CHAPTER 10

Linked List Revisited

This task is a big task and is divided into multiple sub-tasks. Do not be alarmed if you are not able to complete all the sub-tasks as they all carry partial marks, and some tasks might not be marked. Check the mark (task weight) of the sub-task to understand or speculate how much you got when you completed one. As a few students could not complete their tasks, I have made the task smaller. However, the next ones will be more inclusive so brush up your coding skills.

10.1 Scenario

This is not a sub-task, but a scenario to help you understand the sub-tasks better. The Spanish Football League have started giving emphasis to computer softwares to manage their clubs as the current health crisis have moved a lot of things online. You have been selected as one of the few programmers to code their database using raw structured languages (C). The teams and players can regularly change their affiliations so you have to create the system to be able to change easily (use linked lists). The club owners have given a hefty amount for the system and so the system has been divided into multiple milestones for your ease of completion.

10.2 Structure Formation

Task priority: 01, Task Weight: 05
Each club will have certain information that they need to store. The clubs are the nodes of the linked list and in this sub-task you have to create the node structure. The node will contain the following information:

- Name of club (maximum of 30 letters)
- Year of Formation (a whole number)
- Yearly revenue in million Euros (a real number)
- A structure pointer which can point to another club

Each of the clubs will have multiple player contracts and the contract is also a structure. The player contract information is as follows:

- Name of Player (maximum 30 letters)
- Age of Player (a whole number)
- Player rating (a whole number)
- Yearly salary in million Euros (a real number)
- Position (maximum 15 letters)

In this task you only have to create the structures. The following examples are for the *club* 'Barcelona' and *player* 'Lionel Messi'.

```
Club Information
  Name of club:  Barcelona
```

```
  Year of Formation:  1899
  Yearly revenue in million Euros:  840
  Points to:  Real Madrid
Player Information
  Name of Player:  Lionel Messi
  Age of Player:  33
  Player rating:  94
  Yearly salary in million Euros:  16
  Position:  Forward
```

10.3 Initial System

Task priority: 02, Task Weight: 06

Create a system which takes input of a club and creates the linked list according the input. The system can create new teams, and place a team in a specific position like an insert function. The system can print the list of clubs and their club info and also delete a club from the list. An example interface is given below for your understanding:

```
  La Liga Database Initializing....
  What to you want to do?
  1.  Create Club
  2.  Delete Club
  3.  View Club info
  Choice:  3
  No clubs to show!
  ............
  What to you want to do?
  1.  Create Club
  2.  Delete Club
  3.  View Club info
  Choice:  1
  Enter Name:  Barcelona
  Enter Year of Formation:  1899
  Enter Yearly revenue:  840
  Enter position in list:  1
  ............
  What to you want to do?
  1.  Create Club
  2.  Delete Club
  3.  View Club info
  Choice:  1
  Enter Name:  Real Madrid
  Enter Year of Formation:  1902
```

```
Enter Yearly revenue:  757
Enter position in list:  2
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
Choice:  1
Enter Name:  Real Madrid
Enter Year of Formation:  1902
Enter Yearly revenue:  757
Enter position in list:  1
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
Choice:  3
Showing Club list:
Real Madrid
1902
757
Barcelona
1899
840
Real Madrid
1902
757
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
Choice:  6
La Liga Database Terminating....
```

Giving any choice other than 1, 2, and 3, will terminate the program. The 'delete' choice is not shown as it will only remove a club according to the name given. So if 'Real Madrid' is given as input after choice 2 is given then one club named 'Real Madrid' will be removed. You can implement the interface of 'delete' as you like, however, it has to be remove based on the club name.

10.4 Improved System

Task priority: 03, Task Weight: 04

In this subtask you have to implement a separate choice which can swap the clubs. Which means two club positions can be swapped with each other. This can be used to change rankings of the clubs in each year. The interface is given below for your understanding:

```
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
Choice:  3
Showing Club list:
Real Madrid
1902
757
Barcelona
1899
840
Real Madrid
1902
757
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
Choice:  4
Which two positions do you want to swap?
1 2
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
Choice:  3
Showing Club list:
Barcelona
1899
```

```
840
Real Madrid
1902
757
Real Madrid
1902
757
```

10.5 Complete System

Task priority: 04, Task Weight: 00

This subtask does not carry any marks and was initially meant to be part of the task. Therefore, this will remain as a bonus opportunity, so anyone who can finish this task will get extra marks for the semester (only in lab). Do not attempt this until you have finished all the previous tasks as it is difficult compared to the previous tasks.

In this subtask you have to add a linked list to the club structure. The club structure will have a structure pointer of 'player' type which indicates a contract with the club. The players can also be added to the clubs and deleted from the clubs, however, they do not need to be swapped with each other. Adding or deleting players will not affect other teams and swapping teams will not change the player list of a team. After including the player contracts, the interface will be as follows:

```
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
5.  Add player
6.  Delete player
Choice:  3
Showing Club list:
Barcelona
1899
840
No player contracts!
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
5.  Add player
6.  Delete player
```

```
Choice:  5
Player Name:  Lionel Messi
Age of Player:  33
Player rating:  94
Yearly Salary:  16
Position:  Forward
Club Contract:  Barcelona
............
What to you want to do?
1.  Create Club
2.  Delete Club
3.  View Club info
4.  Swap Clubs
5.  Add player
6.  Delete player
Choice:  3
Showing Club list:
Barcelona
1899
840
List of players in contract:
Lionel Messi
Age:  33, Rating:  94, Salary:  16, Position:  Forward
```

Deleting a player is removing the player from the list, and the interface is upto you. Remove a player based on the name of the player which will be given as input. Adding more players will add two lines in the club info per player (as given in interface).