DATA STRUCTURE – 1

LAB-3

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Initialize and declaration in link list:

Program:

main.c

```c
//S.Praveen kumar
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//data structures lab-3

// initialize and declaration of link list;

#include<stdio.h>
#include<stdlib.h>
struct node
{
  int data;
  struct node* next;
};

int main()
{
    struct node* head;
    struct node* temp;
    head=malloc(sizeof(struct node));
    temp=malloc(sizeof(struct node));
    temp=head;
    int num,number,i;
    printf("Creating a link list: \n");
    printf("Enter the size of linked list: ");
    scanf("%d",&num);
    for(i=0;i<num;i++)
    {
        printf("enter the element %d:",i);
        scanf("%d",&number);
        temp->data=number;
        if(i<num-1)
        {
            temp->next=malloc(sizeof(struct node));
            temp=temp->next;
        }

    }
    temp->next=NULL;
    printf("The LINK LIST ----------> \n");
    while(head!=NULL)
    {
        printf("%d->",head->data);
        head=head->next;
    }
    return 0;
}

```

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

```c
#include<stdio.h>
#include<stdlib.h>
struct node{
    int data;
    struct node* next;
    struct node* prev;
};
int main()
{
    int num,i,number,len,newnum;
    struct node* head;
    struct node* temp;
    struct node* newnode;
    struct node* Firstnode;
    head=(struct node*)malloc(sizeof(struct node));
    temp=malloc(sizeof(struct node));
    temp=head;
    printf("Enter the size in linked list: \n");
    scanf("%d",&num);
    temp->prev=NULL;
    newnode=malloc(sizeof(struct node));
    for(i=0;i<num;i++)
    {
        printf("element %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=num-1)
        {
            temp->next=malloc(sizeof(struct node));
            newnode=temp;
            temp=temp->next;
            temp->prev=newnode;
        }
    }
    temp->next=NULL;
    printf("Enter the element to begin: ");
    scanf("%d",&newnum);
    Firstnode=malloc(sizeof(struct node));
    Firstnode->data=newnum;
    Firstnode->prev=NULL;
    Firstnode->next=head;
    head=Firstnode;
    while(head!=NULL)
    {
        printf("%d->",head->data);
        head=head->next;
    }
    printf("NULL\n");
    return 0;
}
```

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

```c
#include<stdio.h>
#include<stdlib.h>
struct node{
    int data;
    struct node* next;
    struct node* prev;
};
int main()
{
    int num,i,number,len,newnum;
    struct node* head;
    struct node* temp;
    struct node* newnode;
    struct node* Lastnode;
    head=(struct node*)malloc(sizeof(struct node));
    temp=malloc(sizeof(struct node));
    temp=head;
    printf("Enter the size in linked list: \n");
    scanf("%d",&num);
    temp->prev=NULL;
    newnode=malloc(sizeof(struct node));
    for(i=0;i<num;i++)
    {
        printf("element %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=num-1)
        {
            temp->next=malloc(sizeof(struct node));
            newnode=temp;
            temp=temp->next;
            temp->prev=newnode;
        }
    }
    printf("Enter the element to end: ");
    scanf("%d",&newnum);
    Lastnode=malloc(sizeof(struct node));
    Lastnode->data=newnum;
    Lastnode->next=NULL;
    Lastnode->prev=temp;
    temp->next=Lastnode;
    while(head!=NULL)
    {
        printf("%d->",head->data);
        head=head->next;
    }
    printf("NULL\n");
    return 0;
}
```

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

```c
#include<stdio.h>
#include<stdlib.h>
struct node{
    int data;
    struct node* next;
};
int main()
{
    int num,i,number,len,number1,pos;
    struct node* head;
    struct node* temp;
    struct node* temp1;
    struct node* temp2;
    head=(struct node*)malloc(sizeof(struct node));
    temp=malloc(sizeof(struct node));
    temp=head;
    printf("Enter the size in linked list: \n");
    scanf("%d",&num);
    for(i=0;i<num;i++)
    {
        printf("element %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=num-1)
        {
            temp->next=malloc(sizeof(struct node));
            temp=temp->next;
        }
    }
    temp->next=NULL;
    temp1=malloc(sizeof(struct node));
    printf("Enter the elemnet to add: ");
    scanf("%d",&number1);
    printf("Enter the position to add: ");
    scanf("%d",&pos);
    temp1->data=number1;
    temp=head;
    for(i=0;i<pos-1;i++)
    {
        temp=temp->next;
    }
    temp2=temp;
    temp=temp->next;
    temp2->next=temp1;
    temp1->next=temp;

    while(head!=NULL)
    {
        printf("%d->",head->data);
        head=head->next;
    }
    printf("NULL");
    return 0;
}
```

Output:

input

```
Enter the size in linked list:
4
element 0: 1
element 1: 2
element 2: 4
element 3: 5
Enter the elemnet 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

```c
//S.Praveen Kumar
//AIE ch.u4.aie22048
//lab-3

//Deletion at begin
#include<stdio.h>
#include<stdlib.h>
int main()
{
    struct node{
        int data;
        struct node *link;
    };
    struct node *temp,*head;
    head=(struct node *)malloc(sizeof(struct node));
    temp=head;
    int n,number,i;
    printf("Enter the size of the linked likst: ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter the element %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=n-1)
        {
            temp->link=(struct node*)malloc(sizeof(struct node));
            temp=temp->link;
        }
    }
    temp->link=NULL;
    struct node *forward,*print;
    forward=head;
    forward=forward->link;
    while(forward!=NULL)
    {
        printf("%d->",forward->data);
        forward=forward->link;
    }
    printf("NULL\n");
    return 0;
}
```

Output:

input

```
Enter the size of the linked likst: 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

```c
//S.Praveen Kumar
//AIE ch.u4.aie22048
//lab-3

//Deletion at end
#include<stdio.h>
#include<stdlib.h>
int main()
{
    struct node
    {
        int data;
        struct node *link;
    };
    struct node *head,*temp;
    head=(struct node *)malloc(sizeof(struct node));
    temp=head;
    int i,n,number;
    printf("Enter the size of the linked likst: ");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("Enter the elemnt %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=n-1)
        {
            temp->link=(struct node *)malloc(sizeof(struct node));
            temp=temp->link;

        }
    }
    temp->link=NULL;
    struct node *forward;
    forward=head;
    for(i=0;i<(n-1);i++)
    {
        printf("%d->",forward->data);
        forward=forward->link;

    }
    printf("NULL\n");
    return 0;
}

```

Output:

input

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


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

Deletion at specific position:

Program:

main.c

```c
//S.Praveen Kumar
//AIE ch.u4.aie22048
//lab-3

//Deletion at specific position
#include<stdio.h>
#include<stdlib.h>
int main()
{
    struct node
    {
        int data;
        struct node *link;
    };
    struct node *head,*temp;
    head=(struct node *)malloc(sizeof(struct node));
    int n,number,i;
    printf("Enter the size of the Linkedlist: ");
    scanf("%d",&n);
    temp=head;
    for(i=0;i<n;i++)
    {
        printf("Enter the element %d: ",i);
        scanf("%d",&number);
        temp->data=number;
        if(i!=n-1)
        {
            temp->link=(struct node*)malloc(sizeof(struct node));
            temp=temp->link;
        }
    }
    temp->link=NULL;
    int pos;
    printf("Enter the Postion: ");
    scanf("%d",&pos);
    struct node *transverse;
    struct node *forward;
    transverse=head;
    forward=head;
    for(i=0;i<(pos-1);i++)
    {
        forward=forward->link;
    }
    for(i=0;i<pos;i++)
    {
        transverse=transverse->link;

    }
    forward->link=transverse->link;
    while(head!=NULL)
    {
        printf("%d",head->data);
        head=head->link;
    }
    return 0;
}
```

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.
```