**Data Structures and Algorithms**

**ASSIGNMENT 3**

**Fall 2023**

**Due Date**: Announced on Moodle

**NOTE:** Late submissions will not be accepted

**TO SUBMIT:** Submission will be on Moodle

**VERY IMPORTANT**

Academic integrity is expected of all the students. Plagiarism or cheating in any assessment will result in negative marking or an F grade in the course, and possibly more severe penalties.

**PROBLEM 1**

You will implement and test an application that acts as main-memory database containing information about cricket matches. All the records with cricket matches information will be stored in a **Sorted-Circular Doubly-linked list** container class. The insertion of each match record will be based on the match id and its league number. For example: PSL1-1, PSL1-4, PSL2-1. The following diagram illustrates a general level organization of a cricket match database for these three matches, when inserted in that order

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| ∅ |
| next |
| prev |

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| PSL1-1 |
| Next |
| Prev |

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| --- |
| PSL2-2 |
| next |
| prev |

|  |
| --- |
| PSL1-4 |
| Next |
| Prev |

In reality, each node will not have simply the match id, but a record that has the following information:

1. **Match ID**
2. **Team 1- Name and** Linked List with the name of the cricketers if team 1
3. **Team 2 – Name and** Linked List with the name of the cricketers if team 2
4. **Match Date**
5. **Winner**
6. **Location**

You will implement the following operations for the cricket matches database application

1. Add match – add a new match record to the cricket matches database. You cannot insert the cricket match which already exist in the list.
2. Delete match – deletes a cricket match record from the cricket match database.
3. Find match – finds the information record for a cricket match
4. Print match in order – prints all the cricket match in the list sorted order.
5. Add cricketer – adds a new cricketer name to a Match
6. Delete cricketer – deletes a cricketer name (if present) from a Match
7. Find Matches by cricketer name – finds all matches by a given cricketer. Returns a new sorted doubly linked list with them.

**NOTE: You** **must keep the movies in sorted order at all times**

**Bonus Points**

Saving and Restoring Linked List using a text file - Your program will read the data from an input file in order to create cricket match linked list. At the exit, your program will be able to save the data in the file.

**Remember that you will use the circular sorted doubly linked list for two purposes:**

1. **Implement the list of matches’ records in the system.**
2. **Implement the list of cricketer names in a match record.**

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| --- | --- | --- | --- | --- | --- | --- |
| Match Title =  Match date = 2/2/2023  Location = Pakistan  Winner = Team 2  Team1:   |  | | --- | | Cricketer1 | | Cricketer2 | | Cricketer3 |   Team2:   |  | | --- | | Rizwan | | Babar | | Fakhar | |