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Assignment no. 5

Write C++ program for storing binary number using doubly linked lists. Write functions-

a) To compute 1’s and 2’s complement

b) Add two binary numbers

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#include <iostream>

using namespace std;

typedef struct node

{

int binary\_digit;

struct node \*next;

struct node \*prev;

}node;

class dll

{

public:

node \*head\_node,\*last\_node; int b;

dll()

{

head\_node=NULL;

last\_node=NULL;

}

node \*create()

{

head\_node=NULL;

node \*new\_node,\*current\_node;

cout<<"\nEnter number of BITS of binary number ";

cin>>b;

cout<<"Enter binary number:"<<endl;

for(int i=0;i<b;i++){

new\_node=new node;

cin>>new\_node->binary\_digit;

new\_node->next=NULL;

new\_node->prev=NULL;

if(head\_node==NULL){

head\_node=new\_node;

last\_node=new\_node;

}

else{

current\_node=head\_node;

while(current\_node->next!=NULL){

current\_node=current\_node->next;

}

current\_node->next=new\_node;

new\_node->prev=current\_node;

last\_node=new\_node;

}

}

return head\_node;

}

void display(node \*pq){

node \*current\_node;

current\_node=pq;

while(current\_node!=NULL){

cout<<current\_node->binary\_digit;

current\_node=current\_node->next;

}

}

void ones(){

cout<<"\nOne's Complement: "<<endl;

node \*current\_node;

current\_node=head\_node;

while(current\_node!=NULL){

if(current\_node->binary\_digit==0)

{

cout<<1;

}

else cout<<0;

current\_node=current\_node->next;

}

}

void twos()

{

cout<<"\n2's Complement:\n";

node \*current\_node,\*t,\*x;

int flag=0;

int m;

current\_node=t=last\_node;

while(current\_node!=NULL)

{

if(flag==0)

{

if(current\_node->binary\_digit==0)

t->binary\_digit=0;

else

{

t->binary\_digit=1;

flag=1;

}

}

else

{

if(current\_node->binary\_digit==0)

t->binary\_digit=1;

else t->binary\_digit=0;

}

x=t;

t=t->prev;

m=current\_node->binary\_digit;

current\_node=current\_node->prev;

}

display(x);

}

void add()

{

node \*head\_node1,\*head\_node2;

node \*l1,\*l2;

cout<<"\n\nBinary number 1\n";

head\_node1=create();

l1=last\_node;

cout<<"\n\nBinary number 2\n";

head\_node2=create();

l2=last\_node;

cout<<"\nNumber 1: ";

display(head\_node1); cout<<endl;

cout<<"\nNumber 2: ";

display(head\_node2); cout<<endl;

int A[20]; int p=0;

cout<<"\nAddition is\n";

int cy=0;

while(l1!=NULL&&l2!=NULL)

{

if(l1->binary\_digit==l2->binary\_digit&&l1->binary\_digit==0)

{

A[p]=0+cy;

p++;

cy=0;

}

else if(l1->binary\_digit==l2->binary\_digit&&l1->binary\_digit==1)

{

A[p]=0+cy;

p++;

cy=1;

}

else if(l1->binary\_digit!=l2->binary\_digit)

{

if(cy==1)

{

A[p]=0;

p++;

cy=1;

}

else

{

A[p]=1;

p++;

}

}

l1=l1->prev;

l2=l2->prev;

}

while(l1!=NULL)

{

if(cy==0)

{ A[p]=l1->binary\_digit;

p++;

}

else if(l1->binary\_digit==1&&cy==1)

{

A[p]=0;

p++;

}

else if(l1->binary\_digit==0&&cy==1)

{

A[p]=1;

p++;

cy=0;

}

l1=l1->prev;

}

while(l2!=NULL)

{

if(cy==0)

{ A[p]=l2->binary\_digit;

p++;

}

else if(l2->binary\_digit==1&&cy==1)

{

A[p]=0;

p++;

}

else if(l2->binary\_digit==0&&cy==1)

{

A[p]=1;

p++;

cy=0;

}

l2=l2->prev;

}

if(cy==1)

{

A[p]=cy;

p++;

}

for(int i=p-1;i>=0;i--)

cout<<A[i];

}

};

int main()

{

dll obj;

node \*p;

cout << "Example input: " << endl;

cout << "Enter number of BITS of binary number: 4" << endl;

cout << "Enter binary number: " << endl;

cout << "1" << endl;

cout << "0" << endl;

cout << "1" << endl;

cout << "0" << endl;

cout << endl;

cout << "----------------------------------" << endl;

cout<<"\t\tMenu\t\t" << endl;

cout << "----------------------------------" << endl;

cout<<"1. Enter Binary Number"<< endl;

cout<<"2. Display number"<< endl;

cout<<"3. Calculate One's Complement"<< endl;

cout<<"4. Calculate Two's Complement"<< endl;

cout<<"5. Add Two Binary Numbers"<< endl;

cout<<"6. Exit"<< endl;

int ch;

do{

cout<< endl <<"Enter Choice:\t";

cin>>ch;

switch(ch)

{

case 1: obj.create();

p=obj.head\_node; break;

case 2: cout<<"\nEntered Number is ";

p=obj.head\_node;

obj.display(p); cout<<endl;break;

case 3: obj.ones(); cout<<endl; break;

case 4: obj.twos(); cout<<endl; break;

case 5: obj.add(); cout<<endl; break;

case 6: cout<<"Exit."<< endl; break;

default: ch=6; cout<<"Exit.\n"; break;

}

}while(ch!=6);

}