EX 1: Implementation of single linked list

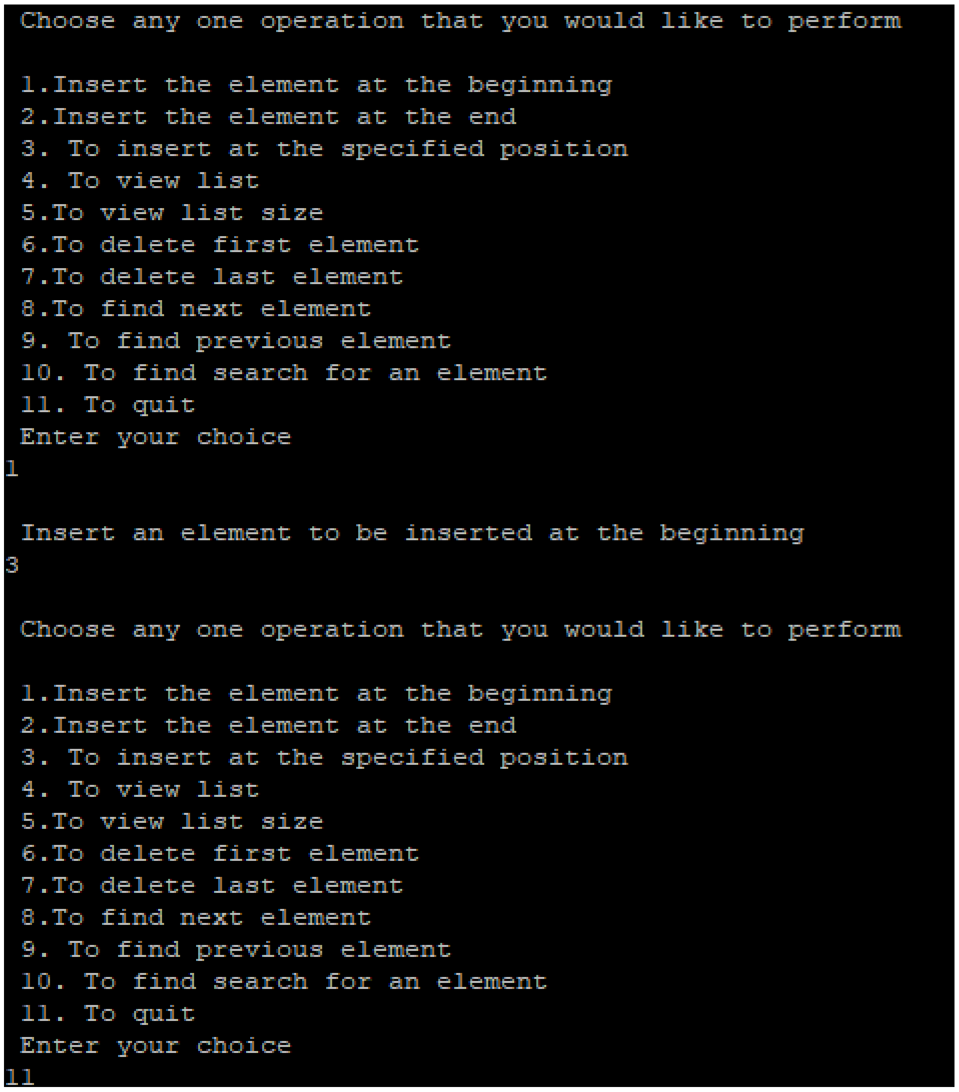
PROGRAM:

```
#include <stdlib.h>
#include <stdio.h>
struct node
{
    int data;
    struct node *link;
}*FIRST=NULL;

void Insert_Begin(int);
void Insert_End(int);
void Insert_Betwn(int,int);
void Delete_data(int);
void Delete_pos(int);
int count();
void display();
int IsEmpty();
int IsLast();
int Search(int);
int FindNext(int);
int FindPrev(int);


int FindPrev(int v){
    int pos=Search(v);
    struct node *temp;
    temp=FIRST;
    if (!(pos==0)){
        for (int i=0;i<pos-1;i++)
        {
        temp=temp->link;
        }
        int Dat=temp->data;
        return Dat;
    }
    else
    return -1;
}
```

```
int FindNext(int v){
    int pos=Search(v);
    struct node *temp;
    temp=FIRST;
    if (!IsLast(v) && (pos!=-1)){
        for (int i=0;i<pos+1;i++)
        {
        temp=temp->link;
        }
        int Dat=temp->data;
        return Dat;
    }
    else
    return -1;
}
int Search(int value){
    struct node *temp;
    temp=FIRST;
    int count=0,op,flag=0;
    while (temp!=NULL)
    {
        if (temp->data==value)
        {
            op=count;
            flag=1;
            break;
        }
        else
        {
            temp=temp->link;
        }
        count++;
    }
    if (flag)
    return count;
    else
    return -1;
}

int IsLast(int val){
    struct node *temp;
    temp=FIRST;
    while (temp->link!=NULL)
    {
        temp=temp->link;
    }
    if (temp->data==val)
    return 1;
    else
    return 0;

}
int IsEmpty(){
    if (FIRST==NULL)
    return 1;
    else
    return 0;
}
void Insert_Begin(int dat)
{
    struct node *newnode;
    newnode=(struct node*)malloc(sizeof(struct node));
    newnode->data=dat;
    if (FIRST==NULL)
    {
        newnode->link=NULL;
    }
    else
    {
        newnode->link=FIRST;
    }
    FIRST=newnode;
}

void Insert_End(int dat)
{
    struct node *newnode,*temp;
    newnode=(struct node*)malloc(sizeof(struct node));
    newnode->data=dat;

    if (FIRST==NULL)
    {
        newnode->link=NULL;
        FIRST=newnode;
    }
    else
    {
        temp=FIRST;
        while (temp->link!=NULL)
        {
            temp=temp->link;
        }
        temp->link=newnode;
        newnode->link=NULL;
    }
}


void Insert_Betwn(int dat,int pos)
{
    struct node *newnode,*temp,*TEMP;
    newnode=(struct node*)malloc(sizeof(struct node));
    newnode->data=dat;
    int countlist;
    countlist=count();
    TEMP=FIRST;

    if (countlist<pos)
    {
        printf("INVALID POSITION");
    }
    else
    {
        temp=FIRST;
        for (int i=1;i<pos;i++)
        {
            temp=temp->link;
        }
        newnode->link=temp->link;
        temp->link=newnode;
    }

}

int count()
{
    struct node *temp;
    int count=0;
    temp=FIRST;
    while (temp!=NULL)
    {
        temp=temp->link;
        count++;
    }
    return count;
}

void Delete_data(int dat)
{
    struct node *temp=FIRST,*prev=NULL;
    if (temp!=NULL && temp->data==dat)
    {
        FIRST=temp->link;
    }
    while (temp!=NULL && temp->data!=dat)
    {
        prev=temp;
        temp=temp->link;
    }
    if (temp==NULL)
    printf("DATA NOT FOUND");
    prev->link=temp->link;
}

void Delete_pos(int pos)
{
    struct node *temp,*TEMP,*prev=NULL;
    temp=FIRST;
    if (pos==1)
    FIRST=temp->link;
    int count;
    TEMP=FIRST;
    while (TEMP!=NULL)
    {
        TEMP=TEMP->link;
        count++;
    }
    if (count<pos)
    {
        printf("INVALID POSITION\n\n");
    }
    else
    {
        for (int i=0;i<pos-1;i++)
        {
            if (temp!=NULL)
            {
                prev=temp;
                temp=temp->link;
            }
            else
            printf("INVALID POSITION");
        }
        prev->link=temp->link;
    }

}


void display()
{
    struct node *temp;
    temp=FIRST;
    while (temp!=NULL)
    {
        printf("%d ",temp->data);
        temp=temp->link;
    }
}
int main()
{
    int t=1,choice,d,p;
    while (t==1)
    {
        printf("\n\n1.Insert a node at the begining.\n2.Insert a node at the end.\n3.Insert a node at
a given position.\n4.Delete a node by data.\n5.Delete a node by
position.\n6.Display.\n7.Count.\n8.Exit\n9.Check if Empty\n10.Check if Element is at
last\n11.search\n12.Find next number\n13.find previous number\n14.Delete list\n");
        printf("Enter your choice:");
        scanf("%d",&choice);

        if (choice==1)
        {
            printf("Enter data:");
            scanf("%d",&d);
            Insert_Begin(d);
        }
        else if (choice==2)
        {
            printf("Enter data:");
            scanf("%d",&d);
            Insert_End(d);
        }
        else if (choice==3)
        {
            printf("Enter data:");
            scanf("%d",&d);
            printf("Enter position:");
            scanf("%d",&p);
            Insert_Betwn(d,p);
        }
        else if (choice==4)
        {
            printf("Enter data:");
            scanf("%d",&d);
            Delete_data(d);
        }
        else if (choice==5)
        {
            printf("Enter position:");
            scanf("%d",&d);
            Delete_pos(d);
        }
        else if (choice==6)
        display();
        else if (choice==7)
        printf("%d",count());
        else if (choice==8)
        {
            t=0;
            break;
        }
        else if (choice==9)
        {
            if (IsEmpty())
            printf("The Element is at the last position");
            else
            printf("The element is not at the last position");
        }
        else if (choice==10)
        {
            int value;
            printf("Enter the value to be checked: ");
            scanf("%d",&value);
            if (IsLast(value))
            printf("The Element is at the last position");
            else
            printf("The element is not at the last position");
        }
        else if (choice==11)
        {
            int val;
            printf("Enter value to Search:");
            scanf("%d",&val);
            if (Search(val)!=-1)
            printf("The element is found at index: %d",Search(val));
            else
            printf("The element is not found");
        }
        else if (choice==12)
        {
            int val;
            printf("Enter value:");
            scanf("%d",&val);
            if (FindNext(val)!=-1)
            printf("The element at the next index is: %d",FindNext(val));
            else
            printf("INVALID NUMBER");
        }
        else if (choice==13)
        {
            int val;
            printf("Enter value:");
            scanf("%d",&val);
            if (FindPrev(val)!=-1)
            printf("The element at the prev index is: %d",FindPrev(val));
            else
            printf("INVALID NUMBER");
        }
        else if (choice==14)
        {
            struct node *temp;
            temp=FIRST;
            for (int i=0;i<count()-1;i++)
            {
                free(temp);
                temp=temp->link;
            }
```

```
            FIRST=NULL;
        }
        else
        printf("INVALID CHOICE");
    }

    return 0;
}
```

OUTPUT:



```
 Choose any one operation that you would like to perform

 1.Insert the element at the beginning
 2.Insert the element at the end
 3. To insert at the specified position
 4. To view list
 5.To view list size
 6.To delete first element
 7.To delete last element
 8.To find next element
 9. To find previous element
 10. To find search for an element
 11. To quit
 Enter your choice
1

 Insert an element to be inserted at the beginning
3

 Choose any one operation that you would like to perform

 1.Insert the element at the beginning
 2.Insert the element at the end
 3. To insert at the specified position
 4. To view list
 5.To view list size
 6.To delete first element
 7.To delete last element
 8.To find next element
 9. To find previous element
 10. To find search for an element
 11. To quit
 Enter your choice
11
```