

CO222: Programming Methodology**Lab: 11**

Deadline: Apr 10th 2016 @ 11.55PM

Today lab is to make the exact same program as in the last lab. But the implementation should be done with linked lists.

Q1

Write a program that can be used to handle a student registration system.

1. The system should keep following data of each student,
 - a. Registration Number
 - b. Batch
 - c. First Name
 - d. Last Name
 - e. GPA
2. There should be options to
 - a. Add new students.
 - b. Delete students.
 - c. Show the information of a student when his/her registration number is given.
 - d. Show information of all the students.
3. Its okay to make the student registration system volatile. (The data is lost when the program is stopped. No need to write student data to a file or a database.)
4. Internally the program should use a linked list to store student data.
5. The UI can be command line based. (See the sample UI given.)

```
-----  
A VOLATILE STUDENT RECORD MAINTENANCE SYSTEM  
-----  
0. Quit  
1. Insert a Student Record  
2. Print a Student Record  
3. Print all Student Records  
4. Delete a Student Record
```

Figure 1 : Main UI

```
-----  
A VOLATILE STUDENT RECORD MAINTENANCE SYSTEM  
-----  
0. Quit  
1. Insert a Student Record  
2. Print a Student Record  
3. Print all Student Records  
4. Delete a Student Record  
1  
Enter the batch (11/12/13/14): 11  
Enter the registration number: 333  
Enter the first name          : aaa  
Enter the last name           : bbb  
Enter the cumulative GPA      : 3.5
```

Figure 2 : Adding a new record.

```
-----  
A VOLATILE STUDENT RECORD MAINTENANCE SYSTEM  
-----  
0. Quit  
1. Insert a Student Record  
2. Print a Student Record  
3. Print all Student Records  
4. Delete a Student Record  
2  
Enter the Registration Number: 555  
The student ppp qq (E/11/555) has a cumulative GPA of 3.20  
  
-----  
A VOLATILE STUDENT RECORD MAINTENANCE SYSTEM  
-----  
0. Quit  
1. Insert a Student Record  
2. Print a Student Record  
3. Print all Student Records  
4. Delete a Student Record  
3  
The student aaa bbb (E/11/123) has a cumulative GPA of 3.10  
The student ppp qq (E/11/555) has a cumulative GPA of 3.20
```

Figure 3 : Displaying results.

```
-----  
A VOLATILE STUDENT RECORD MAINTENANCE SYSTEM  
-----  
0. Quit  
1. Insert a Student Record  
2. Print a Student Record  
3. Print all Student Records  
4. Delete a Student Record  
4  
Enter the Registration Number: 555
```

Figure 4 : Deleting a record

Instructions

- The code should be in a file named code.c
- Start by creating the UI.
- Next create the structure to store a student record, and the array.
 - An structure similar to following can be used,

```
typedef struct _ {  
    int batch;  
    int regNo;  
    char firstName[20];  
    char lastName[20];  
    float cGPA;  
    struct _* next;  
} student_t;
```

- Create separate functions for each operation (Add, delete, print) and add them to UI.
- Write answers on the discussion part in a text file named discussion.txt
- Put both code.c and discussion.txt files to a zip file named E13###_co222_lab10.zip
 - use `zip -r E13###_co222_lab10.zip *`
 - Replace ### with your registration number.
- Submit E13###_co222_lab10.zip to feels.

Discussion

1. How much memory (in bytes) is allocated for your linked list with 5 data elements inserted? Show your calculation.
2. At what stage of your program this memory allocation is happened and when the memory is freed?
3. Explain how deleting values is implemented?
4. Can we add unlimited amount of student data to this program? If no what is the limitation now?
5. What are the pros and cons of linked lists over arrays?
6. Assume you want a similar system to add exactly 1000 student records at the beginning and after that no additions or deleting. Each record has a unique ID from 0-999. You want to view the student records and modify them. What is the preferred way to implement the system (Array based or Linked list based)? Explain.