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Roll No	1345
Name	Shubham Sarang
Topic	DLL
Title of Program	Doubly linked list

CODE:

```
/*
Name: Shubham Sarang
Roll no: 1345
Program: Doubly Linked List
*/
#include<iostream>
#include<conio.h>
using namespace std;
//Node template
class DNode
{
	public:
		int data;
		DNode *left;
		DNode *right;
};
class DList
{
```

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```
        DNode *head;
        DNode *tail;
        public:
                DList()
                {
                        head = NULL;
                        tail = NULL;
                }
                void Insert(int x);
                void Display();
                void Length();
                void Search(int x);
                void Remove(int x);
};
//List template
void DList :: Insert(int x)
{
        DNode *t = new DNode();
        t->data = x;
        t->left = NULL;
        t->right = NULL;
        if(head == NULL)
```

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```
        {
                head = t;
                tail = t;
        }
        else
        {
                tail->right = t;
                t->left = tail;
                tail = t;
        }
}

void DList :: Display()
{
        if(head == NULL)
        {
                cout<<"Empty list";
                return;
        }

        DNode *tmp = head;
        cout<<"Forward Direction: ";
```

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```
        while( tmp!= NULL)
        {
                cout<<tmp->data<<"<->";
                tmp = tmp->right;
        }
        cout<<"End of list"<<endl;
        tmp = tail;
        cout<<"Reverse Direction: ";
        while( tmp!= NULL)
        {
                cout<<tmp->data<<"<->";
                tmp = tmp->left;
        }
        cout<<"Start of list"<<endl;
}

void DList::Length()
{
        int count=0;
        if(head == NULL)
        {
                cout<<"Empty list";
```

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```
            return;
        }

        DNode *tmp = head;
        while( tmp!= NULL)
        {
            count++;
            tmp = tmp->right;
        }
        cout<<"Length of list: "<<count;
}

void DList::Search(int x)
{
        if(head == NULL)
        {
            cout<<"Empty list";
            return;
        }
        int flag = 0;
        DNode *tmp = head;
        while(tmp!=NULL)
```

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```
    {
        if(tmp->data==x)
        {
            flag=1;
            break;
        }
        tmp=tmp->right;
    }

    if(flag==1)
    {
        cout<<"Element "<<x<<" found";
    }
    else
    {
        cout<<"Element "<<x<<" not found";
    }
}

void DList::Remove(int x)
{
    if(head == NULL)
```

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```
{
        cout<<"Empty list";
        return;
}
DNode *tmp = head;
DNode *prev = NULL;
int flag = 0;
while(tmp!=NULL)
{
        if(tmp->data == x)
        {
                flag = 1;
                break;
        }
        prev = tmp;
        tmp = tmp->right;
}
//step 3: unsuccessfull search return control
if(flag==0)
{
        cout<<"Element "<<x<<" not found ";
        return;
```

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```
}

//Step 4: Successful search, a single node deletion
if(head == tail)
{
        head = NULL;
        tail = NULL;
}
else if(tmp==head) //step 4 b: head node deletion
{
        head = tmp->right;
        head->left = NULL;
}
else if(tmp == tail) //step4 c: tail node deletion
{
        tail = prev;
        tail->right = NULL;
}
else //Step 4 d: any node in the middle
{
        prev->right = tmp->right;
        (tmp->right)->left = prev;
```

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```
        }
    //Step 5: delete the node containing x
    delete tmp;
    cout<<"Element deleted ";
}
//Functions

//Menu

int main()
{
        int ch, x, y,z, num;
        DList d;
        while(1)
        {
                system("cls");
                cout<<"**Doubly linked list**"<<endl;
                cout<<"1. Insert in DLL\n";
                cout<<"2. Display List\n";
                cout<<"3. Length of DLL\n";
                cout<<"4. Search for the node in DLL\n";
                cout<<"5. Remove a node\n";
```

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```
cout<<"6. Exit\n\n";

cout<<"Enter your choice: ";
cin>>ch;

switch(ch)
{
        case 1:
                cout<<"Enter the data: ";
                cin>>num;
                d.Insert(num);
                getch();
                break;
        case 2:
                cout<<"The list is: ";
                d.Display();
                getch();
                break;
        case 3:
                cout<<"Length of the list is: ";
                d.Length();
                getch();
```

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```
                    break;
            case 4:
                    cout<<"Enter the element to be searched: ";
                    cin>>y;
                    d.Search(y);
                    getch();
                    break;
            case 5:
                    cout<<"Enter the element to be removed: ";
                    cin>>z;
                    d.Remove(z);
                    d.Display();
                    getch();
                    break;
            case 6:
                    exit(1);
            default:
                    cout<<"Incorrect option";
                    getch();
                    break;
        }//end of switch
}//end while
```

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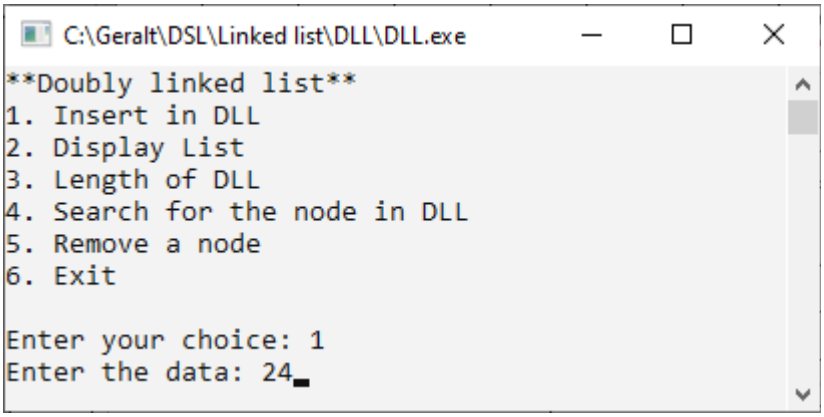
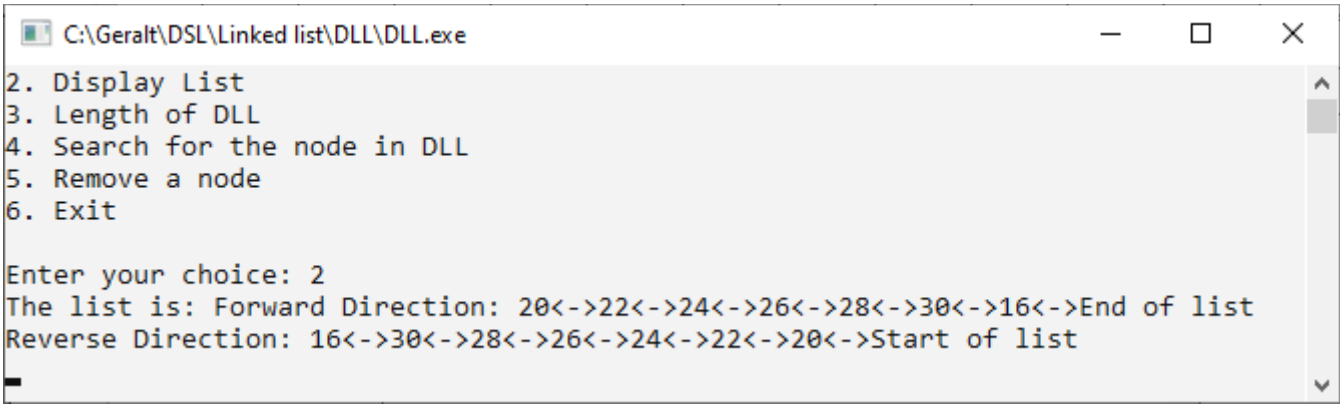
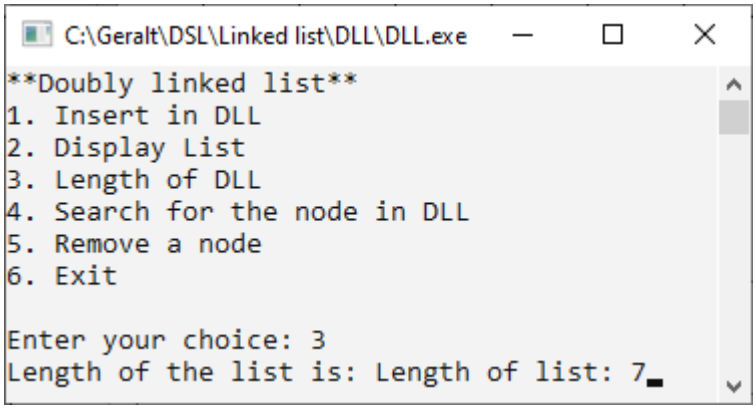
}//end main

Enter element in list:



Display list:





Length of list:

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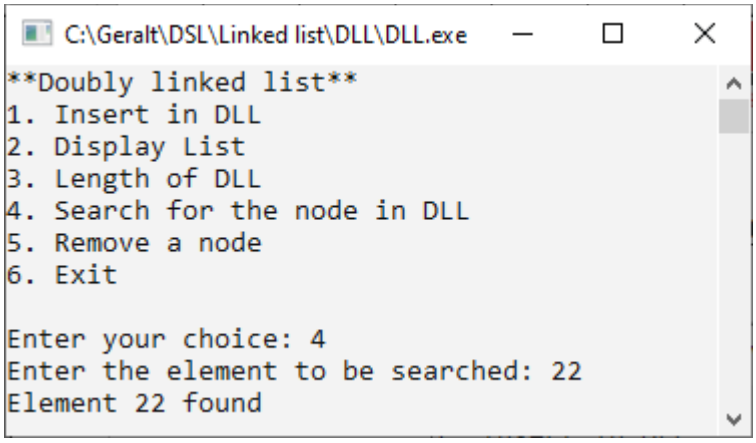
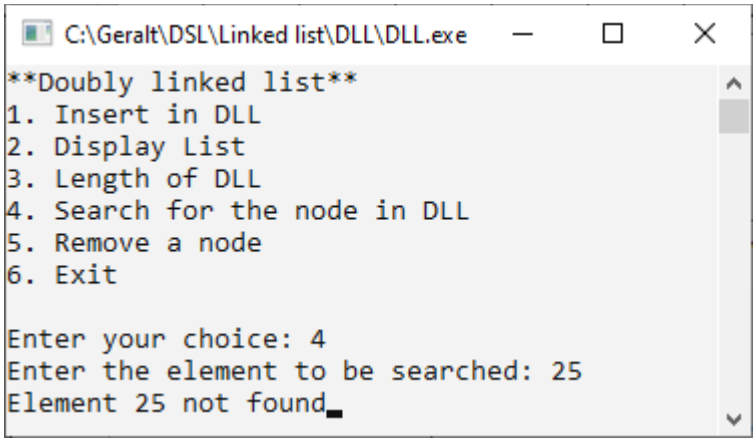
Search element:

Element found:



Element not found:



Delete element:

Head node deletion:

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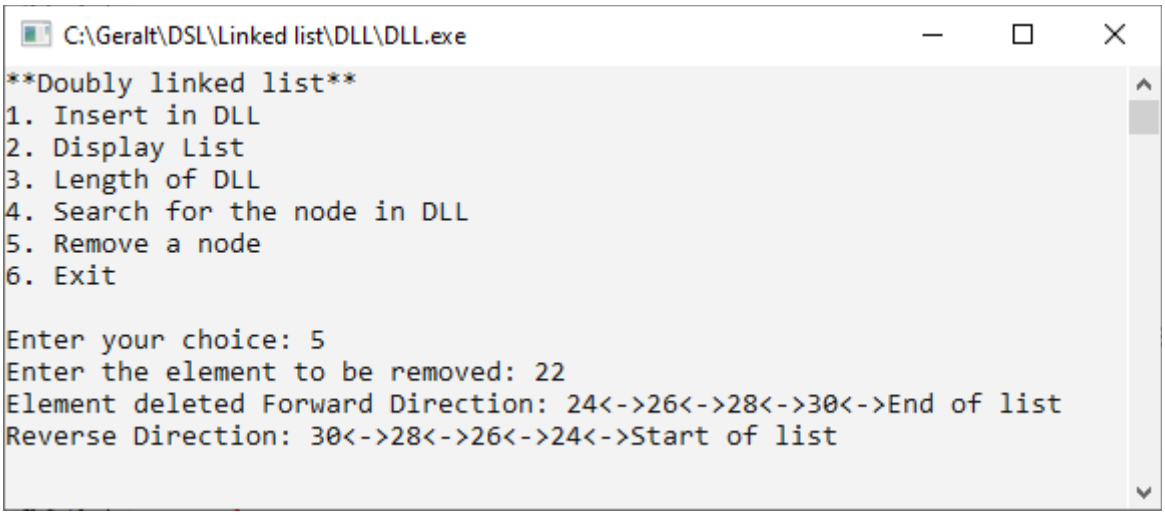
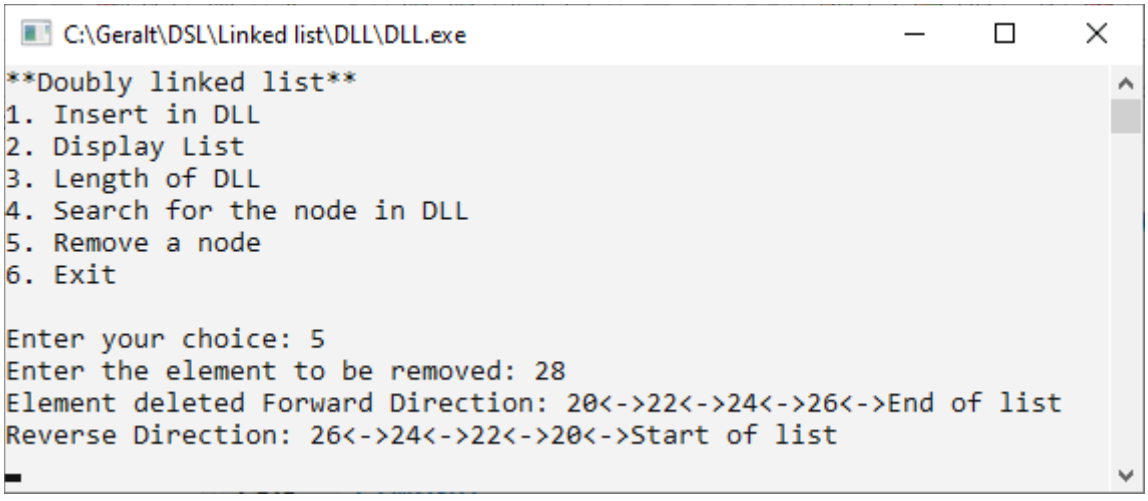


Tail node deletion:



Mid node deletion:

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