp1=malloc(sizeof(struct node));
32     printf("Enter the elemenet to add: ");
33     scanf("%d",&number1);
34     printf("Enter the position to add: ");
35     scanf("%d",&pos);
36     temp1->data=number1;
37     temp=head;
38     for(i=0;i<pos-1;i++)
39     {
40         temp=temp->next;
41     }
42     temp2=temp;
43     temp=temp->next;
44     temp2->next=temp1;
45     temp1->next=temp;
46
47     while(head!=NULL)
48     {
49         printf("%d->",head->data);
50         head=head->next;
51     }
52     printf("NULL");
53     return 0;
54 }
```

Output:

```
input
Enter the size in linked list:
4
element 0: 1
element 1: 2
element 2: 4
element 3: 5
Enter the elemenet to add: 3
Enter the position to add: 2
1->2->3->4->5->NULL

...Program finished with exit code 0
Press ENTER to exit console.
```

Deletion at beginning:

Program:

```
main.c
1 //S.Praveen Kumar
2 //AIE ch.u4.aie22048
3 //Lab-3
4
5 //Deletion at begin
6 #include<stdio.h>
7 #include<stdlib.h>
8 int main()
9 {
10     struct node{
11         int data;
12         struct node *link;
13     };
14     struct node *temp,*head;
15     head=(struct node *)malloc(sizeof(struct node));
16     temp=head;
17     int n,number,i;
18     printf("Enter the size of the linked list: ");
19     scanf("%d",&n);
20     for(i=0;i<n;i++)
21     {
22         printf("Enter the element %d: ",i);
23         scanf("%d",&number);
24         temp->data=number;
25         if(i!=n-1)
26         {
27             temp->link=(struct node*)malloc(sizeof(struct node));
28             temp=temp->link;
29         }
30     }
31     temp->link=NULL;
32     struct node *forward,*print;
33     forward=head;
34     forward=forward->link;
35     while(forward!=NULL)
36     {
37         printf("%d->",forward->data);
38         forward=forward->link;
39     }
40     printf("NULL\n");
41     return 0;
42 }
```

Output:

```
Enter the size of the linked list: 5
Enter the element 0: 0
Enter the element 1: 1
Enter the element 2: 2
Enter the element 3: 3
Enter the element 4: 4
1->2->3->4->NULL
```

```
...Program finished with exit code 0
Press ENTER to exit console.
```

Deletion at end:

Program:

```
main.c
1 //S.Praveen Kumar
2 //AIE ch.u4.aie22048
3 //Lab-3
4
5 //Deletion at end
6 #include<stdio.h>
7 #include<stdlib.h>
8 int main()
9 {
10     struct node
11     {
12         int data;
13         struct node *link;
14     };
15     struct node *head,*temp;
16     head=(struct node *)malloc(sizeof(struct node));
17     temp=head;
18     int i,n,number;
19     printf("Enter the size of the linked list: ");
20     scanf("%d",&n);
21     for(i=0;i<n;i++)
22     {
23         printf("Enter the element %d: ",i);
24         scanf("%d",&number);
25         temp->data=number;
26         if(i!=n-1)
27         {
28             temp->link=(struct node *)malloc(sizeof(struct node));
29             temp=temp->link;
30         }
31     }
32     temp->link=NULL;
33     struct node *forward;
34     forward=head;
35     for(i=0;i<(n-1);i++)
36     {
37         printf("%d->",forward->data);
38         forward=forward->link;
39     }
40     printf("NULL\n");
41     return 0;
42 }
```

Output:

```
input
Enter the size of the linked list: 4
Enter the element 0: 1
Enter the element 1: 2
Enter the element 2: 3
Enter the element 3: 5
1->2->3->NULL

...Program finished with exit code 0
Press ENTER to exit console.
```

Deletion at specific position:

Program:

```
main.c
1 //S.Praveen Kumar
2 //AIE ch.u4.aie22048
3 //Lab-3
4
5 //Deletion at specific position
6 #include<stdio.h>
7 #include<stdlib.h>
8 int main()
9 {
10     struct node
11     {
12         int data;
13         struct node *link;
14     };
15     struct node *head,*temp;
16     head=(struct node *)malloc(sizeof(struct node));
17     int n,number,i;
18     printf("Enter the size of the Linkedlist: ");
19     scanf("%d",&n);
20     temp=head;
21     for(i=0;i<n;i++)
22     {
23         printf("Enter the element %d: ",i);
24         scanf("%d",&number);
25         temp->data=number;
26         if(i!=n-1)
27         {
28             temp->link=(struct node *)malloc(sizeof(struct node));
29             temp=temp->link;
30         }
31     }
32     temp->link=NULL;
33     int pos;
34     printf("Enter the Postion: ");
35     scanf("%d",&pos);
36
37     struct node *transverse;
38     struct node *forward;
39     transverse=head;
40     forward=head;
41     for(i=0;i<(pos-1);i++)
42     {
43         forward=forward->link;
44     }
45     for(i=0;i<pos;i++)
46     {
47         transverse=transverse->link;
48     }
49     forward->link=transverse->link;
50     while(head!=NULL)
51     {
52         printf("%d",head->data);
53         head=head->link;
54     }
55     return 0;
56 }
```

Output:

```
input
Enter the size of the Linkedlist: 3
Enter the element 0: 1
Enter the element 1: 2
Enter the element 2: 3
Enter the Postion(start from zero): 1
13
...Program finished with exit code 0
Press ENTER to exit console.
```