

CO222: Programming Methodology

Lab: 10

E/18/022

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1. How much memory (in bytes) is allocated for your Linked-list with 5 data elements inserted? Show your calculation.

For other nodes,

int batchNo;	= 4 bytes
int regNo;	= 4 bytes
char firstName[20];	= 20 bytes
char lastName[20];	= 20 bytes
float cGPA;	= 8 bytes
struct _ *next;	= <u>8 bytes</u>
Total	= 64 bytes

Another 64 bytes allocated for tail node

Total memory allocation for the list = $6 \times 64 = \underline{384 \text{ bytes}}$

2. At what stage of your program, this memory allocation has happened and when the memory is freed?

- First 64 bytes allocated after `student_t *head= (student_t *)malloc(sizeof(student_t));` line executed.
- When user enter 1 it calls Add() function and allocated 64 bytes
- After calling 5 times Add() function, total 384 bytes has allocated.

3. Explain how deleting values is implemented?

- If list doesn't have any element it prints "No student with given registration number"
- If data which wants to delete is at first node of the list it updates head from head ->next and free head node.
- If data is at middle of the list, it finds the previous node and update previous node next from current node (node contain data wants to delete) next. Then free current node.

4. Can we add an unlimited amount of student data to this program? If not, what is the limitation?

- The maximum amount of student data would be limited only by memory.
- The program can hold many data records until the memory run out of space.
- The program really cannot hold an unlimited amount of student data, but the limit will be much higher.

5. What are the pros and cons of linked lists over arrays?

Pros in Linked-list

- Efficient memory utilization can achieve.
- No memory wastage
- It has dynamic data structure
- Insertion and deletion operations are more easier and fast.

Cons in Linked-list

- Takes more time for search an element.
- Need more memory compared to an array.
- Reverse traversing is not possible.

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

- In here no need dynamic data allocation because the size of data in the system is fixed and no more additions or deleting implemented. System contains unique ID for each student so it is better to use array elements instead of linked-list.
- It is preferred Array-based system.