ASSIGNMENT-14

Write a C Program for the following problem statements

1. Write a C Program to perform the following operations in Singly Linked List

- create a singly linked list of n nodes.

- insert a new node at the beginning

- insert a new node at the end

- insert a new node at any location

- delete a node at the beginning

- delete a node at the end

- delete a node at any location

- search an existing element

- display all elements

#include <stdio.h>

#include <stdio.h>

struct node

{

int data;

struct node\* link;

};

struct node\* start = NULL;

// Function to traverse the linked list

void traverse()

{

struct node\* temp;

if (start == NULL)

printf("\nList is empty\n");

else

{

temp = start;

while (temp != NULL) {

printf("Data = %d\n",

temp->data);

temp = temp->link;

}

}

}

// Function to insert at the front

void insertAtFront()

{

int data;

struct node\* temp;

temp = malloc(sizeof(struct node));

printf("\nEnter number to"

" be inserted : ");

scanf("%d", &data);

temp->data = data;

temp->link = start;

start = temp;

}

// Function to insert at the end of

void insertAtEnd()

{

int data;

struct node \*temp, \*head;

temp = malloc(sizeof(struct node));

printf("\nEnter number to"

" be inserted : ");

scanf("%d", &data);

temp->link = 0;

temp->data = data;

head = start;

while (head->link != NULL) {

head = head->link;

}

head->link = temp;

}

// Function to insert at any specified

void insertAtPosition()

{

struct node \*temp, \*newnode;

int pos, data, i = 1;

newnode = malloc(sizeof(struct node));

printf("\nEnter position and data :");

scanf("%d %d", &pos, &data);

temp = start;

newnode->data = data;

newnode->link = 0;

while (i < pos - 1) {

temp = temp->link;

i++;

}

newnode->link = temp->link;

temp->link = newnode;

}

// Function to delete from the front

void deleteFirst()

{

struct node\* temp;

if (start == NULL)

printf("\nList is empty\n");

else {

temp = start;

start = start->link;

free(temp);

}

}

// Function to delete from the end

void deleteEnd()

{

struct node \*temp, \*prevnode;

if (start == NULL)

printf("\nList is Empty\n");

else {

temp = start;

while (temp->link != 0) {

prevnode = temp;

temp = temp->link;

}

free(temp);

prevnode->link = 0;

}

}

// Function to delete from any specified

void deletePosition()

{

struct node \*temp, \*position;

int i = 1, pos;

if (start == NULL)

printf("\nList is empty\n");

else {

printf("\nEnter index : ");

scanf("%d", &pos);

position = malloc(sizeof(struct node));

temp = start;

while (i < pos - 1) {

temp = temp->link;

i++;

}

position = temp->link;

temp->link = position->link;

free(position);

}

}

int main()

{

int choice;

while (1) {

printf("\n\t1 To see list\n");

printf("\t2 For insertion at"

" starting\n");

printf("\t3 For insertion at"

" end\n");

printf("\t4 For insertion at "

"any position\n");

printf("\t5 For deletion of "

"first element\n");

printf("\t6 For deletion of "

"last element\n");

printf("\t7 For deletion of "

"element at any position\n");

printf("\t8 To exit\n");

printf("\nEnter Choice :\n");

scanf("%d", &choice);

switch (choice) {

case 1:

traverse();

break;

case 2:

insertAtFront();

break;

case 3:

insertAtEnd();

break;

case 4:

insertAtPosition();

break;

case 5:

deleteFirst();

break;

case 6:

deleteEnd();

break;

case 7:

deletePosition();

break;

case 8:

exit(1);

break;

default:

printf("Incorrect Choice\n");

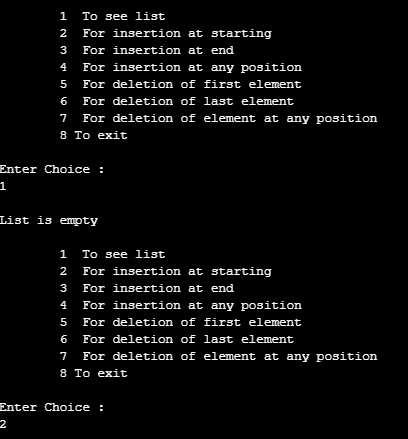
}

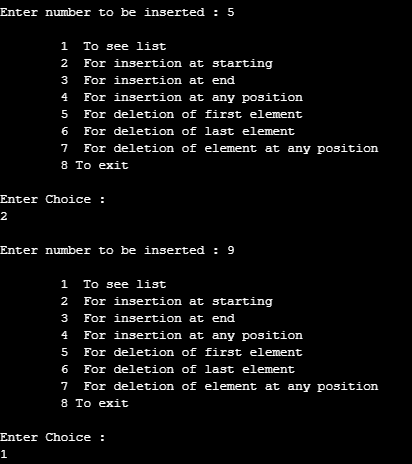
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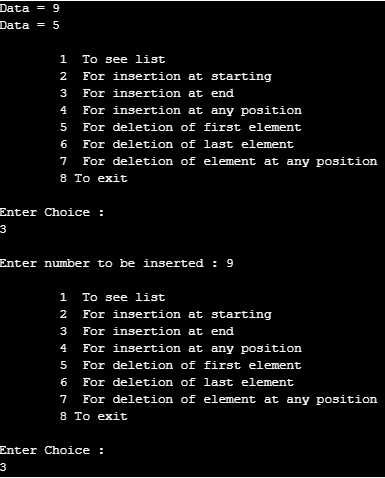
return 0;

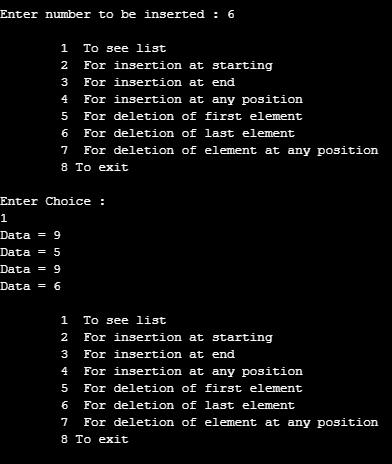
}

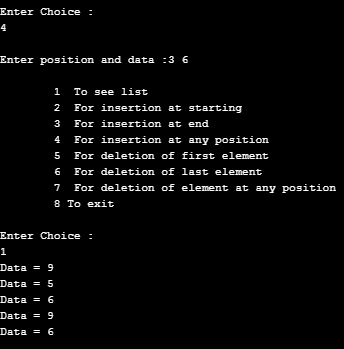
Output:-

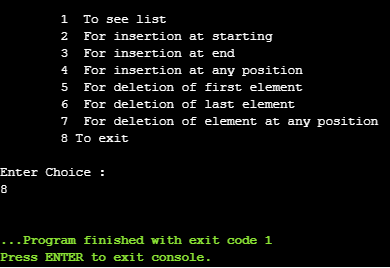












2. Write a C Program to perform the following operations in Doubly Linked List

- create a singly linked list of n nodes.

- insert a new node at the beginning

- insert a new node at the end

- insert a new node at any location

- delete a node at the beginning

- delete a node at the end

- delete a node at any location

- search an existing element

- display all elements

#include<stdio.h>

#include<stdlib.h>

struct node

{

struct node \*prev;

struct node \*next;

int data;

};

struct node \*head;

void insertion\_beginning();

void insertion\_last();

void insertion\_specified();

void deletion\_beginning();

void deletion\_last();

void deletion\_specified();

void display();

void search();

void main ()

{

int choice =0;

while(choice != 9)

{

printf("\n1.Insert in begining\n2.Insert at last\n3.Insert at any random location\n4.Delete from Beginning\n 5.Delete from last\n6.Delete the node after the given data\n7.Search\n8.Show\n9.Exit\n");

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

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

switch(choice)

{

case 1:

insertion\_beginning();

break;

case 2:

insertion\_last();

break;

case 3:

insertion\_specified();

break;

case 4:

deletion\_beginning();

break;

case 5:

deletion\_last();

break;

case 6:

deletion\_specified();

break;

case 7:

search();

break;

case 8:

display();

break;

case 9:

exit(0);

break;

default:

printf("Please enter valid choice..");

}

}

}

void insertion\_beginning()

{

struct node \*ptr;

int item;

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

if(ptr == NULL)

{

printf("\nOVERFLOW");

}

else

{

printf("\nEnter Item value");

scanf("%d",&item);

if(head==NULL)

{

ptr->next = NULL;

ptr->prev=NULL;

ptr->data=item;

head=ptr;

}

else

{

ptr->data=item;

ptr->prev=NULL;

ptr->next = head;

head->prev=ptr;

head=ptr;

}

printf("\nNode inserted\n");

}

}

void insertion\_last()

{

struct node \*ptr,\*temp;

int item;

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

if(ptr == NULL)

{

printf("\nOVERFLOW");

}

else

{

printf("\nEnter value");

scanf("%d",&item);

ptr->data=item;

if(head == NULL)

{

ptr->next = NULL;

ptr->prev = NULL;

head = ptr;

}

else

{

temp = head;

while(temp->next!=NULL)

{

temp = temp->next;

}

temp->next = ptr;

ptr ->prev=temp;

ptr->next = NULL;

}

}

printf("\nnode inserted\n");

}

void insertion\_specified()

{

struct node \*ptr,\*temp;

int item,loc,i;

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

if(ptr == NULL)

{

printf("\n OVERFLOW");

}

else

{

temp=head;

printf("Enter the location");

scanf("%d",&loc);

for(i=0;i<loc;i++)

{

temp = temp->next;

if(temp == NULL)

{

printf("\n There are less than %d elements", loc);

return;

}

}

printf("Enter value");

scanf("%d",&item);

ptr->data = item;

ptr->next = temp->next;

ptr -> prev = temp;

temp->next = ptr;

temp->next->prev=ptr;

printf("\nnode inserted\n");

}

}

void deletion\_beginning()

{

struct node \*ptr;

if(head == NULL)

{

printf("\n UNDERFLOW");

}

else if(head->next == NULL)

{

head = NULL;

free(head);

printf("\nnode deleted\n");

}

else

{

ptr = head;

head = head -> next;

head -> prev = NULL;

free(ptr);

printf("\nnode deleted\n");

}

}

void deletion\_last()

{

struct node \*ptr;

if(head == NULL)

{

printf("\n UNDERFLOW");

}

else if(head->next == NULL)

{

head = NULL;

free(head);

printf("\nnode deleted\n");

}

else

{

ptr = head;

if(ptr->next != NULL)

{

ptr = ptr -> next;

}

ptr -> prev -> next = NULL;

free(ptr);

printf("\nnode deleted\n");

}

}

void deletion\_specified()

{

struct node \*ptr, \*temp;

int val;

printf("\n Enter the data after which the node is to be deleted : ");

scanf("%d", &val);

ptr = head;

while(ptr -> data != val)

ptr = ptr -> next;

if(ptr -> next == NULL)

{

printf("\nCan't delete\n");

}

else if(ptr -> next -> next == NULL)

{

ptr ->next = NULL;

}

else

{

temp = ptr -> next;

ptr -> next = temp -> next;

temp -> next -> prev = ptr;

free(temp);

printf("\nnode deleted\n");

}

}

void display()

{

struct node \*ptr;

printf("\n printing values...\n");

ptr = head;

while(ptr != NULL)

{

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

ptr=ptr->next;

}

}

void search()

{

struct node \*ptr;

int item,i=0,flag;

ptr = head;

if(ptr == NULL)

{

printf("\nEmpty List\n");

}

else

{

printf("\nEnter item which you want to search?\n");

scanf("%d",&item);

while (ptr!=NULL)

{

if(ptr->data == item)

{

printf("\nitem found at location %d ",i+1);

flag=0;

break;

}

else

{

flag=1;

}

i++;

ptr = ptr -> next;

}

if(flag==1)

{

printf("\nItem not found\n");

}

}

}

Output:-

