SOCCER GLIMPSE DATABASE SYSTEM

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5-05-17
CS 5318 Database Management Systems
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Abstract

Soccer Glimpse is a web based application soccer fans can use to view scores, fixtures, information about competitions, teams, players, managers, and stadiums. This system is modeled after popular sports websites such as ESPN Sports. The application's database will be populated using the football-data RESTful API (application programming interface); an open source that serves football (Soccer) data and makes it easy-to-use for free. As a result, the users of Soccer Glimpse will only be able to access information about certain competitions that are available in the football-data API. The system will allow the website administrator to add, modify and delete data from the database. Additionally, the user will be able to search information based on distinct filters as well as to keep up to date with the latest scores and upcoming fixtures.

Introduction

This document describes the requirements, design, implementation and testing of the Soccer Glimpse. Soccer Glimpse application's database contains data acquired from the football-data RESTful API. Python programming language is used to retrieve football data with API. MAMP is used as a local server and PostgreSQL Database Management System is used as a database, we used PGAdmin4 as an interface for our database. Users will be able to view information about the teams, fixtures, stadiums and managers of the soccer team.

Functions

Administrator Use Cases

UC1- Add new competition

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects "update data"
4. Output: The system displays base table names and "insert", "delete", "modify" options.
5. Input: Administrator selects the "competition" table and the "insert" option.
6. Output: System prompts administrator to enter information in each of the competition table fields.
7. Output: System displays "Table will be updated, click yes to continue".
8. Input: Administrator clicks on "yes" option.
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. If the data is not a duplicate the new competition is added to the system and is displayed including the generated ID field.

UC2- Add new team

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects "update data"

4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “team” table and the “insert” option.
6. Output: System prompts administrator to enter information in each of the team table fields.
7. Output: System displays “Table will be updated, click yes to continue”.
8. Input: Administrator clicks on “yes” option.pla
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. If the data is not a duplicate the new team is added to the system and is displayed including the generated ID field.

UC3- Add new player

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “player” table and the “insert” option.
6. Output: System prompts administrator to enter information in each of the player table fields.
7. Output: System displays “Table will be updated, click yes to continue”.
8. Input: Administrator clicks on “yes” option.
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. If the data is not a duplicate the new player is added to the system and is displayed including the generated ID field.

UC4-Add new league_table entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “league_table” table and the “insert” option.
6. Output: System outputs “Please enter the name of competition you would like to create league table for.”
7. Input: Administrator enters the name of the competition.
8. Output: The system verifies that there is not an existing league_table entry for the entered competition.
9. Output: System prompts administrator to enter information in each of the league_table fields.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: New league_table is added to the system and is displayed including the generated ID field.

UC5- Add new fixture

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “fixture” table and the “insert” option.
6. Output: System prompts administrator to enter information in each of the fixture table fields.
7. Output: System displays “Table will be updated, click yes to continue”.
8. Input: Administrator clicks on “yes” option.
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. If the data is not a duplicate the new fixture is added to the system and is displayed including the generated ID field.

UC6- Add new stadium

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “stadium” table and the “insert” option.
6. Output: System prompts administrator to enter information in each of the stadium table fields.
7. Output: System displays “Table will be updated, click yes to continue”.
8. Input: Administrator clicks on “yes” option.
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. Output: If the data is not a duplicate the new stadium is added to the system and is displayed including the generated ID field.

UC7- Add new manager

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the “manager” table and the “insert” option.
6. Output: System prompts administrator to enter information in each of the manager table fields.
7. Output: System displays “Table will be updated, click yes to continue”.
8. Input: Administrator clicks on “yes” option.
9. Output: The system checks to verify that the entered information does not already exist in the system.
10. Output: If the data is not a duplicate the new manager is added to the system and is displayed including the generated ID field.

UC8- Modify competition

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the competition table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC9- Modify team

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the team table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC10- Modify player

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the player table and the “modify” option.

6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC11- Modify league_table

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the league_table table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC12- Modify fixture

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the fixture table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.

12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC13- Modify stadium

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the stadium table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC14- Modify manager

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the manager table and the “modify” option.
6. Output: System displays selected table and a search field.
7. Input: The administrator may search for the record to be modified by name or ID number or select it from the table.
8. Output: The record is displayed and the fields become editable.
9. Input: The user modifies the desired fields of the record.
10. Output: System displays “Table will be updated, click yes to continue”.
11. Input: Administrator clicks on “yes” option.
12. Output: The system verifies that the modification does not make the record a duplicate.
13. Output: If the data is not a duplicate the record is updated in the system and is displayed.

UC15- Delete competition entry

1. Input: The administrator logs in the system.

2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the name of the competition table and the “delete” option.
6. Output: System displays the competition table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC16- Delete team entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the team and the “delete” option.
6. Output: System displays the team table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC17- Delete player entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the player table and the “delete” option.
6. Output: System displays player table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC18- Delete league_table entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”

4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the name of the league_table table and the “delete” option.
6. Output: System displays the league_table table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC19- Delete fixture entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the name of the fixture table and the “delete” option.
6. Output: System displays fixture table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC20- Delete stadium entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.
5. Input: Administrator selects the stadium table and the “delete” option.
6. Output: System displays stadium table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

UC21- Delete manager entry

1. Input: The administrator logs in the system.
2. Output: The menu options are displayed.
3. Input: Administrator selects “update data”
4. Output: The system displays base table names and “insert”, “delete”, “modify” options.

5. Input: Administrator selects the manager table and the “delete” option.
6. Output: System displays manager table and a search field.
7. Input: The administrator may search for the record to be deleted by name or ID number or select it from the table.
8. Input: The user clicks on “delete” button.
9. Output: System displays “Table will be updated, click yes to continue”.
10. Input: Administrator clicks on “yes” option.
11. Output: Record is deleted from the system and the updated table is displayed.

Customer Use Cases

UC1- Search for competition by name

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: The user clicks on the search box and types in the desired competition name.
4. Output: If the competition exists in the system, then the options for the competition are displayed.
5. Input: The user selects the menu option of what they want to view about the competition. (eg. Fixtures)
6. Output: The system displays the requested information.

UC2- Search for team by name

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: The user clicks on the search box and types in the desired team name.
4. Output: If the team exists in the system, then the options for the team are displayed.
5. Input: The user selects the menu option of what they want to view about the completion. (eg. players)
6. Output: The system displays the requested information.

Join operation between team and manager is performed to display the team information along with manager name.

UC3- Search for player by name

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: The user clicks on the search box and types in the desired player name.
4. Output: If the player exists in the system, then the options for the player’s team are displayed along with a tab for player info.
5. Input: The user selects the menu option of what they want to view about the player. (eg. General Info)
6. Output: The system displays the requested information.

Join operation between player and team is performed to display the player information along with team name.

UC6- Search for stadium by name

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.

3. Input: The user clicks on the search box and types in the desired stadium name.
4. Output: If the stadium exists in the system, then the general information about the stadium is displayed

Join operation between stadium and team is performed to display the stadium information along with team name.

UC7- Search for manager by name

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: The user clicks on the search box and types in the desired manager name.
4. Output: If the player exists in the system, then the options for the manager's team are displayed along with a tab for manager info.
5. Input: The user selects the menu option of what they want to view about the manager. (eg. General Info)
6. Output: The system displays the requested information.

Join operation between manager and team is performed to display the manager information along with team name.

UC8- View standings of a competition

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User selects the "competition" tab.
4. Output: System shows the league table for the competition, which contains the rank of each team.

Join operation between league table, competition and team is performed to display the league table information along with the competition name and team name.

UC9- View teams in a competition

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects competition from menu.
4. Output: Competitions are displayed.
5. Input: The user selects the desired competition and the "teams" option.
6. Output: The system displays the list of teams participating in the competition.

Join operation between competition and team is performed to display the list of teams where the competition is equal to the searched competition.

UC10 –View basic stats of a competition

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects competition from menu.
4. Output: The menu options of the competition are displayed.
5. Input: The user selects the "Statistics" option.
6. Output: The system displays the most home goals, most away goals, most wins and most losses.

Aggregate functions max () are performed on the home_goals, away_goals, wins and losses fields of the league table view.

UC11- View fixtures by competition

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects competition from menu.
4. Output: The menu options for the competition are displayed.
5. Input: The user selects the “fixtures & scores” option.
6. Output: The system displays the upcoming matches and results for the competition.

Join operation between fixtures, fixture_team, team and competition is performed in order to view fixtures corresponding to a certain competition.

UC12- View fixtures by week

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User clicks on "fixtures & scores"
4. Input: The user clicks on the week he wants to view the matches or scores for.
5. Output: The system displays the matches and results across competitions for the selected week.

Join operation between fixtures, fixture_team, team and competition is performed in order to view fixtures including the team and competition name.

UC13- View Scores across competitions

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User selects the “fixtures & scores” tab.
4. Output: Shows scores in order from most recent to less recent.

Join operation between fixtures, fixture_team, team and competition is performed in order to view fixtures including the team and competition name.

UC14- View fixtures of a team

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects team from menu.
4. Output: The menu options for the team are displayed.
5. Input: The user selects the “fixtures & scores” option.
6. Output: The system display upcoming matches of the team as well as results of the finished matches.

Join operation between fixtures, fixture_team, team and competition is performed in order to view fixtures including the team and competition name.

UC15- View average manager age and largest capacity of stadiums

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User selects basic stats
4. Output: The system displays youngest manager and largest stadium contained in the database.

Aggregate functions avg_age () and max() are performed on the manager dob and stadium capacity attributes respectively.

UC16- View players of a team

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects team from menu.
4. Output: The menu options for the team are displayed.
5. Input: User selects the "squad" option.
6. Output: The list of players belonging to the team is displayed.

Join operation between player and team is performed in order to view the players who play for the searched team.

UC17- View team's standings in competitions

1. Input: User accesses the system.
2. Output: The homepage is displayed along with the menu tabs.
3. Input: User searches or selects team from menu.
4. Output: The menu options for the team are displayed.
5. Input: User selects the "Standings" option.
6. Output: The rank of the team within the competition(s) it is currently participating in is displayed.

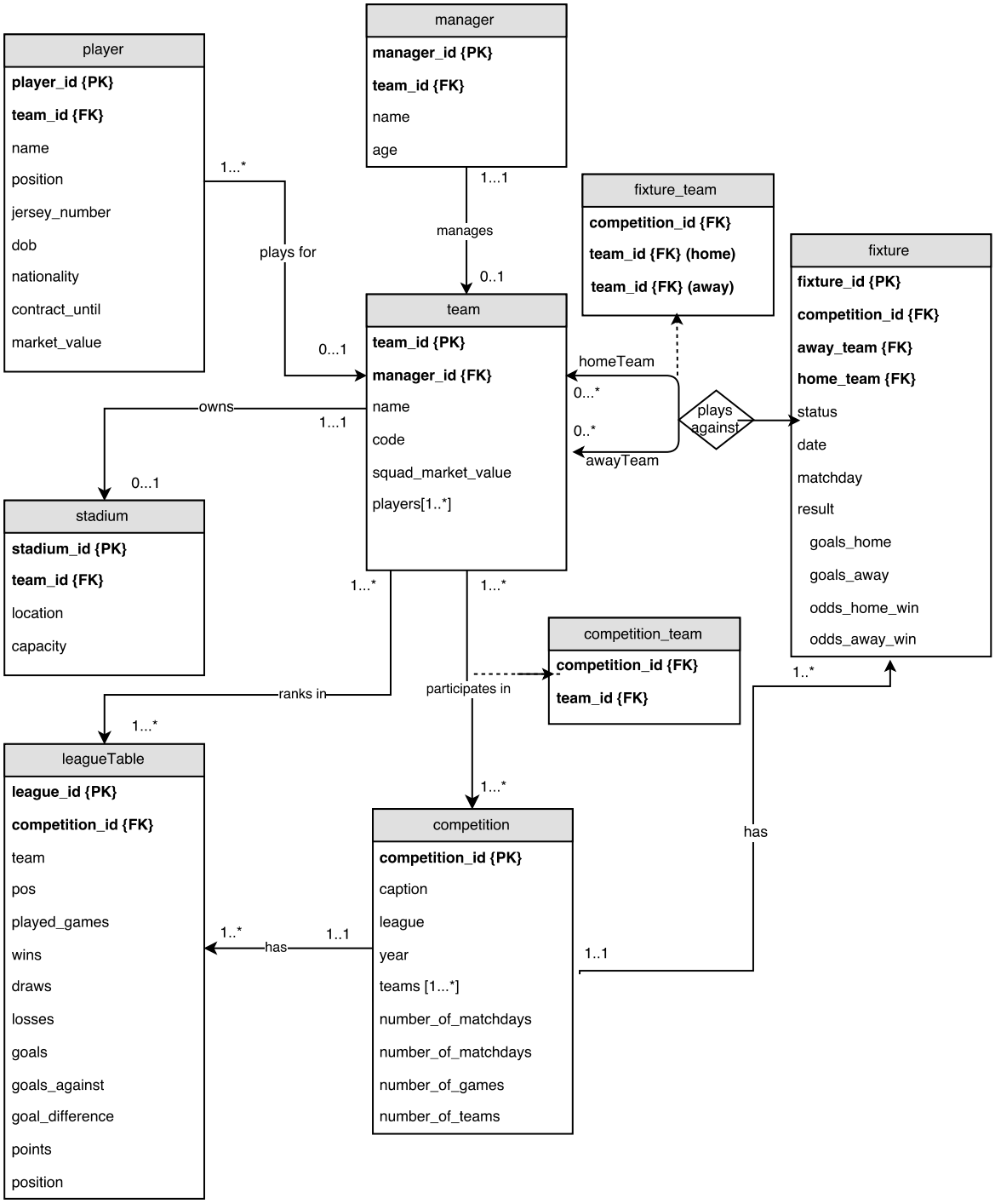
League Table view is used to display the records where team name is equal to the searched name.

UC18 –View basic stats of a team

5. Input: User accesses the system.
6. Output: The homepage is displayed along with the menu tabs.
7. Input: User searches or selects team from menu.
8. Output: The menu options of the team are displayed.
9. Input: The user selects the "Statistics" option.
10. Output: The system displays max player market_value, youngest player, number of wins, losses and draws.

Aggregate functions max (), min () are performed on market_value and dob fields respectively.

Entity Relationship Diagram



Relational Model

The Competition Relation

Each tuple in the competition relation will represent each competition in the Soccer Glimpse system. A tuple of the competition relation will contain the following attributes: name, year, number_of_games, number_of_teams, and an id which is automatically generated by the database system.

Key constrains

The competition_id attribute is the primary key of the competition relation. The name attribute is a candidate key since each competition has a unique name.

Referential integrity constrains:

There are no foreign key fields in this relation.

Null constrains:

The id, name, year, number_of_games, number_of_teams in the Competition relation cannot be Null.

Attribute	**Domain**
ID	serial primary key
name	text not null
year	integer not null
number_of_games	integer not null
number_of_teams	integer not null

The Team Relation

Each tuple in the team relation will represent each team. A tuple of the team relation will contain the following attributes: a team_id, manager_id, name, code, squad_market_value. The team_id will be generated automatically by the database system.

Key constrains

The team_id attribute is the primary key of the team relation.

Referential integrity constrains:

The manager_id attribute in team relation takes values from the manager_id attribute in the manager relation.

Null constrains:

The team_id, manageID, name, code attributes in the team relation cannot be Null. The only attribute on the team relation which may contain a Null value is the attribute denoting the squad_market_value.

Attribute	**Domain**
ID	serial primary key
manager_id	references Manager(id) not null
name	text not null
code	text
squad_market_value	character varying

The Player Relation

Each tuple in the player relation will represent each player. A tuple of the player relation will contain the following attributes: a player_id, team_id, name, position, jersey_number, dob, nationality, contracUnit, market_value. The player_id will be generated automatically by the database system.

Key constrains

The player_id attribute is the primary key of the player relation.

Referential integrity constrains:

The team_id attribute in player relation takes values from the team_id attribute in the team relation.

Null constrains:

The player_id, team_id, and name attributes in the player relation cannot be Null. The only attributes on the team relation which may contain a Null values are the attributes denoting the position, dob, nationality, contract_until and market_value.

Attribute	**Domain**
ID	serial primary key
team_id	references Team(id) not null
name	text not null
position	text
jersey_number	character varying

dob	date
nationality	text
contract_until	date
market_value	character varying

The Fixture Relation

Each tuple in the fixture relation will represent each fixture in the Soccer Glimpse system. A tuple of the fixture relation will contain the following attributes: competition_id, away_team, home_team, result, status, date, matchday, and an id which is automatically generated by the database system.

Key constrains

The fixture_id attribute is the primary key of the fixture relation.

Referential integrity constrains:

The competiton, away_team, home_team and result take values from the competition, team and result relation respectively.

Null constrains:

The fixture_id, competition_id, away_team, home_team, and status in the fixture relation cannot be Null.

Attribute	**Domain**
ID	serial primary key
competition_id	references Competition(id) not null
home_team	references Team(id) not null
away_team	references Team(id) not null
result	references Result(id)
status	character varying
date	date
machday	integer not null

The Result Relation

Each tuple in the result relation will represent each result in the Soccer Glimpse system. A tuple of the result relation will contain the following attributes: fixture_id, goals_home, goals_away, odds_away_win, odds_home_win and an id which is automatically generated by the database system.

Key constrains

The ID attribute is the primary key of the fixture relation.

Referential integrity constrains:

The fixture_id will take values from the Fixture relation.

Null constrains:

The ID and fixture_id may in the Result relation cannot be Null.

Attribute	**Domain**
ID	serial primary key
fixture_id	references Fixture(id) not null
goals_home	integer
goals_away	integer
odds_away_win	float
odds_home_win	float

The League_table Relation

Each tuple in the league_table relation will represent each league table entry in the database system. Each competition will have a distinct view of the league table, which only includes the entries belonging to the selected competition. The competitions that will have this version of the league table are: Premier League, Serie A, Primera Division, and Bundesliga. A tuple of the league_table relation will contain the following attributes: a league_id, competition, position, games_played, team, wins, draws, losses, goals, goals_against, goal_difference and points. The ID will be automatically generated by the database system.

Key constrains

The ID attribute is the primary key of the league_table relation.

Referential integrity constrains:

The competition_id attribute in league_table relation takes values from the competition_id attribute in the competition relation.

Null constrains:

None of the attributes in the league_table relation may be null, all the fields must contain information regarding each team in the competition.

Attribute	**Domain**
ID	serial primary key
competition_id	references Competition(id) not null
position	character varying
games_played	integer not null
team_id	references Team(id) not null
wins	integer not null
draws	integer not null
losses	integer not null
goals	integer not null
goals_against	integer not null
goal_difference	integer not null
points	integer not null

The Champions League_table Relation

Each tuple in the Champions league_table relation will represent the league table entries belonging the Champions League competition. The league table of this competition has a different set of fields, since participating teams are divided into groups. A tuple of the Champions league_table relation will contain the following attributes: a league_id, competition, group, position, team, games_played, goals, goals_against, goal_difference and points. The ID will be automatically generated by the database system.

Key constrains

The ID attribute is the primary key of the Champions league_table relation.

Referential integrity constrains:

The competition attribute in the Champions league_table relation takes values from the competition_id attribute in the competition relation.

Null constrains:

None of the attributes in the Champions league_table relation may be null, all the fields must contain information regarding each team in the competition.

Attribute	**Domain**
ID	serial primary key
competition_id	references Competition(id) not null
position	integer not null
group	ENUM (‘A’, ‘B’, ‘C’, ‘D’, ‘E’, ‘F’, ‘G’, ‘H’)
games_played	integer not null
team_id	references Team(id) not null
goals	integer not null
goals_against	integer not null
goal_difference	integer not null
points	integer not null

The Manager Relation

Each tuple in the Manager relation will represent the manager of a soccer team. A tuple of the Manager relation will contain the following attributes: a manager_id, team, name, and age. The ID will be automatically generated by the database system.

Key constrains

The ID attribute is the primary key of the Manager relation.

Referential integrity constrains:

The team attribute takes values from the team_id in the Team Relation.

Null constrains:

The ID, name and team cannot be null in the Manager relation.

Attribute	**Domain**
ID	serial primary key

team_id	references Team(id) not null
name	text not null
age	integer

The Stadium Relation

Each tuple in the Stadium relation will represent the stadium that belongs to a soccer team. A tuple of the Stadium relation will contain the following attributes: a stadium_id, team, name, location and capacity. The ID will be automatically generated by the database system.

Key constrains

The ID attribute is the primary key of the Stadium relation.

Referential integrity constrains:

The team attribute takes values from the team_id in the Team Relation.

Null constrains:

The ID, name and team cannot be null in the Stadium relation.

Attribute	**Domain**
ID	serial primary key
team_id	references Team(id) not null
name	text not null
location	text
Capacity	integer

The Competition_Team Relation

This relation is meant to associate a competition with all teams participating in it. Some of the teams in the database system may participate in more than one competition. It contains pairs of competition_id and team_id attributes.

Key constrains

Both the competition_id and the team_id attribute are primary keys in their native tables. Therefore, each tuple is uniquely identifiable using a combination of these two attributes.

Referential integrity constrains
The team_id attribute in the Competition_Team relation takes values from the id attribute in the Team relation. The competition_id attribute takes values from the id in the competition relation.

Null constraints
None of the values in the Competition_Team relation can be null.

Attribute	**Domain**
competition_id	references Competition(id)
team_id	References Team(id)

The League_table_Team Relation
This relation is meant to associate league_table tuples with teams. Some of the teams in the database system may participate in more than one competition, therefore they may be present in more than one league_table. It contains pairs of league_id and team_id attributes.

Key constrains
Both the league_id and the team_id attributes are primary keys in their native tables. Therefore, each tuple is uniquely identifiable using a combination of these two attributes.

Referential integrity constrains
The team_id attribute in the League_table_Team relation takes values from the id attribute in the Team relation. The league_id attribute takes values from the id in the competition relation.

Null constraints
None of the values in the League_table_Team relation can be null.

Attribute	**Domain**
ID	serial primary key
league_id	references League_table(id)
team_id	References Team(id)

The Fixture_Team Relation
This relation is meant to associate teams participating in a match and the corresponding fixture. A tuple of the Fixture_Team relation contains home_team, away_team, and fixture_id.

Key constrains

The home_team, away_team, and the fixture_id attributes take values from primary keys in their native tables. Therefore, each tuple is uniquely identifiable using a combination of these three attributes.

Referential integrity constrains

The home_team, away_team and Fixture_Team attributes take values from the id attribute in the Team relation and Fixture relation respectively.

Null constraints

None of the values in the Fixture_Team relation can be null.

Attribute	**Domain**
home_team	references Team(id)
away_team	references Team(id)
fixture_id	references Fixture(id)

Database Functionalities

Add new competition

The administrator may add a new competition to the database system. This functionality is performed by inserting the corresponding data into each attribute of the Competition relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new team

The administrator may add a new team to the database system. This functionality is performed by inserting the corresponding data into each attribute of the Team relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new player

The administrator may add a new player to the database system. This functionality is performed by inserting the corresponding data into each attribute of the Player relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new league_table entry

The administrator may add a new league_table entry to the database system. This functionality is performed by inserting the corresponding data into each attribute of the league_table relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new fixture

The administrator may add a new fixture to the database system. This functionality is performed by inserting the corresponding data into each attribute of the fixture relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new Stadium

The administrator may add a new stadium to the database system. This functionality is performed by inserting the corresponding data into each attribute of the Stadium relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Add new Manager

The administrator may add a new manager to the database system. This functionality is performed by adding the corresponding data into each attribute of the Manager relation. The new row including an automatically generated ID is only created if it did not previously exist in the system.

Modify competition

The administrator may change a competition's information. This functionality is performed by selecting the row to be updated by competition caption. Then the attributes of the Competition relation are updated with the new inputted values.

Modify team

The administrator may change a team's information. This functionality is performed by selecting the row to be updated by team name. Then the attributes of the Team relation are updated with the new inputted values.

Modify player

The administrator may change a player's information. This functionality is performed by selecting the row to be updated by player name. Then the attributes of the Player relation are updated with the new inputted values.

Modify league_table

The administrator may change a league table's information. This functionality is performed by selecting the row to be updated by team and position. Then the attributes of the league_table relation are updated with the new inputted values.

Modify fixture

The administrator may change a fixture's information. This functionality is performed by selecting the row to be updated by status and date. Then the attributes of the Fixture relation are updated with the new inputted values.

Modify stadium
The administrator may change a stadium's information. This functionality is performed by selecting the row to be updated by stadium location. Then the attributes of the Stadium relation are updated with the new inputted values.

Modify manager
The administrator may change a manager's information. This functionality is performed by selecting the row to be updated by manager name. Then the attributes of the Manager relation are updated with the new inputted values.

Delete competition
The administrator may delete a competition from the system. This functionality is performed by selecting the competition to be deleted by name. The selected competition and its league table and fixtures will be deleted from the system.

Delete player
The administrator may delete a player from the system. This functionality is performed by selecting the player to be deleted by name. The selected player will be deleted from the system.

Delete fixture
The administrator may delete a fixture from the system. This functionality is performed by selecting the home team, away team and competition names of the fixture. The selected fixture will be deleted from the system.

Delete stadium
The administrator may delete a stadium from the system. This functionality is performed by selecting the stadium to be deleted by name. The selected stadium will be deleted from the system.

Delete manager
The administrator may delete a manager from the system. This functionality is performed by selecting the manager to be deleted by name. The selected manager will be deleted from the system.

Search for competition by name
The user may search for a competition by name. This functionality is performed by selecting the competition by name. The system displays basic information about the selected competition.

Search for team by name
The user may search for a team by name. This functionality is performed by selecting the team by name and joining the team and manager table. The system displays basic information about the selected team, including the name of the manager.

Search for player by name
The user may search for a player by name. This functionality is performed by selecting the player by name. The system displays basic information about the selected player including their age which is a derived attribute.

Search for stadium by name
The user may search for a stadium by name. The stadium will be selected by name and will be joined with the team table. The system displays information about the selected stadium including the home team name.

Search for manager by name
The user may search for a manager by name. The manager will be selected by name and will be joined with the team table. The system displays information about the selected manager including the name of the team he manages.

View standings of a competition
The user may view the league table of a competition. The league table will be a view created for the selected competition. The league_table, competition and team base tables will be joined.

View teams in a competition
The user may view the teams participating in a competition. The team and the competition base tables will be joined. The system will display the basic information of the teams participating in the selected competition.

View basic stats of a competition
The user may view basic stats of a competition. The attributes of this table will be derived from attributes contained in base tables. This table will show **most goals, most wins, most losses and max squad market value**.

Most Home Goals
This function calculates the maximum amount of home goals within a competition. This is performed by using the max () aggregate function on the homeGoals attribute of the league table. The system displays the name of the team with the most goals.

Most Away Goals
This function calculates the maximum amount of away goals within a competition. This is performed by using the max () aggregate function on the awayGoals attribute of the league table. The system displays the name of the team with the most away goals.

Most Wins
This function calculates the maximum amount of wins within a competition. This is performed by using the max () aggregate function on the Wins attribute of the league table. The system displays the name of the team with the most wins.

Most Losses
This function calculates the maximum amount of losses within a competition. This is performed by using the max () aggregate function on the Losses attribute of the league table. The system displays the name of the team with the most losses.

View max squad market value

This function calculates the average squad market value of the teams within a competition. This is performed by calculating the max () aggregate function on the squad_market_value attribute of the team table.

View fixtures by competition
The user may view the fixtures and results of the teams participating in a competition. The fixtures are selected by competition name. This functionality is performed by joining the competition, teams and fixtures tables (which is done in a view). The upcoming fixtures and results for the selected competition will be displayed.

View fixtures by date
The user may view fixtures and results of teams by week across competitions. The fixtures are selected by date. This functionality is performed by joining the teams and fixtures tables (which is done in a view). The upcoming fixtures and results for the selected week are displayed.

View Scores across competitions
The user may view the past scores contained in the database system in order from most recent to less recent. This is performed displaying ordering by date in descending order. The results of finished matches will be displayed with the most recent first.

Min number of Games
This function calculates the average number of games in the competitions contained in the database system. This functionality is performed using the min () function on the number_of_games attribute of the Competition table.

View fixtures & scores of a team
The user may view the fixtures and scores of a team. The fixtures are selected by team name. This functionality is performed by joining the team and fixture table. The fixtures and results of the selected team will be displayed.

View players of a team
The user may view the squad of a team. The players are selected by team name. This functionality is performed by joining the player and team tables (which was already done by creating view). A list of players that play for the selected team will be displayed.

View team's standings in competitions
The user may view the rank, wins, losses and draws of a team in all of the competitions it is currently participating in. Essentially the user will view all the league table entries a team appears in. This functionality is performed by joining the league_table, team and competition base tables (which was already done by creating a view).

View basic stats of a team
The user may view basic stats of a team. The attributes of this table will be derived from attributes contained in base tables. This table will show **Wins, Losses, Draws and max player market_value.**

Number of wins
This function displays the number of wins of the team.

Number of losses
This function displays the number of losses of the team.

Number of draws
This function displays the number of draws of the team.

Average manager age
This function calculates the minimum age of the managers of teams contained in the database system. This is performed by using the avg_age () aggregate function on the Age attribute.

Largest Capacity
This function calculates the maximum capacity of the stadiums contained in the database system. This is performed by using the max () aggregate function on the capacity attribute of the stadium table.

Count number of fixtures with each status
This function counts the number of fixtures with a finished or scheduled status. This is performed by using the count () aggregate function on the status attribute of the fixture table.

BCNF Verification

In our Soccer Glimpse database, we have nine tables, since we used an API to retrieve and organize data for our relations by default the tables are in first, second and third form of normalization, therefore the relations are already in normalized form. The relations are divided by making transitive dependency as a primary key in another table. For example, the "competition_team" table has "team_id" as a foreign key which can have relation with "team" table's "id" which is a primary key, making the tables(competition_team & fixture_team) as mapping table, shown in the ER diagram. As a result the redundant data is eliminated, and only data related to the attribute is stored within the table.

Prototype's Technical Specifications

The project will be implemented using the PostgreSQL Database Management System. Also, the application's source code will be hosted on a remote GitHub repository. Our PostgreSQL database will be populated using the football-data REST API Python Client. Lastly, Python will be used to process JSON objects and insert data into the database system.

Time Table

Tasks	**Completed by**	**Status**
Create use cases	Nilufar, Abigail	Complete
Complete E/R diagram	Nilufar, Abigail	Complete
Formalize relational model	Nilufar, Abigail	Complete
Request data from RESTful API	Abigail	Complete
Organize JSON data into data frames	Abigail	Complete
Acquire data from online sources	Abigail	Complete
Create database on PostgreSQL server	Nilufar, Abigail	Complete
Implement database tables	Nilufar, Abigail	Complete
Implement mapping tables	Abigail	Complete
Implement database views	Abigail	Complete
Implement stored procedures	Nilufar, Abigail	Complete
Create GitHub repository	Abigail	Complete
Manage version control	Nilufar, Abigail	Complete

Complete and revise documentation	Nilufar, Abigail	Complete
Perform black box testing / record outcome	Nilufar, Abigail	Complete
Write unit tests for critical components	Nilufar, Abigail	Complete
Perform BCNF verification	Nilufar	Complete

Stored procedures for all functionalities

Add new competition

```
CREATE OR REPLACE FUNCTION public.competition_insert(IN id integer, IN caption text, IN league text,
IN year date, IN teams text, IN number_of_matchdays integer, IN number_of_games integer,
IN number_of_teams integer)
RETURNS void AS $function$
  BEGIN
    INSERT INTO competition(caption, league, year,
      teams, number_of_matchdays, number_of_games, number_of_teams);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new team

```
CREATE OR REPLACE FUNCTION public.team_insert(IN id integer, IN name text,
  IN code integer, IN squad_market_value text, IN players text)
RETURNS void AS $function$
  BEGIN
    INSERT INTO team(name, code, squad_market_value, players);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new player

```
CREATE OR REPLACE FUNCTION public.player_insert(IN id integer, IN name text, IN dob date,
IN contract_until text, IN jersey_number text, IN market_value text, IN nationality text,
IN team_id integer)
RETURNS void AS $function$
  BEGIN
    INSERT INTO player(name, dob, contract_until, jersey_number, market_value, nationality)
    VALEUS (name, dob, contract_until, jersey_number, market_value, nationality);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new league_table entry

```
CREATE OR REPLACE FUNCTION public.league_table_insert(IN id integer, IN team text,
  IN pos text, IN played_games text,
  IN wins text, IN draws text, IN losses text, IN goals text, IN goals_against text,
  IN goal_difference text, IN position text)
RETURNS void AS $function$
  BEGIN
    INSERT INTO league_table(team, pos, played_games, wins, draws, losses,
      goals, goals_against, oal_difference, position);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new fixture

```
CREATE OR REPLACE FUNCTION public.fixture_insert(IN id integer, IN status text,
  IN date date, IN matchday text, IN result text)
RETURNS void AS $function$
  BEGIN
    INSERT INTO fixture(status, date, matchday, result);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new Stadium

```
CREATE OR REPLACE FUNCTION public.stadium_insert(IN id integer, IN location text,
  IN capacity text)
RETURNS void AS $function$
  BEGIN
    INSERT INTO stadium(location, capacity);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Add new manager

```
CREATE OR REPLACE FUNCTION public.manager_insert(IN id integer, IN name text, IN age date)
RETURNS void AS $function$
  BEGIN
    INSERT INTO manager(name, age);
  END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify competition

```
CREATE OR REPLACE FUNCTION public.competition_update(IN id integer, IN caption text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     caption text;
BEGIN
    SELECT id INTO id FROM competition WHERE id=id;
    UPDATE competition SET caption=caption
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify team

```
CREATE OR REPLACE FUNCTION public.team_update(IN id integer, IN name text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     name text;
BEGIN
    SELECT id INTO id FROM team WHERE id=id;
    UPDATE team SET name=name
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify player

```
CREATE OR REPLACE FUNCTION public.player_update(IN id integer, IN name text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     name text;
BEGIN
    SELECT id INTO id FROM player WHERE id=id;
    UPDATE player SET name=name
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify league_table

```
CREATE OR REPLACE FUNCTION public.league_table_update(IN id integer, IN team text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     team text;
BEGIN
    SELECT id INTO id FROM league_table WHERE id=id;
    UPDATE league_table SET team=team
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify fixture

```
CREATE OR REPLACE FUNCTION public.fixture_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM fixture WHERE id=id;
    DELETE FROM fixture WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify stadium

```
CREATE OR REPLACE FUNCTION public.stadium_update(IN id integer, IN location text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     location text;
BEGIN
    SELECT id INTO id FROM stadium WHERE id=id;
    UPDATE stadium SET location=location
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Modify manager

```
CREATE OR REPLACE FUNCTION public.manager_update(IN id integer, IN name text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     name text;
BEGIN
    SELECT id INTO id FROM manager WHERE id=id;
    UPDATE manager SET name=name
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete competition

```
CREATE OR REPLACE FUNCTION public.competition_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM competition WHERE id=id;
    DELETE FROM competition WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete team

```
CREATE OR REPLACE FUNCTION public.team_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM team WHERE id=id;
    DELETE FROM team WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete player

```
CREATE OR REPLACE FUNCTION public.player_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM player WHERE id=id;
    DELETE FROM player WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete fixture

```
CREATE OR REPLACE FUNCTION public.fixture_update(IN id integer, IN status text)
RETURNS boolean AS $function$
DECLARE
     id integer;
     status text;
BEGIN
    SELECT id INTO id FROM fixture WHERE id=id;
    UPDATE fixture SET status=status
    WHERE id=id
    RETURN TRUE;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete league table

```
CREATE OR REPLACE FUNCTION public.league_table_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM league_table WHERE id=id;
    DELETE FROM league_table WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete stadium

```
CREATE OR REPLACE FUNCTION public.stadium_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM stadium WHERE id=id;
    DELETE FROM stadium WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Delete manager

```
CREATE OR REPLACE FUNCTION public.manager_delete(IN id integer)
RETURNS boolean AS $function$
DECLARE
     id integer;

BEGIN
    SELECT id INTO id FROM manager WHERE id=id;
    DELETE FROM manager WHERE id=id;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Search competition by name

```
CREATE OR REPLACE FUNCTION public.search_competition(IN competition_name text)
RETURNS TABLE(caption character varying,
              league character varying,
              number_of_games integer,
              number_of_matchdays integer,
              number_of_teams integer,
              year integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT c.caption,
           c.league,
           c.number_of_games,
           c.number_of_matchdays,
           c.number_of_teams,
           c.year
     FROM competition as c
     WHERE LOWER(c.caption) ~ LOWER(competition_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

competition minimum matches

```
CREATE OR REPLACE FUNCTION public.min_matches()
RETURNS TABLE(competition character varying,
              num_games integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT competition.caption,
           competition.number_of_games
    FROM competition
    WHERE  competition.number_of_games=
    (SELECT MIN(competition.number_of_games) FROM competition);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

List teams in competition

```
CREATE OR REPLACE FUNCTION public.teams_in_competition(IN competition_name text)
RETURNS TABLE(name character varying,
              code character varying,
              squad_market_value character varying,
              competiton character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT team.name,
           team.code,
           team.squad_market_value,
           competition.caption
    FROM team
    JOIN competition_team ON competition_team.team_id = team.id
    JOIN competition ON competition.id = competition_team.competition_id
    WHERE LOWER(competition.caption) ~ LOWER(competition_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Search team by name

```
CREATE OR REPLACE FUNCTION public.players_in_team(IN team_name text)
RETURNS TABLE(name character varying,
              age float,
              contract_until date,
              player_position character varying,
              jersey_number character varying,
              market_value character varying,
              nationality character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT p.name,
           EXTRACT(YEAR FROM (AGE(p.dob::timestamp))) AS age,
           p.contract_until,
           p.position,
           p.jersey_number,
           p.market_value,
           p.nationality
     FROM player as p
     JOIN team as t ON t.id = p.team_id
     WHERE LOWER(t.name) ~ LOWER(team_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Team max squad market value

```
CREATE OR REPLACE FUNCTION public.max_squadvalue()
RETURNS TABLE(team character varying,
              marketvalue integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT team.name,
           replace(trim(trailing '€'from team.squad_market_value),',','')::integer
    FROM team
    WHERE  replace(trim(trailing '€'from team.squad_market_value),',','')::integer =
    (SELECT MAX(replace(trim(trailing '€'from team.squad_market_value),',','')::integer)
    FROM team);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

List players in team

```
CREATE OR REPLACE FUNCTION public.players_in_team(IN team_name text)
RETURNS TABLE(name character varying,
              age float,
              contract_until date,
              player_position character varying,
              jersey_number character varying,
              market_value character varying,
              nationality character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT p.name,
           EXTRACT(YEAR FROM (AGE(p.dob::timestamp))) AS age,
           p.contract_until,
           p.position,
           p.jersey_number,
           p.market_value,
           p.nationality
     FROM player as p
     JOIN team as t ON t.id = p.team_id
     WHERE LOWER(t.name) ~ LOWER(team_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

List competitions team participates in

```
CREATE OR REPLACE FUNCTION public.team_competitions(IN team_name text)
RETURNS TABLE(name character varying,
              caption character varying,
              league character varying,
              number_of_teams integer,
              year integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT team.name,
           c.caption,
           c.league,
           c.number_of_teams,
           c.year
    FROM team
    JOIN competition_team AS ct ON ct.team_id = team.id
    JOIN competition AS c ON c.id = ct.competition_id
    WHERE  LOWER(team.name )~ LOWER(team_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Search player by name

```
CREATE OR REPLACE FUNCTION public.search_player(IN player_name text)
RETURNS TABLE(name character varying,
              age integer,
              contract_until date,
              player_position character varying,
              jersey_number character varying,
              market_value character varying,
              nationality character varying,
              team_name character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT p.name,
           EXTRACT(YEAR FROM (AGE(p.dob::timestamp))) AS age,
           p.contract_until,
           p.position,
           p.jersey_number,
           p.market_value,
           p.nationality,
           t.name
     FROM player as p
     JOIN team as t ON t.id = p.team_id
     WHERE LOWER(p.name) ~ LOWER(player_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

player max market value

```
CREATE OR REPLACE FUNCTION public.max_marketvalue()
RETURNS TABLE(player character varying,
              marketvalue integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT player.name,
           replace(trim(trailing '€'from player.market_value),',','')::integer
    FROM player
    WHERE  replace(trim(trailing '€'from player.market_value),',','')::integer =
    (SELECT MAX(replace(trim(trailing '€'from player.market_value),',','')::integer)
    FROM player);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Search manager by name

```
CREATE OR REPLACE FUNCTION public.search_manager(IN manager_name text)
RETURNS TABLE(name character varying,
              dob date,
              nationality character varying,
              team_name character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT m.name,
           m.dob,
           m.nationality,
           t.name
    FROM manager as m
    JOIN team as t ON t.id = m.team_id
    WHERE LOWER(m.name) ~ (manager_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

average manager age

```
CREATE OR REPLACE FUNCTION public.avg_age_final(IN dobs date[])
RETURNS double precision AS $function$
DECLARE
    dob date;
    age_as_interval interval;
    age_in_years double precision;
    total_years double precision;
    num_ages double precision;
    avgerage double precision;
BEGIN
    IF dobs IS NULL THEN
        RETURN NULL;
    END IF;

    total_years := 0;

    FOREACH dob IN ARRAY dobs LOOP
        age_as_interval := age(dob::timestamp);
        age_in_years := EXTRACT(YEAR FROM age_as_interval);
        total_years := total_years + age_in_years;
    END LOOP;

    num_ages := array_length(dobs, 1);
    avgerage := total_years / num_ages;

    RETURN avgerage;
END;
$function$ LANGUAGE 'plpgsql' IMMUTABLE;

DROP AGGREGATE IF EXISTS avg_age(date);

CREATE AGGREGATE avg_age(date) (
  SFUNC = array_append,
  STYPE = date[],
  FINALFUNC = avg_age_final
);
```

Search stadium by name

```
CREATE OR REPLACE FUNCTION public.search_stadium(IN s_name text)
RETURNS TABLE(name character varying,
              location character varying,
              capacity integer,
              team_name character varying)
AS $function$
BEGIN
    RETURN QUERY
    SELECT s.name,
           s.location,
           s.capacity,
           t.name
           FROM stadium as s
           JOIN team as t ON t.id = s.team_id
           WHERE LOWER(t.name) ~ (s_name)
           OR LOWER(s.name) ~ LOWER(s_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

stadium max capacity

```
CREATE OR REPLACE FUNCTION public.max_capacity()
RETURNS TABLE(stadium character varying,
              team character varying,
              capacity float)
AS $function$
BEGIN
    RETURN QUERY
    SELECT stadium.name,
           team.name,
           stadium.capacity
    FROM stadium
    JOIN team ON team.id = stadium.team_id
    WHERE  stadium.capacity=
    (SELECT MAX(stadium.capacity) FROM stadium);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Fixtures view

```sql
CREATE OR REPLACE VIEW fixture_view AS
SELECT fixture.id,
competition.caption AS competition,
(SELECT name FROM team WHERE team.id = fixture_team.home_team) AS home,
(SELECT name FROM team WHERE team.id = fixture_team.away_team) AS away,
fixture.status AS status,
fixture.date,
fixture.matchday,
result.goals_home,
result.goals_away,
result.odds_home_win,
result.odds_away_win
FROM team
JOIN fixture_team ON fixture_team.home_team = team.id
JOIN fixture ON fixture.id = fixture_team.id
JOIN competition ON competition.id = fixture.competition_id
JOIN result ON result.fixture_id = fixture.id
```

Search fixture by team

```sql
CREATE OR REPLACE FUNCTION public.fixture_by(IN team_name text)
RETURNS TABLE(competiton character varying,
              home character varying,
              away character varying,
              status character varying,
              game_date timestamp,
              matchday integer,
              goals_home float,
              goals_away float,
              odds_home_win float,
              odds_away_win float
             )
AS $function$
BEGIN
    RETURN QUERY
    SELECT f.competition,
           f.home,
           f.away,
           f.status,
           f.date,
           f.matchday,
           f.goals_home,
           f.goals_away,
           f.odds_home_win,
           f.odds_away_win
    FROM fixture_view as f
    WHERE LOWER(f.home) ~ LOWER (team_name) OR LOWER(f.away) ~ LOWER (team_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Search fixture by date

```
CREATE OR REPLACE FUNCTION public.fixture_by(IN game_day date)
RETURNS TABLE(competiton character varying,
              home character varying,
              away character varying,
              status character varying,
              game_date date,
              matchday integer,
              goals_home float,
              goals_away float,
              odds_home_win float,
              odds_away_win float
             )
AS $function$
BEGIN
    RETURN QUERY
    SELECT f.competition,
           f.home,
           f.away,
           f.status,
           f.date::timestamp::date ,
           f.matchday,
           f.goals_home,
           f.goals_away,
           f.odds_home_win,
           f.odds_away_win
    FROM fixture_view as f
    WHERE (f.date::timestamp::date) = game_day;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Fixtures by status

```
CREATE OR REPLACE FUNCTION public.fixture_by_status()
RETURNS TABLE(fixture_status character varying,
              num bigint)
AS $function$
BEGIN
    RETURN QUERY
    SELECT fixture.status, COUNT(*)
    FROM fixture
    GROUP BY fixture.status;
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

League Table view

```sql
CREATE OR REPLACE VIEW league_table_view AS
SELECT  league_table.id,
  competition.caption AS competition,
  team.name AS team,
  league_table.pos,
  league_table.p,
  league_table.w,
  league_table.d,
  league_table.l,
  league_table.f,
  league_table.a,
  league_table.hw,
  league_table.hl,
  league_table.hga,
  league_table.aw,
  league_table.al,
  league_table.ad,
  league_table.agf,
  league_table.aga,
  league_table.gd,
  league_table.pts
FROM league_table
JOIN team ON team.id = league_table.team_id
JOIN competition ON competition.id = league_table.competition_id;
```

Champions League Table view

```sql
CREATE OR REPLACE VIEW champions_view AS
SELECT  champions_table.id,
  team.name AS team,
  champions_table.group,
  champions_table.pos,
  champions_table.p,
  champions_table.f,
  champions_table.a,
  champions_table.gd,
  champions_table.pts,
FROM champions_table
JOIN team ON team.id = league_table.team_id;
```

View standings in competition / of a team

```
CREATE OR REPLACE FUNCTION public.view_standings(IN search_name text)
RETURNS TABLE(competition character varying,
              team character varying,
              pos integer,
              p integer,
              w integer,
              d integer,
              l integer,
              f integer,
              hw integer,
              hl integer,
              hga integer,
              aw integer,
              al integer,
              ad integer,
              agf integer,
              aga integer,
              gd integer,
              pts integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT
    l.competition,
    l.team,
    l.p,
    l.w,
    l.d,
    l.l,
    l.f,
    l.hw,
    l.hl,
    l.hga,
    l.aw,
    l.al,
    l.ad,
    l.agf,
    l.aga,
    l.gd,
    l.pts
    FROM league_table_view as l
    WHERE LOWER(l.competition) ~ LOWER(search_name)
    OR LOWER(l.team) ~ LOWER(search_name);
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

View champions league standings

```
CREATE OR REPLACE FUNCTION public.view_champions_standings(IN search_name text)
RETURNS TABLE(team character varying,
              group character,
              pos integer,
              f integer,
              a integer,
              gd integer,
              pts integer
  AS $function$
  BEGIN
      RETURN QUERY
      SELECT champions_view.team AS team,
      champions_view.group::character,
      champions_view.pos,
      champions_view.p,
      champions_view.f,
      champions_view.a,
      champions_view.gd,
      champions_view.pts
      FROM champions_view
      WHERE LOWER(champions_view.team) ~ LOWER(search_name);
      END;
      $function$ LANGUAGE 'plpgsql' STABLE;
```

Most goals in competition

```
CREATE OR REPLACE FUNCTION public.most_goals(IN competition_name text)
RETURNS TABLE(team character varying,
              number_goals integer)
AS $function$
BEGIN
    RETURN QUERY
    SELECT league_table_view.team,
           league_table_view.f
    FROM league_table_view
    WHERE  league_table_view.f = (SELECT MAX(league_table_view.f) FROM league_table_view
    WHERE LOWER(league_table_view.competition )~ LOWER(competition_name));
END;
$function$ LANGUAGE 'plpgsql' STABLE;
```

Test Records

Test Plan

Testing is conducted to determine if the product requirements and specifications are met. The testing phase consisted primarily of glass box testing of the code that parsed JSON objects into dataframes (tables). Additionally, we tested the code that requested the data from the Football-data API and code that populated the database. Finally, we conducted black box testing to ensure that the stored procedures met the product requirements.

Task	**Pass/ Fail**	**Comment**
Installation of PostgreSQLql server on macOs	FAIL	The official download installation did not work
Installation of PostgreSQLql server on macOs	PASS	Installed the PostgreSQLApp instead of the regular install
Github repository setup	PASS	Setup successful on both systems
Request data competitions from the football-data API	PASS	Successfully requested data and saved JSON format
Request data competitions from the football-data API	FAIL	Exceeded number of allowed requests, API key in incorrect field
Request data competitions from the football-data API	FAIL	Exceeded the number of requests per second
Request data competitions from the football-data API	PASS	Successfully requested and saved data in JSON format
Request data soccer teams from the football- data API	PASS	Successfully requested and saved data in JSON format
Request data players from the football- data API	PASS	Successfully requested and saved data in JSON format
Request data fixtures from the football- data API	PASS	Successfully requested and saved data in JSON format
Request data league table from the football- data API	PASS	Successfully requested and saved data in JSON format
Load JSON files to python	FAIL	JSON objects are not in the correct format
Load JSON files to python	PASS	JSON objects were reformatted
Parse JSON files to data frames	FAIL	Data frame cells contain lists instead of atomic values
Parse JSON files to data frames	FAIL	Data frames were not collated into one correctly
Parse JSON files to data frames	PASS	Data frames successfully created for each table
Create / insert into competition table	FAIL	The data type not compatible

Create / insert into competition table	PASS	Competition table successfully
Create / insert into team table	FAIL	squad market value has a currency symbol, not compatible with integer
Create/ insert into tables on Nilu's database	FAIL	python version is not compatible
Create/ insert into tables on Nilu's database	PASS	created an virtual environment with python 2.7 installed
Create / insert into team table	PASS	Set squad market value as character varying.
Create / insert into team_competition table	PASS	Table successfully exported to PostgreSQL database
Create / insert into fixtures table	PASS	Table successfully exported to PostgreSQL database
Create / insert into fixture_team table	PASS	Table successfully exported to PostgreSQL database
Create / insert into league_table table	PASS	Table successfully exported to PostgreSQL database
Create / insert into champions_table table	PASS	Table successfully exported to PostgreSQL database
Create / insert into fixtures table	PASS	Table successfully exported to PostgreSQL database
Create / insert into manager table	PASS	Table successfully exported to PostgreSQL database
Create / insert into manager table	PASS	Table successfully exported to PostgreSQL database

Conclusion

Soccer Glimpse was created to keep soccer fans informed about competitions, teams, players, fixtures & scores and league table standings. The data contained in the system was obtained from Football-data RESTful API and Wikipedia. Data was requested from the API using Python's request library. Once JSON objects were returned from the request they were parsed into pandas data frames and later exported to the PostgreSQL database using Python's sqlalchemy library. Finally, stored procedures were implemented in order to satisfy all of the system's specifications and requirements. All of the Python scripts, SQL code and accompanying documentation are available on https://github.com/abbyyy23/Soccer .

References

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