**WEEK 2**

**Doubly linked list Implementation**

#include <stdio.h>

#include <stdlib.h>

struct node

{

struct node \*Prev;

int Element;

struct node \*Next;

};

typedef struct node Node;

int IsEmpty(Node \*List);

int IsLast(Node \*Position);

Node \*Find(Node \*List, int x);

void InsertBeg(Node \*List, int e);

void InsertLast(Node \*List, int e);

void InsertMid(Node \*List, int p, int e);

void DeleteBeg(Node \*List);

void DeleteEnd(Node \*List);

void DeleteMid(Node \*List, int e);

void Traverse(Node \*List);

int main()

{

Node \*List = malloc(sizeof(Node));

List->Prev = NULL;

List->Next = NULL;

Node \*Position;

int ch, e, p;

printf("1.Insert Beg \n2.Insert Middle \n3.Insert End");

printf("\n4.Delete Beg \n5.Delete Middle \n6.Delete End");

printf("\n7.Find \n8.Traverse \n9.Exit\n");

do

{

printf("Enter your choice : ");

scanf("%d", &ch);

switch(ch)

{

case 1:

printf("Enter the element : ");

scanf("%d", &e);

InsertBeg(List, e);

break;

case 2:

printf("Enter the position element : ");

scanf("%d", &p);

printf("Enter the element : ");

scanf("%d", &e);

InsertMid(List, p, e);

break;

case 3:

printf("Enter the element : ");

scanf("%d", &e);

InsertLast(List, e);

break;

case 4:

DeleteBeg(List);

break;

case 5:

printf("Enter the element : ");

scanf("%d", &e);

DeleteMid(List, e);

break;

case 6:

DeleteEnd(List);

break;

case 7:

printf("Enter the element : ");

scanf("%d", &e);

Position = Find(List, e);

if(Position != NULL)

printf("Element found...!\n");

else

printf("Element not found...!\n");

break;

case 8:

Traverse(List);

break;

}

} while(ch <= 8);

return 0;

}

int IsEmpty(Node \*List)

{

if(List->Next == NULL)

return 1;

else

return 0;

}

int IsLast(Node \*Position)

{

if(Position->Next == NULL)

return 1;

else

return 0;

}

Node \*Find(Node \*List, int x)

{

Node \*Position;

Position = List->Next;

while(Position != NULL && Position->Element != x)

Position = Position->Next;

return Position;

}

void InsertBeg(Node \*List, int e)

{

Node \*NewNode = malloc(sizeof(Node));

NewNode->Element = e;

if(IsEmpty(List))

NewNode->Next = NULL;

else

{

NewNode->Next = List->Next;

NewNode->Next->Prev = NewNode;

}

NewNode->Prev = List;

List->Next = NewNode;

}

void InsertLast(Node \*List, int e)

{

Node \*NewNode = malloc(sizeof(Node));

Node \*Position;

NewNode->Element = e;

NewNode->Next = NULL;

if(IsEmpty(List))

{

NewNode->Prev = List;

List->Next = NewNode;

}

else

{

Position = List;

while(Position->Next != NULL)

Position = Position->Next;

Position->Next = NewNode;

NewNode->Prev = Position;

}

}

void InsertMid(Node \*List, int p, int e)

{

Node \*NewNode = malloc(sizeof(Node));

Node \*Position;

Position = Find(List, p);

NewNode->Element = e;

NewNode->Next = Position->Next;

Position->Next->Prev = NewNode;

Position->Next = NewNode;

NewNode->Prev = Position;

}

void DeleteBeg(Node \*List)

{

if(!IsEmpty(List))

{

Node \*TempNode;

TempNode = List->Next;

List->Next = TempNode->Next;

if(List->Next != NULL)

TempNode->Next->Prev = List;

printf("The deleted item is %d\n", TempNode->Element);

free(TempNode);

}

else

printf("List is empty...!\n");

}

void DeleteEnd(Node \*List)

{

if(!IsEmpty(List))

{

Node \*Position;

Node \*TempNode;

Position = List;

while(Position->Next != NULL)

Position = Position->Next;

TempNode = Position;

Position->Prev->Next = NULL;

printf("The deleted item is %d\n", TempNode->Element);

free(TempNode);

}

else

printf("List is empty...!\n");

}

void DeleteMid(Node \*List, int e)

{

if(!IsEmpty(List))

{

Node \*Position;

Node \*TempNode;

Position = Find(List, e);

if(!IsLast(Position))

{

TempNode = Position;

Position->Prev->Next = Position->Next;

Position->Next->Prev = Position->Prev;

printf("The deleted item is %d\n", TempNode->Element);

free(TempNode);

}

}

else

printf("List is empty...!\n");

}

void Traverse(Node \*List)

{

if(!IsEmpty(List))

{

Node \*Position;

Position = List;

while(Position->Next != NULL)

{

Position = Position->Next;

printf("%d\t", Position->Element);

}

printf("\n");

}

else

printf("List is empty...!\n");

}