Data and Applications

Project Phase-I

Team 4

Team Members:

Garvit Gupta , 2022101113

Ishan Gupta , 2022111007

Atidipt Ashnin , 2022111020

Ayush Sahu , 2022113003

Rahul Singal , 2022113009

Introduction To Mini-World

The mini-world is based on the IPL(Indian Premier League) , the most popular cricket league in the world. It consists of multiple teams native to Indian regions involving native as well as international players contesting to win the tournament.

Purpose of The Database

The purpose of the database is to handle the data of the teams, players and the managing, coaching staff of each team for easily retrieving information about a specific team or a player and it also allows the users to identify relationships between these entities. It can also be used for data analysis (such as calculating the average player value of a certain team, or the average runs scored by a player in the previous tournament) and, in general, to get a better understanding about the League.

Users of the Database: IPL Organizing committee, Team Management and Selectors, General Spectators and Audience

Applications of the Database:-

- To Find out the Players belonging to certain teams and the Staff and Managers in the Team as well as its Sponsors
- To Find out Individual Records held by Players
- To Find out all the details related to a specific Match

Database Requirements:

Strong Entities:

Team:

- Team ID (Primary Key) (Single Valued)(INTEGER)
- Name (Single Valued)(STRING)
- Owner (Multi-Valued)(STRING)
- Region (Single Valued)(STRING)
- Sponsor IDs(Multi Valued)(INTEGER)
- Manager ID(Multi Valued)(INTEGER)

Player:

- Player ID (Primary Key)(Single valued)(INTEGER)
- Player Name (Single Valued)(STRING)
- Date of Birth (Composite Valued)(DATE)
    - ❖ Year (Single Valued)(INTEGER)
    - ❖ Month (Single Valued)(INTEGER)
    - ❖ Day (Single Valued)(INTEGER)
- Age(Derived)(Single valued)(INTEGER)
- Base Salary (Single Valued)(INTEGER)
- Team ID (Foreign Key) (Single Valued)(INTEGER)
- Player Role(Multi Valued)(STRING)
- Nationality(Single Valued)(STRING)

Stadium:

- Stadium ID (Primary Key) (Single Valued)(INTEGER)
- Stadium Name (Single Valued)(STRING)
- Locality(Composite Valued)
    - ❖ Region/State (Single Valued)(STRING)
    - ❖ City (Single Valued)(STRING)
- Capacity(Single Valued)(INTEGER)
- Home Team ID(Single Valued)(STRING)

Team Manager:

- Manager ID (Primary Key) (Single Valued)(INTEGER)
- Manager Name (Single Valued)(STRING)
- Email(STRING)(Single Valued)
- Team ID (Foreign Key)(Single Valued)(INTEGER)

Sponsor:

- Sponsor ID (Primary Key) (Single Valued)(INTEGER)
- Sponsor Name (Single Valued)(STRING)
- Email(STRING)(Single valued)
- Sponsorship Contracts(Composite Valued)
    - ❖ Financial Terms(STRING)(Multi Valued)
    - ❖ Termination Clause(STRING)(Multi Valued)
- Address(STRING)(Composite valued)
    - ❖ Region/State (Single Valued)(STRING)
    - ❖ City (Single Valued)(STRING)

Staff:

- Name (Single Valued)(STRING)
- Staff ID(Primary Key) (Single Valued)(INTEGER)
- Age(Single Valued)(INTEGER)
- Department(Single Valued)(STRING)
- Stadium ID(Single Valued)(INTEGER)
- Contact Number(Single Valued)(INTEGER)

Weak Entities:

Match:

- Team ID (Multi Valued) (Partial Key)(INTEGER)
- Stadium ID(Single Valued)(INTEGER)
- Staff ID(Multi Valued)(INTEGER)
- Match Details(Composite Valued)
    - ❖ Toss Winner(STRING)(Single Valued)
    - ❖ Total Number of Stumpings(INTEGER)(Single Valued)
    - ❖ Match Winner ID(INTEGER)(Single Valued)
- Match Type(Single Valued)(STRING)
- Date(DATE)(Composite Valued)
    - ❖ Date(INTEGER)(Single Valued)
    - ❖ Month(INTEGER)(Single Valued)
    - ❖ Year(INTEGER)(Single Valued)
- Time(TIME)(Composite Valued)
    - ❖ Hours(INTEGER)(Single Valued)
    - ❖ Minutes(INTEGER)(Single Valued)
    - ❖ Seconds(INTEGER)(Single Valued)

Stats:

- Player ID(Single Valued)(Partial Key)(INTEGER)
- Team ID(Single Valued)(Partial Key)(INTEGER)
- Total Runs(Single Valued)(INTEGER)
- Total Wickets(Single Valued)(INTEGER)
- Total Matches(Single Valued)(INTEGER)
- Achievements(Multi Valued)(STRING)

Assumptions:

1. Every player plays for only one team.
2. A Sponsor can be affiliated to multiple teams.
3. Different teams may have different number of players(substitutes and reserves included)
4. Each team can have at least 11 players and at most 30 players.
5. Every staff member works only in a single department.
6. Each team manager is managed by at least 1 team manager.
7. A sponsor can sponsor different teams in different seasons.

8. Each team has at least 1 sponsor.
9. Each Stadium has a fixed staff member.
10. No two teams will have matches of the same type more than once.

Relationship Type:

- Players **PLAYING** for a Team
    - Degree - 2
    - Participating Entities - Player, Team
    - Cardinality Ratio - N:1
    - Min-Max - (1,1):(11,30)
- Staff **WORKING** in Matches
    - Degree - 2
    - Participating Entities - Staff, Match
    - Cardinality Ratio - N:M
    - Min-Max - (0,M):(0,N)
- Team **MANAGED** by Team Managers
    - Degree - 2
    - Participating Entities - Team Manager, Team
    - Cardinality Ratio -1:N
    - Min-Max - (1,N):(1,1)
- Matches **SCHEDULED** between Teams
    - Degree - 2
    - Participating Entities - Matches, Teams
    - Cardinality Ratio - 1:N
    - Min-Max - (2,2):(1,1)
- Staff **ASSISTING** the Matches being **PLAYED** by Teams **INSIDE** a Stadium
    - Degree - 4
    - Participating Entities - Staff, Match, Team, Stadium
    - Cardinality Ratio - M:1:N:1
    - Min-Max - (0,M):(1,1):(2,2):(1,1)
- Sponsors **SPONSORING** Teams
    - Degree - 2
    - Participating Entities - Sponsor, Teams
    - Cardinality Ratio - M:N
    - Min-Max - (1,N):(1,M)
- Stats **ASSOCIATED** with a Player
    - Degree - 2
    - Participating Entities - Stats, Players
    - Cardinality Ratio - 1:1
    - Min-Max - (1,1):(1,1)
- Player **LEADING** Player
    - Degree - 1
    - Participating Entities - Player, Player
    - Roles : Captain, Team Players
    - Cardinality Ratio - 1:N
    - Min-Max - (10,29):(1,1)
- Sponsors **ASSOCIATED** with the Teams **PLAYING** a Match **INSIDE** a Stadium
    - Degree - 4

- Participating Entities - Sponsor, Team, Match, Stadium
- Cardinality Ratio - N:M:1:1
- Min-Max - (0,N) : (2,2) : (1,1) : (1,1)

*Note - Cardinality Ratio for Entities corresponds to the order of Participating Entities.
Example: Participating Entities - A,B,C
Cardinality Ratio(CR) - CR_A, CR_B, CR_C

Functional Requirements

1. Modification:
   a)Insertion:
   1. To introduce a new Player into a Team
   2. To associate a new Sponsor with the Team
   3. To introduce a new Staff member

   b) Deletion:
   1. Deleting a Player from a Team when he leaves.
   2. Deleting sponsors associated with a team incase of a backout.

   c) Updation:
   1. Rescheduling a Match.
   2. Updating the records of players after the matches.
   3. Updating the team manager, in case of retirement etc.

2. Retrieval:
   a)Selection:
   1. Returning the list of Sponsors for a particular Team
   2. Returning the list of Players of a Team
   3. Returning the list of Matches played by a Player

   b) Projection:
   1. Returning the list of Players who have scored a Century
   2. Returning the list of Players having a 3 wicket-haul.

   c) Aggregate (SUM,MAX,MIN,AVG)
   1. Maximum Runs scored by a Player
   2. Average Runs scored in an over in a match
   3. Maximum Number of Sixes hit by a Player

   d) Search: To search for various entities/attributes in the database
   1. List of Players whose name starts with “Ja”.

3. Analysis: To make creative conclusions and reports by combining functional requirements.
   1. Player who scored the most runs over the past week.
   2. Player who had the best average(runs per match) over the last 5 matches.
   3. Player with the most half-centuries over entire tournament

Summary:

The database is built around the Indian Premier League (IPL), having strong entities like Teams, Players, Stadiums, Team Managers, Sponsors, Staff, and weak entities like Matches and Stats. Assumptions include one player per team, sponsors affiliated with multiple teams, varying player numbers, single department staff, and every team having at least one sponsor. The database has several relationship types, including player-team affiliations and staff involvement in matches. Functional requirements cover data insertion, deletion, updating, and retrieval for purposes like managing players, sponsors, and staff, rescheduling matches, and analysing player performance. It serves IPL organisers, team management, selectors, and spectators, facilitating data retrieval and analysis for a better understanding of the league.