

Relational Schema:

Matches(MId, Date/Time, Length, Round, Hteam, Ateam, Referee, Stadium)

- MId not null
- Hteam/Ateam foreign key referencing home/away Team Name/Country
- Hteam/Ateam not null
- Referee foreign key referencing Referees
- Referee not null
- Stadium foreign key referencing Stadium
- Stadium not null

Teams(Name/Country, Group, URL, National Assoc.)

- Name/Country not null

NOTE: No Members entity translations because ISA is covering and non-overlapping

Players(PId, Name, DOB, Position, Shirt #, Team)

- PId not null (primary/reference key cannot be null)

Coach(PId, Name, DOB, Role)

- PId not null (primary/reference key cannot be null)

Playing in(MId, PId, Entered, Left, Yellow, Red)

- MId and PId not null
- MId foreign key referencing Match
- PId foreign key referencing Players

Goal(MId, Occurrence, Minute Scored, Penalty Kick, PId)

- MId and Occurrence not null
- MId foreign key referencing Matches
- PId foreign key referencing Players

Referees(PId, Name, Country Born, Role, Years Experience)

- PId not null

Officiating(MId, PId)

- MId and PId not null
- MId foreign key referencing Match
- PId foreign key referencing Players

Stadium(Name, Location, Capacity)

- Name not null

Ticket(PId, Cost, MId, Seat#, Email)

- PId not null
- MId foreign key referencing Matches
- Seat# foreign key referencing Seat
- Email foreign key referencing Customer

Customer(Email, Name, Phone #, Address, Credit Card #)

- Email not null

Seat(Seat #, Row, Section, Cost, Stadium)

- Seat# not null
- Stadium foreign key referencing Stadium

Application Interaction:

3a)

i

```
db2 => select * from matches;
```

MID	DATE_TIME	LENGTH	ROUND	HTEAM	ATEAM	REFEREE	STADIUM
1	2023-03-11-20.00.00.000000	90	Group Stage	Argentina	Spain		1 Maracana Stadium
2	2023-03-11-22.00.00.000000	90	Group Stage	Brazil	South Korea		2 Allianz Arena
3	2023-03-12-20.00.00.000000	90	Group Stage	France	Portugal		3 Signal Iduna Park
4	2023-03-13-22.00.00.000000	90	Group Stage	Germany	Mexico		4 Johan Cruyff Arena
5	2023-03-12-20.00.00.000000	90	Group Stage	Japan	Japan		5 Wembley Stadium
6	2023-03-12-22.00.00.000000	90	Group Stage	Mexico	Germany		6 King Baudouin Stadium
7	2023-03-13-20.00.00.000000	90	Group Stage	Portugal	France		7 La Bombonera
8	2023-03-10-22.00.00.000000	90	Group Stage	South Korea	Brazil		8 Estadio do Dragao
9	2023-03-13-20.00.00.000000	90	Group Stage	Spain	Argentina		9 Parc des Princes

9 record(s) selected.

ii

Soccer Main Menu

1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application

[Please Enter Your Option: 1

[Enter the name of the country: Argentina

```
Argentina  Spain  2023-03-11  Group Stage  1  2  4
Spain    Argentina  2023-03-13  Group Stage  0  0  2
```

[Enter [A] to find matches of another country, [P] to go to the previous menu: █

iii

[Enter [A] to find matches of another country, [P] to go to the previous menu: P

Soccer Main Menu

1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application

[Please Enter Your Option: █

3b)

i

March 12th date of runtime

```
db2 => SELECT MId, Hteam, Ateam, Date_Time, Round
        FROM Matches
        WHERE Date_Time BETWEEN CURRENT_DATE AND CURRENT_DATE + 3 DAY;c
```

MID	HTEAM	ATEAM	DATE_TIME	ROUND
3	France	Portugal	2023-03-12-20.00.00.000000	Group Stage
4	Germany	Mexico	2023-03-13-22.00.00.000000	Group Stage
5	Japan	Japan	2023-03-12-20.00.00.000000	Group Stage
6	Mexico	Germany	2023-03-12-22.00.00.000000	Group Stage
7	Portugal	France	2023-03-13-20.00.00.000000	Group Stage
9	Spain	Argentina	2023-03-13-20.00.00.000000	Group Stage

6 record(s) selected.

ii

```
db2 => select name from players,playing_in where players.PID = playing_in.PID and playing_in.Entered >= 0 and players.team = 'Portugal' and playing_in.MID = 3;
```

NAME

0 record(s) selected.

iii

```
db2 => select * from players where team = 'Portugal';
```

PID	NAME	DOB	POSITION	SHIRT_NUM	TEAM
4	Sara Lee	11/30/1992	Goalkeeper	1	Portugal
10	Jacob Lerner	06/24/1990	Forward	6	Portugal
11	Ben Halpern	06/24/1990	Defense	55	Portugal
12	Jaden Leach	04/21/1991	Defense	66	Portugal
13	Jordan bara	05/21/1993	Left Wing	77	Portugal

5 record(s) selected.

iv

```
Soccer Main Menu
1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application
[Please Enter Your Option: 2
```

```
Matches:
3  France Portugal 2023-03-12 Group Stage
4  Germany Mexico 2023-03-13 Group Stage
5  Japan Japan 2023-03-12 Group Stage
6  Mexico Germany 2023-03-12 Group Stage
7  Portugal France 2023-03-13 Group Stage
9  Spain Argentina 2023-03-13 Group Stage
```

```
Enter [P] to go to the previous menu or anything else to continue: █
```

v

```
[Enter [P] to go to the previous menu or anything else to continue: anything
[Enter the Match ID: 3
[Enter the Country: Portugal
```

Vi

(No players currently set in the match which is consistent with ii) can be seen through message “No players in the match”

```
[Enter the Match ID: 3
[Enter the Country: Portugal
```

The following players from Portugal are already entered for match 3:

```
No players in the match
Bench Players:
1. Sara Lee      1      Goalkeeper
2. Jacob Lerner  6      Forward
3. Ben Halpern   55     Defense
4. Jaden Leach   66     Defense
```

```
Enter the number of the player you want to insert or [P]
to go to the previous menu: █
```

Vii

```
[to go to the previous menu: 1
[Enter the position of the player: Goalkeeper

Sara Lee      1      Goalkeeper    from minute 0      to minute NULL  yellow: 0  red: 0

Bench Players:
1. Jacob Lerner      6      Forward
2. Ben Halpern       55     Defense
3. Jaden Leach       66     Defense
[Enter [P] to go to main menu or anything else to select another Match ID █
```

Viii (This is assuming I added two more players then tried adding a fourth for the same country C and match ID M)

(notice how bench players are not showing and only option is to quit along with the message too many players)

```
[Enter the Match ID: 3
[Enter the Country: Portugal
```

The following players from Portugal are already entered for match 3:

```
Sara Lee      1      Goalkeeper    from minute 0      to minute NULL  yellow: 0  red: 0
Jacob Lerner   6      Forward      from minute 0      to minute NULL  yellow: 0  red: 0
Ben Halpern    55     Defense      from minute 0      to minute NULL  yellow: 0  red: 0

Already 3 players in the game, cannot add any more
```

```
[Enter [P] to go to the previous menu: █
```

ix

Already 3 players in the game, cannot add any more

```
[Enter [P] to go to the previous menu: P
Soccer Main Menu
1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application
[Please Enter Your Option: 4
Exiting application...
cs421g10@winter2023-comp421:~$ █
```

X(taken after adding all three players into the database for country C and Match ID M, taking into account question viii)

```
db2 => SELECT Players.Name, Players.Shirt_Num, Players.Position, Playing_in.Entered AS Start_Time, Playing_in.Left AS End_Time, Playing_in.Yellow, Playing_in.Red
FROM Playing_in
INNER JOIN Players ON Playing_in.Pid = Players.Pid
INNER JOIN Matches ON Playing_in.Mid = Matches.Mid
WHERE Matches.Mid = 3 AND Playing_in.Entered >= 0 AND Players.Team = 'Portugal';db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => ;
```

NAME	SHIRT_NUM	POSITION	START_TIME	END_TIME	YELLOW	RED
Sara Lee	1	Goalkeeper	0	-	0	0
Jacob Lerner	6	Forward	0	-	0	0
Ben Halpern	55	Defense	0	-	0	0

3 record(s) selected.

3c)

We designed this part to input goals to a game anytime after the game occurred up until 24 hours of the game. The reason we did that is for an easier organization of games shown in the menu when selecting this option. Also when inputting a score to a game, someone would do this right after the game finished or a few hours later.

Firstly when selecting 3 it shows all the games that occurred in the last day:

And to handle errors, if there are no games it will give a message and return to main menu automatically:

```
[Please Enter Your Option: 3

Matches:
No games in the past day
Soccer Main Menu
1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application
Please Enter Your Option: █
```

If there are games:

```
Soccer Main Menu
1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application
[Please Enter Your Option: 3

Matches:
1  Argentina  Spain  2023-03-11  Group Stage
2  Brazil     South Korea 2023-03-11  Group Stage

Enter [P] to go to the previous menu or anything else to continue: █
```

After selecting the match ID, the current goals recorded and all the players on the team are selected with the option to choose the player number. If the player is not on the list then a message will be displayed and returned to the main menu:(note it will only show the players that played in the match (entered time ≥ 0)).

```
[Enter the Match ID: 2

The following are goals from that have already been entered for match 2:

Jane Doe      7   1   17   1
Jane Doe      7   3   14   0
Jane Doe      7   2   81   0
Tom Davis     3   4   12   0

The following are the names and shirt number of the player that played and were active in the game with MatchID: 2:

Jane Doe      7
Tom Davis     3

Enter the number of the player who scored the goal or [P] to go to the previous menu: █
```

Before inserting:

```
db2 => select p.Name, p.shirt_num, g.occurrence, g.minute_scored, g.penalty_kick, p.pid from Goal g, players p, matches m where p.pid = g.pid and m.mid = g.mid and g.mid = 2;
```

NAME	SHIRT_NUM	OCCURRENCE	MINUTE_SCORED	PENALTY_KICK	PID
Jane Doe	7	1	17	1	2
Jane Doe	7	3	14	0	2
Jane Doe	7	2	81	0	2
Tom Davis	3	4	12	0	9

4 record(s) selected.

And then we then insert the following information. (if the minute is over 100 which includes extra time then a message will be displayed and sent back to main menu)

```
[Enter the number of the player who scored the goal or [P] to go to the previous menu: 3
[Enter the minute scored: 15
[was this a penalty (1 for yes, 0 for no): 1
Jane Doe      7  1    17  1
Jane Doe      7  3    14  0
Jane Doe      7  2    81  0
Tom Davis     3  4    12  0
Tom Davis     3  5    15  1

The following are are the names and shirt number of the player that played and were active in the game with MatchID:  2:
Jane Doe      7
Tom Davis     3

Select [P] to go to main menu or anything else to pick a new Match ID: █
```

After inserting:

```
db2 => select p.Name, p.shirt_num, g.occurrence, g.minute_scored, g.penalty_kick, p.pid from Goal g, players p, matches m where p.pid = g.pid and m.mid = g.mid and g.mid = 2;
```

NAME	SHIRT_NUM	OCCURRENCE	MINUTE_SCORED	PENALTY_KICK	PID
Jane Doe	7	1	17	1	2
Jane Doe	7	3	14	0	2
Jane Doe	7	2	81	0	2
Tom Davis	3	4	12	0	9
Tom Davis	3	5	15	1	9

5 record(s) selected.

If we select a Match ID not in the available games a message will be shown and return to main menu:

```
[Enter the Match ID: 3

Match Id not in list of games played in the last day

Soccer Main Menu
1. List information of matches of a country
2. Insert initial player information for a match
3. Insert a Goal
4. Exit application
Please Enter Your Option: █
```


q4)

```
db2 => CREATE INDEX Match ON Matches(MId, Hteam, Ateam);
DB20000I The SQL command completed successfully.
db2 => █
```

We chose to create an index over the match id, the home team, and the away team. We chose to create an index for these attributes of the matches table because we found that most of our queries referenced information from the matches table. Additionally, it was particularly helpful to be able to reference the specific match (match id) and the teams competing in that match. The match id is used as a foreign key in most of our other tables, making it especially useful to quickly access this. The teams values are referenced often because we want specific information for certain teams.

Data Analytics:

```
SELECT Teams.Name_Country, COUNT(Goal.MId) AS Goals_Scored
FROM Teams
JOIN Players ON Teams.Name_Country = Players.Team
JOIN Playing_in ON Players.PId = Playing_in.PId
JOIN Goal ON Playing_in.MId = Goal.MId AND Playing_in.PId = Goal.PId
JOIN Matches ON Playing_in.MId = Matches.MId
WHERE Matches.Round = 'Group Stage'
GROUP BY Teams.Name_Country;
```

Name of excel file: Goals_Per_Team

