2023

FIFA World Cup 2022 Database Project

CS 4318, INSTRUCTOR: DR. LING XU
VAUGHN JORGENSEN, BRAXTON WILSON

UHD | Spring 2023

Contribution Breakdown

Vaughn Jorgensen	Braxton Wilson
Data Preparation/Input	ER/EER Diagram
Database Set up	Wrote Abstract/Mission Statement/Objectives
Use Case Implementation	Use Cases with Steps
Testing	Relational Model
Video	Normalization Process
	Conclusion

Abstract

The purpose of this project is to design a database for FIFA World Cup 2022 data. The motivation is to provide easy access to information for country, player, goal, match, and stadium, to FIFA DBM, FIFA officials, coaches, players, and fans. The design/process is based on principles learned in CS 4318 this semester.

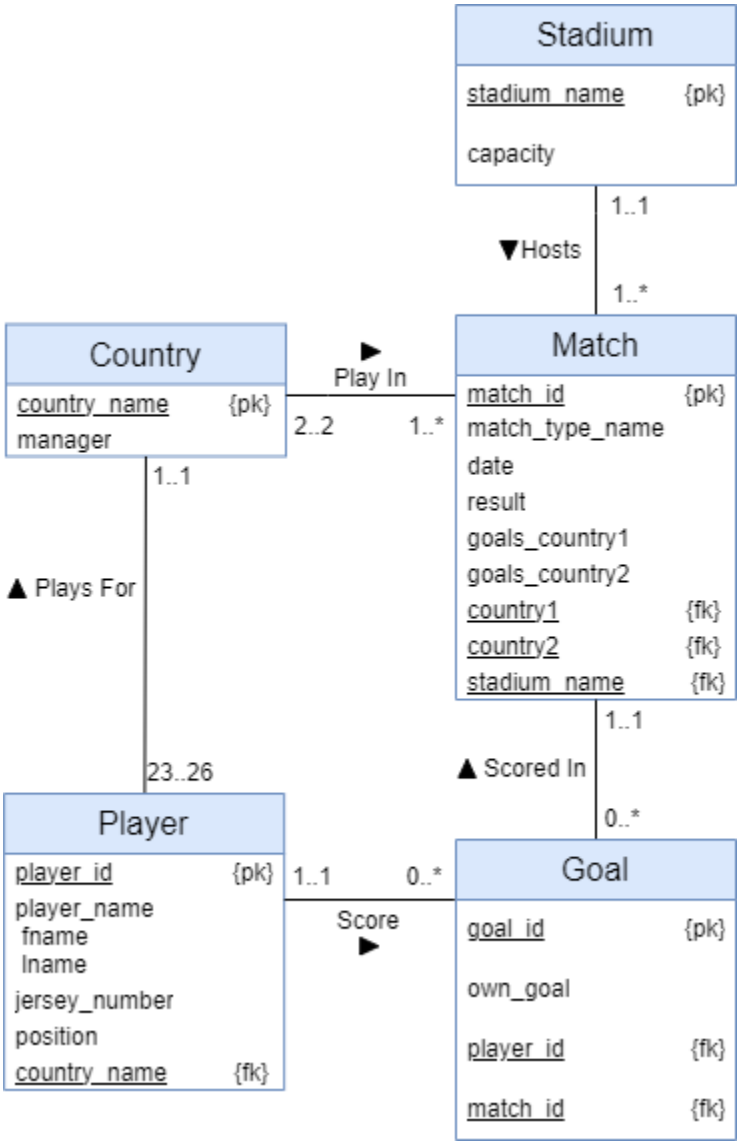
Mission Statement

The purpose of the FIFA World Cup 2022 database system is to maintain and provide data about countries/teams, players, stadiums, matches, and match results to fans, participants (players, coaches, etc), and FIFA officials.

Mission Objectives

- To maintain (enter, update, and delete) data on Countries.
- To maintain (enter, update, and delete) data on Players.
- To maintain (enter, update, and delete) data on Stadiums.
- To maintain (enter, update, and delete) data on Matches.
- To maintain (enter, update, and delete) data on Goals.
- To perform searches on Countries.
- To perform searches on Players.
- To perform searches on Stadiums.
- To perform searches on Matches.
- To perform searches on Goals.
- To track the status of Countries.
- To track the status of Players.
- To track the status of Matches.
- To report on Countries.
- To report on Players.
- To report on Stadiums.
- To report on Matches.
- To report on Goals.

E/R Diagram



Relational Model

(**NOTE**: primary key, *foreign key*)

Match(match_id, match_type_name, date, result, goals_country1, goals_country2, *country1*, *country2*, *stadium_name*)

Country(country_name, manager, group)

Stadium(stadium_name, capacity)

Goal(goal_id, own_goal, *player_id*, *match_id*)

Player(player_id, fName, lName, jersey_number, position, *country_name*)

Normalization Process

Match(match_id, match_type_name, date, result, goals_country1, goals_country2, *country1*, *country2*, *stadium_name*) This is in 3NF due to the lack of transitive dependencies, every non-primary-key attribute is fully functionally dependent on the primary key (match_id), and the intersection of each row and column contains one and only one value. The foreign keys country1 and country2 reference the country entity to identify which countries are playing in the match. The foreign key stadium_name references the stadium which hosts the match. The foreign keys country1, country2, and stadium_name can be null (ex. If the match is waiting on the results of other matches to see which countries will be participating, if the stadium has not been decided upon yet).

Country(country_name, manager, group) This is in 3NF due to the lack of transitive dependencies, every non-primary-key attribute is fully functionally dependent on the primary key (country_name), and the intersection of each row and column contains one and only one value.

Stadium(stadium_name, capacity) This is in 3NF due to the lack of transitive dependencies, every non-primary-key attribute is fully functionally dependent on the primary key (stadium_name), and the intersection of each row and column contains one and only one value.

Goal(goal_id, own_goal, *player_id*, *match_id*) This is in 3NF due to the lack of transitive dependencies, every non-primary-key attribute is fully functionally dependent on the primary key (goal_id), and the intersection of each row and column contains one and only one value. The foreign key player_id references the entity player to identify which player scored the goal. The foreign key match_id references the entity match to identify the match in which the goal was scored. Neither foreign key can be null due to total participation (goals can only be scored in matches by players).

Player(player_id, fName, lName, jersey_number, position, *country_name*) This is in 3NF due to the lack of transitive dependencies, every non-primary-key attribute is fully functionally dependent on the primary key (player_id), and the intersection of each row and column contains one and only one value. The foreign key country_name references the country entity to identify

the player's country. The foreign key country_name cannot be null because countries are selected before those countries select players to represent them in the World Cup.

Use Case List

Use case name: View Match Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the Match data window

2. Program displays a list of all matches.

3. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Match to open a Match Information Window.

Use case name: Search Match Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the search window.

2. Fan or Coach or Player or FIFA Official or FIFA DBM inputs one or more Match attributes to search by (ex. Match Type Name and Date).

3. Program displays a list of Matches in the database that have those attributes.

4. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Match to open a Match Information Window.

Use case name: View Goal Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the Goal data window.

2. Program displays a list of all goals.

3. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Goal to open a Goal Information Window.

Use case name: Search Goal Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the search window.

2. Fan or Coach or Player or FIFA Official or FIFA DBM inputs one or more Goal attributes to search by (ex. Match ID and/or Player Name).

3. Program displays a list of Goal in the database that have those attributes.

4. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Goal to open a Goal Information Window.

Use case name: View Country Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the Country data window.

2. Program displays a list of all countries.

3. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Country to open a Country Information Window.

Use case name: Search Country Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the search window.

2. Fan or Coach or Player or FIFA Official or FIFA DBM inputs one or more Country attributes to search by (ex. Group or Manager).

3. Program displays a list of Countries in the database that have those attributes.

4. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Country to open a Country Information Window.

Use case name: View Stadium Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the Stadium data window.

2. Program displays a list of all Stadiums.

3. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Stadium to open a Stadium Information Window.

Use case name: Search Stadium Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the search window.

2. Fan or Coach or Player or FIFA Official or FIFA DBM inputs one or more stadium attributes to search by (ex. Stadium Name or Capacity).

3. Program displays a list of Stadiums in the database that have those attributes.

4. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Stadium to open a Stadium Information Window

Use case name: View Player Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the Player data window.

2. Program displays a list of all Players.

3. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Player to open a Player Information Window.

Use case name: Search Player Data

Actor: Fan or Coach or Player or FIFA Official or FIFA DBM

Steps:

1. Fan or Coach or Player or FIFA Official or FIFA DBM opens the search window.

2. Fan or Coach or Player or FIFA Official or FIFA DBM inputs one or more Player attributes to search by (ex. Country Name and/or Position).

3. Program displays a list of Players in the database that have those attributes.

4. Fan or Coach or Player or FIFA Official or FIFA DBM can select any Player to open a Player Information Window.

Use case name: Register Match Data

Actor: FIFA DBM

Steps:

1. FIFA DBM selects the “New Match” button;

2. A new Match ID is shown

3. Prompt to enter/select Match attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Register Goal Data

Actor: FIFA DBM

Steps:

1. FIFA DBM selects the “New Goal” button;
2. A new Goal ID is shown
3. Prompt to enter/select Goal attributes
4. All information is displayed, and confirmation is requested
5. FIFA DBM selects the “Confirm” button.

Use case name: Register Countries Data

Actor: FIFA DBM

Steps:

1. FIFA DBM selects the “New Country” button;
2. Prompt to enter/select Country attributes
3. All information is displayed, and confirmation is requested
4. FIFA DBM selects the “Confirm” button.

Use case name: Register Stadium Data

Actor: FIFA DBM

Steps:

1. FIFA DBM selects the “New Stadium” button;
2. Prompt to enter Stadium attributes

3. All information is displayed, and confirmation is requested

4. FIFA DBM selects the “Confirm” button.

Use case name: Register Player Data

Actor: FIFA DBM

Steps:

1. FIFA DBM selects the “New Player” button;

2. A new Player ID is shown

3. Prompt to enter/select Player attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Edit Match Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Match

2. FIFA DBM selects the “Edit Match” button

3. Prompt to select/edit Match attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Edit Goal Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Goal

2. FIFA DBM selects the “Edit Goal” button

3. Prompt to select/edit Goal attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Edit Countries Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Country

2. FIFA DBM selects the “Edit Country” button

3. Prompt to select/edit Country attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Edit Stadium Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Stadium

2. FIFA DBM selects the “Edit Stadium” button

3. Prompt to select/edit Stadium attributes

4. All information is displayed, and confirmation is requested

5. FIFA DBM selects the “Confirm” button.

Use case name: Edit Player Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Player
2. FIFA DBM selects the “Edit Player” button
3. Prompt to select/edit Player attributes
4. All information is displayed, and confirmation is requested
5. FIFA DBM selects the “Confirm” button.

Use case name: Delete Match Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Match
2. FIFA DBM selects the “Delete Match” button
3. Prompt with a warning and request for confirmation
4. FIFA DBM selects the “Confirm” button.

Use case name: Delete Goal Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Goal
2. FIFA DBM selects the “Delete Goal” button
3. Prompt with a warning and request for confirmation
4. FIFA DBM selects the “Confirm” button.

Use case name: Delete Countries Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Country
2. FIFA DBM selects the “Delete Country” button
3. Prompt with a warning and request for confirmation
4. FIFA DBM selects the “Confirm” button.

Use case name: Delete Stadium Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Stadium
2. FIFA DBM selects the “Delete Stadium” button
3. Prompt with a warning and request for confirmation
4. FIFA DBM selects the “Confirm” button.

Use case name: Delete Player Data

Actor: FIFA DBM

Steps:

1. FIFA DBM searches/selects a Player
2. FIFA DBM selects the “Delete Player” button
3. Prompt with a warning and request for confirmation
4. FIFA DBM selects the “Confirm” button.

Use Case Implementation

Use case: View Country Data

```
/* View Country Data--ordered by group */
SELECT *
FROM Country
ORDER BY [group];
```

Use case: Search Country Data

```
/* Aggregate query using COUNT()
   count number of countries in each group */
SELECT [group], COUNT([group]) AS n_countries
FROM Country
GROUP BY [group];
```

Use case: Register Country Data

```
/* Insert operation
   adding country_name: Sweden, manager: Janne Andersson, group: I */
INSERT INTO Country
VALUES ('Sweden', 'Jane Anderson', 'I');
```

Use case: Edit Country Data

```
/* Update operation
   correcting Sweden manager to have 2 n's and 2 s'*/
UPDATE Country
SET manager = 'Janne Andersson'
WHERE country_name = 'Sweden';
```

Use case: Delete Country Data

```
/* Delete operation
   removing Sweden since they weren't in tournament */
DELETE FROM Country
WHERE country_name = 'Sweden';
```

Use case: View Stadium Data

```
/* View Stadium Data */
SELECT *
FROM Stadium;
```

Use case: Search Stadium Data

```
/* Aggregate query using AVG(), MIN(), MAX()
   finding average, minimum, and maximum stadium capacity */
SELECT AVG(capacity) AS avg_capacity,
            MIN(capacity) AS min_capacity,
            MAX(capacity) AS max_capacity
FROM Stadium;
```

Use case: Register Stadium Data

```
/* Insert operation
   adding stadium_name: Rostov Arena, capacity: 45000 */
INSERT INTO Stadium
VALUES ('Rostov Arena', 450000);
```

Use case: Edit Stadium Data

```
/* Update operation
   correcting Rostov Arena to 45000 */
UPDATE Stadium
SET capacity = 45000
WHERE stadium_name = 'Rostov Arena';
```

Use case: Delete Stadium Data

```
/* Delete operation
   removing Rostov Arena since it was from 2018 World Cup */
DELETE FROM Stadium
WHERE stadium_name = 'Rostov Arena';
```

Use case: View Player Data

```
/* View Player Data */
SELECT *
FROM Player;
```

Use case: Search Player Data

```
/* Aggregate query using COUNT()
   how many players does each country have for each position */
SELECT country_name, position, COUNT(position) AS n_players
FROM Player
GROUP BY country_name, position
ORDER BY country_name;
```

Use case: Register Player Data

```
/* Insert operation
   add new player - player_id: P999, player_name: Tom King,
   fName, lName, jersey_number: 0, position: GK, country_name: Wales */
INSERT INTO Player
VALUES ('P999', 'Tom King', 'Tom', 'King', 0, 'GK', 'Wales');
```

Use case: Edit Player Data

```
/* Update operation
   correcting King jersey number 0 => 40 */
UPDATE Player
SET jersey_number = 40
```

```
WHERE player_id = 'P999';
```

Use case: Delete Player Data

```
/* Delete operation
   removing King */
DELETE FROM Player
WHERE player_id = 'P999';
```

Use case: View Match Data

```
/* View Match Data */
SELECT *
FROM [Match];
```

Use case: Search Match Data

```
/* Aggregate query using COUNT() and SUM()
  number of games and goals scored for each match type */
SELECT match_type_name,
            COUNT(match_type_name) AS n_games,
            SUM(goals_country1 + goals_country2) AS goals_scored
FROM [Match]
GROUP BY match_type_name;
```

Use case: Register Match Data

```
/* Insert operation
add new Match - match_id: M65, date: 2022-12-20, result: a, country1: Argentina, country2:
France, goals_country1: 2, goals_country2: 1, match_type_name: Final, stadium_name: Lusail
Stadium */
INSERT INTO [Match]
VALUES ('M65', '2022-12-20', 'a', 'Argentina', 'France', 2, 1, 'Final', 'Lusail Stadium');
```

Use case: Edit Match Data

```
/* Update operation
   correcting score for match M65 */
UPDATE [Match]
SET goals_country1 = 4, goals_country2 = 3
WHERE match_id = 'M65';
```

Use case: Delete Match Data

```
/* Delete operation
   removing match M65 */
DELETE FROM [Match]
WHERE match_id = 'M65';
```

Use case: View Goal Data

```
/* Goal - */
SELECT *
FROM Goal;
```

Use case: Search Goal Data

```
/* Aggregate query using COUNT()
   count of normal goals and own goals */
SELECT own_goal, COUNT(own_goal) AS [count]
FROM Goal
GROUP BY own_goal;
```

Use case: Register Goal Data

```
/* Insert operation
   add new goal - goal_id: G173,  match_id: M64, player_id: P021, own_goal: N*/
INSERT INTO Goal
VALUES ('G173', 'M64', 'P021', 'N');
```

Use case: Edit Goal Data

```
/* Update operation
   correcting player for goal G173, P021 => P020 */
UPDATE Goal
SET player_id = 'P020'
WHERE goal_id = 'G173';
```

Use case: Delete Goal Data

```
/* Delete operation
   removing goal G173 */
DELETE FROM Goal
WHERE goal_id = 'G173';
```

Use case: View/Search Stadium and Match Data (Hosts Relationship)

```
/* Joining Match and Stadium to include capacity from Stadium in Match */
SELECT m.*, s.capacity
FROM [Match] m
FULL JOIN Stadium s ON m.stadium_name = s.stadium_name;
```

Use case: View/Search Country and Match Data (Play In Relationship)

```
/* Join Country and Match to get the managers for both countries playing */
SELECT m.*, c.manager AS country1_manager, ce.manager AS country2_manager
FROM [Match] m
RIGHT JOIN Country c ON m.country1 = c.country_name
RIGHT JOIN Country ce ON m.country2 = ce.country_name
ORDER BY m.match_id;
```

Use case: View/Search Player and Country Data (Plays For Relationship)

```
/* Join Player and Country to show each players manager */
SELECT p.*, c.manager
FROM Player p
RIGHT JOIN Country c ON p.country_name = c.country_name;
```

Use case: View/Search Player and Goal Data (Scores Relationship)

```
/* Join Player and Goal to show the name of player who scored the goal */
SELECT g.*, p.player_name
FROM Goal g
LEFT JOIN Player p ON g.player_id = p.player_id
ORDER BY g.goal_id;
```

Use case: View/Search Goal and Match Data (Scored In Relationship)

```
/* Join Goal and Match to show the two countries playing for the goal scored */
SELECT g.*, m.country1, m.country2
FROM Goal g
LEFT JOIN [Match] m ON g.match_id = m.match_id;
```

Testing

Use case: View Country Data

Input data:

```
SELECT *
FROM Country
ORDER BY [group];
```

Expected output: A view of all columns (country name, manager, country group) ordered by group letter.

Actual output: Query functioned as expected.

	country_name	manager	group
1	Ecuador	Gustavo Alfaro	A
2	Netherlands	Louis Van Gaal	A
3	Qatar	Felix Sanchez	A
4	Senegal	Aliou Cisse	A
5	USA	Gregg Berhalter	B
6	Wales	Rob Page	B
7	England	Gareth Southgate	B
8	Iran	Carlos Queiroz	B

Use case: Search Country Data

Input data:

```
SELECT [group], COUNT([group]) AS n_countries
FROM Country
GROUP BY [group];
```

Expected output: A count for the number of countries in each group stage group.

Actual output: Query functioned as expected.

	group	n_countries
1	A	4
2	B	4
3	C	4
4	D	4
5	E	4
6	F	4
7	G	4
8	H	4

Use case: Register Country Data

Input data:

```
INSERT INTO Country
VALUES ('Sweden', 'Jane Anderson', 'I');
```

Expected output: New values for country_name, manager, and group in the Country table.

Actual output: Query functioned as expected.

	country_name	manager	group
1	Sweden	Jane Anderson	I
2	South Korea	Paulo Bento	H
3	Uruguay	Diego Alonso	H
4	Portugal	Fernando Santos	H
5	Ghana	Otto Addo	H
6	Brazil	Tite	G
7	Cameroon	Rigobert Song	G
8	Serbia	Dragan Stojkovic	G

Use case: Edit Country Data

Input data:

```
UPDATE Country
SET manager = 'Janne Andersson'
```

WHERE country_name = 'Sweden';

Expected output: An updated value for Sweden's manager's name.

Actual output: Query functioned as expected.

	country_name	manager	group
1	Sweden	Janne Andersson	I
2	South Korea	Paulo Bento	H
3	Uruguay	Diego Alonso	H
4	Portugal	Fernando Santos	H
5	Ghana	Otto Addo	H
6	Brazil	Tite	G
7	Cameroon	Rigobert Song	G
8	Serbia	Dragan Stojkovic	G

Use case: Delete Country Data

Input data:

DELETE FROM Country

WHERE country_name = 'Sweden';

Expected output: No existing values for the country of Sweden.

Actual output: Query functioned as expected.

	country_name	manager	group
1	Ghana	Otto Addo	H
2	Portugal	Fernando Santos	H
3	South Korea	Paulo Bento	H
4	Uruguay	Diego Alonso	H
5	Switzerland	Murat Yakin	G
6	Serbia	Dragan Stojkovic	G
7	Brazil	Tite	G
8	Cameroon	Rigobert Song	G

Use case: View Stadium Data

Input data:

SELECT *

FROM Stadium;

Expected output: A view of all columns (stadium_name, capacity).

Actual output: Query functioned as expected.

	stadium_name	capacity
1	Ahmad Bin Ali Stadium	45032
2	Al Bayt Stadium	68895
3	Al Janoub Stadium	44325
4	Al Thumama Stadium	44400
5	Education City Stadium	44667
6	Khalifa International Stadium	45857
7	Lusail Stadium	88966
8	Stadium 974	44089

Use case: Search Stadium Data

Input data:

```
SELECT AVG(capacity) AS avg_capacity,
       MIN(capacity) AS min_capacity,
       MAX(capacity) AS max_capacity
FROM Stadium;
```

Expected output: The average, minimum, and maximum capacity of each stadium.

Actual output: Query functioned as expected.

	avg_capacity	min_capacity	max_capacity
1	53278	44089	88966

Use case: Register Stadium Data

Input data:

```
INSERT INTO Stadium
VALUES ('Rostov Arena', 450000);
```

Expected output: New values for stadium_name and capacity.

Actual output: Query functioned as expected.

	stadium_name	capacity
1	Ahmad Bin Ali Stadium	45032
2	Al Bayt Stadium	68895
3	Al Janoub Stadium	44325
4	Al Thumama Stadium	44400
5	Education City Stadium	44667
6	Khalifa International Stadium	45857
7	Lusail Stadium	88966
8	Rostov Arena	450000
9	Stadium 974	44089

Use case: Edit Stadium Data

Input data:

UPDATE Stadium

SET capacity = 45000

WHERE stadium_name = 'Rostov Arena';

Expected output: An updated capacity for Rostov Arena.

Actual output: Query functioned as expected.

	stadium_name	capacity
1	Ahmad Bin Ali Stadium	45032
2	Al Bayt Stadium	68895
3	Al Janoub Stadium	44325
4	Al Thumama Stadium	44400
5	Education City Stadium	44667
6	Khalifa International Stadium	45857
7	Lusail Stadium	88966
8	Rostov Arena	45000
9	Stadium 974	44089

Use case: Delete Stadium Data

Input data:

DELETE FROM Stadium

WHERE stadium_name = 'Rostov Arena';

Expected output: No existing values for the Rostov Arena stadium.

Actual output: Query functioned as expected.

	stadium_name	capacity
1	Ahmad Bin Ali Stadium	45032
2	Al Bayt Stadium	68895
3	Al Janoub Stadium	44325
4	Al Thumama Stadium	44400
5	Education City Stadium	44667
6	Khalifa International Stadium	45857
7	Lusail Stadium	88966
8	Stadium 974	44089

Use case: View Player Data

Input data:

SELECT *

FROM Player;

Expected output: A view of all columns (player_id, player_name, fName, lName, jersey_number, position, country_name).

Actual output: Query functioned as expected.

	player_id	player_name	fName	lName	jersey_number	position	country_name
1	P001	Emiliano Martinez	Emiliano	Martinez	23	GK	Argentina
2	P002	Franco Armani	Franco	Armani	1	GK	Argentina
3	P003	Geronimo Rulli	Geronimo	Rulli	12	GK	Argentina
4	P004	Nicolas Otamendi	Nicolas	Otamendi	19	DF	Argentina
5	P005	Marcos Acuna	Marcos	Acuna	8	DF	Argentina
6	P006	Nicolas Tagliafico	Nicolas	Tagliafico	3	DF	Argentina
7	P007	German Pezzella	German	Pezzella	6	DF	Argentina
8	P008	Nahuel Molina	Nahuel	Molina	26	DF	Argentina

Use case: Search Player Data

Input data:

SELECT country_name, position, COUNT(position) AS n_players

FROM Player

GROUP BY country_name, position

ORDER BY country_name;

Expected output: The number of players each country has for each position.

Actual output: Query functioned as expected.

	country_name	position	n_players
1	Argentina	DF	9
2	Argentina	FW	7
3	Argentina	GK	3
4	Argentina	MF	7
5	Australia	DF	9
6	Australia	FW	8
7	Australia	GK	3
8	Australia	MF	6
9	Belgium	DF	7
10	Belgium	FW	7
11	Belgium	GK	3
12	Belgium	MF	9

Use case: Register Player Data

Input data:

INSERT INTO Player

VALUES ('P999', 'Tom King', 'Tom', 'King', 0, 'GK', 'Wales');

Expected output: New value for each column to add Wales goalkeeper Tom King.

Actual output: Query functioned as expected.

	player_id	player_name	fName	lName	jersey_number	position	country_name
1	P999	Tom King	Tom	King	0	GK	Wales
2	P831	Dan James	Dan	James	20	FW	Wales
3	P830	Brennan Johnson	Brennan	Johnson	9	FW	Wales
4	P829	Mark Harris	Mark	Harris	19	FW	Wales
5	P828	Kieffer Moore	Kieffer	Moore	13	FW	Wales
6	P827	Gareth Bale	Gareth	Bale	11	FW	Wales
7	P826	Rubin Colwill	Rubin	Colwill	25	FW	Wales
8	P825	Aaron Ramsey	Aaron	Ramsey	10	MF	Wales

Use case: Edit Player Data

Input data:

```
UPDATE Player
SET jersey_number = 40
WHERE player_id = 'P999';
```

Expected output: Player P999's jersey number updated to 40.

Actual output: Query functioned as expected.

	player_id	player_name	fName	lName	jersey_number	position	country_name
1	P999	Tom King	Tom	King	40	GK	Wales
2	P831	Dan James	Dan	James	20	FW	Wales
3	P830	Brennan Johnson	Brennan	Johnson	9	FW	Wales
4	P829	Mark Harris	Mark	Harris	19	FW	Wales
5	P828	Kieffer Moore	Kieffer	Moore	13	FW	Wales
6	P827	Gareth Bale	Gareth	Bale	11	FW	Wales
7	P826	Rubin Colwill	Rubin	Colwill	25	FW	Wales
8	P825	Aaron Ramsey	Aaron	Ramsey	10	MF	Wales

Use case: Delete Player Data

Input data:

```
DELETE FROM Player
WHERE player_id = 'P999';
```

Expected output: No existing values for player P999.

Actual output: Query functioned as expected.

	player_id	player_name	fName	lName	jersey_number	position	country_name
1	P831	Dan James	Dan	James	20	FW	Wales
2	P830	Brennan Johnson	Brennan	Johnson	9	FW	Wales
3	P829	Mark Harris	Mark	Harris	19	FW	Wales
4	P828	Kieffer Moore	Kieffer	Moore	13	FW	Wales
5	P827	Gareth Bale	Gareth	Bale	11	FW	Wales
6	P826	Rubin Colwill	Rubin	Colwill	25	FW	Wales
7	P825	Aaron Ramsey	Aaron	Ramsey	10	MF	Wales
8	P824	Jonny Williams	Jonny	Williams	18	MF	Wales

Use case: View Match Data

Input data:

```
SELECT *
FROM [Match];
```

Expected output: A view of all columns (match_id, date, result, country1, country2, goals_country1, goals_country2, match_type_name, stadium_name).

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name
1	M01	2022-11-20	Ecuador	Qatar	Ecuador	0	2	Group A	Al Bayt Stadium
2	M02	2022-11-21	England	England	Iran	6	2	Group B	Khalifa International Stadium
3	M03	2022-11-21	Netherlands	Senegal	Netherlands	0	2	Group A	Al Thumama Stadium
4	M04	2022-11-21	tie	USA	Wales	1	1	Group B	Ahmad Bin Ali Stadium
5	M05	2022-11-22	Saudi Arabia	Argentina	Saudi Arabia	1	2	Group C	Lusail Stadium
6	M06	2022-11-22	tie	Denmark	Tunisia	0	0	Group D	Education City Stadium
7	M07	2022-11-22	tie	Mexico	Poland	0	0	Group C	Stadium 974
8	M08	2022-11-22	France	France	Australia	4	1	Group D	Al Janoub Stadium

Use case: Search Match Data

Input data:

```
SELECT match_type_name,
        COUNT(match_type_name) AS n_games,
        SUM(goals_country1 + goals_country2) AS goals_scored
FROM [Match]
GROUP BY match_type_name;
```

Expected output: The number of games played and goals scored for each type of match.

Actual output: Query functioned as expected.

	match_type_name	n_games	goals_scored
1	Final	1	6
2	Group A	6	15
3	Group B	6	16
4	Group C	6	12
5	Group D	6	11
6	Group E	6	22
7	Group F	6	11
8	Group G	6	16
9	Group H	6	17
10	Quarter-final	4	10
11	Round of 16	8	28
12	Semi-final	2	5
13	Third place	1	3

Use case: Register Match Data

Input data:

INSERT INTO [Match]

VALUES ('M65', '2022-12-20', 'a', 'Argentina', 'France', 2, 1, 'Final', 'Lusail Stadium');

Expected output: New value for each column to add a second Final match between Argentina and France at Lusail Stadium.

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name
1	M65	2022-12-20	a	Argentina	France	2	1	Final	Lusail Stadium
2	M64	2022-12-18	Argentina	Argentina	France	3	3	Final	Lusail Stadium
3	M63	2022-12-17	Croatia	Croatia	Morocco	2	1	Third place	Khalifa International Stadium
4	M62	2022-12-14	France	France	Morocco	2	0	Semi-final	Al Bayt Stadium
5	M61	2022-12-13	Argentina	Argentina	Croatia	3	0	Semi-final	Lusail Stadium
6	M60	2022-12-10	France	England	France	1	2	Quarter-final	Al Bayt Stadium
7	M59	2022-12-10	Morocco	Morocco	Portugal	1	0	Quarter-final	Al Thumama Stadium
8	M58	2022-12-09	Argentina	Netherlands	Argentina	2	2	Quarter-final	Lusail Stadium

Use case: Edit Match Data

Input data:

UPDATE [Match]

SET goals_country1 = 4, goals_country2 = 3

WHERE match_id = 'M65';

Expected output: Updated values for the goals each country scored in match M65.

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name
1	M65	2022-12-20	a	Argentina	France	4	3	Final	Lusail Stadium
2	M64	2022-12-18	Argentina	Argentina	France	3	3	Final	Lusail Stadium
3	M63	2022-12-17	Croatia	Croatia	Morocco	2	1	Third place	Khalifa International Stadium
4	M62	2022-12-14	France	France	Morocco	2	0	Semi-final	Al Bayt Stadium
5	M61	2022-12-13	Argentina	Argentina	Croatia	3	0	Semi-final	Lusail Stadium
6	M60	2022-12-10	France	England	France	1	2	Quarter-final	Al Bayt Stadium
7	M59	2022-12-10	Morocco	Morocco	Portugal	1	0	Quarter-final	Al Thumama Stadium
8	M58	2022-12-09	Argentina	Netherlands	Argentina	2	2	Quarter-final	Lusail Stadium

Use case: Delete Match Data

Input data:

DELETE FROM [Match]

WHERE match_id = 'M65';

Expected output: No existing values for a match M65.

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name
1	M64	2022-12-18	Argentina	Argentina	France	3	3	Final	Lusail Stadium
2	M63	2022-12-17	Croatia	Croatia	Morocco	2	1	Third place	Khalifa International Stadium
3	M62	2022-12-14	France	France	Morocco	2	0	Semi-final	Al Bayt Stadium
4	M61	2022-12-13	Argentina	Argentina	Croatia	3	0	Semi-final	Lusail Stadium
5	M60	2022-12-10	France	England	France	1	2	Quarter-final	Al Bayt Stadium
6	M59	2022-12-10	Morocco	Morocco	Portugal	1	0	Quarter-final	Al Thumama Stadium
7	M58	2022-12-09	Argentina	Netherlands	Argentina	2	2	Quarter-final	Lusail Stadium
8	M57	2022-12-09	Croatia	Croatia	Brazil	1	1	Quarter-final	Education City Stadium

Use case: View Goal Data

Input data:

SELECT *

FROM Goal;

Expected output: A view of all columns (goal_id, match_id, player_id, own_goal).

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal
1	G001	M01	P259	N
2	G002	M01	P259	N
3	G003	M02	P273	N
4	G004	M02	P284	N
5	G005	M02	P285	N
6	G006	M02	P284	N
7	G007	M02	P389	N
8	G008	M02	P283	N

Use case: Search Goal Data

Input data:

SELECT own_goal, COUNT(own_goal) AS [count]

FROM Goal

GROUP BY own_goal;

Expected output: The number of own goals (Y) and normal goals (N) that were scored in the 2022 FIFA World Cup tournament.

Actual output: Query functioned as expected.

	own_goal	count
1	N	170
2	Y	2

Use case: Register Goal Data

Input data:

INSERT INTO Goal

VALUES ('G173', 'M64', 'P021', 'N');

Expected output: New value for each column to add a goal scored by player P021 in match M64.

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal
1	G173	M64	P021	N
2	G172	M64	P306	N
3	G171	M64	P020	N
4	G170	M64	P306	N
5	G169	M64	P306	N
6	G168	M64	P025	N
7	G167	M64	P020	N
8	G166	M63	P206	N

Use case: Edit Goal Data

Input data:

```
UPDATE Goal
SET player_id = 'P020'
WHERE goal_id = 'G173';
```

Expected output: An updated player id for goal G173.

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal
1	G173	M64	P020	N
2	G172	M64	P306	N
3	G171	M64	P020	N
4	G170	M64	P306	N
5	G169	M64	P306	N
6	G168	M64	P025	N
7	G167	M64	P020	N
8	G166	M63	P206	N

Use case: Delete Goal Data

Input data:

```
DELETE FROM Goal
WHERE goal_id = 'G173';
```

Expected output: No existing values for a goal G173.

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal
1	G172	M64	P306	N
2	G171	M64	P020	N
3	G170	M64	P306	N
4	G169	M64	P306	N
5	G168	M64	P025	N
6	G167	M64	P020	N
7	G166	M63	P206	N
8	G165	M63	P449	N

Use case: View/Search Stadium and Match Data (Hosts Relationship)

Input data:

```
SELECT m.*, s.capacity
FROM [Match] m
FULL JOIN Stadium s ON m.stadium_name = s.stadium_name;
```

Expected output: All columns from the Match table with the capacity column from the Stadium table.

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name	capacity
1	M01	2022-11-20	Ecuador	Qatar	Ecuador	0	2	Group A	Al Bayt Stadium	68895
2	M02	2022-11-21	England	England	Iran	6	2	Group B	Khalifa International Stadium	45857
3	M03	2022-11-21	Netherlands	Senegal	Netherlands	0	2	Group A	Al Thumama Stadium	44400
4	M04	2022-11-21	tie	USA	Wales	1	1	Group B	Ahmad Bin Ali Stadium	45032
5	M05	2022-11-22	Saudi Arabia	Argentina	Saudi Arabia	1	2	Group C	Lusail Stadium	88966
6	M06	2022-11-22	tie	Denmark	Tunisia	0	0	Group D	Education City Stadium	44667
7	M07	2022-11-22	tie	Mexico	Poland	0	0	Group C	Stadium 974	44089
8	M08	2022-11-22	France	France	Australia	4	1	Group D	Al Janoub Stadium	44325
9	M09	2022-11-23	tie	Morocco	Croatia	0	0	Group F	Al Bayt Stadium	68895
10	M10	2022-11-23	Japan	Germany	Japan	1	2	Group E	Khalifa International Stadium	45857

Use case: View/Search Country and Match Data (Play In Relationship)

Input data:

```
SELECT m.*, c.manager AS country1_manager, ce.manager AS country2_manager
FROM [Match] m
RIGHT JOIN Country c ON m.country1 = c.country_name
RIGHT JOIN Country ce ON m.country2 = ce.country_name
ORDER BY m.match_id;
```

Expected output: All columns from the Match table and both managers for the two countries playing for every tournament match.

Actual output: Query functioned as expected.

	match_id	date	result	country1	country2	goals_country1	goals_country2	match_type_name	stadium_name	country1_manager	country2_manager
1	M01	2022-11-20	Ecuador	Qatar	Ecuador	0	2	Group A	Al Bayt Stadium	Felix Sanchez	Gustavo Alfaro
2	M02	2022-11-21	England	England	Iran	6	2	Group B	Khalifa International Stadium	Gareth Southgate	Carlos Queiroz
3	M03	2022-11-21	Netherlands	Senegal	Netherlands	0	2	Group A	Al Thumama Stadium	Aliou Cisse	Louis Van Gaal
4	M04	2022-11-21	tie	USA	Wales	1	1	Group B	Ahmad Bin Ali Stadium	Gregg Berhalter	Rob Page
5	M05	2022-11-22	Saudi Arabia	Argentina	Saudi Arabia	1	2	Group C	Lusail Stadium	Lionel Scaloni	Herve Renard
6	M06	2022-11-22	tie	Denmark	Tunisia	0	0	Group D	Education City Stadium	Kasper Hjulmand	Jalel Kadri
7	M07	2022-11-22	tie	Mexico	Poland	0	0	Group C	Stadium 974	Gerardo Martino	Czeslaw Michniewicz
8	M08	2022-11-22	France	France	Australia	4	1	Group D	Al Janoub Stadium	Didier Deschamps	Graham Arnold
9	M09	2022-11-23	tie	Morocco	Croatia	0	0	Group F	Al Bayt Stadium	Walid Regragui	Zlatko Dalic
10	M10	2022-11-23	Japan	Germany	Japan	1	2	Group E	Khalifa International Stadium	Hansi Flick	Hajime Moriyasu
11	M11	2022-11-23	Spain	Spain	Costa Rica	7	0	Group E	Al Thumama Stadium	Luis Enrique	Luis Fernando Suarez
12	M12	2022-11-23	Belgium	Belgium	Canada	1	0	Group F	Ahmad Bin Ali Stadium	Roberto Martinez	John Herdman

Use case: View/Search Player and Country Data (Plays For Relationship)

Input data:

```
SELECT p.*, c.manager
FROM Player p
RIGHT JOIN Country c ON p.country_name = c.country_name;
```

Expected output: All columns from the Player table the manager for each respective player.

Actual output: Query functioned as expected.

	player_id	player_name	fName	lName	jersey_number	position	country_name	manager
1	P001	Emiliano Martinez	Emiliano	Martinez	23	GK	Argentina	Lionel Scaloni
2	P002	Franco Armani	Franco	Armani	1	GK	Argentina	Lionel Scaloni
3	P003	Geronimo Rulli	Geronimo	Rulli	12	GK	Argentina	Lionel Scaloni
4	P004	Nicolas Otamendi	Nicolas	Otamendi	19	DF	Argentina	Lionel Scaloni
5	P005	Marcos Acuna	Marcos	Acuna	8	DF	Argentina	Lionel Scaloni
6	P006	Nicolas Tagliafico	Nicolas	Tagliafico	3	DF	Argentina	Lionel Scaloni
7	P007	German Pezzella	German	Pezzella	6	DF	Argentina	Lionel Scaloni
8	P008	Nahuel Molina	Nahuel	Molina	26	DF	Argentina	Lionel Scaloni

Use case: View/Search Player and Goal Data (Scores Relationship)

Input data:

```
SELECT g.*, p.player_name
FROM Goal g
LEFT JOIN Player p ON g.player_id = p.player_id
ORDER BY g.goal_id;
```

Expected output: All columns from the Goal table and the name of the player who scored the goal from the Player table.

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal	player_name
1	G001	M01	P259	N	Enner Valencia
2	G002	M01	P259	N	Enner Valencia
3	G003	M02	P273	N	Jude Bellingham
4	G004	M02	P284	N	Bukayo Saka
5	G005	M02	P285	N	Raheem Sterling
6	G006	M02	P284	N	Bukayo Saka
7	G007	M02	P389	N	Mehdi Taremi
8	G008	M02	P283	N	Marcus Rashford

Use case: View/Search Goal and Match Data (Scored In Relationship)

Input data:

```
SELECT g.*, m.country1, m.country2
FROM Goal g
LEFT JOIN [Match] m ON g.match_id = m.match_id;
```

Expected output: All columns from the Goal table and the two columns from the Match table to show the two countries that were playing when the goal was scored.

Actual output: Query functioned as expected.

	goal_id	match_id	player_id	own_goal	country1	country2
1	G001	M01	P259	N	Qatar	Ecuador
2	G002	M01	P259	N	Qatar	Ecuador
3	G003	M02	P273	N	England	Iran
4	G004	M02	P284	N	England	Iran
5	G005	M02	P285	N	England	Iran
6	G006	M02	P284	N	England	Iran
7	G007	M02	P389	N	England	Iran
8	G008	M02	P283	N	England	Iran

Conclusion

The database has been designed, related, normalized, built, and tested to the expectations of our mission statement and objectives. The fans, players, coaches, FIFA Officials, and the FIFA DBM should be able to utilize this database to achieve the intended purpose of this project. This was a challenging project but we both feel like we learned a lot (about DBMS and FIFA).

References

Connolly, T., & Begg, C. (2014). *Database systems: A practical approach to design, implementation, and management: Global edition*. Pearson Education.

Data:

- https://www.kaggle.com/datasets/shrikrishnaparab/fifa-world-cup-2022-qatar-match-data
- https://www.fifa.com/fifaplus/en/tournaments/mens/worldcup/qatar2022/scores-fixtures?country=US&wtw-filter=ALL
- https://fdp.fifa.org/assetspublic/ce44/pdf/SquadLists-English.pdf
- https://www.kaggle.com/datasets/rhugvedbhojane/fifa-world-cup-2022-players-statistics?select=FIFA+WC+2022+Players+Stats.csv
- https://www.theguardian.com/football/ng-interactive/2022/nov/16/world-cup-2022-player-profiles-qatar-match-ratings
- https://www.fifa.com/fifaplus/en/tournaments/mens/worldcup/qatar2022/scores-fixtures?country=US&wtw-filter=ALL