TITLE 43

Write a C program to perform the following tasks:

a. Insert a node at the beginning of a singly-linked list.

b. Insert a node at end of a singly-linked list.

c. Insert a node at the middle of a singly-linked list.

d. Delete a node from the beginning of the singly-linked list.

e. Delete a node from the end of a singly-linked list

OBJECTIVE:

To insert a node at the beginning, middle and the end of a singly-linked list and also delete a node from the beginning and the end of a singly-linked list.

PROBLEM STATEMENT:

To implement the above operations.

ALGORITHM:

START

INPUT: input from users

COMPUTATION: Computing different operations on the singly-linked list

DISPLAY: Displaying the output after the different operations are performed on a singly-linked list.

STOP

PROGRAM:

#include <stdio.h>

#include <stdlib.h>

#define init() ((struct node\*)malloc(sizeof(struct node)))

typedef struct node

{

int data;

struct node \*next;

struct node \*prev;

}node;

node\* createNode(int data){

node \*n = ((node\*)malloc(sizeof(node)));

n->data = data;

n->next = NULL;

return n;

}

node\* insertBeg(node \*head,int data){

node \*newNode = createNode(data);

newNode->next = head;

return newNode;

}

{

node \*ptr = head;

if(ptr == NULL){

//if list empty doesnot add element

printf("empty\n");

return;

}

while(head->next != NULL){

if(head->next->next != NULL){

head = head->next->next;//runs fast

ptr = ptr->next;//runs half the iterations

}

else{

break;

}

}

node \*temp = ptr->next;

ptr->next = createNode(data);

ptr->next->next = temp;

}

node\* insertEnd(node \*head, int data){

//if empty return a newlist with one element

if(head == NULL){

return createNode(data);

}

head->next = insertEnd(head->next, data);

return head;

}

node\* deleteBeg(node \*head){

node \*temp = head;

//node empty thus returns null

if(head == NULL){

printf("Empty\n");

return NULL;

}

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

free(temp);

return head->next;

}

node\* deleteEnd(node \*head){

if(head == NULL ){

printf("empty\n");

return NULL;

}

if (head->next == NULL){

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

free(head);

return NULL;

}

//last node deleted

head->next = deleteEnd(head->next);

return head;

}

//displays the list

void display(node \*head){

while(head!=NULL){

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

head = head->next;

}

printf("NULL\n");

}

int main () {

int choice,data;

node \*head ;

while(1){

printf("\n\*\*\*Main Menu\*\n");

printf("\nChoose one option from the following list ...\n");

printf("\n----------------------------------\n");

printf("\n1.Insert in beginning\n2.Insert at last\n3.Insert middle.\n4.Delete number at the beginning \n5.Delete number at the end\n6.Display\n7.Exit\n");

printf("\nEnter your choice\n");

scanf("\n%d",&choice);

switch(choice){

case 1:{

printf("Enter the data to be inserted\n");

scanf("%d",&data);

head = insertBeg(head, data);

break;

}

case 2:{

printf("Enter the data to be inserted\n");

scanf("%d",&data);

head = insertEnd(head, data);

break;

}

case 3:{

printf("Enter the data to be inserted\n");

scanf("%d",&data);

insertMiddle(head, data);

break;

}

case 4:{

head = deleteBeg(head);

break;

}

case 5:{

head = deleteEnd(head);

break;

}

case 6:{

printf("The list:\n");

display(head);

break;

}

case 7: {exit(0);break;}

}

}

return 0;

}

CONCLUSION:

This program helps us to understand to change a singly-linked list according to the users choice.

OUTPUT:

\*\*\*Main Menu\*

Choose one option from the following list ...

-----------------------------------------------

1.Insert in beginning

2.Insert at last

3.Insert middle

4.Delete number at the beginning

5.Delete number at the end

6.Display

7.Exit

Enter your choice

1

Enter the data to be inserted

1

\*\*\*Main Menu\*

Choose one option from the following list …

-----------------------------------------------

1.Insert in beginning

2.Insert at last

3.Insert middle

4.Delete number at the beginning

5.Delete number at the end

6.Display

7.Exit

Enter your choice?

1

Enter the data to be inserted

2

\*\*\*Main Menu\*

Choose one option from the following list ...

1.Insert in beginning

2.Insert at last

3.Insert middle

4.Delete number at the beginning

5.Delete number at the end

6.Display

7.Exit

Enter your choice

1

Enter the data to be inserted

3

\*\*\*Main Menu\*

Choose one option from the following list ...

1.Insert in beginning

2.Insert at last

3.Insert middle

4.Delete number at the beginning

5.Delete number at the end

6.Display

7.Exit

Enter your choice

6

The list:

3->2->1->NULL

Enter your choice?

7