

	<b>Assignment No. 1</b> <b>Semester: Spring 2021</b> <b>CS301 – Data Structures</b>	<b>Total Marks: 20</b> <b>Due Date: 18/05/2021</b>
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## **Solution**

**NAME: TAMKEEN SAJJAD**

**ID: MC200400003**

**Course: MIT**

### Program Code:

```
#include<iostream>
#include <string>

using namespace std;

struct node
{
    int courseID;
    string studentName;
    node *next;
};

class list
{
private:
    node *head, *tail;
public:
    list()
    {
        head=NULL;
        tail=NULL;
    }
    void createnode(int value, string name)
    {
        node *temp=new node;
        temp->courseID=value;
        temp->studentName=name;
        temp->next=NULL;
        if(head==NULL)
        {
            head=temp;
            tail=temp;
            temp=NULL;
        }
        else
        {
            tail->next=temp;
            tail=temp;
        }
    }
    void display()
    {
        node *temp=new node;
        temp=head;
```

```

        while(temp!=NULL)
        {
            cout<<"("<<temp->courseID<<","<<temp->studentName<<")\t";
            temp=temp->next;
        }
        cout<<"\n";
    }
    void displayWithCourseID(int id)
    {
        node *temp=new node;
        temp=head;
        while(temp!=NULL)
        {
            if(temp->courseID == id)
            {
                cout<<"("<<temp->courseID<<","<<temp->studentName<<")\t";
            }
            temp=temp->next;
        }
        cout<<"\n";
    }
    void insert_start(int value, string name)
    {
        node *temp=new node;
        temp->courseID=value;
        temp->studentName=name;
        temp->next=head;
        head=temp;
    }

    void insert_position(int pos, int value, string name)
    {
        node *pre=new node;
        node *cur=new node;
        node *temp=new node;
        cur=head;
        for(int i=1;i<pos;i++)
        {
            pre=cur;
            cur=cur->next;
        }
        temp->courseID=value;
        temp->studentName=name;
        pre->next=temp;
        temp->next=cur;
    }

```

```

    }

    void delete_first()
    {
        node *temp=new node;
        temp=head;
        head=head->next;
        delete temp;
    }
    void delete_last()
    {
        node *current=new node;
        node *previous=new node;
        current=head;
        while(current->next!=NULL)
        {
            previous=current;
            current=current->next;
        }
        tail=previous;
        previous->next=NULL;
        delete current;
    }
    void delete_position(int pos)
    {
        node *current=new node;
        node *previous=new node;
        current=head;
        for(int i=1;i<pos;i++)
        {
            previous=current;
            current=current->next;
        }
        previous->next=current->next;
    }
};

int main()
{
    list obj;
    string n;
    char opt;
    int cID;

    cout<<"Enter the name of the Student: ";
    cin>>n;

```

```

cout<<"1. Introduction to Computing "<<endl;
cout<<"2. Introduction to Programming "<<endl;
cout<<"3. Data Structures "<<endl;
cout<<"4. Object Oriented Programming "<<endl;
cout<<"Enter the course code: ";
cin>>cID;
obj.createnode(cID,n);
cout<<"Student's information saved sesseccfully!"<<endl;

cout<<"Do you want to add another student? ";
cin>>opt;

while(opt=='y')
{
    cout<<"Enter the name of the Student: ";
    cin>>n;
    cout<<"1. Introduction to Computing "<<endl;
    cout<<"2. Introduction to Programming "<<endl;
    cout<<"3. Data Structures "<<endl;
    cout<<"4. Object Oriented Programming "<<endl;
    cout<<"Enter the course code: ";
    cin>>cID;
    obj.createnode(cID,n);
    cout<<"Student's information saved sesseccfully!"<<endl;

    cout<<"Do you want to add another student? ";
    cin>>opt;
}

cout<<"0. Display all students enrolled"<<endl;
cout<<"1. Display all students enrolled in Introduction to Computing "<<endl;
cout<<"2. Display all students enrolled in Introduction to Programming "<<endl;
1;
cout<<"3. Display all students enrolled in Data Structures "<<endl;
cout<<"4. Display all students enrolled in Object Oriented Programming "<<endl;
1;
cout<<"5. Close the program"<<endl;

cout<<"Select an option for required operation: ";
cin>>opt;

do
{
    switch(opt)
    {

```

```

        case '0':
            cout<<"Displaying all students enrolled"<<endl;
            cout<<"\n-----\n";
            cout<<"-----Displaying All nodes-----";
            cout<<"\n-----\n";
            obj.display();
            break;

        case '1':
            cout<<"Displaying all students enrolled in Introduction to Comput
ing "<<endl;
            cout<<"\n-----\n";
            cout<<"-----Displaying All nodes-----";
            cout<<"\n-----\n";
            obj.displayWithCourseID(1);
            break;

        case '2':
            cout<<"Displaying all students enrolled in Introduction to Progra
mming "<<endl;
            cout<<"\n-----\n";
            cout<<"-----Displaying All nodes-----";
            cout<<"\n-----\n";
            obj.displayWithCourseID(2);
            break;

        case '3':
            cout<<"Displaying all students enrolled in Data Structures "<<end
l;
            cout<<"\n-----\n";
            cout<<"-----Displaying All nodes-----";
            cout<<"\n-----\n";
            obj.displayWithCourseID(3);
            break;

        case '4':
            cout<<"Displaying all students enrolled in Object Oriented Progra
mming "<<endl;
            cout<<"\n-----\n";
            cout<<"-----Displaying All nodes-----";
            cout<<"\n-----\n";
            obj.displayWithCourseID(4);
            break;
        case '5':

```

```

        break;
    }
    cout<<"Select an option for required operation: ";
    cin>>opt;
}while(opt!='5');

cout<<"Closing the program"<<endl;

/*list obj;
obj.createnode(25,"Sajjad");
obj.createnode(50,"Tamkeen");
obj.createnode(90,"Tahir");
obj.createnode(40,"Zainab");
cout<<"\n-----\n";
cout<<"-----Displaying All nodes-----";
cout<<"\n-----\n";
obj.display();
cout<<"\n-----\n";
cout<<"-----Inserting At End-----";
cout<<"\n-----\n";
obj.createnode(55,"Hussain");
obj.display();
cout<<"\n-----\n";
cout<<"-----Inserting At Start-----";
cout<<"\n-----\n";
obj.insert_start(50,"Ashique");
obj.display();
cout<<"\n-----\n";
cout<<"-----Inserting At Particular-----";
cout<<"\n-----\n";
obj.insert_position(5,60,"Bhatti");
obj.display();
cout<<"\n-----\n";
cout<<"-----Deleting At Start-----";
cout<<"\n-----\n";
obj.delete_first();
obj.display();
cout<<"\n-----\n";
cout<<"-----Deleing At End-----";
cout<<"\n-----\n";
obj.delete_last();
obj.display();
cout<<"\n-----\n";
cout<<"-----Deleting At Particular-----";
cout<<"\n-----\n";

```

```

    obj.delete_position(4);
    obj.display();
    cout<<"\n-----\n";
    */
    system("pause");
    return 0;
}

```

### Example-1:

```

Enter the name of the Student: mc200400003
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 1
Student's information saved sesseccfully!
Do you want to add another student? n
0. Display all students enrolled
1. Display all students enrolled in Introduction to Computing
2. Display all students enrolled in Introduction to Programming
3. Display all students enrolled in Data Structures
4. Display all students enrolled in Object Oriented Programming
5. Close the program
Select an option for required operation: 0
Displaying all students enrolled

-----
-----Displaying All nodes-----
-----
(1,mc200400003)
Select an option for required operation: 5
Closing the program
Press any key to continue . . . █

```

### Example-2:



```
Enter the name of the Student: Sajjad
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 1
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Tamkeen
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 2
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Tahir
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 3
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Zainab
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 4
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Umar
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 1
Student's information saved sesseccfully!
```

```

Enter the course code: 1
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Ayan
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 2
Student's information saved sesseccfully!
Do you want to add another student? y
Enter the name of the Student: Rehan
1. Introduction to Computing
2. Introduction to Programming
3. Data Structures
4. Object Oriented Programming
Enter the course code: 3
Student's information saved sesseccfully!
Do you want to add another student? n
0. Display all students enrolled
1. Display all students enrolled in Introduction to Computing
2. Display all students enrolled in Introduction to Programming
3. Display all students enrolled in Data Structures
4. Display all students enrolled in Object Oriented Programming
5. Close the program
Select an option for required operation: 0
Displaying all students enrolled

-----
-----Displaying All nodes-----
-----
(1,Sajjad)      (2,Tamkeen)    (3,Tahir)      (4,Zainab)     (1,Umar)       (2,Ayan)       (3,Rehan)
Select an option for required operation: 1
Displaying all students enrolled in Introduction to Computing

-----
-----Displaying All nodes-----
-----
(1,Sajjad)      (1,Umar)
Select an option for required operation: 5
Closing the program

```