Department of Computer Science and Engineering

CSE 2211: Database Management System - 1 Lab

Project Title: Fifa World Cup football game management system

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Project Title: Fifa World Cup football game management system

Project Area Major: Sports

Project Area Minor:

Information about total earnings of fifa, football players and their performance on game, history of world cup football game (team and individual performance)

Brief Description:

The FIFA World Cup Football Game Management System stands as an intricate and fully-integrated database meticulously developed to streamline the administrative complexities inherent in the orchestration of the World Cup football tournament. This sophisticated system serves as a repository for comprehensive information pertaining to participating teams, individual player performances, the nuances of spectator engagement, popular teams among the fan base, tournament-related data, and financial statistics. Its architectural design is predicated upon the facilitation of efficient administrative processes, encompassing the orchestration of match schedules, the enforcement of equitable play, and the provision of analytical tools for performance evaluation.

This technologically advanced system is distinguished by its user-friendly interface and meticulous data management protocols, attributes that collectively contribute to heightened operational efficiency. Its salient functionalities extend support not only to the administrative apparatus but also to teams, players, coaching personnel, and fervent supporters, engendering a paradigm shift towards a data-driven and seamlessly coordinated footballing experience. The amalgamation of precision, accessibility, and analytical depth within this system fosters an environment conducive to informed decision-making and enhanced football management practices.

In the broader context of football administration, this technological innovation plays an instrumental role in advancing the field. By affording stakeholders access to data-driven insights and establishing a robust foundation for FIFA, the World Cup Football Game Management System becomes an indispensable asset, catalyzing progress within the realms of football governance and tournament orchestration.

Detailed Description:

Story:

Fifa is going to arrange “World Cup Football 2022”. So they need a database to manage the game efficiently. They have a list of football playing countries around the world. They have selected the top countries in the list to play in the world cup. Each country provides their team and coaching staff information to FIFA.Fifa then selects a country that will host the tournament. Then they make the match fixtures according to the venues and stadiums. Fifa has to store each team and individual statistics as they have to regulate the tournament and decide the champion team. Also fifa has to award the best players in sectors like “Top Scorer”, “Best Goalkeeper”, “Best Player”. Finally, Fifa has to calculate the financial benefits by selling tickets of every match and determining the fan favorite team for their business strategies.
So, FIFA is in need of a database that can help them to administrate the tournament effectively. Also, they have a plan to use this database to store the previous record of “FIFA World Cup”.

Let us see in detail all the major tables of the database.

1. **World cup organization:**
    a. **World Cup table:** This table records details about individual World Cup events, including a unique World Cup identifier (wc_id), the year of the tournament (wc_year), and the organizing entity (wc_organizer).

    b. **Stadium table:** Manages details about stadiums, including unique identifiers, names, capacities, and locations.
2. **Team management:**
    a. **Teams table:** This table captures information about football teams participating in the World Cup, including a unique team identifier (team_id) and the team's name.
    b. **Teams playing in the world cup table:** This table establishes the relationship between teams and World Cups, detailing which teams participated in specific World Cup events.
    c. **Team officials table:** This table manages information about team officials, such as coaches and staff, including their unique identifier (official_id) and contact details.
    d. **Officials roles in team table:** It tracks the tenure of team officials within specific teams, including start and end dates of their roles.
    e. **Trainer table:** Records information about trainers associated with players, including their tenure and roles.
3. **Player management:**
    a. **Player table:** Captures details about individual players, including their unique identifier (player_id), name, date of birth, playing position, and nationality.
    b. **Players and team relationship table:** Establishes associations between players and teams, tracking jersey numbers, debut, and retirement dates.
4. **Game management:**
    a. **Match table:** Captures information about individual matches, including date, time, participating teams, spectators, ticket prices, and total score.
    b. **Venue table:** Establishes relationships between World Cups, stadiums, and matches, providing a venue-centric perspective.
    c. **Player statistics table:** Records statistics about player performances in matches, including scoring times and types.
    d. **Team performance and qualification analysis table:** Manages qualification statistics for teams, including total

matches played, wins, losses, draws, goal differentials, and current qualification status.

Scopes and limitations:

This database can only handle the game management system. The Fifa world cup is a massive event and there are many sectors including Financial, business, sponsors etc. But in this project my main focus is to build a database that only helps to manage game related information. Limitation of this projects are:

1. The database does not account for fan engagement metrics or social media interactions related to the World Cup.
2. There is no provision for recording player injuries or their impact on matches.
3. Information about match officials, including referees and assistant referees, is not present in the schema.
4. After each world cup we have to manually update the ranking of each teams
5. As there is a lot of complex data that needs to be handled during the world cup, this project only shows a simple overview of how a football tournament should be managed.
6. Data that is currently present in the database is not enough to answer all sorts of queries. Collecting the data needs a vast amount of work and not all data is present online. So there may be some queries that are valid for the database but can not provide results due to data shortage.

Expected Queries:

Here are some examples of queries that can be obtained from the project and also necessary for the objective of the project:

Query-1: Find the teams participated in specific world cup
This query provide s the list of teams that had participated in the previous world cup or currently participating in the world cup.

Query-2: Find the total number of spectators and average ticket price for all matches in a specific world cup
This query gives the amount of earnings via selling tickets in a specific world cup and also provides the number of spectators that will help fifa to analyze in which country football is popular.

Query-3: Find the top goal scorers in a specific World Cup
This query searches in the database to find the top scorer in a certain world cup and this is necessary as FIFA gives “Golden Boot” to the top scorer after the final.

Query-4: Find the best goalkeeper in each World Cup
This query searches in the database to find the goalkeeper in a certain world cup who has maintained clean sheets in maximum matches and conceded the lowest amount of goal and this is necessary as FIFA gives “Golden Gloves” to the best goalkeeper after the final.

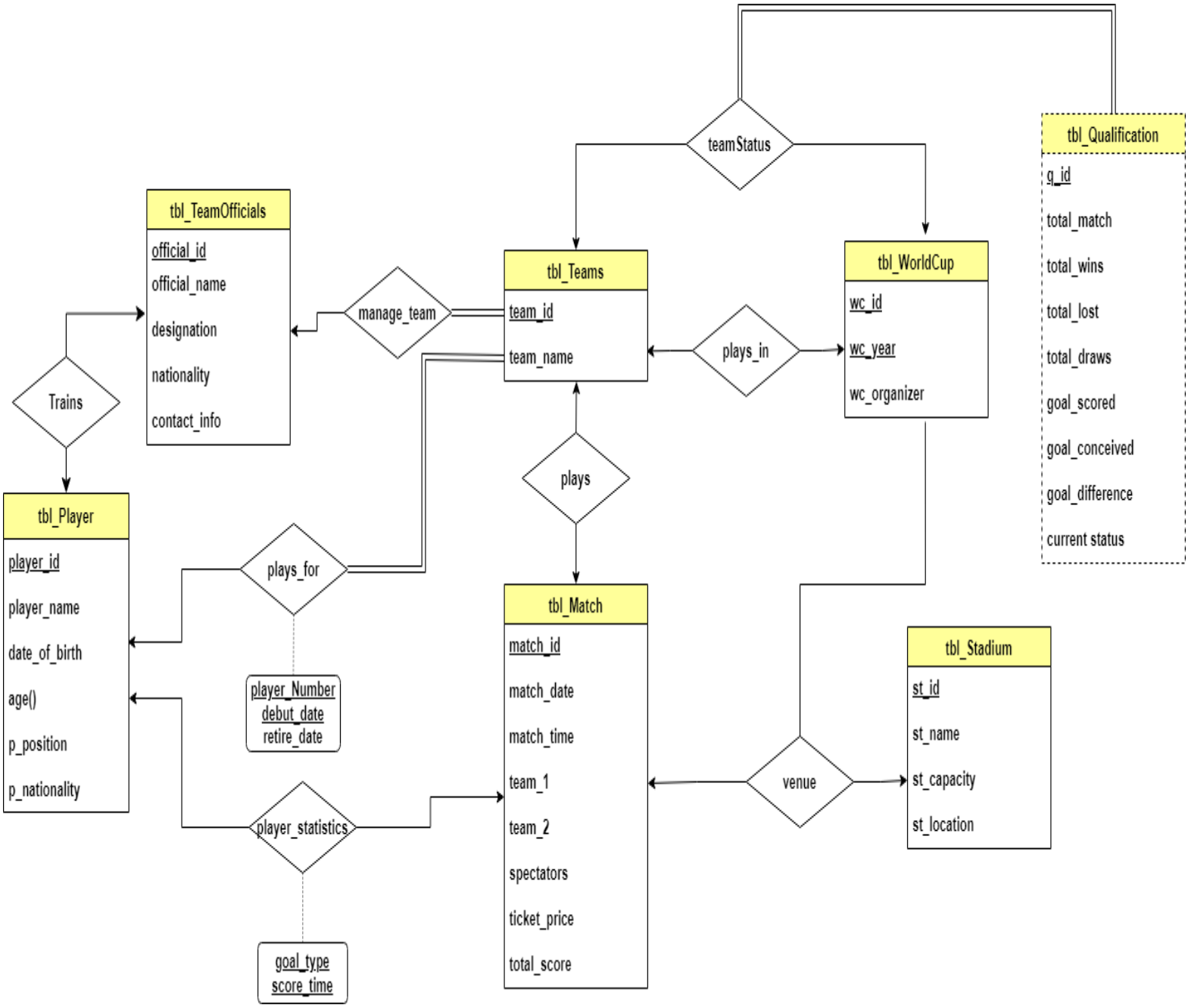
Query-5: Find the teams that did not qualify to play in the World Cup
There are many teams that play football but not all the teams qualify for the main event. This query helps to find the teams that didn’t qualify for the world cup but play football well.

Query-6: List all the players of the teams that plays football
This query provides the list of footballers who participated in a football game at least once.

List of Tables:

1. tbl_Teams = (team_id, team_name)
2. tbl_WorldCup = (wc_id, wc_year, wc_organizer)
3. tbl_team_in_WorldCup = (wc_id, team_id, wc_year)
4. tbl_TeamOfficials = (official_id, official_name, designation, nationality, contact_info)
5. tbl_manage_team = (team_id, official_id, job_start_date, job_end_date)
6. tbl_Player = (player_id, player_name, p_date_of_birth, p_position, p_nationality)
7. tbl_Trainers = (player_id, official_id, job_start_date, job_end_date)
8. tbl_Plays_for = (player_id, team_id, player_jersy_number, debut_date, retire_date)
9. tbl_Stadium = (st_id, st_name, st_capacity, st_location)
10. tbl_Match = (match_id, match_date, match_time, team_1, team_2, spectators, ticket_price, total_score)
11. tbl_Player_Stat = (match_id, palyer_id, score_time, score_type)
12. tbl_Venue = (wc_id, wc_year, st_id, match_id)
13. tbl_Qualification = (q_id, wc_id, wc_year, team_id, total_match_played, total_wins, total_lost, total_draws, goal_scores, goal_conceivedm goal_difference, current_status)

ER Diagram:


teamStatus
tbl_Qualification
q_id
total_match
total_wins
total_lost
total_draws
goal_scored
goal_conceived
goal_difference
current status
tbl_TeamOfficials
official_id
official_name
designation
nationality
contact_info
manage_team
tbl_Teams
team_id
team_name
plays_in
tbl_WorldCup
wc_id
wc_year
wc_organizer
Trains
plays
tbl_Player
player_id
player_name
date_of_birth
age()
p_position
p_nationality
plays_for
player_Number
debut_date
retire_date
tbl_Match
match_id
match_date
match_time
team_1
team_2
spectators
ticket_price
total_score
venue
tbl_Stadium
st_id
st_name
st_capacity
st_location
player_statistics
goal_type
score_time

List of Functional dependencies:

Table: tbl_Teams

- team_id -> team_name

Table: tbl_WorldCup

- {wc_id, wc_year} -> wc_organizer

Table: tbl_team_in_WorldCup

- {team_id, wc_id} -> wc_year

Table: tbl_TeamOfficials

- official_id -> {official_name, designation, nationality, contact_info}

Table: tbl_manage_team

- {team_id, official_id, job_start_date} -> job_end_date

Table:tbl_Player

- player_id -> {player_name, p_date_of_birth, p_position, p_nationality}

Table: tbl_Trainers

- {player_id, official_id, job_start_date} -> job_end_date

Table: tbl_Plays_for

- {player_id, team_id, player_jersey_number, debut_date} -> retire_date
- player_id -> {team_id, player_jersey_number, debut_date, retire_date}

Table: tbl_Stadium

- St_id -> {st_name, st_capacity, st_location}

Table: tbl_Match

- Match_id -> {match_date, match_time, team_1, team_2, spectators, ticket_price, total_score}

Table: tbl_Player_Stat

- {match_id, player_id, score_time, score_type} -> {match_id, player_id, score_time, score_type} // trivial dependency

Table: tbl_venue

- {wc_id, wc_year, st_id, match_id} -> {wc_id, wc_year, st_id, match_id} // trivial dependency

Table: tbl_Qualifcation

- {q_id, wc_id, wc_year, team_id} -> {total_match_played, total_wins, total_lost, total_draws, goal_scored, goal_conceived, goal_difference, current_status}
- {wc_id, wc_year} -> q_id

Table Schema:

Table: tbl_Teams

S/N	Attributes	Datatype	Constraints	Comments
1	team_id	VARCHAR(20)	PK	Unique identifier for each team
2	team_name	VARCHAR(20)		Name of the football team
Information Stored: Team details, including a unique identifier (team_id), team name (team_name). Purpose/Use: To maintain a list of participating teams in the football tournament.				

Table: tbl_WorldCup

S/N	Attributes	Datatype	Constraints	Comments
1	wc_id	VARCHAR(20)	PK	Unique identifier for each world cup
2	wc_year	YEAR		Time of the world cup
3	wc_organizer	VARCHAR(20)		Host of the world cup
Information Stored: World Cup details like wc_id, wc_year, and wc_organizer. Purpose: To store information about different World Cup tournaments, including the year and the organizing entity.				

Table: tbl_team_in_WorldCup

S/N	Attributes	Datatype	Constraints	Comments
1	wc_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_WorldCup
2	team_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Teams

3	wc_year	YEAR	FK	Keep consistency with tbl_WorldCup
Information Stored: Link between teams and World Cups, with additional information about the year. Purpose: To establish a relationship between teams and the World Cups they participate in, with foreign key constraints ensuring data integrity.				

Table: tbl_TeamOfficials

S/N	Attributes	Datatype	Constraints	Comments
1	official_id	VARCHAR(20)	PK	Unique identifier for each team officials
2	official_name	VARCHAR(20)		Name of the official
3	designation	VARCHAR(20)		Describe the role of team official
4	nationality	VARCHAR(20)		Shows from where the team official came from
5	contact_info	VARCHAR(20)		Provides the contact info of the team official

Information Stored: Details of team officials, including official_id, official_name, designation, nationality, and contact_info.
Purpose: To store information about the officials associated with teams.

Table: tbl_manage_team

S/N	Attributes	Datatype	Constraints	Comments
1	team_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Teams
2	official_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_TeamOfficial
3	job_start_date	DATE	PK	
4	job_end_date	DATE		

Information Stored: Details about team officials managing teams, including start and end dates of their jobs.
Purpose: To track the management history of team officials in different teams.

Table:tbl_Player

S/N	Attributes	Datatype	Constraints	Comments
1	player_id	VARCHAR(20)	PK	Unique id for each player
2	player_name	VARCHAR(20)		Name of the players, no need to be unique
3	p_date_of_birth	DATE		Indicates the player's date of birth, providing information about their age
4	p_position	enum("GK","CB","LB","RB","WB","DM","CM","AM","WF","CF","ST","LM")	CHECK	Gives the players favorite position on the field
5	p_nationality	VARCHAR(20)		Signify players home country and origin
Information Stored: Player details like player_id, player_name, date of birth, position, and nationality. Purpose: To store information about individual players, including their positions on the field.				

Table: tbl_Trainers

S/N	Attributes	Datatype	Constraints	Comments
1	player_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Player
2	official_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_TeamOfficial
3	job_start_date	DATE	PK	Indicates from when started association with the player
4	job_end_date	DATE		End date of the association

Information Stored: Information about trainers, including player_id, official_id, job start and end dates.
Purpose: To establish a link between players and trainers, tracking the trainers associated with each player.

Table: tbl_Plays_for

S/N	Attributes	Datatype	Constraints	Comments
1	palyer_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Player
2	team_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Teams
3	player_jersey_number	INT		Player jersey number while playing for the national team
4	debut_date	DATE	FK	Indicates the date when the player started to play for the team
5	rertire_date	DATE		Date of retirement of the player from the team
Information Stored: Player-team relationships with details like jersey number, debut date, and retire date. Purpose: To track which players play for which teams, with historical information on their debut and retirement dates.				

Table: tbl_Stadium

S/N	Attributes	Datatype	Constraints	Comments
1	st_id	VARCHAR(20)	PK	Unique id to identify stadium
2	st_name	VARCHAR(20)		Name of the stadium
3	st_capacity	INT		Total number of spectators the stadium can hold
4	st_location	VARCHAR(20)		Place where the stadium is situated
Information Stored: Stadium details such as st_id, st_name, st_capacity, and st_location. Purpose: To store information about the stadiums where matches are played.				

Table: tbl_Match

S/N	Attributes	Datatype	Constraints	Comments
1	match_id	VARCHAR(20)	PK	Unique representation of each match
2	match_date	DATE	NOT NULL	Represents the match placement date

3	match_time	TIME	NOT NULL	Represents the match placement time
4	team_1	VARCHAR(20)	FK, NOT NULL	Keep consistency with tbl_Teams
5	team_2	VARCHAR(20)	FK, NOT NULL	Keep consistency with tbl_Teams
6	spectators	INT		Number of spectators attending the match
7	ticket_price	INT		Ticket price of each match
8	total_score	INT		Total goal by each team in a match
Information Stored: Match details like match_id, match_date, match_time, teams playing, spectators, ticket_price, and total_score. Purpose: To store information about individual matches, including teams, date, time, and match-specific details.				

Table: tbl_Player_Stat

S/N	Attributes	Datatype	Constraints	Comments
1	match_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Match
2	player_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Player
3	score_time	TIME	PK	Represent s the time of score
4	score_type	VARCHAR(20)	PK	Nature of goal
Information Stored: Player statistics for each match, including match_id, player_id, score_time, and score_type. Purpose: To store detailed statistics for each player in a specific match.				

Table: tbl_venue

S/N	Attributes	Datatype	Constraints	Comments
1	wc_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_WorldCup
2	wc_year	YEAR	PK, FK	Keep consistency with tbl_WorldCu

				p
3	st_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Stadium
4	match_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_Match
Information Stored: Venue details, linking World Cup, stadium, and match details. Purpose: To establish relationships between World Cups, stadiums, and matches, providing information on where each match takes place.				

Table: tbl_Qualifcation

S/N	Attributes	Datatype	Constraints	Comments
1	q_id	VARCHAR(20)	PK	Unique representation of qualification
2	wc_id	VARCHAR(20)	PK, FK	Keep consistency with tbl_WorldCup
3	wc_year	YEAR	PK, FK	Keep consistency with tbl_WorldCup
4	team_id	VARCHAR(2	PK, FK	Keep

		0)		consistency with tbl_Team
5	total_match	INT		Keep track how many match a team played
6	total_wins	INT		Keep track how many match a team win
7	toal_lost	INT		Keep track how many match a team lost
8	total_draws	INT		Keep track how many match a team draws
9	goal_scored	INT		Keep track how many goal a team scored
10	goal_conceived	INT		Keep track how many goal a team conceived
11	goal_difference	INT		Keep track the goal difference of a team
12	current_status	enum('Group', 'Quarter',	CHECK	Provides the stage a team

		'Semi', 'Final')		is currently in
Information Stored: Qualification statistics for teams, including total matches played, wins, losses, draws, goals scored, and goals conceded. Purpose: To store information about the qualification status of teams in a World Cup, including their current stage (Group, Quarter, Semi, Final).				

Constraints:

tbl_Teams:

- CONSTRAINT pk_team PRIMARY KEY (team_id)

tbl_WorldCup:

- CONSTRAINT pk_WorldCup PRIMARY KEY (wc_id , wc_year)

tbl_team_in_WorldCup:

- CONSTRAINT pk_team_in_WorldCup PRIMARY KEY (wc_id , team_id)
- CONSTRAINT fk_team_in_WorldCup_team FOREIGN KEY (team_id) REFERENCES tbl_Teams (team_id),
- CONSTRAINT fk_team_in_WorldCup_wc FOREIGN KEY (wc_id , wc_year) REFERENCES tbl_WorldCup (wc_id , wc_year)

tbl_TeamOfficials:

- CONSTRAINT pk_TeamOfficials PRIMARY KEY (official_id)

tbl_manage_team:

- CONSTRAINT pk_manage_team PRIMARY KEY (team_id , official_id , job_start_date),
- CONSTRAINT fk_manage_team_ref_team FOREIGN KEY (team_id) REFERENCES tbl_Teams (team_id),
- CONSTRAINT fk_manage_team_ref_officials FOREIGN KEY (official_id) REFERENCES tbl_TeamOfficials (official_id)

tbl_Player:

- CONSTRAINT pk_players PRIMARY KEY (player_id),
- CONSTRAINT check_position CHECK (p_position IN ('GK' , 'CB', 'LB', 'RB', 'WB', 'DM', 'CM', 'AM', 'WF', 'CF', 'ST', 'LM'))

tbl_Trainers:

- CONSTRAINT pk_trainer PRIMARY KEY (player_id , official_id , job_start_date),
- CONSTRAINT fk_trainer_palyer FOREIGN KEY (player_id) REFERENCES tbl_Player (player_id),
- CONSTRAINT fk_trainer_official FOREIGN KEY (official_id) REFERENCES tbl_TeamOfficials (official_id)

tbl_Plays_for:

- CONSTRAINT pk_Plays_for PRIMARY KEY (player_id , team_id , debut_date)
- CONSTRAINT fk_Plays_for_team FOREIGN KEY (team_id) REFERENCES tbl_Teams (team_id)
- CONSTRAINT fk_Plays_for_player FOREIGN KEY (player_id) REFERENCES tbl_Player (player_id)

tbl_Stadium:

- CONSTRAINT pk_tbl_Stadium PRIMARY KEY (st_id)

tbl_Match:

- CONSTRAINT pk_match PRIMARY KEY (match_id),
- CONSTRAINT fk_match_team1 FOREIGN KEY (team_1) REFERENCES tbl_Teams (team_id),
- CONSTRAINT fk_match_team2 FOREIGN KEY (team_2) REFERENCES tbl_Teams (team_id),
- CONSTRAINT match_date_time UNIQUE (match_date , match_time)

tbl_Player_Stat:

- CONSTRAINT pk_player_stat PRIMARY KEY (match_id , player_id , score_time , score_type),
- CONSTRAINT fk_player_stat_player FOREIGN KEY (player_id) REFERENCES tbl_Player (player_id),
- CONSTRAINT fk_player_stat_match FOREIGN KEY (match_id) REFERENCES tbl_Match (match_id)

tbl_Venue:

- CONSTRAINT pk_Venue PRIMARY KEY (wc_id , wc_year , st_id , match_id),
- CONSTRAINT fk_Venue_wc FOREIGN KEY (wc_id , wc_year) REFERENCES tbl_WorldCup (wc_id , wc_year),
- CONSTRAINT fk_Venue_st FOREIGN KEY (st_id) REFERENCES tbl_Stadium (st_id),
- CONSTRAINT fk_Venue_match FOREIGN KEY (match_id) REFERENCES tbl_Match (match_id)

tbl_Qualification:

- CONSTRAINT pk_qualification PRIMARY KEY (q_id , wc_id , wc_year , team_id),
- CONSTRAINT fk_q_wc FOREIGN KEY (wc_id , wc_year) REFERENCES tbl_WorldCup (wc_id , wc_year),
- FOREIGN KEY (team_id) REFERENCES tbl_Teams (team_id),
- CONSTRAINT chk_stat CHECK (current_status IN ('Group' , 'Quarter', 'Semi', 'Final'))

SQL Implementation:

```
CREATE TABLE tbl_Teams (
    team_id VARCHAR(20),
    team_name VARCHAR(20),
    CONSTRAINT pk_team PRIMARY KEY (team_id)
);
```

```sql
CREATE TABLE tbl_WorldCup (
    wc_id VARCHAR(20),
    wc_year YEAR,
    wc_organizer VARCHAR(20),
    CONSTRAINT pk_WorldCup PRIMARY KEY (wc_id , wc_year)
);

CREATE TABLE tbl_team_in_WorldCup (
    wc_id VARCHAR(20),
    team_id VARCHAR(20),
    wc_year YEAR,
    CONSTRAINT pk_team_in_WorldCup PRIMARY KEY (wc_id ,
team_id),
    CONSTRAINT fk_team_in_WorldCup_team FOREIGN KEY
(team_id)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT fk_team_in_WorldCup_wc FOREIGN KEY (wc_id
, wc_year)
        REFERENCES tbl_WorldCup (wc_id , wc_year)
);

CREATE TABLE tbl_TeamOfficials (
    official_id VARCHAR(20),
    official_name VARCHAR(20),
    designation VARCHAR(20),
    nationality VARCHAR(20),
    contact_info VARCHAR(20),
    CONSTRAINT pk_TeamOfficials PRIMARY KEY (official_id)
);


CREATE TABLE tbl_manage_team (
```

```
    team_id VARCHAR(20),
    official_id VARCHAR(20),
    job_start_date DATE,
    job_end_date DATE,
    CONSTRAINT pk_manage_team PRIMARY KEY (team_id ,
official_id , job_start_date),
    CONSTRAINT fk_manage_team_ref_team FOREIGN KEY
(team_id)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT fk_manage_team_ref_officials FOREIGN KEY
(official_id)
        REFERENCES tbl_TeamOfficials (official_id)
);


CREATE TABLE tbl_Player (
    player_id VARCHAR(20),
    player_name VARCHAR(20),
    p_date_of_birth DATE,
    p_position ENUM('GK', 'CB', 'LB', 'RB', 'WB', 'DM',
'CM', 'AM', 'WF', 'CF', 'ST', 'LM'),
    p_nationality VARCHAR(20),
    CONSTRAINT pk_players PRIMARY KEY (player_id),
    CONSTRAINT check_position CHECK (p_position IN ('GK'
, 'CB',
        'LB',
        'RB',
        'WB',
        'DM',
        'CM',
        'AM',
        'WF',
```

```
        'CF',
        'ST',
        'LM'))
);

CREATE TABLE tbl_Trainers (
    player_id VARCHAR(20),
    official_id VARCHAR(20),
    job_start_date DATE,
    job_end_date DATE,
    CONSTRAINT pk_trainer PRIMARY KEY (player_id ,
official_id , job_start_date),
    CONSTRAINT fk_trainer_palyer FOREIGN KEY (player_id)
        REFERENCES tbl_Player (player_id),
    CONSTRAINT fk_trainer_official FOREIGN KEY
(official_id)
        REFERENCES tbl_TeamOfficials (official_id)
);

CREATE TABLE tbl_Plays_for (
    player_id VARCHAR(20),
    team_id VARCHAR(20),
    player_jersey_number INT,
    debut_date DATE,
    retire_date DATE,
    CONSTRAINT pk_Plays_for PRIMARY KEY (player_id ,
team_id , debut_date),
    CONSTRAINT fk_Plays_for_team FOREIGN KEY (team_id)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT fk_Plays_for_player FOREIGN KEY
(player_id)
        REFERENCES tbl_Player (player_id)
```

```
);

CREATE TABLE tbl_Stadium (
    st_id VARCHAR(20),
    st_name VARCHAR(20),
    st_capacity INT,
    st_location VARCHAR(20),
    CONSTRAINT pk_tbl_Stadium PRIMARY KEY (st_id)
);

CREATE TABLE tbl_Match (
    match_id VARCHAR(20),
    match_date DATE NOT NULL,
    match_time TIME NOT NULL,
    team_1 VARCHAR(20) NOT NULL,
    team_2 VARCHAR(20) NOT NULL,
    spectators INT,
    ticket_price INT,
    total_score INT,
    CONSTRAINT pk_match PRIMARY KEY (match_id),
    CONSTRAINT fk_match_team1 FOREIGN KEY (team_1)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT fk_match_team2 FOREIGN KEY (team_2)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT match_date_time UNIQUE (match_date ,
match_time)
);


CREATE TABLE tbl_Player_Stat (
    match_id VARCHAR(20),
    player_id VARCHAR(20),
```

```
    score_time TIME,
    score_type VARCHAR(20),
    CONSTRAINT pk_player_stat PRIMARY KEY (match_id ,
player_id , score_time , score_type),
    CONSTRAINT fk_player_stat_player FOREIGN KEY
(player_id)
        REFERENCES tbl_Player (player_id),
    CONSTRAINT fk_player_stat_match FOREIGN KEY
(match_id)
        REFERENCES tbl_Match (match_id)
);

CREATE TABLE tbl_venue (
    wc_id VARCHAR(20),
    wc_year YEAR,
    st_id VARCHAR(20),
    match_id VARCHAR(20),
    CONSTRAINT pk_Venue PRIMARY KEY (wc_id , wc_year ,
st_id , match_id),
    CONSTRAINT fk_Venue_wc FOREIGN KEY (wc_id , wc_year)
        REFERENCES tbl_WorldCup (wc_id , wc_year),
    CONSTRAINT fk_Venue_st FOREIGN KEY (st_id)
        REFERENCES tbl_Stadium (st_id),
    CONSTRAINT fk_Venue_match FOREIGN KEY (match_id)
        REFERENCES tbl_Match (match_id)
);

CREATE TABLE tbl_Qualification (
    q_id VARCHAR(20),
    wc_id VARCHAR(20),
    wc_year YEAR,
    team_id VARCHAR(20),
```

```
    total_match_played INT,
    total_wins INT,
    total_lost INT,
    total_draws INT,
    goal_scored INT,
    goal_conceived INT,
    goal_difference INT,
    current_status ENUM('Group', 'Quarter', 'Semi',
'Final'),
    CONSTRAINT pk_qualification PRIMARY KEY (q_id , wc_id
, wc_year , team_id),
    CONSTRAINT fk_q_wc FOREIGN KEY (wc_id , wc_year)
        REFERENCES tbl_WorldCup (wc_id , wc_year),
    FOREIGN KEY (team_id)
        REFERENCES tbl_Teams (team_id),
    CONSTRAINT chk_stat CHECK (current_status IN ('Group'
, 'Quarter', 'Semi', 'Final'))
);
```

Queries and output:

1. Find the teams participated in specific world cup

```
select team_name, wc_year from tbl_Teams
right outer join
tbl_team_in_WorldCup
on tbl_Teams.team_id = tbl_team_in_WorldCup.team_id;
```

Output:

team_name	wc_year
Argentina	2018
Belgium	2018
Brazil	2018
Colombia	2018
Croatia	2018
Denmark	2018
England	2018
Spain	2018
France	2018
Germany	2018
Japan	2018
Mexico	2018
Portugal	2018
Russia	2018
Sweden	2018
Uruguay	2018
Argentina	2022
Belgium	2022
Brazil	2022
Colombia	2022
Croatia	2022
Denmark	2022
England	2022
Spain	2022
France	2022

2. Find the total number of spectators and average ticket price for all matches in a specific world cup

```
SELECT YEAR(match_date) AS match_year,
       SUM(spectators) AS total_spectators,
       AVG(ticket_price) AS avg_ticket_price
FROM tbl_Match
GROUP BY match_year;
```

Output:

match_year	total_spectators	avg_ticket_price
2022	504000	103.0000
2018	454000	105.5000

3. Find the top goal scorers in a specific World Cup

```
SELECT player_name, COUNT(*) AS goals_scored
FROM tbl_Player
JOIN tbl_Player_Stat ON tbl_Player.player_id =
tbl_Player_Stat.player_id
JOIN tbl_Match ON tbl_Player_Stat.match_id =
tbl_Match.match_id
JOIN tbl_team_in_WorldCup ON tbl_Match.team_1 =
tbl_team_in_WorldCup.team_id
                              OR tbl_Match.team_2 =
tbl_team_in_WorldCup.team_id
JOIN tbl_WorldCup ON tbl_team_in_WorldCup.wc_id =
tbl_WorldCup.wc_id AND tbl_team_in_WorldCup.wc_year =
tbl_WorldCup.wc_year
WHERE tbl_WorldCup.wc_id = 'WC2022' AND
tbl_WorldCup.wc_year = 2022
GROUP BY player_name
ORDER BY goals_scored DESC;
```

Output:

player_name	goals_scored
Lionel Messi	2
Eden Hazard	2
Borna Barisic	2
Raheem Sterling	2
Olivier Giroud	2

4. Find the best goalkeeper in each World Cup

```
with less_goal_conceived_team as(
SELECT team_id, wc_id, goal_difference,
goal_conceived
FROM tbl_Qualification
WHERE goal_conceived = (SELECT MIN(goal_conceived)
FROM tbl_Qualification)
and goal_difference = (select MAX(goal_difference)
from tbl_Qualification)
GROUP BY team_id, wc_id, goal_difference,
goal_conceived
ORDER BY goal_difference DESC
),
goalkeeper as(
    select pf.team_id, p.player_id, p.player_name
from tbl_Player p
    join tbl_Plays_for pf on p.player_id =
pf.player_id
    where p_position = 'GK'
)

select player_name as Best_Goalkeeper from goalkeeper
g
join less_goal_conceived_team l on g.team_id =
l.team_id;
```

Output:

Best_Goalkeeper
Manuel Neuer

5. Find the teams that did not qualify to play in the World Cup

```
select team_name from tbl_Teams
where team_id not in (
select T.team_id from tbl_Teams T
join
tbl_team_in_WorldCup TW
on T.team_id = TW.team_id
);
```

Output:

team_name
Bangladesh
Italy
Morocco

6. List all the players of the teams that plays football

```
SELECT
    T.team_id,
    T.team_name,
    P.player_id,
    P.player_name
FROM
    tbl_Teams T
LEFT JOIN
    tbl_Plays_for PF ON T.team_id = PF.team_id
LEFT JOIN
    tbl_Player P ON PF.player_id = P.player_id;
```

Output:

ARG	Argentina	ARG1	Lionel Messi
ARG	Argentina	ARG10	Leandro Paredes
ARG	Argentina	ARG11	Giovani Lo Celso
ARG	Argentina	ARG2	Sergio Agüero
ARG	Argentina	ARG3	Ángel Di María
ARG	Argentina	ARG4	Paulo Dybala
ARG	Argentina	ARG5	Gonzalo Higuaín
ARG	Argentina	ARG6	Nicolas Otamendi
ARG	Argentina	ARG7	Marcos Rojo
ARG	Argentina	ARG8	Rodrigo De Paul
ARG	Argentina	ARG9	Lautaro Martínez
BD	Bangladesh	NULL	NULL
BEL	Belgium	BEL1	Thibaut Courtois
BEL	Belgium	BEL10	Youri Tielemans
BEL	Belgium	BEL11	Thorgan Hazard
BEL	Belgium	BEL2	Jan Vertonghen
BEL	Belgium	BEL3	Toby Alderweireld
BEL	Belgium	BEL4	Thomas Meunier
BEL	Belgium	BEL5	Kevin De Bruyne
BEL	Belgium	BEL6	Axel Witsel
BEL	Belgium	BEL7	Eden Hazard
BEL	Belgium	BEL8	Romelu Lukaku
BEL	Belgium	BEL9	Dries Mertens
BRA	Brazil	BRA1	Neymar Jr.
BRA	Brazil	BRA10	Éverton Ribeiro

Fig.1

team_id	team_name	player_id	player_name
BRA	Brazil	BRA10	Éverton Ribeiro
BRA	Brazil	BRA11	Vinícius Júnior
BRA	Brazil	BRA2	Gabriel Jesus
BRA	Brazil	BRA3	Philippe Coutinho
BRA	Brazil	BRA4	Roberto Firmino
BRA	Brazil	BRA5	Casemiro
BRA	Brazil	BRA6	Marquinhos
BRA	Brazil	BRA7	Thiago Silva
BRA	Brazil	BRA8	Fabinho
BRA	Brazil	BRA9	Richarlison
COL	Colombia	NULL	NULL
CRO	Croatia	CRO1	Dominik Livakovic
CRO	Croatia	CRO10	Ivan Rakitic
CRO	Croatia	CRO11	Josko Gvardiol
CRO	Croatia	CRO2	Domagoj Vida
CRO	Croatia	CRO3	Borna Barisic
CRO	Croatia	CRO4	Sime Vrsaljko
CRO	Croatia	CRO5	Luka Modric
CRO	Croatia	CRO6	Mateo Kovacic
CRO	Croatia	CRO7	Ivan Perisic
CRO	Croatia	CRO8	Andrej Kramaric
CRO	Croatia	CRO9	Ante Rebic
DEN	Denmark	DEN1	Kasper Schmeichel
DEN	Denmark	DEN10	Martin Braithwaite
DEN	Denmark	DEN11	Andreas Skov Ol...

Fig.2

team_id	team_name	player_id	player_name
DEN	Denmark	DEN4	Andreas Christe...
DEN	Denmark	DEN5	Jens Stryger Lar...
DEN	Denmark	DEN6	Thomas Delaney
DEN	Denmark	DEN7	Christian Eriksen
DEN	Denmark	DEN8	Pierree Hojbjerg
DEN	Denmark	DEN9	Yussuf Poulsen
ENG	England	ENG1	Jordan Pickford
ENG	England	ENG10	Jadon Sancho
ENG	England	ENG11	Bukayo Saka
ENG	England	ENG2	Trent Alexander
ENG	England	ENG3	Declan Rice
ENG	England	ENG4	Mason Mount
ENG	England	ENG5	Raheem Sterling
ENG	England	ENG6	Phil Foden
ENG	England	ENG7	Harry Kane
ENG	England	ENG8	John Stones
ENG	England	ENG9	Harry Maguire
ESP	Spain	ESP1	David De Gea
ESP	Spain	ESP10	Dani Carvajal
ESP	Spain	ESP11	Mikel Oyarzabal
ESP	Spain	ESP2	Sergio Ramos
ESP	Spain	ESP3	Jordi Alba
ESP	Spain	ESP4	Sergio Busquets
ESP	Spain	ESP5	Thiago Alcântara
ESP	Spain	ESP6	Koke

Fig. 3

team_id	team_name	player_id	player_name
ESP	Spain	ESP7	Ferran Torres
ESP	Spain	ESP8	Álvaro Morata
ESP	Spain	ESP9	Gerard Moreno
FRA	France	FRA1	Hugo Lloris
FRA	France	FRA10	Lucas Hernandez
FRA	France	FRA11	Kingsley Coman
FRA	France	FRA2	Benjamin Pavard
FRA	France	FRA3	Raphael Varane
FRA	France	FRA4	NGolo Kanté
FRA	France	FRA5	Paul Pogba
FRA	France	FRA6	Antoine Griezmann
FRA	France	FRA7	Kylian Mbappé
FRA	France	FRA8	Karim Benzema
FRA	France	FRA9	Olivier Giroud
GER	Germany	GER1	Manuel Neuer
GER	Germany	GER10	Thomas Müller
GER	Germany	GER11	Timo Werner
GER	Germany	GER2	Joshua Kimmich
GER	Germany	GER3	Leon Goretzka
GER	Germany	GER4	Toni Kroos
GER	Germany	GER5	Serge Gnabry
GER	Germany	GER6	Leroy Sané
GER	Germany	GER7	Kai Havertz
GER	Germany	GER8	Matthias Ginter
GER	Germany	GER9	Antonio Rüdiger

Fig. 4

team_id	team_name	player_id	player_name
ITA	Italy	NULL	NULL
JPN	Japan	JPN1	Eiji Kawashima
JPN	Japan	JPN10	Shoya Nakajima
JPN	Japan	JPN11	Daichi Kamada
JPN	Japan	JPN2	Yuto Nagatomo
JPN	Japan	JPN3	Maya Yoshida
JPN	Japan	JPN4	Hiroki Sakai
JPN	Japan	JPN5	Gaku Shibasaki
JPN	Japan	JPN6	Wataru Endo
JPN	Japan	JPN7	Takumi Minamino
JPN	Japan	JPN8	Genki Haraguchi
JPN	Japan	JPN9	Yuya Osako
MEX	Mexico	MEX1	Guillermo Ochoa
MEX	Mexico	MEX10	Hirving Lozano
MEX	Mexico	MEX11	Chucky Lozano
MEX	Mexico	MEX2	Hector Moreno
MEX	Mexico	MEX3	Carlos Salcedo
MEX	Mexico	MEX4	Jesus Gallardo
MEX	Mexico	MEX5	Hector Herrera
MEX	Mexico	MEX6	Jonathan dos S...
MEX	Mexico	MEX7	Andres Guardado
MEX	Mexico	MEX8	Raul Jimenez
MEX	Mexico	MEX9	Jesus Corona
MRC	Morocco	NULL	NULL
POR	Portugal	POR1	Rui Patricio

Fig.5

Finding Normal Form:

Table: tbl_Teams

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_WorldCup

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_team_in_WorldCup

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_TeamOfficials

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_manage_team

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Player

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Trainers

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Plays_for

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Stadium

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Match

- There is no transitive dependency.So, this table is in BCNF

Table: tbl_Player_Stat

- Here every attribute is atomic, so it is 1NF

Table: tbl_venue

- Here every attribute is atomic, so it is 1NF

Table: tbl_Qualifcation

- There is no transitive dependency.So, this table is in BCNF

Future Works and Conclusion:

This project aims to provide an efficient database management system for FIFA World Cup football.The football database system is a powerful tool for organizing and analyzing various aspects of the football ecosystem. By utilizing constraints and foreign key links, the relational database

architecture ensures data integrity and provides an organized method of data organization. The developed queries showcase the system's ability to extract valuable insights from the stored data. For instance, a query can retrieve player goal statistics for a specific World Cup, effectively capturing the complex relationships between teams, players, matches, and World Cups.

However, this model is not fully capable of doing all sorts of things related to the FIFA world cup. Also, shortage of input data has limited the ability to showcase the functionality it is capable of performing. There are absence of past records, match official records, sponsor records, team selection process around the world, overall team rankings and many more. Introducing all this things will make the database more powerful. Creating an intuitive user interface is a key component of upcoming work for the football database system. The interface will allow users who are not familiar with SQL to easily connect with the database and extract data.

Overall, this project lays a solid foundation for a football management system, offering a valuable resource for stakeholders in the football domain, including coaches, analysts, and administrators. It represents a starting point for a more comprehensive and feature-rich system to meet the evolving needs of the football community.