

Exercise 5: Linked Lists

Q1: Write and call a function that add a node to the end of a linked list. The node contains id, name and degree of each student. Also, write another function to display the list contents.

```
#include<iostream>
using namespace std;
struct ListNode
{
    int id;
    string name;
    float degree;
    ListNode *next;};

void add_to_end(ListNode *& listHead,int id, string name,float degree)
{
    ListNode *newNode, *nodePtr;
    newNode = new ListNode;
    newNode->id=id;
    newNode->name=name;
    newNode->degree=degree;
    newNode->next=NULL;
    if (!listHead)
        listHead = newNode;
    else
    {
        nodePtr = listHead;
        while (nodePtr->next)
            nodePtr = nodePtr->next;
        nodePtr->next = newNode;
    }
}

void displayList(ListNode * listHead)
{
    if (!listHead)
    {
        cout << "Empty List!" << endl;
        return;
    }
    ListNode *nodePtr = listHead;
    while (nodePtr)
    {
        cout << nodePtr->id<<"\t"<<nodePtr->name<<"\t"<<nodePtr->degree<<"=">";
        nodePtr = nodePtr->next;
    }
    cout<<endl;
}

main ()
{
    int id;
    string name;
    float degree;
    ListNode * Head=NULL;
    cout<<"Enter The Student Info: ";
    cin>> id;
    cin.ignore();
    getline(cin,name);
    cin>>degree;
    add_to_end(Head,id,name,degree);
    displayList(Head);
}
```

Q2: Modify the program of the previous question to allow the user to repeatedly asked to enter a new student or display the list contents.

```
main ()
{
    ListNode * Head=NULL;
    int choice;
    do
    {
        cout<<endl<<endl;
        cout<<"--- Basic Linked List Operations ---"<<endl<<endl;
        cout<<"\n (1) Display Linked List"<<endl;
        cout<<"\n (2) Add Node at End of List"<<endl;
        cout <<"\n PLEASE ENTER YOUR CHOICE:  "<<endl;
        cin>> choice;
        switch(choice)
        {
            case 1:
                displayList(Head);
                break;
            case 2:
                {
                    cout<<"Add a new student to the list:\n";
                    displayList(Head);
                    cout<<"\n Please enter the student info (Id, Name, Degree):";
                    int id;
                    string name;
                    float degree;
                    cout<<"Enter The Student Info: ";
                    cin>> id;
                    cin.ignore();
                    getline(cin,name);
                    cin>>degree;
                    add_to_end(Head,id,name,degree);
                }
                break;
            default:
                cout<<"ERROR: You Entered Wrong Choice Number !!!!!!! Try Again" <<endl;
                break;
        }
    } while (choice !=0);
}
```

Q3: Create a function that counts the number of nodes in a list. Add the function to the previous program and call it.

```
int countList(ListNode * listHead)
{
    int counter=0;
    ListNode *nodePtr = listHead;
    while (nodePtr)
    {
        counter++;
        nodePtr = nodePtr->next;
    }
    return counter;
}
```

Q4: This Question is assigned as an assignment and delivered to the lab instructor. Write and call a function that returns the average degree of all students in the linked list.