

ICC ODI Player Performance Analyzer:

Objective:

- Design and implement a data management and analysis system for ICC ODI player statistics that organizes and processes data using Searching, Sorting and Linked list concepts.
- The system should allow storing, searching, sorting, and merging team and player data for analytical insights.

Players_data.h

- This header file provides predefined data of 200 players of 10 teams.
- It also includes array of all 10 teams names.
- This header file can be included in our program to load initial data of these players and teams.
- Please note that, A separate Player object must be defined according to the data model provided below, independent of the Player structure defined in this header file.

Data Model:

- Each player will have playerId, Name, TeamName, Role (Batsman, Bowler, All-rounder), TotalRuns, BattingAverage, StrikeRate, Wickets, EconomyRate, PerformanceIndex.

- Each team will have TeamId, Name, TotalPlayers, AverageBattingStrikerate.
(Note: To calculate AverageBattingStrikerate, consider strike rate of batters and all-rounders only)

PerformanceIndex:

- Each player will have a performance index according to the Role. And formula for the same are given below:
 - **Batsman:** $(\text{BattingAverage} \times \text{StrikeRate}) / 100$
 - **Bowlers:** $(\text{Wickets} \times 2) + (100 - \text{EconomyRate})$
 - **All-Rounders:** $[(\text{BattingAverage} \times \text{StrikeRate}) / 100] + (\text{Wickets} \times 2)$
- **Note:** Performance indexes for different roles are not directly comparable. For example, if Batsman X has a higher performance index than Bowler Y, it does not necessarily mean X's performance is better than Y.

Functional Requirements:

- Create a menu-driven program to simulate ICC's internal system with the following features:
- Once the program starts, initialize players and teams using the given header file. After that:
 1. Allow user to add new players to teams using team id.
 2. Allow user to display all players of a specific team with a total number of players and average batting strike rate.

3. Allow user to display teams according to average batting strike rate of batters + all-rounders of that team in descending order.
4. Allow user to display top K players of a specific team according to their performance index and given Role. (For example, if the input role is *Batsman*, then the top K batsmen of that specific team will be displayed according to their performance index in descending order, and the same applies for Bowlers and All-rounders.).
5. Allow user to display players of all teams of specific role according to their performance index in descending order. (For example, if the input role is *Bowler*, then all Bowlers of all team will be displayed according to their performance index in descending order, and the same applies for Batsmen and All-rounders.).

Performance Requirements:

- After initialization, team searching should be done in **$O(\log n)$** time when required.
- Requirement mentioned in 4th point should be done in **$O(K)$** time.
- Requirement mentioned in 5th point should be done in **$O(N \log t)$** time.

Where t is the number of teams and N is the total number of players of that role (An extra list can be created.)

Constraints:

- Number of teams = 10
- $1 \leq \text{PlayerId}/\text{TeamId} \leq 1000$
- $11 \leq \text{Players per team} \leq 50$
- $1 \leq \text{Name length} \leq 50$

Example:

Note: Purpose of data displayed in the example is only to explain each requirement. It may not align with data given in the header file.

Menu:

```
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ICC ODI Player Performance Analyzer
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```

1. Add Player to Team
 2. Display Players of a Specific Team
 3. Display Teams by Average Batting Strike Rate
 4. Display Top K Players of a Specific Team by Role
 5. Display all Players of specific role Across All Teams by performance index
 6. Exit
- ```
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```

Enter your choice:

### Choice 1 → Add Player to Team

Enter Team ID to add player: 1

Enter Player Details:

Player ID: 121

Name: Yuzvendra Chahal

Role (1-Batsman, 2-Bowler, 3-All-rounder): 2

Total Runs: 50

Batting Average: 8.5

Strike Rate: 70.0

Wickets: 180

Economy Rate: 4.6

Player added successfully to Team India!

Choice 2 → Display All Players of a Specific Team

Enter Team ID: 1

Players of Team India:

| ID  | Name           | Role        | Runs  | Avg  | SR    | Wkts | ER  | Perf. Index |
|-----|----------------|-------------|-------|------|-------|------|-----|-------------|
| 101 | Rohit Sharma   | Batsman     | 9800  | 48.3 | 94.5  | 0    | 0.0 | 45.64       |
| 102 | Virat Kohli    | Batsman     | 13000 | 57.3 | 93.2  | 0    | 0.0 | 53.40       |
| 103 | Jasprit Bumrah | Bowler      | 120   | 7.8  | 70.0  | 145  | 4.6 | 236.40      |
| 104 | Hardik Pandya  | All-Rounder | 2300  | 36.5 | 121.0 | 80   | 5.2 | 242.65      |

Total Players: 4

Average Batting Strike Rate: 94.68

Choice 3 → Display Teams by Average Batting Strike Rate

Teams Sorted by Average Batting Strike Rate

| ID | Team Name   | Avg Bat SR | Total Players |
|----|-------------|------------|---------------|
| 1  | India       | 102.9      | 4             |
| 2  | Australia   | 99.4       | 4             |
| 3  | England     | 97.6       | 4             |
| 4  | Pakistan    | 95.3       | 4             |
| 5  | New Zealand | 93.2       | 4             |

|    |              |      |   |
|----|--------------|------|---|
| 6  | South Africa | 91.8 | 4 |
| 7  | Bangladesh   | 90.7 | 4 |
| 8  | Sri Lanka    | 89.5 | 4 |
| 9  | Afghanistan  | 88.9 | 4 |
| 10 | West Indies  | 87.4 | 4 |

#### Choice 4 → Display Top K Players of a Specific Team of specific role

Enter Team ID: 1

Enter Role (1-Batsman, 2-Bowler, 3-All-rounder): 1

Enter number of players: 2

Top 2 Batsmen of Team India:

| ID  | Name         | Role    | Runs  | Avg  | SR   | Wkts | ER  | Perf. Index |
|-----|--------------|---------|-------|------|------|------|-----|-------------|
| 102 | Virat Kohli  | Batsman | 13000 | 57.3 | 93.2 | 0    | 0.0 | 53.40       |
| 101 | Rohit Sharma | Batsman | 9800  | 48.3 | 94.5 | 0    | 0.0 | 45.64       |

#### Choice 5 → Display All Players Across All Teams of specific role

Enter Role (1-Batsman, 2-Bowler, 3-All-rounder): 3

All-rounders of all teams:

| ID  | Name           | Team      | Role   | Runs | Avg  | SR   | Wkts | ER  | Perf. Index |
|-----|----------------|-----------|--------|------|------|------|------|-----|-------------|
| 301 | Jasprit Bumrah | India     | Bowler | 190  | 12.2 | 80.1 | 230  | 4.6 | 330.4       |
| 202 | Mitchell Starc | Australia | Bowler | 210  | 10.5 | 84.2 | 240  | 4.7 | 335.3       |
| 204 | Pat Cummins    | Australia | Bowler | 180  | 11.8 | 75.5 | 215  | 4.9 | 325.1       |

|      |                     |             |        |     |      |      |     |     |       |
|------|---------------------|-------------|--------|-----|------|------|-----|-----|-------|
| 402  | Jofra Archer        | England     | Bowler | 160 | 11.0 | 75.0 | 205 | 4.9 | 325.1 |
| 405  | Chris Woakes        | England     | Bowler | 230 | 14.1 | 92.4 | 198 | 5.1 | 322.9 |
| 502  | Trent Boult         | NewZealand  | Bowler | 180 | 10.8 | 82.3 | 200 | 5.0 | 320.0 |
| 602  | Shaheen Afridi      | Pakistan    | Bowler | 130 | 9.5  | 70.0 | 190 | 4.8 | 315.2 |
| 702  | Kagiso Rabada       | SouthAfrica | Bowler | 170 | 11.4 | 79.8 | 185 | 5.2 | 314.8 |
| 704  | Anrich Nortje       | SouthAfrica | Bowler | 120 | 8.9  | 68.4 | 178 | 5.0 | 311.0 |
| 802  | Alzarri Joseph      | WestIndies  | Bowler | 150 | 9.8  | 72.1 | 180 | 5.0 | 310.0 |
| 902  | Dushmantha Chameera | SriLanka    | Bowler | 110 | 8.5  | 65.3 | 175 | 5.1 | 304.9 |
| 904  | Lahiru Kumara       | SriLanka    | Bowler | 90  | 7.6  | 59.2 | 168 | 5.3 | 302.7 |
| 1002 | Taskin Ahmed        | Bangladesh  | Bowler | 140 | 9.9  | 68.2 | 172 | 5.3 | 303.7 |
| 1102 | Rashid Khan         | Afghanistan | Bowler | 280 | 14.5 | 95.0 | 170 | 4.2 | 301.8 |
| 1103 | Mujeeb Ur Rahman    | Afghanistan | Bowler | 100 | 8.1  | 60.0 | 162 | 4.9 | 297.1 |

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## Guidelines:

### GitHub Repository Setup:

- Create a public GitHub repository (accessible by mentors) for submitting Kalpavriksha assignments throughout the program.
- Create a separate branch for assignment submission and raise a Pull Request (PR) for this branch.

### Submission Deadline:

- The assignments should be done in C language.
- The final submission deadline is 17th November, 5:00 PM.
- Late submissions will not be accepted under any circumstances.

- Any commits made to the repository after 17th November, 5:00 PM will be disregarded.

### **Prohibited AI Usage**

- The use of AI or automated tools to complete the assignment is strictly prohibited.
- Assignments should be completed independently.

### **Assignment Review and Compliance**

- Mentors will thoroughly review each assignment submission.