Indian Premier League Database - Project Phase 2

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1 Modifications and corrections done to the schema

1. Replaced the ternary relation - MATCH_STATS with two degree 2 relations namely - BATTING_STATS [between Match and Batsman_Stats entity types] and BOWLING_STATS [between Match and Bowling_Stats entity types] to present more sensible relationship

2. Replaced the degree 2 relation - PLAYED_AT with a ternary relation HOSTED_AT, among Season, Match and Venue entity types, which simultaneously captures the relation between a particular season and the venues hosting that season as well as the relation between a particular match and the venue hosting that match

3. Removed Teams entity type from the BROUGHT_TO_YOU_BY relation

4. Correction in partial key for Staff entity type - Team_ID, Staff_Role together form a partial key rather than Team_ID alone as considered in Phase 1 submission

5. Correction in partial key for Batsman_Stats and Bowler_Stats entity types - Match_ID, Player_ID together form a partial key rather than Match_ID alone as considered in Phase 1 submission

6. Correction in constraints of the HEAD_TO_HEAD recursive relation between Teams - since there are only 10 teams in a season, the (min, max) constraints are (0, 9) rather than (0, N) as considered in Phase 1 submission

7. Correction in constraints of the PLAYED_BY relation between Match and Team entity types - since a team plays atleast one season, the constraint on minimum matches played by a team in a season is 14, if it does not qualify for playoffs, as per the IPL format [Each team plays twice against all five teams in the other group (home and away), and once against all four of the teams in its own group. All teams play seven home and seven away games]. Since a team can play in multiple season, there is no upper limit on the total number of matches played by a team. Hence the (min, max) constraints for Team entity type are (14, N) rather than (14, 17) as considered in Phase 1 submission, which was incorrectly related team to match entity types only for a particular season

2 Modified Database

1. **Entity types**

   MVP - Most Valuable Player
   MOTS - Man Of The Season
   POTM - Player Of The Match

Entity Type	Attribute	Attribute Type	Sub Attributes	Data Type
SEASON	Season_Year	Key Attribute		VARCHAR(4)
	Champions_Team_ID	Simple		VARCHAR(10)
	Runner_Up_Team_ID	Simple		VARCHAR(10)
	Emerging_Player_ID	Simple		VARCHAR(10)
	MVP_Player_ID	Simple		INT
	MOTS_Player_ID	Simple		INT
	Orange_Cap_Player_ID	Simple		INT
	Purple_Cap_Player_ID	Simple		INT
BROADCASTERS	Broadcaster_ID	Key Attribute		INT
	Broadcaster_Name	Key Attribute		VARCHAR(25)
	Contract_ID	Simple		INT
SPONSORS	Sponsor_ID	Key Attribute		INT
	Sponsor_Name	Key Attribute		VARCHAR(25)
	Contract_ID	Simple		INT
MATCH	Match_ID	Key Attribute		INT
	Team1_ID	Simple		INT
	Team2_ID	Simple		INT
	Match_Date	Simple		DATE
	Match_Session	Simple		TIME
	POTM_Player_ID	Simple		INT
	Result	Simple		VARCHAR(25)
	Winning_Team_ID	Simple		INT
	Win_Type	Simple		VARCHAR(10)
	Win_Margin	Simple		INT
TEAM	Team_ID	Key Attribute		VARCHAR(10)
	Team_Name	Key Attribute		VARCHAR(10)
	Owner_Name	Simple		VARCHAR(25)
	Title(s)	Multi-Valued		YEAR
	Captain_Player_ID	Simple		VARCHAR(10)
	Vice_Captain_Player_ID	Simple		VARCHAR(10)
	Home_Ground_ID	Simple		INT
PLAYER	Player_ID	Key Attribute		INT
	Player_Name	Composite	First Name	VARCHAR(25)
			Last Name	VARCHAR(25)
	Date_of_Birth	Simple		DATE
	Age	Derived		INT
	Runs	Simple		INT
	Wickets	Simple		INT
	Batting_Hand	Simple		VARCHAR(10)
	Bowling_Hand	Simple		VARCHAR(10)
	Highest_Score	Simple		INT
	Average	Simple		DOUBLE
	Strike_Rate	Simple		DOUBLE
	100s	Simple		INT
	50s	Simple		INT
	4s	Simple		INT
	6s	Simple		INT
	Overs_Bowled	Simple		INT
	Best_Bowled_Innings	Simple		VARCHAR(10)
	Economy	Simple		DOUBLE
	5W	Simple		INT
	Country	Simple		VARCHAR(25)
STAFF	Team_ID	Partial Key		INT
	Staff_Name	Composite	First Name	VARCHAR(25)
			Last Name	VARCHAR(25)
	Staff_Role	Partial Key		VARCHAR(25)
UMPIRE	Umpire_ID	Key Attribute		INT
	Umpire_Name	Composite	First Name	VARCHAR(25)
			Last Name	VARCHAR(25)

	Country	Simple		VARCHAR(25)
	Experience	Simple		INT
TOSS	Match_ID	Partial Key		INT
	Team_ID	Simple		INT
	Toss_Decision	Simple		VARCHAR(10)
	Toss_Outcome	Simple		VARCHAR(10)
VENUE	Venue_ID	Key Attribute		INT
	Venue_Name	Key Attribute		VARCHAR(100)
	City	Key Attribute		VARCHAR(25)
	Capacity	Simple		INT
	Country	Simple		VARCHAR(25)
BATSMAN_STATS	Match_ID	Partial Key		INT
	Player_ID	Partial Key		INT
	Runs_Scored	Simple		INT
	Balls_Played	Simple		INT
	4s	Simple		INT
	6s	Simple		INT
	Strike_Rate	Derived		DOUBLE
BOWLER_STATS	Match_ID	Partial Key		INT
	Player_ID	Partial Key		DOUBLE
	Overs	Simple		DOUBLE
	Maiden_Overs	Simple		INT
	Runs	Simple		INT
	Wickets	Simple		INT
	Economy	Derived		DOUBLE

2. **Weak Entity types**

STAFF:
Staff is a weak entity type as it doesn't have any any key attribute which can uniquely define an entity in it. It needs to have partial key as mentioned above with Identifying Relation with TEAM Strong Entity Type.

TOSS:
TOSS is a weak entity type. It has MATCH_ID as a partial key with Identifying Relationship to Strong Entity Type MATCH.

BATSMAN_STATS and BOWLER_STATS:
Both theses entity types are weak entity as they don't have any attribute which can uniquely identify the Entity. It must have Identifying Relationship with MATCH through BATTING_STATS and BOWLING_STATS respectively. They both have Match_ID, Player_ID as partial key.

3. **Relation Types**
   CR - Cardinality Ratio
   DEG - Degree
   Bat_S - BATSMAN_STATS
   Bowl_S - BOWLER_STATS
   B - BROADCASTERS
   S - SPONSORS
   T - TEAMS
   P - PLAYERS
   x - 1:N:M:O

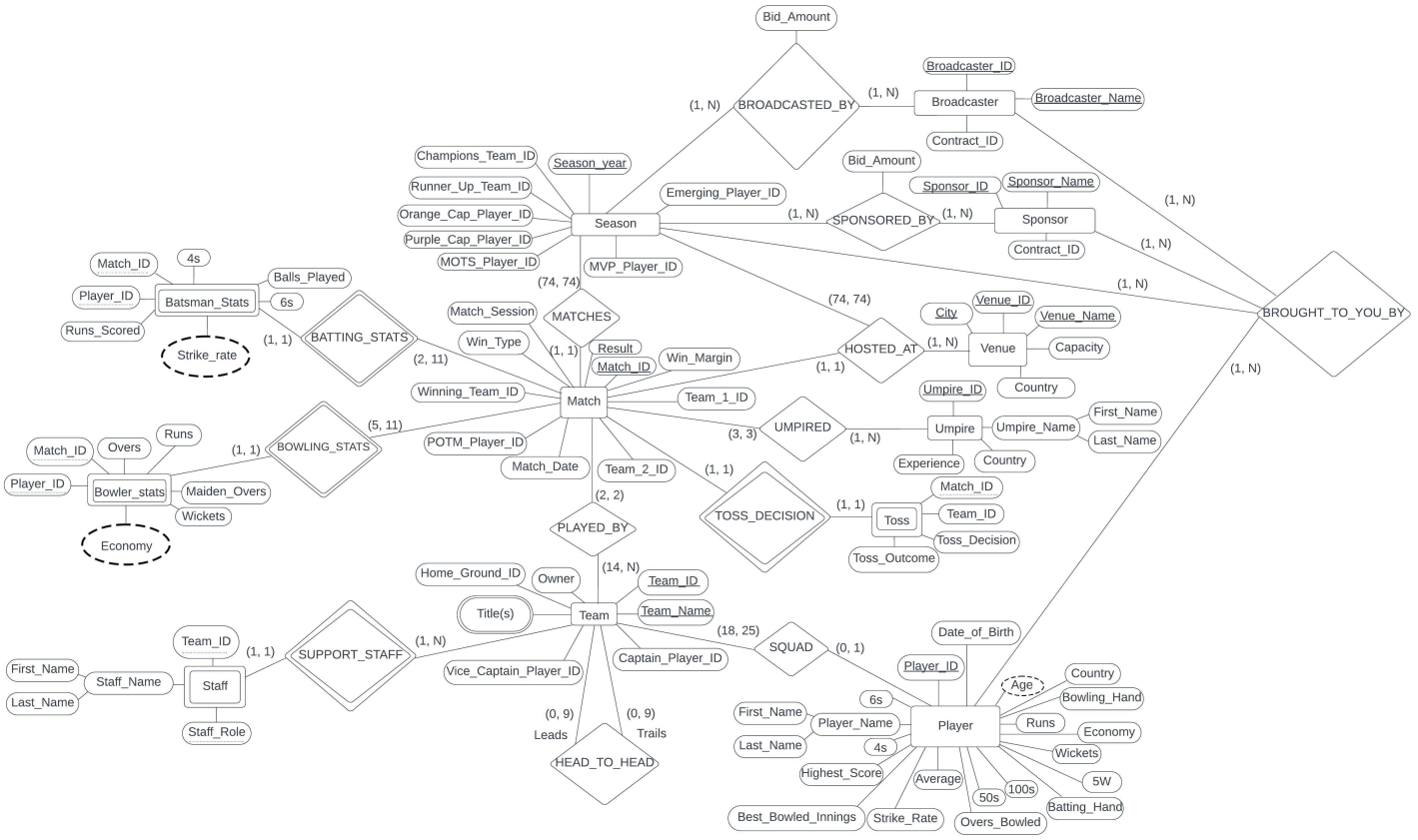
Relationship Type	DEG	Entities	CR	Constraints
BATTING_STATS	2	Match has BATTING_STATS Bat_s	1:N	MATCH(2, 11) BAT_S(1, 1)
BOWLING_STATS	2	Match has BOWLING_STATS Bowl_s	1:N	MATCH(5, 11) BOWL_S(1, 1)
PLAYED_BY	2	Match PLAYED_BY Team	1:2	MATCH (2,2) TEAM (14,N)
SUPPORT_STAFF	2	Team has SUPPORT_STAFF Staff	1:N	TEAM (1,N) STAFF (1,1)
SQUAD	2	Team has SQUAD consisting Players	1:N	TEAM (18,25) PLAYER (0, 1)
UMPIRED	2	Match UMPIRED by Umpires	1:3	MATCH (3, 3) UMPIRES (1, N)
TOSS_DECISION	2	Match has TOSS_DECISION as Toss	1:1	MATCH (1,1) TOSS (1, 1)
HOSTED_AT	3	Season, Match is HOSTED_AT Venue(s)	1:N:M	MATCH (1,1) SEASON (74, 74) VENUE (1, N)
MATCHES	2	Season has MATCHES Match	1:	SEASON (74, 74) MATCH (1, 1)
SPONSORS	2	Season has SPONSORS Sponsor	1:N	SEASON (1,N) SPONSOR (1, N)
BROADCAST_BY	2	Season is BROADCAST_BY Broadcasters	1:N	SEASON (1,N) BROADCASTERS (1, N)
HEAD_TO_HEAD	2	Team HEAD_TO_HEAD Team	1:N	TEAM (0, 9) TEAM (0, 9)
BROUGHT_TO_YOU_BY	4	Season BROUGHT_TO_YOU_BY B, S, P	x	SEASON(1, N) BROADCASTER (1, N) PLAYER (1, N) SPONSOR (1, N)

4. **Relationship types with degree > 2**
   The Relationship Type **HOSTED_AT** has degree 3. It conveys the following: A SEASON has MATCHES **HOSTED_AT** VENUES

5. **Recursive Relationship Type**
   The Relationship Type **HEAD_TO_HEAD** is a recursive Relationship between TEAM and TEAM. Team1 LEAD Team2 and Team2 TRAIL Team1.

6. **Relationship types with degree > 3**
   BROUGHT_TO_YOU_BY is a 4 degree relationship type which relates all the Broadcasters, Sponsors and Players in the database to a particular Season.

3 ER Diagram



4 Reading the relations in the ER Diagram

- SEASON (Entity Type) is BROADCASTED_BY (Relation - with attribute Bid_Amount) BROADCASTER (Entity Type) with a constraint that each season has atleast one broadcaster and each broadcaster entity broadcasts atleast one season

- SEASON (Entity Type) is SPONSORED_BY (Relation - with attribute Bid_Amount) SPONSOR (Entity Type) with a constraint that each season has atleast one sponsor and each sponsor entity sponsors atleast one season

- SEASON (Entity Type) has MATCHES (Relation) MATCH (Entity Type) with a constraint that each season has exactly 74 matches

- BATSMAN_STATS (Weak Entity Type) are BATTING_STATS (Identifying Relation) of MATCH (Strong Entity Type)

- BOWLER_STATS (Weak Entity Type) are BOWLING_STATS (Identifying Relation) of MATCH (Strong Entity Type)

- MATCH (Entity Type) is PLAYED_BY (Relation) TEAMS (Entity Type) with a constraint that each team plays a minimum of 14 matches, as explained in the corrections section

- STAFF (Entity Type) are part of SUPPORT_STAFF (Identifying Relation) of TEAM (Entity Type)

- TEAM (Entity Type) has SQUAD (Relation) consisting of PLAYERS (Entity Type) with a constraint that each team must have a minimum of 18 players and a maximum of 25 players in its squad. For a player, the maximum constraint is trivially 1 but the minimum constraint is 0 - for the cases where either a player released from a team is not bought by any team in auctions or the player retires from the tournament. We still store such a player in the database, as we intend to store the player record even if he is not playing the tournament anymore

- TEAM (Entity Type) has HEAD_TO_HEAD (Relation) relation with other teams with position in the points table as the parameter [constraints as mentioned in the corrections section]

- TOSS (Weak Entity Type) is the TOSS_DECISION (Identifying Relation) of MATCH (Strong Entity Type)

- MATCH (Entity Type) is UMPIRED by UMPIRE (Entity Type), with a trivial constraint that each match has exactly 3 umpires and an Umpire entity type must stand for atleast one match

- SEASON (Entity Type) has MATCHES (Entity Type) HOSTED_AT (Relation) VENUE (Entity Type), with constraints - a season entity is related to exactly 74 (Match, Venue) tuples, as a season has exactly 74 matches; a match entity is related to exactly 1 (Season, Venue) tuple, as a match is trivially played only at a single venue; a venue entity is related to minimum of 1 (Season, Match) tuple, and since a venue can host multiple mathces in multiple seasons, the maximum constraint is N

- SEASON (Entity Type) is BROUGHT_TO_YOU_BY (Relation) BROADCASTERS (Entity Type), SPONSORS (Entity Type) and PLAYERS (Entity Type)