Final Project Written Submission

Team Name: Team Socios

Vinay Kumar Thadaka (ASU ID: 1223433926)

Saketh Velidimalla (ASU ID: 1225618875)

Sharan Kumar Mogili (ASU ID: 1225885780)

Department of Information Technology, Arizona State University

IFT 530: Advanced Database Management Systems

Project Title: La Liga Database Management System

Dr. Robert Rucker

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Section 1

Synopsis

The topic of interest for our team is Sports, and we have decided to go with football as our choice of sport particularly focusing on the Spanish football league also called as La Liga. The ORM diagram is generated using the CSDP stages. Based on the ORM diagram, the SQL code is constructed, which will build tables and populate the data in them. We will be creating two stored procedures and triggers to handle the data in our database.

The entities are Player, Game, Team, Manager, Stadium, SquadPlayer and SubstitutePlayer. Entities such as Game and Team have many to many-to-many relationship whereas the relationship between Team, Game and PlaysGameOnDate is a ternary one.

We created the social information database using this outline. We also used these materials to shape cans in Couchbase to focus on the JSON structure. The JSON structure makes it easier to address information in a fixed manner without having to use many tables joins. By using the relational database mentioned above, we aim to answer questions like –

- Which team is the best performing team based on number of wins?
- Which team is the poorly performing team based on number of wins?
- Which teams have performed the best as home and away teams?
- For a team that does well in games, what is the average height and weight of the team players?

We used saved systems and triggers to aid us in our investigation. The put away methodology helps us answer some of our questions, such as which group performs well as the host group and which group performs well as the away group. They also help us determine which group is the most solid and which is the most vulnerable based on the number of wins. CouchBase was used to investigate the NoSQL functionality. We also used CouchBase's inquiry administrations and investigation administrations.

Introduction

We have chosen Sports as it gives us a wide range of options to choose from and the members of our team are sports enthusiasts. Almost all the countries today participate in different kinds of sports and as a result there is a large amount of data being generated. We have chosen one such sport i.e., Football, to create the database.

Football is one of the sports which has a huge popularity and following. As a result of which, winning is a game is a matter of great pride for the teams. Due to this popularity, there is a constant pressure of forming teams with the best performing players who can lead the team to victory.

The data gathered from the past games, attributes of teams and players can be utilized to gain an understanding of what factors contribute to a team's good performance. Querying the database can give results that would be helpful in making important decisions about the teams.

The database that we will be implementing here will be a Football database to perform multiple operations to demonstrate our knowledge on database management.

Massive informational collections are used in modern training to nurture winning methods for both individual competitors and organizations. Expert group mentors, for example, can use information science to create hyper-customized competitor matches and different designs for each game they play. As a result, the group's strategies remain mysterious while being viable. The information gathered from previous games, qualities of groups, and players can be used to gain an understanding of what components contribute to a group's good presentation. To meet our needs, the data collection includes diverse substances displayed in several tables with varying quality. The data base contains a few substances that are displayed in several tables with diverse attributes, allowing us to perform different data set tasks to the information.

Different entities that we've chosen for this project are Manager, Player, Team, Game and Stadium.

There is a many-to-many relationship between Game and Group. Subtypes of Player include SquadPlayer and SubstitutePlayer.

We used Put away Techniques, UDFs, and Triggers to aid us in our investigation. We used saved systems to answer some of our questions, for example, which group is the most solid and most fragile in the organization based on the number of wins. We also attempted to determine which group performs well as the host group and which group performs well as the away group. Put away Strategy has also been used to determine a team's chances of dominating a match based on its previous game history.

For a game whose area isn't referenced, we used a Trigger to define the default incentive for Arena as the home ground of the group playing as host group. Another Trigger is also used, which converts the country names to title case.

Expected Value of the Project

This venture, which focuses on basketball data analysis, can be used by sports teams to generate huge suspicions. These assumptions can be used to improve a group's presentation, devise a powerful gaming technique, and underline the group's weak points. This task's storage techniques, UDFs, and triggers are dynamic. New investigations can be drawn as new information becomes available. This will be valuable for an extended period. We can also modify the data set to record new traits in existing tables, create new tables, and remove section ascribes that are no longer required.

Questions to be answered

We are aiming to find solutions to various questions using the data collection, such as -

• Which group is the most successful in terms of number of wins?

• Which group is underperforming in terms of the number of wins?

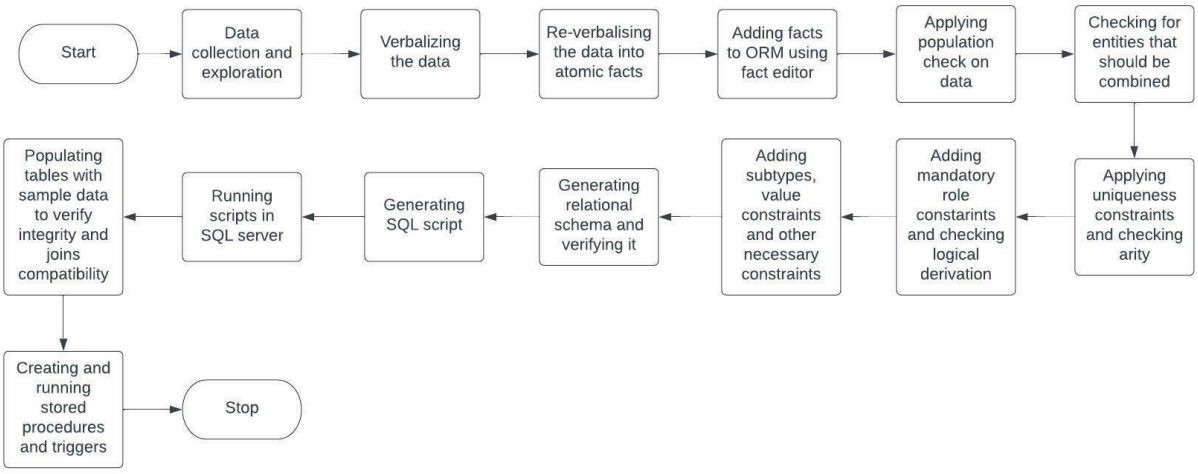
• Which group has performed better as a host group?

• Taking aside exhibitions into account, which group is the best?

• What is the average level and weight of cooperative persons for a most grounded group based on the number of wins?

Section 2

Job Flow Diagram



ORM Diagram

The ORM diagram is built based on the knowledge we have about the entities and the relationships between them. The ORM model is built using the 7 CSDP steps. We have different entities in the ORM diagram such as Player, Game, Team, Manager and Stadium.

The entities have different attributes which are defined in the diagram. The different relationships between the entities are also defined in the diagram. The entity player has a many to one relationship with the entity team. The SquadPlayer and SubstitutePlayer are subsets of the entity

Player. The entities Team and Game have a ternary relationship with the field PlaysGameOnDate. The other entities in the diagram are Manager and Stadium.

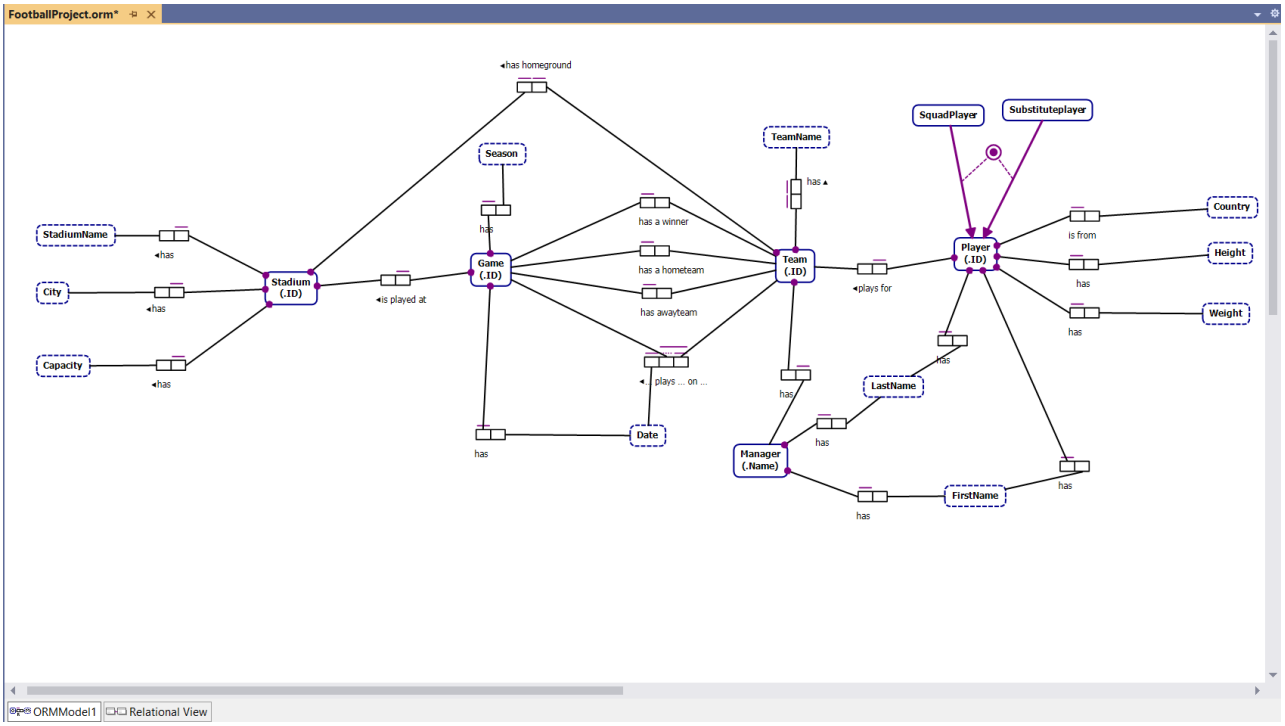


Figure 1: ORM diagram for La Liga Database

Section 3

Relational Schema

NORMA programming is used to obtain the social chart from the ORM outline. This depicts the relationship between the substances based on the situation for data set display. It depicts what attributes the tables will have, as well as the necessary and unfamiliar keys of individual tables, as well as the information types of each property. This gives the client a clear picture of how the information base plan should seem. As can be seen from the outline, each table includes an ID/Name column that serves as the primary key. Every important key is unique and cannot be duplicated. The vital key is used to identify each outstanding entry in the table. When necessary, the unfamiliar keys assist in joining the various tables. The unfamiliar keys are essentially the essential keys in another table

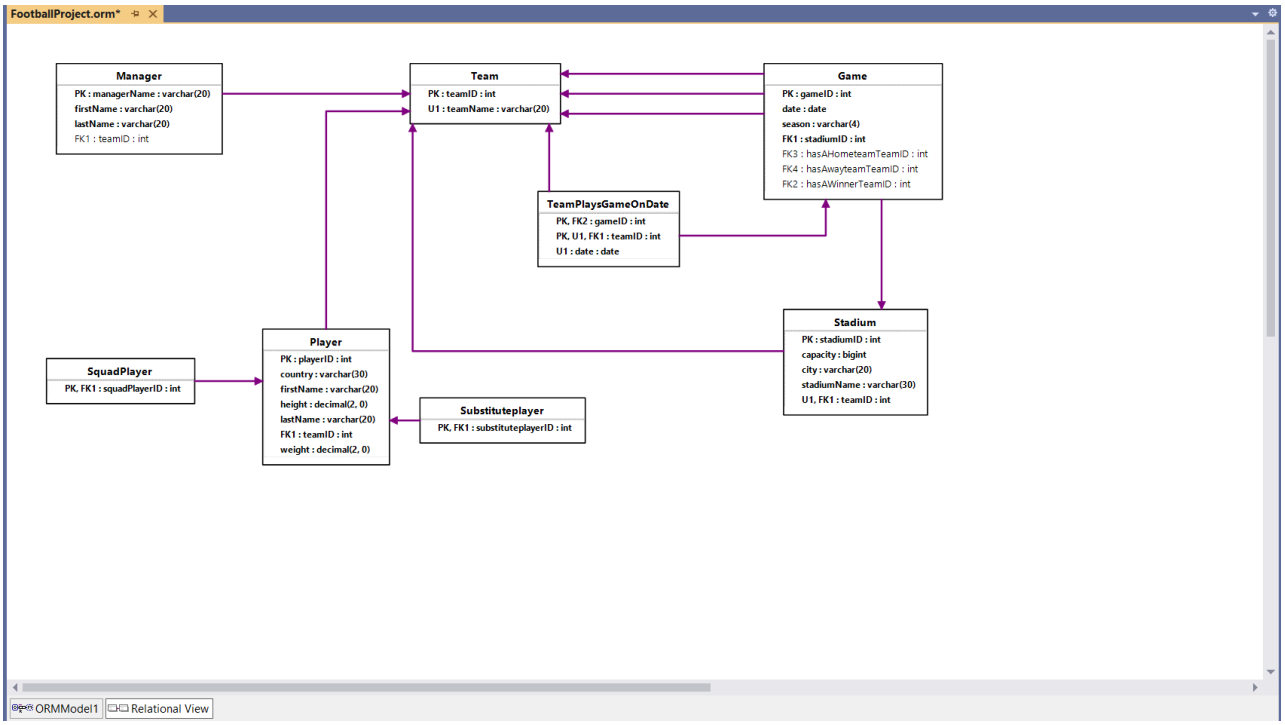


Figure 2: Relational Diagram

Cardinality Ratio

Entity 1	Entity 2	Relationship
Player	Team	1:1
SquadPlayer	Player	1:1
SubstitutePlayer	Player	1:1
TeamPlaysGameOnDate	Team	1:M
Game	Team	1:M
Game	Stadium	1:1
Manager	Team	1:1

Design Decisions

- A Player can be a SubstituePlayer or a SquadPlayer, therefore a 1:1 relationship.
- A Player may play only for one Team, hence 1:1 relationship.
- On a given date many teams can play games, which is why 1:M relationship.
- A game can only be played between two teams, hence 1:M relationship.
- On a given date a game can be played at one stadium, hence 1:1 relationship.
- A Manager can manage only one team, hence 1:1 relationship.

Section 4

Database Description

The database has 8 tables which are –

Player, Team, Game, Manager, Stadium, TeamPlaysGameOnDate, SquadPlayer and SubstitutePlayer.

- Player has Primary Key as playerId and Foreign Key as teamId
- Team has Primary Key as teamId
- Manager has Primary Key as ManagerName and Foreign Key as teamId
- Game has has PrimaryKey as gameId and
    i. Foreignkey1 as hasHometeamTeamId
    ii. Foreignkey2 as hasAwayteamTeamId
    iii. Foreignkey3 as hasAWinnerTeamId
    iv. Foreignkey4 as stadiumId
- Stadium has Primary Key as stadiumId and Foreign Key as teamId
- SquadPlayer has both primary key(PK) and ForeignKey(FK1) as SquadPlayerId which isinteger data type.
- SubstitutePlayer has both primary key(PK) and ForeignKey(FK1) as substitutePlayerId which is integer data type.
- TeamPlaysGameOnDate has Primary Key as date and
    i. Foreignkey1 as teamId
    ii. Foreignkey2 as gameId

Data in Tables

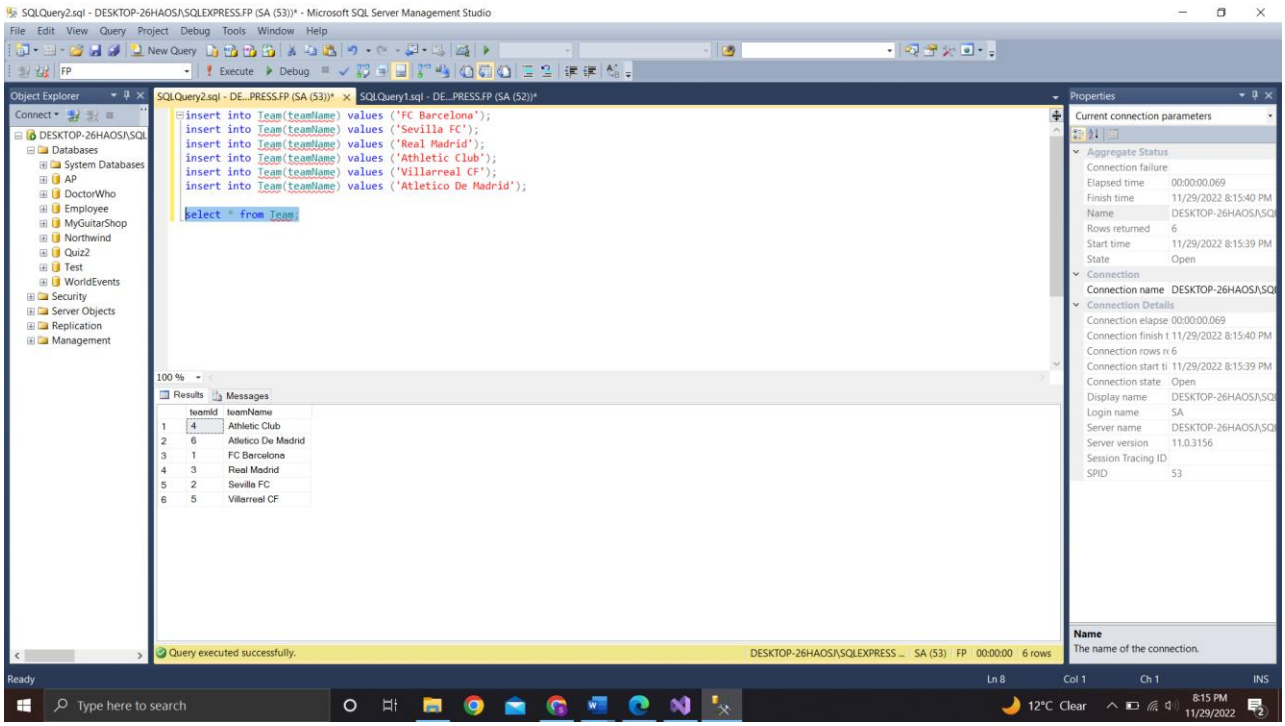
Team Table –

DDL Statements:

```
CREATE TABLE Team(
        teamId int IDENTITY (1, 1) NOT NULL,
        teamName nvarchar(20) NOT NULL,
        CONSTRAINT Team_PK PRIMARY KEY(teamId),
        CONSTRAINT Team_UC UNIQUE(teamName)
)
```

DML Statements:

```
insert into Team(teamName) values ('FC Barcelona');
insert into Team(teamName) values ('Sevilla FC');
insert into Team(teamName) values ('Real Madrid');
insert into Team(teamName) values ('Athletic Club');
insert into Team(teamName) values ('Villarreal CF');
insert into Team(teamName) values ('Atletico De Madrid');
```



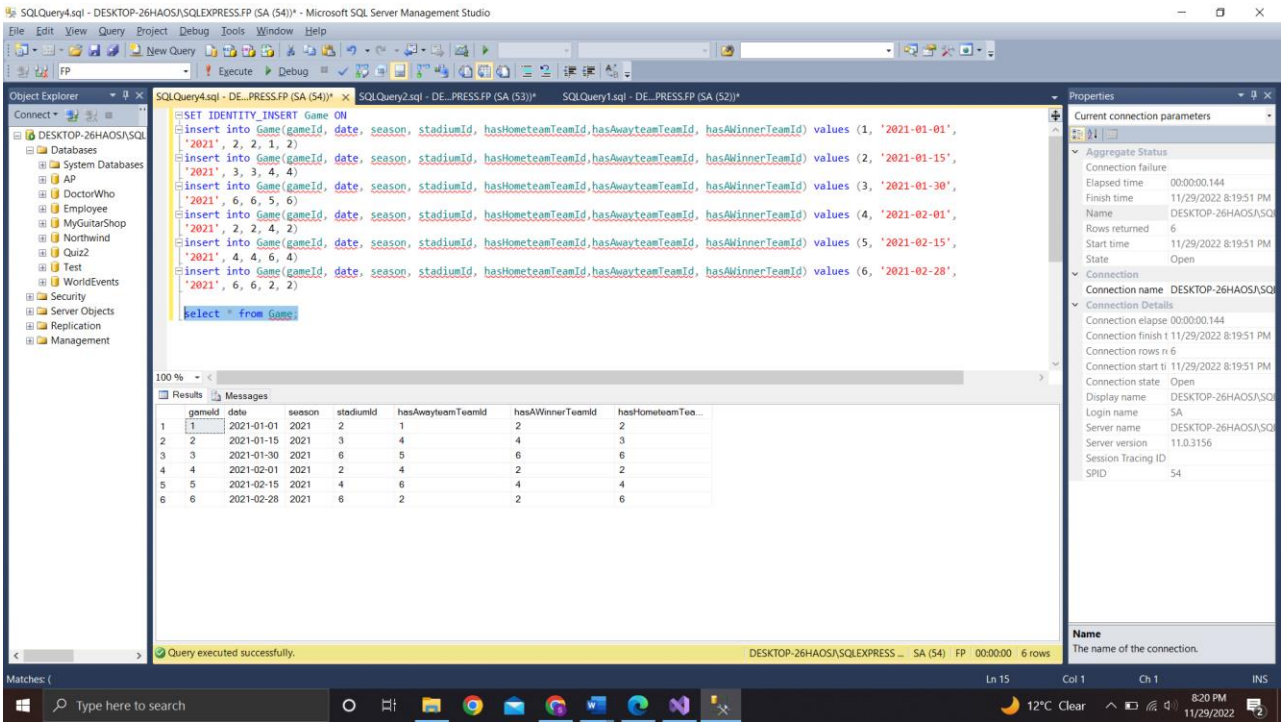
Game Table –

DDL Statements:

```
CREATE TABLE Game(
        gameId int IDENTITY (1, 1) NOT NULL,
        "date" date NOT NULL,
        season nchar(4) NOT NULL,
        stadiumId int NOT NULL,
        hasAwayteamTeamId int,
        hasAWinnerTeamId int,
        hasHometeamTeamId int,
        CONSTRAINT Game_PK PRIMARY KEY(gameId)
)
```

DML Statements:

```
SET IDENTITY_INSERT Game ON
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (1, '2021-01-01',
'2021', 2, 2, 1, 2)
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (2, '2021-01-15',
'2021', 3, 3, 4, 4)
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (3, '2021-01-30',
'2021', 6, 6, 5, 6)
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (4, '2021-02-01',
'2021', 2, 2, 4, 2)
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (5, '2021-02-15',
'2021', 4, 4, 6, 4)
insert into Game(gameId, date, season, stadiumId, hasHometeamTeamId,hasAwayteamTeamId,
hasAWinnerTeamId) values (6, '2021-02-28',
'2021', 6, 6, 2, 2)
```



Player Table –

DDL Statements:

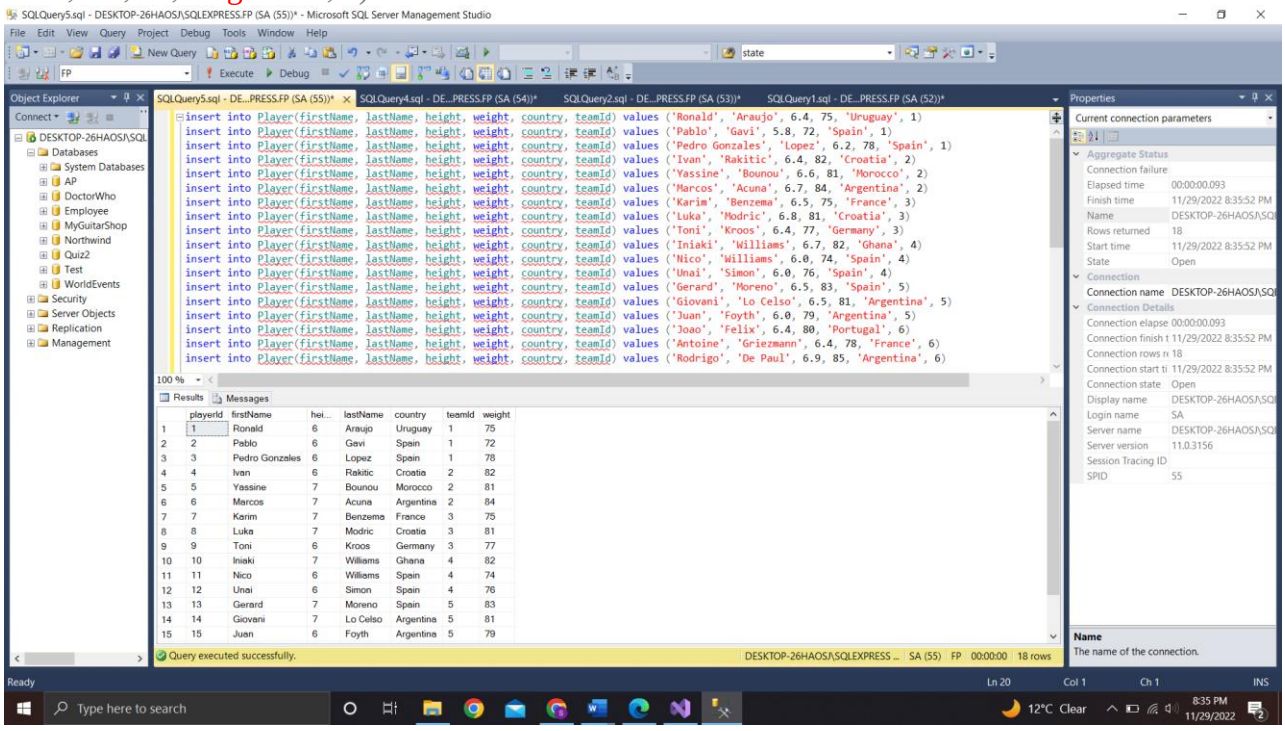
```
CREATE TABLE Player

(
	playerId int IDENTITY (1, 1) NOT NULL,
	firstName nvarchar(20) NOT NULL,
	height decimal(2,0) NOT NULL,
	lastName nvarchar(20) NOT NULL,
	country nvarchar(30) NOT NULL,
	teamId int NOT NULL,
	weight decimal(2,0) NOT NULL,
	CONSTRAINT Player_PK PRIMARY KEY(playerId)
)
```

DML Statements:

```
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Ronald', 'Araujo', 6.4, 75, 'Uruguay', 1)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Pablo', 'Gavi', 5.8, 72, 'Spain', 1)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Pedro Gonzales', 'Lopez', 6.2, 78, 'Spain', 1)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Ivan', 'Rakitic', 6.4, 82, 'Croatia', 2)
```

```
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Yassine', 'Bounou', 6.6, 81, 'Morocco', 2)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Marcos', 'Acuna', 6.7, 84, 'Argentina', 2)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Karim', 'Benzema', 6.5, 75, 'France', 3)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Luka', 'Modric', 6.8, 81, 'Croatia', 3)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Toni', 'Kroos', 6.4, 77, 'Germany', 3)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Iniaki', 'Williams', 6.7, 82, 'Ghana', 4)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Nico', 'Williams', 6.0, 74, 'Spain', 4)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Unai', 'Simon', 6.0, 76, 'Spain', 4)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Gerard', 'Moreno', 6.5, 83, 'Spain', 5)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Giovani', 'Lo Celso', 6.5, 81, 'Argentina', 5)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Juan', 'Foyth', 6.0, 79, 'Argentina', 5)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Joao', 'Felix', 6.4, 80, 'Portugal', 6)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Antoine', 'Griezmann', 6.4, 78, 'France', 6)
insert into Player(firstName, lastName, height, weight, country, teamId) values ('Rodrigo', 'De Paul', 6.9, 85, 'Argentina', 6)
```



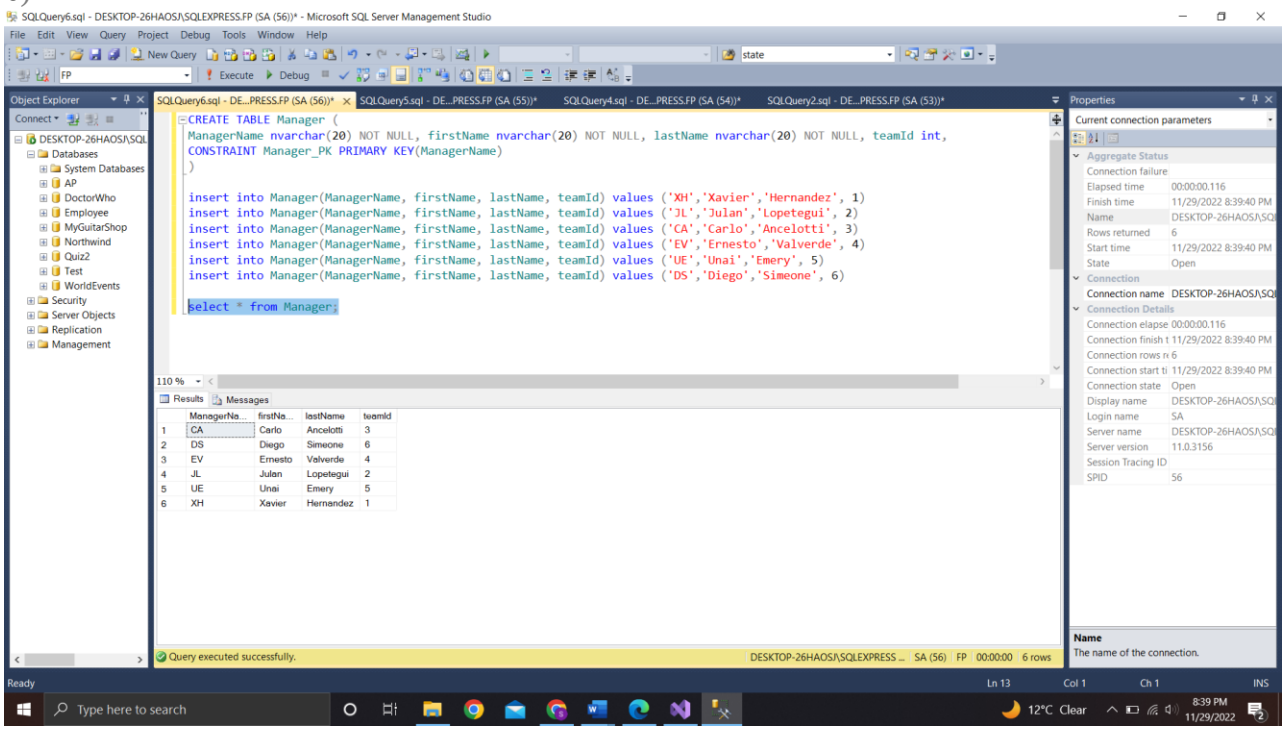
Manager Table –

DDL Statements:

```
CREATE TABLE Manager(
        ManagerName nvarchar(20) NOT
        NULL,firstName nvarchar(20) NOT
        NULL, lastName nvarchar(20) NOT
        NULL, teamId int,
        CONSTRAINT Manager_PK PRIMARY KEY(ManagerName)
)
```

DML Statements:

```
insert into Manager(ManagerName, firstName, lastName, teamId) values
('XH','Xavier','Hernandez', 1)
insert into Manager(ManagerName, firstName, lastName, teamId) values ('JL','Julan','Lopetegui',
2)
insert into Manager(ManagerName, firstName, lastName, teamId) values ('CA','Carlo','Ancelotti',
3)
insert into Manager(ManagerName, firstName, lastName, teamId) values ('EV','Ernesto','Valverde',
4)
insert into Manager(ManagerName, firstName, lastName, teamId) values ('UE','Unai','Emery', 5)
insert into Manager(ManagerName, firstName, lastName, teamId) values ('DS','Diego','Simeone',
6)
```



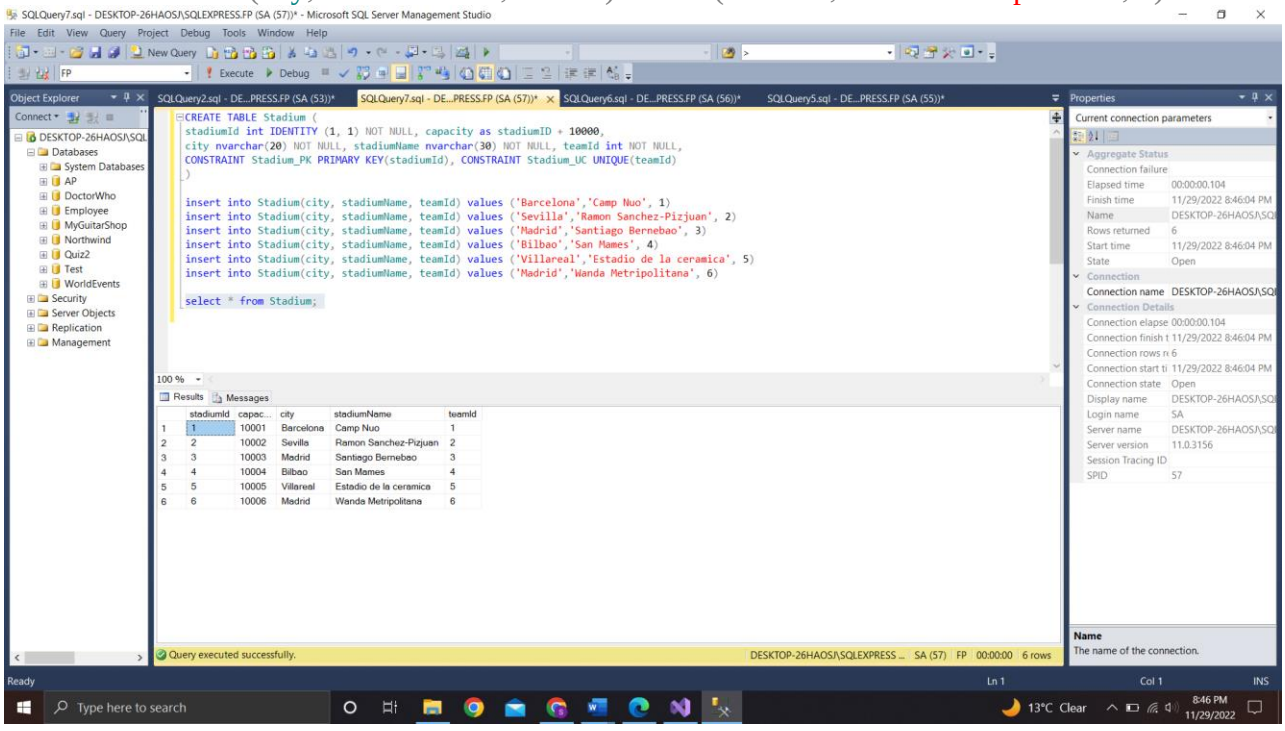
Stadium Table –

DDL Statements:

```
CREATE TABLE Stadium(
        stadiumId int IDENTITY (1, 1) NOT NULL,
        capacity as stadiumID + 10000,
        city nvarchar(20) NOT NULL,
        stadiumName nvarchar(30) NOT NULL,
        teamId int NOT NULL,
        CONSTRAINT Stadium_PK PRIMARY KEY(stadiumId),
        CONSTRAINT Stadium_UC UNIQUE(teamId)
)
```

DML Statements:

```
insert into Stadium(city, stadiumName, teamId) values ('Barcelona','Camp Nuo', 1)
insert into Stadium(city, stadiumName, teamId) values ('Sevilla','Ramon Sanchez-Pizjuan', 2)
insert into Stadium(city, stadiumName, teamId) values ('Madrid','Santiago Bernebao', 3)
insert into Stadium(city, stadiumName, teamId) values ('Bilbao','San Mames', 4)
insert into Stadium(city, stadiumName, teamId) values ('Villareal','Estadio de la ceramica', 5)
insert into Stadium(city, stadiumName, teamId) values ('Madrid','Wanda Metripolitana', 6)
```



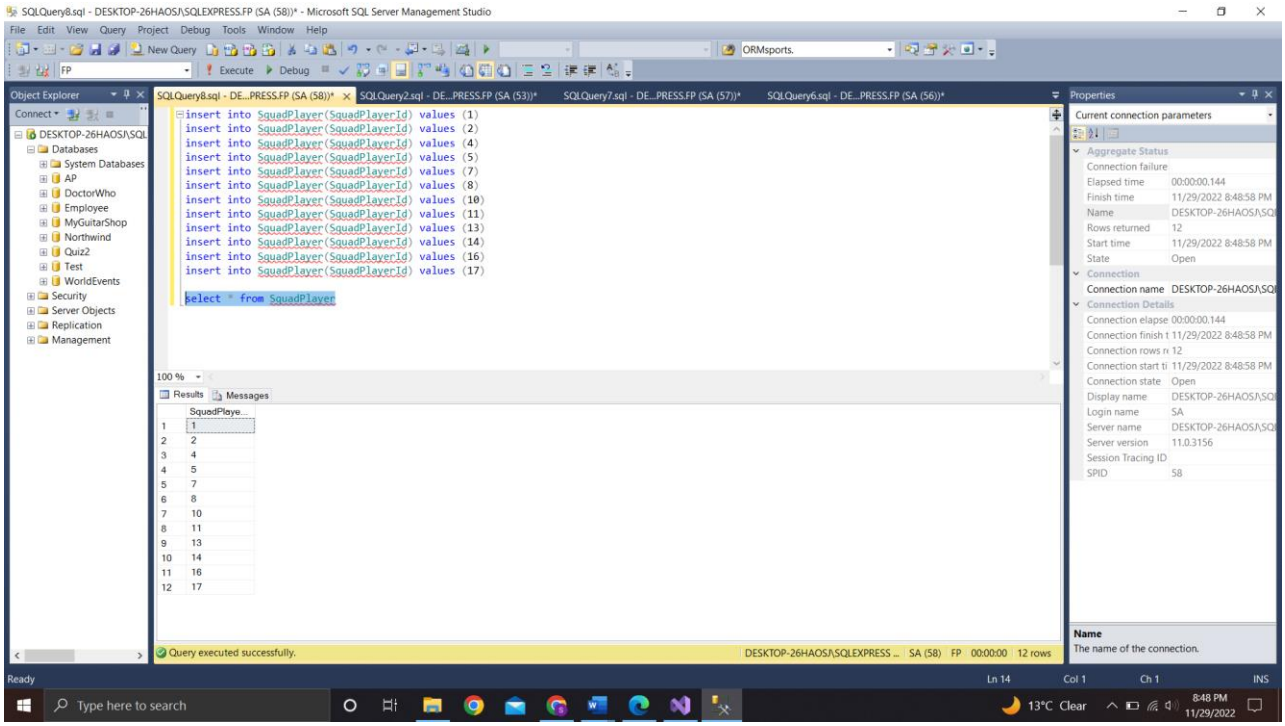
Squad Player Table –

DDL Statements:

```
CREATE TABLE SquadPlayer(
        SquadPlayerId int NOT NULL,
        CONSTRAINT SquadPlayer_PK PRIMARY KEY(SquadPlayerId)
)
GO
```

DML Statements:

```
insert into SquadPlayer(SquadPlayerId) values (1)
insert into SquadPlayer(SquadPlayerId) values (2)
insert into SquadPlayer(SquadPlayerId) values (4)
insert into SquadPlayer(SquadPlayerId) values (5)
insert into SquadPlayer(SquadPlayerId) values (7)
insert into SquadPlayer(SquadPlayerId) values (8)
insert into SquadPlayer(SquadPlayerId) values (10)
insert into SquadPlayer(SquadPlayerId) values (11)
insert into SquadPlayer(SquadPlayerId) values (13)
insert into SquadPlayer(SquadPlayerId) values (14)
insert into SquadPlayer(SquadPlayerId) values (16)
insert into SquadPlayer(SquadPlayerId) values (17)
```



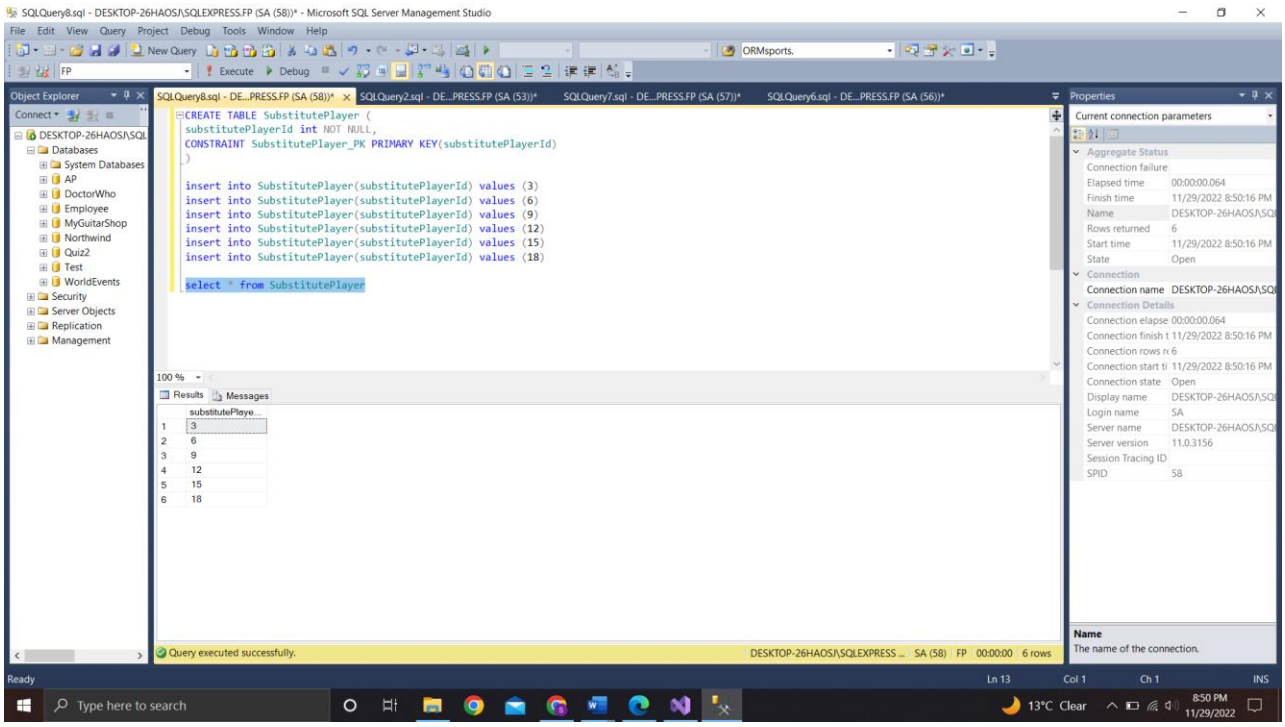
Substitute Player Table –

DDL Statements:

```
CREATE TABLE SubstitutePlayer(
        substitutePlayerId int NOT NULL,
        CONSTRAINT SubstitutePlayer_PK PRIMARY KEY(substitutePlayerId)
)
```

DML Statements:

```
insert into SubstitutePlayer(substitutePlayerId) values (3)
insert into SubstitutePlayer(substitutePlayerId) values (6)
insert into SubstitutePlayer(substitutePlayerId) values (9)
insert into SubstitutePlayer(substitutePlayerId) values (12)
insert into SubstitutePlayer(substitutePlayerId) values (15)
insert into SubstitutePlayer(substitutePlayerId) values (18)
```



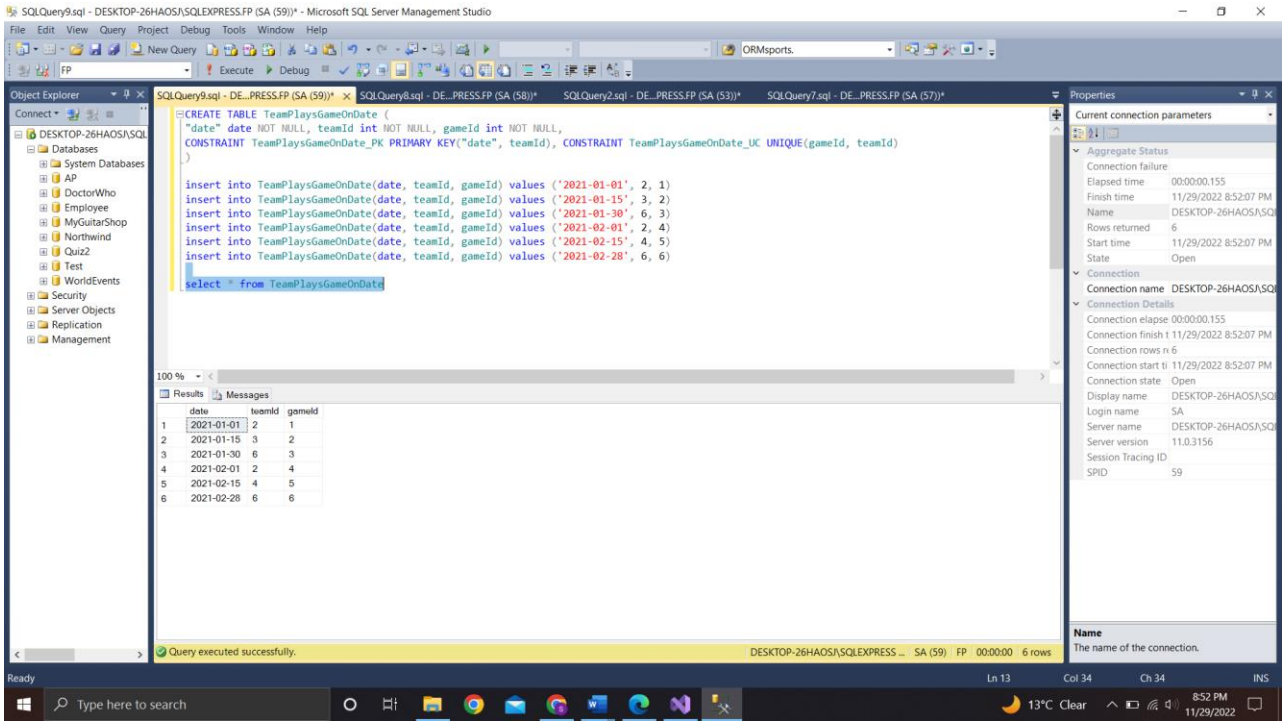
TeamPlaysGameOnDate Table –

DDL Statements:

```
CREATE TABLE TeamPlaysGameOnDate(
        "date" date NOT NULL,
        teamId int NOT NULL,
        gameId int NOT NULL,
        CONSTRAINT TeamPlaysGameOnDate_PK PRIMARY KEY("date", teamId),
        CONSTRAINT TeamPlaysGameOnDate_UC UNIQUE(gameId, teamId)
)
```

DML Statements:

```
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-01-01', 2, 1)
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-01-15', 3, 2)
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-01-30', 6, 3)
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-02-01', 2, 4)
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-02-15', 4, 5)
insert into TeamPlaysGameOnDate(date, teamId, gameId) values ('2021-02-28', 6, 6)
```



Constraints on the Database

```
ALTER TABLE Game ADD CONSTRAINT Game_FK1 FOREIGN KEY
(hasHometeamTeamId) REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE
NO ACTION
GO

ALTER TABLE Game ADD CONSTRAINT Game_FK2 FOREIGN KEY
(hasAwayteamTeamId) REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE
NO ACTION
GO

ALTER TABLE Game ADD CONSTRAINT Game_FK3 FOREIGN KEY
(hasAWinnerTeamId) REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE
NO ACTION
GO

ALTER TABLE Game ADD CONSTRAINT Game_FK4 FOREIGN KEY
(stadiumId) REFERENCES Stadium (stadiumId) ON DELETE NO ACTION ON UPDATE NO
ACTION
GO

ALTER TABLE Manager ADD CONSTRAINT Manager_FK FOREIGN KEY (teamId)
REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE NO ACTION
GO

ALTER TABLE Stadium ADD CONSTRAINT Stadium_FK FOREIGN KEY (teamId)
REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE NO ACTION
GO

ALTER TABLE Player ADD CONSTRAINT Player_FK FOREIGN KEY (teamId)
REFERENCES Team (teamId) ON DELETE NO ACTION ON UPDATE NO ACTION
GO

ALTER TABLE SquadPlayer ADD CONSTRAINT SquadPlayer_FK FOREIGN KEY
(SquadPlayerId) REFERENCES Player (playerId) ON DELETE NO ACTION ON UPDATE NO
ACTION
GO

ALTER TABLE SubstitutePlayer ADD CONSTRAINT SubstitutePlayer_FK FOREIGN KEY
(substitutePlayerId) REFERENCES Player (playerId) ON DELETE NO ACTION ON UPDATE
NO ACTION
GO
```

```
ALTER TABLE TeamPlaysGameOnDate ADD CONSTRAINT TeamPlaysGameOnDate_FK1
FOREIGN KEY (teamId) REFERENCES Team (teamId) ON DELETE NO ACTION ON
UPDATE NO ACTION
GO
```

```
ALTER TABLE TeamPlaysGameOnDate ADD CONSTRAINT TeamPlaysGameOnDate_FK2
FOREIGN KEY (gameId) REFERENCES Game (gameId) ON DELETE NO ACTION ON
UPDATE NO ACTION
GO
```

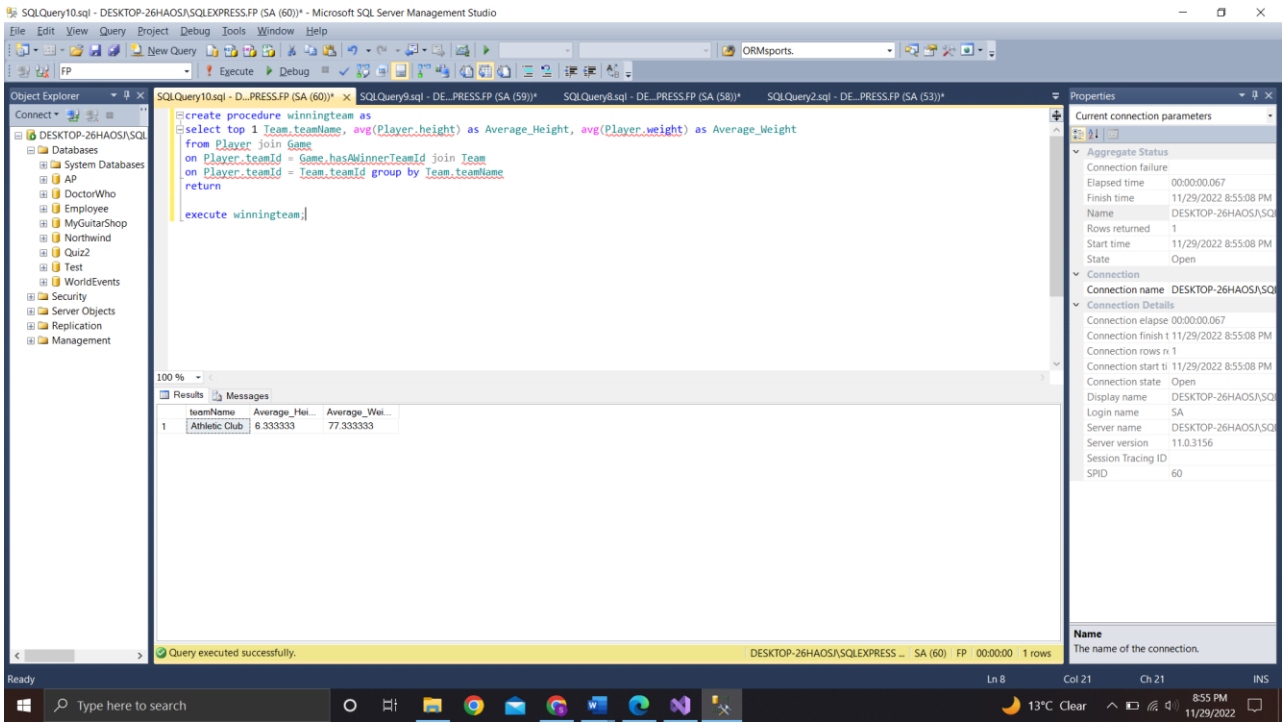
Section 5

Stored Procedures

1. Procedure to fetch the average height and weight of players in the best team based on the number of wins.

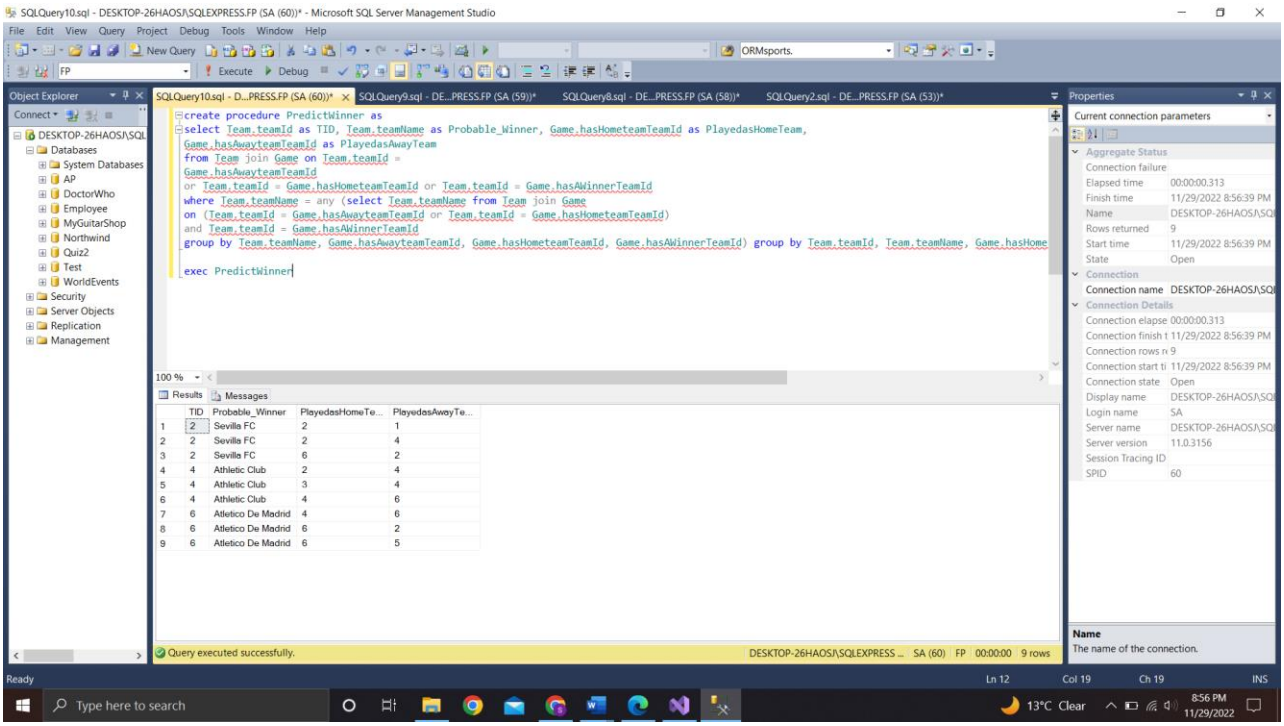
```
create procedure winningteam as
select top 1 Team.teamName, avg(Player.height) as Average_Height, avg(Player.weight) as
Average_Weight
from Player join Game
on Player.teamId = Game.hasAWinnerTeamId join Team
on Player.teamId = Team.teamId group by Team.teamName
return

execute winningteam;
```



2. Stored procedure to predict the winner in future games, based on previous games.

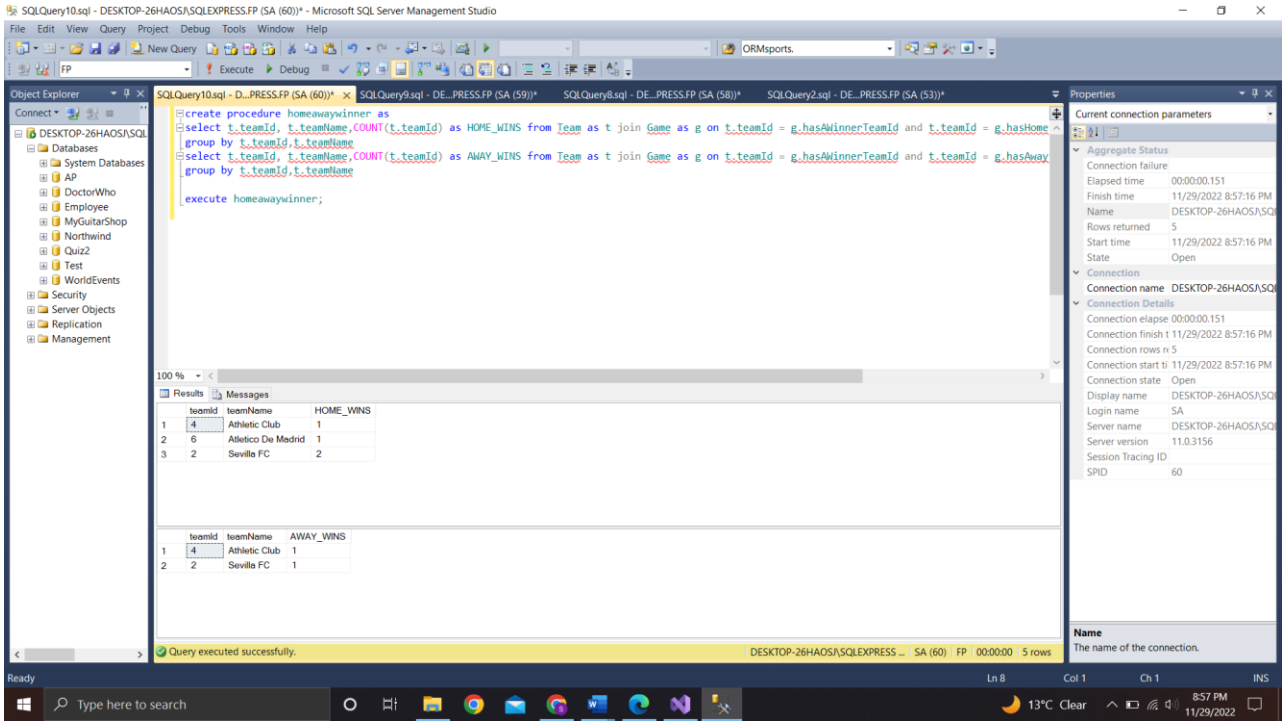
```
create procedure PredictWinner as
select Team.teamId as TID, Team.teamName as Probable_Winner, Game.hasHometeamTeamId as
PlayedasHomeTeam,
Game.hasAwayteamTeamId as PlayedasAwayTeam
from Team join Game on Team.teamId =
Game.hasAwayteamTeamId
or Team.teamId = Game.hasHometeamTeamId or Team.teamId = Game.hasAWinnerTeamId
where Team.teamName = any (select Team.teamName from Team join Game
on (Team.teamId = Game.hasAwayteamTeamId or Team.teamId = Game.hasHometeamTeamId)
and Team.teamId = Game.hasAWinnerTeamId
group by Team.teamName, Game.hasAwayteamTeamId, Game.hasHometeamTeamId,
Game.hasAWinnerTeamId) group by Team.teamId, Team.teamName,
Game.hasHometeamTeamId, Game.hasAwayteamTeamId
```



3. Procedure to get the number of wins of teams as home and away teams.

```
create procedure homeawaywinner as
select t.teamId, t.teamName,COUNT(t.teamId) as HOME_WINS from Team as t join Game
as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasHometeamTeamId
group by t.teamId,t.teamName
select t.teamId, t.teamName,COUNT(t.teamId) as AWAY_WINS from Team as t join Game
as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasAwayteamTeamId
group by t.teamId,t.teamName

execute homeawaywinner;
```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SQLQuery8.sql - DE...PRESS.FP (SA (58))*
SQLQuery2.sql - DE...PRESS.FP (SA (53))*
create procedure homeawaywinner as
select t.teamId, t.teamName,COUNT(t.teamId) as HOME_WINS from Team as t join Game as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasHome
group by t.teamId,t.teamName
select t.teamId, t.teamName,COUNT(t.teamId) as AWAY_WINS from Team as t join Game as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasAway
group by t.teamId,t.teamName
execute homeawaywinner;
100 %
Results
Messages
teamId teamName HOME_WINS
1 4 Athletic Club 1
2 6 Atletico De Madrid 1
3 2 Sevilla FC 2
teamId teamName AWAY_WINS
1 4 Athletic Club 1
2 2 Sevilla FC 1
Query executed successfully.
DESKTOP-26HAOSJ\SQLEXPRESS ... SA (60) FP 00:00:00 5 rows
Properties
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Finish time 11/29/2022 8:57:16 PM
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Rows returned 5
Start time 11/29/2022 8:57:16 PM
State Open
Connection
Connection name DESKTOP-26HAOSJ\SQL
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Login name SA
Server name DESKTOP-26HAOSJ\SQL
Server version 11.0.3156
Session Tracing ID
SPID 60
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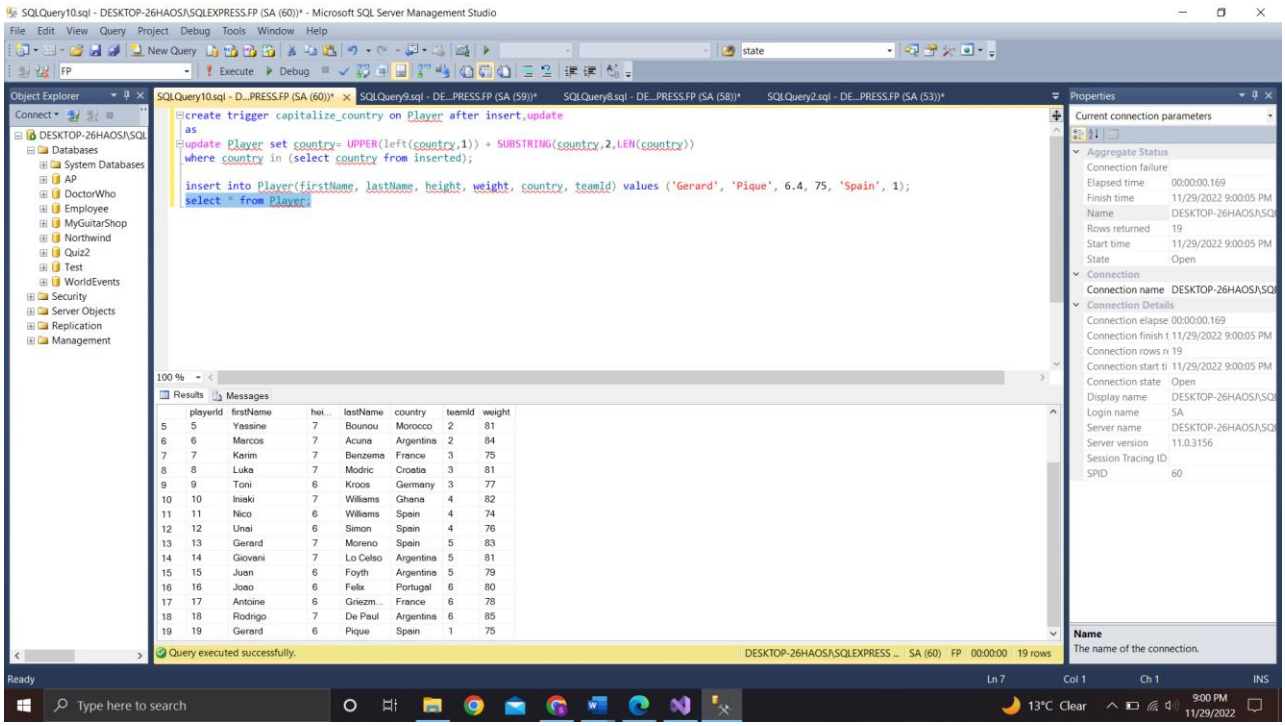
Triggers

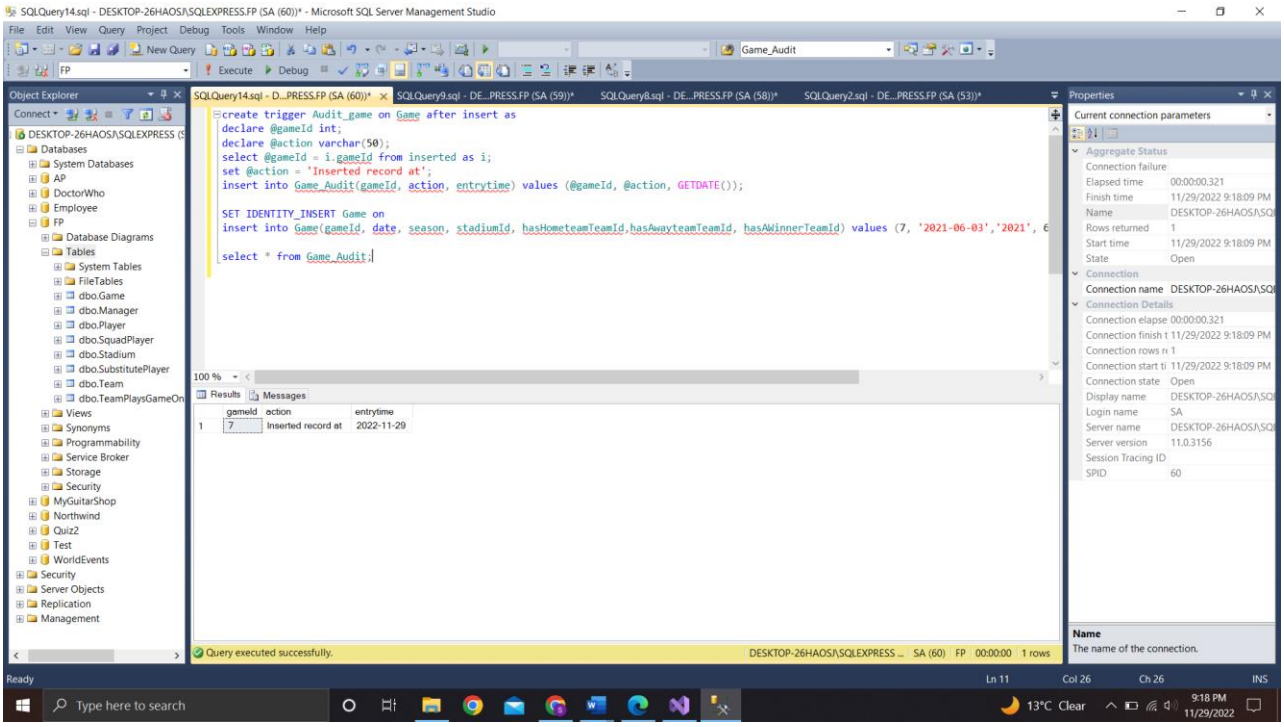
1. Trigger to capitalize the first letter in the country name

```
create trigger capitalize_country on Player after insert,update
as
update Player set country= UPPER(left(country,1)) + SUBSTRING(country,2,LEN(country))
where country in (select country from inserted);
```



2. Trigger to audit the entered game details

```
create trigger Audit_game on Game after insert as
declare @gameId int; declare @action varchar(50);
select @gameId = i.gameId from inserted as i; set @action = 'Inserted record at'
insert into Game_Audit (gameId, action, entrytime) values (@gameId, @action, GETDATE());
```

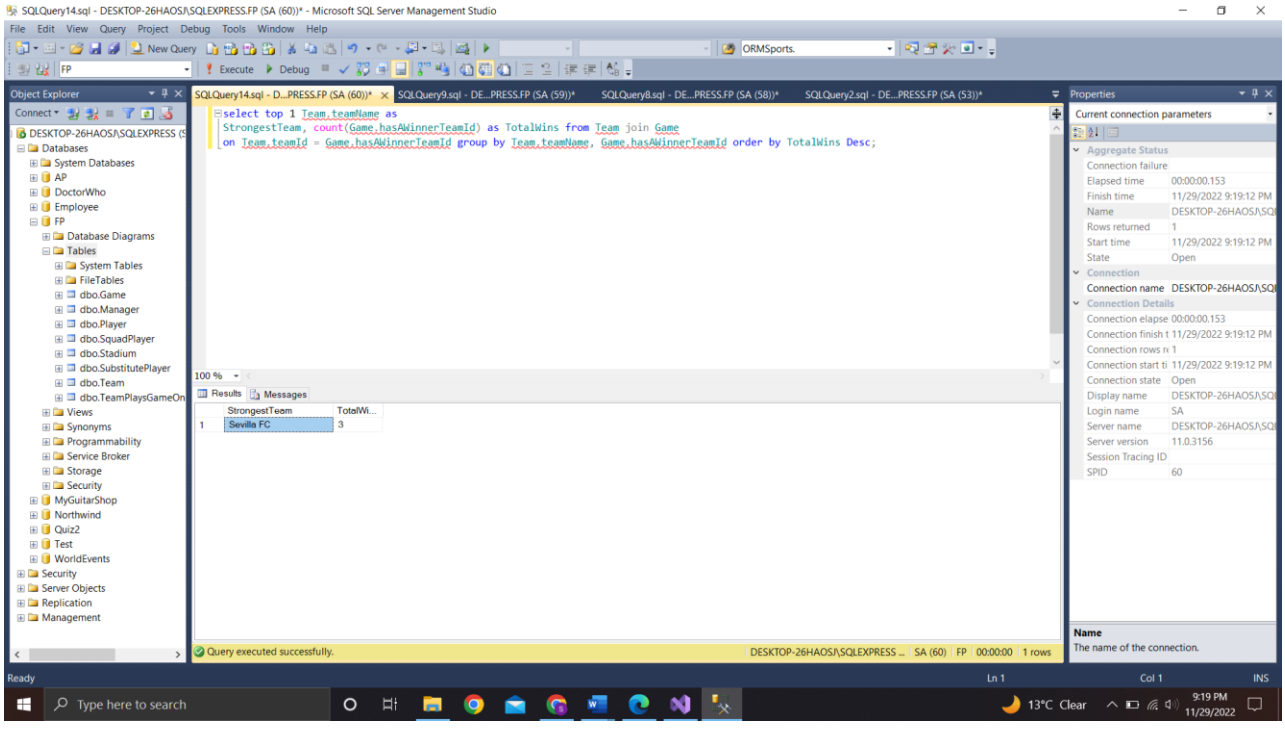


Section 5.1

Queries

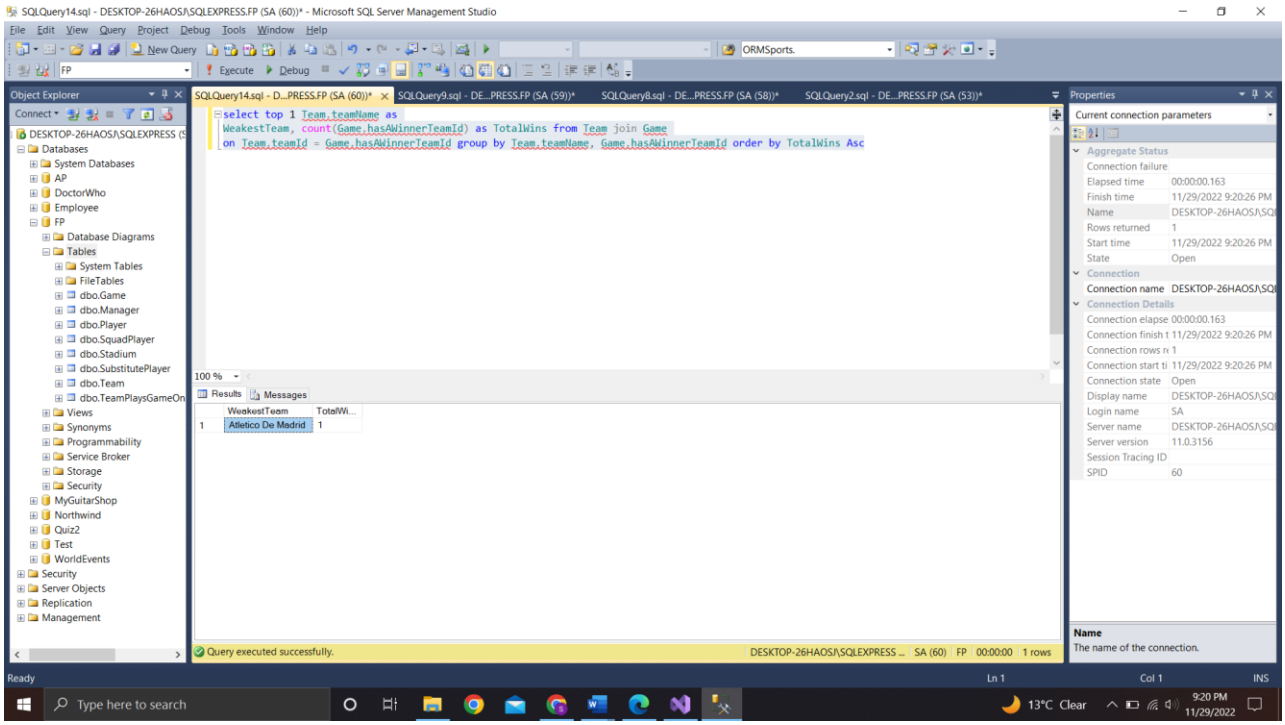
- Which team is the best performing team based on number of wins?

```
select top 1 Team.teamName as
StrongestTeam, count(Game.hasAWinnerTeamId) as TotalWins from Team join Game
on Team.teamId = Game.hasAWinnerTeamId group by Team.teamName,
Game.hasAWinnerTeamId order by TotalWins Desc;
```



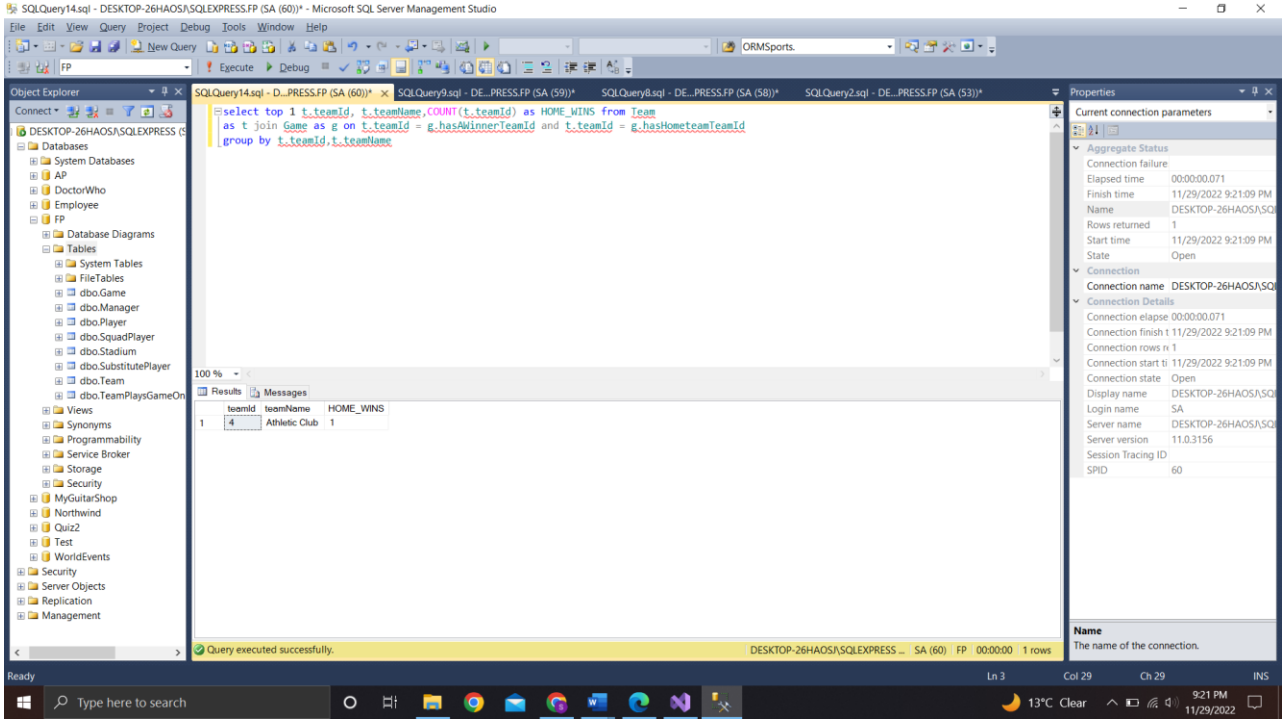
- Which team is the poorly performing team based on number of wins?

```
select top 1 Team.teamName as
WeakestTeam, count(Game.hasAWinnerTeamId) as TotalWins from Team join Game
on Team.teamId = Game.hasAWinnerTeamId group by Team.teamName,
Game.hasAWinnerTeamId order by TotalWins Asc;
```



- Which team has performed the best as a home team?

```
select top 1 t.teamId, t.teamName,COUNT(t.teamId) as HOME_WINS from Team
as t join Game as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasHometeamTeamId
group by t.teamId,t.teamName
```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Tables
System Tables
FileTables
dbo.Game
dbo.Manager
dbo.Player
dbo.SquadPlayer
dbo.Stadium
dbo.SubstitutePlayer
dbo.Team
dbo.TeamPlaysGameOn
Views
Synonyms
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Northwind
Quiz2
Test
WorldEvents
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Server Objects
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SQLQuery8.sql - DE...PRESS.FP (SA (58))*
SQLQuery2.sql - DE...PRESS.FP (SA (53))*
select top 1 t.teamId, t.teamName,COUNT(t.teamId) as HOME_WINS from Team
as t join Game as g on t.teamId = g.hasAWinnerTeamId and t.teamId = g.hasHometeamTeamId
group by t.teamId,t.teamName
100 %
Results
Messages
teamId
teamName
HOME_WINS
1
4
Athletic Club
1
Query executed successfully.
DESKTOP-26HAOSJ\SQLEXPRESS ...
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00:00:00
1 rows
Properties
Current connection parameters
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Elapsed time 00:00:00.071
Finish time 11/29/2022 9:21:09 PM
Name
Rows returned 1
Start time 11/29/2022 9:21:09 PM
State Open
Connection
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Connection finish t 11/29/2022 9:21:09 PM
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Connection start ti 11/29/2022 9:21:09 PM
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Login name SA
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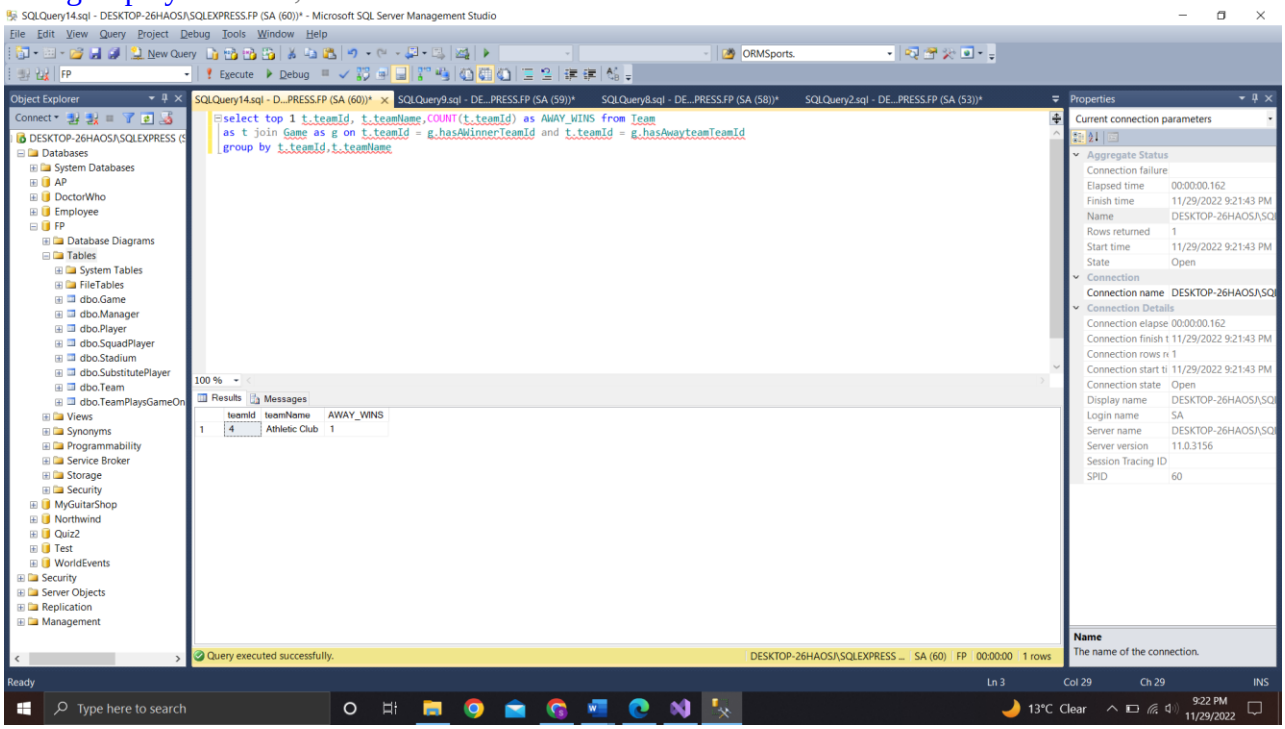
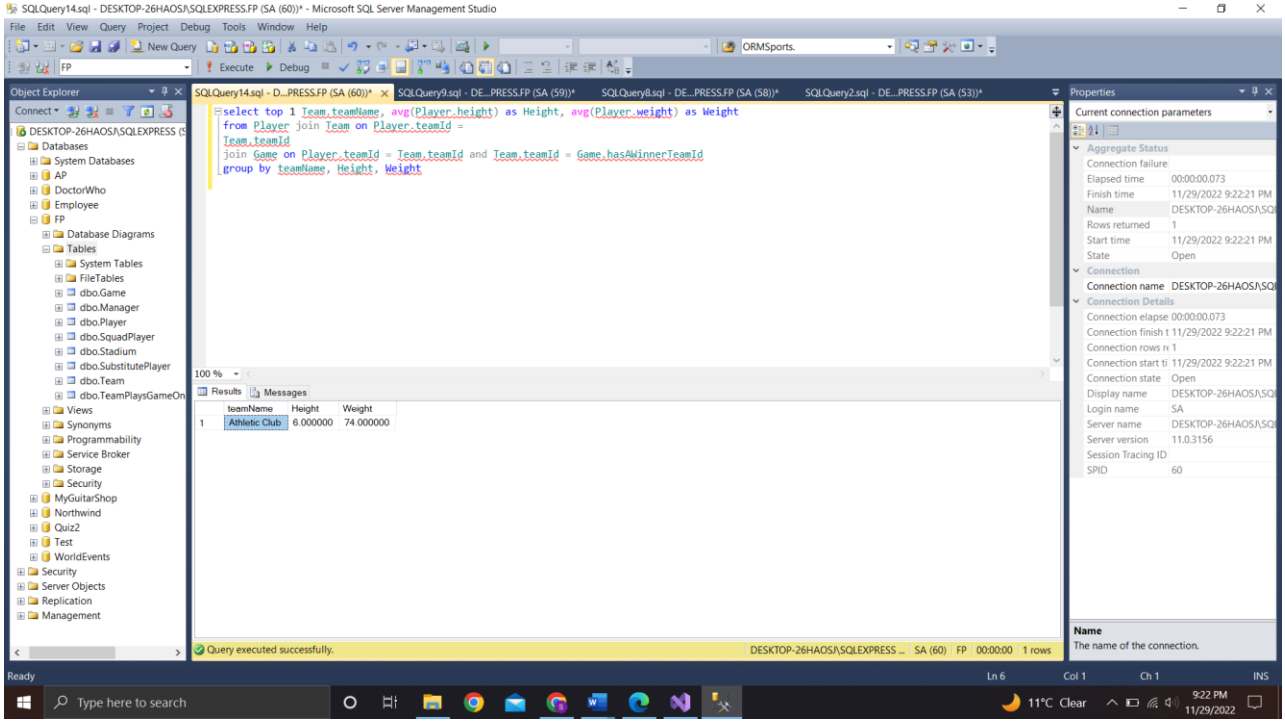
- Considering the away performances of teams, which team is the best?

```
select top 1 t.teamId, t.teamName,COUNT(t.teamId) as AWAY_WINS from Team
as t join Game as g on t.teamId = g.hasAWinnerTeamId and t.teamId =
g.hasAwayteamTeamId
group by t.teamId,t.teamName
```



- For a strongest team based on the number of wins, what is the average height and weight of the team players?

```
select top 1 Team.teamName, avg(Player.height) as Height, avg(Player.weight) as Weight
from Player join Team on Player.teamId =
Team.teamId
join Game on Player.teamId = Team.teamId and Team.teamId = Game.hasAWinnerTeamId
group by teamName, Height, Weight
```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dbo.Player
dbo.SquadPlayer
dbo.Stadium
dbo.SubstitutePlayer
dbo.Team
dbo.TeamPlaysGameOn
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SQLQuery8.sql - DE...PRESS.FP (SA (58))*
SQLQuery2.sql - DE...PRESS.FP (SA (53))*
select top 1 Team.teamName, avg(Player.height) as Height, avg(Player.weight) as Weight
from Player join Team on Player.teamId =
Team.teamId
join Game on Player.teamId = Team.teamId and Team.teamId = Game.hasAWinnerTeamId
group by teamName, Height, Weight
100 %
Results
Messages
teamName Height Weight
1 Athletic Club 6.000000 74.000000
Query executed successfully.
DESKTOP-26HAOSJ\SQLEXPRESS ... SA (60) FP 00:00:00 1 rows
Properties
Current connection parameters
Aggregate Status
Connection failure
Elapsed time 00:00:00.073
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Rows returned 1
Start time 11/29/2022 9:22:21 PM
State Open
Connection
Connection name DESKTOP-26HAOSJ\SQ
Connection Details
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Connection rows re 1
Connection start ti 11/29/2022 9:22:21 PM
Connection state Open
Display name DESKTOP-26HAOSJ\SQ
Login name SA
Server name DESKTOP-26HAOSJ\SQ
Server version 11.0.3156
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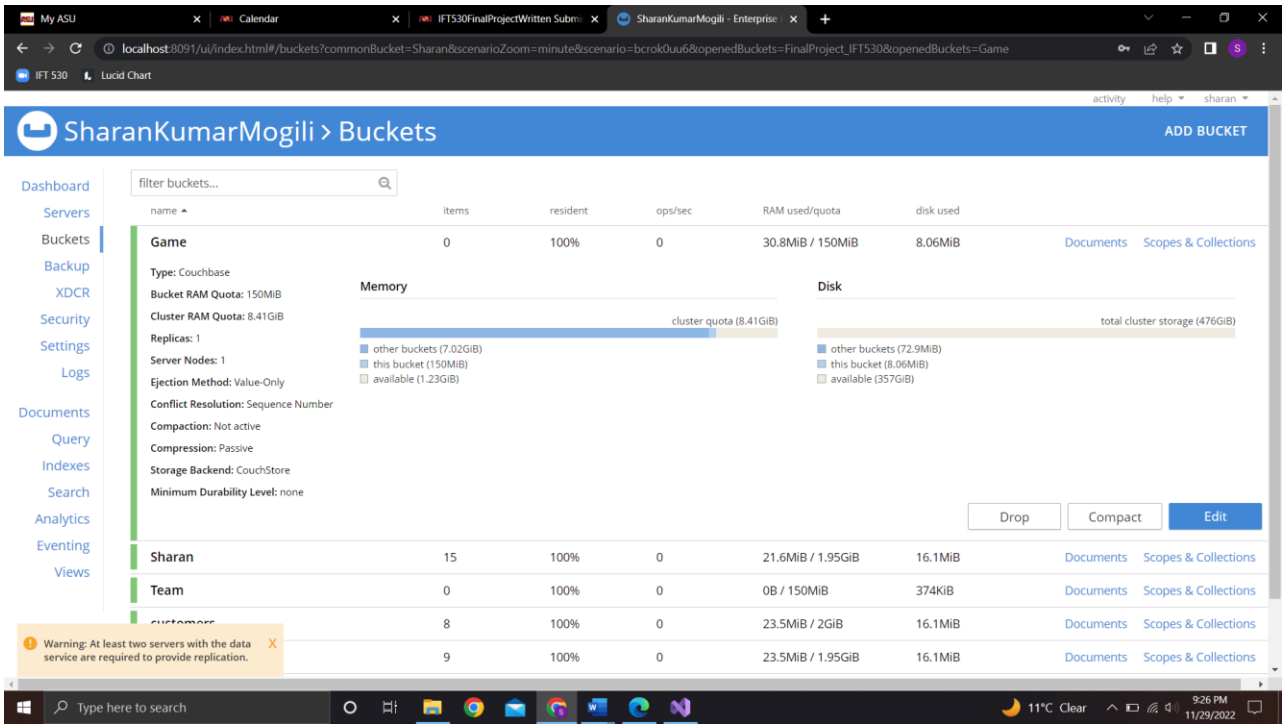
Section 6 - Couchbase (NoSQL)

Introduction:

We have two buckets named Game and Team in the NoSQL database. The Game bucket maintains all information about the game such as the date it was played on, the season, the stadium ID, team IDs of the teams that played as home and away teams and the winning team ID. The Team bucket contains information such as the team Id, Name of the team, its home stadium (Id), and team players. In the instance of nested structures, we employed NoSQL to simplify queries and eliminate several table joins. The player names in the Team bucket are from the Player table and we used nested structures while loading the Team bucket in order to access the data. This is a highly helpful feature of NoSQL since it allows us to have nested structures that eliminate the needfor separate tables and allows data to be stored in the same bucket as a subset of it.

Buckets:

Game Bucket:



JSON Document:

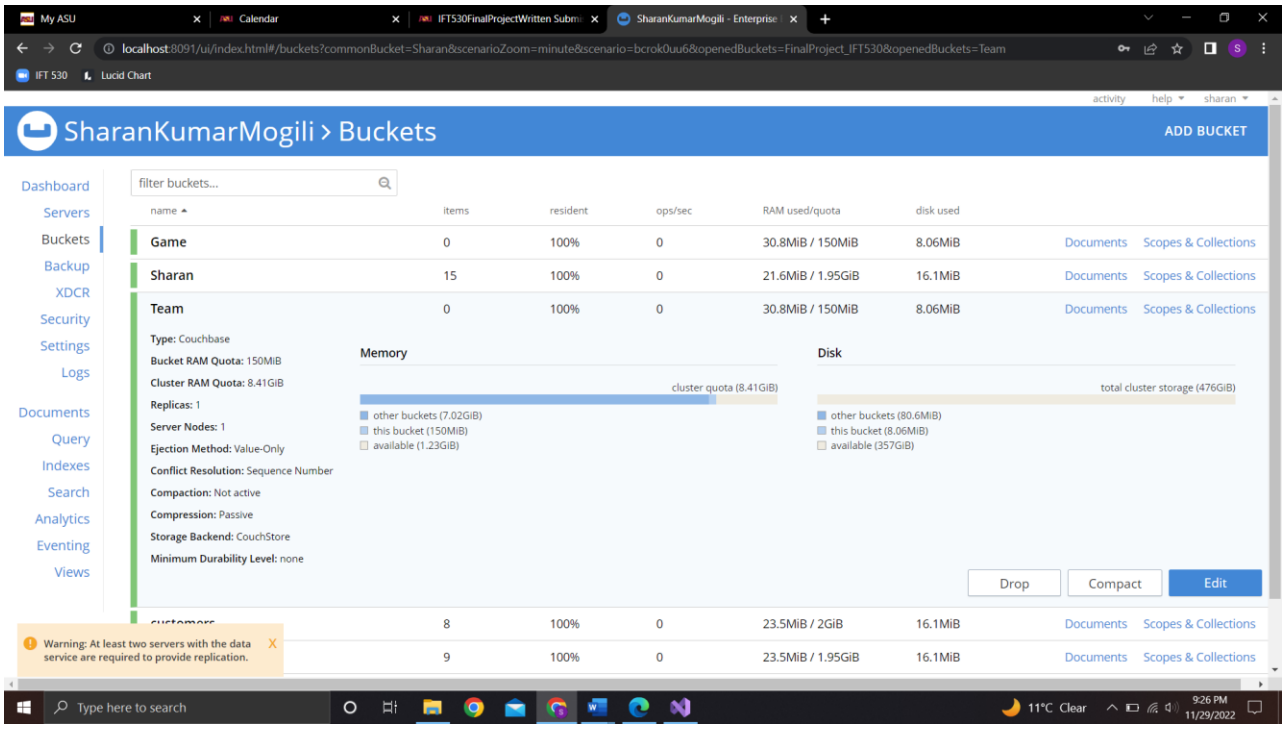
insert into Game (key, value) values ("1",
{ "gameId": "1",
"date": "2021-01-01",

"season": "2021",
"stadiumId": "2",
"hasHometeamTeamId": "2",
"hasAwayteamTeamId": "2",
"hasAWinnerteamId" : "2"
}),("2",
{ "gameId": "2",
"date": "2021-01-15",
"season": "2021",
"stadiumId": "3",
"hasHometeamTeamId": "3",
"hasAwayteamTeamId": "4",
"hasAWinnerteamId" : "4"
}),("3",
{ "gameId": "3",
"date": "2021-01-30",
"season": "2021",
"stadiumId": "6",
"hasHometeamTeamId": "6",
"hasAwayteamTeamId": "5",
"hasAWinnerteamId" : "6"
}),("4",
{ "gameId": "4",
"date": "2021-02-01",
"season": "2021",
"stadiumId": "2",
"hasHometeamTeamId": "2",
"hasAwayteamTeamId": "4",
"hasAWinnerteamId" : "2"
}),("5",
{ "gameId": "5",
"date": "2021-02-15",
"season": "2021",
"stadiumId": "4",
"hasHometeamTeamId": "4",
"hasAwayteamTeamId": "6",
"hasAWinnerteamId" : "4"
}),("6",
{ "gameId": "6",
"date": "2021-02-28",
"season": "2021",

"stadiumId": "6",
"hasHometeamTeamId": "6",

"hasAwayteamTeamId": "2" ,
"hasAWinnerteamId" : "2"
})

Team Bucket:



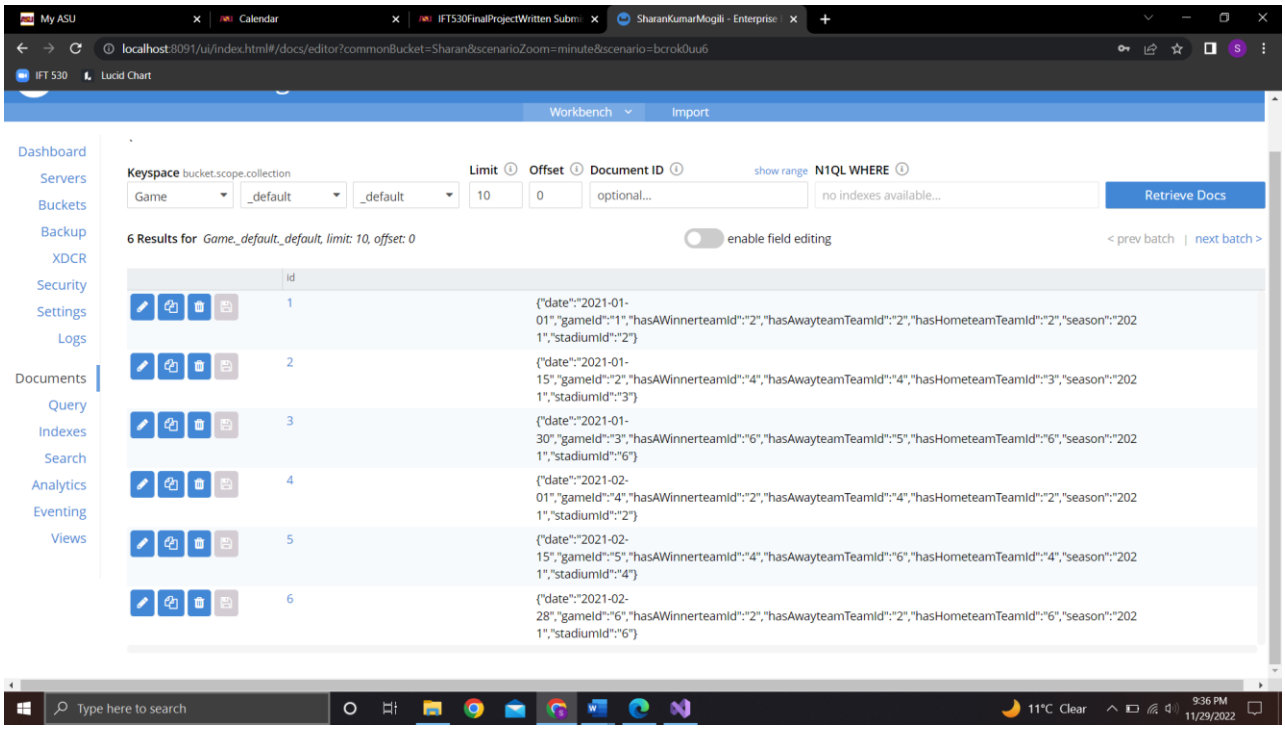
JSON Document:

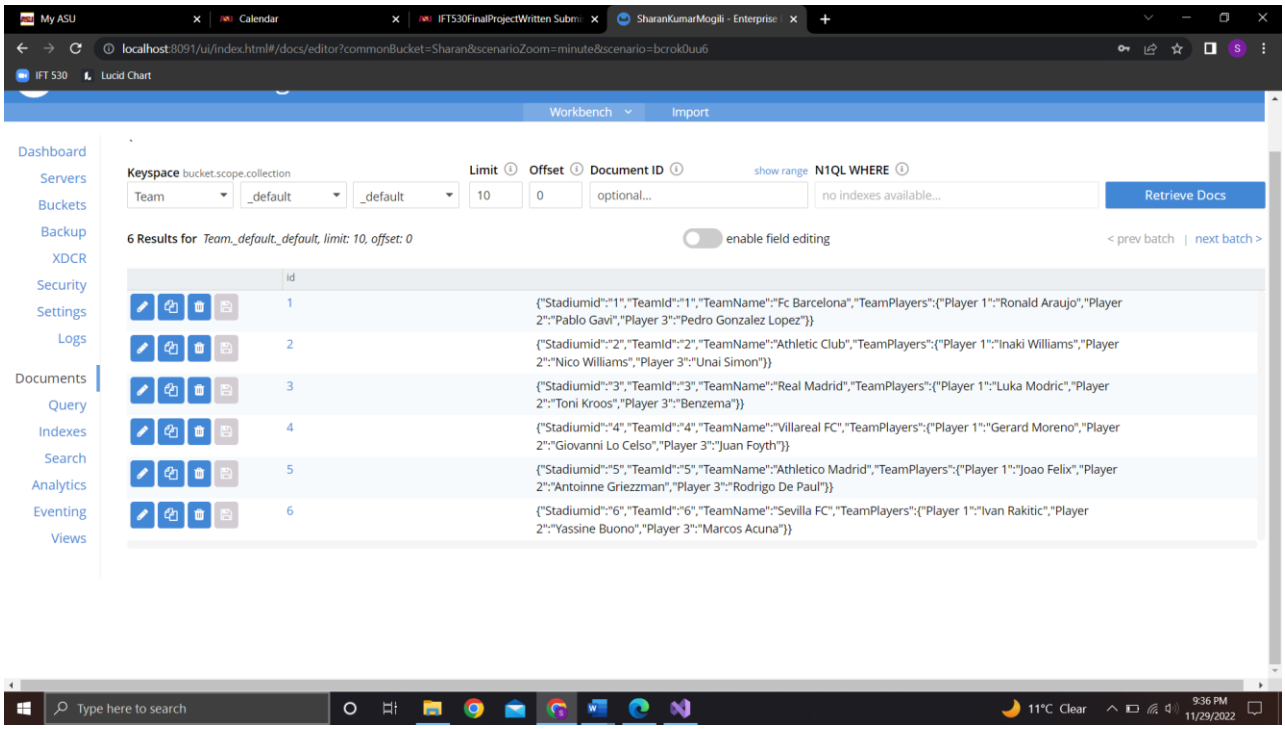
insert into Team (key, value) values ("1",
{ "TeamId":"1",
"TeamName":"Fc Barcelona", "Stadiumid" : "1",
"TeamPlayers": { "Player 1":"Ronald Araujo","Player 2":"Pablo Gavi","Player 3":"Pedro Gonzalez Lopez"}
}), ("2",
{ "TeamId":"2",
"TeamName":"Athletic Club", "Stadiumid" : "2",
"TeamPlayers": { "Player 1":"Inaki Williams","Player 2":"Nico Williams","Player 3":"Unai Simon"}
}),("3",
{ "TeamId":"3",
"TeamName":"Real Madrid", "Stadiumid" : "3",
"TeamPlayers": { "Player 1":"Luka Modric","Player 2":"Toni Kroos","Player 3":"Benzema"}
}),("4",
{ "TeamId":"4",

"TeamName":"Villareal FC", "Stadiumid" : "4",
"TeamPlayers": { "Player 1":"Gerard Moreno","Player 2":"Giovanni Lo Celso","Player 3":"Juan Foyth"}

}),("5",
{ "TeamId":"5",
"TeamName":"Athletico Madrid", "Stadiumid" : "5",
"TeamPlayers": { "Player 1":"Joao Felix","Player 2":"Antoinne Griezzman","Player 3":"Rodrigo De Paul"}
}),("6",
{ "TeamId":"6",
"TeamName":"Sevilla FC", "Stadiumid" : "6",
"TeamPlayers": { "Player 1":"Ivan Rakitic","Player 2":"Yassine Buono","Player 3":"Marcos Acuna"}
})

Documents in bucket

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IFT 530
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Workbench
Import
Dashboard
Servers
Buckets
Backup
XDCR
Security
Settings
Logs
Documents
Query
Indexes
Search
Analytics
Eventing
Views
Keyspace bucket.scope.collection
Team
_default
_default
Limit
10
Offset
0
Document ID
optional...
show range
N1QL WHERE
no indexes available...
Retrieve Docs
6 Results for Team._default._default, limit: 10, offset: 0
enable field editing
< prev batch | next batch >
id
1 {"Stadiumid":"1","TeamId":"1","TeamName":"Fc Barcelona","TeamPlayers":{"Player 1":"Ronald Araujo","Player 2":"Pablo Gavi","Player 3":"Pedro Gonzalez Lopez"}}
2 {"Stadiumid":"2","TeamId":"2","TeamName":"Athletic Club","TeamPlayers":{"Player 1":"Inaki Williams","Player 2":"Nico Williams","Player 3":"Unai Simon"}}
3 {"Stadiumid":"3","TeamId":"3","TeamName":"Real Madrid","TeamPlayers":{"Player 1":"Luka Modric","Player 2":"Toni Kroos","Player 3":"Benzema"}}
4 {"Stadiumid":"4","TeamId":"4","TeamName":"Villareal FC","TeamPlayers":{"Player 1":"Gerard Moreno","Player 2":"Giovanni Lo Celso","Player 3":"Juan Foyth"}}
5 {"Stadiumid":"5","TeamId":"5","TeamName":"Athletico Madrid","TeamPlayers":{"Player 1":"Joao Felix","Player 2":"Antoinne Griezzman","Player 3":"Rodrigo De Paul"}}
6 {"Stadiumid":"6","TeamId":"6","TeamName":"Sevilla FC","TeamPlayers":{"Player 1":"Ivan Rakitic","Player 2":"Yassine Buono","Player 3":"Marcos Acuna"}}
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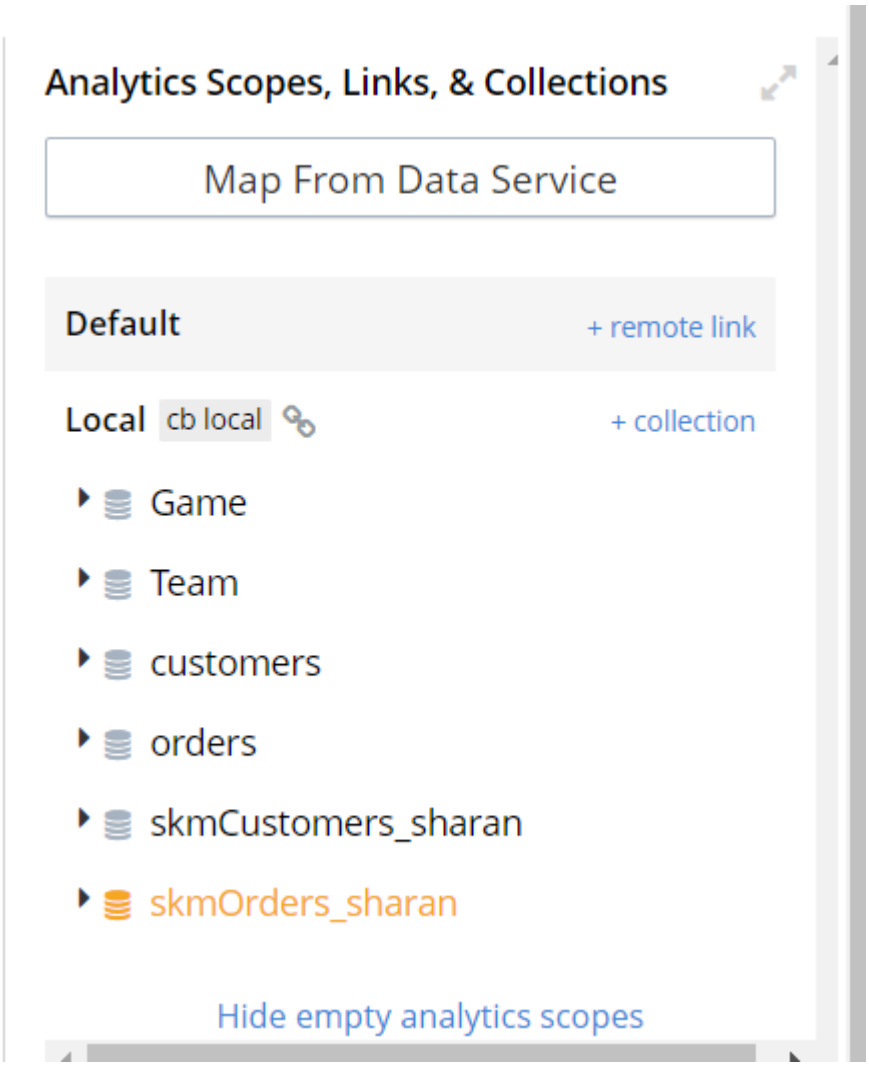
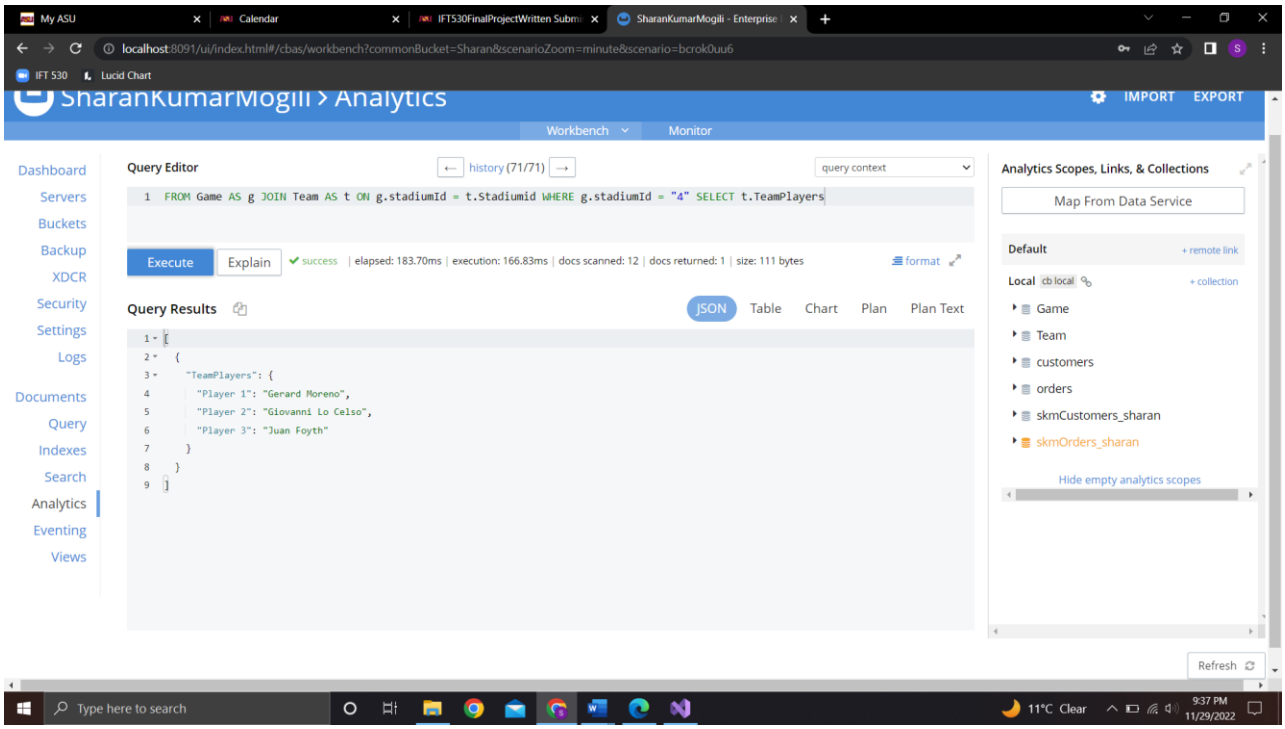
Analytics Service



Queries

1. Query to find out the player names who belongs to a certain team played in a particular stadium.

```
FROM Game AS g JOIN Team AS t
ON g.stadiumId = t.Stadiumid
WHERE g.stadiumId = "4"
SELECT t.TeamPlayers
```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Lucid Chart
SharanKumarMogili > Analytics
IMPORT
EXPORT
Workbench
Monitor
Dashboard
Servers
Buckets
Backup
XDCR
Security
Settings
Logs
Documents
Query
Indexes
Search
Analytics
Eventing
Views
Query Editor
history (71/71)
query context
1 FROM Game AS g JOIN Team AS t ON g.stadiumId = t.Stadiumid WHERE g.stadiumId = "4" SELECT t.TeamPlayers
Execute
Explain
success | elapsed: 183.70ms | execution: 166.83ms | docs scanned: 12 | docs returned: 1 | size: 111 bytes
format
Query Results
JSON
Table
Chart
Plan
Plan Text
[
{
"TeamPlayers": {
"Player 1": "Gerard Moreno",
"Player 2": "Giovanni Lo Celso",
"Player 3": "Juan Foyth"
}
}
]
Analytics Scopes, Links, & Collections
Map From Data Service
Default
+ remote link
Local
cb local
+ collection
Game
Team
customers
orders
skmCustomers_sharan
skmOrders_sharan
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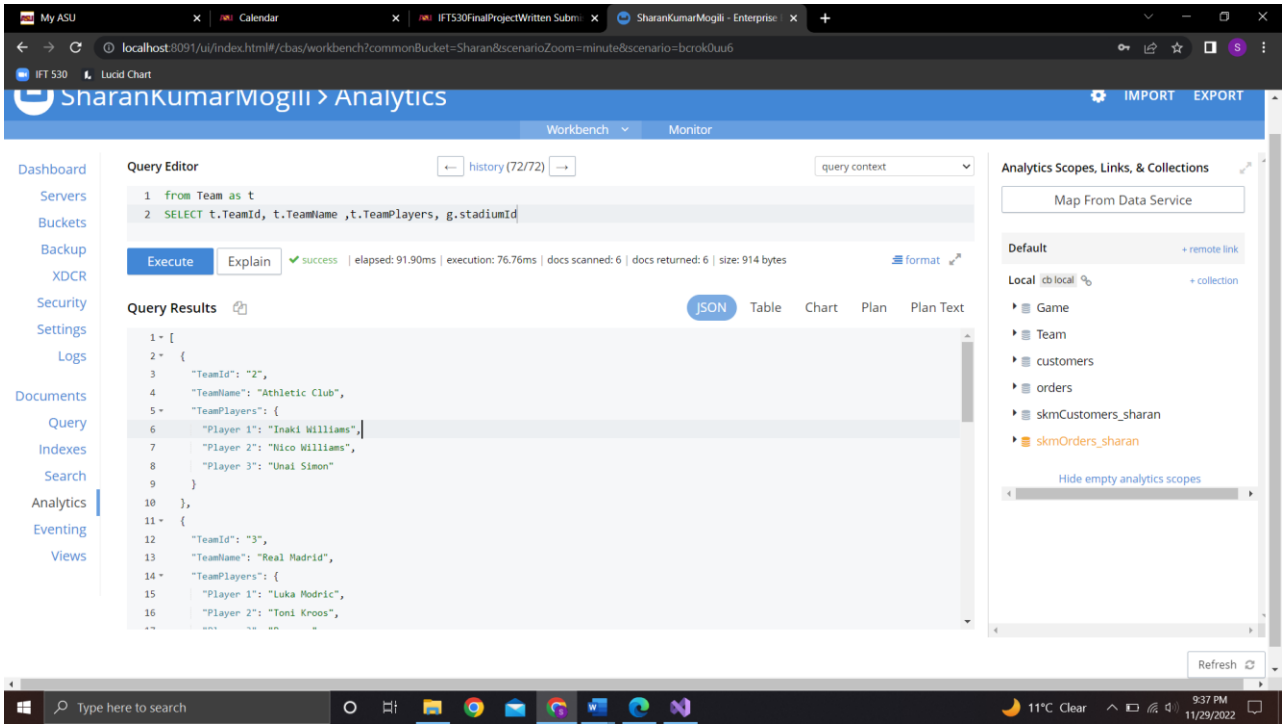
2. Query to find out all the names of players in all the teams

   from Team as t
   SELECT t.TeamId, t.TeamName ,t.TeamPlayers, g.stadiumId



Section 7

Summary

We were able to obtain some useful analytics after properly constructing the ORM Diagram, Tables, and Stored Procedures. Using the number of wins each team has had in past games, we can predict who is likely to win in the future games and who is highly unlikely to win.

Based on the performance of the teams against each other in prior matches, we may also estimate which side will win in a given game. This provides insight into how teams should prepare for upcoming matchups as well as the flaws they face. We've also been able to anticipate whether a team will do better at home or away. This prediction will assist us in determining whether any team will have a home-field advantage. This will help the other team, allowing them to plan properly.

We also attempted to determine what characteristics of a player contribute to a good player and a strong team. This will aid in team building and determining a number for the sought-after player.

The tables containing the appropriate data in relational database management systems are related to one another, so the required data is fetched from the preceding tables, avoiding data redundancy.

Data access is privileged, which means the database administrator has the authority to provide data access to specific personnel, ensuring the data's security. However, the database uses tables with rows and columns, which necessitate a lot of physical capacity, which is one of the database's drawbacks.

To underscore its capacity to manage massive amounts of rapidly changing, unstructured data in ways that a relational (SQL) database with rows and tables cannot, NoSQL databases are frequently referred to as ‘non-relational’, ‘NoSQL DBs’, or ‘non- SQL’.

Because of its JSON structure, which allows us to have layered structures, NoSQL has helped us evaluate data quickly. We've used this functionality to collect information about players who were

part of a team in a specific game. CouchDB is a trustworthy and dependable NoSQL community member. CouchDB takes a truly decentralized approach to data storage, based on theassumption that networks are inherently unstable, and that hardware failure is inevitable.

CouchDB, which is small enough to fit in your pocket but powerful enough to run a business, supports a wide range of deployment options. These non-relational, or table-less, NoSQL databases differ from SQL databases in that they are not relational. They make management easier while keeping a high level of responsiveness to new data in this way.

NoSQL has gained popularity as a result of its increased elasticity and scalability over previous types of databases. It was designed to work in a variety of settings, including low-cost hardware.

Despite the fact that NoSQL has expanded at a great pace, due to the technology's newness, community support is limited. It doesn't have a common platform, like SQL, which makes it difficult to propagate. During migration, this was a source of concern. The database industry can only come together through standardization. Interface and interoperability are another difficulty that NoSQL faces, and they need to be addressed as soon as possible.

Conclusion

Even though much has been analyzed and evaluated, this data exploration has resulted in a slew of new questions, the answers to which can be sought after further investigation. We can currently predict which team will win, but perhaps with new data and more information, we can try to determine what factors are facilitating the win and what advantage is assisting them. It could be the location, the performance of the players, or the overall strategy of the team. We can also use our analysis to determine what the best aspect of each team and player is that contributesto their success. We may also try to figure out how we can help a weaker team improve their strategy by identifying their weak points.

Because the NoSQL structure eliminates the need for tables and table joins, there is a lot of room

to improve our analysis. This allows us to have attributes and sub-attributes in a nested structure, allowing us to include any related features in the future for our analysis without having to touch our SQL database model.

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