**EX:2 IMPLEMENTATION OF LINKED LIST ADT**

**PROGRAM:**

#include<stdio.h>

#include<stdlib.h>

// Define eh structure node

struct node

{

int data;

struct node \*next;

};

struct node \*start = NULL;

void insertFirst(int data)

{

struct node \* newnode;

newnode = malloc(sizeof(struct node));

newnode->data = data;

newnode->next = NULL;

newnode->next = start;

start=newnode;

}

void insertLast(int data)

{

struct node \* newnode;

newnode = malloc(sizeof(struct node));

newnode->data = data;

newnode->next = NULL;

struct node \* temp=start;

while(temp->next!=NULL)

{

temp =temp->next;

}

temp->next=newnode;;

}

void insertAfter(int data, int element)

{

int flag;

struct node \* newnode;

newnode = malloc(sizeof(struct node));

newnode->data = data;

newnode->next = NULL;

struct node \* temp = start;

while(temp->next!=NULL)

{

if(element==temp->data)

{

flag=1;

break;

}

else

{

temp=temp->next;

}

}

if(flag==0)

{

printf("element not found");

}

else

{

newnode->next=temp->next;

temp->next=newnode;

}

}

void insertBefore(int data, int element)

{

int flag;

struct node \* newnode;

struct node \* pre;

newnode = malloc(sizeof(struct node));

newnode->data = data;

newnode->next = NULL;

struct node \* temp = start;

while(temp->next!=NULL)

{

if(element==temp->data)

{

flag=1;

break;

}

else

{

pre=temp;

temp=temp->next;

}

}

if(flag==0)

{

printf("element not found");

}

else if(temp -> next == NULL && temp -> data == element)

{

newnode->next=pre->next;

pre->next=newnode;

}

else

{

newnode->next=pre->next;

pre->next=newnode;

}

}

void insertAtpos(int data, int pos)

{

int flag,i=0;

struct node \* newnode;

newnode = malloc(sizeof(struct node));

newnode->data = data;

newnode->next = NULL;

struct node \* temp = start;

while(temp->next!=NULL)

{

i++;

if(i==pos-1)

{

flag=1;

break;

}

else

{

temp=temp->next;

}

}

if(flag==0)

{

printf("element not found");

}

else

{

newnode->next=temp->next;

temp->next=newnode;

}

}

void deleteFirst()

{

printf("The first element is deleted");

start = start -> next;

}

void deleteLast()

{

printf("The last element is deleted");

struct node \* temp = start;

struct node \* pre;

while(temp -> next != NULL)

{

pre = temp;

temp = temp -> next;

}

pre -> next = NULL;

}

void deleteAfter(int element)

{

struct node\*temp=start;

struct node \* after;

temp=start;

while(temp->next!=NULL&&temp->data!=element)

{

temp=temp->next;

}

after=temp->next;

temp->next=after->next;

}

void deleteBefore(int element)

{

struct node\*temp=start;

struct node \* before;

struct node \* prev;

temp=start;

while(temp->next!=NULL&&temp->data!=element)

{

prev = temp;

temp= temp->next;

}

prev->next = temp->next;

}

void deleteAtpos(int pos)

{

int i=0;

struct node\*temp=start;

struct node \* after;

temp=start;

while(temp->next!=NULL)

{

i++;

if(i==pos-1)

temp=temp->next;

}

after=temp->next;

temp->next=after->next;

}

void search(int element)

{

struct node \* temp;

temp=start;

int flag=0;

while(temp!=NULL)

{

if(temp -> data == element)

flag=1;

temp=temp -> next;

}

if(flag == 0)

printf("Element not found");

else

printf("Element found");

}

void display()

{

if(start==NULL)

{

printf("Sorry.... Empty List");

}

else

{

struct node \* temp=start;

while(temp!=NULL)

{

printf("%d \n",temp->data);

temp=temp->next;

}

}

}

// Declare the neccessary global variables

int main()

{

// Declare the neccessary variable

int choice,data,element;

printf("Name:R.Sridevi");

printf("\nRoll.No:20UIT021");

printf("\nProgram Name: Linked list Implementation");

do

{

// Generate the menu here

printf("\nMenu \n-------- \n1. Insert First \n2. Insert Last \n3. Insert After \n4. Insert Before \n5.InsertAtpos \n6.Delete first \n7.Delete last \n 8.DeleteAfter \n 9.DeleteBefore \n 10.DeleteAtpos \n12.Display \n 13.Exit");

printf("\nEnter your choice : ");

scanf("%d",&choice);

// Generaate the case here

switch(choice)

{

case 1:

printf("\nEnter the elements: ");

scanf("%d",&data);

insertFirst(data);

printf("\nInserted Successfully\n");

break;

case 2:

printf("\nEnter the elements: ");

scanf("%d",&data);

insertLast(data);

printf("\nInserted Successfully\n");

break;

case 3:

printf("\nEnter the elements: ");

scanf("%d",&data);

printf("Enter the element after which it has to be inserted :");

scanf("%d",&element);

insertAfter(data,element);

break;

case 4:

printf("\nEnter the elements: ");

scanf("%d",&data);

printf("Enter the element before which it has to be inserted :");

scanf("%d",&element);

insertBefore(data,element);

break;

case 5:

printf("\n enter data:");

scanf("%d",&data);

printf("\n enter a position to be inserted : ");

scanf("%d",&element);

insertAtpos(data,element);

break;

case 6:

deleteFirst();

break;

case 7:

deleteLast();

break;

case 8:

printf("\n enter a element to be deleted after : ");

scanf("%d",&element);

deleteAfter(element);

break;

case 9:

printf("\n enter a element to be deleted before : ");

scanf("%d",&element);

deleteBefore(element);

break;

case 10:

printf("\n enter a position to be deleted : ");

scanf("%d",&element);

deleteAtpos(element);

break;

case 11:

printf("enter a element to be searched :");

scanf("%d",&element);

search(element);

break;

case 12:

display();

break;

case 13:

printf("bye");

}

}while(choice != 13);

}

**OUTPUT:**

Name:R.Sridevi

Roll.No:20UIT021

Program Name: Linked list Implementation

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

Sorry.... Empty List

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 1

Enter the elements: 10

Inserted Successfully

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 2

Enter the elements: 50

Inserted Successfully

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 3

Enter the elements: 20

Enter the element after which it has to be inserted :10

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 4

Enter the elements: 40

Enter the element before which it has to be inserted :50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

40

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 3

Enter the elements: 30

Enter the element after which it has to be inserted :20

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 5

enter data:60

enter a position to be inserted : 5

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

30

40

60

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 6

The first element is deleted

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

30

40

60

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 7

The last element is deleted

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

30

40

60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 8

enter a element to be deleted after : 20

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

40

60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 9

enter a element to be deleted before : 60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

40Name:R.Sridevi

Roll.No:20UIT021

Program Name: Linked list Implementation

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

Sorry.... Empty List

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 1

Enter the elements: 10

Inserted Successfully

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 2

Enter the elements: 50

Inserted Successfully

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 3

Enter the elements: 20

Enter the element after which it has to be inserted :10

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 4

Enter the elements: 40

Enter the element before which it has to be inserted :50

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

40

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Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 3

Enter the elements: 30

Enter the element after which it has to be inserted :20

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 5

enter data:60

enter a position to be inserted : 5

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

10

20

30

40

60

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Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 6

The first element is deleted

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

30

40

60

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Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 7

The last element is deleted

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

30

40

60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 8

enter a element to be deleted after : 20

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

40

60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 9

enter a element to be deleted before : 60

Menu

--------

1. Insert First

2. Insert Last

3. Insert After

4. Insert Before

5.InsertAtpos

6.Delete first

7.Delete last

8.DeleteAfter

9.DeleteBefore

10.DeleteAtpos

12.Display

13.Exit

Enter your choice : 12

20

40