

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:** $(BattingAverage \times StrikeRate) / 100$
 - **Bowlers:** $(Wickets \times 2) + (100 - EconomyRate)$
 - **All-Rounders:** $[(BattingAverage \times StrikeRate) / 100] + (Wickets \times 2)$
- **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(logn)** 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 logt)** 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
- $1 \leq \text{PlayerId/TeamId} \leq 1000$
- $11 \leq \text{Players per team} \leq 50$
- $1 \leq \text{Name length} \leq 50$

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:

ICC ODI Player Performance Analyzer

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-rounders): 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-rounders): 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

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.