**Ex 2: Doubly Linked List**

**Program:**

#include <stdio.h>

#include<malloc.h>

struct node

{

int data;

struct node \*next;

struct node \*prev;

};

struct node \*newnode;

struct node \*head=NULL;

void insertfront(int ele)

{

newnode=(struct node\*)malloc(sizeof(struct node));

if(head==NULL)

{

newnode->data=ele;

newnode->next=NULL;

newnode->prev=NULL;

head=newnode;

}

else

{

newnode->data=ele;

newnode->next=head;

head->prev=newnode;

head=newnode;

}

}

void insertend(int ele)

{

newnode=(struct node\*)malloc(sizeof(struct node));

newnode->data=ele;

newnode->next=NULL;

if(head!=NULL)

{

struct node \*t;

t=head;

while(t->next!=NULL)

{

t=t->next;

}

newnode->next=NULL;

t->next=newnode;

newnode->prev=t;

}

else

{

newnode->prev=NULL;

head=newnode;

}

}

int listsize()

{

int c=0;

struct node \*t;

t=head;

while(t!=NULL)

{

c=c+1;

t=t->next;

}

printf("\n The size of the list is %d:\n",c);

return c;

}

void insertpos(int ele,int pos)

{

int ls=0;

struct node \*temp;

ls=listsize();

if(head == NULL)

{

printf("\nInvalid position to insert a node\n");

return;

}

if(head != NULL && (pos <= 0 || pos > ls))

{

printf("\nInvalid position to insert a node\n");

return;

}

newnode=(struct node\*)malloc(sizeof(struct node));

if(newnode != NULL)

{

newnode->data=ele;

temp = head;

int count = 1;

while(count < pos-1)

{

temp = temp -> next;

count += 1;

}

if(pos == 1)

{

newnode->next = head;

head->prev=newnode;

head = newnode;

}

else

{

newnode->next = temp->next;

temp->next->prev = newnode;

temp->next=newnode;

newnode->prev=temp;

}

}

}

void find(int s)

{

int c=1;

struct node \*temp;

temp=head;

if(head==NULL)

{

printf("\n List is empty");

}

else

{

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

{

temp=temp->next;

c++;

}

if(temp!=NULL && temp->data==s)

{

printf("\n Searching ele %d is present in the addr of %p in the pos%d",temp->data,temp,c);

}

else

{

printf("\n Searching elem %d is not present",s);

}

}

}

void findnext(int s)

{

struct node \*temp;

temp=head;

if(temp==NULL&&temp->next==NULL)

{

printf("No next element ");

}

else

{

while(temp->data!=s)

{

temp=temp->next;

}

printf("\nNext Element of %d is %d\n",s,temp->next->data);

}

}

void findprev(int s)

{

struct node \*temp;

temp=head;

if(temp==NULL)

{

printf("List is empty ");

}

else

{

while(temp->data!=s)

{

temp=temp->next;

}

printf("\n The previous ele of %d is %d\n",s,temp->prev->data);

}

}

void deleteAtBeginning()

{

struct node \*t;

// t=head;

head->next->prev=NULL;

head=head->next;

}

void deleteAtEnd()

{

struct node \*temp;

temp=head;

if(head==NULL)

{

printf("\n List is empty");

}

else

{

while(temp->next!=NULL)

{

temp=temp->next;

}

temp->prev->next=NULL;

}

}

void delete(int ele)

{

struct node \*t;

t=head;

if(t->data==ele)

{

head=t->next;

}

else

{

while(t->data!=ele)

{

t=t->next;

}

t->prev->next=t->next;

t->next->prev=t->prev;

}

}

void display()

{

struct node \*temp;

temp=head;

while(temp!=NULL)

{

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

temp=temp->next;

}

}

int main()

{

insertfront(10);

insertfront(20);

insertfront(30);

display();

printf("\n Inserted ele 40 at the end\n");

insertend(40);

display();

insertpos(25,3);

display();

find(25);

findnext(25);

findprev(25);

printf("\n element deleted in the beginning\n");

deleteAtBeginning();

display();

deleteAtEnd();

printf("\n Element deleted at the end\n");

display();

printf("\n After deleting element 25\n");

delete(25);

display();

return 0;

}

**OUTPUT:**

