FIFA World Cup (1930-2014)

Sri Aditya Panda (UIN: 223003437)
Arjun Jayaraj Moothedath (UIN: 722008073)
Dakshina Ilangovan (UIN: 622009678)
Rajashree Rao Polsani (UIN: 223001584)

2 DATABASE SCHEMA

PART A

The following schemas have been derived based on the proposed ER diagram.

1. TEAM(Country_Code, Country_Name, Association, Points, Ranking)
2. WORLD_CUP (Year, Host_Country, Winner, Runner_Up)
3. PLAYER(Country_Code, Player_Name, Player_Role, DOB, Jersey_Number, Club)
4. MATCH(Stadium, Stadium_Address, Match_Number, Winner, Decision, Team_1, Team_2, Team_1_Score, Team_2_Score, Date.Day, Date.Month, Date.Year)
5. GOAL(Match_Number, Date.Year, Time)
6. TEAM_PARTICIPATES_IN_WORLD_CUP(Group, Country_Code, Year)
7. WORLD_CUP_PLAYED_BY_PLAYER(Year, Player_Name, Country_Code)
8. MATCH_PLAYED_BY(Match_Number, Date.Year, Player_Name, Country_Code)
9. PLAYER_SCORES_GOALS(Player_Name, Country_Code, Match_Number, Date.Year, Time)

These are translated in to database DDL queries as follows.

1.

```
CREATE TABLE TEAM(
Country_Code CHAR(3) PRIMARY KEY,
Country_Name CHAR(30),
Association CHAR(50),
Points INT,
Ranking INT
)
```

2.

```
CREATE TABLE WORLD_CUP (
Year INT PRIMARY KEY,
Host_Country CHAR(30) NOT NULL,
Winner CHAR(3),
Runner_Up CHAR(3),
FOREIGN KEY (Winner) REFERENCES TEAM (Country_Code),
```

```
FOREIGN KEY (Runner_Up) REFERENCES TEAM (Country_Code)
)
```

3.

```
CREATE TABLE PLAYER(
Country_Code CHAR(3),
Player_Role CHAR(20),
Player_Name CHAR(50),
DOB DATE,
Jersey_Number INT ,
Club CHAR(50),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
PRIMARY KEY (Country_Code, Player_Name)
)
```

4.

```
CREATE TABLE MATCH(
Stadium CHAR(50),
Stadium_Address CHAR(200),
Match_Number INT,
Winner CHAR(3) NULL,
Decision CHAR(10),
Team_1 CHAR(3),
Team_2 CHAR(3),
Team_1_Score INT,
Team_2_Score INT,
Date.Day INT,
Date.Month CHAR(3),
Date.Year INT,
FOREIGN KEY (Date.Year) REFERENCES WORLD_CUP (Year),
PRIMARY KEY (Match_Number, Date.Year)
)
```

5.

```
CREATE TABLE GOAL(
Match_Number INT,
Date.Year INT,
Time TIME,
FOREIGN KEY (Match_Number, Date.Year) REFERENCES MATCH (Match_Number, Date.Year),
PRIMARY KEY (Match_Number, Date.Year, Time)
)
```

6.

```
CREATE TABLE TEAM_PARTICIPATES_IN_WORLD_CUP(
Group CHAR(1) NOT NULL,
Country_Code CHAR(3),
Year INT,
FOREIGN KEY (Year) REFERENCES WORLD_CUP (Year),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
PRIMARY KEY (Year, Country_Code)
)
```

7.

```
CREATE TABLE WORLD_CUP_PLAYED_BY_PLAYER(
Year INT,
Player_Name CHAR(50),
Country_Code CHAR(3),
FOREIGN KEY (Year) REFERENCES WORLD_CUP (Year),
FOREIGN KEY (Player_Name) REFERENCES PLAYER (Player_Name),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
PRIMARY KEY (Year, Player_Name, Country_Code)
)
```

8.

```
CREATE TABLE MATCH_PLAYED_BY(
Match_Number INT,
Date.Year INT,
Player_Name CHAR(50),
Country_Code CHAR(3),
FOREIGN KEY (Match_Number, Date.Year) REFERENCES MATCH (Match_Number, Date.Year),
FOREIGN KEY (Player_Name) REFERENCES PLAYER (Player_Name),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
PRIMARY KEY (Match_Number, Date.Year, Player_Name, Country_Code)
)
```

9.

```
CREATE TABLE PLAYER_SCORES_GOALS(
Player_Name CHAR(50),
Country_Code CHAR(3),
Match_Number INT,
Date.Year INT,
```

```
Time TIME,
FOREIGN KEY (Player_Name) REFERENCES PLAYER (Player_Name),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
FOREIGN KEY (Match_Number, Date.Year) REFERENCES MATCH (Match_Number, Date.Year),
FOREIGN KEY (Time) REFERENCES GOAL (Time)
PRIMARY KEY (Match_Number, Date.Year, Player_Name, Country_Code, Time)
)
```

PART B

After identifying and resolving BCNF violation, the MATCH relation is split into MATCH and STADIUM relation as follows

MATCH(Stadium, Match_Number, Winner, Decision, Team_1, Team_2, Team_1_Score, Team_2_Score, Date.Day, Date.Month, Date.Year)
STADIUM(Stadium, Stadium_Address)

The corresponding database DDL queries are

```
CREATE TABLE MATCH(
Stadium CHAR(50),
Match_Number INT,
Winner CHAR(3) NULL,
Decision CHAR(10),
Team_1 CHAR(3),
Team_2 CHAR(3),
Team_1_Score INT,
Team_2_Score INT,
Date.Day INT,
Date.Month CHAR(3),
Date.Year INT,
FOREIGN KEY (Date.Year) REFERENCES WORLD_CUP (Year),
FOREIGN KEY (Stadium) REFERENCES STADIUM (Stadium),
PRIMARY KEY (Match_Number, Date.Year)
)

CREATE TABLE STADIUM(
Stadium CHAR(50) PRIMARY KEY,
Stadium_Address CHAR(200)
)
```

Also, GOAL AND PLAYER have a many-one relationship as PLAYER_SCORES_GOALS. The relations GOAL and PLAYER_SCORES_GOALS can be effectively combined as Time in GOAL is associated with exactly one

player, hence no redundancy is introduced. We thus eliminate the relation PLAYER_SCORES_GOALS by combining it with relation GOAL. This leads to GOAL relation being modified as

GOAL_AND_PLAYER_SCORES_GOALS(Match_Number, Date.Year, Time, Player_Name, Country_Code)

The corresponding database DDL query is

```
CREATE TABLE GOAL_AND_PLAYER_SCORES_GOALS (
Match_Number INT,
Date.Year INT,
Time TIME,
Player_Name CHAR(50),
Country_Code CHAR(3),
FOREIGN KEY (Player_Name) REFERENCES PLAYER (Player_Name),
FOREIGN KEY (Country_Code) REFERENCES TEAM (Country_Code),
FOREIGN KEY (Match_Number, Date.Year) REFERENCES MATCH (Match_Number, Date.Year),
PRIMARY KEY (Match_Number, Date.Year, Player_Name, Country_Code, Time)
)
```

Hence the final relations are

1. TEAM(Country_Code, Country_Name, Association, Points, Ranking)
2. WORLD_CUP (Year, Host_Country, Winner, Runner_Up)
3. PLAYER(Country_Code, Player_Name, Player_Role, DOB, Jersey_Number, Club)
4. MATCH(Stadium, Match_Number, Winner, Decision, Team_1, Team_2, Team_1_Score, Team_2_Score, Date.Day, Date.Month, Date.Year)
5. STADIUM(Stadium, Stadium_Address)
6. GOAL_AND_PLAYER_SCORES_GOALS(Match_Number, Date.Year, Time, Player_Name, Country_Code)
7. TEAM_PARTICIPATES_IN_WORLD_CUP(Group, Country_Code, Year)
8. WORLD_CUP_PLAYED_BY_PLAYER(Year, Player_Name, Country_Code)
9. MATCH_PLAYED_BY(Match_Number, Date.Year, Player_Name, Country_Code)